COMPUTER SOFTWARE APPLICATION

TRADE PRACTICAL NSQF LEVEL - 4

VOLUME - 1

HANDBOOK FOR CRAFTS INSTRUCTOR TRAINING SCHEME



DIRECTORATE GENERAL OF TRAINING MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP GOVERNMENT OF INDIA



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A Comprehensive Training Program under Crafts Instructor Training Scheme (CITS) for Instructors

HANDBOOK ON TECHNICAL INSTRUCTOR TRAINING MODULES



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अतुल कुमार तिवारी, I.A.S. सचिव

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भारत सरकार कौशल विकास एवं उद्यमिता मंत्रालय GOVERNMENT OF INDIA MINISTRY OF SKILL DEVELOPMENT AND ENTREPRENEURSHIP



Foreword

In today's rapidly evolving world, the role of skilled craftsmen and women is more crucial than ever. The Craft Instructor Training Scheme (CITS) stands at the forefront of this transformation, shaping the educators who will train the next generation of artisans and technicians. This book aims to provide an in-depth understanding of the subject, exploring its significance, methodologies, and impact on vocational training.

The Craft Instructor Training Scheme was established with the objective of enhancing the quality of instruction in industrial training institutes and other vocational training institutions. By equipping instructors with advanced skills and knowledge, the scheme ensures that they are well-prepared to impart high-quality training to their students. This, in turn, contributes to the creation of a highly skilled workforce capable of meeting the demands of modern industry.

The initial chapters provide the importance of specialized instructor training. Following this, detailed chapters delve into the curriculum covering advanced techniques, safety protocols, and instructional strategies. Each section is designed to offer both theoretical insights and practical applications, ensuring a well-rounded understanding of the subject.

The book offers recommendations for overcoming obstacles and enhancing the effectiveness of the program, with the ultimate goal of producing highly skilled instructors capable of shaping the future workforce.

This book is intended for a diverse audience, including current and aspiring instructors, vocational training administrators, policymakers, and industry stakeholders. It serves as a valuable resource for understanding the intricacies of the subject and its pivotal role in vocational education.

I extend my heartfelt gratitude to all contributors who have shared their experiences and expertise, enriching this book with their valuable insights. Special thanks to the contribution of the development team, reviewers and NIMI that have supported this endeavor, providing essential data and resources.

It is my sincere hope that this book will inspire and guide readers in their efforts to enhance vocational training, ultimately contributing to the development of a skilled and competent workforce.

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ATUL KUMAR TIWARI, I.A.S. Secretary, MSDE



त्रिशलजीत सेठी महानिदेशक Trishaljit Sethi, IPos Director General



भारत सरकार कौशल विकास एवं उद्यमशीलता मंत्रालय प्रशिक्षण महानिदेशालय GOVERNMENT OF INDIA MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP DIRECTORATE GENERAL OF TRAINING

FOREWORD

The Craftsmen Training Scheme (CTS) implemented by the Directorate General of Training (DGT) provides skill training to the youth and ensures a steady flow of skilled manpower for the industry. It aims to raise quantitatively and qualitatively the industrial production by systematic training, and to reduce unemployment among the youth by providing them with employable skills.

The Craft Instructor Training Scheme (CITS) is an indispensable part of the Craftsmen Training Scheme (CTS). It offers comprehensive training both in 'skills' and in 'training methodology' to the instructor trainees to make them conversant with techniques of transferring hands-on skills.

I congratulate NIMI for taking the initiative of preparation of the course content for CITS. This will help institutionalize the mechanism for imparting training to the trainers all across the ecosystem. I also extend my gratitude to the Instructors and Officials of National Skill Training Institutes (NSTIs) and the DGT for their invaluable contribution in preparation of the CITS course content.

As we navigate the complexities of a rapidly changing world and the technological disruptions, the significance of CTS and CITS has increased manifold. It not only empowers individuals with practical skills but also lays the foundation for a prosperous future. I am confident that this book will serve as a guiding light to all instructor trainees for skill development and nation-building.

Techolalit (Trishaljit Sethi)



PREFACE-

The Craft Instructor Training Scheme is an indispensable module of the Craftsmen Training Scheme, which has been an integral part of the Indian skill development industry since its inception. This program aims to equip instructors with the necessary skills and teaching methodology to effectively transfer hands-on skills to trainees and promote a holistic learning experience. The first Craft Instructor Training Institute was established in 1948, followed by six more institutes across India in 1960. Today, these institutes, including the National Skill Training Institute (formerly Central Training Institute for Instructors), offer the CITS course, which is mandated by the Directorate General of Training (DGT).

The Craft Instructor training program is designed to develop skilled manpower for industries. The course aims to offer instructors an opportunity to improve their instructional skills, engage learners effectively, offer impactful mentoring, and make efficient use of resources, leading to a more skilled workforce in various industries. The program emphasizes collaborative and innovative approaches to teaching, resulting in high-quality course delivery. Overall, the Craft Instructor Training Scheme is a pivotal program that helps instructors grow in their careers and make a significant contribution to society. This program is essential for developing skilled manpower and promoting a robust learning environment that benefits both trainees and instructors alike.

ACKNOWLEDGEMENT -

National Instructional Media Institute (NIMI) sincerely acknowledges with thanks for the co-operation and contribution extended by the following experts to bring out this Instructional material (Trade Practical) for CITS Computer Software Application (Volume - I of II) (NSQF Level - 4) under the IT & ITES Sector for Instructors.

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NIMI records its appreciation of the Data Entry, CAD, DTP Operators for their excellent and devoted services in the process of development of this Instructional Material.

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NIMI is grateful to all others who have directly or indirectly helped in developing this IMP.

ABOUT THE TEXT BOOK

The Vocational Instructor Training Program is a comprehensive initiative designed to equip aspiring students with the necessary skills and knowledge to effectively teach in vocational education settings. This program encompasses a range of pedagogical strategies, instructional techniques, and subject-specific content tailored to the diverse vocational fields. Participants engage in coursework that covers curriculum development, assessment methods, classroom management, and the integration of industry-relevant technologies. Practical experience and hands-on training are emphasized, allowing participants to apply theoretical concepts in realworld teaching environments. Through collaborative learning experiences and mentorship opportunities, aspiring vocational instructors develop the confidence and competence to facilitate engaging and impactful learning experiences for their students. This training program aims to cultivate a new generation of educators who are not only proficient in their respective vocational fields but also adept at fostering the success and employability of their students in today's competitive workforce.

This text book covers communication, self-management, information and communication .as b technology, entrepreneurial and green skills. It has been developed as per the learning outcome-based curriculum.

G C Rama Murthy, Joint Director, Curriculum Development, DGT, MSDE, New Delhi.



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Module 1 : Network Architecture 🔶

EXERCISE 1 : Straight cabling and cross cabling

Objectives

At the end of this exercise you shall be able to

- · crimp a straight through ethernet cable
- crimp a crossover through ethernet cable.

Requirements

Tools/Materials

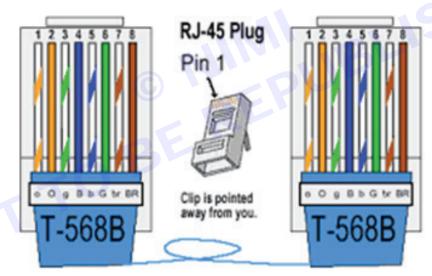
- Ethernet cable
- RJ 45 connector
- Crimping tool

Procedure

- Wire stripper/cutter
- LAN Tester
- PCs/Laptops

TASK 1: Crimping a straight through ethernet cable

Straight through ethernet cables are the standard cable used for almost all purposes, and are often called "patch cables". It is highly recommend you duplicate the color order as shown on the below.



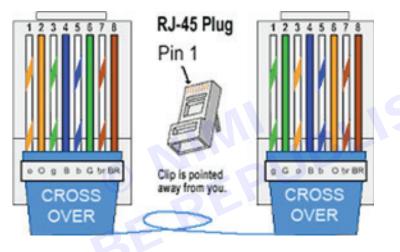
- 1 Take the Cat6 Cable of 1 meter.
- 2 Strip 1 to 2 inches (2.5 to 5.1 cm) of the outer skin at the end of the cable wire by making a shallow cut in the skin with a crimping Tool.
- 3 Unwind and pair the similar colours.
- 4 Fold each pair of wires backwards to expose the core of the cable.
- 5 Straighten the twisted wires.
- 6 Arrange the untwisted wires in a row, placing them into the position, running from right to left, in which they will go into the RJ-45 connector:
 - a Orange with a white stripe
 - b Orange
 - c Green with a white stripe
 - d Blue



- e Blue with a white stripe
- f Green
- g Brown with a white stripe
- h Brown
- 7 Trim the untwisted wires to a suitable length by holding the RJ-45 connector next to the wires.
- 8 Insert the wires into the RJ-45 connector, making sure that they stay aligned and each color goes into its appropriate channel.
- 9 Use the crimping tool to crimp the RJ-45 connector to the cable by pressing the jacket and cable into the connector so that the wedge at the bottom of the connector is pressed into the jacket.
- 10 Follow the instructions above to crimp an RJ-45 connector to the opposite end of the cable.
- 11 Use a cable tester to assure that your cable is working properly when both ends are crimped.

TASK 2: Crimping a Crossover Through Ethernet Cable

Crossover cables - The purpose of a Crossover Ethernet cable is to directly connect one computer to another computer (or device) without going through a router, switch or hub.



- 1 Crimp one end following the steps in Task 1
- 2 For the next end Follow the similar steps for preparation and then
- 3 Arrange the untwisted wires in a row, placing them into the position, running from right to left, in which they will go into the RJ-45 connector:
 - a Green with a white stripe
 - b Green
 - c Orange with a white strip
 - d Blue
 - e Blue with a white strip
 - f Orange
 - g Brown with a white strip
 - h Brown
- 4 Trim the untwisted wires to a suitable length by holding the RJ-45 connector next to the wires.
- 5 Insert the wires into the RJ-45 connector, making sure that they stay aligned and each color goes into its appropriate channel.
- 6 Use the crimping tool to crimp the RJ-45 connector to the cable by pressing the jacket and cable into the connector so that the wedge at the bottom of the connector is pressed into the jacket.
- 7 Use a cable tester to assure that your cable is working properly when both ends are crimped.



EXERCISE 2 : Switch Configuration

Objectives

At the end of this exercise you shall be able to

- use cisco packet tracee application
- configure a switch by using cisco packet tracer.

Requirements

Tools/Materials

- PC/Laptop
- Cisco pocket tracee software

Procedure

TASK 1: Configure the Switch

Step 1: Open the packet tracer desktop and take a switch (PT-Switch) from the devices.

Step 2: Configure the Host name of the swicth0.

- Click on switch0 and go to Command Line Interface.
- Then change the hostname to "sh"

Command:

switch>

switch>en

switch#conf t

switch(config)#hostname sh

sh(config)exit

Step 3: Set a message of the day (MOTD) banner for the users.

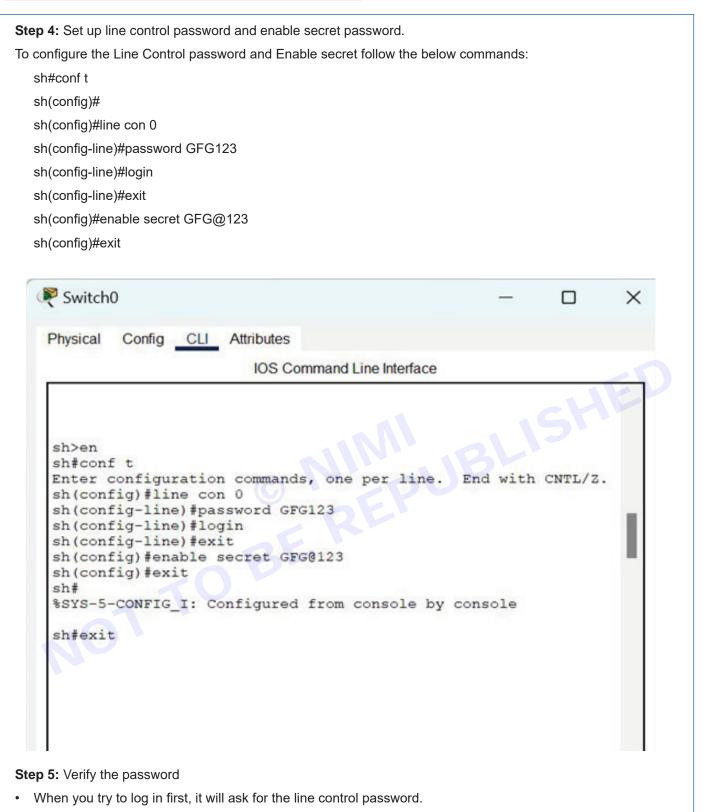
Command:

sh(config)#banner motd \$

• Then, enter MOTD and end it with '\$' to exit.

Ref Switch0					×
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• Then, to configure the terminal it will ask to enable a secret password.

COMPUTER SOFTWARE APPLICATION - CITS

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EXERCISE 3 : LAN and WAN setup

Objectives

At the end of this exercise you shall be able to

- · create a LAN and check connectivity by between two computer
- · share a file, folder and a printer over a network
- configure a router and set up a WAN.

Requirements

Tools/Materials

- 2 or more PC/Laptop connected to a network
- Printer
- Router

Procedure

Connecting two computers using LAN

TASK 1: Creating a LAN

- 1 Determine whether or not your computers have Ethernet ports.
- 2 Check to see if you have a crossover Ethernet cable.
- 3 Plug one end of the Ethernet cable in to one computer.
- 4 Plug the other end of the Ethernet cable in to the other computer.
- 5 Finish.

TASK 2: Checking the IP address of a given computer

- 1 Open the command prompt. press windows + R and type cmd into the field. Press Enter to open the command prompt.
- 2 Type IP config and press Enter. This will display a list of your network connection information. All of the network connections on your computer will be displayed.
- 3 Find your IP address your active connection may be labelled wireless network connection, Ethernet adapter, or Local Area Connection. It may also be labelled by the manufacturer of your network adapter. Find your active connection and look for ipv4 address.
 - The IP address is four sets of digits, with up tc three digits per set. For example, it might look like 192.168.1.
- 4 Finish.

TASK 3: Check connectivity between two computers

- 1 Open the command prompt. Press windows + R and type cmd into the field. Press Enter to open the command prompt.
- 2 Type the word "ping" Followed by a space and then your IP address at the DOS prompt (e.g.ping 111.22.33.4). Press the "Enter" key once.
- 3 View the result of the ping. If a result of "request timed out" appears, then there is a problem with either the computer or the network. A successful ping will result in a response of "Replay from" followed by the IP address.
- 4 Repeat the above steps in the other computer
- 5 Finish.

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TASK 4: Sharing a File or Folder over a Network

- 1 Switch on the system.
- 2 Open control panel and click network and internet. Click network and sharing Centre.
 - a Click change advanced sharing settings to the left of your network name.
 - b Find the folder you wish to share. Right click on it.
- 3 Select the "share with" option. This will open the sharing submenu. You can choose to share it with everyone in your Home group or select specific people to share it with.
 - a When choosing a Home group option, you can allow other Home group members to both read and write to the folder, or limit them to just read from it.
- 4 Click the specific people option to select which user you want to share with. This will open a new window with a list of all the users that currently have access to the folder. You can add users to this list and give them specific permissions for the folder.
 - a To share the folder with everyone, click the dropdown menu at the top and select everyone. Click the add button.
 - b To share with specific users, click the dropdown menu and select them or type in the name and click add.
- 5 Set permissions for users on the list. Find a user on the list that you want to change the permissions for. Look in the permissions level column, and click the arrow next to the existing permission. Select the new one from the list.
 - a Read user can see, copy, and open files from the folder, but cannot change files or add new ones.
 - b Read/write besides read abilities, users can change files and add new files to the shared folder. Files can be deleted by users with r3ead/write permissions.
 - c Remove- removes permission for this user, and removes them from the list.
- 6 Click the share button. Your permission settings will be saved, and the folder will be available on the network for all allowed users.
- 7 Finish.

TASK 5: Opening a shared file or folder over a network

- 1 Start the computer.
- 2 Make sure you are on the correct network. In order to open a shared folder from a different computer, you must be using the same internet network as the computer which is sharing the file.
- 3 Open start click the windows logo in the bottom-left corner of the screen. The start menu will pop up.
- 4 Open settings click the settings gear in the lower-left corner of the start menu. This will open the settings window.
- 5 Click network and internet. This is in the middle of the settings window.
- 6 Click the network and sharing center. It is a link toward the bottom of the page.
 - a You may need to scroll down to see this link. If you still cannot find the link after scrolling down, click the status tab in the upper left corner of the window and look again.
- 7 Click change advanced sharing settings. This is in the upper-left side of the window. A new window will open.
- 8 Turn on network discovery and file sharing. Check both the turn on network discovery box and the turn on file and printer sharing box.
- 9 Click save changes. It is at the bottom of the window. Doing so saves your settings.
- 10 Open file explorer click the file explorer app icon at the bottom of the screen, or right click the start icon and then click file explorer in the resulting pop-up menu.
 - a You can also press Win+E to open the file explorer.

- 11 Click network. It's is near the bottom of the sidebar that is on the left of the file explorer window.
 - a You may have to scroll down in the file explorer"s left-hand sidebar to see this option.
- 12 Select a computer. Double-click the name of the computer from which the folder you want to open is being shared.
- 13 Select a folder. Double-click the folder you want to open is being shared.
- 14 Enter a username and password if prompted. This will usually be the username and password used to log into the computer which is sharing the folder. Doing so correctly will cause the folder to open.
 - a If a folder isn"t protected, double clicking it will open it immediately.

15 Finish.

TASK 6: Sharing a Printer over a Network

- 1 Switch on the system.
- 2 Click on the Windows start button and navigate to setting, control panel, printers. Right click on the printer to be shared.
- 3 Select "change sharing options" if network and print sharing has not already been enabled. Follow the prompts to allow sharing.
- 4 Check the button next to "share this printer". Enter a share name for the printer. This is the name that other users on the network will see when searching for printers.
 - a Limit the name to 8 letters with no characters or spaces.
- 5 Select "additional drivers" if there are other computers on the network with older Windows operating systems. Follow the promotes to install drivers for these computers.
 - a This will save time since the drivers won"t have to be downloaded and installed separately on the other computers.
- 6 Finish.

TASK 7: Operating a Shared File or Folder over a Network.

- 1 Start the computer.
- 2 Follow the same steps to get to the printers setting on the other computer.
- 3 Right click" add printer" and select "network printer". Allow Windows to search the network for printers.
 - a If the printer isn"t found automatically, select "the printer I want is not listed. Select "browse for printers" and find the computer that attached to the USB printer. Click the plus sign to expand it, and then select the printer.
- 4 Finish

TASK 8: Sharing a Printer over a Network

- 1 Turn on your printer into an electrical outlet if necessary, then press the Printers "Power" button to turn on the printer if it isn"t already on.
- 2 Connect your printer to your network. The process for this varies from printer to printer. Most modern printers can connect your network via WI-FI. Some printers may be able to connect via Ethernet cable, though this requires that they be close enough to the router for Ethernet to be viable.
 - a If your printer is WI-FI capable, you can generally connect it to the network using the built-in menu display. Refer to your printer"s documentation or look up the model online for exact instructions.
 - b Make sure your Wi-Fi printer is close enough to the router to get a solid signal.
- 3 Connect to the printer (Windows). Now that the printer is your network, you can use the Windows "Add a Printer" wizard to automatically install the necessary software on your on your Computer to use it. If you are using OS X, Skip down to the next step.[1]

- a) Click the start menu and select Control Panel. Windows 8 users can press Win and type "Control panel".
- b) Select "Devices and Printers" or "View Devices and Printers".
- c) Click Add a printer at the top of the window.
- d) Select "Add network, Bluetooth printer".
- e) Select your network printer from the list and click Next.
- f) Install the necessary drivers if prompted. Windows should be able to find and install the correct drivers for most printers.
- 4 Printer to the network printer. Once you've added to the printer to the operating system, you can print it just as you would a printer connected directly to your computer. Simply select the printer from the "Print" window of any program.
 - a) Make sure that the printer is turned and that you are connected to the same network. That will save time since the drivers won"t have to be downloaded and installed separately on the other computers.
- 5 Finish.

TASK 9: Setup a WAN

1 Select WAN Connection Type

Choose the appropriate WAN connection type based on your needs.

2 Sign Up with an ISP

Select an ISP and sign up for a WAN connection plan.

3 Install Modem or Router

Install a modem or router provided by your ISP or purchase one separately.

Connect the cables:

- 1 Once you've acquired a wireless router, you'll need to connect it to your existing Internet modem.
- 2 Connect an Ethernet cable from your modem to the wireless router (there is usually a short Ethernet cable included with your wireless router for this purpose).
- 3 Plug in the power cable for the wireless router.
- 4 Wait at least 30 to 60 seconds, and make sure the lights on your router are working correctly.

Configure your router:

- 1 Using your web browser, enter the router's default IP address into the address bar and then press Enter. Your router's instructions should include this information, but some of the most common addresses include 192.168.0.1, 192.168.1.1, and 192.168.2.1.
- 2 The router's sign-in page will appear. Again, the exact sign-in details should be included with your router's instructions, but most routers use a standard user name and password combination, such as admin and password.
- 3 Your router's settings page will appear. Locate and select the Network Name setting, then enter a unique network name.
- 4 Locate and select the Network Password setting, and choose an Encryption option. There are several types of encryption you can use, but we recommend WPA2, which is generally considered to be the most secure.
- 5 Enter your desired password. Make sure to use a strong password to help ensure no one else can access your network.
- 6 Locate and select the Save button to save your settings.

EXERCISE 4 : Setting TCP/IP

Objectives

At the end of this exercise you shall be able to

- assign IP address to a PC
- setup TCP/IP connection

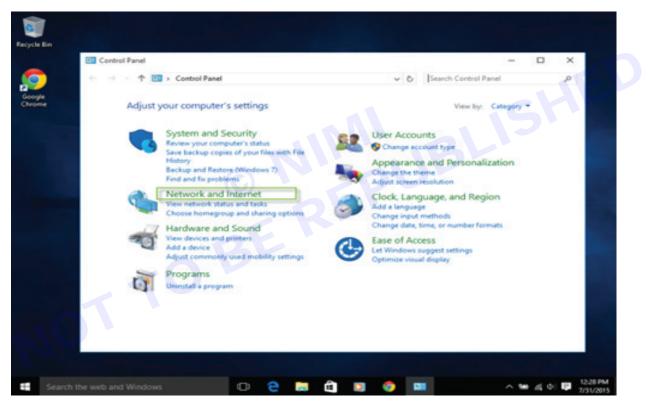
Requirements

Tools/Materials

• Windows PC/Laptop connected to a network

Procedure

1 Select Start, then select Settings > Network & Internet .



- 2 Do one of the following:
 - Choose the network you want to change the settings for, then select Properties.
 - For an Ethernet network, select Ethernet, then select the Ethernet network you're connected to.
- 3 Under IP assignment, select Edit.
- 4 Under Edit IP settings, select Manual.
- 5 To specify IPv4 settings manually
 - i Under Edit IP settings, choose Manual, then turn on IPv4.
 - ii To specify an IP address, in the IP address, Subnet prefix length, and Gateway boxes, type the IP address settings.
 - iii To specify a DNS server address, in the Preferred DNS and Alternate DNS boxes, type the addresses of the primary and secondary DNS servers.



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00	🖕 Local Area Connection Properties 🛛 🔂		00	Constant of		
G v 🗜 + Control Panel + 1	Networking	Search Network Con	nections	٩		
Organize Disable this networ	Connect using:	30	8 · 🗇	0		
Local Area Connection	2 Intel 21140-Based PCI Fast Ethernet Adapter (Emulated)					
Intel 21140-Based PCI Fast	Configure					
	Chert for Microsoft Networks CoS Packet Scheduler CoS Pack					
	Tenenisson Control Protocol/Veternet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks. OK Cancel					

- When you select Automatic (DHCP), the IP address settings and DNS server address setting are set automatically by your router or other access point (recommended).
- When you select Manual, you can manually set your IP address settings and DNS server address.

aeneral	Alternate Configuration	
If this consettings		n one network, enter the alternate IP
OA	utomatic private IP address	
OU	ser configured	
[P a	ddress:	192.168.1.50
Sub	net mask:	255 . 255 . 255 . 0
Defa	ault gateway:	192.168.1.1
Pref	erred DNS server:	192.168.1.11
Alter	nate DNS server:	192.168.1.33
Pref	erred <u>W</u> INS server:	· · · ·
Alter	mate WI <u>N</u> S server:	

6 When you're done, select OK/Save.

EXERCISE 5 : Network Monitoring and Control

Objectives

At the end of this exercise you shall be able to

- install SNMP agent
- configure the SNMP service
- configure RMON.

Requirements

Tools/Materials

- Windows server
- PC/Laptop
- Network connection

Procedure

TASK 1: Install SNMP Agent and configure the community string

- 1 Open the Control Panel on your Windows machine.
- 2 Open the Programs and Features.
- 3 Select Turn Windows features on or off.
- 4 On Windows workstations (Windows 10) select Simple Network Management Protocol (SNMP) and install it.

Windows Features	
Turn Windows features on or off	•
To turn a feature on, select its check box. To turn a feature off, clear box. A filled box means that only part of the feature is turned on.	its check
🕀 🔲 Microsoft Message Queue (MSMQ) Server	^
Microsoft Print to PDF	
MultiPoint Connector	
🗉 🔳 🔄 Print and Document Services	
RAS Connection Manager Administration Kit (CMAK)	
Remote Differential Compression API Support	
RIP Listener	
🗉 🗹 📊 Simple Network Management Protocol (SNMP)	
Simple TCPIP services (i.e. echo, daytime etc)	
SMB 1.0/CIFS File Sharing Support	
Telnet Client	
TFTP Client	
Windows Identity Foundation 3.5	
🕀 🗹 📊 Windows PowerShell 2.0	¥
ОК	Cancel

5 On Windows Server 2016 and above you'll have to click Next in the Add Roles and Features Wizard until you reach the Features sections where you can install the SNMP Service.



III Dashboard	WELCOME TO SERVER MAN	IAGER	
Local Server	<u>6</u>	Add Roles and Features Wizard	_ 0
All Servers	Select features		DESTINATION SERVED NUE-DORU-E1 participation.de
	Before You Begin Installation Type Server Selection	Select one or more features to install on the selected server. Features	Description Simple Network Management
	Server Roles Features Economication	Peer Name Resolution Protocol Quality Windows Audio Video Experience RAS Connection Manager Administration Kit (CMA Remote Assistance	Simple instructs management Protocol (SNMP) Service includes agents that monitor the activity in network devices and report to the network console workstation.
	Invatio	Remote Differential Compression Remote Server Administration Tools (1 of 40 instal RPC over HTTP Proxy	
		Simple TCP/IP Services SM8 1.0/CIPS File Sharing Support (Installed) SM8 Bandwidth Limit	
		SMTP Server Model and Server Telnet Client Telnet Server	
		C BING Server	

6 Install SNMP Service

Note : The system will automatically install SNMP Tools required by the service.

TASK 2: configure the SNMP service

- 1 Run services. msc as administrator.
- 2 Navigate to the Properties of the SNMP service.
- 3 Select Automatic as the Startup type. The service always runs, even after turning your computer off and on again.
- 4 For monitoring purposes, select all of the services on the Agent tab to have all SNMP properties available.
- 5 Click on the Security tab and adjust the security parameters like the community string and the IP/host filter list to your security compliance. For example, add the community string public with READ ONLY rights and accept SNMP packets from at least the address of your monitoring server.

Send authentication tra Accepted community na	38		_
Community	R	ghts	- 1
public	R	EAD ONLY	
Accept SNNP pack 192.0.2.55 ecomple.com yourPTTCeever.com			
Add	Edi	Renove	

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SNMP Service Pro	perties (Loca	I Computer))		\times	
General Log On	Recovery	Agent Trap	s Security	Dependencies		
Internet manage system location, SNMP service.						
Contact: J	ohn Q. Public					
Location: E	xample City					
Service						
Physical	Applica	itions 🗹 [atalink and s	ubnetwork		
🗹 Internet	🗹 End-to-	end				
		ок	Cance	Apply		

TASK 3: Enable RMON on devices

- 1 Access the device's configuration interface.
- 2 Enable RMON functionality on interfaces or VLANs that need to be monitored.
- 3 Specify RMON groups and parameters based on monitoring requirements.

Configure RMON Probes (For RMON2):

- 1 Install RMON2 probe software on devices capable of running probe applications.
- 2 Configure probes to monitor specific network segments or traffic types.

Define RMON Groups and Alarms:

- 1 Determine which RMON groups (Hosts, Matrix, Filters, etc.) are needed for monitoring.
- 2 Configure RMON groups to collect and analyze relevant statistics (e.g., packet counts, errors, protocol distribution).
- 3 Set up alarms and thresholds for triggering notifications or actions based on predefined criteria.

Monitor and Analyze Data:

- 1 Use SNMP management tools or dedicated RMON management software to access and analyze collected data.
- 2 Monitor network performance, identify trends, and troubleshoot issues using RMON statistics and reports.

Fine-Tune Configuration:

- 1 Periodically review RMON configurations and adjust parameters as needed based on network changes or performance requirements.
- 2 Optimize RMON filters and alarms to focus on critical network metrics and reduce unnecessary overhead.



EXERCISE 6 : Wireless Networking Design

Objectives

At the end of this exercise you shall be able to

design a wireless network

Requirements

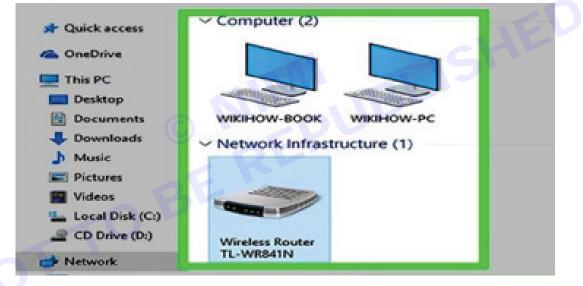
Tools/Materials

- Windows PC/Laptop
- Wireless router

Procedure

TASK 1: Wireless network design

1 When you power on the router, it will only generate its wi-fi network, and the device will be connected to the router's wi-fi connection, not the internet. To connect the router to the internet need a MAC address to the internet service provider's website.

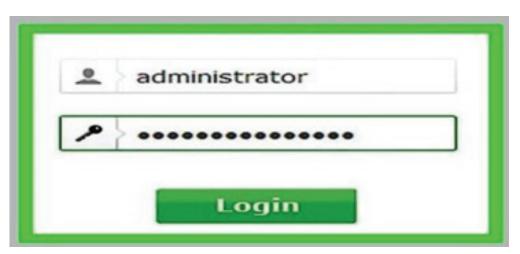


2 The MAC address will display already the old one need to Reset the MAC address

Name	
Phone	
Email	
Address	
MAC Address	



3 Enter the administrator name and password and click on login



4 Select the wireless network name and select the enable the wireless router radio and SSID broadcast

Wireless Network Name:	www.wikihow.com	c so called the
Region.	United States	
Warning:	Ensure you select a correct count Incorrect settings may cause inte	
Mode:	11bgn mixed ~	
Channel Width:	Auto ~	
Channel:	Auto ~	
	Z	
	Enable Wireless Router Rad	10
	Enable SSID Broadcast	
	Enable WDS Bridging	

5 Select the WPA/WPA2 and fill all the fields.

O Disable Security		
WPA/WPA2 - Personal(Recommende	ed)
version:	Automatic	
Encryption:	AES	~
Wireless Password:		
	(You can enter 8 and 64.)	er ASCII characters between 8 and 63 or Hexad
Group Key Update Period:	0	Seconds
	(Keep it defau	ult if you are not sure, minimum is 30, 0 means
O WPA/WPA2 - Enterprise	•	
Version:	Automatic	~
Encryption:	Automatic	~
Radius Server IP:		
Radius Port:	1812 (1	-65535, 0 stands for default port 1812)



- 6 Enter the wireless password and click on the save button **Disable Security** 0 WPA/WPA2 - Personal(Recommended) Version: Automatic ~ Encryption: ACC Wireless Password: passwordhere Tou can enter ASCII characters between o 8 and 64.) Group Key Update Period: 0 Seconds (Keep it default if you are not sure, minimum is WPA/WPA2 - Enterprise 0 Version: Automatic -Encryption: Automatic **Radius Server IP:** (1-65535, 0 stands for default port 1812) Radius Port: 1812 **Radius Password: Group Key Update Period:** (in second, minimum is 30, 0 means no up 0 O WEP Automatic Type: ~ WEP Key Format: Hexadecimal ~ WEP Key **Key Selected** Кеу Туре Key 1: Disabled Key 2: Disabled Key 3: Disabled ~ Key 4: Disabled ~ Save
- 7 Gave old administrator name and password and a new username and password then click on save.

Old User Name:	administrator	
Old Password:	•••••	
New User Name:	wikihow	
New Password:	•••••	
Confirm New Password:	•••••	



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8 Open the WIFI portal see the name is displaying then click on connect.



9 Enter the password0r security key which was given before and click on next button.

Networks
Enter the network security key
by pushing the button on the router.
Next Cancel

10 The WIFI is connected finally it is displaying in WIFI portal.

EXERCISE 7 : Implementing Voiceover IP

Objectives

At the end of this exercise you shall be able to

- configure VPN
- download and install skype.

Requirements

Tools/Materials

- Windows enabled PC/Laptop
- Internet connectivity with VPN
- Skype software setup

Procedure

TASK 1: Planning and preparation

- 1 Assess your needs:
- 2 Determine how many users will need VoIP, what features you require (e.g., call forwarding, voicemail), and your budget.
- 3 Test your internet connection:
- 4 Ensure your upload and download speeds are sufficient for VoIP calls (generally, at least 3 Mbps for both). You can use online speed tests to check.
- 5 Choose a VoIP provider:
- 6 Select a provider that meets your needs and budget, offering reliable service and features you need.
- 7 Decide on hardware:
- 8 Consider whether you'll use physical VoIP phones, softphones (software apps on computers), or a combination.

TASK 2: Installation

- 1 Follow your provider's instructions:
- 2 Each provider will have specific setup steps, so refer to their documentation or website for detailed guidance.
- 3 Configure your network:
- 4 Depending on your setup, you may need to adjust firewall settings, enable Quality of Service (QoS) for VoIP traffic prioritization, or configure a Virtual Private Network (VPN) for added security.
- 5 Set up your devices:
- 6 Connect your VoIP phones or install the softphone app on your devices. Configure settings like your phone number, voicemail, and call forwarding.

TASK 3: Download and Install Skype

- 1 Download skype link ms-windows-store://pdp/?productid=9WZDNCRFJ364&cid=scom-web-store
- 2 Click on Download Button for download Skype in windows.
- 3 Click on Install button for installation process.
- 4 After installation you have to create an account using Sign in button.

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EXERCISE 8 : Configuring DHCP, IPV4/IPV6

Objectives

At the end of this exercise you shall be able to

- install DHCP server
- configure DHCP server and creating scope
- provide IP address range along with subnet.

Requirements

Tools/Materials

- PC/Laptop
- Windows server
- Internet connectivity

Procedure

TASK 1: Installing DHCP Server

1 Open Server Manager from task bar and click Add roles and features

Server M	anager • Dashboard	• (2) 🚩 Manage Tools View Help	
Dashboard Local Server All Servers AD DS	WELCOME TO SERVER MANAGER	gu s local server	
▲ DNS ■ File and Storage Services ▶	QUICK START	d roles and features	
	WELSTE NOW	d other servers to manage sate a server group	
	5 CO	nnect this server to cloud services Hide	

2 Before you run the installation wizard, make sure that an administrator account has a strong password, static IP is configured, and security updates from Windows updates are installed. When you are done, click Next

Sefore You Begin	This wizard helps you install roles, role services, or features. You determine which roles, role services, or features to install based on the computing needs of your organization, such as sharing documents, or
nstallation Type	hosting a website.
erver Selection	To remove roles, role services, or features:
	Start the Remove Roles and Features Wizard
	Before you continue, verify that the following tasks have been completed:
	The Administrator account has a strong password
	 Network settings, such as static IP addresses, are configured
	 The most current security updates from Windows Update are installed
	If you must verify that any of the preceding prerequisites have been completed, close the wizard, complete the steps, and then run the wizard again.
	To continue, click Next.
	Skip this page by default



3 Select Role-based or feature-based installation and click Next

Before You Begin	Select the installation type. You can install roles and features on a running physical computer or virtual	
Installation Type	machine, or on an offline virtual hard disk (VHD).	
Server Selection	Role-based or feature-based installation	
Server Roles	Configure a single server by adding roles, role services, and features.	
Features	Remote Desktop Services installation	
Confirmation	Install required role services for Virtual Desktop Infrastructure (VDI) to create a virtual machine-base or session-based desktop deployment.	
	or session-oased desktop deprogramment.	

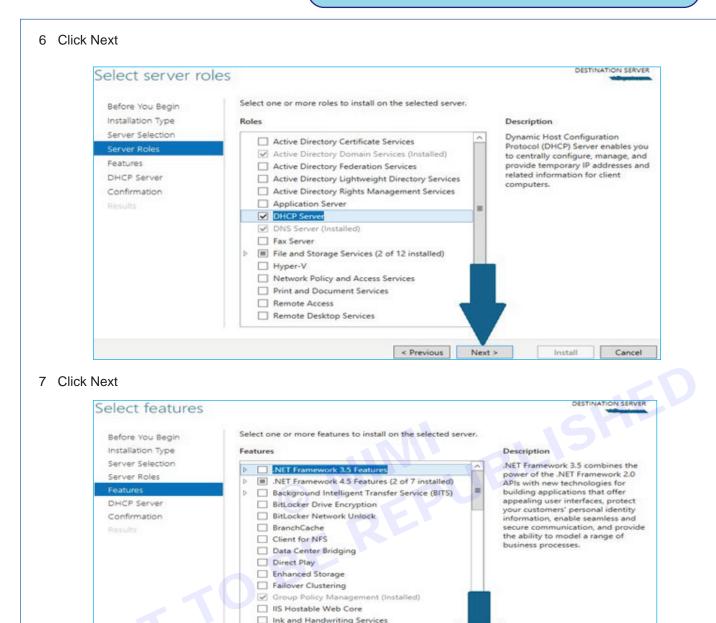
4 Select a destination server on which you want to install the DHCP server. In our case, there is only one server which is local server and it is selected by default. Click Next

Sefore You Begin nstallation Type Server Selection	Select a server or a virtual hard disk on which to install roles and features. Select a server from the server pool Select a virtual hard disk
erver Roles	Server Pool
eatures Confirmation	Filter:
	Name IP Address Operating System
	AD.peLcom 192.168.1.1 Microsoft Windows Server 2012 R2 Standard
	1 Computer(s) found
	This page shows servers that are running Windows Server 2 and that have been added by using the

5 Select DHCP server role by checking the appropriate box. As soon as you check the box, a small window will pop up alerting you that there are some other features which are also required to be installed along with DHCP server. Click Add Features

ave	e to be installed on the same server.
	[Tools] Group Policy Management
4	Remote Server Administration Tools
	 A Role Administration Tools
	 AD DS and AD LDS Tools
	AD DS Tools
	[Tools] Active Directory Actistrative Center
	[Tools] AD DS Snap-Ins an mmand-Line Tools





8 Note the things outlined in the screen and click Next

Before You Begin Installation Type Server Selection Server Roles Features	The Dynamic Host Configuration Protocol allows servers to assign, or lease, IP addresses to compute and other devices that are enabled as DHCP clients. Deploying a DHCP server on the network provide computers and other TCP/IP-based network devices with valid IP addresses and the additional configuration parameters these devices need, called DHCP options. This allows computers and device to connect to other network resources, such as DNS servers, WINS servers, and routers. Things to note:
DHCP Server	 You should configure at least one static IP address on this computer.
Confirmation Results	Before you install DHCP Server, you should plan your subnets, scopes and exclusions. Store the pla in a safe place for later reference.
	< Previous Next > Install Cance

< Previous

Next >

Cancel

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Install

9 Confirm your installation selections and click Install

efore You Begin	To install the following roles, role services, or features on selected server, click Install.
nstallation Type	Restart the destination server automatically if required
erver Selection	Optional features (such as administration tools) might be displayed on this page because they have
erver Roles	been selected automatically. If you do not want to install these optional features, click Previous to clear their check boxes.
eatures	
HCP Server	DHCP Server
onfirmation	Remote Server Administration Tools Role Administration Tools
	Export configuration settings Specify an alternate source path

10 Click Close to finish the installation

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	View installation progress Feature installation
	Configuration required. Installation succeeded on AD.pel.com.
Features DHCP Server Confirmation	DHCP Server Launch the DHCP post-install wizard Complete DHCP configuration
Results	Remote Server Administration Tools Role Administration Tools DHCP Server Tools
	You can close this wizard without interrupting running tasks. View task page again by clicking Notifications in the command bar, and then Texport configuration settings
	< Previous Next > Close Cancel

TASK 2: Configuring DHCP Server and Creating Scope

1 Open Server Manager and click notifications icon. A small window will appear. Click Complete DHCP configuration

€ ⊕ + Server M	lanager • Dashboard	- 🕄 🍢 Manage Tools View Help
🖩 Dashboard	WELCOME TO SERVER MANAGER	Post-deployment Configura
Local Server		Configuration required for DHCP Server at AD
All Servers	1 Configure this local serve	Complete DHCP configuration
1 DHCP	QUICK START	feature inclusion
A DNS	2 Add roles and features	Configurative direct. Installation succeeded on
File and Storage Services	3 Add other servers to manage	AD pelco DE Add Role entures
	WHAT'S NEW 4 Create a server group	Task Deta

2 Click Next

Description	The following steps will be performed to complete the configuration of the DHCP Server on the target computer:
Authorization	target composer.
	Create the following security groups for delegation of DHCP Server Administration. - DHCP Administrators - DHCP Users
	Authorize DHCP server on target computer (if domain joined).

3 Choose Skip AD authorization since we do not have any AD configured and click Commit

escription	Specify the credentials to be used to authorize this DHCP server in AD DS.
uthorization	O Use the following user's credentials
	User Name: PEL\Administrator
	Use alternate credentials
	UserName: Specify
	Skip AD authorization

4 Read the summary and click Close

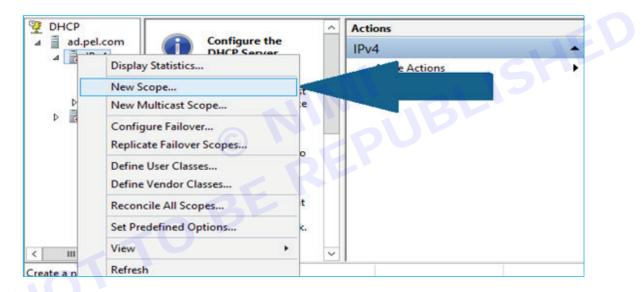
	The status of the post install configuration steps are indicated below:
iummary	Creating security groups Done Please restart the DHCP server service on the target computer for the security groups to be effective.

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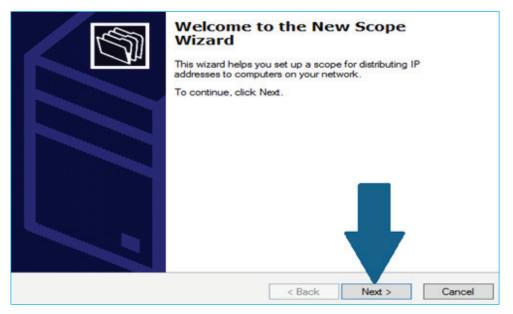
5 Open Server Manager and click on Tools. When a small window appear, scroll to DHCP and click it

GER	Active Directory Administrative Center Active Directory Domains and Trusts Active Directory Module for Windows PowerShell
Configure this local server	Active Directory Sites and Services Active Directory Users and Computers ADSI Edit Component Services
Add roles and features	Computer Management Defragment and Optimize Drives
Add other servers to manage	DHCP
Create a server group	DNS Embedded Lockdown Manager
Connect this server to cloud services	Event Viewer Group Policy Management iSCSI Initiator Local Security Policy
ers total: 1	Microsoft Azure Services ODBC Data Sources (32-bit) ODBC Data Sources (64-bit) Performance Monitor
1 DHCP 1 🕰 DNS 1	Resource Monitor

6 In management console, right click on IPv4 and scroll to New Scope and click it.



7 Click Next



8 Provide name and meaningful description of this new scope and click Next

a description.				the option of provid	
	and description fo is to be used on		is information he	lps you quickly ider	ntify
Name:	Old campus				
Description:	IP pool of old	campus			

9 Provide IP address range along with sub net you need to distribute to client machines and click Next P Address Range You define the scope address range by identifying a set of consecutive IP addresses.

Configuration settings	for DHCP Server		
	ddresses that the scope	distributes.	
Start IP address:	192.168.1.	1	
End IP address:	192.168.1.1	00	
Configuration setting: Length:	that propagate to DHC	P Client	
Subnet mask:	255 . 255 . 255 .	0	

10 Provide any IP addresses you need to exclude from pool and click Add. I have excluded a first IP address which is statically assigned to my DHCP server. Click Next

type an	addres	s in Sta	t IP a	addres	s only.		want t	o exclude	e a single	
address		End	IP ad	dress:	<u> </u>	_				
	-						Add			
d addres	s range									
192.16	8.1.1					F	Remove			
						Subr	net dela	y in milli s	second:	
								0-		
								-		
							1			
							2		-	
	type an address d addres	type an addres address:	type an address in Sta address: End d address range:	type an address in Start IP a address: End IP ad d address range:	type an address in Start IP address address: End IP address: d address range:	type an address in Start IP address only. address: End IP address: d address range:	type an address in Start IP address only. address: End IP address: d address range: 192.168.1.1 F	type an address in Start IP address only. address: End IP address: Add address range: 192.168.1.1 Remove	type an address in Start IP address only. address: End IP address: Add d address range: 192.168.1.1 Remove	address: End IP address: Add

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11 Keep lease duration as 8 days and click Next

ease Duration The lease duration sp	ecifies how long a	a client can	use an IP ad	dress from this sco	pe.
Lease durations shoul connected to the sam portable computers or Likewise, for a stable o locations, longer lease	e physical network dial-up clients, shi network that cons	k. For mobil orter lease o lists mainly o	a networks th durations can of desktop co	at consist mainly o be useful.	
Set the duration for sc	ope leases when	distributed I	y this server	J.	
Limited to:					
Days: Hours:	Minutes:				
		1	< Back	Next >	Cancel

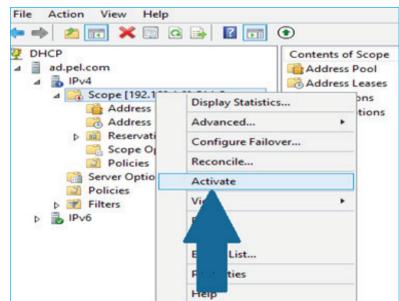
12 Choose No, I will configure these options later and click Next

1	igure DHCP Options fou have to configure the most common DHCP options before clients can use the acope.
a	When clients obtain an address, they are given DHCP options such as the IP addresses of routers (default gateways), DNS servers, and WINS settings for that cope.
	The settings you select here are for this scope and override settings configured in the Server Options folder for this server.
0	Do you want to configure the DHCP options for this scope now?
0	Yes, I want to configure these options now
(No, I will configure these options later
	T ⁰

13 Click Finish to end the new scope wizard

5	Completing the New Scope Wizard				
A ₽	You have successfully completed the New Scope wizard.				
	Before clients can receive addresses you need to do the following:				
	1. Add any scope specific options (optional).				
	2. Activate the scope.				
	To provide high availability for this scope, configure failover for the newly added scope by right clicking on the scope and clicking on configure failover.				
	< Back Finish Cancel				

14.Right-click on new scope you just created in above step and click Activate



15 Right-click on your server, scroll to All Tasks and then click Restart to finish with configuration

DHCP		Nam	e
ad.pel	Add/Remove Bindings Unauthorize		v4 v6
Þ	Backup Restore		
	All Tasks	•	Start
	View	+	Stop
□ □ □ □ □ □ □ □ □ □ □ □ □ □	Delete Refresh Export Li		Pause Resume Restart
	Properties		
	Help		

16 Open Command Prompt and Type : ipconfig /all

	Autorities and Frompt
IP Routing Enabled WINS Proxy Enabled DNS Suffix Search List.	: No : No : ittaster.local
Ethernet adapter Ethernet:	
Connection-specific DNS Description	Suffix . : ittaster.local : Intel(R> 82574L Gigabit Network Connectio
Physical Address DHCP Enabled. Autoconfiguration Enable IFv4 Address Subnet Mask Lease Obtained	d: Yes : 10.0.2.11 <preferred> : 255.0.0.0 : 255.0.0.0 : 19 April 2013 22:53:29 : 19.0.0.1 : 10.0.0.1 : 10.0.0.2 : 10.0.0.2</preferred>
Tunnel adapter Teredo Tunne	ling Pseudo-Interface:
Description	: Media disconnected Suffix - : : Teredo Tunneling Pseudo-Interface : 800-00-00-00-00-00-E0 : No d: Yes
Tunnel adapter isatap.ittas	ter.local:
Description	: Media disconnected Suffix .: ittaster.local : Microsoft ISATAP Adapter #2 : 80-00-00-00-00-00-E0 : No d: Yes
C:\Users\administrator>	×

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EXERCISE 9 : Configuring Network Security for preventing Attacks

Objectives

- At the end of this exercise you shall be able to
- implement a fire wall
- secure routers and wireless access point
- monitor network activity and security events.

Requirements

Tools/Materials

- PC laptop with network connectivity
- Firewall
- Routers

Procedure

TASK 1: Implement a Firewall

- 1 **Choose a firewall:** Select a firewall suitable for your network size and needs. Hardware firewalls offer robust protection, while software firewalls are more cost-effective for smaller networks.
- 2 **Configure firewall rules:** Define rules to allow only authorized traffic and block suspicious connections. Consider factors like source IP addresses, destination ports, and protocols.
- 3 **Enable logging and monitoring:** Regularly review firewall logs to identify potential threats and adjust rules accordingly.

TASK 2: Secure Your Routers and Wireless Access Points

- 1 **Change default passwords:** Replace factory-set passwords with strong, unique credentials for your router and wireless access points.
- 2 Enable encryption: Secure your Wi-Fi network with WPA2 or WPA3 encryption to prevent unauthorized access.
- 3 **Disable remote access:** If not necessary, disable remote management features on your router and access points to reduce attack surfaces.
- 4 **Update firmware regularly:** Install firmware updates promptly to patch vulnerabilities and keep your devices secure.

TASK 3: Employ Strong Passwords and User Authentication

- 1 **Enforce strong password policies:** Mandate complex passwords with a mix of uppercase and lowercase letters, numbers, and symbols. Consider implementing multi-factor authentication (MFA) for added security.
- 2 Limit user privileges: Assign users the minimum level of access required for their tasks, minimizing potential damage in case of compromised accounts.
- 3 **Educate users on cyber security:** Train employees and users on cyber hygiene practices like phishing awareness, avoiding suspicious links, and reporting suspicious activity.

_ __ __ __



TASK 4: Keep Software and Systems Updated

- 1 Update operating systems and applications regularly: Apply software updates promptly to patch known vulnerabilities and security holes.
- 2 Disable unused software and services: Remove unnecessary software and services to reduce potential attack vectors.

TASK 5: Monitor Network Activity and Security Events

- 1 Implement a Security Information and Event Management (SIEM) system: SIEM tools provide centralized logs and real-time monitoring of security events across your network, helping you detect and respond to threats promptly.
- 2 Regularly review security logs: Monitor logs for suspicious activity like failed login attempts, unauthorized access attempts, and malware signatures.

TASK 6: Conduct Regular Security Assessments and Penetration Testing

- 1 Schedule regular vulnerability scans: Employ vulnerability scanners to identify weaknesses in your network infrastructure and applications.
- 2 **Perform penetration testing:** Engage professional penetration testers to simulate real-world attacks and
- 3 Address identified vulnerabilities: Prioritize and address identified vulnerabilities based on their severity



EXERCISE 10 : Setting password policy

Objectives

At the end of this exercise you shall be able to • implement a password policy.

Requirements

Tools/Materials

PC laptop with network connectivity

Procedure

Setting up a password policy in a network is an essential security measure to protect sensitive information and resources from unauthorized access.

Implement a password policy

- 1 **Assessment:** Begin by assessing the current state of password security within your network. Understand the existing password practices, weaknesses, and areas that need improvement.
- 2 **Define Password Requirements:** Determine the password requirements that users must adhere to. These requirements typically include:
 - Minimum password length: Suggest a minimum length of 8-12 characters.
 - **Complexity:** Require a combination of uppercase letters, lowercase letters, numbers, and special characters.
 - Expiry: Set a policy for password expiration, such as every 90 days.
 - History: Enforce a rule that prevents users from reusing old passwords.
 - Lockout: Establish a threshold for failed login attempts before an account is locked out temporarily.
 - Account Inactivity: Consider disabling or prompting for password change after a certain period of inactivity.
 - **Two-Factor Authentication (2FA):** Encourage or mandate the use of 2FA where possible for an added layer of security.
- 3 **Communicate Policy:** Clearly communicate the password policy to all users within the network. Explain the rationale behind each requirement and the importance of adhering to them.
- 4 **Implement Policy:** Utilize the network's administrative tools or security software to enforce the password policy. This may involve configuring settings in:
 - Active Directory (for Windows networks)
 - Group Policy (for Windows networks)
 - LDAP (Lightweight Directory Access Protocol)
 - RADIUS (Remote Authentication Dial-In User Service)
 - IAM (Identity and Access Management) solutions
 - Password management tools
- 5 **Enforcement:** Regularly monitor adherence to the password policy. Implement mechanisms to enforce the policy automatically, such as system prompts for password changes when they expire, or locking out accounts after multiple failed login attempts.
- 6 **Education and Training:** Conduct training sessions or provide resources to educate users about the importance of strong passwords, how to create them securely, and the consequences of weak password practices.
- 7 **Periodic Review and Update:** Regularly review the password policy to ensure it remains effective and upto-date with evolving security threats and best practices. Make necessary adjustments based on feedback, security incidents, or changes in regulations.
- 8 **Testing:** Periodically conduct security audits or penetration tests to evaluate the effectiveness of the password policy and identify any vulnerabilities that need to be addressed.



EXERCISE 11 : Sniffing on Switched Networks

Objectives

At the end of this exercise you shall be able to

• use wireshark, the packet sniffing tool.

Requirements

Tools/Materials

- · Windows PC/Laptop connected to a network
- Wireshark network setup

Procedure

TASK 1: Using Wireshark , a packet-sniffing tool

1 Open Wireshark. If you don't have the free program for Windows, Mac, and Linux, you can download it from their website.

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	🥖 Wireshark	Tuesday		
	Messenger	25		
	O Oculus	25	Mail	
	Expand ~			Heavy rain
	Most used			84° ^{89*} 79*
	C Microsoft Edge	Microsoft Edge	Photos	Manila
				Contraction of the local division of the

2 Navigate to "Edit" and click Preferences. You'll find "Edit" in the menu bar along the top of the Wireshark window.

2	Preferences	Ctrl+Shift+P	No Packets
	Configuration Drofiler	Ctola Shifta A	of the receive determinate opdates.
	Delete All Packet Comments		Mailing Lists · SharkFest · Wireshark O). You receive automatic updates.
	Packet Comments	•	
	Time Shift	Ctrl+Shift+T	
	Previous Time Reference	Ctrl+Alt+B	
	Next Time Reference	Ctrl+Alt+N	
	Unset All Time References	Ctrl+Alt+T	
	Set/Unset Time Reference	Ctrl+T	
	Unignore All Displayed	Ctrl+Alt+D	
	Ignore All Displayed	Ctrl+Shift+D	
	Ignore/Unignore Packet(s)	Ctrl+D	
	Previous Mark	Ctrl+Shift+B	downloadable version of Npcap and for instructions
	Next Mark	Ctrl+Shift+N	t be able to capture packets. In order to capture packets

- 3 Click the Capture tab. It's in the panel on the left side of the window.
- 4 Ensure "Capture packets in promiscuous mode" is selected and press OK.



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Capture Capture packets in pcaping format Expert Update list of packets in real time Protocols Automatic scrolling in live capture Protocols Don't load interfaces on startup Statistics Disable external capture interfaces Advanced Default interface Wireshark - Preferences Default interface Columns Pont and Colors Layout Capture packets in promiscuous mode Expert Update list of packets in real time Filter Buttons Automatic scrolling in live capture Name Resolution Protocols RSA Keys Default interface	 Appearance Columns Font and Colors 	Default interface	
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Statistics Disable external capture interfaces	 Appearance Columns Font and Colors Layout Capture Expert Filter Buttons Name Resolution 	Default interface Capture packets in promiscuous mode Capture packets in pcaping format Update list of packets in real time Automatic scrolling in live capture	

5 Close the Wireshark Preferences window if it doesn't close automatically.

Lapturing from Local Area Lonnection

6 Click the blue fin icon to start recording. You can also press Ctrl + E. You'll see a graph that indicates your network activity.

File		the second se	and	ireless Too
I. Acc	ly a display filter			
No.	Time	Source	Destination	Pro

7 Press the red fin icon to stop recording. You'll see the previous history in the window at the top of your screen.

Aco	ly a display filter	CH-/>	≝₹⊻⊒≣€	
No.	Time	Source	Destination	Pr

8 Click on an instance to see the IP addresses it was going to and coming from as well as additional data.



EXERCISE 12 : IP Address Spoofing

Objectives

At the end of this exercise you shall be able to

· do IP spoofing using Hide.me

Requirements

Tools/Materials

• Windows PC/Laptop connected to internet

Procedure

TASK 1: IP Spoofing using Hide.me

- 1 Download Hide.me VPN Software and install it.
- 2 Click "Enable VPN" button to enable the Virtual private network and your ip address will change.



- 3 Click on "Change" button in the right side of the window to set the country location for the IP Address.
- 4 Goto Cmd Prompt and type the command "ipconfig" then we will get the latest IP Address.

Cofault Gateway	- 8
Ethernet adapter VMware Network Adapter VMnet8:	
Connection-specific DNS Suffix .: Link-local IPv6 Address : fe80:u0d98:179d;5c2f Autoconfiguration IPv4 Address . : 169:und:220:226 Subnet Mask : 255.255.0.0 Default Gateway :	:76d8523
Ethernet adapter Ethernet 4:	
Media State Media disconnected Connection-specific DMS Suffix . !	

5 On Click "Details" button in the left side of the window. We are able to see the location is changed to Netherlands. But our actual location is India.





EXERCISE 13 : DNS Spoofing

Objectives

At the end of this exercise you shall be able to

• do DNS spoofing using Ettercap.

Requirements

Tools/Materials

- PC/Laptop
- Kali Linux OS
- Ettercap

Procedure

TASK 1: DNS Spoofing using Ettercap

1 Start by booting up Kali Linux

Note: before you continue and make sure that you are on the same network as your target.

2 Open the file /etc/ettercap/etter.conf with a text editor like gedit and edit the file.

root@Kali:-# gedit /etc/ettercap/etter.conf

3 Edit the uid and gid values at the top to make them 0.

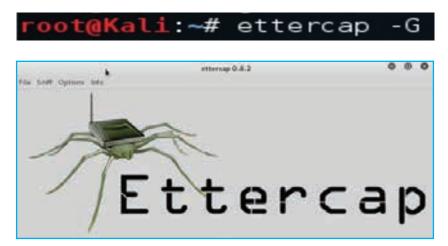
<pre># (at your option) any l</pre>	au	ai vers	TOU			
						-
#						#
~~~~~~~~~	##	******	###	****	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	***********
[privs]						
ec_uid = 0	#	nobody	is	the	default	
ec gid = 0 T	#	nobody	is	the	default	
[mitm]						
arp storm delay = 10		# mi	lli	secor	nds	
arp poison smart = 0		# bo	ole	an		
arp poison warm up = 1		# se	con	ds		
arp poison delay = 10		# 50	con	ds		
arp poison icmp = 1			ole	an		
arp poison reply = 1			ole	an		
arp poison request = 0			ole	an		
arp poison equal mac = 1						
dhcp lease time = 1800						
port steal delay = 10						
port steal send delay = 2					- d-	

4 Remove both the # signs below where it says "if you use iptables".

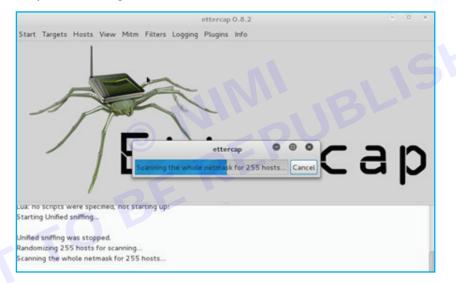
#
# Linux
#
<pre># if you use ipchains: #redir_command_on = "ipchains -A input -i %iface -p tcp -s 0/0 -d 0/0 %por #redir_command_off = "ipchains -D input -i %iface -p tcp -s 0/0 -d 0/0 %po</pre>
<pre># if you use iptables: redir_command_on = "iptables -t nat -A PREROUTING -i %iface -p tcpdport redir_command_off = "iptables -t nat -D PREROUTING -i %iface -p tcpdpor</pre>
#
# Mac Os X
#
<pre># quick and dirty way: #redir_command_on = "ipfw -q add set %set fwd 127.0.0.1,%rport tcp from an #redir_command_off = "ipfw -q delete set %set"</pre>
# a batter colution is to use a script that keeps track of the rules interted



5 Run Ettercap by using Terminal.



- 6 Select Sniff > Unified sniffing... > (Select the interface connected to the internet) > OK it automatically starts sniffing after we press OK
- 7 To scan for targets on your network go to Hosts > Scan for hosts and wait until it does the scan.



- 8 Go back to Hosts and select Host list to see all the targets that Ettercap has found.
- 9 Select IP address from the host list in Ettercap and choose Add to Target 1
- 10 Now select the gateway IP from the host list and choose Add to Target 2.

lost 192.168.1.11 added to lost 192.168.1.254 added t			
4 hosts added to the hosts	list		
canning the whole netmask	for 255 hosts		
andomizing 255 hosts for so	anning		
nined snimng was stopped.			
Delete Host		Add to Target 1	Add to Targ
fe80::f606:8dff:fe6c:b195	F4:06:8D:6C:B1:95		
192.168.1.254	10:7B:EF:7A:89:09	N	
192.168.1.37	34:23:87:7A:89:5F		
192.168.1.13	90:B9:31:CD:73:8A		
192.168.1.12	80:BE:05:20:38:CF		

- 11 Go to the MITM tab and select ARP poisoning, choose Sniff remote connections and press OK.
- 12 go to Plugins > Manage the plugins and double click dns_spoof to activate that plugin.
- 13 Edit etter.dns file, This is the hosts file and is responsible for redirecting specific DNS requests.

# root@Kali:~# gedit /etc/ettercap/etter.dns

14 Add another line, use whatever website you would like and change the IP address to your IP address.(Here example facebook is used).



15 Start Apache to accept incoming traffic.



- 16 Go to /var/www/html folder and alter index.html page for your needs and save the page.
- 17 Go back to Ettercap and select Start > Start sniffing and that to start the attack.

# EXERCISE 14 : Password Cracking: Dictionary vs Brute-Force vs Hybrid methods

# **Objectives**

## At the end of this exercise you shall be able to

- crack password by using Dictionary Attack method
- crack password by using Brute-Force Attack method
- · crack password by using Hybrid Attack method.

# Requirements

## **Tools/Materials**

- Linux PC/Laptop with internet connection
- Password cracking tools John the Ripper, Hashcat, Hydra

## **Procedure**

Password cracking involves attempting to gain unauthorized access to a system or an account by trying to decipher or guess the password. There are several methods for password cracking, including dictionary attacks, brute-force attacks, and hybrid attacks. Here are practical steps for each method:

## TASK 1: Dictionary Attack

- 1 **Gather Wordlists:** Obtain a comprehensive wordlist or dictionary containing commonly used passwords, phrases, and combinations.
- 2 **Select Tools:** Choose a password cracking tool that supports dictionary attacks, such as John the Ripper, Hashcat, or Hydra.
- 3 **Configure Tool:** Set up the password cracking tool to use the selected wordlist as input.
- 4 **Execute Attack:** Run the tool against the target system or account, attempting to log in with each password in the dictionary.
- 5 Analyze Results: Review the output to identify successful password guesses and gain access to the target account.

## TASK 2: Brute-Force Attack

- 1 **Determine Password Complexity:** Assess the complexity of the target password, including length and character set.
- 2 **Select Tools:** Choose a password cracking tool capable of brute-force attacks, such as John the Ripper, Hashcat, or Hydra.
- 3 **Configure Tool:** Set up the password cracking tool to systematically generate and try all possible combinations of characters within the specified parameters.
- 4 **Execute Attack:** Run the tool against the target system or account, attempting to guess the password through exhaustive trial and error.
- 5 **Monitor Progress:** Monitor the progress of the brute-force attack, as it may take significant time and computational resources.
- 6 **Analyze Results:** Review the output to identify successful password guesses and gain access to the target account.



### TASK 3: Hybrid Attack

- 1 Combine Wordlists and Brute Force: Create a hybrid wordlist by combining common words, phrases, and patterns with brute-force-generated strings.
- 2 Select Tools: Choose a password cracking tool that supports hybrid attacks, such as John the Ripper, Hashcat, or Hydra.
- 3 **Configure Tool:** Set up the password cracking tool to use the hybrid wordlist as input, along with parameters for brute-force generation.
- 4 Execute Attack: Run the tool against the target system or account, attempting to guess the password using both dictionary-based and brute-force methods.
- 5 Adjust Parameters: Fine-tune the attack parameters based on initial results and feedback to optimize the cracking process.
- 6 Analyze Results: Review the output to identify successful password guesses and gain access to the target account.
- 7 Additional Considerations:
  - a **Resource Requirements:** Password cracking can be resource-intensive, requiring significant computational power and time, especially for brute-force attacks.
  - .u policies, multi-factor au .ung attempts. b Legal and Ethical Considerations: Ensure that password cracking activities comply with applicable laws,
  - c Defensive Measures: Implement strong password policies, multi-factor authentication, and other security

# EXERCISE 15 : Handling Denial-of-Service (DoS)

# **Objectives**

At the end of this exercise you shall be able to

- handle DoS during a attack
- prevent DoS during the attack.

# **Requirements**

## **Tools/Materials**

- PC/Laptop with network connectivity
- Firewall & VPN

# Procedure

## TASK 1: Handling DoS During a Attack

- 1 **Identify the Attack:** The first step is to recognize a DoS attack. Signs include unusually slow network performance, website outages, or specific applications being unavailable.
- 2 **Isolate the Attack:** Try to isolate the affected system or service to minimize the impact on the entire network. Firewalls and traffic filtering rules can be helpful here.
- 3 Activate DDoS Defense Mechanisms: Many network devices like routers have built-in DDoS protection features. These may include rate limiting, which restricts incoming traffic volume, or blackholing malicious IP addresses.
- 4 **Contact Your Service Provider:** If you suspect a large-scale DDoS attack, especially for businesses or organizations, your internet service provider (ISP) can offer more advanced mitigation techniques and resources.
- 5 **Analyze and Adapt:** Once the immediate attack subsides, analyze logs and traffic patterns to understand the attack type. This will help refine your mitigation strategies for future attacks.

## TASK 2: Preventing DoS Attacks

- 1 **Plan and Prepare:** Develop a DoS incident response plan that outlines roles, responsibilities, and communication protocols during an attack.
- 2 **Strengthen Network Security:** Regularly update firewalls, intrusion detection/prevention systems (IDS/IPS), and software on all devices.
- 3 **Utilize DDoS Mitigation Services:** Consider subscribing to DDoS protection services offered by security vendors. These services can filter malicious traffic before it reaches your network.
- 4 **Content Delivery Networks (CDNs):** CDNs can absorb large traffic spikes and distribute legitimate traffic more efficiently.
- 5 **Educate Users:** Train employees on potential social engineering tactics hackers use to launch DoS attacks via phishing emails or malware.

NOTE: DoS mitigation strategies depend on the specific attack type and the resources available.



# EXERCISE 16 : Using Tools like John the Ripper, Cain & Abeletc

# **Objectives**

## At the end of this exercise you shall be able to

- use Cain&Abel test
- install John the Ripper pass and cracker tool
- crack password protected zip file using John the Ripper tool.

# Requirements

## **Tools/Materials**

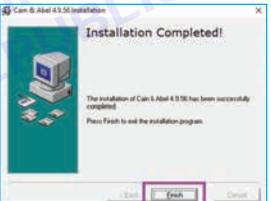
- PC with network connectivity
- Operating system, Windows/LInux Cain & Abel tool setup

# Procedure

## TASK 1: Using tool Cain & Abel

- 1 Download the Cain&Abel zip file from any browser.
- 2 Follow the installation instructions, proceeding by clicking "Next," accepting the terms, and concluding by selecting "Finish" at the end.





John the Ripper Password cracker tool

- 3 To install this tool, WinPcap also need. Click "Install" and then follow the setup steps as instructed by the wizard.
- 4 Click on "Cracker" in Cain&Abel.

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5 Click the option "LM & NTLM Hashes".

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Cece OF MOY H Cece PXI-MDS H APOP MDS Hade CRAM-MOS Heat					
Cece OF MOY H Cece Pix MOS H APOP MOS Hale CRAM MOS Heilt ODPF-MOS Heilt					
Cente ICI-MO9 H Cente PXI-MO5 H APOP MD5 Hash CIAMI M05 Hash OUPI-MD5 Hash RPu2 MD5 Hash					
Center CDI-MOD H Center PDI-MOD H APC/P-MOD Hauthe COLMM-MOD Hauthe OLDPI-MOD Hauthe R/PL-2 MOD Hauthe VEIDP-HMALC Hau					
Correl CD MO9 H Correl PX MD5 H APCP MD5 Hash COMM MD5 Hash COMM MD5 Hash COMM MD5 Hash COMM MD5 Hash COMM MD5 Hash COMM CD5 Hash COMM CD5 Hash					
Center IDL MIDS H Center FIX ANDS HL APCR MIDS Hushe CRAM ANDS Hushe CRAM ANDS Hushe CRAM ANDS Hushe CRAM ANDS Hushe VIED - MIDS Hushe VIED - INFACT Hus MID2 Hushes (3)					
Center CD- MOY H Center PM (MDS H APOPT MDS Hauk CRAM MDS Hauk DISPENDOL Hauke RPV2 MDS Hauke					

6 Click on the "+" symbol, then select "Import Hashes." Check the corresponding box and proceed by clicking "Next."

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7 Choose the account for which you want to crack the password. Right-click on it, then opt for a brute force attack. Within the attack options, select NTLM hashes.

User Name	LM Password	< 8	NT Password	LM Hash	NT Hash	challenge
Administrator	* empty * * empty *	:	* empty * * empty *	AAD38435851 AAD38435851	31D6CFE0D16 31D6CFE0D16	
🗙 Devis 📃	" empty "	•			8F0B190A687F	
Guest	Dictionary Attack	_	>	AAD3B435B51	31D6CFE0D16	
X WDAGUtility4	Brute-Force Attack		>	LM Hashes		1
	Cryptanalysis Attack		>	LM Hashes + challer	ige	-
	Rainbowcrack-Online >			NTLM Hashes		
	ActiveSync		>	NTLM Hashes + cha NTLM Session Securi		
	Select All Note		F			
	Test password					
	Add to list Remove Remove Machine Accou Remove All	ints	Insert Delete			
	Export					

Nimi)

## **COMPUTER SOFTWARE APPLICATION - CITS**

8 Specify the Charset, Password length and then click on "Start". It will start making combinations and take some time to crack hashes.

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0123456789		• Max 16 -
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9 Password cracked successfully.

Dharset		Password length
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0123456789		• Max 16 -
C Custom		Start from
		282384
Кеукрасе	Current password	
111111110516718		
Key Rate	Time Left	
Plaintext of D3383B770D940C1 Attack stopped! 1 of 1 hashes cracked	99AB32F22CE3470E4 is	Statt Ext

## TASK 2: Install John the Ripper Password Cracker

- 1 Open the terminal in Linux distributions like Ubuntu, Fedora, Arch etc.
- 2 Run the command sudo apt-get install john.
- 3 Type Y and press enter to continue the installation.

ub@kanav:-5 sudo apt-get install john
[sudo] password for ub:
Reading package lists Done
Building dependency tree
Reading state information Done
The following packages were automatically installed and are no longer required:
cabextract fonts-wine fuseiso glib-networking:1386 libatk-bridge2.0-0:1386 libatk1.0-0
libproxy1v5:1386 librest-0.7-0:1386 libsoup-gnome2.4-1:1386 libsoup2.4-1:1386 linux-he
wine-staging-amdó4 wine-staging-1386:1386
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
1ohn-data
The following NEW packages will be installed:
John John-data
8 upgraded, 2 newly installed, 8 to remove and 189 not upgraded.
Need to get 4,466 k8 of archives.
After this operation, 7,875 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y



### TASK 3: Use John the Ripper

- 1 Open the terminal
- 2 Type the command john hash.txt --format=RAW-MD5 and hit enter

Note: type john followed by the hash file that you want to crack and then just define the format of the hash.

### TASK 4: Cracking Zip File using John the Ripper

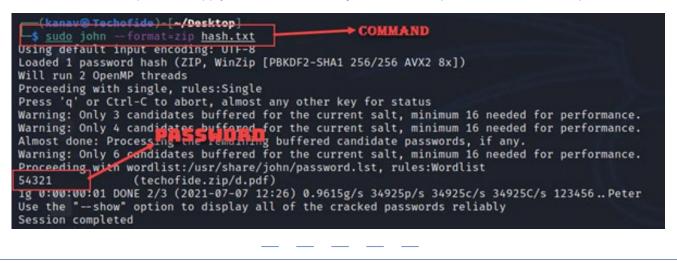
1 Select a zip folder (techofide.zip ) which is password protected and asking for a password to open it.

Archive E				-	
в т	Open -		nti tenti i	0	
*	÷ ↑ [	Location: 🛄 /			
Name		- Size	Түре	Date Modified	
d pd		257.3 kB	PDF docum	<ol> <li>03 July 3021, 05.1</li> </ol>	4
		Engramp	pe .	×	
	<u> </u>	Password required			
		Enter the password for t Password:	the archive 'tecl	hofide.zip'.	54

2 Generate a hash of our zip file using the command sudo zip2john techofide.zip > hash.txt.



3 Use hash of our zip file and apply the command sudo john --format=zip hash.txt to crack the password.



# **EXERCISE 17 : Configuring Firewalls**

# **Objectives**

At the end of this exercise you shall be able to

- setup the windows firewall
- crack firewall settings on the PC.

# Requirements

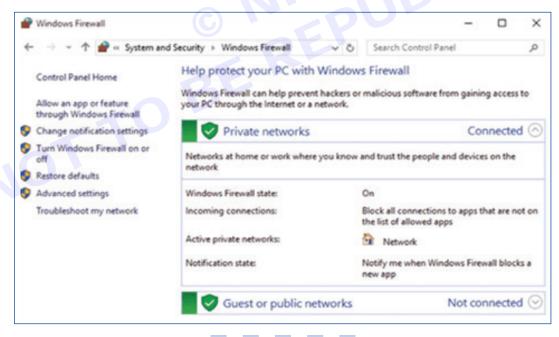
## **Tools/Materials**

Windows PC/Laptop with internet connectivity

# **Procedure**

## TASK 1: Set Up the Windows Firewall

- 1 Open the Control Panel.
- 2 Click the System and Security heading.
- 3 Click the Windows Firewall heading.
- 4 The Windows Firewall window appears.
- 5 To change the setting, click the Turn Windows Firewall "On" or "Off" link on the left side of the Windows Firewall window.

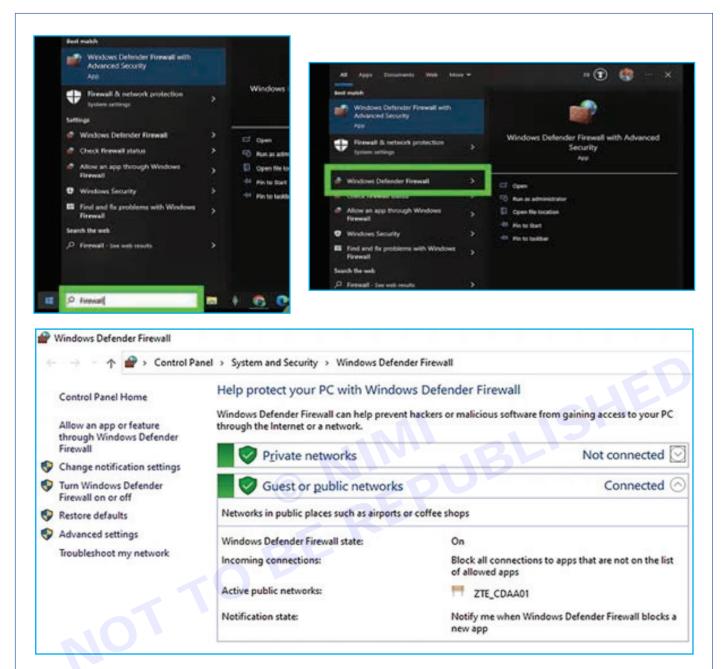


## TASK 2: Checking Firewall Settings on a PC

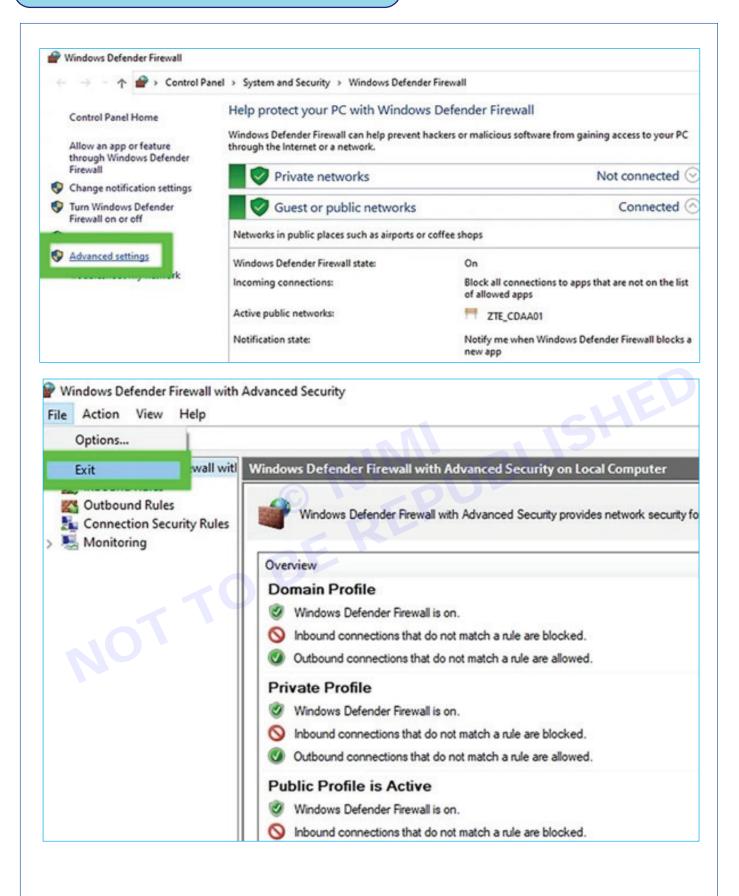
- 1 Open your Start menu.
- 2 Type "firewall" into the search bar.
- 3 Click the "Windows Firewall" option on the top of the search window.
- 4 "Private networks" and "Guest or public networks" with green shields to the left of them, signifying that the firewall is active.



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- 5 Click the "Advanced Settings" option to alter the following:
  - a "Inbound Rules" Which incoming connections are automatically allowed.
  - b "Outbound Rules" Which outgoing connections are automatically allowed.
  - c "Connection Security Rules" Baselines for which connections your computer will allow and which ones it will block.
  - d "Monitoring" An overview of your firewall's basic monitoring guidelines.
- 6 Exit the Advanced Settings menu when you're finished.



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# Module 2 : Data base concepts

# **EXERCISE 18 : Installation Steps of MySQL**

# **Objectives**

At the end of this exercise you shall be able to

- download MySQL installer
- · know about the MySQL installation steps & procedure
- check and verify MySQL by using command prompt.

# Requirements

### **Tools/Materials**

- Operating System: Windows 10 or 11 (64-bit)
- MySQL Setup Software
- Desktop/Laptop will latest configuration

# **Procedure**

## **Installation Methods**

### TASK 1 : Download MySQL

**Step 1:** Go to the official website of MySQL and download the community server edition software. Here, you will see the option to choose the Operating System, such as Windows.

**Step 2:** Next, there are two options available to download the setup. Choose the version number for the MySQL community server, which you want. If you have good internet connectivity, then choose the mysql-installer-web-community. Otherwise, choose the other one.

General Availability (GA) Releases Arch	ives U		
MySQL Installer 8.0.19			
Select Operating System:		Looking for p	revious GA
Microsoft Windows	•	versions?	
Windows (x86, 32-bit), MSI Installer	8.0.19	18.6M	Download
myspectaliae web-community-8.0.13.0.mst	ND5: 324437	79ch2239dh454opad	Received   Separate
Windows (x86, 32-bit), MSI Installer	B.0.19	398.9M	Download
cristal installer community 8.0.15.0 mp)	MOS Avenue	(Saa7400)/1864717a	Chattiny ( Section

## TASK 2 : Installing MySQL on Windows

**Step 1:** After downloading the setup, unzip it anywhere and double click the MSI installer .exe file. It will give the following screen:

**Step 2:** In the next wizard, choose the Setup Type. There are several types available, and you need to choose the appropriate option to install MySQL product and features. Here, we are going to select the Full option and click on the Next button.

This option will install the following things: MySQL Server, MySQL Shell, MySQL Router, MySQL Workbench, MySQL Connectors, documentation, samples and examples, and many more.



MySq. mail     MySq. mail     MySq. busineline     MySq. busineline     Cheming & String Darger     Cheming Barter     Cheming Barter <td< th=""><th>MySQL Installer - C</th><th>while Windows configures I</th><th>MySQL Installer -</th><th>Community</th><th></th></td<>	MySQL Installer - C	while Windows configures I	MySQL Installer -	Community	
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**Step 3:** Once we click on the Next button, it may give information about some features that may fail to install on your system due to a lack of requirements. We can resolve them by clicking on the Execute button that will install all requirements automatically or can skip them. Now, click on the Next button.

MySQL: Installer Adding Community	Check Requirements	requirements. MySCX installer will attempt to marked as manual samuel to resolved action	e telefice etically. Chi
Channey & Series Type	any each dam to by and much with	analy.	
Orest Designation	Per Product C MySQL Per Evold 1 3.8	Requirement Visual Studio 2010 Socia Ner Office R	Status
Intelligence (	C MySQL for Vision Televan 1.2.8	Visual Studio version 2015, 2017 or 2	Manual
Reduct Configuration	CC Convertisinity than 8.0.19 (	Pythian 284 845 is not installed	Manual
matalana Dargiste			
	J		

**Step 4:** In the next wizard, we will see a dialog box that asks for our confirmation of a few products not getting installed. Here, we have to click on the Yes button.





After clicking on the Yes button, we will see the list of the products which are going to be installed. So, if we need all products, click on the Execute button.

Product     Stetus     Progress     Not       Institution     MySQL Sener 8.0.19     Ready to install     Not       Product Configuration     MySQL Workbench 8.0.19     Ready to install     Not       Installation Complete     MySQL Sener 8.0.19     Ready to install     Not       Installation Complete     MySQL Sener 8.0.19     Ready to install     Not       Installation Complete     MySQL Rooter 8.0.19     Ready to install     Not       MySQL Rooter 8.0.19     Ready to install     Not     Not	nstallation refollowing products will be installed.				
Installation       MySQL Workbench 8.0.19       Ready to Install         Product Configuration       MySQL Notifier 1.1.8       Ready to Install         Installation Complete       MySQL Shell 8.0.19       Ready to Install         MySQL Shell 8.0.19       Ready to Install         MySQL Rooter 8.0.19       Ready to Install         Connector/ODBC 8.0.19       Ready to Install         Connector/IDSC 8.0.19       Ready to Install         MySQL Documentation 8.0.19       Ready to Install	Product	Status	Progress	Notes	
Freduct Configuration       MySQL NotFier 1.1.8       Ready to Install         Installation Complete       MySQL Shell 8.0.19       Ready to Install         Installation Complete       MySQL Router 8.0.19       Ready to Install         Important Complete       MySQL Shell 8.0.19       Ready to Install         Important Complete       MySQL Router 8.0.19       Ready to Install         Important Complete       Important Complete       MySQL Router 8.0.19       Ready to Install         Important Complete       Important Complete       Important Ready to Install       Important Ready to Install         Important Complete       Important Ready to Install       Important Ready to Install       Important Ready to Install         Important Complete       Important Ready to Install       Important Ready to Install       Important Ready to Install         Important Ready to Important Ready to Install       Important Ready to Install       Important Ready to Install         Important Ready to Important Ready to Install       Important Ready to Install       Important Ready to Install         Important Ready to Important Ready to Important Ready to Install       Important Ready to Install       Important Ready to Install	MySQL Server 8.0.19	Ready to Install			
Installation Complete       Image: Section 2000 Section	MySQL Workbench 8.0.19	Ready to Install			
MySQL Shell 8.0.19         Ready to Install           MySQL Router 8.0.19         Ready to Install           MySQL Router 8.0.19         Ready to Install           Connector/OD8C 6.0.19         Ready to Install           Connector/ID8C 6.0.19         Ready to Install	The second s	Ready to Install			
Connector/IOCBC 6.0.19 Ready to Install Connector/IOCBC 6.0.19 Ready to Install Connector/IC++ 8.0.19 Ready to Install Connector/INET 8.0.19 Ready to Install MySQL Documentation 8.0.19 Ready to Install	Notes of Control of Co	Ready to Install			
Connector/C++ 8.0.19 Ready to Install Connector/J 8.0.19 Ready to Install Connector/NET 8.0.19 Ready to Install MySQL Documentation 8.0.19 Ready to Install		Ready to Install			
Connector/J 8.0.19 Ready to Install Connector/NET 8.0.19 Ready to Install MySQL Documentation 8.0.19 Ready to Install	Connector/ODBC 8.0.19	Ready to Install			
Connecter/NET 8.0.19 Ready to Install MySQL Documentation 8.0.19 Ready to Install	Annual Control of Cont	Ready to Install			
MySQL Documentation 8.0.19 Ready to Install	Connector/J 8.0.19	Reedy to Install			
		Ready to install			
Samples and Examples 5.0.19 Ready to Install		Ready to Install			
	Samples and Examples 8.0.19	Ready to Install			
Click (Execute) to initial the following packages.	ick (Execute) to initial the following packages	é			

**Step 5:** Once we click on the Execute button, it will download and install all the products. After completing the installation, click on the Next button.

MySQL. Installer	Installation			
Adding Community	The following products will be installed.			
	Product	Status	Progress	Notes
Choosing a Setup Type	S MySQL Server 8.0.19	Complete		
nstallation	SQL Workbench 8.0.19	Complete		
Product Configuration	MySQL Notifier 1.1.8	Complete		
	MySQL Shell 8.0.19	Complete		
nstallation Complete	MySQL Router 8.0.19	Complete		
	Connector/ODBC 8.0.19	Complete		
	Connector/C++ 8.0.19	Complete		
	Connector/J 8.0.19	Complete		
	MySQL Documentation 8.0.19	Complete		
	Samples and Examples 8.0.19	Complete		
	Show Details >			

**Step 6:** In the next wizard, we need to configure the MySQL Server and Router. Here, I am not going to configure the Router because there is no need to use it with MySQL. We are going to show you how to configure the server only. Now, click on the Next button.

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MySQL: Installer Adding Community	Product Configuration	and for each of the following products.
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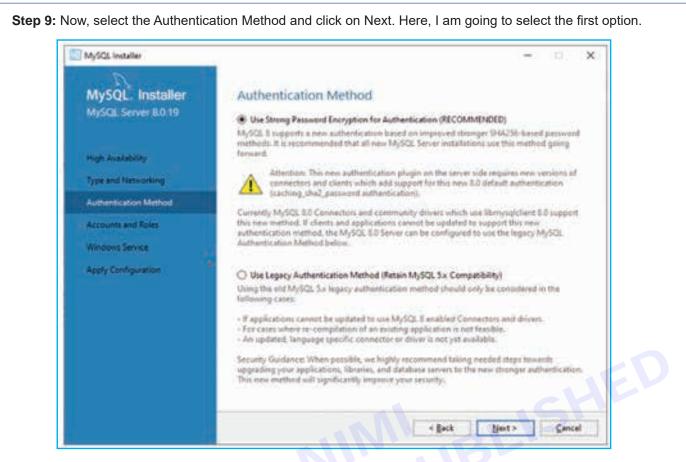
**Step 7:** As soon as you will click on the Next button, you can see the screen below. Here, we have to configure the MySQL Server. Now, choose the Standalone MySQL Server/Classic MySQL Replication option and click on Next. Here, you can also choose the InnoDB Cluster based on your needs.

MyS2a hotelai	
MySQL Instation MySQL Lenser 8.0.19	High Availability  Thereadow MySta Server / Classis MySta Replication  The Server and the server is not the United and the Server and the server will be a server of the server and the server is the server is the server and the server is the
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Type and Televoltory Roberts active Hands Rosens Types Type Lagging Cynnes Adapting Cyntere Adapting Cyntere	The block of the first sector of the sector
	- Hert - Canot

**Step 8:** In the next screen, the system will ask you to choose the Config Type and other connectivity options. Here, we are going to select the Config Type as 'Development Machine' and Connectivity as TCP/IP, and Port Number is 3306, then click on Next.

May Annual Sectors 1	El TCR/IP Fort 1006 KPutteral Port 1006
Tendent Internet Autom	nethody The following protocol to solice how you windle like to parametric by Dirit action: [2] 129-00 Ref. [1006 ] K Parametric Pare. [1006
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	[2] Open Mindows Friendl path for retroit access
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Apply Centry and a	Shared Marriery Marriery Name: 3/15/2
	ansed Configuration
	el tha chaol Ban Batera to gat additional configuration pages advers you can cat advance logging tationic for the server instance.
	Shave Advanced and Logging Culture





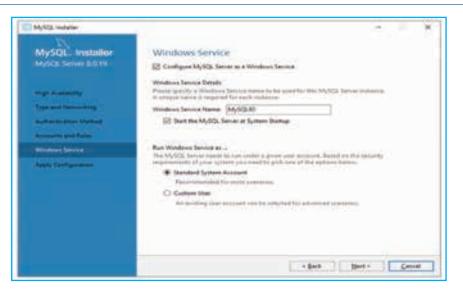
Step 10: The next screen will ask you to mention the MySQL Root Password. After filling the password details, click on the Next button.

MySQL. Installer	Accounts and Ro	des		
MySQL Server B.0.19	Root Account Password Enter the partword for the place.	root account. Pleas	e remember to store this p	annound in a necore
High Availability	MySQL Root Password		•	
Type and Networking	Repert Password:		dimension .	
Authentication Method		Password streng	De: 50/065	
Windows Service				
Windows Service Apply Configuration	MySQL User Accounts Create MySQL user Accounts consults of a set of provide MySQL User Name	ges.	nd applications. Antign a m User Role	de to the user that
	Greate MySGL user accor consists of a set of provide	ges.	- Statement St.	

**Step 11:** The next screen will ask you to configure the Windows Service to start the server. Keep the default setup and click on the Next button.

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**Step 12:** In the next wizard, the system will ask you to apply the Server Configuration. If you agree with this configuration, click on the Execute button.

MySQL Installer MySQL Server 8.0.19	Apply Configuration Click (Execute) to apply the changes Configuration Steps Log
Ingh, Analability Type and Methodolog Anti-antication Mathem Accessing and Raine Westmet Senses Analy Coldgeomet	<ul> <li>Undering scaledparations file</li> <li>Updating Windows Environment</li> <li>Adjusting Windows Environment</li> <li>Mantaning Induktions</li> <li>Undering Windows</li> <li>Mantaning Induktions</li> <li>Updating Security settlings</li> <li>Updating the State reverse lengt</li> </ul>
	· Enter Epocate Concer

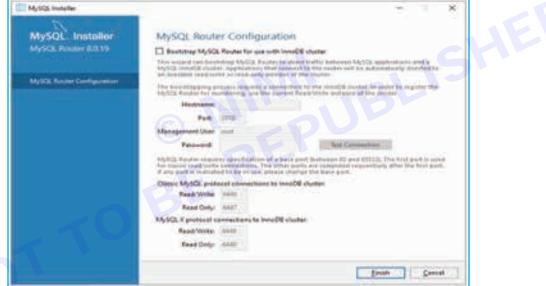
**Step 13:** Once the configuration has completed, you will get the screen below. Now, click on the Finish button to continue.

Night Analysissing         Nyme and Nerrounding         Automatication Methods         Automatication Methods         Accounts and Automatication         Accounts and Automatications         Account and Automatications <th>MySQL Instatler MySQL Server 8.0.19</th> <th>Apply Configuration The configuration operation has completed. Configuration News Log</th> <th></th> <th></th>	MySQL Instatler MySQL Server 8.0.19	Apply Configuration The configuration operation has completed. Configuration News Log		
The contiguration for MyUCL Server 6.0.19 wes surroughul. Click Proceholo continue.	<ul> <li>Type and Demonstrang</li> <li>Schwartsstan Methods</li> <li>Accounts and Astern</li> <li>Relevant Denvis #</li> </ul>	Updating Windows Firewall rules     Adjusting Windows service     Adjusting Windows service     Stating the later (may faile a long line)     Stating the server     Applying service		
		The configuration for MySQL Server 8.0.19 wet successful. Click Reich to continue.		

**Step 14:** In the next screen, you can see that the Product Configuration is completed. Keep the default setting and click on the Next-> Finish button to complete the MySQL package installation.

MySEL Menter		5.5.3
MySQL Installer Adding Community	Product Configuration	
	We'll now aufli through a cardigorithen via 'New card caread at any paint if you wish to 'n penducts.	
Diamong a Series Type -	Product	100m
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Inselation Compton		
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Step 15: In the next wizard, we can choose to configure the Router. So click on Next->Finish and then click the Next button.



**Step 16:** In the next wizard, we will see the Connect to Server option. Here, we have to mention the root password, which we had set in the previous steps.

MySQL. Installer Samples and Examples	Connect To Server Seat the MyS2, sever solverer from the lot to reveal simple obtained and data.
Convert 1 i Serveri	Show MySEX Servey instances that may be subsing in read-only mode
Appro Configuration	Senser Part Anthon Spee Dathys Senser R.2.13 2006 354 Stand along Senser Correction Sciences
	Projecter that developments that threads for used (impairing that private get). Chilk "Chick" As ensure they ware.
	Paganetak asat Paganetak asata asata Check af

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It is also required to check about the connection is successful or not by clicking on the Check button. If the connection is successful, click on the Execute button. Now, the configuration is complete, click on Next.

Step 17: In the next wizard, select the applied configurations and click on the Execute button.

C 44,513 metallar	
MySQL Installer Samplet and Coungles	Apply Configuration Cisis (Executive apply the changes Configuration Steps: Lag
Colonies for Service	Charlong of More are any features installed that need savid quantum.     Burning Scripts
Apply Configuration	
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Step 18: After completing the above step, we will get the following screen. Here, click on the Finish button.

MySQL Installer	
MySQL Installer	Apply Configuration The configuration designation free completed Configuration large Large
Comment for Server	Orienting if there are any factors and that that read configuration.     Orienting Scripts
Apply Configuration	NIN BE
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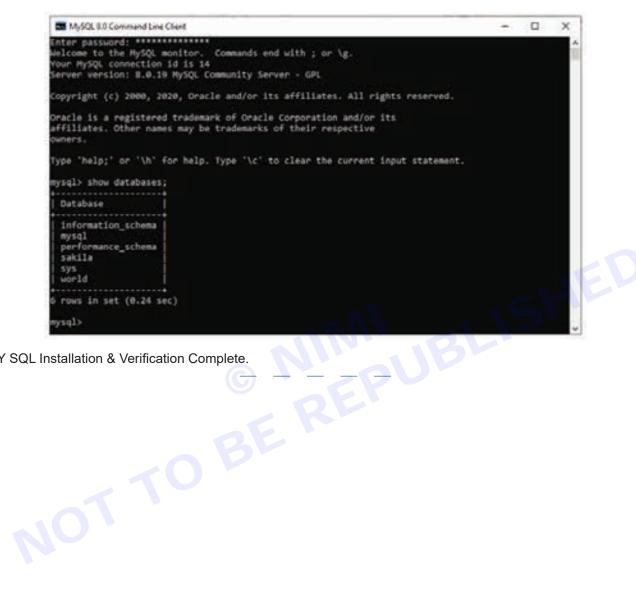
Step 19: Now, the MySQL installation is complete. Click on the Finish button.



### TASK 3 : Verify MySQL

After Installation, Open your MySQL Command Line Client; it should have appeared with a mysql> prompt. If you have set any password, write your password here. Now, you are connected to the MySQL server, and you can execute all the SQL command at mysql> prompt as follows:

For example: Check the already created databases with show databases command:



MY SQL Installation & Verification Complete.

# **EXERCISE 19 : Troubleshooting Basic Installation Issues**

# **Objectives**

## At the end of this exercise you shall be able to

- · troubleshoot basic installed issuses in MySQL
- · verify installation status
- do advance trouble shooting

# Requirements

## **Tools/Materials**

- Operating System: Windows 10 or 11 (64-bit)
- MySQL Setup Software
- Desktop/Laptop will latest configuration

# **Procedure**

## Troubleshooting Basic Installation Issues in MySQL on Windows:

TASK 1 : Check Error Logs

- Location: The default location for the error log is C:\ProgramData\MySQL\MySQL Server 8.0\data\ mysql.err.
- Analysis: Open the error log and search for specific error messages. Here are some common errors and their meanings:
- Access denied: Check the root password or permissions related to data directories.
- **Port conflicts:** Another program might be using the default port (3306). Disable conflicting programs or change the MySQL port.
- Missing files or directories: Verify that all installation files are present and in the correct locations.
- Configuration errors: Double-check your configuration settings in my.ini based on your specific setup.

TASK 2 : Verify Installation Status

- Open the "Services" app: On Windows 10,
- press Win+R, type services.msc, and press Enter.On Windows 11,
- right-click the Start button, select "Settings", then "Apps & features", and scroll down to "Optional features".
- Under "More Windows features", click "Add features". Look for "MySQL Server" and install it if not already
  present.
- Check the status: In the "Services" app, locate "MySQL80" (or your version number) and check its status. If it's
  not running, try starting it manually.

## TASK 3 : Address Common Issues

- Insufficient Permissions: Ensure the MySQL service has the necessary permissions to access its data directories and files.
- Antivirus/Firewall Interference: Temporarily disable antivirus or firewall software to see if it's blocking MySQL.
- Incorrect Data Directory: Verify the data directory path in the my.ini file matches the actual location.
- Missing Visual C++ Redistributables: Install the correct version of Visual C++ Redistributables, downloadable from Microsoft's website.

## TASK 4 : Advanced Troubleshooting

- Use mysqldump to check data integrity: After successful installation, consider using mysqldump to back up existing data if possible. If data corruption occurred during installation, you can potentially restore it after resolving the issue.
- Reinstall MySQL: If all else fails, consider reinstalling MySQL using the latest installer from the official website. Make sure to back up any existing data you may have.



# **EXERCISE 20 : Creating and Using a Database in MySQL**

# **Objectives**

## At the end of this exercise you shall be able to

- create the database & use it
- · create the table and use it & perform insert ,Select,update and delete queries

# **Requirements**

## **Tools/Materials**

- Operating System: Windows 10 or 11 (64-bit)
- MySQL Setup Software
- Desktop/Laptop will latest configuration

# **Procedure**

## TASK 1 : Creating and Using a Database in MySQL

1 Open the MySQL Command Line Client:

Windows: Search for "MySQL Shell" or "mysql.exe" in the Start menu.

macOS/Linux: Open a terminal and type mysql (if installed globally) or path/to/your/mysql/bin/mysql.

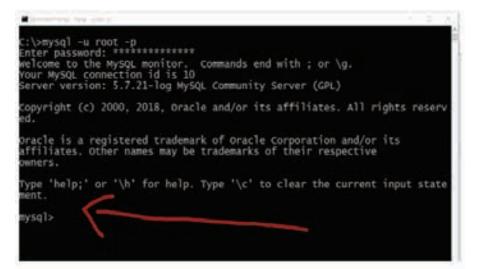
dit System Variat	le με
Variable name:	Path
Variable value:	hell\v1.0\;C:\xampp\php\;C:\xampp\mysq
	OK Cancel
ystem variables	
Variable	Value
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Variable NUMBER_OF_P OS Path	2 Windows_NT C:\Windows\system32;C:\Windows;C:\
Variable NUMBER_OF_P OS	2 Windows_NT

2 Connect to the MySQL Server:

Type mysql -u root -p

Enter your root password when prompted.



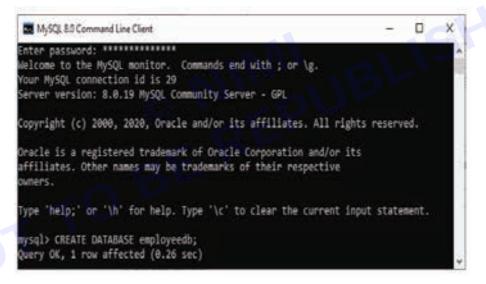


3 Create a Database:

Use the CREATE DATABASE command:

CREATE DATABASE database name;

Replace database name with the desired name for your database (e.g., employeedb).



4 Select the Database:

Use the USE command:

USE database name;

This switches the focus to the newly created database.

5 Create a Table:

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Use the CREATE TABLE command:

SQL

CREATE TABLE table name ( column1 name data type PRIMARY KEY, column2 name data type, column3 name data type, ...

);

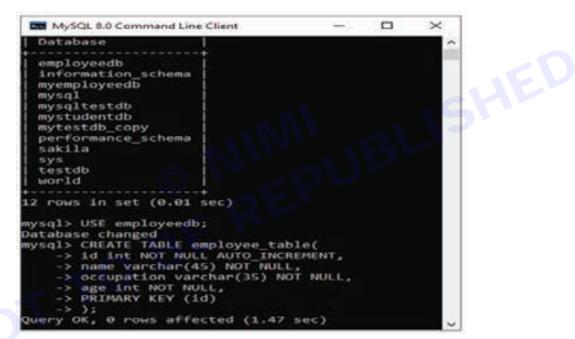
Replace:

table name with the desired name for your table (e.g., employee table).

column name with the names of each data column.

data type with the appropriate data type for each column (e.g., INT, VARCHAR, DATE).

PRIMARY KEY specifies the unique identifier for each row (usually an auto-incrementing INT).



6 Insert Data:

Use the INSERT INTO command:

INSERT INTO table name (column1 name, column2 name, column3 name)

VALUES (value1, value2, value3);

Replace:

table name with the name of your table.

column name with the names of the columns you want to insert data into.

value with the actual data for each column (e.g., numbers, strings, dates).

7 Retrieve Data:

Use the SELECT command:

SELECT * FROM table name;

This retrieves all data from the table.

You can modify the SELECT command to specify specific columns or filter data based on conditions.

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MySQL 8.0 Command Line Client		-	×
<pre>mysql&gt; CREATE TABLE Student (     -&gt; Stud_ID int AUTO_INCREMENT PRIMARY KE     -&gt; Name varchar(45) DEFAULT NULL,     -&gt; Email varchar(45) NOT NULL UNIQUE,     -&gt; City varchar(25) DEFAULT NULL     -&gt; ); Query OK, θ rows affected (0.88 sec) mysql&gt; INSERT INTO Student(Stud_ID, Name, Email     -&gt; VALUES (1,'Stephen', 'stephen@javatpoint     -&gt; (2, 'Joseph', 'Joseph@javatpoint.com',     -&gt; (3, 'Peter', 'Peter@javatpoint.com', 'c Query OK, 3 rows affected (0.18 sec) Records: 3 Duplicates: 0 Warnings: 0 mysql&gt; SELECT * FROM Student;</pre>	il, City) nt.com", 'Texax' 'Alaska'),	),	
Jadas accel than accounty	·		
*			
Stud_ID   Name   Email	City		

8 Modify Data:

Use the UPDATE command:

UPDATE table name SET column name = new value WHERE condition;

Replace:

table name with the name of your table.

column name with the name of the column you want to update.

new value with the new data for the column.

condition specifies which rows to update (e.g., WHERE id = 1).

MySQL 8.0 Co	ommand Line Clie	*	$\simeq$	×
-> WHERE Query OK, 1 r	<pre>mail = 'mike(   course_name   row affected</pre>			
nysql> SELEC1   course_name	FROM tra	++		
Java	Mike	mike@tutorialandexamples.com		
Python	Janes	james@javatpoint.com		
Android	Robin	robin@javatpoint.com		
Hadoop	Stephen	stephen@javatpoint.com		
Testing	Micheal	micheal@javatpoint.com		
***********				

9 Delete Data:

Use the DELETE FROM command:

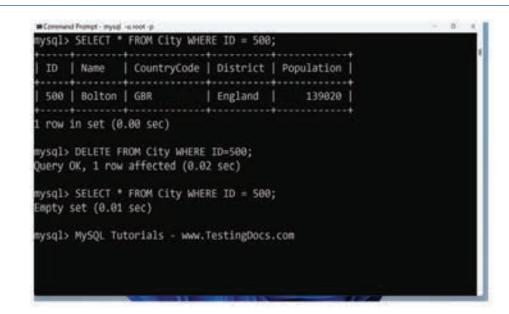
DELETE FROM table name WHERE condition;

Replace:

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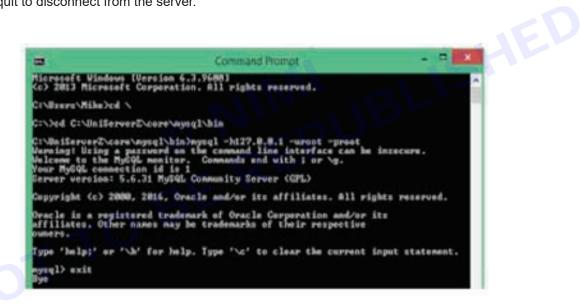
table name with the name of your table.

condition specifies which rows to delete (e.g., WHERE age > 30).



10 Exit MySQL:

Type exit or quit to disconnect from the server.



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# **EXERCISE 21 : Designing of Tables**

# **Objectives**

#### At the end of this exercise you shall be able to

- connect the MySQL database server
- create database and table
- perform insert, select, delete queries

# Requirements

#### **Tools/Materials**

- Operating System: Windows 10 or 11 (64-bit)
- MySQL Setup Software
- Desktop/Laptop will latest configuration

### **Procedure**

#### TASK 1 : Creating Table, Insert values and retrieve data from that table

Step 1: Open MySQL Command Line:

Go to the Start menu, find MySQL, and open the MySQL Command Line client.

Step 2: Login to MySQL Server:

Enter the following command and press Enter. Replace username with your MySQL username, and you'll be prompted to enter your password.

#### mysql -u username -p

and the second sec
C:\>mysql -u root -p Enter password: ************************************
Copyright (c) 2000, 2018, Oracle and/or its affiliates. All rights reserv ed.
Oracle is a registered trademark of Oracle Corporation and/or its affiliates. Other names may be trademarks of their respective owners.
Type 'help;' or '\h' for help. Type '\c' to clear the current input state ment. mysql>

#### Step 3: Create a Database:

If you haven't created a database yet, create one using the following command. Replace yourdatabase with the desired name for your database.

CREATE DATABASE employeedb;



Step 4: Switch to the New Database:

Use the following command to switch to the newly created database.

USE employeedb;

Step 5: Design Tables:

Create tables with the desired columns and data types. Here's an example for a simple "users" table:

CREATE TABLE users (

user id INT AUTO INCREMENT PRIMARY KEY,

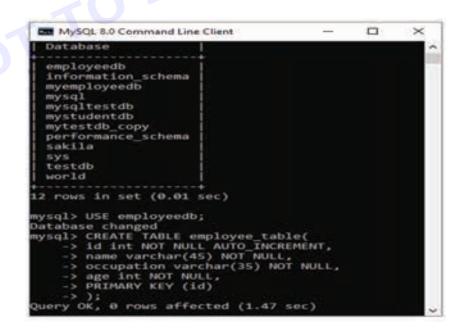
username VARCHAR(50) NOT NULL,

email VARCHAR(100) UNIQUE NOT NULL,

password VARCHAR(255) NOT NULL,

created at TIMESTAMP DEFAULT CURRENT TIMESTAMP

);



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Step 6: Insert Data into the Table:

Once the table is created, you can insert data using the INSERT INTO statement:

INSERT INTO people (id, name, occupation, age)

VALUES (101, 'Peter', 'Engineer', 32);

MySQL 8.0 Command Line Client	- 0	X
<pre>mysql&gt; CREATE TABLE People(     -&gt; id int NOT NULL AUTO_INCREMENT,     -&gt; name varchar(45) NOT NULL,     -&gt; occupation varchar(35) NOT NULL,     -&gt; age int,     -&gt; PRIMARY KEY (id)     -&gt; ); Query OK, 0 rows affected (0.74 sec)</pre>		
mysql> INSERT INTO People (id, name, occu -> VALUES (101, 'Peter', 'Engineer', Query OK, 1 row affected (0.21 sec)		
<pre>mysql&gt; INSERT INTO People VALUES     -&gt; (102, 'Joseph', 'Developer', 30),     -&gt; (103, 'Mike', 'Leader', 28),     -&gt; (104, 'Stephen', 'Scientist', 45); Ouery OK, 3 rows affected (0.27 sec)</pre>		
Records: 3 Duplicates: 0 Warnings: 0		
mysql> INSERT INTO People (name, occupatio -> VALUES ('Stephen', 'Scientist'), ( Query OK, 2 rows affected (0.10 sec)		
Records: 2 Duplicates: 0 Warnings: 0		

**Step 7:** Retrieve Data from the Table:

Use the SELECT statement to retrieve data from the table:

SELECT * FROM users;

**Step 8:** Update and Delete Data:

Modify existing data using the UPDATE statement and remove data using the DELETE statement: UPDATE trainer SET email = 'mike@tutorialandexamples.com' WHERE course name = 'Java';

MySQL 8.0 Com	mand Line Clie	nt	-	×
-> WHERE c Query OK, 1 ro	il = 'mike ourse_name w affected 1 Changed	(θ.26 sec) : 1 Warnings: θ		
course_name	trainer	email		
Java	Hike	mike@tutorialandexamples.com		
Python   Android   Hadoop   Testing	James Robin Stephen Micheal	james@javatpoint.com robin@javatpoint.com stephen@javatpoint.com micheal@javatpoint.com		
+	+	++		

DELETE FROM city WHERE ID = 500;



ID   Name   CountryCode   District   Population	
500   Bolton   GBR   England   139020	
row in set (0.00 sec)	
wsql> DELETE FROM City WHERE ID=500; wery OK, 1 row affected (0.02 sec)	
nysql> SELECT * FROM City WHERE ID = 500; mpty set (0.01 sec)	
wsql> MySQL Tutorials - www.TestingDocs.com	

Step 9: Managing Tables:

To see a list of tables in the current database, use the following command:

SHOW TABLES;

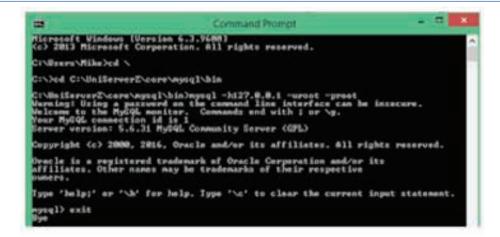
To get information about a specific table, you can use:

DESCRIBE yourtable;

g lables:	urrant databasa	ugo th	o foll		mmondu	
idies in the c	urrent database,	use in	e ioli	owing col	mmanu:	
n about a sp	ecific table, you o	can us	e:			
table;						
nysql) use o Database cha nysql) show -> ; ! Tables_in. ! user	tables userlogin : t (8.88 sec)	u noot -p -	h 127.0.0			
1 Field	Туре	Null	Key	Default	Extra	
id username passud enail	int(11) unsigned varchar(25) varchar(25) varchar(48)	NO 20 20	PRI	NULL NULL NULL	auto_increment	
1	et (8.85 sec) rt into user(userna es('primetuber', 'i	ne, pas 2345',	șud, e	nail)		rol 4
					Nodule	14

#### Step 10: Exit MySQL Command Line:

When you're done working in the MySQL Command Line, you can exit by typing: EXIT;



Create a table named CSA (Roll No., Stu name, Father Name, DOB, Adress, Phone No., Email) and insert 10 values in it.



# **EXERCISE 22 : Applying Data Integrity Rules**

### **Objectives**

#### At the end of this exercise you shall be able to

- start MySQL server ans access MySQL
- desine conctraints
- check and verify integrity rules.

### **Requirements**

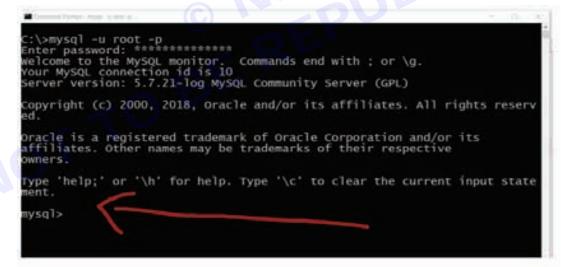
#### **Tools/Materials**

- Desktop/Laptop with latest configuration
- Operating system: window 10:11
- XAMPP server r3.3.0

# Procedure

TASK 1 : Applying data intergrity rules

- 1 Start MySQL Server: start the MySQL server. You can do this by going to the Services application in Windows, finding MySQL service, and starting it.
- 2 Access MySQL: Open the MySQL command line client or a GUI tool like MySQL Workbench to access your MySQL server.



#### 3 Define Your Rules

Start by understanding the data relationships and desired constraints. Consider:

Primary Keys: Identify unique identifiers for each table (e.g., product id in a products table).

**Foreign Keys:** Create references between related tables (e.g., order id in an orders table referencing product id in the products table).

Data Types: Specify allowed data types for each column (e.g., INT for numbers, VARCHAR for text).

NOT NULL: Mark columns that cannot be empty.

UNIQUE: Ensure specific values appear only once within a column.



CHECK: Define custom conditions for valid data (e.g., age must be positive).

4 Create a Database: Use the following SQL command to create a new database:

CREATE DATABASE your database name;

Use the Database: Switch to the newly created database using the following command:

USE your database name;

5 **Create Tables:** Create the tables for which you want to apply data integrity rules. For example:

CREATE TABLE departments (

id INT AUTO INCREMENT PRIMARY KEY,

name VARCHAR(100)

);

CREATE TABLE employees (

INT AUTO INCREMENT PRIMARY KEY,

name VARCHAR(100),

department id INT,

FOREIGN KEY (department id) REFERENCES departments(id)

);

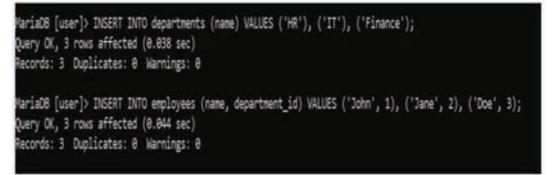
```
ariaD8 [(none)]> create database user;
uery OK, 1 row affected (0.002 sec)
MariaD8 [(none)]> use user;
Database changed
lariaDB [user]> CREATE TABLE departments (
          id INT AUTO_INCREMENT PRIMARY KEY,
          name VARCHAR(100)
   ->
   -> );
Query OK, 0 rows affected (0.254 sec)
MariaDB [user]> CREATE TABLE employees (
          id INT AUTO_INCREMENT PRIMARY KEY,
          name VARCHAR(100),
          department_id INT,
          FOREIGN KEY (department_id) REFERENCES departments(id)
Query OK, 0 rows affected (0.259 sec)
```

In this example, **the employees** table has a foreign key constraint referencing the id column of the **departments** table.

6 Insert Data: Insert some data into the tables you've created. Make sure to maintain referential integrity:

INSERT INTO departments (name) VALUES ('HR'), ('IT'), ('Finance');

INSERT INTO employees (name, department id) VALUES ('John', 1), ('Jane', 2), ('Doe', 3);



Test Data Integrity: Try to insert data that violates the integrity rules you've defined. For example, try to insert 7 an employee with a department id that doesn't exist:

INSERT INTO employees (name, department id) VALUES ('Adam', 10);

lariaD8 [user]> INSERT INTO employees (name, department_id) VALUES ('Adam', 10); RROR 1452 (23000): Cannot add or update a child row: a foreign key constraint fails ('user'. 'employees', CONSTRAINT 'emp loyees_ibfk_1' FOREIGN KEY ('department_id') REFERENCES 'departments' ('id')) MariaD8 [user]>

You should get an error because the department id 10 doesn't exist in the departments table.

. an as necessary to ensure ...d constraints. Update and Delete Data: When updating or deleting data, make sure to maintain referential integrity by updating or deleting related records appropriately.

Review and Modify Rules: Regularly review your data integrity rules and modify them as necessary to ensure they continue to meet the requirements of your application.

We can use the graphical interface of phpMyAdmin to manage tables and constraints.

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# **EXERCISE 23 : Using the DDL, DCL, DML statements**

# **Objectives**

At the end of this exercise you shall be able to

- use DDL statements create, alter and drop
- use DCL statements grant & revoke
- use DML statements insert update delete

# Requirements

#### **Tools/Materials**

- Desktop/Laptop with latest configuration
- Operating system: window 10:11
- XAMPP server r3.3.0

### **Procedure**

TASK 1 : Accessing MySQL:

MySQL Workbench: Download and install the graphical user interface (GUI) for MySQL management.

**Command Prompt:** Open the Command Prompt and navigate to the MySQL installation directory (e.g., C:\ Program Files\MySQL\MySQL Server 8.0\bin).

Connecting to the Database:

MySQL Workbench: Provide your server hostname, username, password, and database name to connect.

Command Prompt: Use the mysql command followed by your credentials (e.g., mysql -h localhost -u root -p).

TASK 2 : Using DDL (Data Definition Language) Statements:

#### 1 Create a Database:

CREATE DATABASE your database name;

#### Use the Database:

USE your database name;

#### Create a Table:

2 CREATE TABLE employees (

id INT AUTO INCREMENT PRIMARY KEY,

name VARCHAR(100),

salary DECIMAL(10, 2)

);

#### 3 Alter Table (Add a Column)

ALTER TABLE employees

ADD COLUMN hire date DATE;

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```
MariaDB [(none)]> create database user;
Query OK, 1 row affected (0.002 sec)
MariaDB [(none)]> use user;
Database changed
MariaDB [user]> CREATE TABLE departments (
          id INT AUTO_INCREMENT PRIMARY KEY,
          name VARCHAR(100)
Query OK, 0 rows affected (0.254 sec)
MariaDB [user]> CREATE TABLE employees (
          id INT AUTO_INCREMENT PRIMARY KEY,
          name VARCHAR(100),
          department_id INT,
          FOREIGN KEY (department_id) REFERENCES departments(id)
Query OK, 0 rows affected (0.259 sec)
ariaDB [user]> select * from employees;
 id | name | department_id |
    1
     John
                           1
  2
      Jane
  3
     Doe
 rows in set (0.000 sec)
MariaDB [user]> alter table employees add column Hire_date date after name;
Query OK, 0 rows affected (0.079 sec)
ecords: 0 Duplicates: 0 Warnings: 0
lariaDB [user]> select * from employees;
 id | name | Hire_date | department_id |
                                     1 |
  1
     John NULL
      Jane
           NULL
                                     2
  2
           NULL
  з
     Doe
 rows in set (0.000 sec)
```

4 Drop Table:

DROP TABLE employees;

TASK 3 : DCL (Data Control Language) Statements:

1 GRANT: Assigns permissions to users on databases and objects.

GRANT SELECT, INSERT ON customers TO user1@localhost;

2 **REVOKE:** Removes permissions from users.

If we want to revoke all privileges assign to the user, execute the following statement:

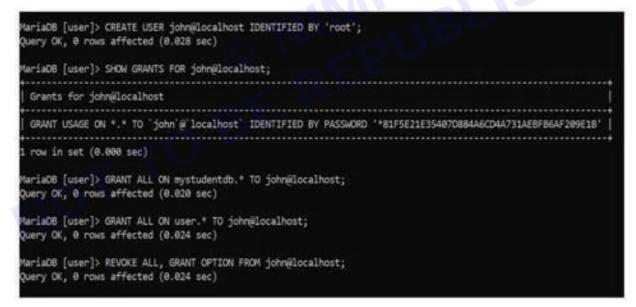
REVOKE ALL, GRANT OPTION FROM john@localhost;

REVOKE INSERT ON customers FROM user1@localhost;

ariaDB [user]> SHOW GRANTS FOR john@localhost;	
Grants for john@localhost	
GRANT USAGE ON *.* TO `john`@`localhost` IDENTIFIED BY PASSWORD '' GRANT SELECT, INSERT, UPDATE ON `user`.* TO `john`@`localhost`	*81F5E21E35407D884A6CD4A731AE8FB6AF209E1B'
rows in set (0.000 sec)	
ariaDB [user]> REVOKE UPDATE, INSERT ON user.* FROM john@localhost wery OK, 0 rows affected (0.866 sec)	t;
ariaDB [user]> SHON GRANTS FOR john@localhost;	
Grants for john@localhost	
	••••••••••••••••••
GRANT USAGE ON *.* TO `john'@`localhost` IDENTIFIED BY PASSWORD '' GRANT SELECT ON 'user',* TO `john'@`localhost'	*81F5E21E35407D684A6CD4A731AEBFB6AF209E1B'
	•••••••
rows in set (0.000 sec)	

#### 3 Create User:

CREATE USER 'new user'@'localhost' IDENTIFIED BY 'user password';



#### 4 Drop User:

DROP USER 'new user'@'localhost';

TASK 4 : Using DML (Data Manipulation Language) Statements:

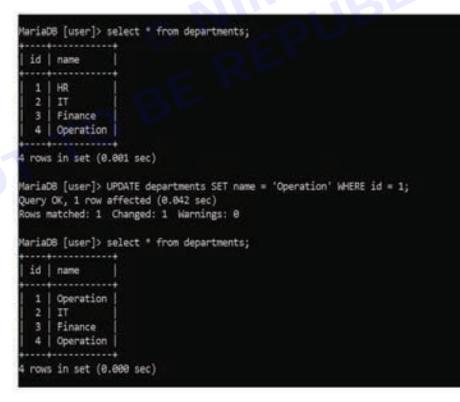
1 INSERT: Adds new data to a table.

INSERT INTO departments (id, name) VALUES (4, 'Operation');





UPDATE departments SET name = 'Operation' WHERE id = 1;

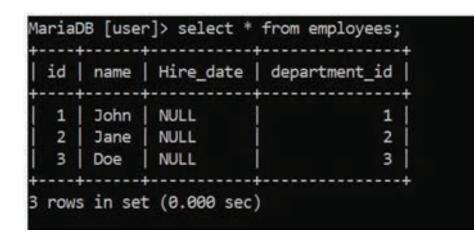


3 DELETE: Removes data from a table.

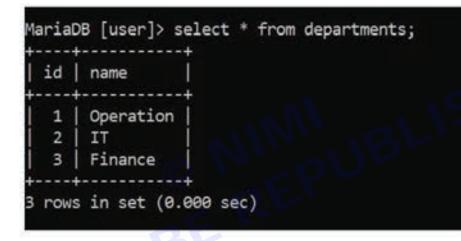
DELETE FROM departments WHERE id = 4;

4 Select Data: Retrieve data from the table.

SELECT * FROM employees;



#### **SELECT * FROM Departments;**



# EXERCISE 24 : Enforcing Constraints, Primary Key and Foreign Key

# **Objectives**

#### At the end of this exercise you shall be able to

- connect the MySQL database server
- design the table
- create primary & foreign key

### **Requirements**

#### **Tools/Materials**

- Desktop/Laptop with latest configuration
- Operating system: window 10:11
- XAMPP server r3.3.0

### **Procedure**

#### TASK 1 : Access MySQL:

MySQL Workbench: Download and install the user-friendly GUI for database management.

Command Prompt: Open the Command Prompt and navigate to the MySQL installation directory (e.g., C:\Program Files\MySQL\MySQL Server 8.0\bin).

#### Connect to your Database:

MySQL Workbench: Enter your server hostname, username, password, and database name to connect.

Command Prompt: Use the mysql command followed by your credentials (e.g., mysql -h localhost -u root -p).

#### TASK 2 : Design Your Tables:

1 **Primary Key:** Identify the unique identifier for each table. This column should not allow null values and should have a unique constraint applied:

product id INT PRIMARY KEY AUTO INCREMENT,

name VARCHAR(255) NOT NULL UNIQUE,

price DECIMAL(8,2) NOT NULL

);

Establish Relationships:

2 Foreign Key: Define references between related tables. The referencing column must match the data type of the referenced column:

CREATE TABLE orders (

order id INT PRIMARY KEY AUTO INCREMENT,

customer id INT NOT NULL,

product id INT NOT NULL,

FOREIGN KEY (customer id) REFERENCES customers(customer id),

FOREIGN KEY (product id) REFERENCES products(product id)

ON DELETE SET NULL

);



lariaDB [(none)]> create database user; Query OK, 1 row affected (0.002 sec) MariaDB [(none)]> use user; Database changed lariaDB [user]> CREATE TABLE departments ( id INT AUTO_INCREMENT PRIMARY KEY, name VARCHAR(100) Query OK, 0 rows affected (0.254 sec) MariaDB [user]> CREATE TABLE employees ( id INT AUTO_INCREMENT PRIMARY KEY, name VARCHAR(100), department_id INT, FOREIGN KEY (department_id) REFERENCES departments(id) -> ); Query OK, 0 rows affected (0.259 sec)

Ensure that each table's primary key constraint is enforced. MySQL automatically enforces primary key constraints, preventing the insertion of duplicate keys.

- יא DELETE. א tor valid data (e.g., י. 3 ON DELETE/UPDATE Actions: Specify how the database reacts when data in the parent table is modified (e.g., ON DELETE SET NULL sets foreign key to null, ON DELETE CASCADE deletes related rows).
- 4 CHECK Constraints: Define custom conditions for valid data (e.g., age must be positive).

# **EXERCISE 25 :** Adding indices to tables

# **Objectives**

#### At the end of this exercise you shall be able to

- connect the MySQL database server
- create tables in database
- create index on tables.

# Requirements

#### **Tools/Materials**

- Desktop/Laptop with latest configuration
- Operating system: window 10:11
- XAMPP server r3.3.0

# Procedure

#### TASK 1 : Access MySQL:

MySQL Workbench: Download and install the GUI for user-friendly management.

Command Prompt: Open it and navigate to the MySQL installation directory (e.g., C:\Program Files\MySQL\ MySQL Server 8.0\bin).

#### Connect to your Database:

MySQL Workbench: Provide your server hostname, username, password, and database name.

Command Prompt: Use the mysql command followed by your credentials (e.g., mysql -h localhost -u root -p).

Identify Columns for Indexing:

Choose columns frequently used in WHERE clauses, ORDER BY, or JOINs. Consider data types and selectivities (percentage of unique values).

#### Use the Database:

USE your database name;

#### TASK 2 :Create a Table:

Let's assume you have a table called employee:

CREATE TABLE employee (

id INT PRIMARY KEY,

name VARCHAR(100),

department id INT,

salary DECIMAL(10, 2)

);

#### TASK 3 : Insert Data into the Table:

INSERT INTO employee (id, name, department id, salary) VALUES (1, 'John Doe', 1, 50000.00), (2, 'Jane Smith', 2, 60000.00);



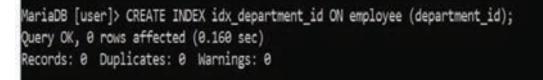


DESC employees;

TASK 4 : Add Index:

Single Column Index-

CREATE INDEX idx department id ON employee (department id);



Multiple Column (Composite) Index-

CREATE INDEX idx department salary ON employee (department id, salary);

View Index Information:

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SHOW INDEX FROM employee;

Table   Non		Seq_in_index		Colla	tion   Card	inality
	+			+		+
employee   NULL   NULL	0   PRIMARY     8TREE	1	. id 	A	1	2
	1   idx_department   YES   BTREE	_id   1	.   department_id	A	l.	2

#### TASK 5 : Test Query Performance:

Run queries and observe the performance improvement. For example:

SELECT * FROM employee WHERE department id = 1;

#### Drop Index (Optional):

If needed, you can drop an index:

DROP INDEX idx department id ON employee;

#### Questions

- 1 How do I check existing indices on a table?
- 2 How do I add a simple Index to a column?
- 3 How do I remove an Index from a table?
- 4 How can I check the performance improvement after adding an Index?
- 5 Can I add a unique Index to a column?

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# **EXERCISE 26 : Simple Select Queries**

### **Objectives**

#### At the end of this exercise you shall be able to

- · retrive data from the table
- · retrive data from the table by using where clause
- retrive data from the table by using aggregate functions.

# Requirements

#### **Tools/Materials**

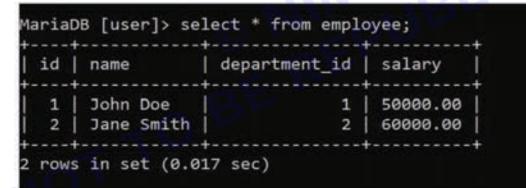
- · Desktop/Laptop with latest configuration
- Operating system: window 10:11
- XAMPP server r3.3.0

# Procedure

TASK 1 : Using select queries:

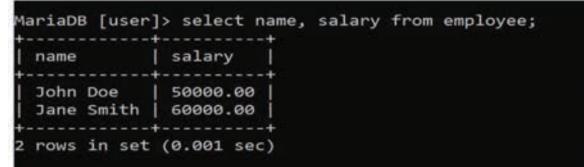
1 Select all columns from a table:

SELECT * FROM your table name;



2 Select specific columns from a table:

SELECT column1, column2 FROM your table name;



#### 3 Select with a condition(WHERE clause):

SELECT * FROM your table name WHERE your column name = 'some value';



MariaDB [user]> select * from employee where id = 2; +----+ | id | name | department_id | salary | +----+ | 2 | Jane Smith | 2 | 60000.00 | +----+ 1 row in set (0.001 sec)

#### 4 Select with multiple conditions:

SELECT * FROM your table name WHERE condition1 AND condition2;

MariaDB [user]> select * from employee where id = 1 and name = "John Doe"; +---+----+ | id | name | department_id | salary | +---+----+ | 1 | John Doe | 1 | 50000.00 | +---+----+ 1 row in set (0.001 sec)

#### 5 Select with ordering(ORDER BY clause):

SELECT * FROM your table name ORDER BY your column name DESC;

#### 6 Select with a limit:

SELECT * FROM your table name LIMIT 10;

#### 7 Select with a join:

SELECT t1.column1, t2.column2

FROM table1 t1

JOIN table2 t2 ON t1.common column = t2.common column;

#### 8 Select with Aggregate functions (e.g. SUM, AVG):

SELECT AVG(your column name) AS average value

FROM your table name;

SELECT MIN(your column name) AS minimum value

FROM your table name;

- 1 How to retrieve maximum and minimum values in any particular column?
- 2 How to retrieve rows based on date range?
- 3 How to retrieve unique values in any column?

# **EXERCISE 27 : Insert, Update and Delete Queries**

# **Objectives**

At the end of this exercise you shall be able to

- · create table and insert the value in the table
- update some values in the tables
- · delete specific tuples from the table

# Requirements

#### **Tools/Materials**

- Desktop/Laptop with latest configuration
- Operating system: window 10:11
- XAMPP server r3.3.0

# Procedure

TASK 1 : Using next query

```
1 Create database:
```

Create database database name:

#### Use database:

Use database name;

2 Create Table:

CREATE TABLE your table name (

column1 datatype1,

column2 datatype2,

column3 datatype3,

-- add more columns as needed

PRIMARY KEY (column1)

);

Ex:

CREATE TABLE `employee` (

`employee id` bigint unsigned NOT NULL AUTO INCREMENT,

`first name` varchar(45) NOT NULL,

`last name` varchar(45) NOT NULL,

`last update` timestamp NOT NULL DEFAULT CURRENT TIMESTAMP,

UNIQUE KEY `employee id` (`employee id`)

);



© REPUBLISHED BE MariaDB [user]> CREATE TABLE `employee` (
 -> `employee_id` bigint unsigned NOT NULL AUTO_INCREMENT,
 -> `first_name` varchar(45) NOT NULL,
 -> `last_name` varchar(45) NOT NULL,
 -> `last_update` timestamp NOT NULL DEFAULT CURRENT_TIMESTAMP,
 -> UNIQUE KEY `employee_id` (`employee_id`)
 -> );
Query OK, 0 rows affected (0.165 sec)

To find the structure of a table called employee, you can use the MySQL DESCRIBE command:

#### **DESCRIBE** employee;

Field	Туре	Null	Key	Default	Extra
employee_id	bigint(20) unsigned	NO	PRI	NULL	auto_increment
first_name	varchar(45)	NO		NULL	
last_name	varchar(45)	NO		NULL	
last_update	timestamp	NO		<pre>current_timestamp()</pre>	

3 Insert Query: Adding new records to the table

INSERT INTO your table name (column1, column2, column3)

VALUES ('value1', 'value2', 'value3');

Ex: INSERT INTO employee(first name, last name)

VALUES ('Bob', 'Smith');

MariaDB [user]> INSERT INTO employee(first_name, last_name)
 -> VALUES ('Bob', 'Smith'
 -> );
Query OK, 1 row affected (0.042 sec)

For show the records

#### SELECT * FROM employee;

employee_id   first	_name   last_name	last_update	1
+++	+	-+	
1   Bob	Smith	2024-03-07 15:07:3	39

4 Using INSERT to add multiple rows at once
INSERT INTO my table(column name, column name 2)
VALUES
('value', 'value2'),
('value3', 'value4'),
('value5', 'value6');
Ex - INSERT INTO employee(first name, last name)
VALUES
('Abigail', 'Spencer'),
('Tamal', 'Wayne'),

('Katie', 'Singh'),

('Felipe', 'Espinosa');

```
MariaDB [user]> INSERT INTO employee(first_name, last_name)
    -> VALUES
    -> ('Abigail', 'Spencer'),
    -> ('Tamal', 'Wayne'),
    -> ('Katie', 'Singh'),
    -> ('Katie', 'Singh'),
    -> ('Felipe', 'Espinosa'
    -> );
Query OK, 4 rows affected (0.038 sec)
Records: 4 Duplicates: 0 Warnings: 0
```

For show the records

SELECT * FROM employee;

employee_id	first_name	last_name	last_update
1	Bob	Smith	2024-03-07 15:07:39
2	Abigail	Spencer	2024-03-07 15:11:27
3	Tamal	Wayne	2024-03-07 15:11:27
4	Katie	Singh	2024-03-07 15:11:27
5	Felipe	Espinosa	2024-03-07 15:11:27

#### TASK 2 : Using update query

#### Update Query:

UPDATE your table name

SET column1 = 'new value1', column2 = 'new value2'

WHERE condition;

MariaD8 [user]: Query OK, 1 row Rows matched: 1	affected (0	.041 sec)	st_name ="John" WHERE 0	employee_id = 1;
MariaDB [user]	> select * fro			<i>w</i>
			last_update	ī
+		+	•	*
1	John	Smith	2024-03-07 15:07:39	1
2	Abigail	Spencer	2024-03-07 15:11:27	
3	Tamal	Wayne	2024-03-07 15:11:27	
4	Katie	Singh	2024-03-07 15:11:27	
5	Felipe	Espinosa	2024-03-07 15:11:27	1
5 rows in set	(0.000 sec)	+	*	÷

TASK 3 : Using delete query:

Delete Query: to remove rows from tables

DELETE FROM your table name

WHERE condition;

EX - DELETE FROM employee

WHERE first name = 'Abigail';



For show the records SELECT * FROM employee;

employee_id	first_name	last_name	last_update
1	John	Smith	2024-03-07 15:07:39
3	Tamal	Wayne	2024-03-07 15:11:27
4	Katie	Singh	2024-03-07 15:11:27
5	Felipe	Espinosa	2024-03-07 15:11:27

The return value here indicates that the DELETE command was processed with a single row being removed. Using DELETE to remove multiple rows at once

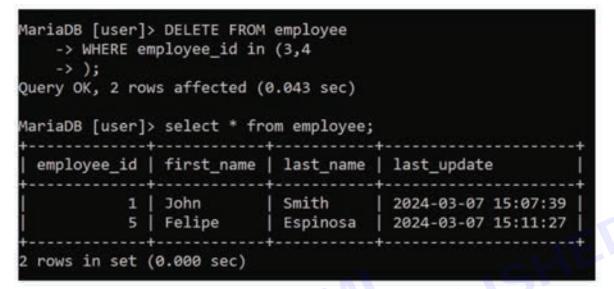


2 You can remove multiple items at once with DELETE by manipulating the selection criteria specified in the WHERE clause.

For instance, to remove multiple rows by ID, you could type something like this:

```
Ex - DELETE FROM employee
```

WHERE employee id in (3,4);



**3** You can even leave out the WHERE clause to remove all of the rows from a given table: DELETE FROM employee;



Questions

- 1 How can you insert multiple records in a single query?
- 2 How can you update multiple columns in a single query?
- 3 How do you delete a specific record from a table?

# EXERCISE 28: Using the Number, Date and Character Functions

# **Objectives**

At the end of this exercise you shall be able to

- use the number functions in MySQL
- use the data functions in MySQL
- use the character functions in MySQL

# Requirements

#### Tools/Materials

- Desktop/Laptop with latest configuration
- Operating system: window 10:11
- XAMPP server r3.3.0

# Procedure

TASK 1 : Using Number Functions:

1 ABS() – Absolute Value:

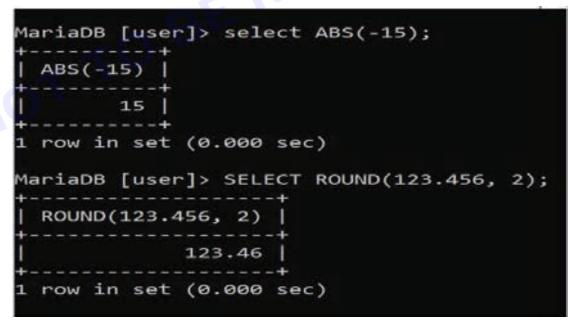
SELECT ABS(-15);

-- Result: 15

2 ROUND() - Round to specified numbers of decimal places.

SELECT ROUND(123.456, 2);

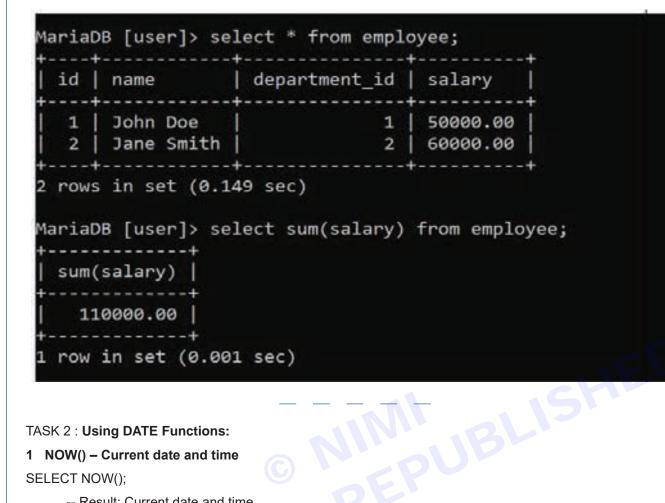
-- Result: 123.46



#### 3 SUM() – Calculate the sum of the values

SELECT SUM(column name) FROM your table;





TASK 2 : Using DATE Functions:

1 NOW() – Current date and time SELECT NOW();

-- Result: Current date and time

```
2 DATE FORMAT() – Format a date
```

SELECT DATE FORMAT(NOW(), '%Y-%m-%d');

-- Result: Formatted date (YYYY-MM-DD)

```
MariaDB [user]> select now();
 now()
 2024-03-07 14:47:55
1 row in set (0.000 sec)
MariaDB [user]> select date_format(now(), '%y-%m-%d
date_format(now(), '%y-%m-%d')
 24-03-07
 row in set (0.000 sec)
```

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**3** DATEDIFF() – Calculate the difference between two dates

SELECT DATEDIFF('2022-01-01', '2021-12-15');

-- Result: 17 (days)

MariaDB [user]> SELECT DATEDIFF('2022-01-01', '2021-12-+-----+ | DATEDIFF('2022-01-01', '2021-12-15') | +-----+ | 17 | 1 row in set (0.001 sec)

TASK 3 : Using CHARACTER Functions:

- 1 CONCATE() Concatenate strings
- SELECT CONCAT('Hello', ' ', 'World');
- -- Result: Hello World



2 LENGTH() - Length of a string

SELECT LENGTH('abcde');

-- Result: 5

#### 3 SUBSTRING() – Extract part of a string

SELECT SUBSTRING('abcdef', 2, 3);

- -- Result: bcd
- 1 How do you calculate the difference in days between two date columns?

SELECT DATEDIFF(end date, start date) FROM your table;

2 How can you concatenate two columns and add a separator between them?

SELECT CONCAT(column1, ' - ', column2) AS concatenated columns FROM your table;

3 How can you find the length of string column?

SELECT LENGTH(string column) FROM your table;

MariaDB [user]> SELECT LENGTH('abcde'); LENGTH('abcde') 5 1 row in set (0.000 sec) MariaDB [user]> SELECT SUBSTRING('abcdef', 2, 3); SUBSTRING('abcdef', 2, 3) | © NIMIUBLISHED BE REPUBLISHED bcd



# EXERCISE 29: Joins, Group by, Having, Sub query

# **Objectives**

At the end of this exercise you shall be able to

- use joins in queries
- use group by in queries
- · use having & subquery in queries

# **Requirements**

#### **Tools/Materials**

- Desktop/Laptop with latest configuration
- Operating system: window 10:11
- XAMPP server r3.3.0

### **Procedure**

#### TASK 1 :Setup & Connect To MySQL:

Make sure you have MySQL installed on your Windows machine. You can use a tool like MySQL Command-Line Client or a graphical interface like MySQL Workbench.

mysql -u your username -p

```
# mysql -u root -p
Enter password:
Welcome to the MariaDB monitor. Commands end with ; or \g.
Your MariaDB connection id is 8
Server version: 10.4.32-MariaDB mariadb.org binary distribution
Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.
Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.
MariaDB [(none)]> use user;
Database changed
```

Enter your password when prompted.

#### TASK 2 :Create sample tables and insert values

1 Let's create two simple tables -

CREATE TABLE employee (

```
employee id INT PRIMARY KEY,
```

employee name VARCHAR(50),

department id INT

);



ariaDB [user]> CREATE TABLE employee ( employee_id INT PRIMARY KEY, -> employee_name VARCHAR(50), department id INT -> -> ); Query OK, 0 rows affected (0.133 sec) MariaDB [user]> desc employee; Field Type Null | Key | Default | Extra employee_id int(11) NO PRI NULL employee_name | varchar(50) NULL YES department id | int(11) YES NULL rows in set (0.019 sec) 2 CREATE TABLE department ( ISHED department id INT PRIMARY KEY, department name VARCHAR(50) MariaDB [user]> CREATE TABLE department ( department_id INT PRIMARY KEY, -> department_name VARCHAR(50) -> -> ); Query OK, 0 rows affected (0.138 sec) 3 Insert the values in the tables: Insert values in Employees table -INSERT INTO employee VALUES (1, 'John Doe', 1); INSERT INTO employee VALUES (2, 'Jane Smith', 2); INSERT INTO employee VALUES (3, 'Bob Johnson', 1); MariaDB [user]> INSERT INTO employee VALUES (1, 'John Doe', 1); Query OK, 1 row affected (0.051 sec) MariaDB [user]> INSERT INTO employee VALUES (2, 'Jane Smith', 2); Query OK, 1 row affected (0.038 sec) MariaDB [user]> INSERT INTO employee VALUES (3, 'Bob Johnson', 1); Query OK, 1 row affected (0.043 sec)

Insert values in Department table -

);

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INSERT INTO department VALUES (1, 'HR');

INSERT INTO department VALUES (2, 'IT');

MariaDB [user]> INSERT INTO department VALUES (1, 'HR'); Query OK, 1 row affected (0.049 sec) MariaDB [user]> INSERT INTO department VALUES (2, 'IT');

Query OK, 1 row affected (0.048 sec)

4 Show the records of both the tables :

SELECT * from employee;

employee_id	employee_name	department_id
+		+
1	John Doe	1 1
2	Jane Smith	2
3	Bob Johnson	1

SELECT * from department;

	[user]> :				tment;
depart	ment_id	depa	rtment_	name	
	1	HR			
	2	IT			
2 rows 1	n set (0.	.000 s	ec)	+	

TASK 3 : Using Joins:

Inner Join - Retrieve rows where there is a match in both tables.

SELECT * FROM employee

```
INNER JOIN department ON employee.department id = department.department id;
```

-> ;	and deput clienter of	r enproyee.uepui e	ment_ro - depai	tment.department_id
employee_id	employee_name	department_id	department_id	department_name
1	John Doe	1	1	HR
2	Jane Smith	2	2	IT
3	Bob Johnson	1	1	HR

2 Left Join - Retrieve all rows from the left table and the matching rows from the right table.

SELECT * FROM employee

LEFT JOIN department ON employee.department id = department.department id;

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-> LEFT 30	the department on	empioyee.departi	ent_id = departs	ent.department_id;
employee_id	employee_name	department_id	department_id	department_name
		*		
1	John Doe	1	1	HR
2	Jane Smith	2	2	IT
3	Bob Johnson	1	1	HR
4	Tom	3	3	FINANCE
5	Cruze	3	3	FINANCE

3 Right Join – Retrieve all rows from the right table and the matching rows from the left table.

SELECT * FROM employee

RIGHT JOIN department ON employee.department id = department.department id;

				ment.department_id
				department_name
1	John Doe	1	1	HR
2	Jane Smith	2	2	IT
3	Bob Johnson	1	1	HR
4	Tom	3	3	FINANCE
5	Cruze	3	3	FINANCE
NULL	NULL	NULL	4	HR

4 Full Outer Join(Using UNION) - Retrieve all rows when there is a match in either the left or the right table.

SELECT * FROM employee

LEFT JOIN department ON employee.department id = department.department id

UNION

SELECT * FROM employee

RIGHT JOIN department ON employee.department id = department.department id;

-> UNION -> SELECT	* FROM employee			ment.department_i
employee_id	employee_name	department_id	department_id	department_name
1	John Doe	1	1	HR
2	Jane Smith	2	2	IT
3	Bob Johnson	1	1	HR
4	Tom	3	3	FINANCE
5	Cruze	3	3	FINANCE
NULL	NULL	NULL	4	HR

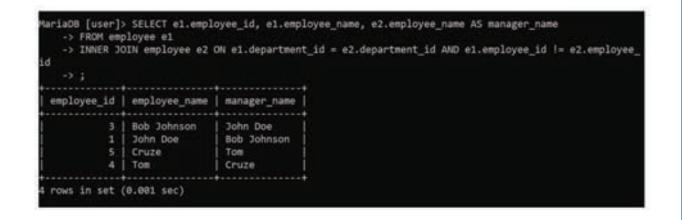
5 Self Join - Perform a join on a table with itself.

SELECT e1.employee id, e1.employee name, e2.employee name AS manager name

FROM employee e1

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INNER JOIN employee e2 ON e1.department id = e2.department id AND e1.employee id != e2.employee id;



TASK 4 : Using GROUP BY:

The MYSQL GROUP BY Clause is used to collect data from multiple records and group the result by one or more column. It is generally used in a SELECT statement.

SELECT product, SUM(amount) as total sales

FROM sales

GROUP BY product;

This query selects the product and the total sales (SUM(amount)) for each product from the sales table, grouped by the product column.

You can use other aggregate functions like COUNT, AVG, MIN, MAX, etc., depending on your requirements.

1 SELECT product, COUNT(*) as total orders, AVG(amount) as avg sales

FROM sales

GROUP BY product;

```
MariaDB [user]> SELECT COUNT(department_id),employee_name from employee GROUP BY department_id;
COUNT(department_id) | employee_name
              2
                  John Doe
                  Jane Smith
                1
               2
                  Tom
rows in set (0.001 sec)
 ariaDB
          [user]>
                     select * from employee;
  employee_id
                   employee_
                                            department id
                                 name
                1
                     John Doe
                                                             1
                2
                     Jane Smith
                                                            2
                3
                     Bob Johnson
                                                             1
                      Tom
                4
                                                             3
                5
                     Cruze
                                                             з
  rows in set (0.000 sec)
```

When you're done, you can exit the MySQL Command Line Client:

EXIT;

This will close the connection and return you to the regular command prompt.

#### TASK 5 : Using Having Clause:

Assume you have a table named sales with columns product and amount. You want to know the total amount of sales per product, but only for products with a total sales greater than a certain threshold, e.g., 100.

1 SELECT product, SUM(amount) as total sales

FROM sales

GROUP BY product

HAVING total sales > 100;

This query selects the product and the total sales (SUM(amount)) for each product from the sales table, grouped by the product column. The HAVING clause filters the results to include only those with a total sales greater than 100.

You can add more conditions in the HAVING clause based on your requirements.

2 SELECT product, SUM(amount) as total sales

FROM sales

**GROUP BY product** 

```
HAVING total sales > 100 AND COUNT(*) > 2;
```

Example-

```
MariaDB [user]> SELECT COUNT(department_id),employee_name from employee GROUP BY department_id HAVING C
DUNT(department_id)<2;
+-----+
| COUNT(department_id) | employee_name |
+----+
| 1 | Jane Smith |
+----+
1 row in set (0.001 sec)</pre>
```

When you're done, you can exit the MySQL Command Line Client: EXIT:

#### TASK 6 : Using Sub Query:

If you haven't already created tables and inserted sample data, you can use the following SQL statements:

1 CREATE TABLE Departments:

CREATE TABLE departments (

id INT PRIMARY KEY,

name VARCHAR(50)

);

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```
2 CREATE TABLE Employees:
```

```
CREATE TABLE employees (
```

```
id INT PRIMARY KEY,
```

#### **COMPUTER SOFTWARE APPLICATION - CITS**

name VARCHAR(50),

department id INT,

FOREIGN KEY (department id) REFERENCES departments(id)

);

#### 3 INSERT SOME VALUES in the Tables:

INSERT INTO departments VALUES (1, 'IT');

INSERT INTO employees VALUES (1, 'John Doe', 1);

INSERT INTO employees VALUES (2, 'Jane Smith', 1);

INSERT INTO employees VALUES (3, 'Bob Johnson', 2);

Write the Sub Query:

4 write a subquery to find the employees who work in the 'IT' department.

SELECT name

FROM employee

WHERE department id = (SELECT id FROM department WHERE name = 'IT');

This subquery (SELECT id FROM departments WHERE name = 'IT') retrieves the department ID for the 'IT' department.

Execute the Query:

Run the entire query to get the result.

SELECT employee name

FROM employee

WHERE department id = (SELECT department id FROM department WHERE department name = 'IT');

The output should be:

```
MariaDB [user]> SELECT employee_name

    -> FROM employee

    -> WHERE department_id = (SELECT department_id FROM department WHERE department_name = 'IT');

+-----+

| employee_name |

+-----+

| Jane Smith |

+-----+

1 row in set (0.001 sec)
```

This example demonstrates how to use a sub query to retrieve information based on conditions from another table.

Questions

1 How to retrieve a list of employees with their department names?

SELECT employees.name, departments.name AS department

**FROM** employees

JOIN departments ON employees.department id = departments.id;

2 How to get a count of employees in each department?

SELECT departments.name AS department, COUNT(*) AS employee count

FROM employees

```
JOIN departments ON employees.department id = departments.id
GROUP BY departments.name;
3 How to retrieve the average salary of employees in each department?
SELECT departments.name AS department, AVG(salary) AS average salary
FROM employees
JOIN departments ON employees.department id = departments.id
GROUP BY departments.name;
4 How to find the employees who earn more than the average salary in their department?
SELECT name, salary
FROM employees
WHERE salary > (
  SELECT AVG(salary)
  FROM employees AS e2
  WHERE e2.department id = employees.department id
                                                 ч
Бривь ShEр
);
5 How to retrieve departments with the highest average salary?
SELECT name AS department, AVG(salary) AS average salary
FROM employees
JOIN departments ON employees.department id = departments.id
GROUP BY departments.name
HAVING AVG(salary) = (
  SELECT MAX(avg salary)
  FROM (
    SELECT AVG(salary) AS avg salary
    FROM employees
    GROUP BY department id
  ) AS department avg
```

);

# **EXERCISE 30 : Indexing and Optimizing query**

## **Objectives**

At the end of this exercise you shall be able to

- create and use the index
- · identify slow queries
- optimize query executive

### Requirements

#### **Tools/Materials**

- Desktop/Laptop with latest configuration
- Operating system: window 10:11
- XAMPP server r3.3.0

# Procedure

#### TASK 1 : INDEXING:

1 Open MySQL Command Line-

Open the MySQL Command Line or any MySQL client that allows you to execute SQL commands.

2 Connect to your database-

mysql -u your username p

Enter your password when prompted

3 Select Your Database-

USE your database name;

Identify the column to be indexed

Let's assume you want to create an index on a column named example column in a table named your table.

4 Create the Index-

CREATE INDEX idx example column ON your table(example column);

5 Verify the Index-

SHOW INDEX FROM your table;

This command displays information about the indexes on the specified table. You should see the newly created index in the output

Example Output -

| Table | Non unique | Key name | Seq in index | Column name | Collation | Cardinality | Sub part | Packed | Null | Index type | Comment | Index comment |

+	4	 +	
-+	+	 +	

your table   YES   BTREE	1   idx example co	blumn   1   example column   A	A	0	NULL   NULL
<b></b>	k			±	
T				T	
-+++	+				



In this output, you can see information about the index, including its name (idx example column), the indexed column (example column), and the index type (BTREE).

#### Test the query performance

After creating the index, you can test the performance of queries involving the indexed column to see if there is an improvement in retrieval speed.

#### TASK 2 : QUERY OPTIMIZATION

Optimizing MySQL queries is crucial for improving database performance. Here are steps you can take to optimize queries in MySQL on a Windows environment:

1 Identify slow queries-

Open MySQL Command Line or a MySQL client.

Execute the following command to enable the slow query log in your MySQL configuration file (my.ini):

SET GLOBAL slow query log = 'ON';

SET GLOBAL slow query log file = 'C:\\path\\to\\your\\log\\file.log';

SET GLOBAL long query time = 1;

Replace 'C:\path\to\your\log\file.log' with the desired path for your slow query log file. The long query time is set JBLISHE to 1 second in this example, meaning queries taking longer than 1 second will be logged.

2 Analyze the slow query log:

Execute slow queries in your application or environment.

After some time, check the slow query log for potential issues:

SHOW VARIABLES LIKE 'slow query log';

SHOW VARIABLES LIKE 'slow query log file';

3 Use EXPLAIN to analyze gueries-

Before optimizing, use the EXPLAIN statement to analyze the execution plan of a slow query:

EXPLAIN SELECT * FROM your table WHERE your condition;

Review the output to understand how MySQL is executing the query and identify potential bottlenecks.

4 Add Indexes:

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Identify columns used in WHERE, JOIN, or ORDER BY clauses.

Create indexes on these columns to speed up query execution:

CREATE INDEX idx your column ON your table(your column);

Replace idx your column, your table, and your column with appropriate names.

5 Optimize WHERE Clause:

Use appropriate indexing to optimize WHERE clauses.

Avoid using functions or operations in the WHERE clause that prevent the use of indexes.

# **EXERCISE 31 : Creating & Using Stored procedure**

### **Objectives**

At the end of this exercise you shall be able to

- Create a stored procedure
- execute the stored procedure
- drop the stored procedure

### Requirements

#### **Tools/Materials**

- Desktop/Laptop with latest configuration
- Operating system: window 10:11
- XAMPP server r3.3.0

### Procedure

#### TASK 1 : Create and use stored procedure

1 Connect to Your Database:

mysql -u your username -p

Enter your password when prompted.

Select Your Database:

USE your database name;

Replace your database name with the name of your actual database.

```
MariaDB [(none)]> create database user;
Query OK, 1 row affected (0.002 sec)
MariaDB [(none)]> use user;
Database changed
```

2 Create a simple Stored Procedure:

In this example, the stored procedure will concatenate "Hello, " with the input parameter and return the result. DELIMITER //

CREATE PROCEDURE GetGreeting(IN input name VARCHAR(50), OUT greeting result VARCHAR(100)) BEGIN

SET greeting result = CONCAT('Hello, ', input name);

END //

DELIMITER;

```
lariaOB [user]> DELIMITER //
lariaOB [user]> CREATE PROCEDURE GetGreeting(IN input_name VARCHAR(50), OUT greeting_result VARCHAR(100
)
    -> BEGIN
    -> SET greeting_result = CONCAT('Hello, ', input_name);
    -> END
    -> //
uery OK, 0 rows affected (0.105 sec)
```



This stored procedure, named GetGreeting, takes an input parameter input name and returns an output parameter greeting result.

#### 3 Call the Stored Procedure:

Now, you can call the stored procedure and capture the output. You'll use the CALL statement to execute the stored procedure.

SET @name = 'John';

CALL GetGreeting(@name, @greeting);

SELECT @greeting AS GreetingOutput;

In this example, @name is the input parameter, and @greeting is the output parameter. Replace 'John' with the desired input value.

#### 4 View the Output:

After executing the above commands, you should see the output of the stored procedure.

```
MariaDB [user]> DELIMITER ;
MariaDB [user]> SET @name = 'John';
Query OK, 0 rows affected (0.000 sec)
MariaDB [user]> CALL GetGreeting(@name, @greeting);
Query OK, 0 rows affected (0.001 sec)
MariaDB [user]> SELECT @greeting AS GreetingOutput;
+-----+
| GreetingOutput |
+-----+
| Hello, John |
+-----+
1 row in set (0.000 sec)
```

The output shows the result of the stored procedure, which is the greeting message based on the provided input.

#### 5 Drop the Stored Procedure:

If you want to remove the stored procedure, you can use the following command:

DROP PROCEDURE IF EXISTS GetGreeting;

This step is optional and can be done if you no longer need the stored procedure.

NariaDB [user]> DROP PROCEDURE IF EXISTS GetGreeting; Query OK, 0 rows affected (0.114 sec)

MariaDB [user]> CALL GetGreeting(@name, @greeting); ERROR 1305 (42000): PROCEDURE user.GetGreeting does not exist

# EXERCISE 32 : Creating and executing MySQL table level Triggers

### **Objectives**

At the end of this exercise you shall be able to

- create the table level triggers
- use the table level triggers

### Requirements

#### **Tools/Materials**

- Desktop/Laptop with latest configuration
- Operating system: window 10:11
- XAMPP server r3.3.0

# Procedure

TASK 1 :Create & execute triggers

1 Connect to Your Database -

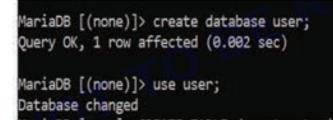
mysql -u your username -p

Enter your password when prompted.

Select Your Database -

USE your database name;

Replace your database name with the name of your actual database.



2 Create a table -

Let's create a simple table for this example:

CREATE TABLE example table (

id INT PRIMARY KEY AUTO INCREMENT,

data VARCHAR(255),

created at TIMESTAMP DEFAULT CURRENT TIMESTAMP

);

```
MariaDB [user]> CREATE TABLE example_table (
    -> id INT PRIMARY KEY AUTO_INCREMENT,
    -> data VARCHAR(255),
    -> created_at TIMESTAMP DEFAULT CURRENT_TIMESTAMP
    -> )
    -> ;
Query OK, 0 rows affected (0.103 sec)
```



This table has an id column as the primary key, a data column, and a created at column with a default value set to the current timestamp.

#### 3 Create a Table Level Trigger -

Now, let's create a trigger that updates the created at timestamp whenever a new record is inserted:

DELIMITER //

CREATE TRIGGER update created at

**BEFORE INSERT ON example table** 

#### FOR EACH ROW

SET NEW.created at = IFNULL(NEW.created at, CURRENT TIMESTAMP);

//

DELIMITER ;

```
MariaDB [user]> DELIMITER //
MariaDB [user]> CREATE TRIGGER update_created_at
    -> BEFORE INSERT ON example_table
    -> FOR EACH ROW
    -> SET NEW.created_at = IFNULL(NEW.created_at, CURRENT_TIMESTAMP);
    -> //
Query OK, 0 rows affected (0.046 sec)
MariaDB [user]> DELIMITER ;
```

This trigger is named **update created at** and is set to execute **BEFORE INSERT** on the **example table**. It updates the **created at** column with the current timestamp if the value is NULL.

#### 4 Insert a Record –

Now, let's insert a record into the table:

INSERT INTO example table (data) VALUES ('Example Data');

View The Updated Record -

Now, retrieve the record to see the effect of the trigger:

SELECT * FROM example table;

You should see the created at column automatically updated with the current timestamp.

	INSERT INTO example_table affected (0.179 sec)	<pre>(data) VALUES ('Example Data');</pre>
++	SELECT * FROM example_tabl	
id   data	created_at	
1   Example D	ata   2024-03-11 14:11:00	1
1 row in set (0.	001 sec)	

#### 5 DROP the Trigger:

If you want to remove the trigger, you can use the following command:

DROP TRIGGER IF EXISTS update created at;

This step is optional and can be done if you no longer need the trigger.

# EXERCISE 33 : Creating Cursors in MYSQL

## **Objectives**

At the end of this exercise you shall be able to

· create stored procedure with cursor

# Requirements

#### **Tools/Materials**

- Desktop/Laptop with latest configuration
- Operating system: window 10:11
- XAMPP server r3.3.0

# Procedure

TASK 1 : Create cursors in MySQL

1 CONNECT TO YOUR DATABASE -

mysql -u your username --p

Enter your password when prompted.

2 SELECT YOUR DATABASE -

USE your database name;

Replace your database name with the name of your actual database

3 CREATE A TABLE -

Let's create a simple table for this example:

```
MariaDB [(none)]> create database user;
Query OK, 1 row affected (0.002 sec)
MariaDB [(none)]> use user;
Database changed
```

CREATE TABLE example table ( id INT PRIMARY KEY AUTO INCREMENT,

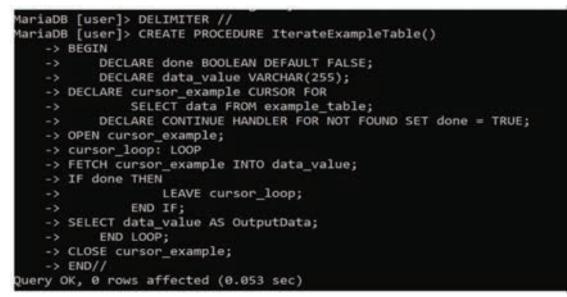
data VARCHAR(255)

);

```
MariaDB [user]> CREATE TABLE example_table (
    -> id INT PRIMARY KEY AUTO_INCREMENT,
    -> data VARCHAR(255)
    -> );
Query OK, 0 rows affected (0.149 sec)
```



4 INSERT SAMPLE DATA -Insert some sample data into the table: INSERT INTO example table (data) VALUES ('Data 1'), ('Data 2'), ('Data 3'); 5 Create A Stored Procedure With A Cursor -Now, create a stored procedure that uses a cursor to iterate through the rows and display the data: DELIMITER // CREATE PROCEDURE IterateExampleTable() BEGIN DECLARE done BOOLEAN DEFAULT FALSE; DECLARE data value VARCHAR(255); -- Declare a cursor for the table DECLARE cursor example CURSOR FOR SELECT data FROM example table; -- Declare an exit handler to close the cursor when no more rows are found NII PUBLISHED DECLARE CONTINUE HANDLER FOR NOT FOUND SET done = TRUE; -- Open the cursor OPEN cursor example; -- Start looping through the rows cursor loop: LOOP -- Fetch the next row into data value FETCH cursor example INTO data value; -- Check if we have reached the end of the cursor IF done THEN LEAVE cursor loop; END IF; -- Output the current row data SELECT data value AS OutputData; END LOOP; -- Close the cursor CLOSE cursor example; END // DELIMITER ;



#### 6 Call The Stored Procedure

Now, call the stored procedure to execute the cursor:

CALL IterateExampleTable();

You should see the data from each row of the example table printed as output.



#### Question

- 1 Explain the key components of a cursor declaration in MySQL.
- 2 When would you use a SCROLL cursor in MySQL, and provide an example?

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# **EXERCISE 34 : Using Cursors in MySQL**

### **Objectives**

At the end of this exercise you shall be able to

- · create a stored procedure with cursor
- · use the cursors in MySQL

### **Requirements**

#### **Tools/Materials**

- Desktop/Laptop with latest configuration
- Operating system: window 10:11
- XAMPP server r3.3.0

### **Procedure**

TASK 1 : Using a cursor in MySQL

1 OPEN MYSQL COMMAND LINE -

Open the MySQL Command Line or any MySQL client that allows you to execute SQL commands. B

2 CONNECT YOUR DATABASE -

mysql -u your username -p

Enter your password when prompted.

3 SELECT YOUR DATABASE -

USE your database name;

Replace your database name with the name of your actual database.

MariaDB [(none)]> create database user; Query OK, 1 row affected (0.002 sec) MariaDB [(none)]> use user; Database changed

#### 4 Create a table -

Let's create a simple table for this example:

CREATE TABLE employee (

emp id INT PRIMARY KEY AUTO INCREMENT,

emp name VARCHAR(255),

```
emp salary DECIMAL(10, 2)
```

);



lariaDB [user]> CREATE TABLE employee (
 -> emp_id INT PRIMARY KEY AUTO_INCREMENT,
 -> emp_name VARCHAR(255),
 -> emp_salary DECIMAL(10, 2)
 -> );
puery OK, 0 rows affected (0.133 sec)

#### 5 Insert sample data -

Insert some sample data into the table:

INSERT INTO employee (emp name, emp salary) VALUES

('John Doe', 50000.00),

('Jane Smith', 60000.00),

('Bob Johnson', 75000.00);

```
MariaDB [user]> INSERT INTO employee (emp_name, emp_salary) VALUES
   -> ('John Doe', 50000.00),
   -> ('Jane Smith', 60000.00),
   -> ('Bob Johnson', 75000.00
   -> );
Query OK, 3 rows affected (0.041 sec)
Records: 3 Duplicates: 0 Warnings: 0
```

#### 6 Create a stored procedure with a cursor

Now, create a stored procedure that uses a cursor to iterate through the rows and display the employee names: DELIMITER //

CREATE PROCEDURE DisplayEmployeeNames() BEGIN

DECLARE done BOOLEAN DEFAULT FALSE;

DECLARE emp name value VARCHAR(255);

-- Declare a cursor for the table

DECLARE cursor employee CURSOR FOR

SELECT emp name FROM employee;

-- Declare an exit handler to close the cursor when no more rows are found

DECLARE CONTINUE HANDLER FOR NOT FOUND SET done = TRUE;

-- Open the cursor

OPEN cursor employee;

-- Start looping through the rows

cursor loop: LOOP

-- Fetch the next row into emp name value

FETCH cursor employee INTO emp name value;

-- Check if we have reached the end of the cursor

IF done THEN

LEAVE cursor loop;

END IF;

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-- Output the current row data

SELECT emp name value AS OutputName;

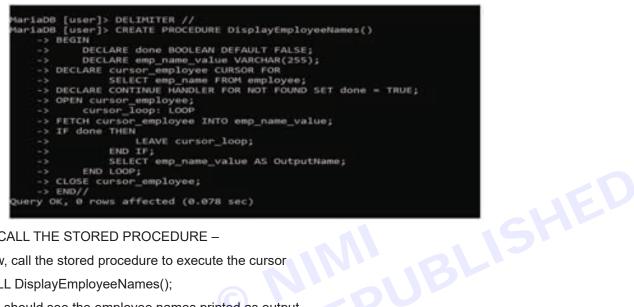
END LOOP;

-- Close the cursor

CLOSE cursor employee;

END //

DELIMITER ;

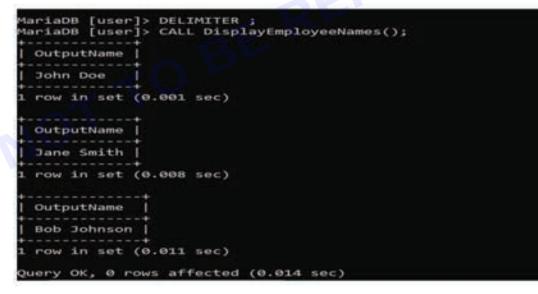


7 CALL THE STORED PROCEDURE -

Now, call the stored procedure to execute the cursor

CALL DisplayEmployeeNames();

You should see the employee names printed as output.



1 Explain the concept of cursor parameters and provide an example of a stored procedure that uses input parameters to filter the result set retrieved by a cursor.



# **EXERCISE 35 : Implementing MySQL Security**

### **Objectives**

At the end of this exercise you shall be able to

secure MySQL database

# Requirements

#### **Tools/Materials**

- Desktop/Laptop with latest configuration
- Operating system: window 10:11
- XAMPP server r3.3.0

### Procedure

TASK 1 : The process of securing MySQL.

1 Change ROOT Password if needed

ALTER USER 'root'@'localhost' IDENTIFIED BY 'new password';

MariaDB [user]> ALTER USER 'root'@'localhost' IDENTIFIED BY '12345' -> ; Query OK, 0 rows affected (0.033 sec)

#### 2 Create the New User

Create a new user with restricted privileges:

CREATE USER 'your username'@'localhost' IDENTIFIED BY 'your password';

MariaDB [user]> CREATE USER 'user1'@'localhost' IDENTIFIED BY '123'; Query OK, 0 rows affected (0.015 sec)

#### 3 Grant Permissions

Grant specific permissions to your new user.

Replace your database with the name of the database you want to grant access to.

GRANT ALL PRIVILEGES ON your database.* TO 'your username'@'localhost';

FLUSH PRIVILEGES;

MariaDB [user]> GRANT ALL PRIVILEGES ON user.* TO 'user1'@'localhost'; Query OK, 0 rows affected (0.020 sec)

#### 4 Remove Anonymous User

Remove anonymous users for security: DROP USER ''@'localhost';



#### FLUSH PRIVILEGES;

#### 5 Bind MySQL to LocalHost

Edit the MySQL configuration file (my.ini or my.cnf) to bind MySQL to localhost:

bind-address = 127.0.0.1

#### 6 Enable the Firewall

Open the Windows Firewall and create an inbound rule to allow traffic on the MySQL port (default is 3306).

	MySQL Initialler - 7
MySQL Installer Aysot Server 5.625	Type and Networking Serve Configuration Type Change the consect server configuration type for this MySQL Server installation. This satisfy will define how much system resources are assigned to the MySQL Server installation.
(in and Netwicking	Caselig Type: Development Machine w
occurres and Poles Indones Samme gally Samer Configuration	Connectivity Use the following controls to set on two gives would like to connect to this server.
	MyG2, Exterprise Forwall Select the site that below to enable the Deterprise Forward, a security effected that effect presentation from cybes attacks. Additional girst installation configuration is recently in Enable Enterprise Forward Click here to view the among decomputation.

#### 7 Install and Use SSL/TLS

For additional security, consider configuring MySQL to use SSL/TLS. This involves obtaining SSL certificates and modifying the MySQL configuration.

#### 8 Regularly Update MySQL

Stay updated with the latest MySQL releases to ensure that you have the latest security patches.

#### Questions

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- 1 How do you secure the MySQL root account?
- 2 How do you grant SELECT privileges to a user for a specific database?

CITS : IT & ITES - Computer Software Application - Exercise 35

# EXERCISE 36 : Simple application on database using SP, **Triggers, Cursors & Indexing**

# **Objectives**

At the end of this exercise you shall be able to

create simple application on database using SP Triggers cursors & indexing

# **Requirements**

#### **Tools/Materials**

- Desktop/Laptop with latest configuration
- Operating system: window 10:11
- XAMPP server r3.3.0

### **Procedure**

TASK 1 : Creating a simple application using stored procedures, triggers, cursors, and indexing in MySQL REMENT

#### **1 CREATE DATABASE –**

CREATE DATABASE library db;

USE library db;

#### 2 CREATE TABLES -

Create table books and users -

CREATE TABLE books (

book id INT PRIMARY KEY AUTO INCREMENT,

title VARCHAR(255) NOT NULL,

author VARCHAR(255) NOT NULL,

quantity INT NOT NULL

);

```
CREATE TABLE users (
```

user id INT PRIMARY KEY AUTO INCREMENT. name VARCHAR(255) NOT NULL, email VARCHAR(255) NOT NULL

#### );

#### **3 INSERT VALUES –**

INSERT INTO books (title, author, quantity) VALUES

('Book 1', 'Author 1', 5),

('Book 2', 'Author 2', 8),

('Book 3', 'Author 3', 3);

INSERT INTO users (name, email) VALUES

('User 1', 'user1@example.com'),

('User 2', 'user2@example.com');



### **4 STORED PROCEDURE –** DELIMITER // CREATE PROCEDURE GetBooksByAuthor(IN authorName VARCHAR(255)) BEGIN SELECT * FROM books WHERE author = authorName; END // DELIMITER ; TRIGGER -DELIMITER // CREATE TRIGGER AfterBookBorrowed AFTER INSERT ON borrowed books FOR EACH ROW BEGIN **UPDATE** books SET quantity = quantity - 1 WHERE book id = NEW.book id; END // **DELIMITER** : 5 CURSOR -DELIMITER // CREATE PROCEDURE DisplayBooksAndQuantities() BEGIN DECLARE done INT DEFAULT FALSE; DECLARE book title VARCHAR(255); DECLARE book quantity INT; DECLARE books cursor CURSOR FOR SELECT title, quantity FROM books; DECLARE CONTINUE HANDLER FOR NOT FOUND SET done = TRUE; OPEN books cursor; read loop: LOOP FETCH books cursor INTO book title, book quantity; IF done THEN LEAVE read loop; END IF; SELECT CONCAT(book title, ': ', book quantity) AS BookInfo; END LOOP; CLOSE books cursor; END // **DELIMITER** ;

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#### 6 INDEXING -

CREATE INDEX idx email ON users(email);

#### 7 TESTING -

-- Test Stored Procedure

CALL GetBooksByAuthor('Author 1');

-- Test Trigger (Assuming you have a 'borrowed books' table)

INSERT INTO borrowed books (user id, book id) VALUES (1, 1);

-- Test Cursor

CALL DisplayBooksAndQuantities();

-- Test Indexing

SELECT * FROM users WHERE email = 'user1@example.com';

#### Question

- 1 How would you call the InsertUser stored procedure to add a new user with the username "nsti" and email "nsti@example.com" to the database?
- 2 Explain the purpose of the before insert user trigger. How does it modify the incoming data before insertion into the users table?
- 3 What does the DisplayUsers procedure do, and how would you execute it to see the details of all users in the
- 4 Describe the purpose of the idx username index on the users table. How does it improve query performance?

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# Module 3 : Introduction to JAVA Script

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# **EXERCISE 37 : Using the JAVA Script Syntax**

### **Objectives**

At the end of this exercise you shall be able to

- · create javascriptcode as in line style
- use external javascript files in HTML.

### Requirements

#### **Tools/Materials**

- Desktop / Laptop with latest configuration
- Text editor
- Web browser

### Procedure

#### TASK 1: Inline JavaScript

- 1 Open the text editor
- 2 Write the following codes

<html >

<head>

<meta charset="UTF-8">

<meta name="viewport" content="width=device-width, initial-scale=1.0">

<title>JavaScript Example</title>

</head>

<body>

<script>

// JavaScript code goes here

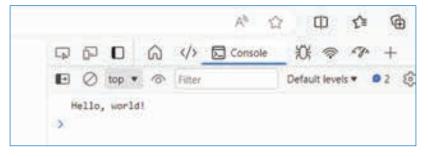
console.log("Hello, world!");

</script>

</body>

</html>

- 3 Save the program as a .html file
- 4 Open the html file with a web browser
- 5 Go to the browsers console tab and verify the output.

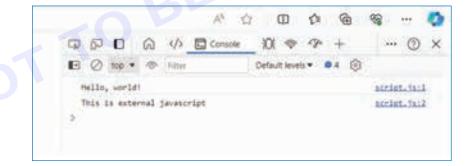


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#### **COMPUTER SOFTWARE APPLICATION - CITS**

#### TASK 2: External JavaScript

- I Create JavaScript file
  - 1 Open the text editor
  - Write the following codes console.log("Hello, world!"); console.log("This is external javascript");
  - 3 Save the program as 'script.js'
- II Link the External JavaScript File to HTML
  - 1 Open the text editor
  - 2 Write the following codes
    - <html> <head>
    - <meta charset="UTF-8">
    - <meta name="viewport" content="width=device-width, initial-scale=1.0">
    - <title>JavaScript Example</title>
    - <!-- Link to external JavaScript file -->
    - <script src="script.js"></script>
    - </head>
    - <body>
    - <!-- HTML content -->
    - </body>
    - </html>
  - 3 Save the program as a .html file
  - 4 Open the html file with a web browser
  - 5 Go to the browsers console tab and verify the output.



- 1 What is inline JavaScript, and how does it differ from external JavaScript files?
- 2 What are some advantages and disadvantages of using inline JavaScript in web development?
- 3 What are the different ways to include inline JavaScript in HTML elements
- 4 How do you include an external JavaScript file in your HTML document, and what are the different ways to specify the path to the file?

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# EXERCISE 38 : Using Variables, Operators and Writing Expressions

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### **Objectives**

At the end of this exercise you shall be able to

- crease variables
- use operators
- use operators

### **Requirements**

#### **Tools/Materials**

- Desktop / Laptop with latest configuration
- Text editor
- Web browser

# Procedure

#### TASK 1: Using Variables

- I Declaring variables and assigning values
  - 1 Open the text editor
  - 2 Write the following codes

<html >

<head>

<title> Declaring variables and assigning values </title>

</head>

<body>

<script>

// Declaring variables

let x; // Declaration without initialization

let y = 5; // Declaration with initialization

```
// Assigning values to variables
```

```
x = 10;
```

// Printing variables

console.log("Value of x:", x); // Output: 10

console.log("Value of y:", y); // Output: 5

// Reassigning variables

x = 20;

y = 8;

console.log("Updated value of x:", x); // Output: 20

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```
console.log("Updated value of y:", y); // Output: 8
// Constants
const PI = 3.14;
// PI = 3.14159; // Trying to reassign a constant will result in an error
console.log("Value of PI:", PI); // Output: 3.14
</script>
</body>
</html>
```

- 3 Save the program as a .html file
- 4 Open the html file with a web browser
- 5 Go to the browsers console tab and verify the output.

	Default levels	
E O top . to, hits	neuntieses 102	
Value of m: 10		Test. html:14
Value of y1 5		Test. Htel:15
Updated value of at 20		Test.htel:19
Updated value of y: 8		Isat_hteli20
Value of FI: 3.14		Test. htel:26
C		

- II Using different types of variable
  - 1 Open the text editor
  - 2 Write the following codes

<html >

<head>

<title> Different types variable </title>

</head>

<body>

<script>

// Numbers:

```
let num = 123.45;
```

// Strings:

```
let text = "This is a string.";
```

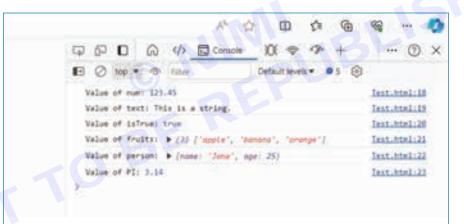
```
// Boolean (true/false):
```

```
let isTrue = true;
```

```
// Arrays (lists of values):
```

let fruits = ["apple", "banana", "orange"];
// Objects (collections of key-value pairs):
let person = { name: "Jane", age: 25 };
const PI=3.14;
console.log("Value of num:", num);
console.log("Value of text:", text);
console.log("Value of text:", text);
console.log("Value of isTrue:", isTrue);
console.log("Value of fruits:", fruits);
console.log("Value of person:", person);
console.log("Value of PI:", PI); // Output: 3.14
</script>
</body>

- </html>
- 3 Save the program as a .html file
- 4 Open the html file with a web browser
- 5 Go to the browsers console tab and verify the output.



#### TASK 2: Using Operators

#### I Arithmetic Operators

- 1 Open the text editor
- 2 Write the following codes
  - <html >

<head>

<title> Arithmetic Operators </title>

</head>

<body>

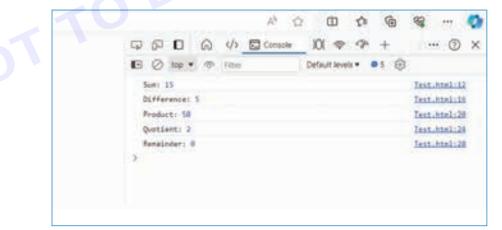
- <script>
- let a = 10;



#### **COMPUTER SOFTWARE APPLICATION - CITS**

	let b = 5;
	// Addition
	let sum = a + b;
	console.log("Sum:", sum); // Output: 15
	// Subtraction
	let difference = a - b;
	console.log("Difference:", difference); // Output: 5
	// Multiplication
	let product = a * b;
	console.log("Product:", product); // Output: 50
	// Division
	let quotient = a / b;
	console.log("Quotient:", quotient); // Output: 2
	// Modulus
	let remainder = a % b;
	console.log("Remainder:", remainder);
	// Output: 0 (10 divided by 5 leaves no remainder)
3	Save the program as a .html file
4	Open the html file with a web browser

- 3 Save the program as a .html file
- 4 Open the html file with a web browser
- 5 Go to the browsers console tab and verify the output.



- II Comparison operators
  - 1 Open the text editor
  - 2 Write the following codes

<html >

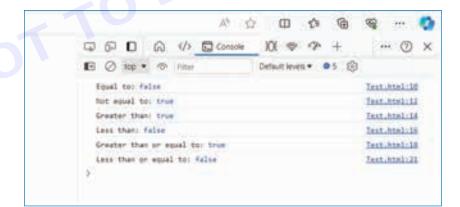
<head>

<title> Comparison operators </title>

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<body></body>
<script></th></tr><tr><th>let a = 10;</th></tr><tr><th>let b = 5;</th></tr><tr><th>// Equal to</th></tr><tr><th>console.log("Equal to:", a == b); // Output: false</th></tr><tr><th>// Not equal to</th></tr><tr><th>console.log("Not equal to:", a != b); // Output: true</th></tr><tr><th>// Greater than</th></tr><tr><th>console.log("Greater than:", a > b); // Output: true</th></tr><tr><th>// Less than</th></tr><tr><th>console.log("Less than:", a < b); // Output: false</th></tr><tr><th>// Greater than or equal to</th></tr><tr><th>console.log("Greater than or equal to:", a >= b); // Output: true</th></tr><tr><th>// Less than or equal to</th></tr><tr><th>console.log("Less than or equal to:", a <= b); // Output: false</th></tr><tr><th></script>

- </html>
- 3 Save the program as a .html file
- 4 Open the html file with a web browser
- 5 Go to the browsers console tab and verify the output.



#### **III** Logical operators

- 1 Open the text editor
- 2 Write the following codes
  - <html >
  - <head>
  - <title> Logical operators </title>



#### **COMPUTER SOFTWARE APPLICATION - CITS**

<body></body>
<script></td></tr><tr><td>let x = true;</td></tr><tr><td>let y = false;</td></tr><tr><td>// Logical AND (&&)</td></tr><tr><td>console.log("Logical AND:", x && y); // Output: false</td></tr><tr><td>// Logical OR (  )</td></tr><tr><td>console.log("Logical OR:", x    y); // Output: true</td></tr><tr><td>// Logical NOT (!)</td></tr><tr><td>console.log("Logical NOT for x:", !x); // Output: false</td></tr><tr><td>console.log("Logical NOT for y:", !y); // Output: true</td></tr><tr><td></script>

- 3 Save the program as a .html file
- 4 Open the html file with a web browser
- 5 Go to the browsers console tab and verify the output.



#### **IV Assignment Operators**

- 1 Open the text editor
- 2 Write the following codes

<html >

<head>

<title> Assignment Operators </title>

</head>

<body>

<script>

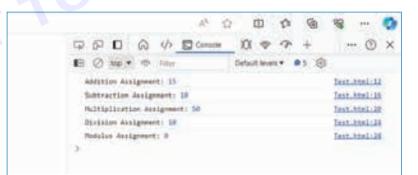
let a = 10;

Nimi)

let b = 5; // Addition assignment (+=) a += b; // equivalent to: a = a + b; console.log("Addition Assignment:", a); // Output: 15 // Subtraction assignment (-=) a = b; // equivalent to: a = a - b; console.log("Subtraction Assignment:", a); // Output: 10 // Multiplication assignment (*=) a *= b; // equivalent to: a = a * b;console.log("Multiplication Assignment:", a); // Output: 50 // Division assignment (/=)  $a \neq b$ ; // equivalent to: a = a / b; console.log("Division Assignment:", a); // Output: 10 // Modulus assignment (%=) a %= b; // equivalent to: a = a % b; console.log("Modulus Assignment:", a); // Output: 0 (since 10 divided by 5 leaves no remainder)

</script>

- </body>
- </html>
- 3 Save the program as a .html file
- 4 Open the html file with a web browser
- 5 Go to the browsers console tab and verify the output.



#### V. Ternary Operator

- 1 Open the text editor
- 2 Write the following codes

<html >

<head>

<title> Ternary Operator </title>



	<body></body>
	<script></td></tr><tr><td></td><td>let age = 20;</td></tr><tr><td></td><td>// Ternary Operator (conditional operator)</td></tr><tr><td></td><td>let message = (age >= 18) ? "You are an adult" : "You are a minor";</td></tr><tr><td></td><td>console.log(message);</td></tr><tr><td></td><td>// Output: You are an adult (since age is 20, which is greater than or equal to 18)</td></tr><tr><td></td><td>// Another example</td></tr><tr><td></td><td>let result = (age < 0) ? "Invalid age" : "Valid age";</td></tr><tr><td></td><td>console.log(result); // Output: Valid age (since age is 20, which is not less than 0)</td></tr><tr><td></td><td></script>
3	Save the program as a .html file
4	Open the html file with a web browser
5	Go to the browsers console tab and verify the output.
	A* \$2 ID \$2 G SG \$2

top      /6 ¹ Filter     Default levels     O 5 1     Test.html:1	60		ŵ	<p< th=""><th>Console</th><th>IOF</th><th>\$ P</th><th>+</th><th> 0</th></p<>	Console	IOF	\$ P	+	 0
You see an adult.	0	top *	18	Filter		Defaul	t levels *	os @	
Valid age			rlub						

#### TASK 3: Writing Expressions

1 Open the text editor

```
2 Write the following codes
```

```
<html >
```

<head>

<title> Different types variable </title>

</head>

<body>

<script>

// Arithmetic Expressions

let a = 10;

let b = 5;

Nimi)

let sum = a + b; let difference = a - b; let product = a * b; let quotient = a / b; let remainder = a % b; console.log("Sum:", sum); // Output: 15 console.log("Difference:", difference); // Output: 5 console.log("Product:", product); // Output: 50 console.log("Quotient:", quotient); // Output: 2 console.log("Remainder:", remainder); // Output: 0 // String Concatenation Expression let firstName = "John"; let lastName = "Doe"; EPUBLISHED let fullName = firstName + " " + lastName; console.log("Full Name:", fullName); // Output: John Doe // Comparison Expressions let x = 10;let y = 5; let isEqual = x == y; console.log("Is x equal to y?", isEqual); // Output: false // Logical Expressions let isAdult = true; let hasLicense = false; let canDrive = isAdult && hasLicense; console.log("Can drive?", canDrive); // Output: false </script> </body> </html>

□ □ □ □ 0 1/ <u>□ console</u> <u>X</u> ♥ ♥ +	① ×
🗈 🖉 top 🔹 🖘 Filter 🕴 Default levels 🔹 🐠 5 🗧	9
Sum: 15	Test.htslil6
Difference: 5	Test.htel:12
Product: 50	Test.htel:18
Quotient: 2	Inst.html:19
Remainder: 0	Test.htel:20
Full Maney John Doe	Test.html/25
Is a equal to y? false	Test.htel:32
Can drive? faise	lest.html:18
×.	

- 3 Save the program as a .html file
- 4 Open the html file with a web browser
- 5 Go to the browsers console tab and verify the output.
  - 1 How do you declare and initialize variables in JavaScript, and what are some best practices for naming conventions and variable declaration?
  - 2 Declare a variable without initializing it in JavaScript? If so, what value does it hold by default check it?
  - 3 Provide examples demonstrating the difference of var, let, and const type of variable declaration.
  - 4 Write JavaScript code that calculates the area of a rectangle and a circle. Declare appropriate variables for the length, width (rectangle), and radius (circle). Use appropriate formulas to calculate the area and display the results with clear labels (e.g., "Area of rectangle: ", "Area of circle: ").
  - 5 Write JavaScript code that converts a temperature value from Celsius to Fahrenheit. Declare a variable for the temperature in Celsius. Use the formula (Celsius * 9/5) + 32 to convert the temperature and store the result in a new variable. Display the original temperature in Celsius and the converted temperature in Fahrenheit with appropriate labels.
  - 6 Create a JavaScript program that converts time between different units (e.g., seconds to minutes, hours to days).
  - 7 Use the ternary operator to check if the entered age is greater than or equal to 18. If it is, display "You are eligible for voting," otherwise display "You are not eligible for voting."
  - 8 Develop a JavaScript program, in which enter the total purchase amount and whether they have a discount coupon (true/false). Use logical operators to calculate and display the final amount after applying the discount.
  - 9 Write a JavaScript program that prompts the user to enter their score for two different exams. Use comparison operators to determine which exam score is higher and display a message indicating which exam the user performed better in.
  - 10 Provide examples demonstrating modulus operators (%) usage and practical applications.
  - 11 Provide examples of unary operators commonly used in arithmetic expressions.

# **EXERCISE 39 : Programming with Control Flow statements**

# **Objectives**

At the end of this exercise you shall be able to

- · use different types if conditional statements
- · use different types of loop statements.

## **Requirements**

#### **Tools/Materials**

- Desktop / Laptop with latest configuration
- Text editor
- Web browser

### **Procedure**

#### TASK 1: Using if statement

- 1 Open the text editor
- 2 Write the following codes

<html >

<head>

© NIMBLISHED © REPUBLISHED BE REPUBLISH <title> if statement </title>

</head>

<body>

<script>

let age = 20;

if (age >= 18)

```
{
```

console.log("You are eligible to vote.");

```
}
```

</script>

</body>

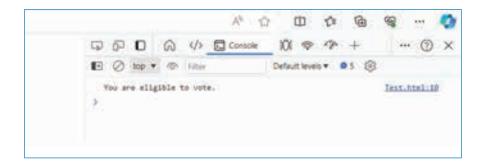
</html>

- 3 Save the program as a .html file
- 4 Open the html file with a web browser
- 5 Go to the browsers console tab and verify the output.



#### **COMPUTER SOFTWARE APPLICATION - CITS**

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#### TASK 2: Using if-else statement

1 Open the text editor

```
2 Write the following codes
```

<html >

<head>

<title> if statement </title>

</head>

<body>

<script>

```
const number = 10;
```

```
if (number % 2 === 0)
```

```
{
```

console.log(number+ " is even.");

}

else

{

console.log(number+ " is odd.");

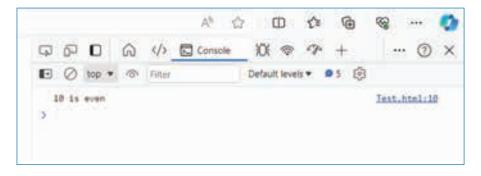
}

</script>

</body>

</html>

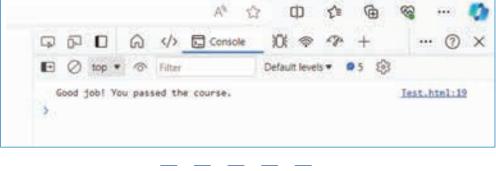
- 3 Save the program as a .html file
- 4 Open the html file with a web browser
- 5 Go to the browsers console tab and verify the output.



2 Write the follow		
	ing codes	
<html></html>		
<head></head>		
<title> if-else-if&lt;/td&gt;&lt;td&gt;statement </title>		
<body></body>		
<script></td><td></td><td></td></tr><tr><td>const age = 17</td><td></td><td></td></tr><tr><td>const votingAg</td><td>e = 18;</td><td></td></tr><tr><td>if (age >= votir</td><td>gAge)</td><td></td></tr><tr><td>{</td><td></td><td></td></tr><tr><td>console.log("Y</td><td>ou are eligible to vote.");</td><td></td></tr><tr><td>}</td><td></td><td></td></tr><tr><td>else if (age >=</td><td>16)</td><td></td></tr><tr><td>{</td><td></td><td></td></tr><tr><td>console.log("Y</td><td>ou can pre-register to vote.");</td><td></td></tr><tr><td>}</td><td></td><td></td></tr><tr><td>else</td><td></td><td></td></tr><tr><td>{</td><td></td><td></td></tr><tr><td>console.log("Y</td><td>ou are not eligible to vote yet.");</td><td></td></tr><tr><td>}</td><td></td><td></td></tr><tr><td></script>		
3 Save the progr	am as a .html file	
4 Open the html	file with a web browser	
5 Go to the brow	sers console tab and verify the output.	
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		≥ -72+ + ⊙ ×
	□ □ □ ∩ ·/> □ Console 10 * @ □ ○ top • ◎ Filter Default let	≥ 174 + ③ × vels• ●5 ⊗3

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```
TASK 4 : Using Nested if statements
1 Open the text editor
2 Write the following codes
   <html >
   <head>
   <title> Nested if statement </title>
   </head>
   <body>
   <script>
   const grade = 85;
   const passingGrade = 70;
   const honorRoll = 90;
   if (grade >= passingGrade)
   {
   if (grade >= honorRoll)
   {
   console.log("Excellent! You made the honor roll.");
   }
   else
   {
   console.log("Good job! You passed the course.");
   }
   }
   else
   {
   console.log("You need to study more and retake the course.");
   }
   </script>
   </body>
   </html>
3 Save the program as a .html file
4 Open the html file with a web browser
5 Go to the browsers console tab and verify the output.
                                                    A<sup>A</sup>
                                                         12
                                                                 D
```



TA	ASK 5 : Using switch statement
1	Open the text editor
2	Write the following codes
	<html></html>
	<head></head>
	<title> switch statement </title>
	<body></body>
	<script></th></tr><tr><td></td><td>const day = "Wednesday";</td></tr><tr><th></th><th>switch (day)</th></tr><tr><th></th><th>{</th></tr><tr><th></th><th>case "Monday": console.log("Start of the week!");</th></tr><tr><th></th><th>break;</th></tr><tr><th></th><th>case "Friday": console.log("TGIF!");</th></tr><tr><th></th><th>break;</th></tr><tr><td></td><td>case "Friday": console.log("TGIF!"); break; case "Weekend": console.log("Time to relax!"); break; default: console.log("Another day in the week.");</td></tr><tr><th></th><th>break;</th></tr><tr><th></th><th>default: console.log("Another day in the week.");</th></tr><tr><th></th><th></th></tr><tr><th></th><th></script>
3	Save the program as a .html file
4	Open the html file with a web browser
5	Go to the browsers console tab and verify the output.
	A* 12 CD 12* @ % 🔇
	E O top • O Filter Default levels • • 5 23

Another day in the week.

×.

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Test.html:17

```
TASK 6 : Using for loop
```

- 1 Open the text editor
- 2 Write the following codes

<html >

<head>

<title> For loop </title>

</head>

<body>

<script>

```
for (let i = 1; i <= 10; i++)
```

{

console.log(i);

}

</script>

</body>

</html>

- 3 Save the program as a .html file
- 4 Open the html file with a web browser
- 5 Go to the browsers console tab and verify the output.



#### TASK 7 : Using for loop and Iterating with conditions

- 1 Open the text editor
- 2 Write the following codes

<html >

<head>

<title> . For loop Iterating with conditions </title>

</head>

<body>

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```
<script>
for (let i = 0; i < 10; i++)
{
if (i % 2 === 0)
{
console.log(i, "is even");
}
else
{
console.log(i, "is odd");
}
}
</script>
</body>
</html>
```

- 3 Save the program as a .html file
- 4 Open the html file with a web browser
- 5 Go to the browsers console tab and verify the output.

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rowse	ers col	nsol	e tab	and v	verify	the output.						
	_		_			A ^A Ú	Ф	£₽	6	~		-
	Ģ	6D	D	â	<td>Console</td> <td>101 🗢</td> <td>P</td> <td>+</td> <td></td> <td> ⑦</td> <td>×</td>	Console	101 🗢	P	+		⑦	×
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	ð	-14	even*							Test	t.html:J	11
	1	* <b>i</b> s	odd'							Test	t.html:/	LS
	2	115	even*							Test	t.html:]	11
	3	155	odd*							Test	t.htel:1	15.
	4	715	even"							Test	t.htel:1	II
	5	*15	odd*							Ies	t.html:1	LS:
	6	15	even'							Test	t.htel:]	11
	7	-11	odd'							Test	t.html:/	15
	8	-14	even*							Test	t.htel:	11
	9	15	odd"								t.htel:	
	1											

TASK 8 : Using for loop and - Iterate through properties of an object

- 1 Open the text editor
- 2 Write the following codes

html >

<head>

<title> for loop </title>



```
</head>
<body>
<script>
const person = { name: "Alice", age: 30 };
for (const key in person)
{
console.log(key, person[key]);
}
</script>
</body>
</html>
```

- 3 Save the program as a .html file
- 4 Open the html file with a web browser
- 5 Go to the browsers console tab and verify the output.

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name All	ce				Test.html:11	
Age 30					Test.html:11	

TASK 9 : Using for loop and -lterate through values of iterable objects (arrays, strings etc.)

- 1 Open the text editor
- 2 Write the following codes

<html >

<head>

<title> for loop </title>

</head>

<body>

<script>

const numbers = [1, 2, 3, 4, 5];

for (const number of numbers)

{

```
console.log(number);
```

}

</script>

</body>

- 3 Save the program as a .html file
- 4 Open the html file with a web browser
- 5 Go to the browsers console tab and verify the output.

A^N 2 CD 2 ≡ G 8 </>
</>
</>
</>
</>
</>
</>
</t> 101 1 000 െ .....  $(\mathcal{D})$ × Default levels * E 🖉 top * @ Fitter 05 3 1 Test.html:18 2 Test.html:10 з Test.html:18 4 Test.htsl:10 5 Test.html:18 5

#### TASK 10 : Using while loop

1 Open the text editor

```
2 Write the following codes
```

<html >

<head>

<title> while loop </title>

</head>

<body>

<script>

```
let count = 0;
```

while (count < 5)

#### {

```
console.log("Count:", count);
```

count++;

#### }

```
</script>
```

</body>

| Ģ   | (J)  | D     | 6 | \$    | Console | 10k     | P     | s. | +   |        | 0      | -> |
|-----|------|-------|---|-------|---------|---------|-------|----|-----|--------|--------|----|
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|     | ount |       |   |       |         |         |       |    |     | Test.  | itel:1 | 0  |
| 4   | ount | 2     |   |       |         |         |       |    |     | Instal | tel 1  | 0  |
| - 5 | ount | 3     |   |       |         |         |       |    |     | Isst.  | itel:1 | 8  |
| . 6 | ount | 4     |   |       |         |         |       |    |     | Test.  | t=1:1  | 2  |
| >.  |      |       |   |       |         |         |       |    |     |        |        |    |

- 3 Save the program as a .html file
- 4 Open the html file with a web browser
- 5 Go to the browsers console tab and verify the output.

#### TASK 11 : Using do-while loop

- 1 Open the text editor
- 2 Write the following codes

<html >

<head>

```
<title> do-while </title>
```

</head>

<body>

<script>

```
let k = 0;
```

do

```
{
```

```
console.log("Value of k:", k);
```

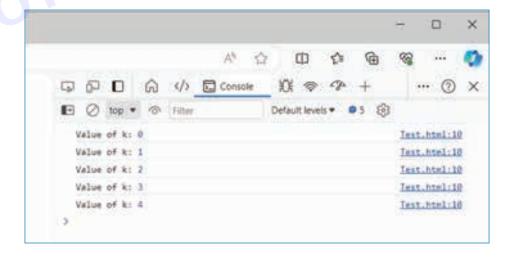
k++;

```
} while (k < 5);
```

</script>

</body>

- 3 Save the program as a .html file
- © NIN BLISHED BEREIS 4 Open the html file with a web browser
- 5 Go to the browsers console tab and verify the output.



- 1 Write a JavaScript program that takes a person's age as input and determines whether they are eligible for voting. If the age is 18 or above, the function should return "Eligible for voting," otherwise, it should return "Not eligible for voting." Use if-else statements to implement the logic
- 2 Develop a JavaScript program that takes a year as input and determines whether it is a leap year or not. If the year is divisible by 4 but not by 100, or if it is divisible by 400, it is considered a leap year.
- 3 Write a JavaScript program that takes two numbers as input and display the maximum of the two. Use if-else statements to implement the comparison.
- 4 Create a JavaScript program that takes a number representing a month (1 for January, 2 for February, etc.) and prints the corresponding season. Consider the following mappings: 1-3 (Winter), 4-6 (Spring), 7-9 (Summer), 10-12 (Fall). Use if-else-if statements to implement this logic.
- 5 Create a JavaScript program that takes a student's score as input and determines their grade. If the score is greater than or equal to 90, assign the grade 'A'; if between 80 and 89, assign 'B'; if between 70 and 79, assign 'C'; if between 60 and 69, assign 'D'; otherwise, assign 'F'. By Using if-else-if statements.
- 6 Write a JavaScript program that takes three numbers as input and determines the largest among them. However, if two or more numbers are equal, display a message indicating that there is a tie, using nested ifelse statements.
- 7 Write a JavaScript program that takes a grade (A, B, C, D, F) as input and shows message indicating the corresponding description (excellent, good, average, poor, fail). Use a switch statement to implement this logic.
- 8 Create a JavaScript program that takes a month's number (1 for January, 2 for February, etc.) as input and returns the name of the month. Use a switch statement to implement this logic.
- 9 Develop a JavaScript program that generates the Fibonacci sequence up to a given number of terms using a for loop. The Fibonacci sequence starts with 0 and 1, and each subsequent number is the sum of the two preceding ones.
- 10 Write a JavaScript program that takes a number and then prints its multiplication table up to 10 using a for loop.
- 11 Create a JavaScript program that takes a positive integer as input and determines whether it is a prime number or not. Use a while loop to implement the prime number checking algorithm.
- 12 Write a JavaScript program that calculates the sum of digits of a given number. Use a while loop to extract digits one by one until the number becomes zero, and accumulate the sum.
- 13 Develop a JavaScript program that calculates the factorial of a given number using a do-while loop. The factorial of a number n is the product of all positive integers less than or equal to n.

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# **EXERCISE 40 : Creating and using Objects in JavaScript**

## **Objectives**

At the end of this exercise you shall be able to

- create objects
- · use document object model.

## **Requirements**

#### **Tools/Materials**

- Desktop / Laptop with latest configuration
- Text editor
- Web browser

## **Procedure**

TASK 1: Creating an Object

#### I Using Object Literal Notation

1 Open the text editor

```
2 Write the following codes
```

<html >

<head>

```
NMUBLISHED
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<title> Object Literal Notation </title>
</head>
<body>
<script>
// Creating an object using object literal notation
var person = {
firstName: "John",
lastName: "Doe",
age: 30,
fullName: function() {
return this.firstName + " " + this.lastName;
}
};
// Accessing object properties and methods
console.log(person.firstName); // Output: John
console.log(person.lastName); // Output: Doe
console.log(person.age); // Output: 30
console.log(person.fullName()); // Output: John Doe
</script>
</body>
```



- 3 Save the program as a .html file
- 4 Open the html file with a web browser
- 5 Go to the browsers console tab and verify the output.

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1	100											Isst.	tel:1	2
	10											Text.	tel:2	8
13	lahn (	Doe .										Testal	11112	1

#### **II** Using Constructor Functions

1 Open the text editor

```
2 Write the following codes
```

<html >

<head>

<title> Constructor Functions </title>

</head>

<body>

<script>

ects // Constructor function for creating person objects function Person(firstName, lastName, age) {

this.firstName = firstName;

this.lastName = lastName;

```
this.age = age;
```

this.fullName = function() {

return this.firstName + " " + this.lastName;

```
};
```

}

// Creating a new instance of Person var person1 = new Person("John", "Doe", 30); // Accessing object properties and methods console.log(person1.firstName); // Output: John console.log(person1.lastName); // Output: Doe console.log(person1.age); // Output: 30 console.log(person1.fullName()); // Output: John Doe </script> </body> </html>

- Save the program as a .html file 3
- 4 Open the html file with a web browser
- Go to the browsers console tab and verify the output. 5

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5															

#### **III Using Classes**

1 Open the text editor

```
iects
2 Write the following codes
  <html >
  <head>
  <title> Classes </title>
  </head>
  <body>
  <script>
  // ES6 class for creating person objects
  class Person {
  constructor(firstName, lastName, age) {
  this.firstName = firstName;
  this.lastName = lastName;
  this.age = age;
  }
  fullName() {
  return this.firstName + " " + this.lastName;
  }
  }
  // Creating a new instance of Person
  let person2 = new Person("Jane", "Smith", 25);
  // Accessing object properties and methods
  console.log(person2.firstName); // Output: Jane
  console.log(person2.lastName); // Output: Smith
  console.log(person2.age); // Output: 25
```





console.log(person2.fullName()); // Output: Jane Smith

</script>

</body>

</html>

- 3 Save the program as a .html file
- 4 Open the html file with a web browser
- 5 Go to the browsers console tab and verify the output.

O top * The Filter     Default levels * • 5 (3)       Jane     Isst.html:23       Seith     Isst.html:24       25     Isst.html:25       Jane Seith     Isst.html:26				
Seith Iest.html:23 Seith Iest.html:24 25 Iest.html:25 Jane Seith Iest.html:26 ent Object Model	고 🖸 🖸 🎧  🖸 Console	101 🗢 🖓 +	() )	×
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25 Test.html:25 Jane Seith Test.html:26	Jane		Test.html:23	
ent Object Model	Smith		Test.html:24	
ent Object Model	25		Test.html:25	
	Jane Smith		Test.html:26	
	ment Object Model or codes	RAN EPU	BLIS	5

#### TASK 2: Using Document Object Model

- 1 Open the text editor
- 2 Write the following codes

<html >

<head>

<title>DOM Example</title>

</head>

<body>

<h1 id="heading">DOM Example</h1>

This is a paragraph.

<button onclick="changeColor()">Change Color</button>

<script>

// Function to change the color of the heading

function changeColor() {

var heading = document.getElementById('heading');

heading.style.color = 'blue';

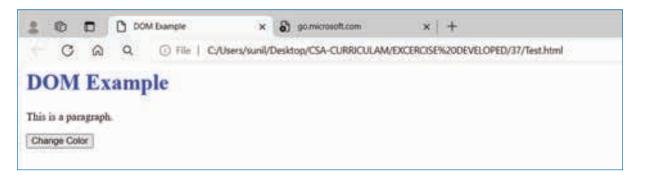
}

</script>

</body>



- 3 Save the program as a .html file
- 4 Open the html file with a web browser
- 5 Verify the output.



- 1 Create a JavaScript object named book with properties title, author, and pages. Initialize the title property with "The Great Gatsby", author with "F. Scott Fitzgerald", and pages with 180.
- 2 Define a JavaScript class named Circle with properties radius and calculateArea method that calculates the area of the circle. Create an instance of the Circle class with a radius of 7 and calculate its area.
- 3 Create a constructor function named Car that initializes the properties make, model, and year. Create an instance of the Car object with the make "Ford", model "Mustang", and year 2022.
- 4 Develop a JavaScript program that dynamically adds new elements (e.g., paragraphs, images) to a webpage when a button is clicked. Use DOM manipulation
- 5 Create a JavaScript program that generates a random number between 1 and 100. Display the generated number on the webpage inside a <div> element using the innerHTML property.
- 6 Develop a JavaScript program that calculates the factorial of a given number entered by the user. Display the result on the webpage using the innerHTML property.

# **EXERCISE 41 : Creating and using Functions**

# **Objectives**

At the end of this exercise you shall be able to

- create user defined functions
- create Anonymus functions

# Requirements

#### **Tools/Materials**

- Desktop / Laptop with latest configuration
- Text editor
- Web browser

## **Procedure**

#### TASK 1: Creating a Function

#### I Function without parameters

- 1 Open the text editor
- 2 Write the following codes

<html >

<head>

<title> Function without parameters </title>

</head>

<body>

<script>

// Defining a function named "greet" without any parameters

function greet()

### {

// Inside the function, logging a greeting message to the console console.log("Hello, world!");

#### }

```
// Calling the function
```

greet(); // Output: Hello, world!

</script>

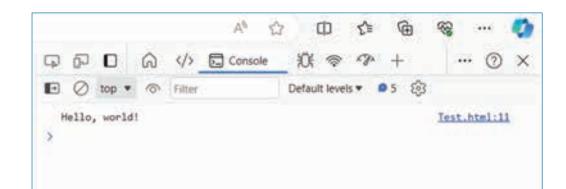
</body>

</html>

- 3 Save the program as a .html file
- 4 Open the html file with a web browser
- 5 Go to the browsers console tab and verify the output.



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#### II. Function with parameters

- 1. Open the text editor
- 2. Write the following codes
  - <html >

<head>

```
<title> Function with parameters </title>
```

</head>

<body>

<script>

// Defining a function named "greet" that takes a parameter named "name"

function greet(name)

```
{
```

```
// Inside the function, logging a greeting message to the console with the provided name
console.log("Hello, " + name + "!");
```

```
}
```

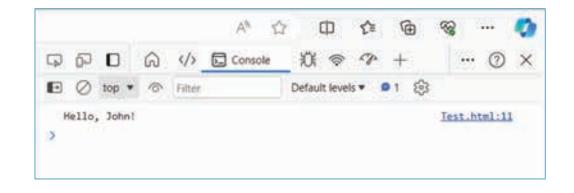
// Calling the function with an argument "John"

greet("John"); // Output: Hello, John!

</script>

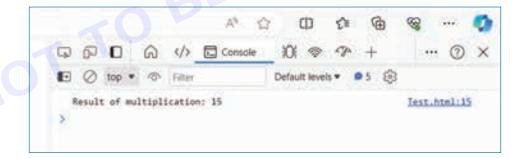
</body>

- 3 Save the program as a .html file
- 4 Open the html file with a web browser
- 5 Go to the browsers console tab and verify the output.



```
III. Function with return statement
   1 Open the text editor
   2 Write the following codes
      <html >
      <head>
      <title> Function with return statement </title>
      </head>
      <body>
      <script>
      // JavaScript function with a return statement
      function multiply(num1, num2) {
      return num1 * num2;
      }
      // Example of using the function
      var result = multiply(5, 3);
      console.log("Result of multiplication: " + result);
      </script> </script>
      </body>
      </html>
   3 Save the program as a .html file
```

- 4 Open the html file with a web browser
- 5 Go to the browsers console tab and verify the output.



#### TASK 2: Creating Anonymous Functions

#### I. Using Function Expression

- 1 Open the text editor
- 2 Write the following codes
  - <html >
  - <head>
  - <title> </title>
  - </head>
  - <body>



```
<script>
```

var greet = function(name)

{

 ${\ensuremath{\textit{//}}}$  Inside the function, logging a greeting message to the console with the provided name

```
console.log("Hello, " + name + "!");
```

};

// Calling the function with an argument "John"

greet("John"); // Output: Hello, John!

</script>

</body>

</html>

- 3 Save the program as a .html file
- 4 Open the html file with a web browser
- 5 Go to the browsers console tab and verify the output.



#### II Using Arrow Function

```
1 Open the text editor
```

```
2 Write the following codes
<html >
<head>
```

<title> </title>

```
</head>
```

<body>

```
<script>
```

```
const greet = () => {
```

console.log("Hello!");

```
};
```

greet(); // Call the function

</script>

</body>

- 3 Save the program as a .html file
- 4 Open the html file with a web browser
- 5 Go to the browsers console tab and verify the output.



- 1 Create a JavaScript function named greetUser that displays a greeting message on the webpage when called.
- 2 Write a JavaScript function named printMessage that takes a string parameter message and logs the message to the console.
- 3 Create a JavaScript function named printMultiplicationTable that takes a parameter number and prints the multiplication table of that number up to 10. Use console.log() to display each multiplication result.
- 4 Write a JavaScript function that takes two numbers as parameters and returns their sum. Store the result in a variable and log it to the console.
- 5 Create a JavaScript function named calculateArea that takes two parameters length and width and returns the area of a rectangle.
- 6 Write a JavaScript function named calculatePower that takes two parameters base and exponent and returns the result of raising the base to the exponent.
- 7 Create a function expression named isEven that takes a parameter num and returns true if the number is even, otherwise returns false.
- 8 Define an arrow function named capitalizeString that takes a parameter as a string and returns the string with the first letter capitalized.

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# **EXERCISE 42 : Using Java Script with Forms**

## **Objectives**

#### At the end of this exercise you shall be able to

- use HTML forms with javascript
- validate HTML form using javascript
- create Dynamic form elements.

## Requirements

#### **Tools/Materials**

- Desktop / Laptop with latest configuration
- Text editor
- Web browser

# Procedure

#### TASK 1: Simple Form Submission

1 Open the text editor

```
2 Write the following codes
```

<html>

```
<head></head>
```

<body>

```
<form id="myForm">
```

<label for="username">Username:</label>

```
<input type="text" id="username" name="username">
```

<button type="submit">Submit</button>

</form>

<script>

const form = document.getElementById("myForm");

form.addEventListener("submit", handleSubmit);

function handleSubmit(event) {

event.preventDefault();

const username = document.getElementById("username").value;

```
console.log("Submitted username:", username);
```

}

```
</script>
```

</body>

- 3 Save the program as a .html file
- 4 Open the html file with a web browser
- 5 Enter a text in the textbox and press submit button.
- 6 Go to the browsers console tab and verify the output.

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|--------------|--------------|---------------|-------|---------|-------|---------|---------|------|---------|--------------|----------|
| Usemame: Sun | Submit       | Ģ             | P     | 0       | 6     | \$      | Ciricle | 10 🗢 | 2 +     | 0            | $\times$ |
|              |              |               | 0     | 200 *   |       | Enter   |         |      | • • T 🕄 |              |          |
|              |              |               | della | thed us |       | ri Buti |         |      |         | Text. htel 1 | ١.       |
|              |              | 2             |       |         |       |         |         |      |         |              |          |

#### TASK 2: Form Validation

- 1 Open the text editor
- 2 Write the following codes

<html>

<head></head>

<body>

<form id="myForm">

```
<label for="username">Username:</label>
```

<input type="text" id="username" name="username">

```
<button type="submit">Submit</button>
```

</form>

<script>

```
const form = document.getElementById("myForm");
```

```
form.addEventListener("submit", handleSubmit);
```

```
function handleSubmit(event) {
```

event.preventDefault();

```
const username = document.getElementById("username").value;
```

```
if (username === "") {
```

alert("Please enter a username");

```
return; // Prevent form submission
```

}

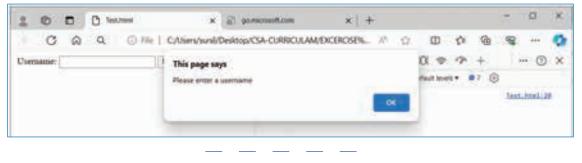
console.log("Submitted username:", username);

```
}
```

</script>

```
</body>
```

- 3 Save the program as a .html file
- 4 Open the html file with a web browser
- 5 Go to the browsers console tab and verify the output.



Vimi

```
TASK 3: Create Dynamic Form Elements
1 Open the text editor
2 Write the following codes
   <html >
   <head>
   <title>Dynamic Form Elements</title>
   </head>
   <body>
   <div id="container">
   <form id="myForm">
   <!-- Initially, the form has one input field -->
   <input type="text" name="field1" placeholder="Field 1">
   <br>
   <button type="button" onclick="addField()">Add Field</button>
   <button type="submit">Submit</button>
   </form>
   </div>
   <script>
   function addField() {
   var form = document.getElementById("myForm");
   var inputCount = form.getElementsByTagName("input").length + 1; // Get the number of existing input fields
      and increment by 1
   var newInput = document.createElement("input"); // Create a new input element
   newInput.type = "text";
   newInput.name = "field" + inputCount; // Assign a unique name to the new input field
   newInput.placeholder = "Field " + inputCount; // Placeholder text
   newInput.required = true; // Optionally, make the field required
   form.appendChild(newInput); // Append the new input field to the form
   }
   </script>
   </body>
   </html>
3 Save the program as a .html file
4 Open the html file with a web browser
5 Verify the output..
```

2	•		Dynamic Form Daments	× a pomerosoftam	× +			-	0	X
	C	9	Q () The [ C/Users/	sunil/Desktop/CSA-CURRICULAM	EXCERCISEN. A	\$	0 0	1.4	- 554	0
Field	19									
Add	Fauld	Submit	Fant 3							
			Please fill out this field.							

- 1 Write a JavaScript program that validates an email input field in a form to ensure it is in a valid email format (e.g., contains "@" and "."). Display an error message if the email format is invalid.
- 2 Create a JavaScript program that implements form validation for a password input field. Validate the password to ensure it meets certain criteria, such as minimum length and inclusion of special characters. Display an error message if the password does not meet the criteria.
- 3 Write a JavaScript program that dynamically adds input fields (e.g., text input, select dropdown) to a form when a button is clicked.
- 4 Create a JavaScript program that dynamically removes input fields from a form when a button is clicked, based on user interaction or condition.
- 5 Create a JavaScript program that disables a form submit button until all required fields in the form are filled. Enable the submit button only when all required fields are filled.

# **EXERCISE 43 : Creating Cookies with JavaScript**

# **Objectives**

#### At the end of this exercise you shall be able to

- · create cookies using javascript
- · display cookie details using javascript
- · delete a cookie using javascript.

# **Requirements**

#### **Tools/Materials**

- Desktop / Laptop with latest configuration
- Text editor
- Web browser

## **Procedure**

© NIMBLISHED BEREPUBLISHED BE TASK 1: Create a cookie and display its value using an alert

- 1 Open the text editor
- 2 Write the following codes

<html>

<head>

<title> Cookies </title>

</head>

<body>

<script>

document.cookie="username=sun";

```
document.cookie="age=33";
```

document.cookie="country=india";

```
alert(document.cookie);
```

</script>

```
</body>
```

- 3 Save the program as a .html file
- 4 Open the html file with a web browser and verify the output.





C

javascript cookies username=sun age=33 country=india

TA	SK 2: Create a cookie and display its value using innerHTML property
1	Open the text editor
2	Write the following codes
	<html></html>
	<head></head>
	<title> Cookies </title>
	<body></body>
	javascript cookies
	<script></th></tr><tr><th></th><th>document.cookie="username=sun";</th></tr><tr><th></th><th>document.cookie="age=33";</th></tr><tr><th></th><th>document.cookie="country=india";</th></tr><tr><th></th><th>var cookie=document.cookie.split(";");</th></tr><tr><th></th><th>for(i=0;i<cookie.length;i++) {     document.getElementById("para").innerHTML+=" "+cookie[i]; } </script>
	{
	document.getElementById("para").innerHTML+=" "+cookie[i];
	}
3	Save the program as a .html file
4	Open the html file with a web browser and verify the output.
	Eile Edit View Higtory Bookmarks Jools Help

Nimi)

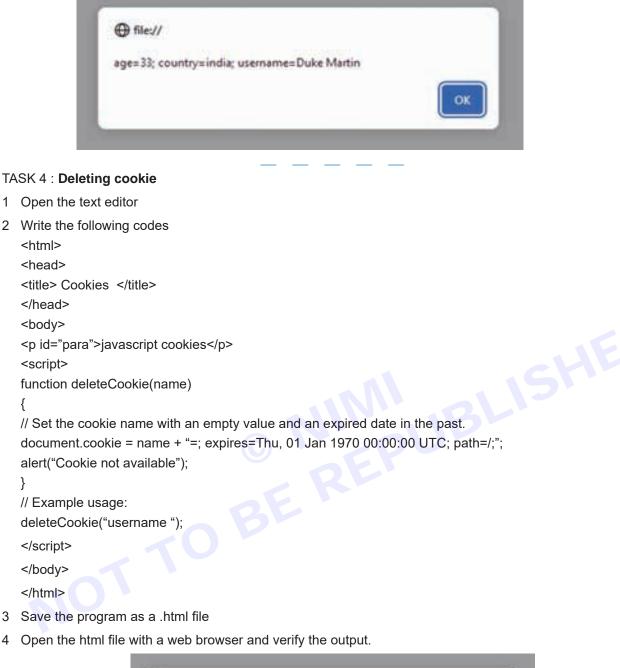
file:///C:/Users/Admin/Desktop/sunil/mycookies.html

```
TASK 3 : Create and display a cookie using a user defined function
1 Open the text editor
2 Write the following codes
   <html>
   <head>
   <script>
   function setCookie()
   {
   document.cookie="username=Duke Martin";
   }
   function getCookie()
   {
   if(document.cookie.length!=0)
   {
   alert(document.cookie);
   }
   else
   {
   alert("Cookie not available");
   }
   }
   </script>
   </head>
   <body>
   <input type="button" value="setCookie" onclick="setCookie()">
   <input type="button" value="getCookie" onclick="getCookie()">
   </body>
   </html>
3 Save the program as a .html file
4 Open the html file with a web browser and verify the output.
            Eile Edit View Higtory Bookmarks Jools Help
                   /C:/Users/Admin/Desktop/sunil/m X
            ē
                       C
                                            file:///C:/Users/Admin/Desktop/sunil/mycookies.html
```

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setCookie getCookie







- 1 Write a JavaScript program that creates a cookie named "username" with the value "John" and an expiration time of 7 days.
- 2 Write a JavaScript program that creates a cookie named "visited" with the value "true" when a user first visits a webpage. Check if the cookie exists when the user revisits the page and display a welcome message accordingly.
- 3 Create a JavaScript program that prompts the user to enter their preferred language and creates a cookie named "language" with the chosen language as its value. Ensure that the cookie expires after 30 days.

{

}

# **EXERCISE 44 : Creating CSS**

## **Objectives**

At the end of this exercise you shall be able to

- · use css in HTML page
- · manipulate the style property of HTML elements using javascript.

## **Requirements**

#### **Tools/Materials**

- Desktop / Laptop with latest configuration
- Text editor
- Web browser

## **Procedure**

# © NIMBLISHED BEREPUBLISHED BEREPUBLISHED TASK 1: Using CSS Element Selector

- 1 Using open the text editor
- 2 Write the following codes

<html>

<head>

<style>

p{

text-align: center; color: blue;

}

</style>

</head>

<bodv>

This style will be applied on every paragraph.

Me too!

And me!

</body>

- 3 Save the program as a .html file
- Open the html file with a web browser 4
- 5 Verify the output.



TÆ	ASK 2: Using CSS Id Selector
1	Open the text editor
2	Write the following codes
	<html></html>
	<head></head>
	<style></th></tr><tr><th></th><th>#para1 {</th></tr><tr><th></th><th>text-align: center;</th></tr><tr><th></th><th>color: blue;</th></tr><tr><th></th><th>}</th></tr><tr><th></th><th></style>
	<body></body>
	Hello Javatpoint.com
	This paragraph will not be affected.
3	Save the program as a .html file
4	Open the html file with a web browser
5	Verify the output.
	- C 🛆 Q. 🗇 File   CAMERSYNER/DERKCO/CSA-CURRICULAM/DXCRICSFILL 🖉 🖄 🖽 🏟 🤫 🔇
	Hello Avatpoint.com

```
This purgraph will not be affected.
```

## TASK 3: Using CSS Class Selector

```
1 Open the text editor
```

```
2 Write the following codes
```

<html>

<head>

<style>

.center {

text-align:right;

color: blue;

```
}
```

```
h1.center {
```

text-align: center;

```
color: red;
```

}



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|    | <body></body>                                                                                                                                                                          |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | <h1 class="center">This heading is red and center-aligned.</h1>                                                                                                                        |
|    | This paragraph is blue and right-aligned.                                                                                                                                              |
|    | This paragraph is blue and right-aligned.                                                                                                                                              |
|    |                                                                                                                                                                                        |
|    |                                                                                                                                                                                        |
| 3  | Save the program as a .html file                                                                                                                                                       |
| 4  | Open the html file with a web browser                                                                                                                                                  |
| 5  | Verify the output.                                                                                                                                                                     |
|    | 👘 🔿 🖓 🕕 🗇 🖓 👘 🖓 🛶 🚱                                                                                                                                                                    |
|    | This heading is red and center-aligned.                                                                                                                                                |
|    | This paragraph is blue and right-aligned.                                                                                                                                              |
|    | This paragraph is blue and right-aligned.                                                                                                                                              |
|    |                                                                                                                                                                                        |
|    |                                                                                                                                                                                        |
| ΤA | ASK 4: Using CSS Universal Selector                                                                                                                                                    |
| 1  | Open the text editor                                                                                                                                                                   |
|    | Write the following codes                                                                                                                                                              |
| 2  | <pre><html></html></pre>                                                                                                                                                               |
|    | <head></head>                                                                                                                                                                          |
|    | <style></th></tr><tr><th></th><th>*{</th></tr><tr><th></th><th>color: green;</th></tr><tr><th></th><th>font-size: 20px;</th></tr><tr><th></th><th>}</th></tr><tr><th></th><th></style> |
|    |                                                                                                                                                                                        |
|    | <body></body>                                                                                                                                                                          |
|    | <h2>This is heading</h2>                                                                                                                                                               |
|    | This style will be applied on every paragraph.                                                                                                                                         |
|    | <pre>Me too!</pre>                                                                                                                                                                     |
|    | And me!                                                                                                                                                                                |
|    |                                                                                                                                                                                        |
|    |                                                                                                                                                                                        |
| 3  | Save the program as a .html file                                                                                                                                                       |
|    | Open the html file with a web browser                                                                                                                                                  |
| 4  |                                                                                                                                                                                        |
| 5  | Verify the output.                                                                                                                                                                     |
|    |                                                                                                                                                                                        |

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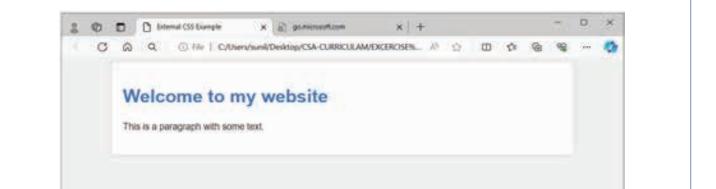
	< C Q O File   C:/Users/sunil/Desktop/CSA-CURRICULAM/EXCERCISE% A 🟠 🗇 🎓 😪 … 💋
	This is heading
	This style will be applied on every paragraph.
	Me too!
	And me!
~ ~ ~	
	5: Using CSS Group Selector
	en the text editor
	te the following codes
	ml>
	ead>
	yle>
	h2, p {
	t-align: center; or: blue; tyle> ead>
	or: blue;
}	
	tyle>
	ead>
	ody>
	I>Hello Javatpoint.com
	2>Hello Javatpoint.com (In smaller font)
	>This is a paragraph.
	ody>
	tml>
	ve the program as a .html file
	en the html file with a web browser
Ver	ify the output.
	- C A A O File   CAlsendauré/Desktop/CSA-CURRICULAM/EXCERCISEN. A & D A & & C
	Hello Javatpoint.com
	Hello Javatpoint.com (In smaller font)
	This is a paragraph.

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```
TASK 6: Using External Stylesheet
I create an external stylesheet
   1 Open the text editor
   2 Write the following codes
     /* styles.css */
     body {
     font-family: Arial, sans-serif;
     background-color: #f0f0f0;
     color: #333;
     }
     h1 {
     color: #007bff;
     }
      .container {
                                  le
B
     width: 80%;
     margin: 0 auto;
     padding: 20px;
     background-color: #fff;
     border-radius: 5px;
     box-shadow: 0 0 10px rgba(0, 0, 0, 0.1);
     }
     р{
     line-height: 1.6;
     }
   3 Save the coding as a style.css file
II Link the css file in HTML
   1 Open the text editor
   2 Write the following codes
      <html>
      <head>
      <meta charset="UTF-8">
      <meta name="viewport" content="width=device-width, initial-scale=1.0">
      <title>External CSS Example</title>
      k rel="stylesheet" href="styles.css">
      </head>
      <body>
      <div class="container">
      <h1>Welcome to my website</h1>
      This is a paragraph with some text.
      </div>
      </body>
     </html>
   3 Save the program as a .html file
   4 Open the html file with a web browser
```

5 Verify the output.

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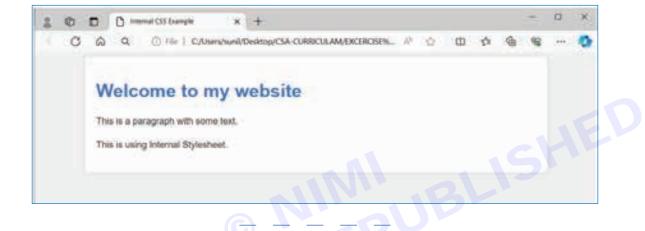


```
TASK 7: Using Internal Stylesheet
```

```
1 Open the text editor
                  ۰.0">
د.0">
2 Write the following codes
<html lang="en">
<head>
<meta charset="UTF-8">
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<title>Internal CSS Example</title>
<style>
/* CSS code here */
body {
font-family: Arial, sans-serif;
background-color: #f0f0f0;
color: #333;
}
h1 {
color: #007bff;
}
.container {
width: 80%;
margin: 0 auto;
padding: 20px;
background-color: #fff;
border-radius: 5px;
box-shadow: 0 0 10px rgba(0, 0, 0, 0.1);
}
р{
line-height: 1.6;
}
</style>
</head>
<body>
```

Nimi)

- <div class="container">
- <h1>Welcome to my website</h1>
- This is a paragraph with some text.
- This is using Internal Stylesheet.
- </div>
- </body>
- </html>
- 3 Save the program as a .html file
- 4 Open the html file with a web browser
- 5 Verify the output.



#### TASK 8: Using Inline CSS

- 1 Open the text editor
- 2 Write the following codes

<html lang="en">

<head>

<meta charset="UTF-8">

<meta name="viewport" content="width=device-width, initial-scale=1.0">

<title>Inline CSS Example</title>

</head>

<body>

<div style="font-family: Arial, sans-serif; background-color: #f0f0f0; color: #333;">

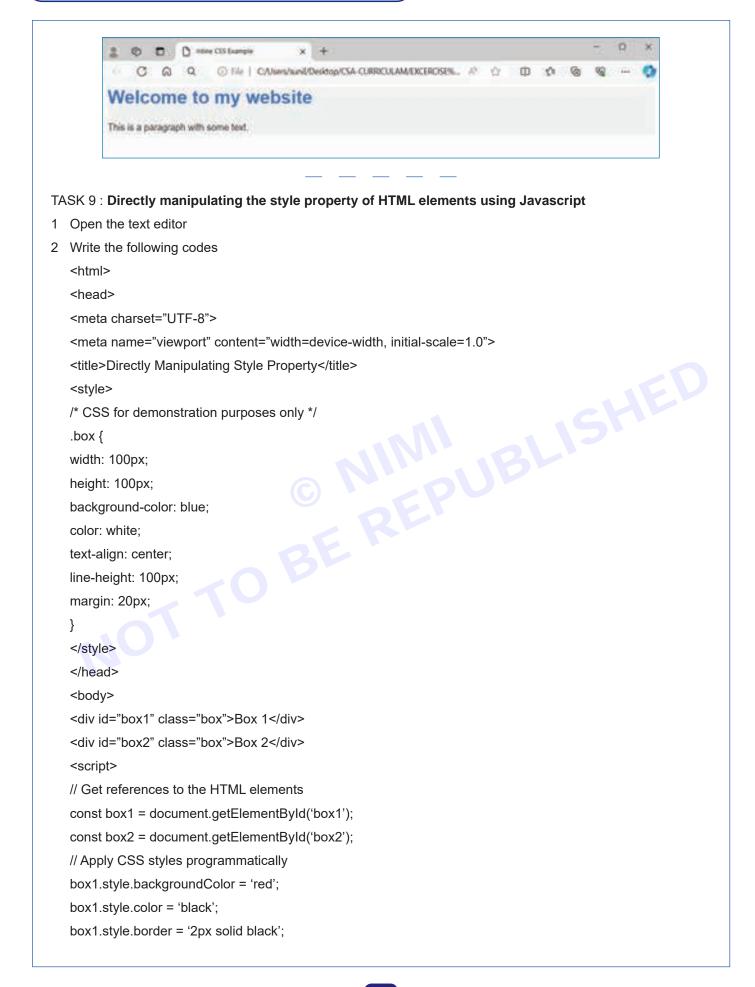
```
<h1 style="color: #007bff;">Welcome to my website</h1>
```

This is a paragraph with some text.

</div>

</body>

- 3 Save the program as a .html file
- 4 Open the html file with a web browser
- 5 Verify the output.





```
box2.style.backgroundColor = 'green';
```

box2.style.color = 'white';

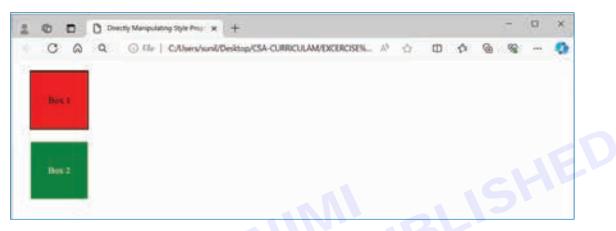
box2.style.border = '2px solid white';

</script>

</body>

</html>

- 3 Save the program as a .html file
- 4 Open the html file with a web browser
- 5 Verify the output.



TASK 10 : creates a <style> element dynamically and appends it to the document

- 1 Open the text editor
- 2 Write the following codes

<html>

<head>

<meta charset="UTF-8">

<meta name="viewport" content="width=device-width, initial-scale=1.0">

<title>Creating a Style Element</title>

</head>

<body>

<div id="content">This text will be styled.</div>

<script>

// Create a style element

const styleElement = document.createElement('style');

// Define your CSS rules

const cssRules = `

#content {

color: blue;

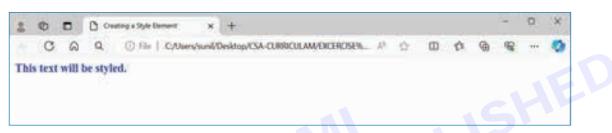
font-size: 20px;

font-weight: bold;

} `;

// Set the CSS rules to the style element styleElement.innerHTML = cssRules; // Append the style element to the document's head document.head.appendChild(styleElement); </script> </body> </html> 3 Save the program as a .html file 4 Open the html file with a web browser

5 Verify the output.



- 1 Style all <h1> elements on a webpage to have a font size of 24px and be displayed in bold by using CSS element Selector.
- 2 Apply a background color of yellow to all <div> elements with the class container by using CSS element Selector.
- 3 Style the font size of an element to be 24px and bold by using its id.
- 4 Style all elements with the class "btn" to have a background color of blue and white text color using CSS.
- 5 Style the color of all text on the webpage to be black using the universal selector.
- 6 Set the text alignment to center for all <h1>, <h2>, and <h3> elements on the webpage by using CSS group Selector.
- 7 Create an external stylesheet and link to an HTML document and apply different style to elements.
- 8 Provide an example of how an inline CSS is applied to an HTML element.

# **EXERCISE 45 : Error Handling in JavaScript**

# **Objectives**

## At the end of this exercise you shall be able to

- · handle error using try catch
- · handle error using try catch and throw
- · handle error using try catch finally.

# **Requirements**

## **Tools/Materials**

- Desktop / Laptop with latest configuration
- Text editor
- Web browser

# **Procedure**

© NINI BLISHED BEREIS TASK 1: Error Handling using try-catch 1 Open the text editor 2 Write the following codes <html > <head>

<title> Object Literal Notation </title>

</head>

<body> <script>

try

```
{
```

// Code that may throw an error

```
let x = 1:
```

let y = x + z; // z is not defined, this will throw an error

} catch (error)

```
{
// Handle the error
```

console.error("An error occurred:", error.message);

```
}
```

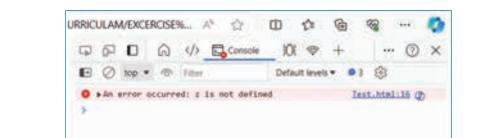
</script>

</body> </html>

- 3 Save the program as a .html file
- 4 Open the html file with a web browser
- 5 Go to the browsers console tab and verify the output.

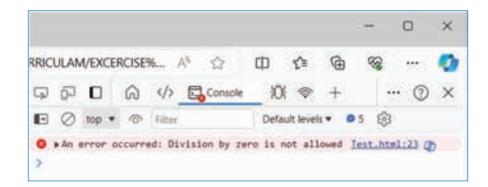


## **COMPUTER SOFTWARE APPLICATION - CITS**



```
TASK 2: Error Handling using try-catch and throw
1 Open the text editor
2 Write the following codes
   <html >
   <head>
   <title> Object Literal Notation </title>
   </head>
   <body>
   <script>
   function divide(a, b)
   {
   if (b === 0)
   {
   throw new Error("Division by zero is not allowed");
   }
   return a / b;
   }
   try
   {
   console.log(divide(10, 0));
   }
   catch (error)
   {
   console.error("An error occurred:", error.message);
   }
   </script>
   </body>
   </html>
3 Save the program as a .html file
4 Open the html file with a web browser
5 Go to the browsers console tab and verify the output.
```

## **COMPUTER SOFTWARE APPLICATION - CITS**



TASK 3: Error Handling using try-catch-finally

```
1 Open the text editor
```

2 Write the following codes

```
<html >
   <head>
   <title> Object Literal Notation </title>
   </head>
   <body>
   <script>
   try {
   // Code that may throw an error
   let x = 1;
   let y = x + z; // ReferenceError: z is not defined
   console.log("This line will not be executed if an error occurs.");
   }
   catch (error)
   {
   // Handle the error
   console.error("An error occurred:", error.message); // Output: An error occurred: z is not defined
   }
   finally
   {
   // Code that runs regardless of whether an error occurred or not
   console.log("This line will always be executed.");
   }
   </script>
   </body>
   </html>
3 Save the program as a .html file
4 Open the html file with a web browser
5 Go to the browsers console tab and verify the output.
```



- 1 Create a JavaScript function that takes two parameters, numerator and denominator, and attempts to divide numerator by denominator inside a try block. Use a catch block to handle any division by zero errors and log an appropriate error message.
- 2 Create a JavaScript program that attempts to execute a non-existent function inside a try block. Use a catch block to handle the error and log a message indicating that the function does not exist.
- 3 Create a JavaScript function named calculateFactorial that takes a parameter num and calculates the factorial of the number. Use a try-catch block to handle the scenario where num is a negative integer. If num is negative, throw an error with an appropriate message.
- 4 Write a JavaScript program that prompts the user to enter their age. Use a try-catch block to validate that the entered age is a positive integer. If the age is not valid, throw an error with a custom message.
- 5 Write a JavaScript program that attempts to access a property of an undefined object inside a try block. Use a catch block to handle the error and log a custom error message to the console. Include a finally block to show some message, regardless of whether an error occurred or not.



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# **EXERCISE 46 : Implementing an AJAX application**

# **Objectives**

At the end of this exercise you shall be able to

- handle AJAX request
- update HTML page content dynamically

# Requirements

## **Tools/Materials**

- Desktop / Laptop with latest configuration
- Text editor
- Web browser
- Apache web server

# **Procedure**

## TASK 1: Implementation an AJAX application

- Create a JavaScript file to handle the AJAX request and update the content dynamically.
  - 1 Open the text editor
  - 2 Write the following codes

// Get references to the button and content container

const loadButton = document.getElementById('loadButton');

```
const contentContainer = document.getElementById('contentContainer');
```

// Function to load content asynchronously

function loadContent() {

// Create a new XMLHttpRequest object

const xhr = new XMLHttpRequest();

// Define the callback function to handle the response

xhr.onreadystatechange = function() {

// Check if the request is complete and successful

```
if (xhr.readyState === XMLHttpRequest.DONE && xhr.status === 200) {
```

// Update the content container with the response text

```
contentContainer.innerHTML = xhr.responseText;
```

```
}
```

};

// Open a GET request to the desired URL

xhr.open('GET', 'example.txt', true);

// Send the request

xhr.send();

}

// Add an event listener to the button to trigger the AJAX request loadButton.addEventListener('click', loadContent);



- 3 Save the program in C:\Apache24\htdocs in a folder as script.js
- II Create an HTML file with an empty container for displaying content and a button to trigger the AJAX request.
  - 1 Open the text editor
  - 2 Write the following codes
    - <html >
    - <head>
    - <title>AJAX Example</title>
    - </head>
    - <body>
    - <button id="loadButton">Load Content</button>
    - <div id="contentContainer"></div>
    - <script src="script.js"></script>
    - </body>
    - </html>
  - 3 Save the program in C:\Apache24\htdocs in a folder as ajaxtest.html

## III Test the application

- 1 Create a text file named example.txt in the same directory as your HTML file. (This file will contain the content to load dynamically.)
- 2 Run the Apache services from windows services
- 3 Open your HTML file in a web browser and click the "Load Content" button.
- 4 verify the output



- 1 Create a JavaScript program that sends form data to a server using AJAX when the form is submitted. Display a success message to the user upon successful submission.
- 2 Write a JavaScript program that uses AJAX to fetch data from a JSON file and display it on a webpage.



# Module 4 : PHP (Hyper Text Pre Processor)

# **EXERCISE 47 : Demonstrate on- Paginators, popovers,** progress, spinner

# **Objectives**

## At the end of this exercise you shall be able to

- use paginators & popoves in HTML
- · use progress bars in HTML
- use spinners in HTML.

## Requirements

## **Tools/Materials**

- Desktop/Laptop with latest configuration
- web browser
- Internet connection

# **Procedure**

## TASK 1: Using Paginators

- 1 create a basic pagination
  - Open the text editor •
  - Write the following codes
    - <!DOCTYPE html>

<html lang="en">

<head>

© NINIUBLISH BERUBLISH BE <title>Bootstrap Example</title>

<meta charset="utf-8">

<meta name="viewport" content="width=device-width, initial-scale=1">

k href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/css/bootstrap.min.css" rel="stylesheet"> <script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/js/bootstrap.bundle.min.js"></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></scri </head>

<body>

<div class="container mt-3">

<h2>Pagination </h2>

a basic pagination

```
class="pagination">
```

class="page-item"><a class="page-link" href="#">Previous</a>

- class="page-item"><a class="page-link" href="#">1</a>
- class="page-item"><a class="page-link" href="#">2</a>
- class="page-item"><a class="page-link" href="#">3</a>
- class="page-item"><a class="page-link" href="#">Next</a>

</div>

</body>

</html>



- Save the program as a .html file
- · Open the html file with a web browser
- Verify the output.



- 2 Pagination Active State
  - Open the text editor
  - Write the following codes

<!DOCTYPE html>

<html lang="en">

<head>

<title>Bootstrap Example</title>

<meta charset="utf-8">

<meta name="viewport" content="width=device-width, initial-scale=1">

k href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/css/bootstrap.min.css" rel="stylesheet"><script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/js/bootstrap.bundle.min.js"></script></script></head>

<body>

<div class="container mt-3">

<h2>Pagination </h2>

Add class .active to let the user know which page he/she is on class="pagination">

class="page-item"><a class="page-link" href="#">Previous</a>

class="page-item"><a class="page-link" href="#">1</a>

class="page-item active"><a class="page-link" href="#">2</a>

<a class="page-link" href="#">3</a>

```
class="page-item"><a class="page-link" href="#">Next</a>
```

</div> </body>

</html>

- Save the program as a .html file
- Open the html file with a web browser
- Verify the output.



- 3 Pagination Disabled State
  - · Open the text editor
  - Write the following codes

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>Bootstrap Example</title>
<meta charset="utf-8">
<meta name="viewport" content="width=device-width, initial-scale=1">
k href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/css/bootstrap.min.css" rel="stylesheet">
<script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/js/bootstrap.bundle.min.js"></script>
</head>
<body>
<div class="container mt-3">
<h2>Pagination- Disabled </h2>
Add class . disabled to disable the pagination 
class="pagination">
      class="page-item disabled"><a class="page-link" href="#">Previous</a>
      class="page-item"><a class="page-link" href="#">1</a>
      class="page-item"><a class="page-link" href="#">2</a>
      class="page-item"><a class="page-link" href="#">3</a>
      class="page-item"><a class="page-link" href="#">Next</a>
</div>
</body>
</html>
Save the program as a .html file
```

- Open the html file with a web browser
- Verify the output.

# Pagination- Disabled

Add class . disabled to disable the pagination

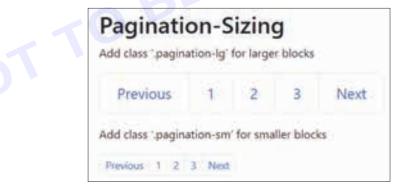


- 4 Pagination Sizing
  - Open the text editor
  - Write the following codes
    - <!DOCTYPE html>
    - <html lang="en">
    - <head>
    - <title>Bootstrap Example</title>
    - <meta charset="utf-8">

<meta name="viewport" content="width=device-width, initial-scale=1">

k href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/css/bootstrap.min.css" rel="stylesheet"> <script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/js/bootstrap.bundle.min.js"></script> </head> <body> <div class="container mt-3"> <h2>Pagination-Sizing </h2> Add class '.pagination-lg' for larger blocks class="pagination pagination-lg"> class="page-item"><a class="page-link" href="#">Previous</a> class="page-item"><a class="page-link" href="#">1</a> class="page-item"><a class="page-link" href="#">2</a> class="page-item"><a class="page-link" href="#">3</a> class="page-item"><a class="page-link" href="#">Next</a> Add class '.pagination-sm' for smaller blocks class="pagination pagination-sm"> class="page-item"><a class="page-link" href="#">Previous</a> class="page-item"><a class="page-link" href="#">1</a> BLISHED class="page-item"><a class="page-link" href="#">2</a> class="page-item"><a class="page-link" href="#">3</a> class="page-item"><a class="page-link" href="#">Next</a> </div> </body> </html> Save the program as a .html file Open the html file with a web browser

Verify the output.



## 5 Pagination Alignment

- · Open the text editor
- Write the following codes

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>Bootstrap Example</title>
<meta charset="utf-8">
<meta name="viewport" content="width=device-width, initial-scale=1">
```



```
k href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/css/bootstrap.min.css" rel="stylesheet">
 <script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/js/bootstrap.bundle.min.js"></script>
 </head>
 <body>
 <div class="container mt-3">
 <h2>Pagination Alignment </h2>
  Default (left-aligned)
 <!-- Default (left-aligned) -->
 class="page-item"><a class="page-link" href="#">Previous</a>
      class="page-item"><a class="page-link" href="#">1</a>
      class="page-item"><a class="page-link" href="#">Next</a>
  Center-aligned 
 <!-- Center-aligned -->
 <l
      class="page-item"><a class="page-link" href="#">Previous</a>
      class="page-item"><a class="page-link" href="#">1</a>
      class="page-item"><a class="page-link" href="#">Next</a>
  Right-aligned
 <!-- Right-aligned -->
 class="page-item"><a class="page-link" href="#">Previous</a>
      class="page-item"><a class="page-link" href="#">1</a>
      class="page-item"><a class="page-link" href="#">Next</a>
 </div>
 </body>
 </html>
 Save the program as a .html file
 Open the html file with a web browser
 Verify the output.
Pagination Alignment
```

Default (left-aligned)				
Previous 1 Next				
Center wigned				
	Previous 1 Nort			
Right-aligned				
		Previous	t	Next.
-				

## TASK 2: Using Popovers

- 1 create a Popovers
  - Open the text editor
  - Write the following codes

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>Bootstrap Example</title>
<meta charset="utf-8">
<meta name="viewport" content="width=device-width, initial-scale=1">
k href=https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/css/bootstrap.min.css rel="stylesheet">
<script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/js/bootstrap.bundle.min.js"></script>
</head>
<body>
<div class="container mt-3">
<h3>Popover Example</h3>
<br/>
<br/>
stutton type="button" class="btn btn-primary" data-bs-toggle="popover" title="Popover Header" data-bs-
content="Some content inside the popover">
Toggle popover
</button>
</div>
<script>
var popoverTriggerList = [].slice.call(document.guerySelectorAll('[data-bs-toggle="popover"]'))
var popoverList = popoverTriggerList.map(function (popoverTriggerEl) {
return new bootstrap.Popover(popoverTriggerEl)
})
</script>
</body>
</html>
```

- · Save the program as a .html file
- · Open the html file with a web browser
- Verify the output.

opover Exa	Popover Header
Toggle popover	Some content inside the popover

- 2 Positioning Popovers
  - Open the text editor
  - Write the following codes

```
<html lang="en">
 <head>
 <title>Bootstrap Example</title>
 <meta charset="utf-8">
 <meta name="viewport" content="width=device-width, initial-scale=1">
 k href=https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/css/bootstrap.min.css rel="stylesheet">
 <script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/js/bootstrap.bundle.min.js">
 </script>
 </head>
 <body>
 <div class="container mt-5">
 <h3>Popover Positioning</h3>
 Click on the links to see the popover in action:
 popover on top and bottom
 <br/><br/><br/><br/>
 <a href="#" title="Header" data-bs-toggle="popover" data-bs-placement="top"
data-bs-content="Content">Top</a>
 <a href="#" title="Header" data-bs-toggle="popover" data-bs-placement="bottom"
 data-bs-content="Content">Bottom</a>
 </div>
 <br/><br/><br/>
 <div class="container mt-5">
 <h3>Popover Positioning</h3>
 Click on the links to see the popover in action:
 popover on left and right side 
 <a href="#" title="Header" data-bs-toggle="popover" data-bs-placement="left"
 data-bs-content="Content">Left</a>
 <a href="#" title="Header" data-bs-toggle="popover" data-bs-placement="right"
 data-bs-content="Content">Right</a>
 </div>
 <script>
var popoverTriggerList = [].slice.call(document.querySelectorAll('[data-bs-toggle="popover"]'))
var popoverList = popoverTriggerList.map(function (popoverTriggerEl) {
 return new bootstrap.Popover(popoverTriggerEl)
})
 </script>
 </body>
 </html>
Save the program as a .html file
 Open the html file with a web browser
Verify the output.
```

Popover Positioning		Popov	er Pos	itioning
Click on the links to see the popover in action:	Click on the links to see the popover in a			
popover on top and bottom	Header	popover or	Header	ht side
Header	Header	Left Right	neager	
reader	Content		Content	
Content				
Top Bottom				
Header				
Contant				
Dpen the text editor Write the following codes <html lang="en"></html>				
Write the following codes <html lang="en"> <head> <title>Bootstrap Example</title> <meta charset="utf-8"/> <meta bootstra<br="" cdn.jsdelivr.net="" content="width=device-&lt;br&gt;&lt;link href=https://cdn.jsdelivr.net/npm/bootstrap&lt;br&gt;&lt;script src=" https:="" name="viewport" npm=""/></head></html>	@5.3.2/dist	/css/bootstr	ap.min.c	•
Write the following codes <html lang="en"> <head> <title>Bootstrap Example</title> <meta charset="utf-8"/> <meta bootstrap<="" cdn.jsdelivr.net="" content="width=device-&lt;br&gt;&lt;link href=https://cdn.jsdelivr.net/npm/bootstrap&lt;br&gt;&lt;script src=" https:="" name="viewport" npm="" td=""/><td>@5.3.2/dist</td><td>/css/bootstr</td><td>ap.min.c</td><td>ss rel="stylesheet"&gt;</td></head></html>	@5.3.2/dist	/css/bootstr	ap.min.c	ss rel="stylesheet">
Write the following codes <html lang="en"> <head> <title>Bootstrap Example</title> <meta charset="utf-8"/> <meta bootstrap<br="" cdn.jsdelivr.net="" content="width=device-&lt;br&gt;&lt;link href=https://cdn.jsdelivr.net/npm/bootstrap&lt;br&gt;&lt;script src=" https:="" name="viewport" npm=""/></head> <body> <div class="container mt-5"> <h3>Popover Positioning</h3></div></body></html>	@5.3.2/dist p@5.3.2/di	/css/bootstr st/js/bootstr	ap.min.c ap.bund	ss rel="stylesheet">
Write the following codes wheads whe	@5.3.2/dist p@5.3.2/di e the popov	/css/bootstr st/js/bootstr ver in action	ap.min.c ap.bund :	ss rel="stylesheet"> le.min.js">
Write the following codes <html lang="en"> <head> <title>Bootstrap Example</title> <meta charset="utf-8"/> <meta bootstrap<br="" cdn.jsdelivr.net="" content="width=device-&lt;br&gt;&lt;link href=https://cdn.jsdelivr.net/npm/bootstrap&lt;br&gt;&lt;script src=" https:="" name="viewport" npm=""/><script bootstrap<br="" cdn.jsdelivr.net="" https:="" npm="" src="https://cdn.jsdelivr.net/npm/bootstrap&lt;br&gt;&lt;script src="><script src="https://cdn.jsdelivr.net/npm/bootstrap <script src="https://cdn.jsdelivr.ne</td><td>@5.3.2/dist p@5.3.2/di e the popov ver" data-ba</td><td>/css/bootstr st/js/bootstr ver in action s-placemen</td><td>ap.min.c ap.bund : t="top" d</td><td>ess rel="stylesheet"> le.min.js"></script> ata-bs-content="Co</head></html>				
Write the following codes <html lang="en"> <head> <title>Bootstrap Example</title> <meta charset="utf-8"/> <meta bootstrap<br="" cdn.jsdelivr.net="" content="width=device-&lt;br&gt;&lt;link href=https://cdn.jsdelivr.net/npm/bootstrap&lt;br&gt;&lt;script src=" https:="" name="viewport" npm=""/><script bootstrap<br="" cdn.jsdelivr.net="" https:="" npm="" src="https://cdn.jsdelivr.net/npm/bootstrap&lt;br&gt;&lt;script src="><script src="https://cdn.jsdelivr.net/npm/bootstrap <script src="https://cdn.jsdelivr.net/npm/bootstrap]</td><td>@5.3.2/dist p@5.3.2/di e the popov ver" data-bs ver" data-bs</td><td>/css/bootstr st/js/bootstr ver in action s-placemen s-placemen</td><td>ap.min.c ap.bund : t="top" d t="bottor</td><td>ss rel="stylesheet"> le.min.js"></script> ata-bs-content="Co n"</head></html>				

```
<script>
```

```
var popoverTriggerList = [].slice.call(document.querySelectorAll('[data-bs-toggle="popover"]'))
var popoverList = popoverTriggerList.map(function (popoverTriggerEl) {
    return new bootstrap.Popover(popoverTriggerEl)
```

```
})
```

```
</script>
```

- </body>
- </html>

- Save the program as a .html file
- Open the html file with a web browser
- Verify the output.



#### TASK 3: Using Progress Bars

- 1 create a progress bar
  - Open the text editor

```
Write the following codes
<html lang="en">
<head>
<title>Bootstrap Example</title>
<meta charset="utf-8">
<meta name="viewport" content="width=device-width, initial-scale=1">
k href=https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/css/bootstrap.min.css rel="stylesheet">
<script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/js/bootstrap.bundle.min.js"></script>
</head>
<body>
<div class="container mt-3">
```

```
<h2>Progress Bar With Label</h2>
<div class="progress" style="height:20px">
<div class="progress-bar" style="width:50%">50%</div>
</div>
</div>
```

```
</body>
</html>
```

- Save the program as a .html file
- Open the html file with a web browser
- Verify the output.

Progress Bar With Label

```
2 Coloured Progress Bars
      Open the text editor
      Write the following codes
      <html lang="en">
      <head>
      <title>Bootstrap Example</title>
      <meta charset="utf-8">
      <meta name="viewport" content="width=device-width, initial-scale=1">
      k href=https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/css/bootstrap.min.css rel="stylesheet">
      <script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/js/bootstrap.bundle.min.js"></script>
      </head>
      <body>
      <!-- Blue -->
      <div class="progress">
      <div class="progress-bar" style="width:10%"></div>
      </div><br>
      <!-- Green -->
      <div class="progress">
      <div class="progress-bar bg-success" style="width:20%"></div>
      </div><br>
      <!-- Turquoise -->
      <div class="progress">
      <div class="progress-bar bg-info" style="width:30%"></div>
      </div><br>
      <!-- Orange -->
      <div class="progress">
      <div class="progress-bar bg-warning" style="width:40%"></div>
      </div><br>
      <!-- Red -->
      <div class="progress">
      <div class="progress-bar bg-danger" style="width:50%"></div>
      </div><br>
      <!-- White -->
      <div class="progress border">
      <div class="progress-bar bg-white" style="width:60%"></div></div></div></div></div></div></div></div</pre>
      </div><br>
      <!-- Grey -->
      <div class="progress">
      <div class="progress-bar bg-secondary" style="width:70%"></div>
      </div><br>
      <!-- Light Grey -->
      <div class="progress border">
      <div class="progress-bar bg-light" style="width:80%"></div>
      </div><br>
      <!-- Dark Grey -->
      <div class="progress">
      <div class="progress-bar bg-dark" style="width:90%"></div>
      </div><br>
      </body>
      </html>
```



## **COMPUTER SOFTWARE APPLICATION - CITS**

- Save the program as a .html file
- Open the html file with a web browser
- Verify the output.

- 3 Animated Progress Bar
  - Open the text editor
  - Write the following codes

<html lang="en">

<head>

<title>Bootstrap Example</title>

<meta charset="utf-8">

<meta name="viewport" content="width=device-width, initial-scale=1">

k href=https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/css/bootstrap.min.css rel="stylesheet">

<script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/js/bootstrap.bundle.min.js"></script>

</head>

<body>

<br/>

<div class="progress">

<div class="progress-bar progress-bar-striped" style="width:40%"></div>

</div>

</body>

</html>

- Save the program as a .html file
- Open the html file with a web browser
- Verify the output.

- 4 Multiple Progress Bars
  - Open the text editor
  - Write the following codes

```
<html lang="en">
<head>
<title>Bootstrap Example</title>
<meta charset="utf-8">
<meta name="viewport" content="width=device-width, initial-scale=1">
k href=https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/css/bootstrap.min.css rel="stylesheet">
<script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/js/bootstrap.bundle.min.js"></script>
</head>
<body>
<br/>br/>
<div class="progress">
<div class="progress-bar bg-success" style="width:40%">
Free Space
</div>
                                               EPUBLISHED
<div class="progress-bar bg-warning" style="width:10%">
Warning
</div>
<div class="progress-bar bg-danger" style="width:20%">
Danger
</div>
</div>
</body>
</html>
Save the program as a .html file
```

- Open the html file with a web browser
- Verify the output.

#### TASK 4: Using Spinners

```
1 Create a spinner/loader
```

- Open the text editor
- Write the following codes

```
<!DOCTYPE html>
<html>
<head>
<title>Bootstrap Example</title>
<meta name="viewport" content="width=device-width, initial-scale=1">
<link href=https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/css/bootstrap.min.css rel="stylesheet">
<script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/js/bootstrap.bundle.min.js"></script>
</head>
</head>
<body>
<div class="container mt-3">
```



## **COMPUTER SOFTWARE APPLICATION - CITS**

<h2>Colored Spinners</h2> <div class="spinner-border"></div> </div> </body> </html>

- Save the program as a .html file
- · Open the html file with a web browser
- Verify the output.

# С

#### 2 Colored Spinners

- Open the text editor
- Write the following codes

<!DOCTYPE html>

<html>

<head>

<title>Bootstrap Example</title>

<meta name="viewport" content="width=device-width, initial-scale=1">

k href=https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/css/bootstrap.min.css rel="stylesheet"><script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/js/bootstrap.bundle.min.js"></script></script></head>

<body>

<div class="container mt-3">

<h2>Colored Spinners</h2>

<div class="spinner-border text-muted"></div>

<div class="spinner-border text-primary"></div>

<div class="spinner-border text-success"></div> <div class="spinner-border text-info"></div>

<div class="spinner-border text-warning"></div>

<div class="spinner-border text-danger"></div>

```
<div class="spinner-border text-secondary"></div>
```

<div class="spinner-border text-dark"></div>

<div class="spinner-border text-light"></div>

</div>

</body>

- </html>
- Save the program as a .html file
- Open the html file with a web browser
- Verify the output.



- 3 Spinner Buttons
  - Open the text editor
  - Write the following codes

<!DOCTYPE html> <html>

<head>

<title>Bootstrap Example</title>

<meta name="viewport" content="width=device-width, initial-scale=1">

k href=https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/css/bootstrap.min.css rel="stylesheet"><script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/js/bootstrap.bundle.min.js"></script></script></head>

<body>

<div class="container mt-3">

<h2>Spinner Buttonss</h2>

<button class="btn btn-primary">

<span class="spinner-border spinner-border-sm"></span>

</button>

<button class="btn btn-primary">

<span class="spinner-border spinner-border-sm"></span>

Loading..

</button>

<button class="btn btn-primary" disabled>

<span class="spinner-border spinner-border-sm"></span>

Loading..

</button>

<br/><button class="btn btn-primary" disabled><br/><span class="spinner-grow spinner-grow-sm"></span>

Loading..

</button>

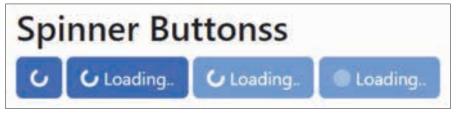
</div>

</body>

</html>

• Save the program as a .html file

- Open the html file with a web browser
- Verify the output.



- implement a basic paginator using Bootstrap classes and components.
- Customize the appearance of the pagination links (e.g., font size, color, hover effects).



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# **EXERCISE 48 : Demonstrateon Table, toasts, tooltips**

# **Objectives**

## At the end of this exercise you shall be able to

- use bootstrap tables in HTML
- use bootstrap toasts in HTML
- use bootstrap tooltips in HTML.

# **Requirements**

## **Tools/Materials**

- Desktop/Laptop with latest configuration
- web browser
- Internet connection

# **Procedure**

#### TASK 1: Using Table

- 1 Create a basic Bootstrap 5 table
  - · Open the text editor
  - Write the following codes

```
<!DOCTYPE html>
```

- <html lang="en">
- <head>

```
<title>Bootstrap Example</title>
<meta charset="utf-8">
```

```
<meta name="viewport" content="width=device-width, initial-scale=1">
```

```
k href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/css/bootstrap.min.css" rel="stylesheet"><script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/js/bootstrap.bundle.min.js"></script></script></script></head>
```

```
<body>
```

```
<div class="container mt-3">
<h2>Table</h2>
<thead>
Firstname
```

Lastname

</thead>

```
John
Doe
Doe
```



```
Mary

</td
```

- Save the program as a .html file
- Open the html file with a web browser
- Verify the output.

	Table Firstname	Lastname	Email
	John	Doe	john@example.com
	Mary	Moe	mary@example.com
Table	with Striped Rows	C I	EPU
•	en the text editor		
• Wri	te the following codes		
<ht <he <titl< th=""><th>OCTYPE html&gt; ml lang="en"&gt; ead&gt; le&gt;Bootstrap Example&lt; eta charset="utf-8"&gt;</th><th></th><th></th></titl<></he </ht 	OCTYPE html> ml lang="en"> ead> le>Bootstrap Example< eta charset="utf-8">		
<lin <sc< th=""><td>k href="https://cdn.jsde</td><td>elivr.net/npm/bootstrap</td><td>width, initial-scale=1"&gt; @@5.3.2/dist/css/bootstrap.min.css" rel="stylesheet" @@6.3.2/dist/js/bootstrap.bundle.min.js"&gt;</td></sc<></lin 	k href="https://cdn.jsde	elivr.net/npm/bootstrap	width, initial-scale=1"> @@5.3.2/dist/css/bootstrap.min.css" rel="stylesheet" @@6.3.2/dist/js/bootstrap.bundle.min.js">
<body><body></body></body>	ody>		
	v class="container mt-3		
	<h2>Table-striped<td></td><td></td></h2>		
	ble class="table table-s <thead></thead>	sinped >	
	Firstname		
	Lastname		
	Email		
<td></td> <td></td> <td></td>			
~/th	nead>		

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John Doe john@example.com Mary Moe mary@example.com July Dooley july@example.com </div> </bodv> </html>

- Save the program as a .html file
- Open the html file with a web browser
- Verify the output.

/table> :/div> :/body> :/html>		
ave the program as a	.html file	
open the html file with rify the output.	a web browser	
Table-str	iped	RE
Firstname	Lastname	Email
John	Doe	john@example.com
Mary	Moe	mary@example.com
July	Dooley	july@example.com

## 3 Bordered Table

- Open the text editor
- Write the following codes

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>Bootstrap Example</title>
<meta charset="utf-8">
<meta name="viewport" content="width=device-width, initial-scale=1">
k href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/css/bootstrap.min.css" rel="stylesheet">
<script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/js/bootstrap.bundle.min.js"></script>
```

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</head> <body> <div class="container mt-3"> <h2>Table-striped</h2> <thead> Firstname Lastname Email </thead> d> John Doe john@example.com Mary Moe mary@example.com July Dooley july@example.com </div> </body> </html>

- Save the program as a .html file
- Open the html file with a web browser
- Verify the output.

Firstname	Lastname	Email
John	Doe	john@example.com
Mary	Moe	mary@example.com
July	Dooley	july@example.com

```
Open the text editor
•
 Write the following codes
  <!DOCTYPE html>
  <html lang="en">
  <head>
  <title>Bootstrap Example</title>
  <meta charset="utf-8">
  <meta name="viewport" content="width=device-width, initial-scale=1">
  k href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/css/bootstrap.min.css" rel="stylesheet">
  <script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/js/bootstrap.bundle.min.js"></script>
  </head>
  <body>
  <div class="container mt-3">
    <h2> Hover Rows </h2>
      ---John
  <thead>
  </thead>
  Mary
  Moe
  mary@example.com
  July
      Dooley
      july@example.com
    </div>
  </body>
  </html>
  Save the program as a .html file
  Open the html file with a web browser
```

Verify the output.

4 Table with Hover Rows

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Hover Roy	WS	
Firstname	Lastname	Email
John	Doe	john@example.com
Mary	Moe	mary@example.com
July	Dooley	july@example.com

- 5 Table with Contextual Classes
  - Open the text editor
  - Write the following codes

```
<!DOCTYPE html>
```

```
<html lang="en">
```

<head>

```
<title>Bootstrap Example</title>
```

<meta charset="utf-8">

- <meta name="viewport" content="width=device-width, initial-scale=1">

</head>

<body>

<div class="container mt-3">

```
<h2>Contextual Classes</h2>
```

<thead>

```
FirstnameLastname
```

Email

</thead>

John

Doe

john@example.com

Mary

```
Moe
```

```
mary@example.com
```



Email

john@example.com

mary@example.com

july@example.com

mary@example.com

july@example.com

mary@example.com

july@example.com

july@example.com

mary@example.com

Lastname

Doe

Moe

Moe

Moe

Dooley

Dooley

Moe

Dooley

Dooley.

```
July
 Dooley
 july@example.com
Mary
 Moe
 mary@example.com
July
             © NINJUBLISHED
BEREPUBLISHED
BE
 Dooley
 july@example.com
Mary
 Moe
 mary@example.com
July
 Dooley
 july@example.com
July
 Dooley
                   Contextual Classes
 july@example.com
Firstname
John
 Mary
                   Mary
 Moe
 mary@example.com
                   July
Mary
July
</div>
                   Mary
</body>
                   July
</html>
Save the program as a .html file
                   July
Open the html file with a web browser
                   Mary
```

Verify the output.



TASK 2: Using Toasts

## 1 Create a Bootstrap 5 toast Open the text editor Write the following codes <!DOCTYPE html> <html lang="en"> <head> <title>Bootstrap Example</title> <meta charset="utf-8"> <meta name="viewport" content="width=device-width, initial-scale=1"> k href=https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/css/bootstrap.min.css rel="stylesheet"> <script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/js/bootstrap.bundle.min.js"></script> </head> <body> <div class="container mt-3"> <h3>Toast Example</h3> In this example, we use a button to show the toast message. <button type="button" class="btn btn-primary" id="toastbtn">Show Toast</button> <div class="toast"> <div class="toast-header"> <strong class="me-auto">Toast Header</strong> <button type="button" class="btn-close" data-bs-dismiss="toast"></button> </div> <div class="toast-body"> Some text inside the toast body </div> </div> </div> <script> document.getElementById("toastbtn").onclick = function() { var toastElList = [].slice.call(document.querySelectorAll('.toast')) var toastList = toastElList.map(function(toastEl) { return new bootstrap.Toast(toastEl) }) Toast Example toastList.forEach(toast => toast.show()) In this example, we use a button to show the toast message. } </script> Show Toast </body> </html> **Toast Header** х Save the program as a .html file Some text inside the toast body Open the html file with a web browser Verify the output.

## TASK 3: Using Tooltips

- 1 Create a Bootstrap 5 Tooltips
  - Open the text editor
  - Write the following codes

```
<html lang="en">
<head>
<title>Bootstrap Example</title>
<meta charset="utf-8">
<meta name="viewport" content="width=device-width, initial-scale=1">
k href=https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/css/bootstrap.min.css rel="stylesheet">
<script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/js/bootstrap.bundle.min.js"></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></scrept></script></script></script></script></script></scrept></scre
</head>
<body>
<div class="container mt-3">
<h3>Tooltip Positioning</h3>
The data-bs-placement attribute specifies the tooltip position.
<a href="#" data-bs-toggle="tooltip" data-bs-placement="top" title="Hooray!">Top</a>
<a href="#" data-bs-toggle="tooltip" data-bs-placement="bottom" title="Hooray!">Bottom</a>
<a href="#" data-bs-toggle="tooltip" data-bs-placement="left" title="Hooray!">Left</a>
<a href="#" data-bs-toggle="tooltip" data-bs-placement="right" title="Hooray!">Right</a>
</div>
<script>
        var tooltipTriggerList = [].slice.call(document.guerySelectorAll('[data-bs-toggle="tooltip"]'))
        var tooltipList = tooltipTriggerList.map(function (tooltipTriggerEl) {
        return new bootstrap.Tooltip(tooltipTriggerEl)
        })
</script>
</body>
</html>
```

- Save the program as a .html file
- · Open the html file with a web browser
- Verify the output.

# **Tooltip Positioning**

The data-bs-placement attribute specifies the tooltip position.

Top Bottom Left Right Hooray!

# EXERCISE 49 : Demonstrate on Bootstrap Styling essentials like Breakpoints for components, layouts and grid systems. Practice on typography, floats, flex, alignment, borders, position of elements, shadow and visibility

# **Objectives**

## At the end of this exercise you shall be able to

- use bootstrap break point components, layouts and grid systerms in HTML
- use bootsrap typography, floats,flex,and alignment in HTML
- use bootsrap borders, position of elements and shadow & visibility in HTML.

# Requirements

## **Tools/Materials**

- Desktop/Laptop with latest configuration
- web browser
- Internet connection

# **Procedure**

## TASK 1: Applying Breakpoints to Components

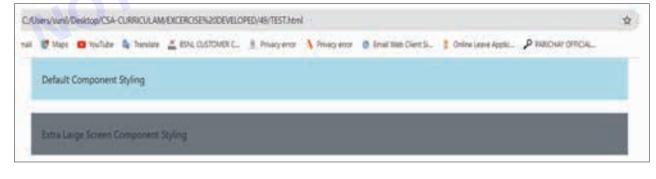
- 1 Open the text editor
- 2 Write the following codes

```
<html lang="en">
<head>
<meta charset="UTF-8">
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<title>Bootstrap Breakpoints</title>
<!-- Bootstrap CSS -->
<style>
/* Additional custom styles */
.custom-component {
background-color: lightblue;
padding: 20px;
margin-bottom: 20px;
}
</style>
<!-- Bootstrap JS (optional) -->
<script src="https://ajax.googleapis.com/ajax/libs/jquery/3.5.1/jquery.min.js"></script>
<script src="https://cdnjs.cloudflare.com/ajax/libs/popper.js/1.16.0/umd/popper.min.js"></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script>
<script src="https://maxcdn.bootstrapcdn.com/bootstrap/4.5.2/js/bootstrap.min.js"></script>
</head>
<body>
```

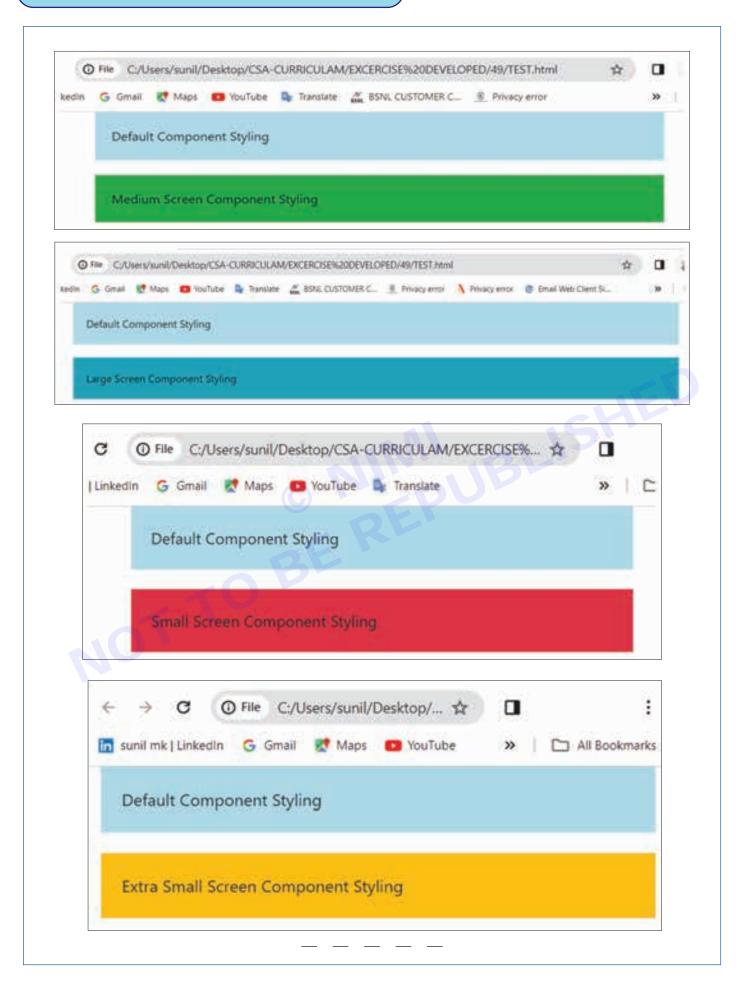


## **COMPUTER SOFTWARE APPLICATION - CITS**

<div class="container"> <!-- Component with default styling --> <div class="custom-component"> Default Component Styling </div> <!-- Component with styling for extra small screens --> <div class="custom-component bg-warning d-block d-sm-none"> Extra Small Screen Component Styling </div> <!-- Component with styling for small screens --> <div class="custom-component bg-danger d-none d-sm-block d-md-none"> Small Screen Component Styling </div> <!-- Component with styling for medium screens --> <div class="custom-component bg-success d-none d-md-block d-lg-none"> Medium Screen Component Styling </div>REPUBLISHED <!-- Component with styling for large screens --> <div class="custom-component bg-info d-none d-lg-block d-xl-none"> Large Screen Component Styling </div> <!-- Component with styling for extra large screens --> <div class="custom-component bg-secondary d-none d-xl-block"> Extra Large Screen Component Styling </div> </div> </body> </html> 3 Save the program as a .html file 4 Open the html file with a web browser 5 Change the screen size and Verify the output.



## **COMPUTER SOFTWARE APPLICATION - CITS**



Nimi)

## TASK 2: Applying layouts and grid systems 1 Open the text editor 2 Write the following codes <!DOCTYPE html> <html lang="en"> <head> <meta charset="UTF-8"> <meta name="viewport" content="width=device-width, initial-scale=1.0"> <title>Bootstrap v3 Layouts and Grid Systems Example</title> <!-- Bootstrap CSS --> k href=https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/css/bootstrap.min.css rel="stylesheet"> </head> <body> <div class="container"> <div class="row"> <div class="col-md-4"> <div class="well">Column 1</div> </div> <div class="col-md-4"> <div class="well">Column 2</div> </div><div class="col-md-4"> <div class="well">Column 3</div> </div></div> <div class="row"> <div class="col-md-6"> <div class="well">Column 1</div> </div><div class="col-md-6"> <div class="well">Column 2</div> </div> </div><div class="row"> <div class="col-md-8"> <div class="well">Column 1</div> </div> <div class="col-md-4"> <div class="well">Column 2</div> </div> </div> <div class="row"> <div class="col-md-3"> <div class="well">Column 1</div> </div> <div class="col-md-6"> <div class="well">Column 2</div> </div> <div class="col-md-3">

```
<div class="well">Column 3</div>
</div>
</div>
<div class="row">
<div class="col-md-9">
<div class="well">Column 1</div>
</div>
<div class="col-md-3">
<div class="well">Column 2</div>
</div>
</div>
</div>
<!-- Bootstrap JS -->
<script src="https://ajax.googleapis.com/ajax/libs/jquery/3.5.1/jquery.min.js"></script>
<script src="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/js/bootstrap.min.js"></script>
</body>
</html>
```

- 3 Save the program as a .html file
- 4 Open the html file with a web browser
- 5 Verify the output.

erify th	ne output.			
He CA	Amviunii Desktop/CSA-OJRRCULAM-EXC	ROSENJIOEVELOPEVAL/TEST Ment		A
G final	Ether Childe & henter A	RON, CLATCHER C. L. Promy more 🐧 frequence	ne 🖉 final Web Dant II. 🦉 Droop (env	Ages. P Matow officia.
	Columer 1	Column2	Course	•
	Colarer 1		Oukares B	
	Colores 1		Gilare	i i
	Colump 1	Column 2		Colum 3
	Column 1			Column 2



## TASK 3: Practice on typography 1 Open the text editor 2 Write the following codes <!DOCTYPE html> <html lang="en"> <head> <meta charset="UTF-8"> <meta name="viewport" content="width=device-width, initial-scale=1.0"> <title>Bootstrap v5 Typography Example</title> k href=https://cdn.jsdelivr.net/npm/bootstrap@5.3.0-alpha1/dist/css/bootstrap.min.css rel="stylesheet"> </head> <body> <div class="container mt-5"> <h1>Typography Example</h1> <h2>Headings</h2> <h1 class="display-1">Display 1</h1> <h2 class="display-2">Display 2</h2> <h3 class="display-3">Display 3</h3> <h4 class="display-4">Display 4</h4> <h5 class="display-5">Display 5</h5> <h6 class="display-6">Display 6</h6> <h2>Text Styles</h2> This is a lead paragraph. This is a regular paragraph. This is a muted paragraph. This is a primary-colored paragraph. This is a secondary-colored paragraph. This is a success-colored paragraph. This is a danger-colored paragraph. This is a warning-colored paragraph. This is an info-colored paragraph. This is a light-colored paragraph on a dark background. This is a dark-colored paragraph. This is a paragraph using the body text color. This is a paragraph with reset color. <h2>Text Alignment</h2> Left aligned text. Center aligned text. Right aligned text. </div> <script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0alpha1/dist/js/bootstrap.bundle.min.js"> </script> </body> </html> 3 Save the program as a .html file 4 Open the html file with a web browser 5 Verify the output.



#### TASK 4: Using floats

- 1 Open the text editor
- 2 Write the following codes

```
<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="UTF-8">
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<title>Bootstrap v5 Floats Example</title>
link href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0alpha1/dist/css/bootstrap.min.css" rel="stylesheet">
<style>
.float start {
float: left;
}
.float-end {
float: right;
}
```





**COMPUTER SOFTWARE APPLICATION - CITS** 

</style> </head> <body> <div class="container mt-5"> <h1>Floats Example</h1> <div class="row"> <div class="col-md-6"> <div class="bg-primary p-3 mb-3"> This is content floated left. Floated left content Another floated left content </div> </div> <div class="col-md-6"> <div class="bg-secondary p-3 mb-3"> This is content floated right. Floated right content Another floated right content </div> </div> </div> </div> <script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0alpha1/dist/js/bootstrap.bundle.min.js"></script> </body> </html>

- 3 Save the program as a .html file
- 4 Open the html file with a web browser
- 5 Verify the output.

<ul> <li>         → C         <ul> <li>                 suni mk ( Linked)                </li> </ul> </li> </ul>	Nulles 2000 00000	LANDENDERAMINANIA	ACCULATION AND PO	EXCERCISEN20DEVEL	Q. \$	<b>0</b> »	I Co All Bookmarks
Flo	ats Example						
	and the second s			a a partiert frankel agen		ann an the	

#### TASK 5: Using flexs

- 1 Open the text editor
- 2 Write the following codes

```
<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="UTF-8">
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<title>Bootstrap v5 Flex Example</title>
<link href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0-alpha1/dist/css/bootstrap.min.css" rel="stylesheet">
```

 <body></body>	
 div class="container mt-5">	
<h1>Flex Example</h1>	
<div class="d-flex"></div>	
<pre><div class="flex-grow-1 bg-primary p-3 mr-3">Flex if</div></pre>	tem 1
<div class="bg-secondary p-3">Flex item 2</div>	
<h2>Vertical Alignment</h2>	
<div class="d-flex align-items-start mb-3"></div>	
<div class="p-2 bg-info">Start aligned</div>	
<div class="d-flex align-items-center mb-3"> <div class="p-2 bg-success">Center aligned</div></div>	
<th></th>	
<div class="d-flex align-items-end"></div>	
<pre><div class="p-2 bg-warning">End aligned</div></pre>	
<h2>Horizontal Alignment</h2>	
<div class="d-flex justify-content-start mb-3"></div>	
<div class="p-2 bg-danger">Start aligned</div>	
<div class="d-flex justify-content-center mb-3"></div>	
<div class="p-2 bg-primary">Center aligned</div>	
<pre><div class="d-flex justify-content-end"> <div class="p-2 bg-secondary">End aligned</div></div></pre>	
<pre><script src="https://cdn.jsdelivr.net/npm/bootstrap@&lt;/pre&gt;&lt;/th&gt;&lt;th&gt;5.3.0-alpha1/dist/is/bootstrap.bundle.min.is"></scrip</th></tr><tr><th></body></th><th></th></tr><tr><th></html></th><th></th></tr><tr><th>Save the program as a .html file</th><th></th></tr><tr><th>Open the html file with a web browser</th><th></th></tr><tr><th>Verify the output.</th><th></th></tr><tr><th></th><th></th></tr><tr><td>and S and P fair O votate & human 2 \$10,0000001. I heavy mark X has</td><td>ayona 🛊 balancharts, 1 Merikanaya, Philippi Mitaki (Mita), 🔹 E</td></tr><tr><td>5 8 228 228 2 4 4 5 4 5 4 5 4 5 4 5 4 5 5 5 5 5 5 5</td><td></td></tr><tr><td>Flex Example</td><td></td></tr><tr><td>invo kounters</td><td></td></tr></tbody></table></script></pre>	

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Vertical Alignment		
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Conservation of Conservation		
Ind aligned		
Horizontal Alignment		
plant arigment.		
	Community and	6
		End areginal



### TASK 6: Using alignment

- 1 Open the text editor
- 2 Write the following codes

```
<!DOCTYPE html>
       <html lang="en">
       <head>
       <meta charset="UTF-8">
       <meta name="viewport" content="width=device-width, initial-scale=1.0">
       <title>Bootstrap v5 Alignment Example</title>
       k href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0"//
       alpha1/dist/css/bootstrap.min.css" rel="stylesheet">
       </head>
       <body>
       <div class="container mt-5">
       <h1>Alignment Example</h1>
       <h2>Vertical Alignment</h2>
       <div class="d-flex align-items-start mb-3">
       <div class="p-2 bg-info">Start aligned</div>
       </div>
       <div class="d-flex align-items-center mb-3">
       <div class="p-2 bg-success">Center aligned</div>
       </div>
       <div class="d-flex align-items-end">
       <div class="p-2 bg-warning">End aligned</div>
       </div>
       <h2>Horizontal Alignment</h2>
       <div class="d-flex justify-content-start mb-3">
       <div class="p-2 bg-danger">Start aligned</div>
       </div>
       <div class="d-flex justify-content-center mb-3">
       <div class="p-2 bg-primary">Center aligned</div>
       </div>
       <div class="d-flex justify-content-end">
       <div class="p-2 bg-secondary">End aligned</div>
       </div>
       <h2>Self-Alignment (Individual Item Alignment)</h2>
       <div class="d-flex align-items-start">
       <div class="p-2 bg-info align-self-start">Start aligned</div>
       <div class="p-2 bg-success align-self-center">Center aligned</div>
       <div class="p-2 bg-warning align-self-end">End aligned</div>
       </div>
       </div>
       <script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0-alpha1/dist/js/bootstrap.bundle.min.js"></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script
       </body>
       </html>
3 Save the program as a .html file
4 Open the html file with a web browser
```

5 Verify the output.

	Alignment Example
	Vertical Alignment
	That aligned
	Horizontal Alignment
	Cartan Superior
	the signed
	Self-Alignment (Individual Item Alignment)
	That aligned Enter aligned End aligned
TA	ASK 7: Using borders
1	Open the text editor Write the following codes html <html lang="en"></html>
2	Write the following codes
	html
	<html lang="en"></html>
	<head></head>
	<meta charset="utf-8"/>
	<meta content="width=device-width, initial-scale=1.0" name="viewport"/>
	<title>Bootstrap v5 Borders Example</title>
	<li><li>k href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0-alpha1/dist/css/bootstrap.min.css" rel="stylesheet"&gt; </li></li>
	<body></body>
	<ul> <li><div class="container mt-5"></div></li> </ul>
	<h1>Borders Example</h1>
	<div class="border p-3 mb-3">Default border</div>
	<div class="border border-primary p-3 mb-3">Primary border</div>
	<div class="border border-secondary p-3 mb-3">Secondary border</div>
	<div class="border border-success p-3 mb-3">Success border</div>
	<pre><div class="border border-danger p-3 mb-3">Danger border</div></pre>
	<pre><div class="border border-warning p-3 mb-3">Warning border</div></pre>
	<div class="border border-info p-3 mb-3">Info border</div> <div class="border border-light p-3 mb-3">Light border</div>
	<pre><div class="border border-light p-3 mb-3">Dight border</div></pre>
	<pre><div class="border border white p-3 mb-3">White border</div></pre>

<h2>Rounded Borders</h2>

<div class="rounded border p-3 mb-3">Default rounded border</div>

<div class="rounded border border-primary p-3 mb-3">Primary rounded border</div> <div class="rounded border border-secondary p-3 mb-3">Secondary rounded border</div> <div class="rounded border border-success p-3 mb-3">Success rounded border</div> <div class="rounded border border-danger p-3 mb-3">Danger rounded border</div> <div class="rounded border border-danger p-3 mb-3">Danger rounded border</div> <div class="rounded border border-warning p-3 mb-3">Warning rounded border</div> <div class="rounded border border-warning p-3 mb-3">Info rounded border</div>



Nimi

<div class="rounded border border-light p-3 mb-3">Light rounded border</div> <div class="rounded border border-dark p-3 mb-3">Dark rounded border</div> <div class="rounded border border-white p-3 mb-3">White rounded border</div> </div> </div> <script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0-alpha1/dist/js/bootstrap.bundle.min.js"></script> </body>

- 3 Save the program as a .html file
- 4 Open the html file with a web browser
- 5 Verify the output.

</html>

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stol Booters	
and a second	

### TASK 8: Positioning of elements

- 1 Open the text editor
- 2 Write the following codes

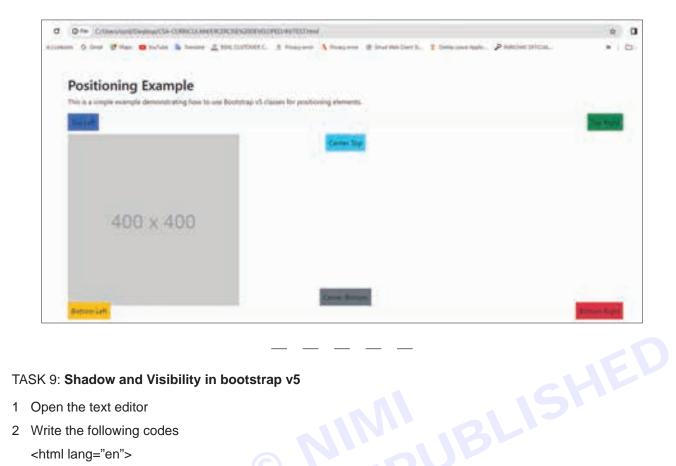
```
<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="UTF-8">
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<title>Bootstrap v5 Positioning Example</title>
<title>Bootstrap v5 Positioning Example</title>
<!-- Bootstrap CSS -->
<link href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0alpha1/dist/css/bootstrap.min.css" rel="stylesheet">
</head>
</body>
```

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<div class="container"> <div class="row mt-5"> <div class="col"> <h2>Positioning Example</h2> This is a simple example demonstrating how to use Bootstrap v5 classes for positioning elements. <div class="position-relative bg-light p-3 mb-3"> <div class="position-absolute top-0 start-0 bg-primary p-2"> Top Left </div> <div class="position-absolute top-0 end-0 bg-success p-2"> Top Right </div> </div> <div class="position-relative"> <img src="https://via.placeholder.com/400" alt="Placeholder Image" class="img-fluid"> <div class="position-absolute top-0 start-50 translate-middle-x bg-info p-2"> Center Top </div> ISHED <div class="position-absolute bottom-0 start-50 translate-middle-x bg-secondary p-2"> Center Bottom </div> </div> <div class="position-relative bg-light p-3 mb-3"> <div class="position-absolute bottom-0 start-0 bg-warning p-2"> Bottom Left </div> <div class="position-absolute bottom-0 end-0 bg-danger p-2">Bottom Right </div> </div> </div> </div> </div> <!-- Bootstrap Bundle with Popper --> <script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0alpha1/dist/js/bootstrap.bundle.min.js"></script> </body> </html> 3 Save the program as a .html file 4 Open the html file with a web browser

5 Verify the output.





TASK 9: Shadow and Visibility in bootstrap v5

- 1 Open the text editor
- 2 Write the following codes

```
<html lang="en">
```

```
<head>
```

```
<meta charset="UTF-8">
```

<meta name="viewport" content="width=device-width, initial-scale=1.0">

<title>Bootstrap v5 Shadow and Visibility Example</title>

```
</head>
```

```
<body>
```

```
<div class="container mt-5">
<h2>Shadow Example</h2>
<div class="row">
<div class="col-md-4">
<div class="p-3 mb-3 bg-white shadow-none">No Shadow</div>
</div>
<div class="col-md-4">
<div class="p-3 mb-3 bg-white shadow-sm">Small Shadow</div>
</div>
<div class="col-md-4">
<div class="p-3 mb-3 bg-white shadow">Default Shadow</div>
</div>
<div class="col-md-4">
```

```
<div class="p-3 mb-3 bg-white shadow-lg">Large Shadow</div>
```

```
</div>
```

```
<div class="col-md-4">
```

```
<div class="p-3 mb-3 bg-white shadow-2xl">Extra Large Shadow</div>
</div>
```

<h2>Visibility Example</h2>
<div class="row"></div>
<div class="col-md-6"></div>
<pre><div class="p-3 mb-3 bg-primary text-white visible">Visible Element</div></pre>
<div class="col-md-6"></div>
<pre><div class="p-3 mb-3 bg-secondary invisible">Invisible Element</div></pre>
<script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0alpha1/dist/js/bootstrap.bundle.min.js"></script>

- 3 Save the program as a .html file
- 4 Open the html file with a web browser
- 5 Verify the output.

Shadow Example			
No Shadow	Small Shadow	Default Shadow	
Large Stadow	Estra Large Shadow		
Visibility Example	BE		
Vuble Dement			



EXERCISE 50 : Perform Installation of Apache Web Server Practice simple PHP programs. Practicing on programming to test events

# **Objectives**

At the end of this exercise you shall be able to

- perform installation of apache webserver
- perform installation of PHP
- configure apache webserver to run PHP as a module.

# Requirements

### **Tools/Materials**

- Computer/Laptop with latest configuration
- Operating system: windows 10 or 11
- Apsssache web server

- PHP
- Text editor
- seb browser

## **Procedure**

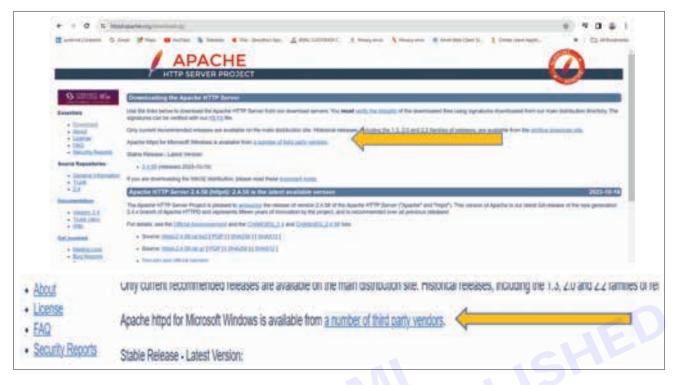
TASK 1: Perform Installation of Apache Web Server on a Windows system

1 Search 'Apache Web Server Download' in Google and click on the first link

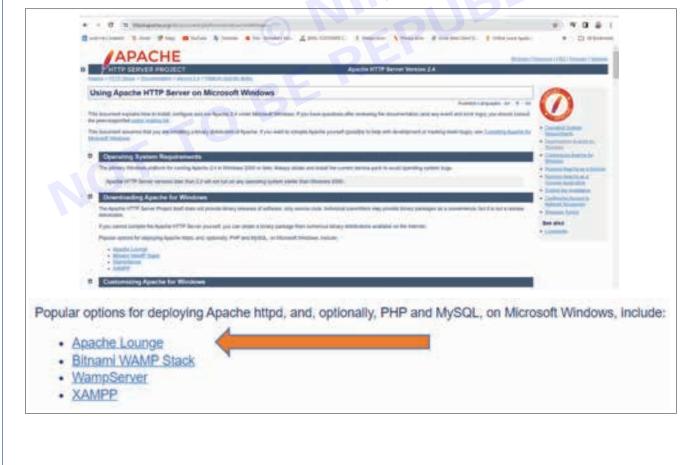
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Google	weather weak performant X & & CC O.	⊕ ≡ 4
	(Arandon D. Bar) Armonia (Maria) Bargar Baras Brandon Baras (Baras) Baras (Brange)	
	The Apache Self-server III III Instantial     The Apache III III III Instantial     The Apache IIII III IIII IIII IIIIIIIII     The Apache IIII IIII IIIIIIIIIIIIIIIIIIIIIIIIII	



2 Click on the 'number of third party vendors'



3 Select 'Apache Lounge'



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4 Click 'Apache 2.4.58 Win64' for downloading Apache Web Server software



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5 Right click on the downloaded file and Unzip the Apache24 folder to c:/Apache24 (that is the ServerRoot in the config).

	Open					
	Open with WinRAR			-		
1	Extract files		100			
			1.1	-		
	Extract to "httpd-2.4.	58-win64-VS17\"		1 des		
	Edit with Notepad++	•				
15	Share		100	See 2		
	Open with		>	1		
	Give access to			14		
	Restore previous ver	sions	2 mil			
	Send to		>			
	Cut			1000		
	Сору			and the		
	Create shortcut					
	Delete					
	Rename			and series		
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Home Share View	n64-VS17	Date modifi	ed Type	Size		
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tuick access Desktop ≠	n64-VS17 Name Apsche24 	18-10-2023 19-10-2023	16:43 File fold 13:47 File	er   1000108	0 KB 3 KB	
thttpd-2.4.58-wir Quick access Desktop x ⁴ Downloads x ⁴	n64-VS17 Name	18-10-2023	16:43 File fold 13:47 File	er   1000108	0 KB 3 KB	
thttpd-2.4.58-wir Quick access Desktop x ⁴ Downloads x ⁴ Documents x ⁴	n64-VS17 Name Apsche24 	18-10-2023 19-10-2023	16:43 File fold 13:47 File	er   1000108		
	n64-VS17 Name Apache24 Win64 VS17 ReadMe.txt	18-10-2023 19-10-2023	16:43 File fold 13:47 File	er   1000108		
↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑      ↑	n64-VS17 Name Apsche24 Win64 VS17 ReadMe.txt	18-10-2023 19-10-2023 19-10-2023	16:43 File fold 13:47 File	er   1000108		
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Nimi)

6 Open the command prompt as 'Run as Administrator'

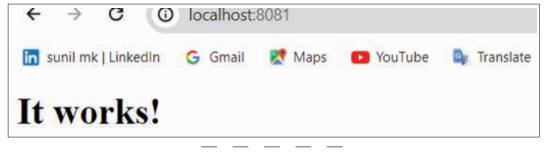
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<ul> <li>cmd ipconfig</li> <li>cmd run as administrator</li> </ul>	> >							
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7 Change the command prompt to C:\Apache24\bin by using CD command

8 Run the httpd.exe file in the command prompt

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Microsoft Windows [Version 10.0.19045.3930] (c) Microsoft Corporation. All rights reserved.	
C:\WINDOWS\system32>cd C:\Apache24\bin	
C:\Apache24\bin>httpd.exe	

9 Open the browser and type the address http://localhost to check the server running



Vimi)

TASK 2: Perform Installation of PHP in windows system

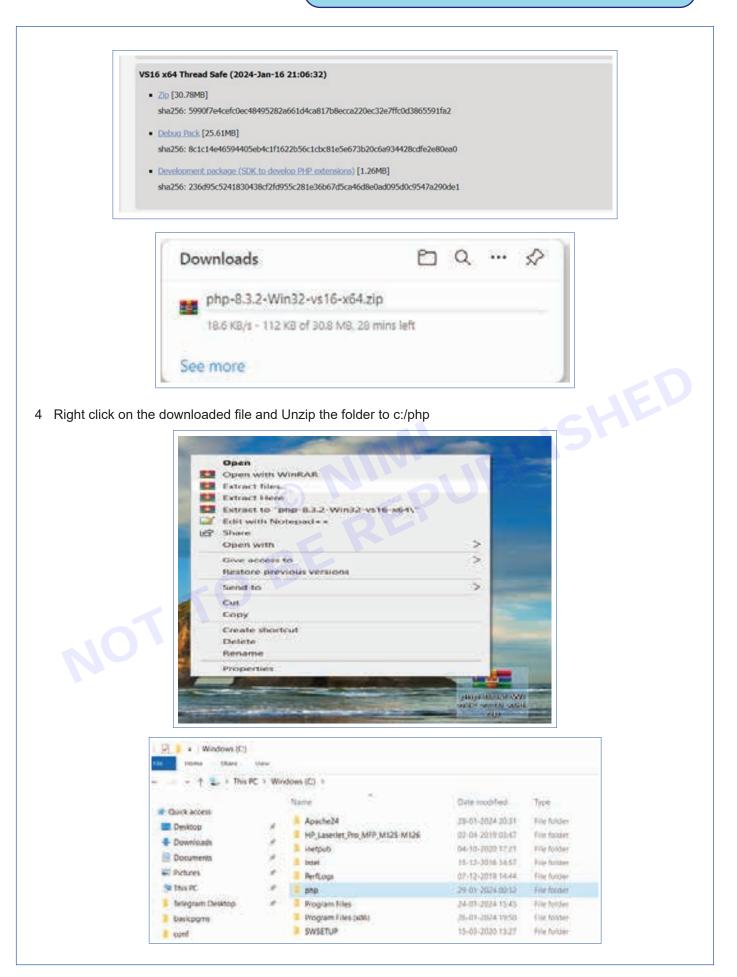
1 Open the link http://www.php.net/downloads.php in any browser

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php-8.3.2.har.gz (sig) [%27%b]     sha2% dec(%)26545156131e455663be5cc8868e4ec561e5c89326c8e5e116	Check the supported versions page for more 10 Jan 2024 information on the support lifetime of each version of PVP.	
<ul> <li>php-8.3.2.tar.bz2 (sig) [15,4470b] shu256:582b3c837a8d952efffe274a5e49706c43a88c162830c2a8c358889fe7449284</li> </ul>	18 Jan 2024 Documentation download	
<ul> <li>php-8.3.2.tarxx (sig) [12,149Kb] sha256.4ffa3e44afc9c590e28dc0d2d31fc61f0139f8b335f11880a121b9f9b9f0634e</li> </ul>	18 Jan 2024 PHP logos	
Windows downloads	Development sources (git)	
GPG Keys for PHP 8.3	Old archives	

### 2 Click on 'Windows downloads'

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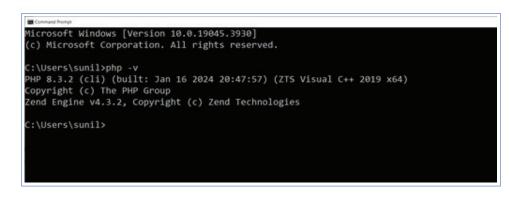
- 5 Open the environment variables and add php folder
  - Right-click on "This PC" or "Computer" and select "Properties."
  - Click on "Advanced system settings"
  - Click the "Environment Variables" button.

System Properties	×
Computer Name Hardware Advanced System Protection Remote	
You must be logged on as an Administrator to make most of these changes.	
Performance	
Visual effects, processor scheduling, memory usage, and virtual memory	
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Startup and Recovery	
System startup, system failure, and debugging information	
Settings	
Environment Variable	s
OK Cancel As	pply

6 Add php home folder by clicking 'New' button

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C:\Program Files (x86)\Intel\Intel\R) Management Engine Comp C:\Program Files\Intel\Intel\Intel\R) Management Engine Components %SYSTEMROOT%\System32\OpenSSH\ C:\Users\sunil\AppData\Local\Programs\Python\Python312 C:\php	C:\Program Files (x86)\Intel\Intel(R) Management Engine Comp	-
C:\Program Files\Intel\Intel(R) Management Engine Components %SYSTEMROOT%\System32\OpenSSH\ C:\Users\sunil\AppData\Local\Programs\Python\Python312 C:\php	C:\Program Files\Intel\Intel(R) Management Engine Components	
C:\Program Files\Intel\Intel\R Management Engine Components %SYSTEMROOT%\System32\OpenSSH\ C:\Users\sunil\AppData\Local\Programs\Python\Python312 C:\php		Move Up
C:\Users\sunil\AppData\Local\Programs\Python\Python312 C:\php		Th
C:\Dsers\sunil\AppData\Local\Programs\Python\Python312 C:\php		Move Dow
		more by
Edit jex	C:\php	
		Edit text
	ОК	Cancel

7 Open the command prompt and check the PHP installed version by the command 'php -v'



TASK 3: Configure Apache to run PHP as a Module

1 Open the apache configuration folder

T - 7 This P	C > Windo	ows (C:) > Apache24 > conf >			
a la se su a su a su a		Name	Date modified	Туре	Size
Quick access		extra	28-01-2024 20:31	File folder	
Desktop	*	Coriginal	28-01-2024 20:31	File folder	
Downloads	*	charset.conv	18-10-2023 16:37	CONV File	2 KB
Documents	#	httpd.conf	29-01-2024 15:40	CONF File	21 KB
F Pictures	*	magic	18-10-2023 16:37	File	14 KB
This PC	#	mime.types	18-10-2023 16:37	TYPES File	62 KB
Telegram Desktop	*	openssl.cnf	19-09-2023 18:31	CNF File	13 KB

2 Open 'httpd.conf' file

pd.conf' file						
📕   🕑 📕 🔻   conf					-	
File Home Share	View			1012		
$\leftrightarrow \rightarrow \uparrow \uparrow \downarrow \rightarrow$ This	PC > W	indows (C:) > Apa	che24 > conf	~ 0	Search conf	
	^	Name	<u>_</u>	Date modified	Туре	Size
🖈 Quick access	1.2	extra		28-01-2024 20:31	File folder	
Desktop	*	original		28-01-2024 20:31	File folder	
Downloads	*	C charset.com	/	18-10-2023 16:37	CONV File	
Documents	*	A httpd.conf		29-01-2024 15:40	CONF File	
E Pictures	*	magic	Open		File	
🕒 This PC	*	mime.typ	Edit		TYPES File	
Telegram Desktop	*	openssl.ci	Edit with Notepad++		CNF File	
basicpgms		1	A Share			
L conf			Open with			

Bir Dit Spreet Ver	per-	~ a ×
	the main Apache HTTP server configuration file. It contains the	
	iration directives that give the server its instructions.	
	RL:http://httpd.apache.org/docs/2.4/> for detailed information.	
	icular, see	
	http://httpd.apache.org/docs/2.4/mod/directives.html> iscussion of each configuration directive.	
# 101 a ui #	scussion of each configuration directive.	
Contractores	f simply read the instructions in here without understanding	
	hey do. They're here only as hints or reminders. If you are unsure	
	t the online docs. You have been warned.	
#		
	uration and logfile names: If the filenames you specify for many	
	server's control files begin with "/" (or "drive:/" for Win32), the	
	will use that explicit path. If the filenames do *not* begin	
	(", the value of ServerRoot is prepended so "logs/access_log"	
	erverRoot set to "/usr/local/apache2" will be interpreted by the as "/usr/local/apache2/logs/access_log", whereas "/logs/access_log"	
	interpreted as '/logs/access_log'.	
he follow	ring codes in the file at the top of the file	
	AddHandler application/x-httpd-php .php	57
	AddType application/x-httpd-php .php .html	
	LoadModule php_module "c:/php/php8apache2_4.dll	
	PHPIniDir "c:/php"	

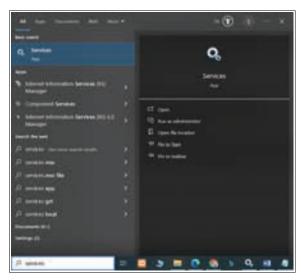
LoadFile "c:/php/php8ts.dll"

#

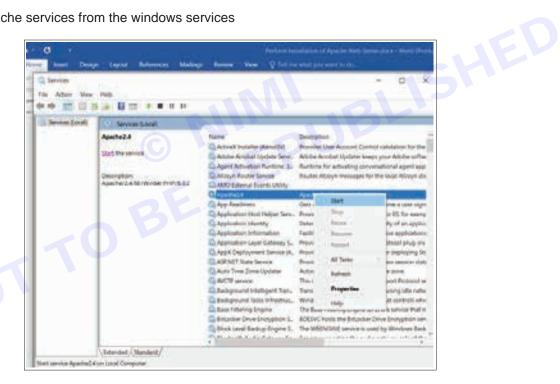
AddHandler application/x-httpd-php.php AddType application/x-httpd-php.php.html LoadModule php_module "c:/php/php8apache2_4.dll PHPIniDir "c:/php" LoadFile "c:/php/php8ts.dll"

# This is the main Apache HTTP server configuration file. It contains the # configuration directives that give the server its instructions. # See <URL:http://httpd.apache.org/docs/2.4/> for detailed information.

4 Type services in search menu to open windows services



5 Start the Apache services from the windows services



6 Open the notepad and write sample PHP



7 Save the in C:\Apache24\htdocs in a folder with .php extension

<html> <body> <?php echo"Ha ?&gt; </body> </html>	i welcome";				SH
we As					×
⇒ 👻 ↑ 📕 « Window	vs (C:) > Apache24	> htdocs > webp	ages v ව	Search webpage	
<ul> <li>Window</li> <li>anize New folder</li> <li>This PC</li> <li>3D Objects</li> <li>Desktop</li> <li>Documents</li> <li>Downloads</li> <li>Music</li> <li>Pictures</li> <li>Videos</li> </ul>	vs (C:) > Apache24 ame	^	Date modified	Search webpage	is
<ul> <li>Window</li> <li>Anize New folder</li> <li>This PC</li> <li>Dobjects</li> <li>Desktop</li> <li>Documents</li> <li>Downloads</li> <li>Music</li> <li>Pictures</li> </ul>		^	Date modified		<b>⊪</b> • <b>(</b> )





8 Open the browser and type the following address http://localhost/foldername/

Index of /webpages *	+									- 0
→ C (O localhost.8012/w	bpages/							*	0	S facel
suni mk j Linkedin 🛛 🤤 Graal 🛛 🛃 M	a 🖸 YouTube 🔓 franslate	€ Kte - Zerodha's fast	E BSAL CUSTOMER C	1 Privacy error	A Privacy error	Imail Web Client S	2 Online Leave Applic			Al Book
dex of /webpage	<u>6</u>									
Parent Directory										

9 Click the php file to run the php sample script and verify the output

	- 0 ×
← → C (i) localhost/1012/webpaper/Example.php In and ink [Lekedin G Gmail & Maps (ii) holds (iii) handles (iii) handl	9, 1     1     1     1       Image: Stand Web Clent S     1     Criste Leave Applic     1     1     1
Hai welcome	
© ALIMI	JBLIST

# EXERCISE 51 : Demonstrate on if statement Using the else clause with if statement, switch statement Using the? operator, while statement, do while statement, for statement, Breaking out of loops, Nesting loops

# **Objectives**

### At the end of this exercise you shall be able to

- use if-else and while statement in PHP
- use while and for loops in PHP
- use ? operator and nesting loops in PHP.

## **Requirements**

### **Tools/Materials**

- Computer/Laptop with latest configuration
- Operating system: windows 10 or 11
- Apache web server

## **Procedure**

### TASK 1: Using If statement

- 1 Open the text editor
- 2 Write the following codes

<html>

<body>

<?php

\$age = 21;

```
if ($age>18)
```

{

echo "You are eligible for DL";

```
}
```

```
?>
```

</body>

</html>

- 3 Save the program in C:\Apache24\htdocs in a folder with .php extension
- 4 Run the Apache services from windows services
- 5 Open the browser and type the following address http://localhost/foldername/
- 6 Click the php file to run and verify the output

- PHP
- Text editor
- Web browser



**COMPUTER SOFTWARE APPLICATION - CITS** 

| C Q () localhost8012/sunil/test.php                                   |     | \$2 | D    |
|-----------------------------------------------------------------------|-----|-----|------|
|                                                                       |     |     | CSTC |
| Using the else clause with if statement                               |     |     |      |
| Dpen the text editor                                                  |     |     |      |
| Vrite the following codes                                             |     |     |      |
| html>                                                                 |     |     |      |
| :body>                                                                |     |     |      |
| php</td <td></td> <td></td> <td></td>                                 |     |     |      |
| \$age = 21;                                                           |     |     |      |
| if (\$age>=18)                                                        |     |     |      |
| {                                                                     |     |     |      |
| echo "You are eligible for DL";                                       |     |     |      |
| }                                                                     |     |     |      |
| else                                                                  |     |     |      |
| {                                                                     |     |     |      |
| echo "You are NOT eligible for DL";                                   |     |     |      |
| }                                                                     |     |     |      |
| ?>                                                                    |     |     |      |
| :/body><br>:/html>                                                    |     |     |      |
|                                                                       |     |     |      |
| Save the program in C:\Apache24\htdocs in a folder with .php extensio | n   |     |      |
| Run the Apache services from windows services                         |     |     |      |
| Open the browser and type the following address                       |     |     |      |
| ttp://localhost/foldername/                                           |     |     |      |
| Click the php file to run and verify the output                       |     | _   |      |
| 2 🕲 🗖 🖾 New tab 🗙 🖸 Socalhost:8012/csa/test.php                       | × + |     |      |
| ← O G ① localhost.8012/csa/test.php                                   |     |     |      |
|                                                                       |     |     |      |
| You are eligible for DL                                               |     |     |      |
|                                                                       |     |     |      |
|                                                                       |     |     |      |
|                                                                       |     |     |      |
|                                                                       |     |     |      |

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### TASK 3: Using Switch statement

```
1 Open the text editor
   2 Write the following codes
      <html>
      <head> <title>PHP </title></head>
      <body>
      <?php
         $favcolor = "brown";
         switch ($favcolor)
         {
            case "red": echo "Your favorite color is red!";
               break;
            case "blue": echo "Your favorite color is blue!";
               break:
            case "green": echo "Your favorite color is green!";
               break;
            default: echo "Your favorite color is neither red, blue, nor green!";
         }
      ?>
      END
      </body>
      </html>
   3 Save the program in C:\Apache24\htdocs in a folder with .php extension
   4 Run the Apache services from windows services
   5 Open the browser and type the following address
      http://localhost/foldername/
   6 Click the php file to run and verify the output
                                                       PHP
         0
                     New tab
                                                  ×
    4

    localhost:8012/csa/test.php

          C
                6
   Your favorite color is neither red, blue, nor green!
   END
TASK 4: Using the ? Operator
```

- 1 Open the text editor
- 2 Write the following codes

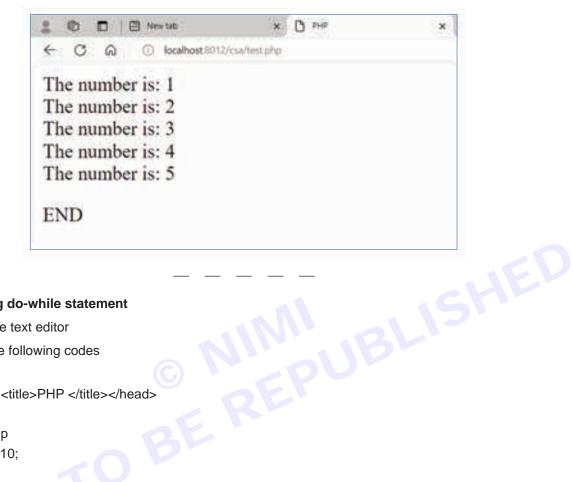
<?php



```
echo $status = (empty($user)) ? "anonymous" : "logged in";
            echo("<br>");
            $user = "John Doe";
            echo $status = (empty($user)) ? "anonymous" : "logged in";
        ?>
   3 Save the program in C:\Apache24\htdocs in a folder with .php extension
   4 Run the Apache services from windows services
   5 Open the browser and type the following address
     http://localhost/foldername/
   6 Click the php file to run and verify the output
                      New tab
                                                            localhost:8012/csa/test.php
                                                    ×
                         Iocalhost 8012/csa/test.php
    anonymous
    logged in
TASK 5: Using While statement
   1 Open the text editor
   2 Write the following codes
      <html>
      <head> <title>PHP </title></head>
      <body>
      <?php
        $x = 1;
        while (x \le 5)
        {
            echo "The number is: $x <br>";
            $x++;
        }
      ?>
      END
      </body>
      </html>
   3 Save the program in C:\Apache24\htdocs in a folder with php extension
```

4 Run the Apache services from windows services

- 5 Open the browser and type the following address http://localhost/foldername/
- 6 Click the php file to run and verify the output



### TASK 6: Using do-while statement

1 Open the text editor

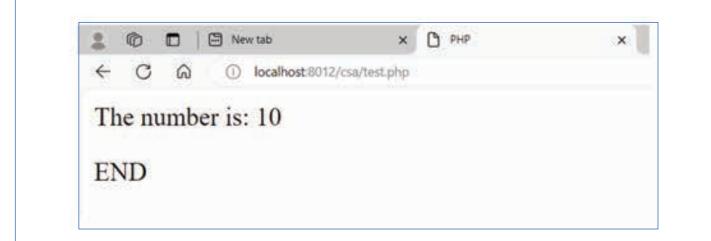
```
2 Write the following codes
```

```
<html>
<head> <title>PHP </title></head>
<body>
  <?php
  x = 10;
  do
  {
     echo "The number is: $x <br>";
     $x++;
  } while ($x <= 5);
?>
END
</body>
</html>
```

- 3 Save the program in C:\Apache24\htdocs in a folder with .php extension
- 4 Run the Apache services from windows services
- 5 Open the browser and type the following address http://localhost/foldername/
- 6 Click the php file to run and verify the output



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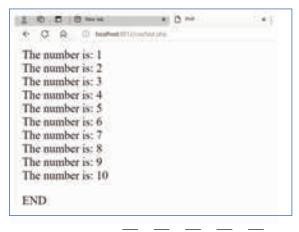
### TASK 7: Using for statement

1 Open the text editor

```
ur>"; ()
2 Write the following codes
  <html>
  <head> <title>PHP </title></head>
  <body>
  <?php
    for ($x =1; $x <=10; $x++)
    {
    echo "The number is: $x <br>"
    }
  ?>
  END
  </body>
```

```
</html>
```

- 3 Save the program in C:\Apache24\htdocs in a folder with .php extension
- 4 Run the Apache services from windows services
- 5 Open the browser and type the following address http://localhost/foldername/
- 6 Click the php file to run and verify the output



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### TASK 8: Breaking out of loops

1 Open the text editor

```
2 Write the following codes
```

```
<html>
<head> <title>PHP </title></head>
<body>
<?php
   for ($x = 0; $x < 10; $x++)
   {
      if ($x == 4)
      {
         break;
     }
      echo "The number is: $x <br>";
  }
   ?>
END
</body>
</html>
```

- 3 Save the program in C:\Apache24\htdocs in a folder with .php extension
- 4 Run the Apache services from windows services
- 5 Open the browser and type the following address http://localhost/foldername/
- 6 Click the php file to run and verify the output

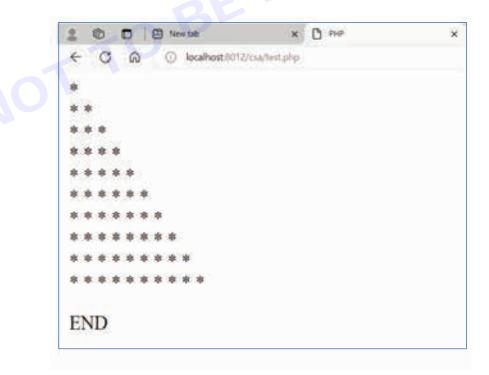
2 🕼 🗖 🖾 New tab	×	D PHP	×
← C @ ① localhost:8012	?/csa/test.php		
The number is: 0			
The number is: 1			
The number is: 2			
The number is: 3			
END			

### TASK 9: Nesting loops

- 1 Open the text editor
- 2 Write the following codes

```
<html>
<head> <title>PHP </title></head>
<body>
<?php
   for ($x = 1; $x < =10; $x++)
   {
     for ($y = 1; $y < =$x; $y++)
      {
         echo "* ":
   }
   echo "<br/>;
}
?>
END
</body>
</html>
```

- 3 Save the program in C:\Apache24\htdocs in a folder with .php extension
- 4 Run the Apache services from windows services
- 5 Open the browser and type the following address http://localhost/foldername/
- 6 Click the php file to run and verify the output





- 1 Create a PHP if statement to determine whether a variable \$temperature is greater than 30 degrees Celsius then display "It's hot outside!"
- 2 Create a PHP program that determines whether a student has passed or failed an exam based on their score. If the score is greater than or equal to 60, display a "Pass" message; otherwise, display a "Fail" message.
- 3 Write a PHP if statement to determine if a variable \$num is divisible by 2 and 3. If it is, echo "The number is divisible by both 2 and 3", otherwise echo "The number is not divisible by both 2 and 3".
- 4 Write a PHP switch statement that checks the value of a variable \$dayOfWeek and echoes "It's a weekday" for Monday to Friday, and "It's a weekend" for Saturday and Sunday.
- 5 Write a PHP switch statement to determine the discount percentage based on the quantity of items purchased. If the quantity is 1-10, apply a 5% discount, if it's 11-20, apply a 10% discount, and if it's over 20, apply a 15% discount.
- 6 Write a PHP ternary operator statement to determine if a given number stored in \$num is even or odd, and echo "Even" if it's even, otherwise echo "Odd".
- 7 Write a PHP while loop that calculates the factorial of a given number \$n and echoes the result.
- 8 Create a PHP while loop that generates Fibonacci numbers until reaching a value greater than 1000, and echoes each Fibonacci number.
- 9 Create a PHP for loop to generate multiples of 2 and 3 in between 1 and 100, and echoes each number.
- 10 Write a PHP script using nested for loops to create a simple multiplication table (e.g., 1x1=1, 1x2=2, ..., 5x5=25).
- 11 Create a script with nested for loops. The outer loop iterates 3 times, and the inner loop iterates 5 times. Inside the inner loop, use break to exit the entire loop structure (both inner and outer) if the current iteration number in the inner loop reaches 3.



EXERCISE 52 : Demonstrate on Function and returning value from function, user defined functions, dynamic functions, variable scope, accessing variable with the global statement, Function calls with the static statement, setting default values for arguments, Passing arguments to a function by value, Passing arguments to a function by reference, Testing for function existence

## **Objectives**

### At the end of this exercise you shall be able to

- create and use user defined functions in PHP
- · check different variable scope in PHP
- test the existence of function in PHP.

## **Requirements**

### **Tools/Materials**

- Computer/Laptop with latest configuration
- Operating system: windows 10 or 11
- Apache web server

# Procedure

### TASK 1: Create user defined functions

- 1 Open the text editor
- 2 Write the following codes

<html>

```
<body>
```

<?php function writeMsg()

```
{
```

echo "Hello world!";

```
}
```

writeMsg();

?>

</body>

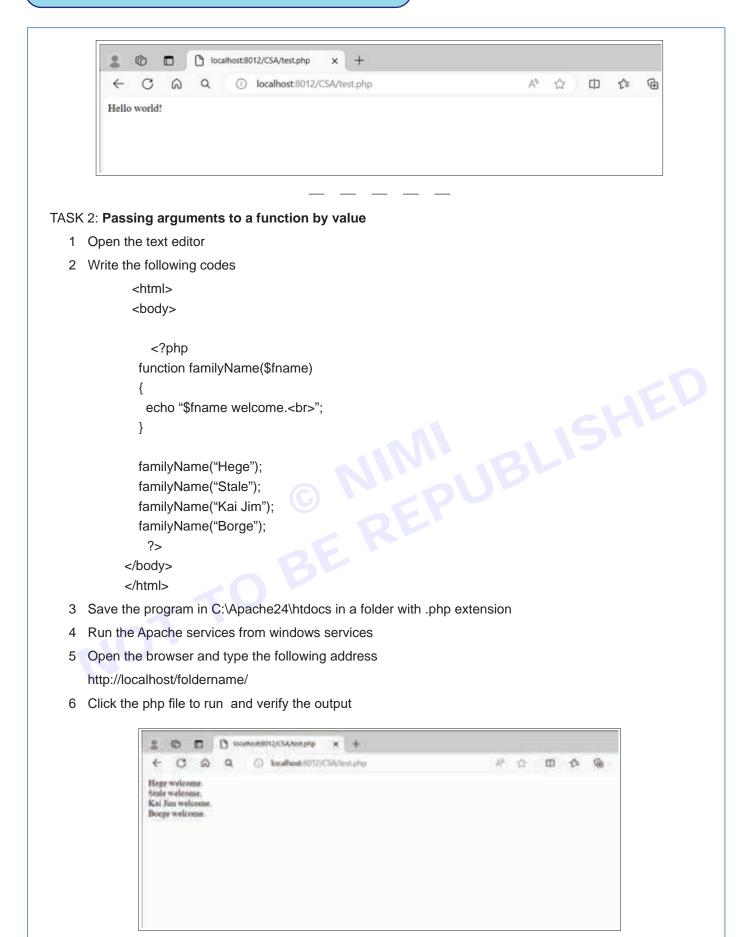
- </html>
- 3 Save the program in C:\Apache24\htdocs in a folder with .php extension
- 4 Run the Apache services from windows services
- 5 Open the browser and type the following address http://localhost/foldername/
- 6 Click the php file to run and verify the output

- PHP
- Text editor
- Web browsers



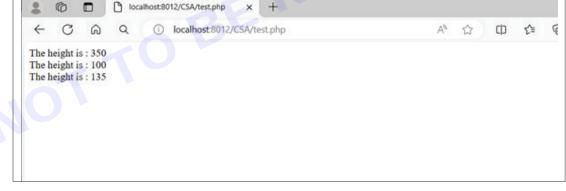


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```
TASK 3: Setting default values for arguments
  1 Open the text editor
  2 Write the following codes
            <html>
            <body>
            <?php
               function setHeight(int $minheight=100)
               {
       echo "The height is : $minheight <br>";
            }
               setHeight(350);
               setHeight();
            setHeight(135);
           ?>
                                                                     BLISHED
           </body>
           </html>
  3 Save the program in C:\Apache24\htdocs in a folder with .php extension
  4 Run the Apache services from windows services
  5 Open the browser and type the following address
     http://localhost/foldername/
  6 Click the php file to run and verify the output
```



### TASK 4: Passing arguments to a function by reference

By default, function arguments are passed by value (so that if the value of the argument within the function is changed, it does not get changed outside of the function). To allow a function to modify its arguments, they must be passed by reference.

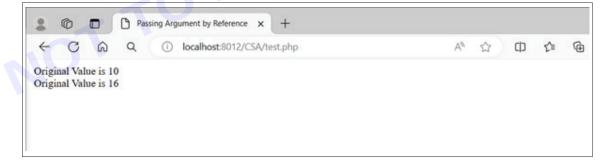
To have an argument to a function always passed by reference, prepend an ampersand (&) to the argument name in the function definition:

- 1 Open the text editor
- 2 Write the following codes
  - <html>
  - <head>

<title>Passing Argument by Reference</title> </head> <body>

```
<?php
         function addFive($num)
         {
            $num += 5;
         }
         function addSix(&$num)
         {
           $num += 6;
         }
         sorignum = 10;
         addFive( $orignum );
         echo "Original Value is $orignum<br />";
         addSix( $orignum );
         echo "Original Value is $orignum<br />";
     ?>
</body>
</html>
```

- 3 Save the program in C:\Apache24\htdocs in a folder with .php extension
- 4 Run the Apache services from windows services
- 5 Open the browser and type the following address http://localhost/foldername/
- 6 Click the php file to run and verify the output



#### TASK 5: Testing for function existence

If you ever want to know whether you have a function available to you, use the function_exists() function. This takes one string parameter that is the name of a function and returns true if the function exists or false if it does not.

- 1 Open the text editor
- 2 Write the following codes

```
<html>
         <head> <title>PHP </title></head>
         <body>
          <?php
               function WelcomeMsg()
              {
                 echo "Welcome to GeeksforGeeks";
               }
              if (function_exists('WelcomeMsg'))
              {
                 echo "WelcomeMsg() function is available.\n";
              }
              else
              {
                 echo "WelcomeMsg() function is not available.\n";
              }
         ?>
         END
         </body>
         </html>
3 Save the program in C:\Apache24\htdocs in a folder with .php extension
```

- 4 Run the Apache services from windows services
- 5 Open the browser and type the following address http://localhost/foldername/
- 6 Click the php file to run and verify the output





### TASK 6: Returning value from function

- 1 Open the text editor
- 2 Write the following codes

```
<html>
```

```
<head> <title>PHP </title></head>
```

<body> <?php

```
function sum(int $x, int $y)
```

{

z = x + y;

return \$z; }

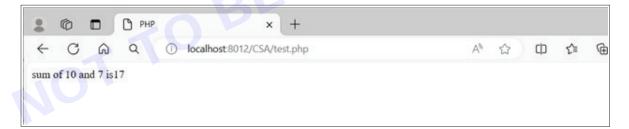
```
$a=10;
```

```
$b=7;
```

echo "sum of \$a and \$b is".sum(10,7);

```
?>
</body>
</html>
```

- 3 Save the program in C:\Apache24\htdocs in a folder with .php extension
- 4 Run the Apache services from windows services
- 5 Open the browser and type the following address http://localhost/foldername/
- 6 Click the php file to run and verify the output



### TASK 7: Create dynamic functions

- 1 Open the text editor
- 2 Write the following codes

```
<html>
<head>
<title>Dynamic Function Calls</title>
</head>
<body>
<?php
function sayHello()
{
```

	echo "Hello ";
	}
	\$function_holder = "sayHello";
	\$function_holder();
	?>
3	Save the program in C:\Apache24\htdocs in a folder with .php extension
4	Run the Apache services from windows services
5	Open the browser and type the following address
	http://localhost/foldername/
6	Click the php file to run and verify the output
	Dynamic Function Calls x +
	← C G Q (i) localhost:8012/CSA/test.php A ^N ☆ CD f=
	Hello
TASK	8: Accessing variable with the global statement
1	Open the text editor
2	Write the following codes
	<html></html>
	<body></body>
	php</th
	\$count = 1;
	function keep_track()
	{
	global \$count;
	\$count=5;
	echo"inside the function ". \$count;
	echo " ";
	}
	keep_track();
	echo "outside the function ".\$count." "; ?>
	<pre>{&gt; </pre>
3	Save the program in C:\Apache24\htdocs in a folder with .php extension
4	Run the Apache services from windows services
5	Open the browser and type the following address
	http://localhost/foldername/
6	Click the php file to run, and verify the output

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```
localhost:8012/CSA/test.php
                                                   +
             0
                 х
         ←
              C
                   6
                        Q

    localhost:8012/CSA/test.php

                                                                                 AN.
                                                                                            ¢D
                                                                                                      G
                                                                                      Û
                                                                                                 ઽે≣
        inside the function 5
        outside the function 5
TASK 9: Function calls with the static statement
   1 Open the text editor
   2 Write the following codes
          <html>
                                  © NINJBLISHED
BEREPUBLISHED
BE
          <body>
          <?php
         function keep_track()
        {
                STATIC \text{$count = 5;}
               $count++;
        echo $count;
               echo "<br />";
        }
        keep_track();
        keep_track();
            keep_track();
         ?>
         </body>
         </html>
   3 Save the program in C:\Apache24\htdocs in a folder with .php extension
   4 Run the Apache services from windows services
   5 Open the browser and type the following address
      http://localhost/foldername/
   6 Click the php file to run and verify the output
                        localhost:8012/CSA/test.php
                                                  +
              O
                   ×

    localhost:8012/CSA/test.php

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          6
          7
          8
```



- 1 Write a function named calculateArea that calculates the area of a rectangle given its length and width.
- 2 Write a PHP function that takes two numbers as parameters (\$num1 and \$num2) and print their sum. Call the function with different values and print result.
- 3 Create a function called sayHello that takes a parameter \$name and defaults to "Guest" if no value is provided. The function should echo "Hello, \$name!". Call the function without providing a value for \$name and observe the output.
- 4 Create a function named getAgeCategory that determines the age category based on the provided age. It should take one parameter \$age with a default value of 25. The function should return "Child" for ages 0-12, "Teen" for ages 13-19, "Adult" for ages 20-59, and "Senior" for ages 60 and above.
- 5 Create a function called incrementByReference that takes an integer parameter \$num by reference and increments it by 1 inside the function. Call the function with a variable and observe its value change after the function call.
- 6 Implement a function called swapValues that takes two variables \$a and \$b by reference and swaps their values inside the function. Call the function with two variables and print their values before and after the
- 7 Write a PHP script that defines a dynamic function named multiply which takes two parameters and returns

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# EXERCISE 53 : Demonstrate the Writing to the browser, Getting input from forms, Output buffering, Common math, Random numbers, File upload, File download, Environment variables

PHP

Text editor Web browser

# **Objectives**

### At the end of this exercise you shall be able to

- write content to the browser using PHP
- · check common math and random number functions in PHP
- upload download from server using PHP.

# **Requirements**

### **Tools/Materials**

- Computer/Laptop with latest configuration
- Operating system: windows 10 or 11
- Apache web server

## Procedure

TASK 1: Writing to the browser

- 1 Open the text editor
- 2 Write the following codes

<html>

<body>

<?php

// Example with echo
echo "Hello, world!";

// Example with print
print "This is also displayed";

// Example with printf
\$name = "Alice";
printf("Welcome, %s!", \$name);

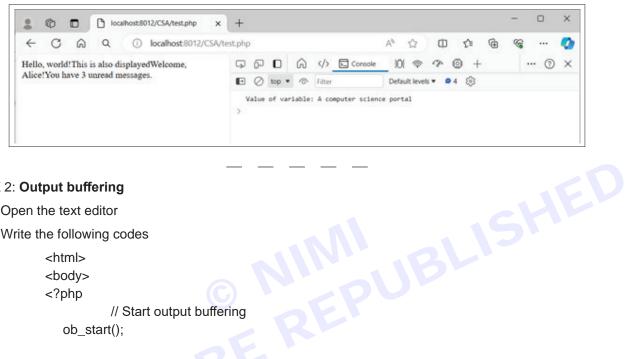
// Example with sprintf
\$message = sprintf("You have %d unread messages.", 3);
echo \$message;

// Declare variable and store the string
\$output = "A computer science portal";
echo "<script>console.log('Value of variable: " . \$output . " );</script>";
?>



```
</body>
</html>
```

- 3 Save the program in C:\Apache24\htdocs in a folder with .php extension
- 4 Run the Apache services from windows services
- 5 Open the browser and type the following address http://localhost/foldername/
- 6 Click the php file to run and verify the output



#### TASK 2: Output buffering

- 1. Open the text editor
- 2. Write the following codes

```
<html>
<body>
<?php
```

// Start output buffering

ob_start();

```
// Your regular PHP code
echo "Hello, ";
echo "World!";
```

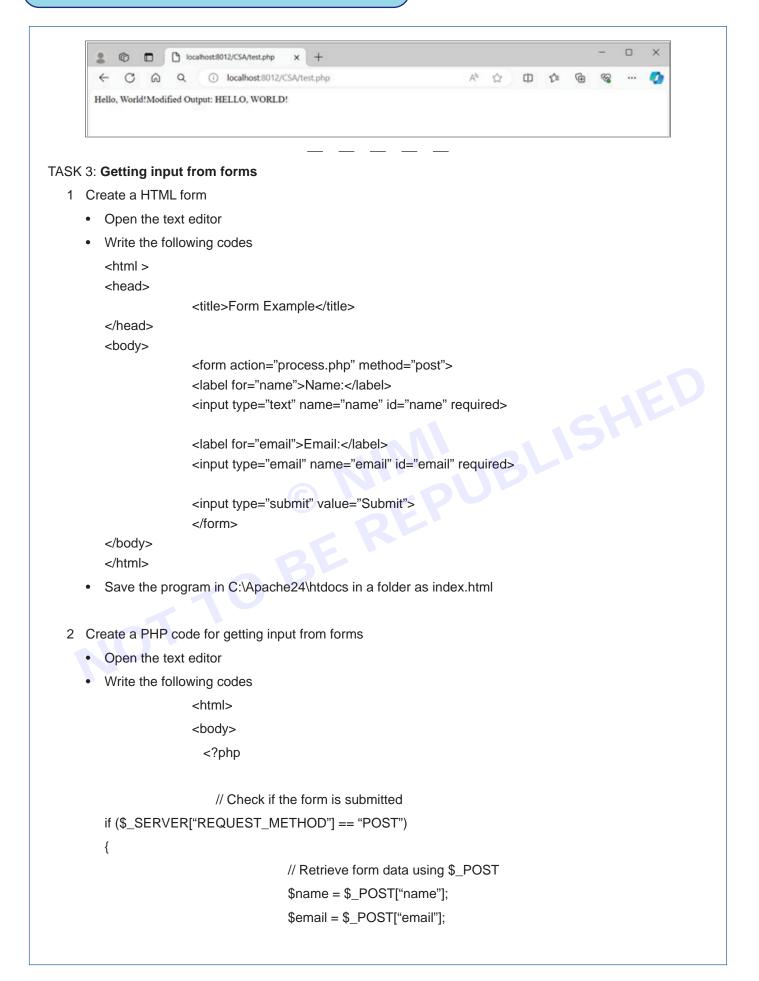
// Capture the output \$output = ob_get_contents();

// End output buffering and send the content to the browser ob_end_flush();

```
// Use the captured output
echo "Modified Output: " . strtoupper($output);
?>
```

```
</body>
</html>
```

- 3 Save the program in C:\Apache24\htdocs in a folder with .php extension
- 4 Run the Apache services from windows services
- 5 Open the browser and type the following address http://localhost/foldername/
- 6 Click the php file to run and verify the output





```
// Do something with the data (e.g., display it)
echo "Name: $name<br>";
echo "Email: $email";
```

```
}
else
{
// Redirect or display an error if someone tries to access this script directly
                                   header("Location: index.html");
                                   exit();
                         }
                   ?>
                 </body>
                 </html>
Save the program in C:\Apache24\htdocs in a folder with .php extension
Run the Apache services from windows services
Open the browser and type the following address
http://localhost/foldername/
Click the index.html file to run and verify the output
                  P Form Example
            +
       n
                               () localhost:8012/CSA/
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        \rightarrow
             C
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                         Q
                                                                                 AN
                                                                                      $7
                                                                                            D
                                                                                                  1
                                                         Submit
  Name: Trainee1
                             Email: sample@csa.in
                localhost:8012/CSA/process.php x
                                           +
       C
            6
                 Q
                       Iocalhost:8012/CSA/process.php
                                                                          A<sup>h</sup>
                                                                                    (h)
   4
                                                                                                   ର
  Name: Trainee1
  Email: sample@csa.in
```

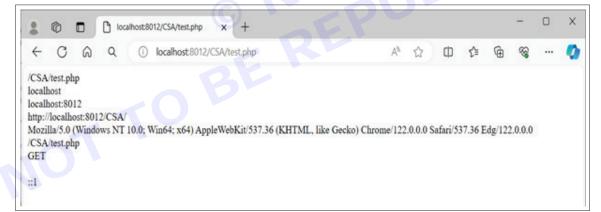
TASK 4: Display environment variables

- Open the text editor
- Write the following codes

<?php echo \$_SERVER['PHP_SELF']; echo "<br>"; echo \$_SERVER['SERVER_NAME']; echo "<br>";

```
echo $_SERVER['HTTP_HOST'];
echo *<br>'';
echo $_SERVER['HTTP_REFERER'];
echo *<br>'';
echo $_SERVER['HTTP_USER_AGENT'];
echo *<br>'';
echo $_SERVER['SCRIPT_NAME'];
echo $_SERVER['SCRIPT_NAME'];
echo *<br>'';
echo $_SERVER['REQUEST_METHOD'];
echo *<br>'';
echo $_SERVER['QUERY_STRING'];
echo *<br>'';
echo $_SERVER['REMOTE_ADDR'];
?>
Save the program in C:\Apache24\htdocs in a folder with .php extension
```

- Run the Apache services from windows services
- Open the browser and type the following address http://localhost/foldername/
- 6 Click the php file to run and verify the output



#### TASK 5: File upload

- 1 Create an HTML form that allows users to select and upload files.
  - Open the text editor
  - Write the following codes

```
<html>
<head>
<meta charset="UTF-8">
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<title>File Upload</title>
</head>
```

```
<body>
```

<form action="upload.php" method="post" enctype="multipart/form-data">

```
<label for="file">Select a file:</label>
```

<input type="file" name="file" id="file" required>

```
<br>
```

<input type="submit" value="Upload File">

```
</form>
```

</body>

```
</html>
```

• Save the program in C:\Apache24\htdocs in a folder as index.html

- 2 Create PHP Script to Handle Upload
  - Open the text editor
  - Write the following codes

```
<html>
```

```
<body>
```

{

<?php

{

```
// upload.php
```

```
if ($_SERVER["REQUEST_METHOD"] == "POST")
```

```
// Check if the file was uploaded without errors
```

```
if (isset($_FILES["file"]) && $_FILES["file"]["error"] == 0)
```

```
$allowedTypes = ['jpg', 'jpeg', 'png', 'gif', 'txt'];
$maxSize = 5 * 1024 * 1024; // 5 MB
```

\$targetDir = "uploads/"; //create a folder in this name in your php file saved location .
\$targetFile = \$targetDir . basename(\$_FILES["file"]["name"]);
\$fileExtension = strtolower(pathinfo(\$targetFile, PATHINFO EXTENSION));

```
// Check file type
if (!in_array($fileExtension, $allowedTypes))
```

```
echo "Error: Invalid file type.";
```

elseif (\$_FILES["file"]["size"] > \$maxSize)

echo "Error: File size exceeds the limit.";

}

else {

{

}

{

```
// Move the uploaded file to the target directory
if (move_uploaded_file($_FILES["file"]["tmp_name"], $targetFile))
{
```



```
echo "The file has been uploaded successfully.";
                    }
                    else
                    {
                        echo "Sorry, there was an error uploading your file.";
                    }
               }
         }
         else
        {
               echo "Error: " . $_FILES["file"]["error"];
        }
   }
   ?>
   </body>
   </html>
Save the program in C:\Apache24\htdocs in a folder with .php extension
Run the Apache services from windows services
Open the browser and type the following address
http://localhost/foldername/
Click the index.html file to run and verify the output
  .
        6
                      File Upload
                                                            +
              ×
                              Q
  -
         \rightarrow
                       6
                                           localhost:8012/CSA/
                C
                                       (i)
 Select a file:
               Choose File
                            mylinks.txt
  Upload File
        6
                            localhost:8012/CSA/upload.php X
                ſ٩
                                                                  +
          C
                  6
   4
                         Q
                                        localhost:8012/CSA/upload.php
                                   (\mathbf{i})
 The file has been uploaded successfully.
```

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T T Inis P	C > Windows (C:) > Ap	vache24 > htdocs > C	SA > uploads		
	Name	^	Date modified	Type	Size
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Desktop	# mylinks.tx	t	16-03-2024 13:26	Text Document	1.6
Downloads	*				
Documents	*				
E Pictures	*				
Inis PC	*				
Telegram Desktop	*				
37					
CSA CSA					
CSA-CURRICULAM					
TP-1 PART-B					
OneDrive - Personal					
S This PC					

### TASK 6: File download

- Open the text editor
- Write the following codes
  - <?php

\$file_path = 'path/to/your/file.pdf'; // Replace with the actual file path
\$file_name = 'downloaded_file.pdf'; // Optional: Customize the filename for download

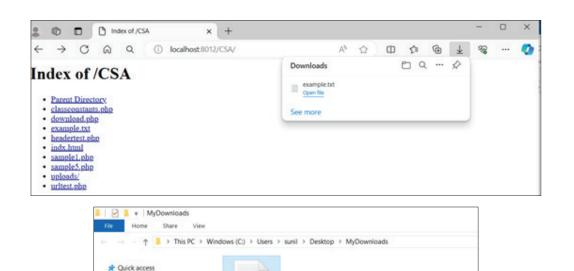
header('Content-Type: application/pdf'); // Set content type based on file extension header('Content-Disposition: attachment; filename="" . \$file_name . '""); // Force download header('Content-Length: ' . filesize(\$file_path)); // Set file size for better download management readfile(\$file_path); // Read and output the file contents directly

// Alternatively, you can use:

// echo file_get_contents(\$file_path);

exit(); // Prevent further output ?>

- Save the program in C:\Apache24\htdocs in a folder with .php extension
- Run the Apache services from windows services
- Open the browser and type the following address http://localhost/foldername/
- Click the php file to run and verify the output



#### TASK 7: Common math functions

**Basic Arithmetic Functions:** 

abs(\$number): Returns the absolute (positive) value of a number.

round(\$number, \$precision = 0): Rounds a number to a specified number of decimal places.

mple.txt

ISHED

ceil(\$number): Rounds a number up to the nearest integer.

floor(\$number): Rounds a number down to the nearest integer.

min(\$number1, \$number2, ...): Returns the smallest value from a list of numbers.

max(\$number1, \$number2, ...): Returns the largest value from a list of numbers.

pow(\$base, \$exponent): Returns the base raised to the power of the exponent.

sqrt(\$number): Returns the square root of a number.

Desktop
 Downloads
 Documents

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#### Trigonometric Functions:

sin(\$angle): Returns the sine of an angle in radians.

cos(\$angle): Returns the cosine of an angle in radians.

tan(\$angle): Returns the tangent of an angle in radians.

asin(\$number): Returns the arcsine of a number (in radians).

acos(\$number): Returns the arccosine of a number (in radians).

atan(\$number): Returns the arctangent of a number (in radians).

Logarithmic Functions:

log(\$number, \$base = M_E): Returns the logarithm of a number to a specified base (default is natural logarithm, base e).

exp(\$number): Returns the value of e raised to the power of a number.

Number Base Conversion Functions:

base_convert(\$number, \$frombase, \$tobase): Converts a number between arbitrary bases.

bindec(\$binary_string): Converts a binary string to a decimal number.



decbin(\$number): Converts a decimal number to a binary string.

dechex(\$number): Converts a decimal number to a hexadecimal string.

hexdec(\$hex_string): Converts a hexadecimal string to a decimal number.

Other Mathematical Functions:

pi(): Returns the value of pi.

deg2rad(\$number): Converts degrees to radians.

rad2deg(\$number): Converts radians to degrees.

fmod(\$x, \$y): Returns the floating-point remainder of x divided by y.

#### TASK 8: Display random numbers

- Open the text editor
- Write the following codes

<?php

echo rand()."<br/>br/>";//returns a pseudo-random integer between 0 and getrandmax().<br/>echo rand(5, 15). "<br/>";//returns random number between 5 and 15 (inclusive)<br/>var_dump(random_int(100, 999));

echo "<br/>;

var_dump(random_int(-1000, 0));// Get a cryptographically secure, uniformly selected integer function for situations requiring strong randomness.

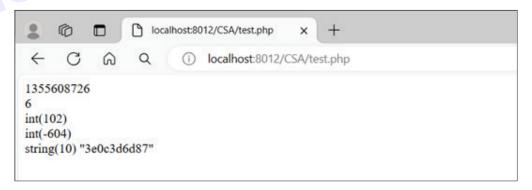
echo "<br/>";

\$bytes = random_bytes(5);

var_dump(bin2hex(\$bytes));// Get cryptographically secure random bytes

?>

- Save the program in C:\Apache24\htdocs in a folder with .php extension
- Run the Apache services from windows services
- Open the browser and type the following address http://localhost/foldername/
- Click the php file to run and verify the output



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- 1 Provide a code example demonstrating the use of the echo and print statements to display text on a web page.
- 2 Provide a code example demonstrating how to capture the output of a PHP script and store it in a variable for further processing.
- 3 Provide examples of how to retrieve user input from fields such as text fields, checkboxes, radio buttons, and select dropdowns.
- 4 Provide a code example demonstrating how to access form data submitted via the GET method.
- 5 Provide a code example illustrating how to create a form that allows users to upload a file to the server.
- 6 Provide a simple code example demonstrating how to force the download of a file named "example.txt".
- 7 Provide a code snippet illustrating how to set headers for downloading a PDF file named "document.pdf".
- 8 Write a PHP function that takes a floating-point number as input and returns its absolute value.
- 9 Write a PHP code to calculate the sine, cosine, and tangent of an angle in radians.

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EXERCISE 54 : Demonstrate on E-mail in PHP, anatomy of a cookie, setting a cookie with PHP, deleting a cookie, creating session cookie, working with the query string, creating query string, starting a session, Working with session, variables, Destroying session, passing session IDs, Encoding and decoding session variables

# **Objectives**

At the end of this exercise you shall be able to

- set and delete cookie using PHP
- · create and destroy a session using PHP
- work with a query string using PHP.

# Requirements

### **Tools/Materials**

- Computer/Laptop with latest configuration
- Operating system: windows 10 or 11
- Apache web server

## Procedure

### TASK 1: Knowing anatomy of a cookie

Cookie Name: Choose a descriptive name that identifies the data stored.
Cookie Value: The data you want to store, like user preferences or a session ID.
Lifetime: How long the cookie should last (in seconds, hours, or days).
Path: The URL path where the cookie should be accessible. Default is current path.
Domain: The domain for which the cookie applies. Default is current domain.
Security: Whether the cookie should only be sent over secure HTTPS connections.
HttpOnly: Whether the cookie should be accessible only through HTTP, protecting it from JavaScript access.

### TASK 2: setting a cookie with PHP

- 1 Open the text editor
- 2 Write the following codes

```
<html>
```

<body>

<?php

\$cookie_name = "username"; \$cookie_value = " John Carter"; \$expire = time()+30*24*60*60; // 30 days in seconds \$path = "/"; // accessible on entire website \$domain = ""; // default domain \$secure = true; // only send over HTTPS \$httponly = true; // not accessible through JavaScript setcookie(\$cookie_name, \$cookie_value, \$expire, \$path, \$domain, \$secure, \$httponly);

#### Text editor Web browser

PHP

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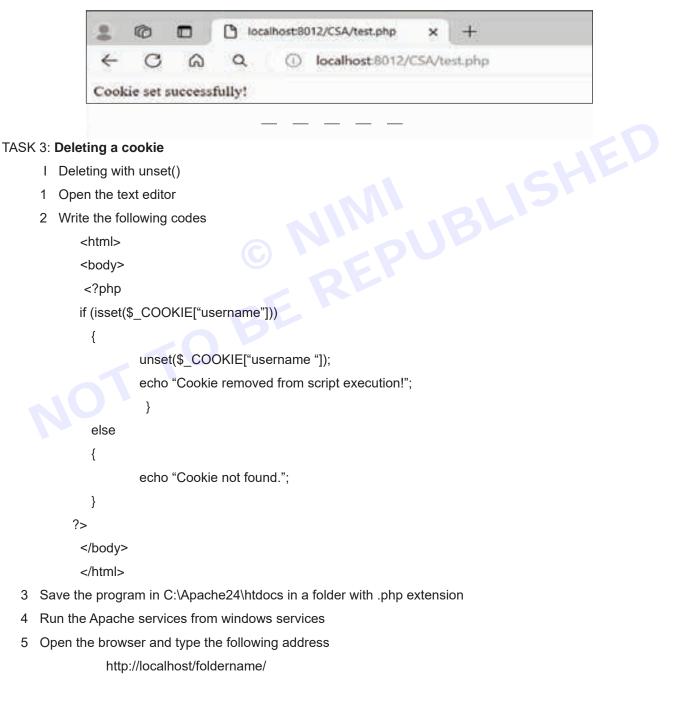
```
echo "Cookie set successfully!";
```

?>

- </body>
- </html>
- 3~ Save the program in C:\Apache24\htdocs in a folder with .php extension
- 4 Run the Apache services from windows services
- 5 Open the browser and type the following address
  - http://localhost/foldername/

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6 Click the php file to run and verify the output



```
6 Click the php file to run and verify the output
             G
                    localhost:8012/CSA/test1.php
                                                              ×
                                                                    +
        \leftarrow
               C
                      6
                             Q
                                      (i)
                                           localhost:8012/CSA/test1.php
      Cookie removed from script execution!
  II Deleting with setcookie()
     Open the text editor
   1
  2 Write the following codes
         <html>
         <body>
                              µast time
         <?php
       if (isset($_COOKIE["username"]))
      {
     setcookie($cookie_name, "", time() - 3600, "/"); // Set expiration to past time
     echo "Cookie removed from script execution!";
     }
     else
      {
      echo "Cookie not found.";
       }
      ?>
         </body>
         </html>
3 Save the program in C:\Apache24\htdocs in a folder with .php extension
4 Run the Apache services from windows services
5 Open the browser and type the following address
            http://localhost/foldername/
6 Click the php file to run and verify the output
                                      localhost:8012/CSA/test1.php
                                                                X
                            ÷
                              ഹ
                                    Q
                                                localhost:8012/CSA/test1.php
                Cookie removed from script execution!
```

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TASK 4: Starting a session					
1 Open the text editor					
2 Write the following codes					
<html></html>					
<body></body>					
php</td					
// Start the session					
session_start();					
echo"Session started with this id: ". session_id();					
// Now you can set session variables					
<pre>\$_SESSION['username'] = 'example_user';</pre>					
<pre>\$_SESSION['is_logged_in'] = true;</pre>					
?>					
3 Save the program in C:\Apache24\htdocs in a folder with .php extension 4 Run the Apache services from windows services 5 Open the browser and type the following address					
4 Run the Apache services from windows services					
5 Open the browser and type the following address					
http://localhost/foldername/					
6 Click the php file to run and verify the output					
2 @ □ Ocalhost:8012/CSA/mysession.p × +					
← C ⋒ Q ① localhost:8012/CSA/mysession.php					
Session started with this id : d3a8976d415c895475816dbd09259b93					
TASK 5: Working with session variables					
1 Open the text editor					

2 Write the following codes

<html>

<body>

<?php

// Start the session

session_start();

// Set session variables

\$_SESSION['username'] = 'john_doe';

\$_SESSION['user_email'] = 'john@example.com';

// Access session variables



\$username = \$_SESSION['username'];

\$user_email = \$_SESSION['user_email'];

// Display session variables

echo "Username: \$username <br>";

echo "Email: \$user email <br>";

// Modify session variable

\$_SESSION['user_email'] = 'john.doe@example.com';

// Display modified session variable

echo "Modified Email: " . \$_SESSION['user_email'] . "<br>";

?>

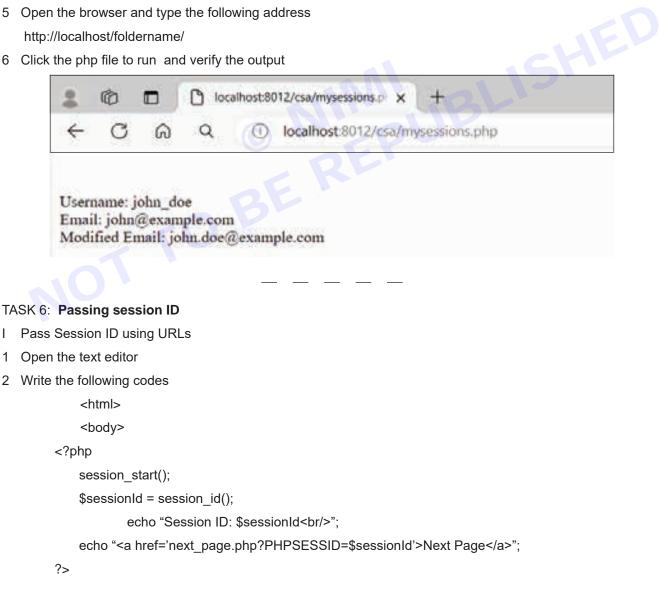
</body>

</html>

- 3 Save the program in C:\Apache24\htdocs in a folder with .php extension
- 4 Run the Apache services from windows services
- 5 Open the browser and type the following address

http://localhost/foldername/

6 Click the php file to run and verify the output



</body>

</html>

- 3 Save the program in C:\Apache24\htdocs in a folder with .php extension
- 4 Run the Apache services from windows services
- 5 Open the browser and type the following address http://localhost/foldername/
- 6 Click the php file to run the program
- 7 Click the "Next Page" link to pass 'Session ID' in the next page.



- II Pass Session ID in Forms
- 1 Open the text editor
- 2 Write the following codes

<html>

<body>

```
<?php
```

session_start();

\$sessionId = session_id();

```
echo "<form action='process_form.php' method='post'>";
```

```
echo "<input type='hidden' name='PHPSESSID' value='$sessionId'>";
```

echo "<input type='text' name='username' placeholder='Enter your username'>";

echo "<input type='submit' value='Submit'>";

echo "</form>";

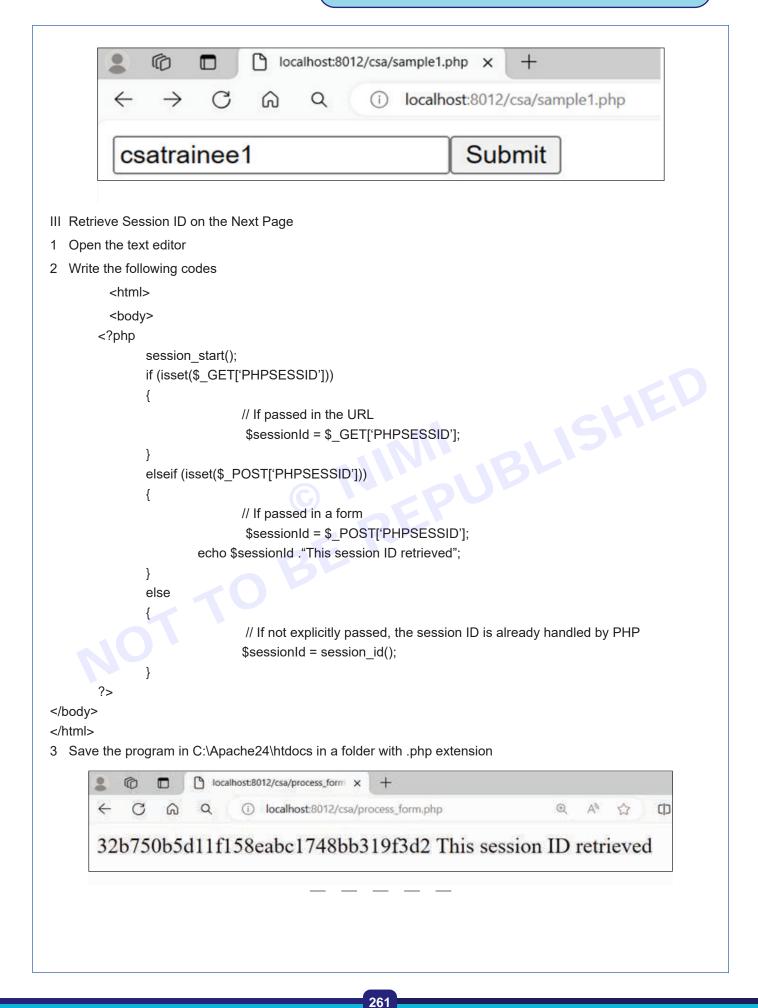
```
?>
```

</body>

</html>

- 3 Save the program in C:\Apache24\htdocs in a folder with .php extension
- 4 Run the Apache services from windows services
- 5 Open the browser and type the following address http://localhost/foldername/
- 6 Click the php file to run the program
- 7 Click the "Submit" button to pass 'Session ID' in the next page.







#### TASK 7: Setting a cookie

- I Creating a session cookie
- 1 Open the text editor
- 2 Write the following codes

<html>

<body>

<?php

session_start();

// Set the session variable

\$sessionId = session_id();

echo "session started with id :".\$sessionId

\$_SESSION['username'] = 'JohnDoe';

// Set a cookie with the session ID

setcookie(session_name(), session_id(), time() + 60 * 60); // Expires in 1 hour

echo "Cookie set successfully!";

?>

</body>

.

4

</html>

6

- 3 Save the program in C:\Apache24\htdocs in a folder with .php extension
- 4 Run the Apache services from windows services
- 5 Open the browser and type the following address

http://localhost/foldername/

6 Click the php file to run and verify the output

C Q () localhost:8012/csa/sessioncookies.php

localhost:8012/csa/sessioncooki ×

Q AN 13

## session started with id :fba32b58224e00d80b5823f8f2e8d9af Cookies set successfully!

+

II Access session data on other pages

- 1 Open the text editor
- 2 Write the following codes

```
<html>
```

```
<body>
```

```
<?php
```

```
session_start();
```

```
if (isset($_SESSION['username']))
```

```
{
```



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```
$username = $_SESSION['username'];
           echo "Welcome back, $username!";
     }
     else
     {
           echo "Session not found!";
     }
  ?>
       </body>
           </html>
3 Save the program in C:\Apache24\htdocs in a folder with .php extension
4 Run the Apache services from windows services
                                 © REPUBLISHED
BE
5 Open the browser and type the following address
            http://localhost/foldername/
6 Click the php file to run and verify the output
TASK 8: Encoding and decoding session variables
I Encoding session variables
  1 Open the text editor
  2 Write the following codes
           <html>
           <body>
          <?php
  // Start the session
         session_start();
     $username = 'JohnDoe';
         //encode using base64 encode()
     $encodedUsername = base64 encode($username);
     $ SESSION['encoded_username'] = $encodedUsername;?>
       </body>
           </html>
  3. Save the program in C:\Apache24\htdocs in a folder with .php extension
  4. Run the Apache services from windows services
  5. Open the browser and type the following address
         http://localhost/foldername/
  6. Click the php file to run and verify the output
                          localhost:8012/csa/econcodeed ×
                                                          +
              0
                   4
                     6
                                      localhost:8012/csa/econcodeedcodesession.php
                                                                                         0
               C
                           Q
         Set encoded session variables successfully
```

```
II Decoding session variables
  1 Open the text editor
  2 Write the following codes
              <html>
              <body>
             <?php
     // Start the session
             session_start();
        if (isset($ SESSION['encoded username']))
        {
             $encodedUsername = $_SESSION['encoded_username'];
                 //decode using base64_decode()
             $decodedUsername = base64_decode($encodedUsername);
                      echo "Decoded Username: $decodedUsername";
                 }
                 else
                 {
                      echo "Session variable 'encoded_username' not set.";
                 }?>
          </body>
              </html>
  3. Save the program in C:\Apache24\htdocs in a folder with .php extension
  4. Run the Apache services from windows services
  5. Open the browser and type the following address
               http://localhost/foldername/
  6 Click the php file to run and verify the output
                                localhost:8012/csa/decodedsess ×
           6
                                                                       +
                                            localhost:8012/csa/decodedsession.php
     4
                     ഹ
     Decoded Username: JohnDoe
TASK 9: Destroying a session
  1 Open the text editor
  2 Write the following codes
```

**CITS : IT & ITES - Computer Software Application - Exercise 54** 

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		<html></html>						
		<body></body>						
		php</th						
		// Start the session						
		session_start();						
		// Unset a session variable						
		unset(\$_SESSION['username']);						
		unset(\$_SESSION['user_email']);						
		// Destroy all session data						
		session_destroy();						
		echo "All session data successfully removed";						
		?>						
	3	Save the program in C:\Apache24\htdocs in a folder with .php extension						
	4	Run the Apache services from windows services						
	5	Open the browser and type the following address						
		http://localhost/foldername/						
	6	Click the php file to run and verify the output						
		localhost:8012/csa/mysession.ph × +						
		← C G Q () localhost:8012/csa/mysession.php						
		BL						
		All session data successfully removed						
ΤA	SK	10: Working with the query string						
I	Cr	eating a query string						
	1	Open the text editor						
	2	Write the following codes						
		<html></html>						
		<body></body>						
		php</th						
		\$data = array(						
		'name' => 'John Doe',						
		'age' => 30						
		);						
		<pre>\$query_string = http_build_query(\$data);</pre>						

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```
$url = "http://localhost:8012/csa/querystring2.php?".$query string;
                                                                              header("Location: $url");//
         Redirect with query string
                   exit(); // Stop further script execution
      ?>
           </body>
                </html>
   3 Save the program in C:\Apache24\htdocs in a folder as querystring1.php extension
   4 Run the Apache services from windows services
   5 Open the browser and type the following address
                 http://localhost/foldername/
   6 Click the php file to run and verify the output
II Processing query string
      1 Open the text editor
      2 Write the following codes
                <html>
                <body>
               <?php
                 echo "Processing query string ... < br/>>
      // Check if guery string parameters exist
      if(isset($ GET['name']) && isset($ GET['age']))
      {
                // Retrieve and sanitize the parameters
                $name = htmlspecialchars($_GET['name']);
                $age = intval($_GET['age']); // Convert age to integer
                // Process the parameters
                if($age >= 18)
                                echo "$name is an adult.";
                }
      else
      {
                                echo "$name is a minor.";
                }
      }
      else
      {
                // If parameters are not provided, display an error message
                echo "Please provide name and age parameters.";
      }
```

```
?>
          </body>
               </html>
   3 Save the program in C:\Apache24\htdocs in a folder as querystring2.php extension
   4 Run the Apache services from windows services
   5 Open the browser and type the following address
                http://localhost/foldername/
   6 Click the php file to run and verify the output
          6
                localhost:8012/csa/querystring2 ×
                                                            +
     \leftarrow
           C
                                     localhost:8012/csa/guerystring2.php?name=John+Doe&....
                  6
                         Q
                                                                                              Ð
    Processing query string...
    John Doe is an adult.
TASK 11: Sending E-mail using PHP
1 Open the text editor
2 Write the following codes
   Note: This code needs a functioning mail server configured in the PHP environment to send emails.
            <html>
            <body>
           <?php
       $to = "recipient@example.com";//provide the actual email address
           $subject = "My Email Subject";
           $message = "This is the email body.";
           // Optional headers
           $headers = "From: sender@example.com" . "\r\n" .
                          "Reply-To: reply@example.com";
           // Send the email
           if (mail($to, $subject, $message, $headers))
           {
               echo "Email sent successfully!";
           }
           else
           {
                echo "Error sending email.";
           }
```

?>

</body>

</html>

- 3 Save the program in C:\Apache24\htdocs in a folder with .php extension
- 4 Run the Apache services from windows services
- 5 Open the browser and type the following address

http://localhost/foldername/

- 6 Click the php file to run and verify the output
  - 1 Provide a code example demonstrating how to set a cookie with the value that expires in 24 hours.
  - 2 Provide a code example demonstrating how to retrieve the value of a cookie named "username" set in a previous request.
  - 3 Provide a code example demonstrating how to delete a cookie named "username" that was previously set.
  - 4 Provide a code example demonstrating how to start a session and set a session variable named "myname" with the value "CSATRAINEE".
  - 5 Provide a code example demonstrating how to modify the value of the session variable "username" set in a previous request.
  - 6 Provide a code example demonstrating how to unset the session variable "username".
  - 7 Write a PHP code snippet generating a unique session ID, associating it with a session, and storing it in a cookie
  - 8 Provide examples of how to add query string parameters programmatically, either within the same page or when redirecting to another page.

EXERCISE 55 : Demonstrateon Creating and deleting a file, Reading and writing text files, working with directories in PHP, checking for existence of file, determining file size, opening a file for writing, reading, or appending, Writing Data to the file Reading characters

PHP

Text editor

Web browser

# **Objectives**

```
At the end of this exercise you shall be able to
```

- · create and delete files/folders in server using PHP
- read and write text files using PHP
- · determine file size and checking for existence of file using PHP.

## Requirements

Tools/Materials

- Computer/Laptop with latest configuration
- Operating system: windows 10 or 11
- Apache web server

## **Procedure**

```
TASK 1: Working with directories
```

- I Creating a Directory
  - 1 Open the text editor
  - 2 Write the following codes
    - <html>
    - <body>

<?php

\$directory_path = 'example_directory';

// Check if the directory doesn't exist before attempting to create

```
if (!is_dir($directory_path))
```

// Create the directory with mkdir()

mkdir(\$directory_path);

echo "Directory created successfully: \$directory_path";

```
}
```

{

```
else
```

{

```
echo "Directory already exists: $directory_path";
```

```
}
```

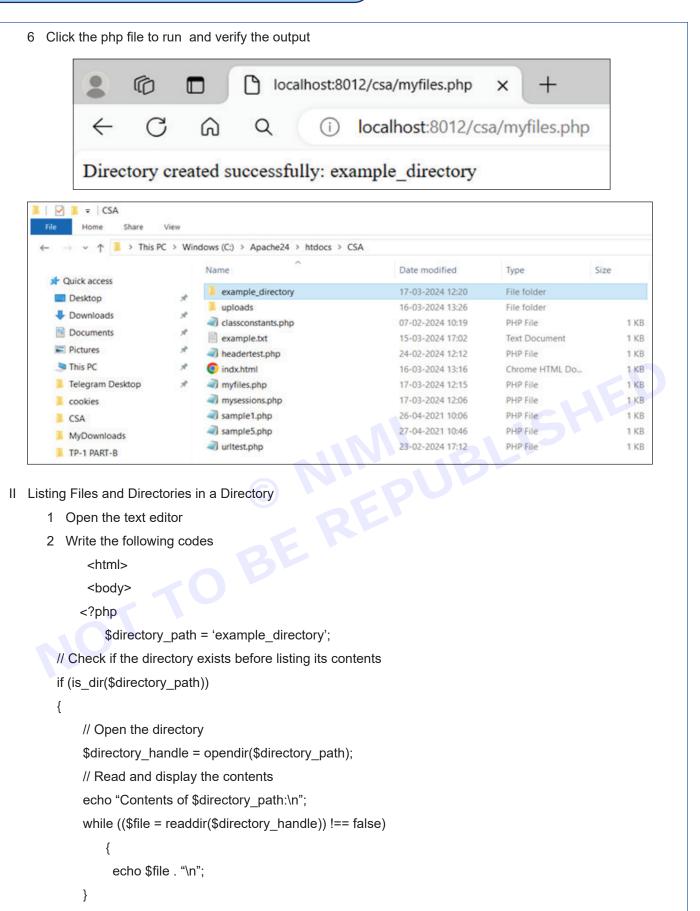
```
?>
```

</body> </html>

- 3 Save the program in C:\Apache24\htdocs in a folder with .php extension
- 4 Run the Apache services from windows services

```
5 Open the browser and type the following address
```





// Close the directory handle



```
closedir($directory_handle);
    }
    else
    {
         echo "Directory not found: $directory_path";
    }
?>
      </body>
         </html>
3 Save the program in C:\Apache24\htdocs in a folder with .php extension
4 Run the Apache services from windows services
5 Open the browser and type the following address
              http://localhost/foldername/
6 Click the php file to run and verify the output
                    6
                                      19
                                          localhost:8012/csa/myfiles.php
                            ×
              \leftarrow
                      C
                               6
                                       Q
                                                       localhost:8012/csa/myfiles.php
                                                 (i)
            Contents of example directory:
            classconstants.php
            example.txt
            headertest.php
            indx.html
            myfiles.php
             uploads
        = | example_directory
               Share
                     View
               > This PC > Windows (C:) > Apache24 > htdocs > CSA > example_directory
                            Name
                                                            Date modified
                                                                              Type
                                                                                             Size
  Quick access
```

| Desktop         | * | uploads            | 17-03-2024 12:28 | File folder    |      |
|-----------------|---|--------------------|------------------|----------------|------|
|                 |   | classconstants.php | 07-02-2024 10:19 | PHP File       | 1 KB |
| Downloads       | A | example.txt        | 15-03-2024 17:02 | Text Document  | 1 KB |
| Documents       | * | headertest.php     | 24-02-2024 12:12 | PHP File       | 1 KB |
| Pictures        | A | indx.html          | 16-03-2024 13:16 | Chrome HTML Do | 1 KB |
| This PC         | * | myfiles.php        | 17-03-2024 12:27 | PHP File       | 1 KB |
| Elegram Desktop | * |                    |                  |                |      |
| Cookies         |   |                    |                  |                |      |
| CSA             |   |                    |                  |                |      |

III Deleting a Directory and Its Contents

1 Open the text editor

```
2 Write the following codes
          <html>
          <body>
        <?php
$directory_path = 'example_directory';
    // Check if the directory exists before attempting to delete
    if (is dir($directory path))
    {
         // Open the directory
         $directory_handle = opendir($directory_path);
         // Iterate over the contents and delete files and subdirectories
         while (($file = readdir($directory_handle)) !== false)
             {
                          if ($file != "." && $file != "..")
                 {
                           // Delete files and subdirectories
                           unlink($directory_path . '/' . $file);
                         }
         }
         // Close the directory handle
         closedir($directory handle);
         // Delete the directory itself
         rmdir($directory_path);
         echo "Directory and its contents deleted successfully: $directory path";
    }
    else
    {
         echo "Directory not found: $directory_path";
        }
?>
       </body>
         </html>
3 Save the program in C:\Apache24\htdocs in a folder with .php extension
4 Run the Apache services from windows services
5 Open the browser and type the following address
              http://localhost/foldername/
6 Click the php file to run and verify the output
                                       localhost:8012/csa/myfiles.php
                   6
                                                                         ×
             4
                     C
                             ົ
                                     Q
                                               (i)
                                                    localhost:8012/csa/myfiles.php
            Directory and its contents deleted successfully: example directory
```

272

| TASK 2: Creating a file                                                    |                                                                          |                                                           |                                             |                      |  |  |
|----------------------------------------------------------------------------|--------------------------------------------------------------------------|-----------------------------------------------------------|---------------------------------------------|----------------------|--|--|
| 1 Open the text editor                                                     |                                                                          |                                                           |                                             |                      |  |  |
| 2 Write the following codes                                                | Write the following codes                                                |                                                           |                                             |                      |  |  |
| <html></html>                                                              | -                                                                        |                                                           |                                             |                      |  |  |
|                                                                            |                                                                          |                                                           |                                             |                      |  |  |
| <body></body>                                                              |                                                                          |                                                           |                                             |                      |  |  |
| php</td <td></td> <td></td> <td></td> <td></td>                            |                                                                          |                                                           |                                             |                      |  |  |
| // Specify the fi                                                          | // Specify the file name and path:                                       |                                                           |                                             |                      |  |  |
| \$filename = "my_new_t                                                     | \$filename = "my_new_file.txt"; // Modify with desired name and location |                                                           |                                             |                      |  |  |
| // Open the file in write                                                  | mode (creates the fi                                                     | le if it doesn't exist):                                  |                                             |                      |  |  |
| \$handle = fopen(\$filena                                                  | ame. "w") or die("Una                                                    | able to open file!"):                                     |                                             |                      |  |  |
| // Write content to the fi                                                 | ,                                                                        |                                                           |                                             |                      |  |  |
| \$content = "This is the                                                   |                                                                          | اما"                                                      |                                             |                      |  |  |
| fwrite(\$handle, \$conter                                                  |                                                                          | ic: ,                                                     |                                             |                      |  |  |
| // Close the file:                                                         | n.),                                                                     |                                                           |                                             |                      |  |  |
| fclose(\$handle);                                                          |                                                                          |                                                           |                                             |                      |  |  |
| // Optional: Display a su                                                  | 100000 0000000                                                           |                                                           |                                             |                      |  |  |
| echo "File created succ                                                    | -                                                                        |                                                           |                                             |                      |  |  |
| ?>                                                                         | essiuny: ,                                                               |                                                           |                                             |                      |  |  |
|                                                                            |                                                                          |                                                           |                                             |                      |  |  |
|                                                                            |                                                                          |                                                           |                                             |                      |  |  |
|                                                                            | haaba21\btdaaa in (                                                      | folder with php extension                                 |                                             |                      |  |  |
|                                                                            |                                                                          | a folder with .php extension                              |                                             |                      |  |  |
| 4 Run the Apache services                                                  |                                                                          |                                                           |                                             |                      |  |  |
| 5 Open the browser and ty                                                  |                                                                          | ress                                                      |                                             |                      |  |  |
| •                                                                          | st/foldername/                                                           |                                                           |                                             |                      |  |  |
| 6 Click the php file to run and verify the output                          |                                                                          |                                                           |                                             |                      |  |  |
|                                                                            |                                                                          |                                                           |                                             |                      |  |  |
| □ □ localhost:8012/csa/myfiles.php × +                                     |                                                                          |                                                           |                                             |                      |  |  |
|                                                                            | /                                                                        |                                                           |                                             |                      |  |  |
| $\leftarrow$ C                                                             | Ω Q                                                                      | i localhost:8012/0                                        | csa/myfiles.ph                              | p                    |  |  |
|                                                                            |                                                                          |                                                           |                                             |                      |  |  |
| File created s                                                             | successfully!                                                            |                                                           |                                             |                      |  |  |
|                                                                            |                                                                          |                                                           |                                             |                      |  |  |
| 📕   🗹 📜 =   CSA                                                            |                                                                          |                                                           |                                             |                      |  |  |
| File Home Share View                                                       |                                                                          |                                                           |                                             |                      |  |  |
| $\leftarrow \rightarrow \checkmark \uparrow$ $\blacksquare$ > This PC > Wi | indows (C:) > Apache24 > htc                                             | locs > CSA                                                |                                             |                      |  |  |
| 🖈 Quick access                                                             | Name                                                                     | Date modified                                             | Туре                                        | Size                 |  |  |
| Desktop *                                                                  | uploads                                                                  | 16-03-2024 13:26                                          | File folder                                 |                      |  |  |
| Downloads *                                                                | classconstants.php                                                       | 07-02-2024 10:19                                          | PHP File                                    | 1 KB                 |  |  |
| Documents *                                                                | example.txt                                                              | 15-03-2024 17:02                                          | Text Document                               | 1 KB                 |  |  |
|                                                                            | headertest.php                                                           | 24-02-2024 12:12                                          | PHP File                                    | 1 1/12               |  |  |
| Fictures 🖈                                                                 | Indy html                                                                | 16.02.2024 12:16                                          | Chrome HTML Do                              | 1 KB                 |  |  |
| Pictures 🖈 🎐 This PC                                                       | indx.html                                                                | 16-03-2024 13:16<br>18-03-2024 15:40                      | Chrome HTML Do<br>Text Document             | 1 KB                 |  |  |
| S This PC 🖈                                                                | my_new_file.txt                                                          | 18-03-2024 15:40                                          | Chrome HTML Do<br>Text Document<br>PHP File |                      |  |  |
| S This PC 🖈                                                                |                                                                          | 18-03-2024 15:40<br>Type: Text Document<br>Size: 35 bytes | Text Document                               | 1 KB<br>1 KB         |  |  |
| <ul> <li>This PC *</li> <li>Telegram Desktop *</li> </ul>                  | my_new_file.txt                                                          | 18-03-2024 15:40<br>Type: Text Document                   | Text Document<br>PHP File                   | 1 KB<br>1 KB<br>1 KB |  |  |

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```
TASK 3: Checking for existence of file
1 Open the text editor
2 Write the following codes
                <html>
            <body>
          <?php
      // Specify the file name
     $fileName = 'my new file.txt';
     // Check if the file exists
     if (file exists($fileName))
     {
                // File exists, display a success message
                echo "File '$fileName' exists.";
     }
     else
     {

               echo "Error: File '$fileName' does not exist.";
     }
?>
        </body>
           </html>
  Save the program in C:\Apache24\htdocs in a folder with .php extension
3
   Run the Apache services from windows services
4
  Open the browser and type the following address
5
                 http://localhost/foldername/
  Click the php file to run and verify the output
6
                          Ø
                                                    localhost:8012/csa/myfiles.php
                                                                                                     +
                                    х
                                                                   localhost:8012/csa/myfiles.php
                   ←
                                      ଲ
                 File 'my_new_file.txt' exists.
TASK 4 : Determining file size
1 Open the text editor
2 Write the following codes
    <html>
    <body>
```

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```
// Specify the file name
                $fileName = 'my new file.txt';
                // Check if the file exists
                if (file exists($fileName))
                {
                        // Get the file size in bytes
                        $fileSizeBytes = filesize($fileName);
                        // Convert the file size to kilobytes or megabytes
                        $fileSizeKB = $fileSizeBytes / 1024; // Bytes to Kilobytes
                        $fileSizeMB = $fileSizeKB / 1024; // Kilobytes to Megabytes
                        // Display the file size
                        echo "File '$fileName' has a size of $fileSizeBytes bytes,
   $fileSizeKB KB, or $fileSizeMB MB.";
                }
                else
                {
                        // Display an error message if the file does not exist
                        echo "Error: File '$fileName' does not exist.";
                }
        ?>
          </body>
            </html>
  Save the program in C:\Apache24\htdocs in a folder with .php extension
3
  Run the Apache services from windows services
4
  Open the browser and type the following address
5
              http://localhost/foldername/
6 Click the php file to run and verify the output
                          localhost:8012/csa/myfiles.php
                                                                 +
           6
                  х
      4
                                    (i) localhost:8012/csa/myfiles.php
             C
                    6
                           Q
    File 'my_new_file.txt' has a size of 46 bytes, 0.044921875 KB, or 4.3869018554688E-5 MB.
TASK 5: Opening a File for reading
1 Open the text editor
2 Write the following codes
          <html>
          <body>
     <?php
```

```
// File path
   $filePath = 'my new file.txt';
   // Open the file in read mode
   $fileHandle = fopen($filePath, 'r');
  // Check if file opened successfully
   if ($fileHandle) {
                // File opened successfully, perform operations here
                       echo "File opened successfully.";
                        // Close the file handle
               fclose($fileHandle);
  } else {
               // File opening failed, handle error
               echo "Failed to open file.";
  }
   ?>
         </body>
            </html>
  Save the program in C:\Apache24\htdocs in a folder with .php extension
3
  Run the Apache services from windows services
4
  Open the browser and type the following address
5
              http://localhost/foldername/
6 Click the php file to run and verify the output
                                  localhost:8012/csa/myfiles.php
                                                                                  +
                                                                           ×
                         6
                                    Q
                                                   localhost:8012/csa/myfiles.php
                                              (i)
       File opened successfully.
```

TASK 6: Opening a File for writing text content

- 1 Open the text editor
- 2 Write the following codes

<html>

<body>

<?php



```
// Specify the file name
               $fileName = 'example.txt';
               // Open the file in write mode ('w')
               $fileHandle = fopen($fileName, 'w');
               // Check if the file is opened successfully
               if ($fileHandle)
               {
                        // Write content to the file
                        fwrite($fileHandle, 'This is a line of text.');
                        // Close the file handle
                        fclose($fileHandle);
                        echo "File '$fileName' has been written successfully.";
               }
                else
               {
                        // Display an error message if the file cannot be opened
                        echo "Error: Unable to open the file for writing.";
               }
   ?>
          </body>
            </html>
3 Save the program in C:\Apache24\htdocs in a folder with .php extension
   Run the Apache services from windows services
4
5 Open the browser and type the following address
              http://localhost/foldername/
  Click the php file to run and verify the output
6
                   O
                                        localhost:8012/csa/myfiles.php
                                                                                +
                           ×
             -
                     C
                             6
                                     Q
                                                     localhost:8012/csa/myfiles.php
                                               (i)
            File 'example.txt' has been written successfully.
TASK 7: Opening a File for appending content
1 Open the text editor
```

```
2 Write the following codes
             <html>
             <body>
            <?php
                                // Specify the file name
                $fileName = 'example.txt';
                // Open the file in append mode ('a'), create the file if it doesn't exist
                $fileHandle = fopen($fileName, 'a');
                // Check if the file is opened successfully
                if ($fileHandle)
                {
                        // Append content to the file
                        fwrite($fileHandle, 'This is a line of text appended to the file.');
                        // Close the file handle
                        fclose($fileHandle);
                        echo "File '$fileName' has been appended successfully.";
                }
                else
                {
                        echo "Error: Unable to open or create the file for appending.";
                }
   ?>
          </body>
            </html>
  Save the program in C:\Apache24\htdocs in a folder with .php extension
3
   Run the Apache services from windows services
4
  Open the browser and type the following address
5
              http://localhost/foldername/
6 Click the php file to run and verify the output
                                        localhost:8012/csa/myfiles.php
                  4
                                  6
                                          0
                                                        localhost:8012/csa/myfiles.php
                                                   (\mathbf{i})
                 File 'example.txt' has been appended successfully.
TASK 8: Writing Data to the file
1 Open the text editor
2 Write the following codes
          <html>
```

```
<?php
           $file="info.txt";
               $content="hai you are welcome";
           file_put_contents($file,$content) or die("Error not opening");
              echo "Content written in the file";
   ?>
          </body>
            </html>
  Save the program in C:\Apache24\htdocs in a folder with .php extension
3
   Run the Apache services from windows services
4
5 Open the browser and type the following address
              http://localhost/foldername/
6 Click the php file to run and verify the output
                                      localhost:8012/csa/myfiles.php
                                                                               +
                 B
                         ×
                                   Q
           ←
                           6
                                                   localhost:8012/csa/myfiles.php
          Content written in the file
TASK 9: Reading characters
     Reading characters using file_get_contents function
I
   1 Open the text editor
   2 Write the following codes
          <html>
          <body>
         <?php
                     $file='my_new_file.txt';
            if(file_exists($file))
            {
                     $content=file_get_contents($file) or die("Error file opening not possible ");
                     echo $content;
            }
            else
            {
                     echo "ERROR: File does not exist.";
            }
     ?>
       </body>
         </html>
```

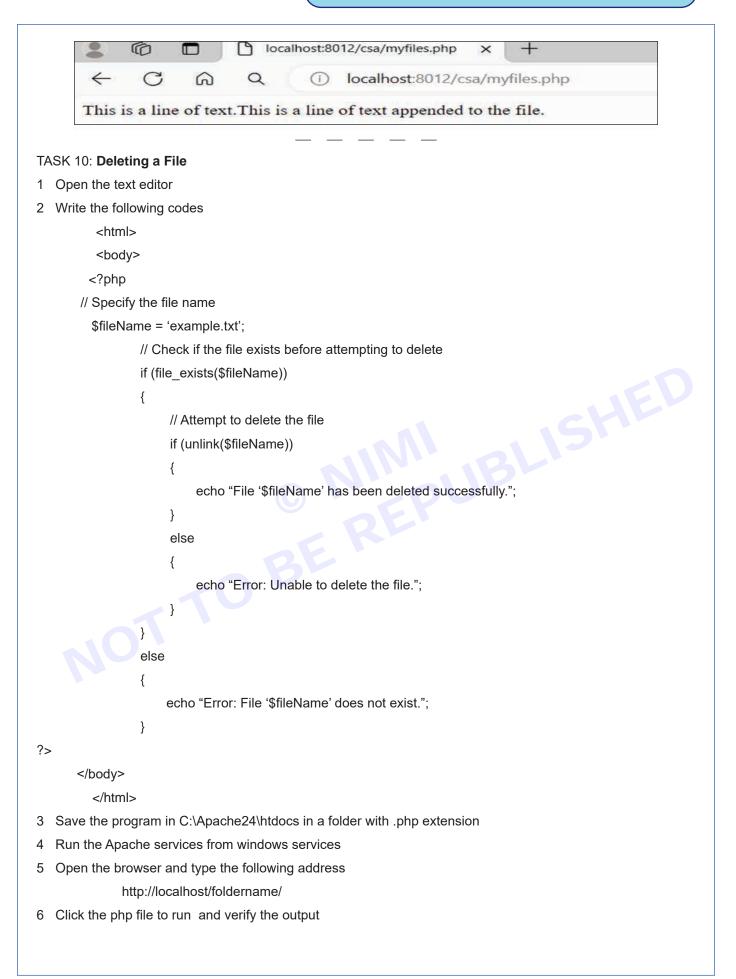
- 3 Save the program in C:\Apache24\htdocs in a folder with .php extension
- 4 Run the Apache services from windows services
- Open the browser and type the following address 5 http://localhost/foldername/
- 6 Click the php file to run and verify the output

```
localhost:8012/csa/myfiles.php
                 0
                         ۱٩.
                                                                           ×
                           6

    localhost:8012/csa/myfiles.php

          6
                   C
                                    Q
         This is the content of my new file! thank you
II Reading characters using file function
   1 Open the text editor
   2. Write the following codes
         <html>
         <body>
        <?php
                    $file="example.txt";
            if(file_exists($file))
            {
                    $content=file($file) or die("Error file opening not possible ");
                    foreach( $content as $line)
                    {
                            echo $line;
                    }
            }
            else
                    echo "ERROR: File does not exist.";
            }
?>
      </body>
         </html>
   Save the program in C:\Apache24\htdocs in a folder with .php extension
3
   Run the Apache services from windows services
4
   Open the browser and type the following address
5
             http://localhost/foldername/
  Click the php file to run and verify the output
6
```

(imi)



| -            | B     |           | loca    | alhost:80 | 12/csa/myfiles.php | ×     | +         |
|--------------|-------|-----------|---------|-----------|--------------------|-------|-----------|
| $\leftarrow$ | C     | ഹ         | Q       | (j)       | localhost:8012/c   | sa/my | files.php |
| File '       | examp | le txt' h | as been | deleted   | successfully.      |       |           |

- 1 Provide a code example demonstrating how to create a directory named "uploads" within the current working directory.
- Provide a code example demonstrating how to list the contents of a directory named "images". 2
- Provide a code example demonstrating how to delete a directory named "temp" and its contents. 3
- Provide a code example demonstrating how to open a file named "example.txt" in read mode. 4
- Provide a code example demonstrating how to read each line from a file handle using the fgets() function. 5
- Provide a code example demonstrating how to use the file_get_contents() 6
- 7
- a file handi. ...d write text content. ...وبالدين والمالية المالية الم مالية المالية المالي Provide a code example demonstrating how to open a file in append mode ("a") and write text content to it. 8
- 9. Provide a code example demonstrating how to delete a file named "example.txt" from the filesystem.

### EXERCISE 56 : Work With Forms - Super global variables the server array A script to acquire user input, importing user input Accessing user input, Combine HTML and PHP code., using hidden fields

# **Objectives**

#### At the end of this exercise you shall be able to:

- acquire user input from a HTML form using PHP
- combine HTML and PHP code in single file
- create hidden feilds and access it using PHP.

### Requirements

#### **Tools/Materials**

- computer/Laptop with latest configuration
- operating system: windows 10 or 11
- apache web server

### Procedure

#### TASK 1: Super global variables the server array

- 1 Open the text editor
- 2 Write the following codes

```
<html >
```

<head>

<title>\$_SERVER Super Global</title>

</head>

<body>

<h2>Server Information</h2>

Server Name: <?php echo \$_SERVER['SERVER_NAME']; ?>Server Software: <?php echo \$_SERVER['SERVER_SOFTWARE']; ?>Server Protocol: <?php echo \$_SERVER['SERVER_PROTOCOL']; ?>Request Method: <?php echo \$_SERVER['REQUEST_METHOD']; ?>Request Time: <?php echo \$_SERVER['REQUEST_TIME']; ?>Request URI: <?php echo \$_SERVER['REQUEST_URI']; ?>Query String: <?php echo \$_SERVER['QUERY_STRING']; ?>User Agent: <?php echo \$_SERVER['HTTP_USER_AGENT']; ?>Remote Address: <?php echo \$_SERVER['REMOTE_ADDR']; ?>



PHP

Text editor

web browser



#### </body> </html> 3 Save the program in C:\Apache24\htdocs in a folder with .php extension 4 Run the Apache services from windows services 5 Open the browser and type the following address http://localhost/foldername/ 6 Click the php file to run and verify the output C S SERVER Super Global × + 8 4 G Q () localhost:8012/csa/superglobal.php 44 C 57 CD **S** G Server Information · Server Name: localhost Server Software: Apache/2.4.58 (Win64) PHP/8.3.2 Server Protocol: HTTP/1.1 · Request Method: GET • Request Time: 1710841808 Request URI: /csa/superglobal.php Query String: User Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/122.0.0.0 Safari/537.36 Edg/122.0.0.0 Remote Address: ::1 EPUBLI TASK 2: Acquiring user input using an HTML form I Create an HTML Form 1 Open the text editor 2 Write the following codes <html> <body> <form action="process_form.php" method="POST"> Name: <input type="text" name="name"><br> Email: <input type="email" name="email"><br> <input type="submit" value="Submit"> </form> </body> </html> 3 Save the program in C:\Apache24\htdocs in a folder with .html extension II Create a PHP script that acquires user input 1 Open the text editor 2 Write the following codes <html> <body> <?php

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```
if ($_SERVER['REQUEST_METHOD'] == 'POST')
{
// Access form data using $_POST array
$name = $_POST['name'];
$email = $_POST['email'];
// Display a confirmation message
echo "Thank you, ". $name. " for your submission!";
  }
?>
```

</body>

</html>

- 3 Save the program in C:\Apache24\htdocs in a folder with .php extension
- Run the Apache services from windows services 4
- Open the browser and type the following address 5 http://localhost/foldername/
- Click the .html file to run and verify the output 6

Run the Apache services from windows services Open the browser and type the following address http://localhost/foldername/ Click the .html file to run and verify the output
Icocalhost:8012/csa/form.html x +
← C ⋒ Q i localhost:8012/csa/form.html
Name: Trainee1
Email: sample@csa.in
Submit
Iocalhost:8012/csa/process_form x +
← C A Q () localhost:8012/csa/process_form.php @
Thank you, Trainee1 for your submission! Your email id is : sample@csa.in

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```
TASK 3: Importing user input and accessing user input
I Create an HTML Form
   1 Open the text editor
   2 Write the following codes
   <html
   <head>
       <title>PHP User Input</title>
   </head>
   <body>
   <h2>Enter your name:</h2>
   <form action="process.php" method="get">
               <input type="text" name="name" placeholder="Enter your
                                                                             name">
               <button type="submit">Submit</button>
   </form>
   </body>
   </html>
   3 Save the program in C:\Apache24\htdocs in a folder as index.html
II Create a PHP script that acquires user input
   1 Open the text editor
   2 Write the following codes
         <html>
         <body>
       <?php
       if ($_SERVER["REQUEST_METHOD"] == "GET")
       {
       // Check if the name field is set and not empty
       if (isset($_GET["name"]) && !empty($_GET["name"]))
                          {
                       $name = $_GET["name"];
                       // Display a greeting message
                       echo "Hello, $name! Welcome!";
       }
       else
       {
                       // If name field is empty, display an error message
                       echo "Please enter your name!";
       }
```



}	
else	
{	
// If the request method is not POST, redirect back to the form	
header("Location: index.html");	
exit();	
}	
?>	
3 Save the program in C:\Apache24\htdocs in a folder with .php extension	
4 Run the Apache services from windows services	
5 Open the browser and type the following address	
http://localhost/foldername/	
6 Click the index.html file to run and verify the output	
Enter your name: Trainee1 Submit	
2 10 D localhost:8012/csa/process.php? × +	
← C A Q ① localhost:8012/csa/process.php?name=Trainee1	
Hello, Trainee1! Welcome!	

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```
TASK 4: Combine HTML and PHP code
1 Open the text editor
2 Write the following codes
       <html >
   <head>
       <title Combine HTML and PHP code </title>
   </head>
   <body>
     <?php
        // Check if the form is submitted
        if ($_SERVER["REQUEST_METHOD"] == "POST")
       {
               // Check if the name field is set and not empty
               if (isset($_POST["name"]) && !empty($_POST["name"]))
       {
                      $name = $_POST["name"];
                     // Display a greeting message
                     echo "<h2>Hello, $name! Welcome!</h2>";
               }
       else
       {
                    // If name field is empty, display an error message
                    echo "<h2>Please enter your name!</h2>";
               }
        }
        ?>
        <form action="<?php echo htmlspecialchars($_SERVER["PHP_SELF"]); ?>"
               method="post">
          <input type="text" name="name" placeholder="Enter your name">
          <button type="submit">Submit</button>
       </form>
   </body>
   </html>
3 Save the program in C:\Apache24\htdocs in a folder with .php extension
4 Run the Apache services from windows services
5 Open the browser and type the following address
   http://localhost/foldername/
6 Click the php file to run and verify the output
```







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	<body></body>
	php</th
	if (\$_SERVER['REQUEST_METHOD'] == 'POST')
	{
	\$userId = \$_POST['user_id'];
	\$username = \$_POST['username'];
	// Process the values
	echo "User ID: \$userId, Username: \$username";
	}
	?>
3	Save the program in C:\Apache24\htdocs in a folder with .php extension
4	Run the Apache services from windows services
5	Open the browser and type the following address
	http://localhost/foldername/
6	Click the .html file to run and verify the output
	2 O localhost:8012/csa/form.html × +
	← C Q Q O localhost.8012/csa/form.html
	csatrainee1 Submit
	Gabrine
	2 1 Iocalhost8012/csa/process.php x +
	← C G Q ① localhost:8012/csa/process.php
	C G G Co locarioscoorz/csa/process.prip
	User ID: 123, Username: csatrainee1
	User ID. 125, Osername. Csattameet

- 1 Provide a code example to determine the request method (GET, POST, etc.) used by a client in PHP.
- 2 Provide examples of accessing common request headers in PHP such as \$_SERVER['HTTP_USER_AGENT'] and \$_SERVER['HTTP_REFERER'].
- 3 Provide a code example demonstrating how to create a simple HTML form with a text input field and retrieve the user's input using the \$_GET superglobal.
- 4 Provide a code example of a PHP file that contains an HTML form for acquiring user input.
- 5 Provide a code example of setting hidden field values in one page and retrieving them in another page using the \$_POST or \$_GET superglobals.



# EXERCISE 57 : Demonstrate redirecting the user, File upload and scripts

PHP

Text editor

Web browser

### **Objectives**

At the end of this exercise you shall be able to

• redireet user to one page to other using PHP.

# Requirements

#### **Tools/Materials**

- Computer/Laptop with latest configuration
- Operating system: windows 10 or 11
- Apache web server

### **Procedure**

#### TASK 1: Redirecting a user

#### I Using header() function

- 1 Open the text editor
- 2 Write the following codes
  - <html >
  - <head>

<title >Using header() function </title>

</head>

<body>

<?php

// Redirect to another page after 5 seconds

header("Location:destination-page.php");

exit; // Make sure to exit after sending the header

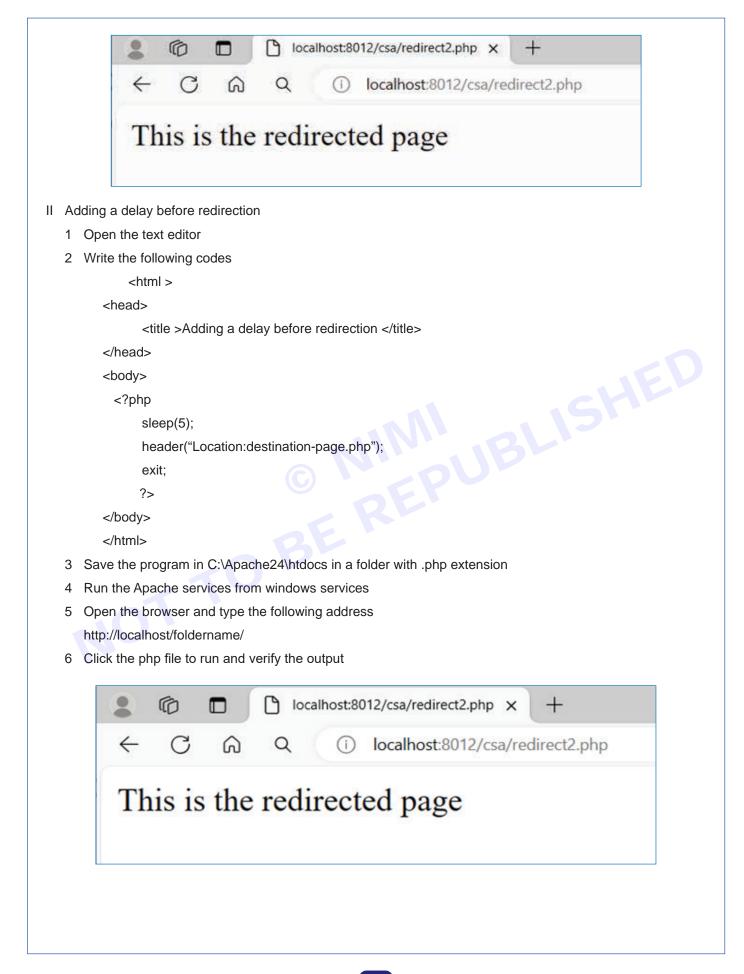
```
?>
```

</body>

</html>

- 3 Save the program in C:\Apache24\htdocs in a folder with .php extension
- 4 Run the Apache services from windows services
- 5 Open the browser and type the following address http://localhost/foldername/
- 6 Click the php file to run and verify the output
- 291





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```



1 Provide a code example of how to redirect a user to another URL with a delay of 5 seconds



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# EXERCISE 58 : Demonstrate Regular Expressions - The basic regular expressions, PCRE, Matching patterns, Finding matches, Replace patterns, Modifiers, Breakup Strings

### **Objectives**

At the end of this exercise you shall be able to:

- use the basic regular expressions in PHP
- use PCRE function in PHP.

# Requirements

#### **Tools/Materials**

- Computer/Laptop with latest configuration
- Operating system: windows 10 or 11
- Apache web server

# Procedure

```
    PHP
```

- Text editor
- Web browser

BLIS

TASK 1: Working with basic regular expressions

#### I Matching a single character

- 1 Open the text editor
- 2 Write the following codes

```
<html >
```

```
<head>
```

<title > Matching a single character </title>

</head>

```
<body>
```

<?php

```
$string = "Hello, world!";
```

```
$pattern = "/w/"; // Matches any word character (alphanumeric or underscore)
```

```
if (preg_match($pattern, $string))
```

```
{
```

echo "Match found!"; // Output: Match found!

```
}
```

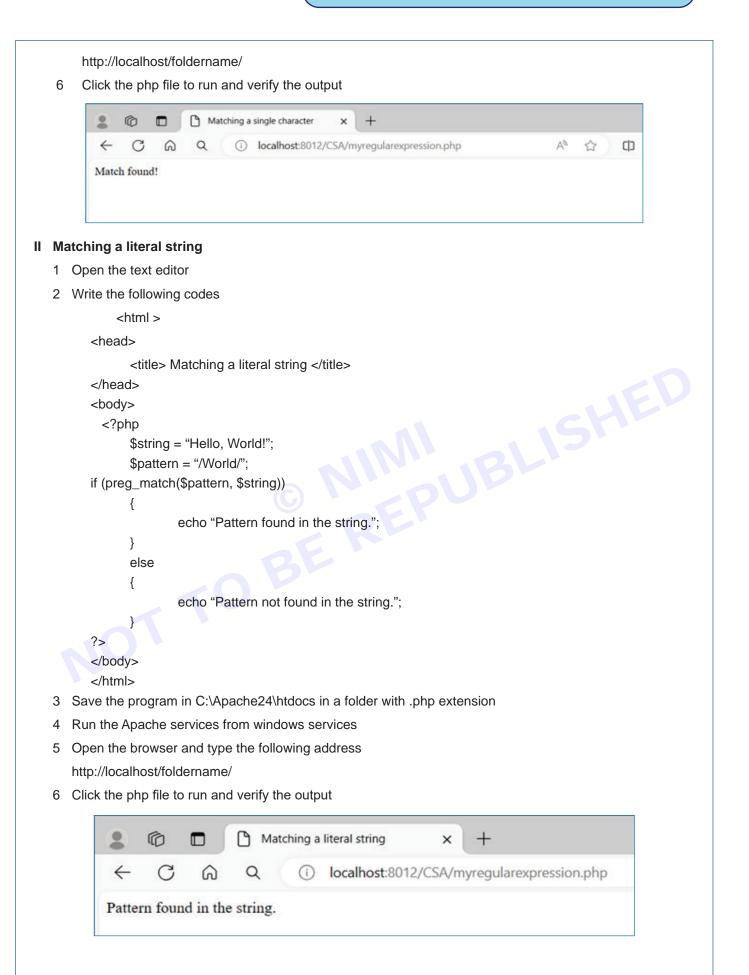
```
?>
```

</body>

</html>

- 3 Save the program in C:\Apache24\htdocs in a folder with .php extension
- 4 Run the Apache services from windows services
- 5 Open the browser and type the following address





```
III Matching any character from a set
   1 Open the text editor
   2 Write the following codes
             <html >
         <head>
                <title> Matching any character from a set </title>
         </head>
         <body>
         <?php
                $string = "The color is blue.";
                $pattern = "/[aeiou]/"; // Matches any vowel
               if (preg_match($pattern, $string))
                {
                        echo "The string contains a vowel.";
               }
         ?>
      </body>
         </html>
   3 Save the program in C:\Apache24\htdocs in a folder with .php extension
   4 Run the Apache services from windows services
   5 Open the browser and type the following address
      http://localhost/foldername/
   6 Click the php file to run and verify the output
                     O
                           Matching any character from a se 🗙
                                                                  +
                      C
                            6
                                  Q
                                          (i) localhost:8012/CSA/myregularexpression.php
               The string contains a vowel.
IV Matching any single character using the dot wildcard
   1 Open the text editor
   2 Write the following codes
          <html >
      <head>
        <title> Matching any single character using the dot wildcard </title>
      </head>
      <body>
         <?php
        $string = "cat";
```



```
$pattern = "/c.t/";
        if (preg_match($pattern, $string))
                echo "Pattern found in the string.";
        }
        else
        {
                echo "Pattern not found in the string.";
       }
      ?>
   </body>
      </html>
   3 Save the program in C:\Apache24\htdocs in a folder with .php extension
   4 Run the Apache services from windows services
   5 Open the browser and type the following address
      http://localhost/foldername/
   6 Click the php file to run and verify the output
                                  Matching any single character us X
                                                                        +
                    O
                           C
                             6
                                    Q
                                          1 localhost:8012/CSA/myregularexpression.php
               \leftarrow
              Pattern found in the string.
V Matching any digit using '\d'
   1 Open the text editor
   2 Write the following codes
          <html >
      <head>
        <title> Matching any digit using '\d' </title>
      </head>
      <body>
         <?php
        $string = "abc123xyz";
        pattern = "/d/";
        if (preg_match($pattern, $string))
        {
```

```
echo "Pattern found in the string.";
        }
        else
        {
                echo "Pattern not found in the string.";
        }
      ?>
   </body>
      </html>
   3 Save the program in C:\Apache24\htdocs in a folder with .php extension
   4 Run the Apache services from windows services
   5 Open the browser and type the following address
      http://localhost/foldername/
   6 Click the php file to run and verify the output
                                   Matching any digit using '\d'
                                                                            +
                    6
                           ×
                      C
                                                  localhost:8012/CSA/myregularexpression.php
              \leftarrow
                             6
                                    Q
                                             \widehat{\mathbf{n}}
             Pattern found in the string.
VI Matching repeating characters using {}
   1 Open the text editor
   2 Write the following codes
           <html >
      <head>
        <title> Matching repeating characters using {} </title>
      </head>
      <body>
         <?php
        $string = "12345";
        pattern = (A_{3,5}), H atches 3 to 5 digits
        if (preg_match($pattern, $string))
        {
                echo "The string contains 3 to 5 digits.";
        }
        ?>
      </body>
      </html>
```



- 3 Save the program in C:\Apache24\htdocs in a folder with .php extension
- 4 Run the Apache services from windows services
- 5 Open the browser and type the following address http://localhost/foldername/
- 6 Click the php file to run and verify the output

	C	0	Q	0	localhost:8012/CSA/myregularexpression.php
8	0	5	X	U	iocanost.ou iz/CSA/myregularexpression.php

#### VII Matching specific number of occurrences using {}

- 1 Open the text editor
- 2 Write the following codes

```
<html >
```

<head>

REPUBLISHED <title> Matching specific number of occurrences using {} </title>

```
</head>
```

<body>

<?php

```
$string = "hellooooo";
```

```
pattern = "/o{5}/";
```

```
if (preg_match($pattern, $string))
```

echo "Pattern found in the string.";

else

{

}

{

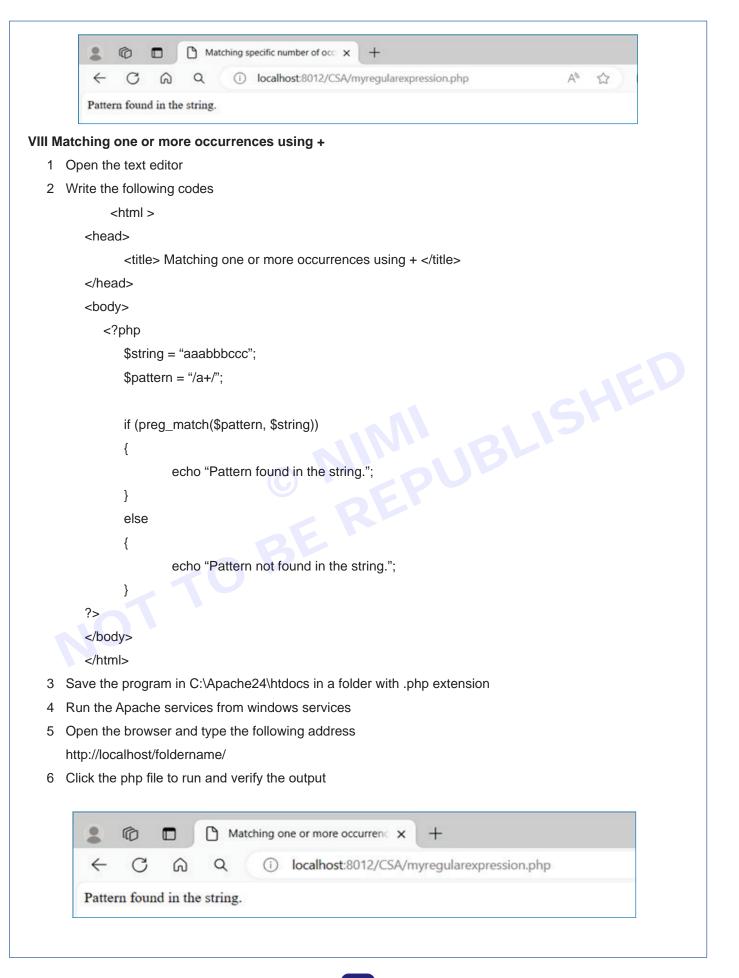
```
echo "Pattern not found in the string.";
```

```
?>
```

</body>

</html>

- 3 Save the program in C:\Apache24\htdocs in a folder with .php extension
- 4 Run the Apache services from windows services
- 5 Open the browser and type the following address http://localhost/foldername/
- 6 Click the php file to run and verify the output



```
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```

```
IX Matching zero or more occurrences using *
   1. Open the text editor
   2. Write the following codes
       <html >
   <head>
    <title> Matching zero or more occurrences using * </title>
   </head>
   <body>
      <?php
    $string = "abbbbbbbc";
    $pattern = "/ab*c/";
    if (preg_match($pattern, $string))
    {
            echo "Pattern found in the string.";
    }
    else
    {
            echo "Pattern not found in the string.";
    }
   ?>
   </body>
   </html>
   3. Save the program in C:\Apache24\htdocs in a folder with .php extension
   4. Run the Apache services from windows services
   5. Open the browser and type the following address
              http://localhost/foldername/
   6. Click the php file to run and verify the output
                                                                         +
                                  Matching zero or more occurrence X
               ര
                      6
                                               localhost:8012/CSA/myregularexpression.php
         \leftarrow
                                Q
                                          (i)
       Pattern found in the string.
```

```
X Matching word boundaries
   1 Open the text editor
   2 Write the following codes
              <html >
         <head>
                <title> Matching word boundaries </title>
         </head>
         <body>
            <?php
                $string = "The quick brown fox jumps over the lazy dog.";
                $pattern = "\bfox\b/"; // Matches "fox" as a whole word
                if (preg_match($pattern, $string))
                {
                        echo "The word 'fox' is present as a whole word.";
                }
         ?>
         </body>
         </html>
   3 Save the program in C:\Apache24\htdocs in a folder with .php extension
   4 Run the Apache services from windows services
   5 Open the browser and type the following address
      http://localhost/foldername/
   6 Click the php file to run and verify the output
                              Matching word boundaries
                                                               +
                  G
                        ×
                                       (i) localhost:8012/CSA/myregularexpression.php
                   C
                         6
                               Q
             The word 'fox' is present as a whole word.
TASK 2 : Using modifiers
I i (case-insensitive) modifier
   1 Open the text editor
   2 Write the following codes
             <html >
         <head>
                <title> i (case-insensitive) modifier </title>
         </head>
         <body>
```



302

<?php \$string = "Hello World"; if (preg_match("/hello/i", \$string)) { echo "Match found!"; } else { echo "No match found!"; }

// Output: Match found!

?>

</body>

</html>

- 3 Save the program in C:\Apache24\htdocs in a folder with .php extension
- 4 Run the Apache services from windows services
- 5 Open the browser and type the following address http://localhost/foldername/
- 6 Click the php file to run and verify the output



#### II m (multiline mode) modifier

- 1 Open the text editor
- 2 Write the following codes

<html >

<head>

<title> m (multiline mode) modifier </title>

```
</head>
```

<body>

<?php

\$string = "First line\nSecond line";

```
if (preg_match("/^Second/m", $string)) {
```

echo "Match found!- multiline mode ";

```
} else {
```

echo "No match found!";

```
}
```

// Output: Match found!

?>

```
</body>
         </html>
   3 Save the program in C:\Apache24\htdocs in a folder with .php extension
   4 Run the Apache services from windows services
   5 Open the browser and type the following address
     http://localhost/foldername/
   6 Click the php file to run and verify the output
                             m (multiline mode) modifier
                O
                      ×
                                                                 +
           \leftarrow
                 C
                        6
                              Q
                                           localhost:8012/CSA/myregularexpression.php
                                      (i)
          Match found!- multiline mode
                                                      III s (single line mode) modifier
   1 Open the text editor
   2 Write the following codes
             <html >
         <head>
               <title> s (single line mode) modifier </title>
         </head>
         <body>
           <?php
               $string = "First line\nSecond line";
     if (preg_match("/First.*line/s", $string)) {
               echo "Match found!- single line mode ";
     } else {
               echo "No match found!";
      }
     // Output: Match found!
           ?>
         </body>
      </html>
   3 Save the program in C:\Apache24\htdocs in a folder with .php extension
   4 Run the Apache services from windows services
   5 Open the browser and type the following address
     http://localhost/foldername/
   6 Click the php file to run and verify the output
```

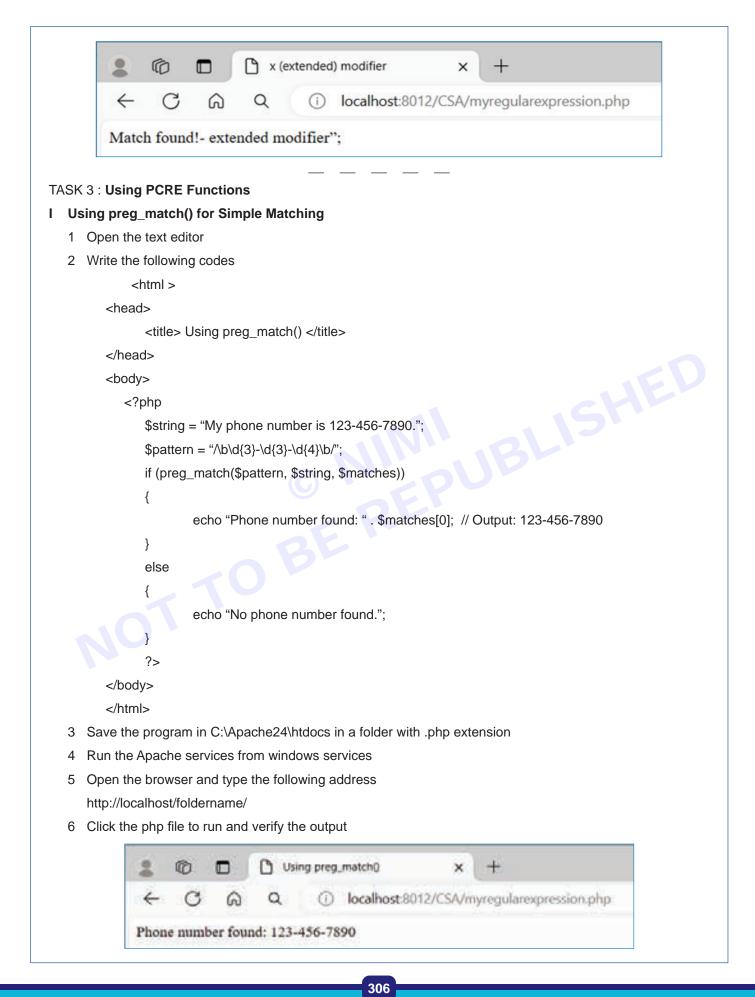


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```
s (single line mode) modifier
                                                                        +
                    ത

    localhost:8012/CSA/myregularexpression.php

               4
                     C
                            ഖ
                                   Q
             Match found!- single line mode
IV x (extended) modifier
   1 Open the text editor
   2 Write the following codes
              <html >
         <head>
                <title> x (extended) modifier </title>
         </head>
         <body>
            <?php
                $pattern = "
                                /
                                Λ
                                          # Start of the string
                                           # Match exactly 3 digits
                                \d{3}
                                          # Match a hyphen
                                _
                                           # Match exactly 4 digits
                                \d{4}
                                $
                                           # End of the string
                                /x
      ":
      $string = "123-4567";
      if (preg_match($pattern, $string)) {
                echo "Match found !- extended modifier";
      ".
      } else {
                echo "No match found!";
      }
      // Output: Match found!
                ?>
         </body>
         </html>
   3 Save the program in C:\Apache24\htdocs in a folder with .php extension
   4 Run the Apache services from windows services
   5 Open the browser and type the following address
      http://localhost/foldername/
   6 Click the php file to run and verify the output
```





```
II Using preg_match_all() for Multiple Matches
   1 Open the text editor
   2 Write the following codes
             <html >
         <head>
               <title> Using preg_match_all()</title>
         </head>
         <body>
            <?php
               $str = "The rain in SPAIN falls mainly on the plains.";
               $pattern = "/ain/i";
               echo preg_match_all($pattern, $str);
                  ?>
         </body>
                                                                        BLISHED
         </html>
   3 Save the program in C:\Apache24\htdocs in a folder with .php extension
   4 Run the Apache services from windows services
   5 Open the browser and type the following address
      http://localhost/foldername/
   6 Click the php file to run and verify the output
                                                                  +
                6
                             Using preg_match_all()
                      ×
                 C
                              Q
                                           localhost:8012/CSA/myregularexpression.php
           6
                        6
          4
III Using preg_replace() for Replacement
   1 Open the text editor
   2 Write the following codes
          <html >
      <head>
       <title> Using preg_replace() </title>
      </head>
      <body>
         <?php
       $str = "Visit Microseft!";
       $pattern = "/microsoft/i";
       echo preg_replace($pattern, "Google", $str);
```

```
?>
      </body>
      </html>
   3 Save the program in C:\Apache24\htdocs in a folder with .php extension
   4 Run the Apache services from windows services
   5 Open the browser and type the following address
      http://localhost/foldername/
   6 Click the php file to run and verify the output
                  6
                         Using preg_replace()
                                                                     ×
                                                                           +
             4
                    C
                            6
                                   Q
                                            (i) localhost:8012/CSA/myregularexpression.php
           Visit Microseft!
                                                   REPUBLISHED
IV Using preg_split() for splits a string into substrings
   1 Open the text editor
   2 Write the following codes
           <html >
      <head>
        <title> Using preg_split()</title>
      </head>
      <body>
         <?php
        // String to split
        $string = "Hello, World! This is a test string.";
        // Split the string by spaces or punctuation marks
        $words = preg_split("/[\s,]+/", $string);
        // Display the resulting array
        print_r($words);
                   ?>
      </body>
      </html>
   3 Save the program in C:\Apache24\htdocs in a folder with .php extension
   4 Run the Apache services from windows services
   5 Open the browser and type the following address
      http://localhost/foldername/
   6 Click the php file to run and verify the output
                          localhost:8012/CSA/myregularex ×
                                                       +
              C
                    ~
                                 () localhost:8012/CSA/myregularexpression.php
                                                                                        A
                C
                     6
                           Q
                                                                                             ŵ
                                                                                                   CD
         Filtered Array: Array ([0] \Rightarrow apple [1] \Rightarrow banana [2] \Rightarrow orange [3] \Rightarrow grape [4] \Rightarrow watermelon [6] \Rightarrow strawberry)
```

```
308
```

```
V Using preg_grep() for filtering elements of an array
```

1 Open the text editor

```
2 Write the following codes
```

```
<html >
<head>
<title> Using preg_grep() </title>
</head>
<body>
<?php
// Sample array containing strings
$array = array(
'apple',
'banana',
```

```
'orange',
'grape',
'watermelon',
'kiwi',
'strawberry'
```

```
);
```

// Regular expression pattern to match fruits containing 'a' followed by any character

```
pattern = '/a./';
```

// Use preg_grep() to filter array elements based on the pattern

```
$filteredArray = preg_grep($pattern, $array);
```

// Output the filtered array

echo "Filtered Array:\n";

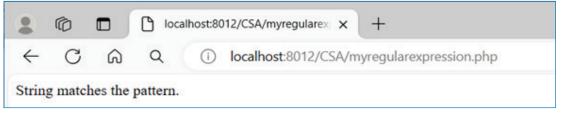
print_r(\$filteredArray);

?>

</body>

</html>

- 3 Save the program in C:\Apache24\htdocs in a folder with .php extension
- 4 Run the Apache services from windows services
- 5 Open the browser and type the following address http://localhost/foldername/
- 6 Click the php file to run and verify the output



#### VI. Using preg_quote() for escapes special characters in a string

- 1 Open the text editor
- 2 Write the following codes

<html > <head> <title> Using preg_quote() </title> </head> <body> <?php // String containing characters to be guoted \$string = "Escaping: .\+*?[^]{}()\$=!|:-"; // Quote the string to escape regular expression characters \$quotedString = preg_quote(\$string); // Regular expression pattern containing the guoted string  $pattern = '/^{'} \cdot pattern = '/^{'}$ // Test string to match against the pattern \$testString = "Escaping: .\\+*?[^]{}()\$=!|:-"; // Perform regular expression matching if (preg_match(\$pattern, \$testString)) { echo "String matches the pattern.\n"; } else { echo "String does not match the pattern.\n' } ?> </body> </html> 3 Save the program in C:\Apache24\htdocs in a folder with .php extension 4 Run the Apache services from windows services 5 Open the browser and type the following address http://localhost/foldername/ 6 Click the php file to run and verify the output 1 Provide an example of using a regular expression to match a single character in PHP 2 Provide an example of a regular expression pattern in PHP that matches any digits 0 to 9? 3 Provide an example of exclude specific characters from a set when using a regular expression in PHP?

- 4 Provide an example of a regular expression in PHP that matches exactly three occurrences of a specific pattern?
- 5 provide an example of a regular expression in PHP that matches a word boundary at the beginning of a word?
- 6 Give an example of a situation where using the (case-insensitive) modifier in PHP regular expressions?
- 7 Provide an example of a complex regular expression pattern where using the (extended) modifier in PHP would enhance readability.
- 8 Provide an example of the (extended) modifier changes the behavior of whitespace and comments within a regular expression pattern.
- 9 Provide an example of how to use preg_match_all() in PHP to extract multiple occurrences of a pattern from a string?
- 10 Provide an example of preg_split() handle capturing groups within the regular expression pattern when splitting a string in PHP
- 11 Give a sample PHP code of using regular expressions for email validation?



EXERCISE 59 : Demonstrate working with Classes And Objects - Creating an object, Object properties, Object methods, Object constructors and destructors

### **Objectives**

At the end of this exercise you shall be able to

- create object in PHP
- use object properties in PHP
- use object constructors and destructors in PHP.

### **Requirements**

#### **Tools/Materials**

- Computer/Laptop with latest configuration
- Operating system: windows 10 or 11
- Apache web server

### **Procedure**

```
PHPText editor
```

Web browser

TASK 1: Creating an object, properties and methods

- 1 Open the text editor
- 2 Write the following codes

<html >

<head>

<title> Creating an object </title>

</head>

<body>

<?php

class Person

{

//Add Properties

```
public $name;
```

public \$age;

//Add Methods

public function greet()

{

}

echo "Hello, my name is " . \$this->name . ".";

}

//Create an Object Instance



\$person1 = new Person(); //Access and Set Properties \$person1->name = "Bob"; person1->age = 25;//Call Methods \$person1->greet(); // Output: Hello, my name is Bob. ?> </body> </html> 3 Save the program in C:\Apache24\htdocs in a folder with .php extension Run the Apache services from windows services 4 5 Open the browser and type the following address http://localhost/foldername/ 6 Click the php file to run and verify the output. Creating an object M × localhost:8012/csa/myobjects.php 6 Hello, my name is Bob. TASK 2: Object constructors 1 Open the text editor 2 Write the following codes <html > <head> <title> constructors</title> </head> <body> <?php class MyClass { // Properties public \$name; public \$age; // Constructor

public function ___construct(\$name, \$age)

```
{
```



```
$this->name = $name;
                          $this->age = $age;
                          echo "Constructor called\n";
           }
           // Method to display information
           public function displayInfo()
           {
                          echo "Name: ". $this->name. ", Age: ". $this->age. "\n";
           }
    }
    // Creating an object of MyClass
    $obj = new MyClass("John", 30);
                                         NIMUBLISHED
    // Calling method to display information
    $obj->displayInfo();
      ?>
</body>
</html>
3
  Save the program in C:\Apache24\htdocs in a folder with .php extension
  Run the Apache services from windows services
4
  Open the browser and type the following address
5
             http://localhost/foldername/
6 Click the php file to run and verify the output
                                     constructors
                                                                     ×
                                                 localhost:8012/csa/myobjects.php
             4
                            6
            Constructor called Name: John, Age: 30
TASK 3: Object destructors
1 Open the text editor
2 Write the following codes
      <html >
   <head>
    <title> destructors</title>
   </head>
```

313



<body> <?php class MyClass { // Destructor public function destruct() { echo "Destructor called\n"; } } // Creating an object of MyClass \$obj = new MyClass(); // The object will be destroyed at the end of the script ?> </body> </html> Save the program in C:\Apache24\htdocs in a folder with .php extension 3 Run the Apache services from windows services 4 Open the browser and type the following address 5 http://localhost/foldername/ Click the php file to run and verify the output. 6 destructors localhost:8012/csa/myobjects.php Destructor called

- 1 Create an object of a class named Car in PHP, which has properties such as \$make, \$model, and \$year. Assign values to these properties during object instantiation.
- 2 Create a PHP class called Book with properties \$title, \$author, and \$price. Write a constructor method to initialize these properties. Instantiate an object of the Book class with the title "PHP Programming", author "John Doe", and price \$29.99.
- 3 Create a PHP class Employee with private properties \$name and \$salary. Implement getter and setter methods for these properties. Instantiate an Employee object and set the name to "John" and salary to 50000.

EXERCISE 60 : Perform class constants, Class inheritance, Abstract classes and methods, Object serialization, checking for class and method, existence, Exceptions, Iterators

## **Objectives**

At the end of this exercise you shall be able to

- use inheritance and abstract classes in PHP
- use object serialization in PHP
- use exceptions and Iterators in PHP.

## Requirements

#### **Tools/Materials**

- Computer/Laptop with latest configuration
- Operating system: windows 10 or 11
- Apache web server

## **Procedure**

- PHP
- Text editor
- Web browser

```
TASK 1: Using class constants
```

- 1 Open the text editor
- 2 Write the following codes

<html >

<head>

<title> class constants </title>

</head>

<body>

<?php

class MathConstants

```
{
```

const PI = 3.14159;

```
const E = 2.71828;
```

public function printConstants()

```
{
```

echo "The value of PI is: " . self::PI . "<br/>br/>";

echo "The value of E is: " . self::E . "<br/>';

```
}
class Circle
```

}

{



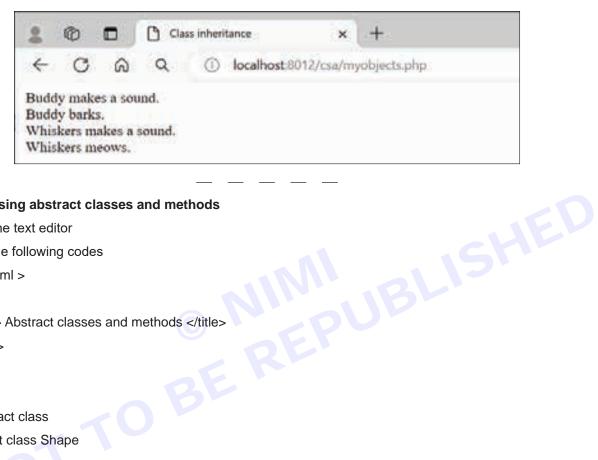
|    |                                                                                                                                                          | private \$radius;                                             |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|
|    |                                                                                                                                                          | public functionconstruct(\$radius)                            |
|    |                                                                                                                                                          | {                                                             |
|    |                                                                                                                                                          | \$this->radius = \$radius;                                    |
|    |                                                                                                                                                          | }                                                             |
|    |                                                                                                                                                          | public function getArea()                                     |
|    |                                                                                                                                                          | {                                                             |
|    |                                                                                                                                                          | return MathConstants::PI * \$this->radius * \$this->radius;   |
|    |                                                                                                                                                          | }                                                             |
|    | }                                                                                                                                                        |                                                               |
|    |                                                                                                                                                          | \$con= new MathConstants();                                   |
|    |                                                                                                                                                          | \$con->printConstants()                                       |
|    | \$circle                                                                                                                                                 | = new Circle(5);                                              |
|    | echo "                                                                                                                                                   | Area of circle is:". \$circle->getArea(); // Output: 78.53975 |
|    | ?>                                                                                                                                                       |                                                               |
|    |                                                                                                                                                          |                                                               |
|    |                                                                                                                                                          |                                                               |
| 3  | Save the program                                                                                                                                         | m in C:\Apache24\htdocs in a folder with .php extension       |
| 4  | Run the Apache                                                                                                                                           | services from windows services                                |
| 5  | Open the browse                                                                                                                                          | er and type the following address                             |
|    | http://localhost/fo                                                                                                                                      | oldername/                                                    |
| 6  | Click the php file                                                                                                                                       | to run and verify the output                                  |
|    |                                                                                                                                                          |                                                               |
|    |                                                                                                                                                          | C Class constants × +                                         |
|    | 4                                                                                                                                                        | C Q i localhost:8012/csa/myobjects.php                        |
|    | Description of the                                                                                                                                       | ralue of PI is: 3.14159                                       |
|    |                                                                                                                                                          | value of E is: 2.71828<br>of circle is:78.53975               |
|    | Aica                                                                                                                                                     |                                                               |
|    |                                                                                                                                                          |                                                               |
|    | ASK 2: Using clas                                                                                                                                        | ss inheritance                                                |
| IA |                                                                                                                                                          |                                                               |
|    | Open the text ec                                                                                                                                         | litor                                                         |
| 1  | Open the text ec<br>Write the following                                                                                                                  |                                                               |
| 1  | •                                                                                                                                                        |                                                               |
| 1  | Write the following                                                                                                                                      |                                                               |
| 1  | Write the followin<br><html><br/><head></head></html>                                                                                                    |                                                               |
| 1  | Write the followin<br><html><br/><head></head></html>                                                                                                    | ng codes                                                      |
| 1  | Write the followin<br><html><br/><head><br/><title>&lt;/th&gt;&lt;th&gt;ng codes&lt;/th&gt;&lt;/tr&gt;&lt;/tbody&gt;&lt;/table&gt;</title></head></html> |                                                               |



```
// Parent class
class Animal
{
      protected $name;
      public function ___construct($name)
      {
                      $this->name = $name;
      }
      public function speak()
      {
                      echo $this->name . " makes a sound.\n";
      }
}
// Child class inheriting from Animal
class Dog extends Animal
{
      public function bark()
      {
                      echo $this->name . " barks.\n"
      }
}
// Child class inheriting from Animal
class Cat extends Animal
{
      public function meow()
                      echo $this->name . " meows.\n";
      }
// Creating instances of child classes
$dog = new Dog("Buddy");
$cat = new Cat("Whiskers");
// Calling methods from parent and child classes
$dog->speak(); // Output: Buddy makes a sound.
$dog->bark(); // Output: Buddy barks.
$cat->speak(); // Output: Whiskers makes a sound.
$cat->meow(); // Output: Whiskers meows.
      ?>
</body>
```

#### </html>

- 3 Save the program in C:\Apache24\htdocs in a folder with .php extension
- 4 Run the Apache services from windows services
- 5 Open the browser and type the following address http://localhost/foldername/
- 6 Click the php file to run and verify the output



#### TASK 3: Using abstract classes and methods

- 1 Open the text editor
- 2 Write the following codes

<html >

```
<head>
```

```
<title> Abstract classes and methods </title>
```

</head>

<body>

<?php

// Abstract class

abstract class Shape

#### {

```
protected $name;
```

public function ___construct(\$name)

```
{
```

\$this->name = \$name;

```
}
```

// Abstract method - no implementation

abstract public function calculateArea();

```
}
```

// Concrete subclass of Shape

class Circle extends Shape

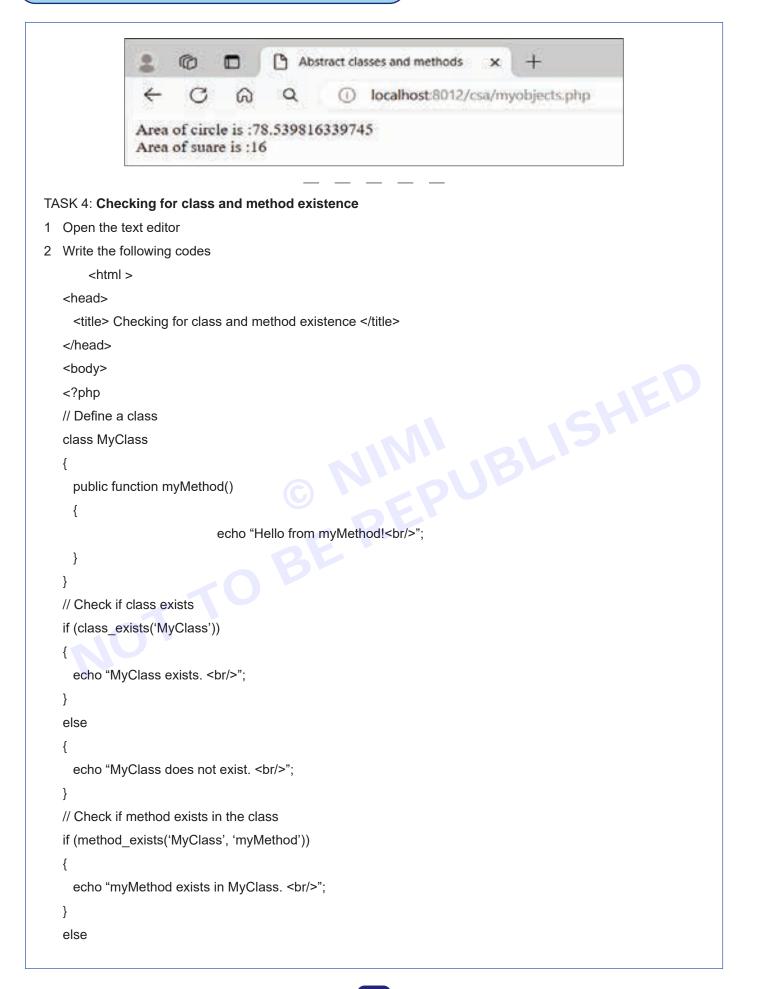
```
{
```

private \$radius;

```
public function ___construct($name, $radius)
```



```
{
                            parent:: __construct($name);
                            $this->radius = $radius;
    }
    // Implementing abstract method
    public function calculateArea()
    {
                            return pi() * pow($this->radius, 2);
    }
   }
  // Concrete subclass of Shape
   class Square extends Shape
   {
    private $side;
    public function ___construct($name, $side)
                                                     INII
EPUBLISHED
    {
                            parent:: construct($name);
                            $this->side = $side;
    }
    // Implementing abstract method
    public function calculateArea()
    {
                            return pow($this->side, 2);
    }
   }
   // Creating instances of concrete subclasses
   $circle = new Circle("Circle", 5);
   $square = new Square("Square", 4);
   // Calling methods on instances
   echo"Area of circle is :".$circle->calculateArea(); // Output: 78.539816339745
   echo "<br/>";
   echo"Area of square is :".$square->calculateArea(); // Output: 16
            ?>
   </body>
   </html>
3 Save the program in C:\Apache24\htdocs in a folder with .php extension
4 Run the Apache services from windows services
5 Open the browser and type the following address
   http://localhost/foldername/
6 Click the php file to run and verify the output
```



320



```
{
    echo "myMethod does not exist in MyClass. <br/> ";
   }
            ?>
   </body>
   </html>
3 Save the program in C:\Apache24\htdocs in a folder with .php extension
  Run the Apache services from windows services
4
  Open the browser and type the following address
5
             http://localhost/foldername/
  Click the php file to run and verify the output
6
                                   Checking for class and method = ×
                    0
                           +
                             ଜ
                                     0
                                              (n)
                                                   localhost:8012/csa/myobjects.php
             MyClass exists.
             myMethod exists in MyClass.
                                             NINIT
REPL
TASK 5: Object serialization
1 Open the text editor
2 Write the following codes
       <html >
   <head>
    <title> Object serialization </title>
   </head>
   <body>
   <?php
   // Define a class
   class MyClass
   {
    public $name;
    public $age;
    public function ___construct($name, $age)
    {
                           $this->name = $name;
                           $this->age = $age;
    }
   }
   // Create an object of MyClass
   $obj = new MyClass("John", 30);
```

// Serialize the object

\$serializedObj = serialize(\$obj);

// Output the serialized object

echo "Serialized object: \$serializedObj<br/>>";

// Unserialize the object

\$unserializedObj = unserialize(\$serializedObj);

// Output the unserialized object

echo "Unserialized object:\n";

var_dump(\$unserializedObj);

```
?>
```

</body>

</html>

- 3 Save the program in C:\Apache24\htdocs in a folder with .php extension
- 4 Run the Apache services from windows services
- 5 Open the browser and type the following address http://localhost/foldername/
- 6 Click the php file to run and verify the output



#### TASK 6: Using Exceptions

#### I Using try, catch, and throw keywords

- 1 Open the text editor
- 2 Write the following codes

<html >

<head>

<title> Exceptions </title>

</head>

<body>

<?php

function divide(\$dividend, \$divisor)

```
{
```

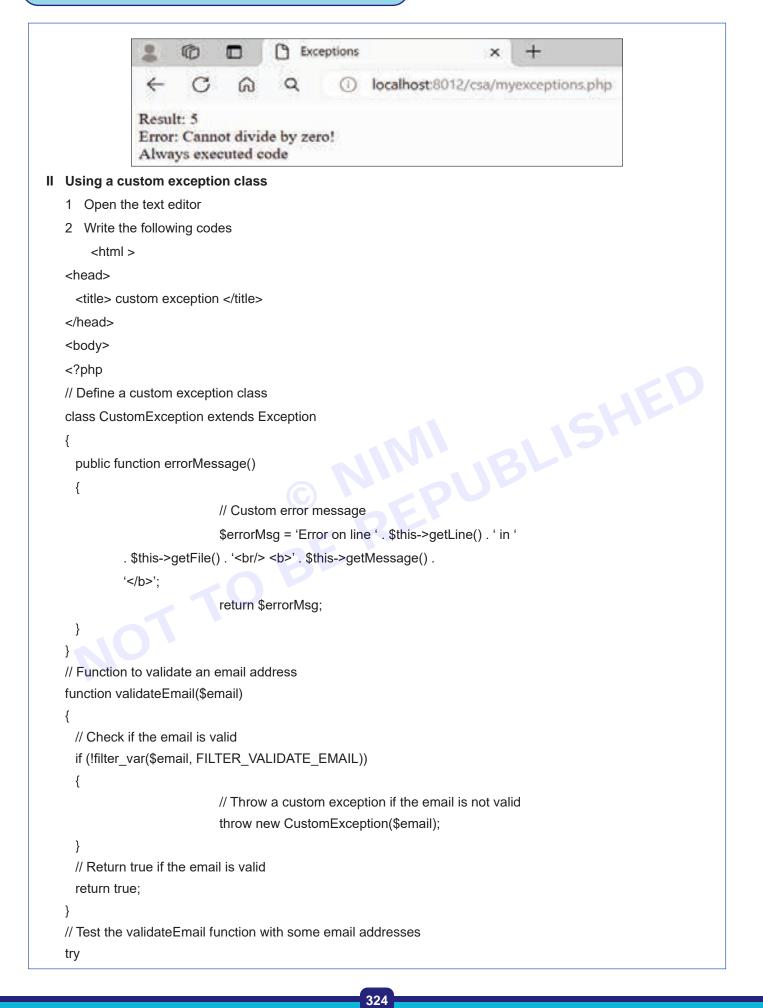
```
if ($divisor === 0)
```

```
{
```

throw new MyCustomException("Cannot divide by zero!");



```
}
    return $dividend / $divisor;
   }
   class MyCustomException extends Exception
   {
    public function ___construct($message, $code = 0)
    {
            parent::___construct($message, $code);
    }
   }
   try
   {
    sresult = divide(10, 2);
                                              NIMUBLISHED
REPUBLISHED
    echo "Result: $result<br/>>";
    $result = divide(10, 0); // This will throw an exception
   }
   catch (MyCustomException $e)
   {
    echo "Error: " . $e->getMessage();
   }
   catch (Exception $e)
   {
    echo "General error: " . $e->getMessage();
   }
   finally
   {
    echo "<br/>Always executed code";
   }
            ?>
   </body>
   </html>
  Save the program in C:\Apache24\htdocs in a folder with .php extension
3
  Run the Apache services from windows services
4
5 Open the browser and type the following address
   http://localhost/foldername/
6 Click the php file to run and verify the output
```





```
{
    validateEmail("john.doe@example.com");
    echo "Valid email address.<br/>";
    validateEmail("invalid_email_address");
    echo "This line will not be reached due an exception will be thrown.<br/>/>";
   }
   catch (CustomException $e)
   {
    // Catch the custom exception and handle it
    echo $e->errorMessage() . "<br/>>";
  }
            ?>
   </body>
   </html>
3 Save the program in C:\Apache24\htdocs in a folder with .php extension
                                                                                     SHED
4 Run the Apache services from windows services
5 Open the browser and type the following address
   http://localhost/foldername/
6 Click the php file to run and verify the output
                                         custom exception
                       G
                              0
                                               (\mathbf{i})
                                                   localhost:8012/csa/myexceptions.php
                 Valid email address.
                Error on line 28 in C:\Apache24\htdocs\CSA\myexceptions.php
                 invalid_email_address
TASK 7: Using Iterators
I Using foreach loop
   1 Open the text editor
   2 Write the following codes
       <html >
   <head>
    <title> Iterators </title>
```

</head>

<body>

<?php

```
$numbers = [1, 2, 3, 4, 5];
```

```
foreach ($numbers as $number)
```

```
{
```

```
echo $number . " ";
```

```
}
```

?>

</body>

```
</html>
3 Save the program in C:\Apache24\htdocs in a folder with .php extension
  Run the Apache services from windows services
4
5 Open the browser and type the following address
   http://localhost/foldername/
6 Click the php file to run and verify the output
                    O

    Iterators

                                                                            +
                           ×

    localhost:8012/csa/myiterators.php

                             6
                                     Q
             12345
                                     © NIMUBLISHED
3E REPUBLISHED
II Using Arraylterator
   1 Open the text editor
   2 Write the following codes
       <html >
   <head>
    <title> Iterators </title>
   </head>
   <body>
   <?php
            $numbers = [1, 2, 3, 4, 5];
            $iterator = new ArrayIterator($numbers);
            while ($iterator->valid())
            {
                  echo $iterator->current() . " ";
         $iterator->next();
   }
            ?>
   </body>
   </html>
3 Save the program in C:\Apache24\htdocs in a folder with .php extension
  Run the Apache services from windows services
4
5 Open the browser and type the following address
   http://localhost/foldername/
6 Click the php file to run and verify the output
```



```
O
                                 P
                                     Iterators
                                                                          +
                          ×
                           6
             \leftarrow
                    C
                                                 localhost:8012/csa/myiterators.php
                                   Q
                                            (i)
           12345
III Iterating over Objects
  1 Open the text editor
  2 Write the following codes
      <html >
  <head>
    <title> Iterators </title>
                                 le, $age)
  </head>
   <body>
   <?php
            class User
  {
           public $name;
    public $age;
    public function ____construct($name, $age)
    {
           $this->name = $name;
           $this->age = $age;
    }
  }
   $users = [
       new User("Alice", 25),
       new User("Bob", 30),
              ];
  // Using foreach loop and custom IteratorAggregate:
  class UserCollection implements IteratorAggregate
  {
    private $users;
    public function __construct(array $users)
    {
           $this->users = $users;
    }
    public function getIterator()
```

```
{
         return new ArrayIterator($this->users);
 }
}
$userCollection = new UserCollection($users);
foreach ($userCollection as $user)
{
 echo $user->name . " (" . $user->age . ")" . PHP_EOL;
}
          ?>
</body>
</html>
```

- 3 Save the program in C:\Apache24\htdocs in a folder with .php extension
- 4 Run the Apache services from windows services
- 5 Open the browser and type the following address http://localhost/foldername/
- 6 Click the php file to run and verify the output

		follow	ving add	lress					
ernam	ne/								
run a	ind vei	rify the	output						
8	0		C iter	rators	110	×	+		
÷	С	â	٩	0	localhost.801	2/csa/myi	terators.	ohp	
Alice	(25) B	ob (30)	C						
	()	1000 (14 W)							

- Provide an example of a class constants be accessed from outside the class definition in PHP.
- 2 Create a 'Person' class with attributes like 'name' and 'age'. Create a 'Student' subclass that inherits from Person and adds a 'studentID' attribute. Instantiate a Student object and access its superclass attributes along with the subclass attribute.
- 3 Create an abstract class 'Animal' with an abstract method 'makeSound()'. Create concrete subclasses 'Cat' and 'Dog' that extend Animal and implement the makeSound() method to produce different sounds for each animal. Call the makeSound() method for a Cat and a Dog object.
- 4 Create a class 'Product' with properties like 'name', 'price', and 'quantity'. Serialize an object of this class into a string using PHP's serialization mechanism.
- 5 Create a function that reads data from a file, use PHP exceptions to handle errors such as file not found or insufficient permissions while reading the file.
- 6 Create an array of product objects representing items in a shopping cart. Use the Arraylterator class in PHP to iterate over this array and calculate the total cost of all items in the shopping cart.



EXERCISE 61 : Connect to MySQL database from PHP and insert, delete & update data in MySQI database from webpage

## **Objectives**

#### At the end of this exercise you shall be able to

- · create a MySQL database and table from PHP
- · insert and update data in MySQL table from PHP
- · delete data in MySQL table from PHP.

## Requirements

#### **Tools/Materials**

- PC/Laptop with latest configuration
- operating system: windows 10 or 11
- Text editor

- web browser
- apache web server

BLIS

- PHP
- MySQL server

## **Procedure**

#### TASK 1: Connect to MySQL database from PHP

- I Connect to MySQL and create a databse
  - 1 Open the text editor
  - 2 Write the following codes
    - <html >

<head>

```
<title> create a databse </title>
```

</head>

```
<body>
```

<?php

\$servername = "localhost"; // Change this if MySQL server is on a different host
\$username = "your_username"; // Change this to your MySQL username

\$password = "your_password"; // Change this to your MySQL password

```
// Create connection
```

\$conn = new mysqli(\$servername, \$username, \$password);

// Check connection

if (\$conn->connect_error)

```
{
```

die("Connection failed: " . \$conn->connect_error);

```
}
```

```
// Create database
```

\$sql = "CREATE DATABASE myDB";



```
if ($conn->query($sql) === TRUE) {
```

echo "Database created successfully";

```
} else {
```

echo "Error creating database: " . \$conn->error;

```
}
?>
```

?:

</body>

</html>

- 3 Save the program in C:\Apache24\htdocs in a folder with .php extension
- 4 Run the Apache services from windows services
- 5 Open the browser and type the following address http://localhost/foldername/
- 6 Click the php file to run and verify the output

| O localhost/csa/mydbco          | nnection.php                                                                                                                                                                                     |             |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| imail 🍳 Maps 🕋 News 🛐 Translate | 🖀   Dashboard 😨 Karmayogi Bharat 🔯 Login   Apprentices                                                                                                                                           | XII Bookmad |
| Database crea                   | ted successfully                                                                                                                                                                                 | BLISH       |
|                                 | 0                                                                                                                                                                                                |             |
|                                 | IN XAMPP for Windows - mysgl × + v                                                                                                                                                               |             |
|                                 | MariaDB [(none)]> show databases;                                                                                                                                                                |             |
|                                 | Database                                                                                                                                                                                         |             |
|                                 | db             everest             information_schema             mysql             nsti             nsti             performance_schema             phymyadmin             sun             test |             |
|                                 | 10 rows in set (0.001 sec)                                                                                                                                                                       |             |
|                                 | MariaDB [(none)]> show databases;<br>++<br>  Database                                                                                                                                            |             |
|                                 | <pre>     db     db     everest     information_schema     mydb     mysql     nsti     nstichennai     performance_schema     phpmyadmin </pre>                                                  |             |

II Connect to MySQL and create a table

- 1 Open the text editor
- 2 Write the following codes



```
<html >
   <head>
    <title> create a table </title>
   </head>
   <body>
   <?php
       // Database connection parameters
      $servername = "localhost"; // Change this if MySQL server is on a different host
      $username = "your_username"; // Change this to your MySQL username
      $password = "your password"; // Change this to your MySQL password
      $database = "example_db"; // Change this to your database name
      // Create connection
      $conn = new mysqli($servername, $username, $password, $database);
          // Check connection
   if ($conn->connect error) {
      die("Connection failed: " . $conn->connect_error);
      }
   // sql to create table
   $sql = "create table persons(
   id int, first_name varchar(30), last_name varchar(30), email varchar(70))";
   if ($conn->query($sql) === TRUE) {
      echo "Table created successfully";
   } else {
      echo "Error creating table: ". $conn->error;
   }
   $conn->close();
              ?>
   </body>
   </html>
3 Save the program in C:\Apache24\htdocs in a folder with .php extension
4 Run the Apache services from windows services
5 Open the browser and type the following address
   http://localhost/foldername/
6 Click the php file to run and verify the output
                 Table created successfully
```

XAMPP for Windows - mysql MariaDB [(none)]> use mydb; Database changed MariaDB [mydb] > show tables; Tables_in_mydb persons 1 row in set (0.000 sec) MariaDB [mydb]> desc persons; Field Type Null Key Default Extra id int(11) YES NULL varchar(30) NULL first_name YES varchar(30) YES NULL last_name email varchar(70) | YES uta NULL 4 rows in set (0.035 sec) MariaDB [mydb]>

TASK 2 : Connect to MySQL database from PHP and insert data

- 1 Open the text editor
- 2 Write the following codes

<head>

<title> </title>

<html >

</head>

<body>

<?php

// Database connection parameters

\$servername = "localhost"; // Change this if MySQL server is on a different host

\$username = "your_username"; // Change this to your MySQL username

\$password = "your_password"; // Change this to your MySQL password

\$database = "example_db"; // Change this to your database name

// Create connection

\$conn = new mysqli(\$servername, \$username, \$password, \$database);

// Check connection

if (\$conn->connect_error) {

die("Connection failed: ". \$conn->connect_error);

```
}
```

\$sql = "INSERT INTO persons (first_name, last_name, email) VALUES ('Peter', mail.com')";

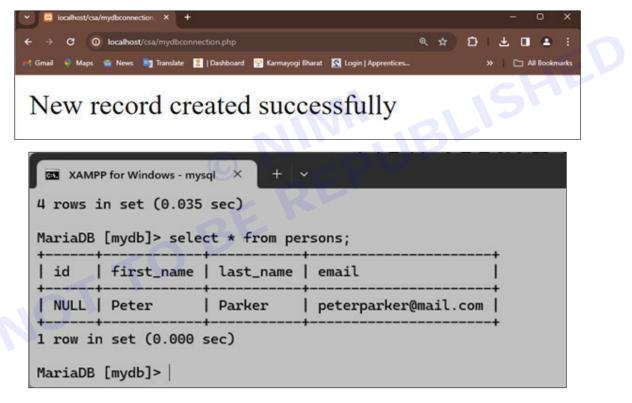
'Parker', 'peterparker@

if (\$conn->query(\$sql) === TRUE) {



```
echo "New record created successfully";
} else {
    echo "Error: " . $sql . "<br>" . $conn->error;
}
$conn->close();
    ?>
</body>
</html>
```

- 3 Save the program in C:\Apache24\htdocs in a folder with .php extension
- 4 Run the Apache services from windows services
- 5 Open the browser and type the following address http://localhost/foldername/
- 6 Click the php file to run and verify the output



#### TASK 3: Connect to MySQL database from PHP and insert data using prepare statement

- i Create an HTML form in the webpage (index.html) to collect the data from the user
  - 1 Open the text editor
  - 2 Write the following codes

<html >

</head>

<body>

```
<body>
```

<h2>Insert Data into MySQL Database</h2>

```
<form method="post" action="insert.php">
```

<label for="username">Username:</label><br>

```
<input type="text" id="username" name="username" required><br><br>
```

<label for="email">Email:</label><br>

<input type="email" id="email" name="email" required><br><br>

<input type="submit" value="Submit">

</form>

```
</bodv>
```

</html>

3 Save the program in C:\Apache24\htdocs in a folder as index.html

```
ii Create a PHP script (insert.php) to connect to the database and handle the insertion process.
```

- 1 Open the text editor
- 2 Write the following codes

<html >

<head>

```
<title> </title>
```

</head>

<body>

```
<?php
```

// Database connection parameters

```
© BERUBLISHED
BERUBLISHED
$servername = "localhost"; // Change this if the MySQL server is on a different host
```

```
$username = "your_username"; // Change this to MySQL username
```

```
$password = "your password"; // Change this to MySQL password
```

```
$database = "example_db"; // Change this to database name
```

// Create connection

```
$conn = new mysqli($servername, $username, $password, $database);
```

```
// Check connection
```

```
if ($conn->connect_error)
```

```
{
```

```
die("Connection failed: ". $conn->connect_error);
```

```
}
```

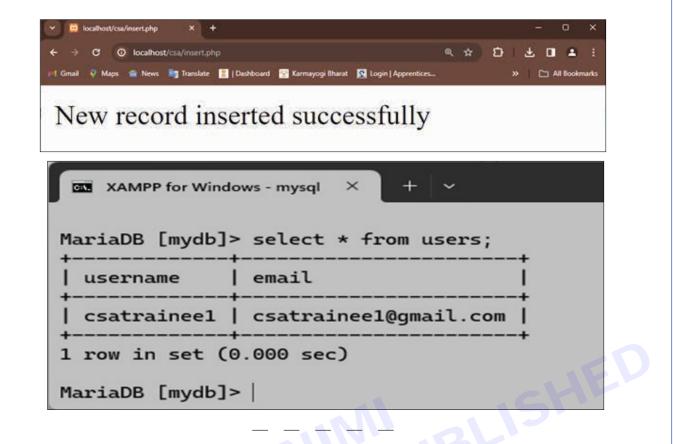
```
// Check if the form is submitted
if ($_SERVER["REQUEST_METHOD"] == "POST")
{
     // Get form data
```

```
username = $ POST["username"];
```



\$email = \$ POST["email"]; // Prepare and execute the SQL statement to insert data into the table \$stmt = \$conn->prepare("INSERT INTO users (username, email) VALUES (?,?)"); \$stmt->bind_param("ss", \$username, \$email); if (\$stmt->execute()) { echo "New record inserted successfully"; } else { echo "Error: " . \$conn->error; } // Close statement \$stmt->close(); } // Close connection \$conn->close(); ?> </body> </html> 3 Save the program in C:\Apache24\htdocs in a folder as insert.php 4 Run the Apache services from windows services 5 Open the browser and type the following address http://localhost/foldername/ 6 Click the index.html file to run and verify the output 

the line has been distoned in the	10.0 A 0 A 1
HTML form	
Insert Data into !	MySQL
Database	100 250
Username:	
csatrainee1	
Email:	
csatrainee1@gmail.com	



#### TASK 4: Connect to MySQL database from PHP and update data

- i Create an HTML form in the webpage (index.html) to collect the data from the user
  - 1 Open the text editor
  - 2 Write the following codes
    - <html >
  - <head> HTML form </title>

</head>

<body>

<h2>Update Data in MySQL Database</h2>

<form method="post" action="update.php">

<label for="username">Username of Record to Update:</label><br><input type="text" id="username" name="username" required><br><br><label for="email">New Email:</label><br><input type="email" id="email" name="email" required><br><br>>

<input type="submit" value="Update">

</form>

</body>

</html>

3 Save the program in C:\Apache24\htdocs in a folder as index.html



```
ii Create a PHP script (update.php) to connect to the database and handle the update process based on user
  input.
   1 Open the text editor
   2 Write the following codes
       <html >
   <head> HTML form </title>
   </head>
   <body>
        <?php
    // Database connection parameters
    $servername = "localhost"; // Change this if MySQL server is on a different host
    $username = "your username"; // Change this to MySQL username
    $password = "your password"; // Change this to MySQL password
    $database = "example_db"; // Change this to database name
                                                                   BLISHED
   // Create connection
   $conn = new mysqli($servername, $username, $password, $database);
   // Check connection
   if ($conn->connect error)
  {
    die("Connection failed: ". $conn->connect error);
   }
   // Check if the form is submitted
   if ($_SERVER["REQUEST_METHOD"] == "POST")
  {
    // Get form data
    //$id = $_POST["id"];
    $newUsername = $_POST["username"];
    $newEmail = $_POST["email"];
    // Prepare and execute the SQL statement to update data in the table
    $stmt = $conn->prepare("UPDATE users SET email = ? WHERE username = ?");
    $stmt->bind param("ss",$newEmail,$newUsername);
     if ($stmt->execute())
    {
                   echo "Record updated successfully";
    }
    else
    {
                   echo "Error: ". $conn->error;
    }
```

// Close statement
\$stmt->close();

}

// Close connection

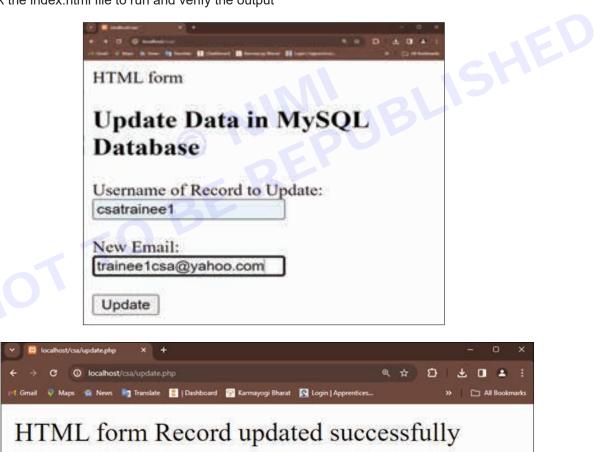
\$conn->close();

?>

</body>

</html>

- 3 Save the program in C:\Apache24\htdocs in a folder as update.php
- 4 Run the Apache services from windows services
- 5 Open the browser and type the following address http://localhost/foldername/
- 6 Click the index.html file to run and verify the output



XAMPP for Wind	ows - mysql X + V	
MariaDB [mydb]	<pre>&gt; select * from users;</pre>	
username	email	
csatrainee1   csatrainee2   csatrainee3	csatrainee1@gmail.com   csatrainee2@gmail.com   csatrainee3@gmail.com	
, 3 rows in set ( MariaDB [mydb]:	(0.000 sec) > select * from users;	
username	email	
csatrainee1   csatrainee2   csatrainee3	trainee1csa@yahoo.com   csatrainee2@gmail.com   csatrainee3@gmail.com	
3 rows in set	(0.001 sec)	

#### TASK 5: Connect to MySQL database from PHP and delete data

- i Create an HTML form in the webpage (index.html) to collect the data from the user
  - 1 Open the text editor
  - 2 Write the following codes

<html >

<head> HTML form </title>

</head>

<body>

<h2>Delete Data from MySQL Database</h2>

<form method="post" action="delete.php">

<label for="username">Username of Record to Delete:</label><br>

<input type="text" id="username" name="username" required><br><br>

<input type="submit" value="Delete">

</form>

</body>

</html>

3 Save the program in C:\Apache24\htdocs in a folder as index.html

ii Create a PHP script (delete.php) to connect to the database and handle the update process based on user input.

- 1 Open the text editor
- 2 Write the following codes

<html >

```
<head> HTML form </title>
   </head>
   <body>
<?php
       // Database connection parameters
      $servername = "localhost"; // Change this if MySQL server is on a different host
      $username = "root"; // Change this to your MySQL username
      $password = ""; // Change this to your MySQL password
      $database = "mydb"; // Change this to your database name
      // Create connection
      $conn = new mysqli($servername, $username, $password, $database);
      // Check connection
      if ($conn->connect_error)
      {
         die("Connection failed: ". $conn->connect error);
      }
      // Check if the form is submitted
      if ($_SERVER["REQUEST_METHOD"] == "POST")
      {
    // Get ID from the form
    $username = $_POST["username"];
    // Prepare and execute the SQL statement to delete data from the table
    $stmt = $conn->prepare("DELETE FROM users WHERE username = ?");
    $stmt->bind_param("s", $username);
    if ($stmt->execute())
                            echo "Record deleted successfully";
    }
    else
    {
                            echo "Error: ". $conn->error;
    }
    // Close statement
    $stmt->close();
       }
       // Close connection
       $conn->close();
```



?>

NOT

</body>

</html>

- 3 Save the program in C:\Apache24\htdocs in a folder as delete.php
- 4 Run the Apache services from windows services
- 5 Open the browser and type the following address http://localhost/foldername/
- 6 Click the index.html file to run and verify the output

HTML form			
10.10110-0.0011			
Delete D	ata from MyS	DL	
Database			
	Record to Delete:		
csatrainee2			15
Delete			
Delete			
			- a x
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ML form R	ecord deleted succe	1.0	
0		1.0	
ML form R		1.0	
0		1.0	
username csatraineel	ows-mysql × + • email traineelcsa@yahoo.com	1.0	
IS XAMPP for Wind	ows-mysqi × + v email	1.0	
username csatrainee1 csatrainee2 csatrainee3	ows-mysql × + • email traineelcsa@yahoo.com csatrainee2@gmail.com csatrainee3@gmail.com	1.0	
username csatrainee1 csatrainee2 csatrainee3 s rows in set	ows-mysql × + • email traineelcsa@yahoo.com csatrainee2@gmail.com csatrainee3@gmail.com	1.0	
username csatrainee1 csatrainee2 csatrainee3 s rows in set	ows-mysql × + • email traineelcsa@yahoo.com csatrainee2@gmail.com csatrainee3@gmail.com (0.001 sec)	1.0	

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- 1 Write the PHP code to establish a connection from a MySQL database named my_database hosted on localhost, using a username and a password.
- 2 Write the PHP code to connect to the database, execute a query to retrieve data from a table named users, and then display the results on a webpage.
- 3 Write PHP code to connect to the database, insert a new product record with specific values in to a table named products and handle any potential errors during the insertion process.
- 4 Write PHP code to connect to the database, update existing records in a MySQL database table named orders. update specific order records with new values, and ensure that the updates are applied successfully.
- 5 Write PHP code to connect to the database, delete specific customer records based on certain criteria from a MySQL database table named customers.

Apache web server

MySQL server

PHP

# EXERCISE 62 : Create a project on PHP & MySQL for online library management

## **Objectives**

At the end of this exercise you shall be able to

· create a project for online library management using PHP & MySQL.

## Requirements

#### **Tools/Materials**

- PC/Laptop with latest configuration
- Operating system: windows 10 or 11
- Text editor
- Web browser

## Procedure

#### Project:

Develop a web-based application to manage a library's book collection, users, loans, and other functionalities.

#### **Technologies:**

Front-end: HTML, CSS, JavaScript (optional)

Back-end: PHP

Database: MySQL

System Modules:

#### 1 User Management:

User registration and login (including different user roles, e.g., admin, librarian, member)

User profile management (update details, password change)

#### 2 Book Management:

Add, edit, and delete book information (title, author, genre, publication date, availability)

Search books by various criteria (title, author, genre, keywords)

View detailed information about each book (summary, reviews, borrowed history)

#### 3 Loan Management:

Borrow and return books (check user eligibility, availability, due dates)

Generate loan reports (individual, overdue, most popular books)

Set and manage loan periods and fines

#### 4 Additional Features (optional):

Book reservation system

Online reading platform for eBooks

User reviews and ratings for books

Recommendations based on user borrowing history

Inventory management (track book condition, purchase new books)

#### **Database Design:**

Tables: Users, Books, Loans, Genres, Authors, etc.
Relationships: Users can borrow Books, Books can have multiple Loans, etc.
Implement data integrity constraints and triggers for efficient management.
Development Approach:
Implement modules iteratively, starting with core functionalities.
Use clear coding practices and modular design for maintainability.

Validate user input to prevent security vulnerabilities.

Implement user authentication and authorization for different roles.

#### **Testing and Deployment:**

Thoroughly test all functionalities manually and with automated tools.

Deploy the application on a web server accessible to users.

#### **Evaluation and Future Improvements:**

Gather user feedback and address issues during maintenance.

Implement new features based on user needs and feedback.

Consider performance optimization and scalability for large datasets.

#### **Additional Notes:**

This is a basic outline, and specific modules and features can be adjusted based on the needs and requirements.

Research existing open-source library management systems for inspiration and potential libraries to utilize.

Always keep security and data privacy in mind when developing and deploying the system.



# Module 5 : Advance Data Analysis Using Excel

# **EXERCISE 63 : Protect sheet using password**

## **Objectives**

At the end of this exercise you shall be able to

protect your Excel Sheet and Work Book.

## Requirements

#### **Tools/Materials**

- PC/Laptop with Windows OS
- MS Excel 2013 or Higher

## Procedure

TASK 1: To protect a sheet using a password in Microsoft Excel, follow these steps

- 1 Open your Excel Workbook:
  - Launch Microsoft Excel and open the workbook containing the sheet you want to protect.
- 2 Navigate to the Sheet:
  - Go to the sheet that you want to protect.

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	A	В	с	1	D	E	F	G	н	
1	EN	IPLOYEE DET	AILS							
3	Name	Age	Occupatio	on						
4	John	25	Engineer							
5	Mary	30	Teach							
5	Tom	22	Student							
7	Alice	35	Doctor							
в	Bob	28	Programmer							
9										
10										-
-	•   Sheet3	Sales_Det	ails Employee	e (	Ð :	[4]				•
Ready	10								+ 10	



- 3 Select the "Review" Tab:
- Click on the "Review" tab in the Excel ribbon at the top.
- 4 Click on "Protect Sheet":
- In the "Changes" group, you will find the "Protect Sheet" option. Click on it.

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		EMPLOYEE DE	ETAILS						
	Name	Age	Occupation						
	John	25	Engineer						
	Mary	30	Teach						
	Tom	22	Student			2			
	Alice	35	Doctor		50				
3	Bob	28	Programmer						
9									
0			BE						-
	• Shee	13 Sales_D	etails Employee	🕀 1	•			100	•

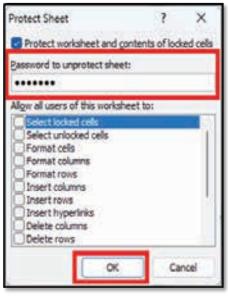
#### 5 Set Protection Options:

• A "Protect Sheet" dialog box will appear. Here, you can set various protection options:

Protect Sheet	?	×
Protect worksheet and	contents of loc	ked cells
Password to unprotect she	et:	
Allow all users of this works	sheet to:	
Select locked cells Select unlocked cells Format cells Format columns Format rows Insert columns Insert rows Insert hyperlinks Delete columns Delete rows		
OK	Ca	ncel



 Enter a password in the "Password to unprotect sheet" field. This password will be required to unprotect the sheet later.



- Choose specific options such as allowing users to select locked cells, format cells, insert rows, insert columns, etc.
- Click on "OK" when you are done.
- 6 Re-enter Password (Optional):

Confirm Password	? )
Reenter password to proceed.	
••••••	
Caution: If you lose or forget the recovered. It is advisable to keep their corresponding workbook and place. (Remember that password	a list of passwords a sheet names in a sa
Contraction of the second s	

- If you set a password, you will be prompted to re-enter it to confirm.
- 7 Save Your Workbook:
- It's a good practice to save your workbook after protecting the sheet.

Now, the selected sheet is protected, and users will need to enter the password to make changes based on the options you've chosen.

Keep in mind that if you forget the password, there is no way to recover it. Make sure to remember the password or keep a backup of your workbook without the protection.

These steps apply to Microsoft Excel versions like Excel 2013, Excel 2016, Excel 2019, and Excel for Microsoft 365. The exact steps might vary slightly depending on the version you are using.

To protect a Work Book using a password in Microsoft Excel, follow these steps:

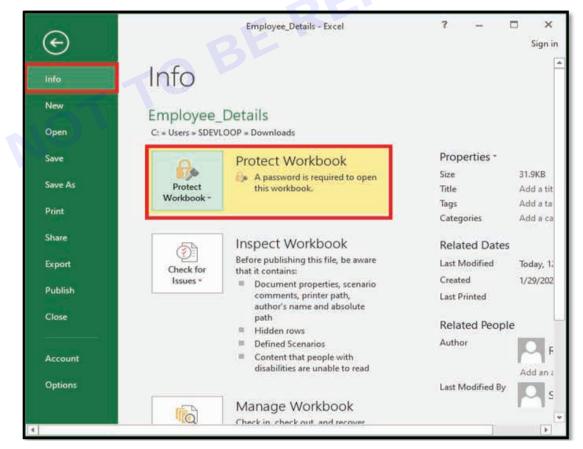
		L Income				e_Details -)			0.00		0.0	
File	Home		Page Layout	Formulas			View			Sign in	A sh	are
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	and 15	Font	( G	Alignment		Number	19	Sty	les			~
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	A		В		c		D	E	F	G	н	
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2				AILS								
3	Nam	e	Age	Occu	patio	n						
4	Johr	R	25	Engineer								
5	Maŋ	r.	30	Teach								
6	Tom	i.	22	Student								
7	Alice		35	Doctor								
8	Bob	s — ]	28	Programm	ner							
9												-
10												
11												

1 Open your Excel Workbook: Open the Excel workbook that you want to protect.

2 Click on the "File" Tab: Click on the "File" tab in the Ribbon to access the Backstage view.

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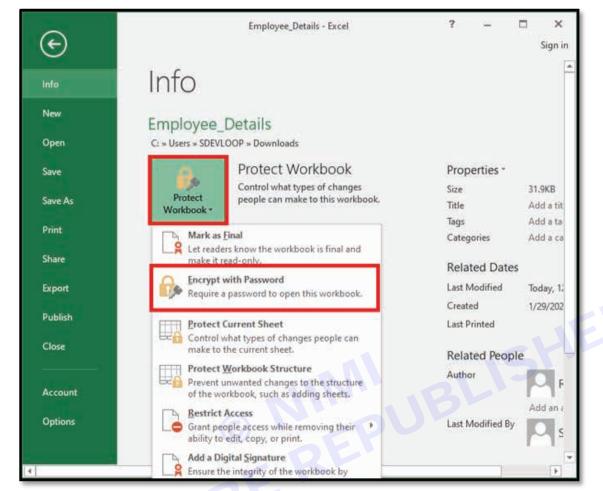
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- Click on "Protect Workbook": Under the "Info" section, you will find an option called "Protect Workbook." 4 Click on it.



Select "Info" from the menu: In the Backstage view, select the "Info" option from the menu on the left.

#### 5 Choose a Protection Method:

• If you want to add a password to open the workbook, choose "Encrypt with Password."



6 Enter the Password: If you selected "Encrypt with Password," enter a password and click "OK."

Passwo <u>r</u> d:			
cannot be recovered passwords and their names in a safe place Remember that pass	corresponding	document	st o

Note: Make sure to remember the password, as it will be required to unprotect the workbook.

7 Confirm the Password: If prompted, confirm the password by entering it again and click "OK."



8 Save the Workbook: Save the workbook to apply the protection. Your workbook is now protected, and users will need the password to open or modify it.

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	Name	Age	Occupat	ion							
	John	25	Engineer		1						
	Mary	30	Teach								
	Tom	22	Student								
	Alice	35	Doctor								
	Bob	28	Programmer		1						
					-						_
-											
	Alice	35	Doctor								1

#### **Related Exercises:**

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- 1 Create a 'SalesData.xlsx' Excel file and protect the 'SalesData' sheet using the password 'Secure123.'
- 2 Create a 'Confidential.xlsx' Excel file and protect the 'Confidential' sheet using the password 'Secret789'. Modify the password from 'Secret789' to 'Classified987.' Ensure that the new password is required to unprotect the sheet.

# **EXERCISE 64 : Use flash fill techniques**

# **Objectives**

- At the end of this exercise you shall be able to
- use flash fill techniques in your worksheet.

# Requirements

### **Tools/Materials**

- PC/Laptop with Windows OS
- MS Excel 2013 or Higher

# Procedure

TASK 1: Given a column of full names use Flash Fill to split them into separate columns for first and last names

1 Data Preparation:

F17	7	▼   × ✓ f _x			
1	A	B	с	D	E
1		Student D	etails		
2	SI No	Name	First Name	Last Name	
3	1	John Smith			
4	2	Mary Johnson			
5	3	Robert Williams	-		
6	4	Emily Davis			
7	5	Michael Brown	0		
8	6	Jennifer Miller			
9	7	Christopher Wilson			
10	8	Jessica Martinez	12		
11	9	David Taylor	0	т. А. С.	
12	10	Sarah Anderson			
13					-

#### 2 Activate Flash Fill:

- In the adjacent cell where you want to apply Flash Fill, start typing the pattern you want Excel to recognize.
- For example, if you want to extract first names, type the first name in the adjacent cell.

## **COMPUTER SOFTWARE APPLICATION - CITS**

100	A	8	C .	D	E
1		Student I	Details		
2	SI No	Name	First Name	Last Name	
	1	John Smith	John		
4	2	Mary Johnson			
5	3	Robert Williams			
6	4	Emily Davis			
7	5	Michael Brown			
8	6	Jennifer Miller			
9	7	Christopher Wilson			
10	8	Jessica Martinez			
11	9	David Taylor			
12	10	Sarah Anderson			
13	-		2 V	12 17	

#### 3 Execute Flash Fill:

• Press Ctrl + E or go to the "Data" tab on the ribbon, and in the "Data Tools" group, click on "Flash Fill."

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٠ Similar steps can be applied in the Last Name to get the result.

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TASK 2: From a column containing full email addresses and other text, use Flash Fill to extract only the email addresses

1 Data Preparation:

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1 2	Email Details		
3	Full Data	Extracted Email Addresses	
4	john.doe@example.com - John's Email		
5	mary.smith@email.com - Mary's Email		
6	contact@company.com - General Contact Email		
7	info@website.org - Website Information Email		
8	support@example.net - Customer Support Email		
9	sales@company.com - Sales Department Email		
10	feedback@email.org - Customer Feedback Email		
11	admin@site.com - Admin Contact Email		
12	billing@service.net - Billing Department Email		
13	hr@corporation.com - Human Resources Email		
14			19

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#### 2 Activate Flash Fill:

In the adjacent cell where you want to apply Flash Fill, start typing the pattern you want Excel to recognize.

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84 ▼ i × √ fe john.do	e@example.com					¥
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3 Full Data	Extracted Ema Addresses	1				
4 john.doe@example.com - John's Email	john.doe@example.c	om				
5 mary.smith@email.com - Mary's Email						
6 contact@company.com - General Contact Email						
7 info@website.org - Website Information Email						
support@example.net - Customer Support Email						
sales@company.com - Sales Department Email						
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### 3 Execute Flash Fill:

Press Ctrl + E or go to the "Data" tab on the ribbon, and in the "Data Tools" group, click on "Flash Fill."

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#### 4 Review and Confirm:

Excel will attempt to recognize the pattern and automatically fill the cells below with the expected results.

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2	A	В	С
1	Email Details		
3	Full Data	Extracted Email Addresses	
4	john.doe@example.com - John's Email	john.doe@example.com	
5	mary.smith@email.com - Mary's Email	mary.smith@email.com	
6	contact@company.com - General Contact Email	contact@company.com	
7	info@website.org - Website Information Email	info@website.org	
8	support@example.net - Customer Support Email	support@example.net	
9	sales@company.com - Sales Department Email	sales@company.com	
10	feedback@email.org - Customer Feedback Email	feedback@email.org	
11	admin@site.com - Admin Contact Email	admin@site.com	51
12	billing@service.net - Billing Department Email	billing@service.net	
13	hr@corporation.com - Human Resources Email	hr@corporation.com	
14			

#### **Related Exercises:**

1 Extract the first names from the list of full names using Flash Fill?

Full Names	First Names
John Doe	
Jane Smith	
Alice Johnson	
Bob Brown	

2 Separate the email addresses into usernames and domains using Flash Fill.

Email Addresses	Username	Domain
john@example.com		
jane@example.com		
bob@example.com		
alice@example.com		

Hint: Separate the first email address into the "Username" and "Domain" columns (e.g., "john" in the Username column and "example.com" in the Domain column.

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# EXERCISE 65 : Perform Goal Seek, Solver & Scenarios on Data

# **Objectives**

At the end of this exercise you shall be able to

- perform Goal seek on data sheet to achieve your target
- use excel solver for data optimization & complex problem solving
- use scenario for various data sheet analysis.

# Requirements

### Tools/Materials

- PC/Laptop with Windows OS
- MS Excel 2013 or Higher

# Procedure

## a Goal Seek :

Goal Seek in Excel is a feature that allows you to find the value of a particular cell that achieves a desired result in another cell by adjusting the value of one input cell. It's often used in financial modeling, engineering, and other fields where you need to determine the input necessary to achieve a specific outcome.

TASK 1: Imagine you are managing the financial data for a company. The NET SALES are determined by the formula NET SALES = GROSS SALES * (PROFIT/100), and the ANNUAL PROFIT is the sum of the net sales from four quarters. Your goal is to set a target ANNUAL PROFIT (23, 00,000) and use the Goal Seek function to find the required PROFIT percentage for each quarter to achieve this target

ales Details			
Quarter	Gross Sales	Profit	Net Sale
Q1	₹ 2,850,000	20	
Q2	₹ 3,155,000	20	
Q3	₹ 2,940,318	20	
Q4	₹0	20	
		Annual Profit	
		Net Profit	₹ 2,300,000

1 Create an Excel table with the following columns:

#### 2 Formulas

- a In cell C3 (Profit (%) for Q1), enter the initial profit percentage (e.g., 20%).
- b In cell D9(Net Profit), enter the target annual profit value (e.g., ₹ 2,300,000).

Vinni)

c In cell D3 (Net Sales for Q1), enter the formula and press Enter Key.

D3	•	E 🗙 🗸	fx =[@	[Gross Sales]]*([@Profit]/1	.00)	
	A	В	с	D	E	F
1		Sale	s Detail	s		
2	Quarter	Gross Sales	Profit	Net Sales		
3	Q1	₹2,850,000	20	=[@[Gross Sales]]*([@Pro	fit]/100)	
4	Q2	₹ 3,155,000	20			
5	Q3	₹2,940,318	20			
6	Q4	₹0	20			
7						
8		Annual Profit				E
9		Net Profit		₹ 2,300,000	GY	
10						

Drag it in the below cells to get the Net Sales Value in Q2, Q3 & Q4 as shown below:

D4	*		fx =[@	[Gross Sales]]*([@Profit]/1	100)
	A	В	с	D	E
1		Sale	s Detail	s	
2	Quarter	Gross Sales	Profit	Net Sales	
3	Q1	₹ 2,850,000	20	₹ 570,000	
4	Q2	₹ 3,155,000	20	₹ 631,000	3
5	Q3	₹ 2,940,318	20	₹ 588,064	2
6	Q4	₹0	20	₹0	
7					
8		Annual Profit	1.		
9		Net Profit		₹ 2,300,000	

3 In cell D8 (SUM of NET SALES), enter the formula to sum the NET SALES from all four quarters:

D8	•	E 🗙 🗸	<i>f</i> _∞ =Su	m(Table3[Net Sales])	
	A	В	С	D	E
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2	Quarter	Gross Sales	Profit	Net Sales	
3	Q1	₹ 2,850,000	20	₹ 570,000	
4	Q2	₹ 3,155,000	20	₹631,000	
5	Q3	₹2,940,318	20	₹588,064	
6	Q4	₹0	20	₹0	
7			K		
8		Annual Profit		=Sum(Table3[Net Sales])	
9		Net Profit	1	₹ 2,300,000	

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1		Sale	s Detail	S	
2	Quarter	Gross Sales	Profit	Net Sales	
3	Q1	₹ 2,850,000	20	₹ 570,000	
4	Q2	₹ 3,155,000	20	₹631,000	
5	Q3	₹2,940,318	20	₹ 588,064	
6	Q4	₹0	20	₹0	
7					
8		Annual Profit		₹ 1,789,064	
9		Net Profit		₹ 2,300,000	
10					

### 4 Use Goal Seek

- a Select cell D8 (SUM of Net Sales).
- b Go to the "Data" tab in the Excel ribbon.



## **COMPUTER SOFTWARE APPLICATION - CITS**

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4 Q2	₹ 3,155,000	20	₹ 631,000				
5 Q3	₹ 2,940,318	20	₹ 588,064				
6 Q4	₹0	20	₹0	-		_	
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c Under "Data Tools," find and click on "What-If Analysis," then select "Goal Seek."

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4	02	₹3,155,000	20	₹ 631,000					
5	03	R 2,940,318	20	₹ 588,064					
6	Q4	20	20	40					
7									
0		Annual Profit	24	1,789,064					
9		Net Profit		₹ 2,300,000					
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#### 4 Set Goal Seek Parameters

In the Goal Seek dialog box:

- Set "Set cell" to the cell containing the SUM of Net Sales (D8).
- Set "To value" to the desired Target PROFIT (23,00,000).
- Set "By changing cell" to the cell containing the initial PROFIT percentage for Q4 (B6).

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#### 5 Run Goal Seek

Click "OK" in the Goal Seek dialog box. Excel will perform calculations to find the required PROFIT percentage for each quarter to achieve the target Annual Profit.

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#### 6 Review the Result

Excel will automatically adjust the PROFIT percentages for each quarter to achieve the target Annual Profit of 2,300,000.

#### TASK 2: You want to use Goal Seek to determine the number of units that need to be produced to achieve a target production cost of 50,0000, assuming fixed costs of 20,0000 and a variable cost per unit of 150

#### 1 Set Up the Initial Table

Create an Excel table with the following columns:

		Production Details		
2	Variable Cost per Unit	Number of Units	Production Cost per Unit	
i	₹150	₹ 1,000	1	1
5	Fixed Costs:	₹200,000		1
į,	Target Production Cost:	2 500 000		1

### 2 Formulas

- 1 In cell B4 (Number of Units), enter the initial number of units (e.g., 1,000).
- 2 In cell C4(Production Cost per Unit), enter the formula:

ć4		1 50	=85+(A4*8	64j	
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1	Variable Cost per Unit	Numb	er of Units	Production Cost per Uni	t
R	* 150	e)	1,000	=85+(A4*54)	
	Fixed Costs:	<b>E</b> )	200,000		
5	Target Production Cost:	•	500,000		
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#### 3 Press Enter

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Target Production Cost:	e	500,000		
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#### 3 Use Goal Seek

- 1 Select cell C4 (Production Cost per Unit).
- 2 Go to the "Data" tab in the Excel ribbon.
- 3 Under "Data Tools," find and click on "What-If Analysis," then select "Goal Seek."

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#### 4 Set Goal Seek Parameters

In the Goal Seek dialog box:

- Set "Set cell" to the cell containing the Production Cost per Unit (C4).
- Set "To value" to the desired Target Production Cost (Rs. 500,000).
- Set "By changing cell" to the cell containing the Number of Units (B4).

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#### 5 Run Goal Seek

Click "OK" in the Goal Seek dialog box. Excel will perform calculations to find the required Number of Units to achieve the target Production Cost.

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#### **Related Exercises:**

1 You are managing a project budget, and the total project cost (Total CostTotal Cost) is determined by the formula:

Total Cost=Fixed Costs+(Variable Cost per Unit×Number of Units)Total Cost=Fixed Costs+(Variable Cost per Unit×Number of Units)

You want to use Goal Seek to determine the required number of units if the fixed costs are \$10,000, and the target total cost is \$25,000.

2 In a manufacturing process, the production time per unit (Production TimeProduction Time) is determined by the formula:

Production Time=Fixed Time+(Variable Time per Unit×Number of Units)Production Time=Fixed Time+(Variable Time per Unit×Number of Units)

You want to use Goal Seek to determine the required number of units if the fixed time is 5 hours, and the target production time is 20 hours.

#### **b** Excel Solver:

Excel Solver is a powerful tool used for optimization and solving complex problems by finding the best solution based on a set of constraints. It is commonly used in operations research, engineering, finance, and other fields where optimization is required

#### Add Solver to your Excel worksheet

The Solver add-in is added with all versions of Microsoft Excel though it is not enabled by default. You need to manually add Solver to your Excel worksheet. To incorporate a Solver into your Excel worksheet, follow the below-given steps.

1 Open your Excel worksheet, click on Files-> Options.



2 The MS Excel options dialog box will appear. From the left side of the pane, click on the Add-Ins options.

Popular	Change the most popular options in Excel.	
Formulas	Change the most popular options in excer.	
Proofing	Top options for working with Excel	
Save	Show Mini Toolbar on selection ①	
Advanced	Enable Live Preview ①	
200009992	Show Developer tab in the Ribbon 🛈	
Customize	<u>C</u> olor scheme: Blue ∨	
Add-Ins	ScreenTip style: Show feature descriptions in ScreenTips	
Trust Center	Create lists for use in sorts and fill sequences: Edit Custom Lists	
Resources	When creating new workbooks	
	Use this font	
	Font size:	
	Default view for new sheets: Normal View	
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3 The Add-Ins screen will be displayed in the center. At the bottom of the screen where the **Manage box** is located, make sure that the **add-ins option** is selected in its field. Click on **Go**.

Popular	View and manage Microsoft Office	add-ins.	
Formulas	Province in the second s		
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	Internet Assistant VBA	C:\rosoft Office\Office12\Library\HTMLXLAM	Excel Add-in
	Invisible Content	C:\6\Microsoft Office\Office12\OFFRHD.DLL	Document inspector
	Lookup Wizard	lookup.xlam	Excel Add-in
	Person Name (Outlook e-mail recipients)	C:\s\Microsoft Shared\Smart Tag\FNAME.DLL	Smart Tag
	Solver Add-in	solver.xiam	Excel Add-in
	Document Related Add-ins		10
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	Add-in: Analysis ToolPak		
	Publisher:		
	Location: analys32.xll		
	Location: analysse.xii		
	Description: Provides data analysis tools f	or statistical and engineering analysis	
	Manage: Excel Add-ins	0	

4 The Add-Ins dialog box will appear. Check the Solver 'Add-ins' box and click on the OK button.

Add-Ins available:		
Analysis ToolPak	-	ОК
Analysis ToolPak - VBA Conditional Sum Wizard Euro Currency Tools		Cancel
Internet Assistant VBA		Browse
Solver Add-in		Automation
	-	
Solver Add-in		
Tool for optimization an	d equat	tion solving

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- 5 That's it; it will add the Solver tool to your Excel Worksheet.
- 6 The Solver add-ins programming tool is located on the Data tab, in the Analysis group.

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Get External Data ~	Refresh All - Connections	$\begin{array}{c c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \\ \\ \end{array} \end{array} \\ \begin{array}{c} \\ \\ \end{array} \end{array} \\ \begin{array}{c} \\ \\ \end{array} \\ \begin{array}{c} \\ \end{array} \end{array} \\ \begin{array}{c} \\ \\ \end{array} \end{array} \\ \begin{array}{c} \\ \\ \end{array} \\ \begin{array}{c} \\ \\ \end{array} \\ \begin{array}{c} \\ \\ \end{array} \end{array} \\ \begin{array}{c} \\ \\ \\ \\ \end{array} \\ \end{array} \\ \begin{array}{c} \\ \\ \end{array} \\ \begin{array}{c} \\ \\ \end{array} \end{array} \\ \begin{array}{c} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \\ \end{array} \\ $	K Clear Reapply Advanced	Text to Remove Columns Duplicates	Outline	?₄ Solver
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### TASK 1: Application of Excel Solver to Get Maximize Profit of Products

This company has some constraints that must be met to produce products:

- The combined production capacity is 300 units per day.
- The company needs 50 units of Software to fill an existing order.
- The company needs 40 units of Computer to fill an expected order.
- The company needs 40 units of Networking Kit to fill an existing order.

4	A B	C	D	E	F
1				B	-
2	Ma	ximize Pr	ofit of Produc	ts	
3					
4	Products	Units	Profit/Unit	Profit	
5	Software	25	₹ 6,000	₹150,000	]
6	Computer	25	₹ 50,000	₹1,250,000	
7	Netwrking Kit	25	₹ 3,000	₹75,000	
8	Total	75		₹1,475,000	
9					
10					

Step 1: First, go to the Data tab on your ribbon.

Then select Solver from the Analysis group.





#### Step 2:

- Select cell E8 as the objective cell / Set Target Cell of the Solver Parameter box.
- Besides the To: options select Max as we are trying the maximize the value of the cell.

-	A	8	с	D	Ε	F G H I I K I
1						Solver Parameters
2		Maxir	nize Pro	fit of Product	s	Set Target Cel: SESS 56 Solve
3						Equal To: Max Mg Value of: 0 Close
1		Products	Units	Profit/Unit	Profit	Guess
		Software	25	₹ 600	₹15,000	Subject to the Constraints: Options
6		Computer	25	₹ 5,000	₹125,000	A Add
		Networking Kit	25	₹ 300	₹7,500	Change
		Total	75		₹ 147,500	w Delete
				8		Eeb
0						

#### Step 3:

• In the By Changing Variable Cells, select the cell values we are mainly focusing on changing. Here, they belong to the range C5:C7.

Maxir	mize Pro	fit of Product	5	Set Target Cel: \$258 5%	Solve
-	· · ·			Equal To: Max Min Value of: 0 By Changing Cells:	Close
Products	Units	Profit/Unit	Profit	\$C\$5:\$C\$7	55
Software	25	₹ 600	₹ 15,000	Subject to the Constraints:	Options
Computer	25	₹5,000	₹125,000	* A	The second se
Networking Kit	25	₹ 300	₹ 7,500	gia di seconda di s	
Total	75		₹ 147,500	Rek	Reset All
0					Help

### Step 4:

• Now add the constraints by clicking on the Add button on the right of the box.

Set Target Cell: \$E\$8	<u>S</u> olve
equal To: OMax OMin OValue of: 0 By Changing Cells:	Close
\$C\$5:\$C\$7	ess
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Software	25	1 600	1 15,000	Cellisference: Company
Computer	25	₹ 5.000	₹ 125,000	1 56 44 - 55
Netwrking #	01 25	₹ 300	\$7,500	OK Canad Att Help
Total	75	3	₹147,500	OK Chros Pos Date

The company needs 50 units of Software to fill an existing order. •

	m	aximize Pro	fit of Products		-				
	Products	Units	Profit/Unit	Profit	Add Constraint Cell Reference			,	9
qſ	tware	25	₹ 600	\$ 15,000	K45	35 24	Constru	75. TK	1
ø	nputer.	23	₹ 5,000	₹ 125,000		6.		1.1.1.1	
ie	twrking Kit	25	₹ 100	₹7,500		Cancel 2	944	99	
	Total	75	1	₹ 147,500		50	4		

The company needs 40 units of Computer to fill an expected order. •

м	aximize Pro	fit of Products				
Products	Units	Profit/Unit	Profit	Add Constraint		)
Software	25	1 600	115,000	Criteforea:	Centrale	
Computer	25	45,000	125,000	<b>X</b> 36	a 4	N
Netwrking Kit	- 25	1 300	\$7,500	oc o	nos 550	194
Total	75		1147,500		الستنبيا ا	

The company needs 40 units of Networking Kit to fill an existing order.

M	aximize Pro	fit of Products						
Products	Units	Profit/Unit	Profit	Add Constraint				-
Settware	25	9.600	4.15,000	Cel Reference:			Centert	
Computer	75	\$3,000	€ 115,000	ECE?	54	+ -	-	D
Networking Kit	25	₹ 300	17,500	( or )	Caniel	E C	AM	and a
Total	75		₹ 147,500		-	-	and the local division of the	

The combined production capacity is 300 units per day. •

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k	Computer	25	1.5,000	125,000	1	3	8058		76	•	3	300		- 78
F	Netwiking Kit	25	₹ 300	₹ 7,500		1	OK.	1	Caincal			655		-
Г	Total	78		£147,500	1		-		. 27.32			Second 1		

#### Step 5:

• Once you are done with all the steps above, click on Solve at the bottom of the box.

By Changing Cells:     Image: Control of the constraints:     Close       \$C\$5:\$C\$7     Image: Constraints:     Options       \$C\$5 >= 50     Add       \$C\$5 >= 50     Add       \$C\$5 >= 40     Change	Set Target Cell: \$C\$5	<b>1</b>		<u>S</u> olve
Subject to the Constraints:         Options           \$C\$5 >= 50         Add           \$C\$6 <= 40         Change           \$C\$7 >= 40         Change           \$C\$8 = 300         Reset All	Equal To: O <u>M</u> ax OMi By Changing Cells:	n <u>V</u> alue of: 0		Close
SC\$5 >= 50         Add           \$C\$6 <= 40	\$C\$5:\$C\$7		Guess	
\$C\$6 <= 40 \$C\$7 >= 40 \$C\$8 = 300	Cubication the Constraints			
\$C\$7 >= 40 \$C\$8 = 300	Subject to the Constraints:			Options
\$C\$8 = 300 Reset All	\$C\$5 >= 50		Add	Options
	\$C\$5 >= 50 \$C\$6 <= 40 \$C\$7 >= 40			Options

#### Step 6:

- After that, the Solver Results box will appear.
- Now select the options and reports you want to prefer in this box. For the demonstration, we are choosing to enable the Keep Solver Solution option only.

Solver Results	
Solver found a solution. All constraints and conditions are satisfied.	d optimality Reports
O Keep Solver Solution	Answer A Sensitivity
O Restore Original Values	Limits

• Click on OK button, then you will get the output like this:

A	В	С	D	E
1				-
2	M	aximize Pro	ofit of Products	
3				
4	Products	Units	Profit/Unit	Profit
5	Software	220	₹ 600	₹132,000
6	Computer	40	₹5,000	₹ 200,000
7	Netwrking Kit	40	₹ 300	₹12,000
8	Total	300		₹ 344,000

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#### **Related Exercise:**

#### **Question1 : Employee Scheduling**

You are a manager responsible for scheduling employees for a customer service department. You want to minimize the total number of hours scheduled while ensuring adequate coverage during peak hours.

Shift	Monday	Tuesday	Wednesday	Thursday	Friday
9am - 5pm	4	3	4	5	4
1pm - 9pm	5	4	3	4	5
5pm - 1am	3	4	3	4	3

# Question: How should you schedule employees for each shift to minimize total hours scheduled while meeting staffing requirements for each day?

Using Solver:

- 1 For each example, set up the objective function to maximize or minimize.
- 2 Define the decision variables and constraints based on the problem.
- 3 Access the Solver tool in Excel, specify the objective cell, decision variables, and constraints.
- 4 Run Solver to find the optimal solution.

#### c Scenarios on data

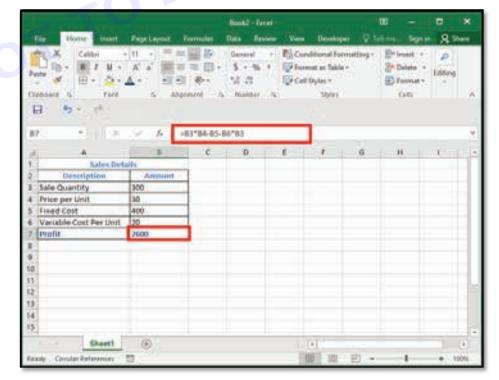
Excel scenarios allow you to create and save different sets of values that can be quickly substituted into your worksheet

TASK 1:

#### 1 Create Dataset with Proper Parameters

Suppose, that we are going to sell a book and would like to know how the Sale Units, Price per Unit, and Variable Cost per Unit can affect the final profits. The profit is dependent on Sale Units (Cell B2), Price per Unit (Cell B3), and the Variable Cost per Unit (Cell B5). Therefore, type the below formula in cell B7.

= B3*B4-B5-B6*B3



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#### 2 Make Scenario Manager

Now if you want to know how to use scenario manager in Excel, let's set up a Scenario Manager. To do that, follow the instructions below:

• First of all, from your Data tab, go to,

 $\textbf{Data} \rightarrow \textbf{Forecast} \rightarrow \textbf{What-If Analysis} \rightarrow \textbf{Scenario Manager}$ 

					Book2 - Excel			œ	-		×
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	External Data ~	New Query - Do Get & Transform	Refresh All - Connections	Sort &	Advanced	Conditinity	₩ 1-0 1-1 4-3 3-3 - 60 1 Tools	nalysis •	orecast Sheet	Outline	^
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в	7	• : ×	√ f _×	=B3*B4-B5-B	6*B3			Data <u>T</u>	able		~
		A	В	с	D	E	F G	н	c II	1	
1		Sales Det	tails								
2		Description	Amount								
3	Sale Q	uantity	300								
4	Price p	per Unit	30								
5	Fixed	Cost	400								
6	Variab	le Cost Per Unit	20								
7	Profit		2600								
8											
9											
10											
11											
12											
13											
14								-			
15										-	-
	4 - F	Sheet1	۲		OK	1 4					Þ
Re	ady Cir	cular References	20			III	(I) (I)	-	1	+ 10	0%

 As a result, a Scenario Manager dialogue box will appear in front of you. From the dialog box, click on Add option.

		Add
		Delete
	oose Add to add scenarios.	Edit
		Merge
		Summary.
Changing cells:		
Comment:		



 In the prompted Add Scenario dialogue box, fill in the required details. Enter a name (Worst Case) for the Scenario name Add any comment that you wish to into the Comment box. Or you can also leave it blank. As for the Changing cells, fill in all the reference cells (B3,B4,B6 in this case) that contain the input values. Please note that the references must be separated by commas. Or, just press the CTRL key on your keyboard and select all the cells, one by one, that contain the input values. At last, press the OK option.

Add Scenario	?	×	
Scenario <u>n</u> ame:			
Worst Case			
Changing cells:			
SB\$3, \$B\$4, \$B\$6		1	
Ctrl+click cells to select non-adjacent changing Comment:	cells.		
Created by SDEVLOOP on 2/20/2024			
		Y	LE
Protection       Prevent changes       Hide	UBL	Þ	
DERE	ок Са	ncel	

Hence, the Scenario Values dialogue box pops up. Fill in the Scenario Values dialog box with the input
values that define the worst case, and press the Add option to add another scenario. Click on OK, and the
Worst Case scenario will be successfully created.

X	?			io Values	Scenar
	ls.	hanging c	ch of the c	lues for eac	Enter va
			300	SB\$3	<u>1</u> :
			30	SBS4	<u>2</u> :
			20	SBS6	<u>3</u> :
	Cano	OK	20		<u>3</u> : <u>A</u> d

 Since we'd like to create another scenario, we click on Add. After clicking on Add, another Add Scenario dialogue box will appear. Use the same approach that we applied when creating the Worst Case scenario to build the Best Case scenario. Please note that Excel has set changing cells for the worst-case scenario as the default changing cells for the best-case scenario. The details are given in the following screenshot.

**COMPUTER SOFTWARE APPLICATION - CITS** 

	io Values	
Enter va	alues for ea	ch of the changing cells.
1	SBS3	5000
<u>2</u> :	SBS4	30
3:	\$B\$6	20

• With the same approach, create the Most Likely Case Here the below screenshot presents the details.

Scenari	io Values			?	×
Enter va	lues for ea	ch of the	changing ce	lls.	
1:	SBS3	3000			
<u>2</u> :	SBS4	30			
<u>3</u> :	\$B\$6	15			
			ок	Car	ncel

You can also use the same above approach to creating other scenarios if you have other combinations
of input values. In this example, we assume that there are only 3 scenarios available and thus we click
on the OK button in the Scenario Values dialogue box. Now, you can see that three scenarios have been
successfully created and they are listed in sequence. Click on Close, and the Scenario Manager dialogue
box will be closed.

Worst Case Best Case		A	<u>A</u> dd	
Most Likely Case			Delete	
			Edit	
			Merge	
		-	S <u>u</u> mmary	
Changing cells:	SBS3,SBS4,SBS6			
Comment:	Created by SDEV Modified by SDE			

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#### 3 View Different Scenarios

So far, you have saved all of those 3 scenarios in your workbook. If you go to the Data tab and click on What-If Analysis in Forecast Group, then choose Scenario Manager in the drop-down, you will see the same Scenario Manager dialogue box as that is shown in the below screenshot.

Scenarios: Worst Case		( A44 )	
Best Case		<u>A</u> dd	
Most Likely Case		Delete	
		Edit	
		Merge	
	-	S <u>u</u> mmary	
hanging cells:	SBS3, SBS4, SBS6	N	
Comment:	Created by SDEVLOOP of Modified by SDEVLOOP		

The Scenario Manager dialogue box is no longer blank. Now you can view the result from each of the scenarios by simply double-clicking on any scenario.

To view a specific scenario and its corresponding outputs, you can click on that scenario and then click on the Show button at the bottom. For example, if we double-click on Best Case, the input values in the Excel worksheet will change into what has been filled for Best Case, and the output value will be calculated automatically based on the formula in cell B7. The dataset will change automatically.

Mart Care		Add
Best Case Most Likely Cast	Delete	
		Edit
		Summary
Changing cells:	SB\$3, \$6\$4, \$6\$6	***
Comment:	Created by SDEVLOOP	on 2/20/2024



B	7 • •	$\checkmark f_x$	=B3*B4-B5-B	6*B3
2	А	В	С	D
1	Sales Det	ails		
2	Description	Amount		
3	Sale Quantity	5000		
4	Price per Unit	30		
5	Fixed Cost	400		
6	Variable Cost Per Unit	20		
7	Profit	49600		
8				

#### 4 Create Scenario Summary Report in Excel

Excel can create a summary report based on the saved scenarios. Now let's see how to make a summary report. To do that, follow the instructions below:

• First of all, from your Data tab, go to,

### $\textbf{Data} \rightarrow \textbf{Forecast} \rightarrow \textbf{What-If Analysis} \rightarrow \textbf{Scenario Manager}$

• After that, a Scenario Manager dialogue box will appear in front of you. From the Scenario Manager dialog box, click on the Summary option.

Worst Case Best Case		<u>A</u> dd
Most Likely Case		Delete
		Edit
		Merge
	-	S <u>u</u> mmary
Changing cells:	SBS3,SBS4,SBS6	W
Comment:	Created by SDEVLOOP	on 2/20/2024

## **COMPUTER SOFTWARE APPLICATION - CITS**

• After clicking on Summary, a Scenario Summary dialog box appears for you to put Result cells (B7 in this case) and choose between Scenario summary. At last, press the OK option.

Scenario Summary	?	×
Report type		
O Scenario summary		
O Scenario PivotTabl	e report	
Scenario <u>PivotTabl</u> <u>Result cells:</u>	e report	
	e report	1

As a result, you will be able to create the scenario summary report

	1								
z		A	В	C	D	E	F	G G H	
	1			h Iù					
	2		Scenario	Sumn	nary				
	2 3 5 6				Current Values:	Worst Case	Best Case M	ost Likely Case	
	5		Changing	Cells:					
	6			\$B\$3	5000	300	5000	3000	
	7			\$B\$4	30	30	30	30	
	8			\$B\$6	20	20	20	15	
	9		<b>Result Ce</b>	lls:				2	
	10			\$B\$7	49600	2600	49600	44600	
	7 8 9 10 11 12		Notes: Cu	Irrent \	/alues column rep	presents values of	f changing cells	at	
	12		time Scen	ario Su	immary Report wa	as created. Chang	ing cells for eac	h	
	13		scenario a	are high	lighted in gray.				
	14		CONTRACTOR STRUCTURE	Contraction of the second s	Contraction and Californian Deep				

#### **Related Exercises:**

#### **Question 1: Sales Projection Scenarios**

Suppose you have a sales projection table like this:

Month	Scenario A	Scenario B	Scenario C
January	1000	1200	900
February	1100	1300	950
March	1050	1250	920

### Question: How can you use Excel scenarios to compare different sales projections for the first quarter? Steps to do :

- 1 Fill in the actual budget allocations in the "Actual" column.
  - 2 Go to the "Data" tab, click on "What-If Analysis," and select "Scenario Manager."
  - 3 Click on "Add" to create new scenarios, naming them as needed (e.g., Scenario 1, Scenario 2).
  - 4 Input different budget allocations for each scenario.
  - 5 By switching between scenarios, you can compare the impact of different budget allocations on departmental spending.

#### **Question 2: Project Timeline Scenarios**

Imagine a project timeline table like this:

Task	Duration (Days)	Scenario 1	Scenario 2
Research	10		
Development	20		
Testing	15		
Deployment	5		

### Question: How can you use scenarios to analyze different project completion timelines?

Steps to do:

- 1 Enter the duration of each task in the "Duration (Days)" column.
- 2 Go to the "Data" tab, click on "What-If Analysis," and select "Scenario Manager."
- 3 Create new scenarios (e.g., Scenario 1, Scenario 2) and input different durations for each task.
- 4 By comparing scenarios, you can assess how adjustments in task durations impact the overall project timeline.



# EXERCISE 66 : Use different types of cell references

# **Objectives**

At the end of this exercise you shall be able to

• use different types of cell references in your tasks.

## Requirements

### **Tools/Materials**

- PC/Laptop with Windows OS
- MS Excel 2013 or Higher

# **Procedure**

In Excel, there are three main types of cell references: relative, absolute, and mixed. Using different types of cell references can be helpful when creating formulas that you plan to copy or fill to other cells.

#### TASK 1: Different types of Cell References

### Method 1: Relative Cell Reference

A relative cell reference adjusts when you copy the formula to other cells.



In a scenario where the objective is to establish a formula P (Price) equals INR (Indian Rupees), the suggestion is to create a single formula in cell E3 and then copy it to other rows to avoid the need for a new formula for each row. The emphasis is on using relative references to ensure the formula calculates the total for each item correctly.

4	А	В	CC	D	E
1		I	NTEREST C	ALCULATION	
2	SL NO	NAME	SALARY	NO. OF YEAR	INTEREST RATE(12%)
3	1	ANU.R	4700	5	
4	2	ARUNIMA.R	3500	4	
5	3	ARYA.A.R	1100	8	
6	4	ASWATHY.K	2500	3	
7	5	BISMINA.S	4000	2	
8	6	ISHA.S.S	4500	7	
9	7	KARTHIKA. B.B	1500	6	
10	8	RESHMA.R	5500	3	
11	9	RIYA.L	3800	4	
12	10	SREEDHA.A	6000	9	
13 14					



1	INTEREST CALCULATION							
2	SI No	Name	Principal Amount	No of Years	Interest	Rate of Interest		
3	1	ANU.R	4700	5		12%		
4	2	ARUNIMA.R	3500	4				
5	3	ARYA.A.R	1100	8				
6	4	ASWATHY.K	2500	3	~			
7	5	BISMINA.S	4000	2				
8	6	ISHA.S.S	4500	7				
9	7	KARTHIKA. B.B	1500	6				
10	8	RESHMA.R	5500	3				
11	9	RIYA.L	3800	4	C			
12	10	SREEDHA.A	6000	9				

Step 1: Select the cell that will contain the formula. In our example, we'll select cell E3.

**Step 2:** Enter the formula to calculate the desired value. In our example, we'll type=(C3*D3)*(12/100). And Press Enter on your keyboard. The formula will be calculated, and the result will be displayed in the cell.

4	А	В	C	D	E	F	G	н
1		II	NTEREST CA	LCULATION				
2	SI No	Name	Principal Amount	No of Years	Interest	Rate of Interest		
3	1	ANU.R	4700	5	=[@[Principal Ar	mount]]*[@[No	of Years]]	12/100
4	2	ARUNIMA.R	3500	4				
5	3	ARYA.A.R	1100	8				
6	4	ASWATHY.K	2500	3				
7	5	BISMINA.S	4000	2				
8	6	ISHA.S.S	4500	7				
9	7	KARTHIKA. B.B	1500	6				
10	8	RESHMA.R	5500	3				
11	9	RIYA.L	3800	4				
12	10	SREEDHA.A	6000	9				
13								

1		LI LI	ITEREST CA	LCULATION		
2	SI No	Name	Principal Amount	No of Years	Interest	Rate of Interest
3	1	ANU.R	4700	5	2820	12%
4	2	ARUNIMA.R	3500	4		
5	3	ARYA.A.R	1100	8		
6	4	ASWATHY.K	2500	3		
7	5	BISMINA.S	4000	2		
8	6	ISHA.S.S	4500	7		
9	7	KARTHIKA. B.B	1500	6		
10	8	RESHMA.R	5500	3		
11	9	RIYA.L	3800	4		JE
12	10	SREEDHA.A	6000	9		

Step 3: Select the cell E3. The fill handle will appear in the bottom-right corner of the cell.

**Step 4:** Click and drag the fill handle over the cells. Select cells E3:E12, Release the mouse. The formula will be copied to the selected cells with relative references, displaying the result in each cell.

1	INTEREST CALCULATION								
2	SI No	Name	Principal Amount	No of Years	Interest	Rate of Interest			
3	1	ANU.R	4700	5	2820	12%			
4	2	ARUNIMA.R	3500	4	1680				
5	3	ARYA.A.R	1100	8	1056				
6	4	ASWATHY.K	2500	3	900				
7	5	BISMINA.S	4000	2	960				
8	6	ISHA.S.S	4500	7	3780				
9	7	KARTHIKA. B.B	1500	6	1080				
10	8	RESHMA.R	5500	3	1980				
11	9	RIYA.L	3800	4	1824				
12	10	SREEDHA.A	6000	9	6480				

Note: Double-click the filled cells to check formulas for accuracy. The relative cell references should be different for each cell, depending on their rows.

#### Method 2: Absolute references

Excel Absolute Reference refers to a' locked' reference so that the address of its corresponding row and column does not change when copied.

• \$A\$2 –Denote the column and the row do not changed when copied

In the example below, we're going to use cell E3 (which contains the Interest rate at 12%) to calculate the interest for each item.

1	INTEREST CALCULATION							
2	SI No	Name	Principal Amount	No of Years	Interest	Rate of Interest		
3	1	ANU.R	4700	5	1	12%		
4	2	ARUNIMA.R	3500	4				
5	3	ARYA.A.R	1100	8				
6	4	ASWATHY.K	2500	3				
7	5	BISMINA.S	4000	2				
8	6	ISHA.S.S	4500	7				
9	7	KARTHIKA, B.B	1500	6		51		
10	8	RESHMA.R	5500	3				
11	9	RIYA.L	3800	4				
12	10	SREEDHA.A	6000	9				

**Step 1:** Input the formula in the selected cell (E3) to compute the desired value. In this instance, the formula will be =(C3*D3)*(\$F\$3), with **\$F\$3** being specified as an absolute reference.

4	A	8	C	D	E	F	G	H
		II	ITEREST CA	LCULATION				
2	SI NO	Name	Principal Amount	No of Years	Interest	Rate of Interest		
3	1	ANU.R	4700	5	≠[@[Principal Ar	nount]]*[@[No	of Years]]	SESS
4	2	ARUNIMA.R	3500	4				
5	3	ARYA.A.R	1100	8				
6	4	ASWATHY.K	2500	3		-		
7	5	BISMINA.S	4000	2		_		
8	6	ISHA.S.S	4500	7				
9	7	KARTHIKA. 8.8	1500	6				
10	8	RESHMA_R	5500	3				
11	9	RIYAL	3800	4				
12	10	SREEDHA.A	6000	9				

1	INTEREST CALCULATION							
2	SI No	Name	Principal Amount	No of Years	Interest	Rate of Interest		
3	1	ANU.R	4700	5	2820	12%		
4	2	ARUNIMA.R	3500	4				
5	3	ARYA.A.R	1100	8				
6	4	ASWATHY.K	2500	3				
7	5	BISMINA.S	4000	2				
8	6	ISHA.S.S	4500	7				
9	7	KARTHIKA. B.B	1500	6				
10	8	RESHMA.R	5500	3	-			
11	9	RIYA.L	3800	4				
12	10	SREEDHA.A	6000	9				

Step 2: Press Enter on your keyboard. The formula will calculate, and the result will display in the cell.

**Step 3:** Click and drag the fill handle across the cells where you intend to replicate the formula. Once you release the mouse, the formula will be copied to the designated cells, retaining the absolute reference, and the values will be automatically calculated in each corresponding cell.

4	Α	В	C	D	E	E.
1		11	NTEREST CA	LCULATION		
2	SI No	Name	Principal Amount	No of Years	Interest	Rate of Interest
3	1	ANU.R	4700	5	2820	12%
4	2	ARUNIMA.R	3500	4	1680	
5	3	ARYA.A.R	1100	8	1056	
6	4	ASWATHY.K	2500	3	900	
7	5	BISMINA.S	4000	2	960	
8	6	ISHA.S.S	4500	7	3780	
9	7	KARTHIKA. B.B	1500	6	1080	
10	8	RESHMA.R	5500	3	1980	
11	9	RIYA.L	3800	4	1824	
12	10	SREEDHA.A	6000	9	6480	

Double-click the filled cells to check their formulas for accuracy. The absolute reference should be the same for each cell, while the other references are relative to the cell's row.

#### Method 3: Mixed references

A Mixed cell reference is a mixture of both relative and absolute cell reference. In mixed cell reference, dollar signs are attached to either the row letter or the column number.

- \$A2 Denote the column does not changed when copied
- A\$2 Denote the row does not changed when copied.

1		II	ITEREST CA	LCULATION		
2	SI No	Name	Principal Amount	No of Years	Interest	Rate of Interest
3	1	ANU.R	4700	5		12%
4	2	ARUNIMA.R	3500	4		
5	3	ARYA.A.R	1100	8		
6	4	ASWATHY.K	2500	3		
7	5	BISMINA.S	4000	2		
8	6	ISHA.S.S	4500	7		-
9	7	KARTHIKA, B.B	1500	6		
10	8	RESHMA.R	5500	3		5
11	9	RIYA.L	3800	4	2	
12	10	SREEDHA.A	6000	9		

**Step 1:** Input the formula in the selected cell (E3) to compute the desired value. In this instance, the formula will be = (\$C3*\$D3)(\$F\$3), with \$F\$3 being specified as an absolute reference and \$C3 and \$D3 is the mixed reference.

2	A	B	C	D	E	F
16		II	ITEREST CA	LCULATION		
2	SI No	Name	Principal Amount	No of Years	Interest	Rate of
3	1	ANU.R	4700	5	=SC3*SD3*SFS3	12%
4	2	ARUNIMA.R	3500	4	8	S
5	3	ARYA.A.R	1100	8		-
6	4	ASWATHY.K	2500	3		2
7	5	BISMINA.S	4000	2		
8	6	ISHA.S.S	4500	7		2
9	7	KARTHIKA. B.B	1500	6		
10	8	RESHMA.R	5500	3		3
11	9	RIYA.L	3800	4		
12	10	SREEDHA.A	6000	9		

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4	Α	В	C	D	E	F	G
1		11	ITEREST CA	LCULATION			
2	SL NO	NAME	Principal Amount	NO. OF YEAR	INTEREST RATE		
3	1	ANU.R	4700	5	2820	Interest	12%
4	2	ARUNIMA.R	3500	4			
5	3	ARYA.A.R	1100	8			
6	4	ASWATHY.K	2500	3			
7	5	BISMINA.S	4000	2			
8	6	ISHA.S.S	4500	7			
9	7	KARTHIKA. B.B	1500	6			
10	8	RESHMA.R	5500	3			
11	9	RIYA.L	3800	4			
12	10	SREEDHA.A	6000	9		SI	
13							

Step 2: Press Enter on your keyboard. The formula will calculate, and the result will display in the cell.

**Step 3:** Click and drag the fill handle across the cells where you intend to replicate the formula. Once you release the mouse, the formula will be copied to the designated cells, retaining the absolute reference, and the values will be automatically calculated in each corresponding cell

1		II	ITEREST CA	LCULATION		
2	SI No	Name	Principal Amount	No of Years	Interest	Rate of Interest
3	1	ANU.R	4700	5	2820	12%
4	2	ARUNIMA.R	3500	4	1680	
5	3	ARYA.A.R	1100	8	1056	
6	4	ASWATHY.K	2500	3	900	
7	5	BISMINA.S	4000	2	960	
8	6	ISHA.S.S	4500	7	3780	
9	7	KARTHIKA. B.B	1500	6	1080	
10	8	RESHMA.R	5500	3	1980	
11	9	RIYA.L	3800	4	1824	
12	10	SREEDHA.A	6000	9	6480	

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#### **Related Exercises:**

#### **Question 1: Sales Commission Calculation**

Suppose you work as a sales representative and earn a commission based on the total sales amount. Your commission rate is 5% of total sales. You have a table with sales data for different months.

Month	Sales Amount (\$)	Commission Earned (\$)
January	\$5,000	
February	\$7,500	
March	\$6,200	
April	\$8,000	
May	\$9,500	

Calculate the commission earned for each month using a formula with absolute references?

#### **Question 2: Product Inventory Management**

Suppose you run a small retail store and want to track the inventory levels of different products. You have a table with the product names and their current inventory counts:

Product	Inventory Count
Product A	100
Product B	50
Product C	75
Product D	120
Product E	80

Calculate the percentage of inventory remaining for each product using a formula with absolute references?

Solution: You can calculate the percentage of inventory remaining as (Inventory Count / Total Inventory) * 100%.

#### **Question 3: Monthly Expense Analysis**

Suppose you are analyzing your monthly expenses and want to calculate the percentage of each expense category relative to the total expenses. You have a table with the expense categories and their amounts:

Category	Amount (\$)
Groceries	\$300
Dining Out	\$200
Utilities	\$150
Transportation	\$100
Entertainment	\$150

Calculate the percentage of each expense category relative to the total expenses using a formula with relative references?

**Solution:** You can calculate the percentage of each expense category relative to the total expenses by dividing the amount of each category by the total expenses, multiplied by 100. Here's the formula you can use in the "Percentage of Total Expenses (%)" column:

#### = (B2 / SUM(B\$2:B\$6)) * 100

# **EXERCISE 67 : Use R1C1 notation**

## **Objectives**

At the end of this exercise you shall be able to

• use R1C1 notation in your worksheet.

## **Requirements**

## **Tools/Materials**

- PC/Laptop with Windows OS
- MS Excel 2013 or Higher

## Procedure

R1C1 notation is an alternative way of referencing cells in Microsoft Excel, as opposed to the more common A1 notation. In R1C1 notation:

- R stands for Row.
- C stands for Column.
- The numbers following R and C represent the row and column numbers, respectively.
- The basic format of an R1C1 reference is R[row]C[column].

For example:

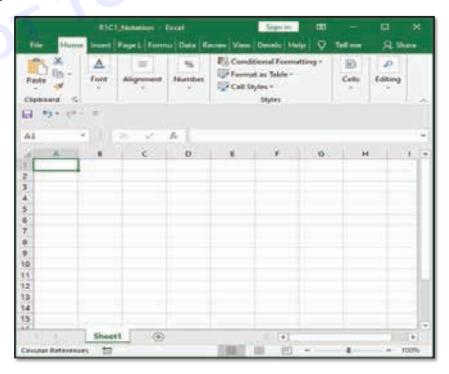
- R1C1 refers to the cell in the first row and first column.
- R2C3 refers to the cell in the second row and third column.

In addition to explicit cell references, you can use relative references in R1C1 notation. For instance:

- RC[-1] refers to the cell in the same row and one column to the left of the active cell/current cell.
- R[2]C refers to the cell two rows below and in the same column.

How to Switch to R1C1 Notation in Excel:

1 Open Excel.





2 Go to the "File" tab. Now you can see the Excel in A1 reference style.

	- 74	R1C	1_Notation - E	ixcel		Sign in	Ξ	-		×
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## 3 Select "Options." from File menu

	R1C1_Notation - Excel	Sign in ? — 🗆
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Info	Blank workbook	
Save	<u> </u>	More templates $\rightarrow$
Save As	Recent Pinned	
	Recent	
Print	D Name	Date modified
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Export	ade Documents	1h ago
Publish	employee Downloads	1h ago
Account	Employee Downloads	1h ago
Feedback	Book1 Downloads	1h ago
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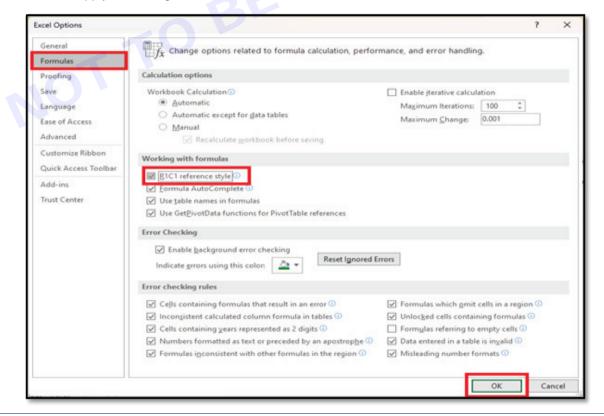
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Seneral	Change options related to formula calculation, perfor	mance and error handling
Formulas	Effx Change options related to formula calculation, perfor	mance, and error nandling.
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	Indicate grors using this color:       Reset Ignored E         Error checking rules       Cells containing formulas that result in an error ①         Incongistent calculated column formula in tables ①       Cells containing years represented as 2 digits ①         Cells containing text car preceded by an apostrophe ①       Formulas inconsistent with other formulas in the region ①	<ul> <li>Formulas which gmit cells in a region ①</li> <li>✓ Unlocked cells containing formulas ①</li> <li>Formulas referring to empty cells ①</li> <li>✓ Data entered in a table is invalid ①</li> <li>✓ Misleading number formats ①</li> </ul>

4 In the Excel Options dialog box, go to the "Formulas" category.

- 5 Look for the "Working with formulas" section.
- 6 Check the box for "R1C1 reference style."
- 7 Click "OK" to apply the changes.



Once switched, you'll notice that the column headers change from letters (A, B, C, etc.) to numbers (1, 2, 3, etc.), indicating the R1C1 notation mode.

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## TASK 1: Sum of Two numbers using R1C1

### Step 1: Switch to R1C1 Notation

Follow the steps from the previous answer to switch to R1C1 notation.

	1	2	3	24
1	Sum	of Numbers		
2	Numbetr 1	Number 2	Sum	
31	10	54		
ŧ	20	25		
5	25	26		
5	12	32		
7	28	25		
		1		



#### Step 2: Write the Formula

In cell R3C3, enter the following formula using R1C1 notation:

	Cirpbourd	181		ont	121	
	<b>5</b> •∂-⊽		_			
R3	C2 -	× v	f _x	=RC[-2]+R	C[-1]	
	1	2	3	4	5	
1	Sum	of Numbers				
2	Numbetr 1	Number 2	Sum			
3	10	=F	C[-2] <b>+RC[</b>	[-1]		
4	20	25				
5	25	26				
6	12	32				
7	28	25				
8						

This formula instructs Excel to sum the value in the cell two columns to the left (column A ie, C[-2]) from the current cell(R3C3) and the value in the cell one column to the left (column Bie, C[-1])).

R3C3= RC[-2]+RC[-1]

## Step 3: Press Enter

Press Enter to execute the formula. Excel will calculate the sum and display the result in cell R3C3.

R4	R4C3 • : × • fx				
	1	2	3	4	
1	Sum	of Numbers			
2	Numbetr 1	Number 2	Sum		
3	10	54	64		
4	20	25			
5	25	26			
6	12	32			
7	28	25			
8					

#### Step 4:

Drag down from R3C3:R7C3 to obtain the result.

#### Result:

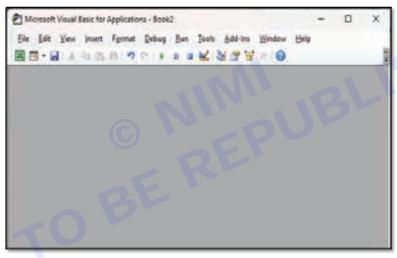
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63	a +	1 2.00	- 6-1	-9421-221+84					
2		201	1		0.001		102		
0	Surr	of Northern	an en en en						
2	Number 1	Number 2	Sum						
1	340	54	64						
ė	20	- 25	-43						
Ċ,	25	- 26	- 54						
6	3.2	. 32	-84						
t	28	21		500					
		1000		<b>H</b> 1					1
3									
1									
									4

## TASK 2 : Using R1C1 Reference in VBA

Step 1: Open the workbook in Excel.

	1	2	3	4	5
1		Sales Det	ails		
2	Product Name	Quantity	Price	Amount	
3	Key Board	14	700		
4	Mouse	25	500		
5	Pendrive	33	1000		
6	Hard Disk	34	5500		
7					

Step 2: Access VBA Editor: Press Alt + F11 to open the Visual Basic for Applications (VBA) editor.



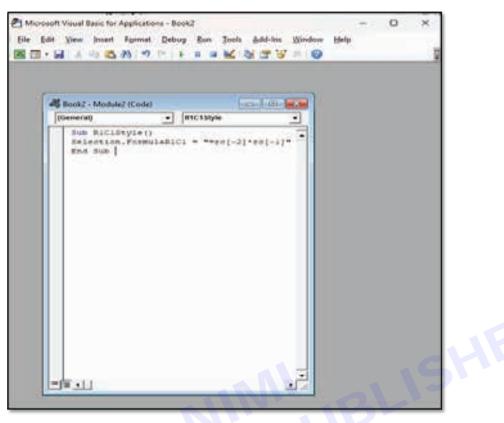
### Step 3: Insert a Module

- In the VBA editor, ensure that your workbook is selected in the left Project Explorer window.
- If there isn't an existing module, right-click on your workbook name, choose Insert, and then click on Module.

🛃 Microsoft Visual 8	Sasic for Applications - Boo	0		-	0	x
Project - VBAProject	File-	Bun Tools Add-Ins	Window Help	-		12.00
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Step 4: Write the Code:



#### **Explanation:**

- 1 Sub R1C1Style(): This line defines the beginning of a subroutine named R1C1Style. Sub indicates the start of a subroutine, followed by the name of the subroutine (R1C1Style), and parentheses to denote that it doesn't take any arguments.
- 2 Selection.FormulaR1C1 = "=rc[-2]*rc[-1]": This line sets the formula of the selected cell or range using R1C1 reference style. Here's the breakdown:
  - Selection: Refers to the currently selected cell or range in Excel.
  - .FormulaR1C1: Indicates that the formula will be assigned using R1C1 reference style.
  - =: Assignment operator used to assign the following formula to the selected cell(s).
  - "=rc[-2]*rc[-1]": The formula being assigned. In R1C1 notation:
  - rc[-2]: Refers to the cell in the same row (relative reference) and two columns to the left.
  - *: Represents the multiplication operator.
  - rc[-1]: Refers to the cell in the same row (relative reference) and one column to the left.
- 3 End Sub: Marks the end of the subroutine R1C1Style. This line tells VBA that the subroutine has finished and returns control to the main program.

In summary, this subroutine sets the formula of the selected cell(s) to multiply the value in the cell two columns to the left by the value in the cell one column to the left, using R1C1 reference style.

#### Step 5: Close VBA Editor:

• Close the VBA editor by clicking the close button or pressing Alt + Q.

#### Step 6: Run the Macro:

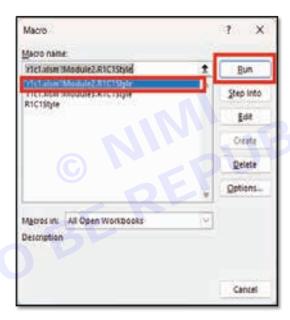
- Press Alt + F8 to open the "Macro" dialog.
- Choose the macro named " 'r1c1.xlsm'!Module2.R1C1Style" from the list.



## **COMPUTER SOFTWARE APPLICATION - CITS**

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And in case of the local division of the loc	Module2.R1C15tyle	Ť	Bun
r1c1.xlsm'lModule2.R1C1Style 'r1c1.xlsm'lModule3.R1C1Style R1C1Style		-	Step into
		3	Edit
			Create
		3	Delete
		-	Options
Macros in:	All Open Workbooks	~	
Description			

• Click "Run."



## **Result:**

R3	3C4 👻 :	×	f _x	=RC[-2]*R	C[-1]
	1	2	3	4	5
1		Sales Det	ails		
2	Product Name	Quantity	Price	Amount	
3	Key Board	14	700	9800	
4	Mouse	25	500	12500	
5	Pendrive	33	1000	33000	
6	Hard Disk	34	5500	187000	
7					
8					

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#### **Related Exercises:**

- 1 Create Mark Sheet of Students Using R1C1 Reference in VBA and Calculate the following:
  - Calculate Total and Average Marks
  - Calculate Average

Student Name	Python	JAVA	PHP	Total	Average
John	80	75	85		
Mary	85	90	80		
Alice	70	65	75		
Bob	75	80	70		

## 2 Create an EMI Calculator Using R1C1 Reference in VBA

EMI Calculator	
Amount	JEV
Rate of Interest	AN . 15M
Year	B
EMI C	- PU

# **EXERCISE 68 : Use array formula**

## **Objectives**

At the end of this exercise you shall be able to

• use various array formula in your tasks.

## Requirements

**Tools/Materials** 

- PC/Laptop with Windows OS
- MS Excel 2013 or Higher

## **Procedure**

## TASK 1: Calculating Total Marks of Students

In our first task we'll calculate the total marks for each student using an array formula in Excel. It's simple and easy. Just follow along.

Cale	ulating Total M	arks of Studen	
Calc	unating rotar M	arks of Studen	its
Name	Maths	Science	Total Marks
Arun	95	76	
Akhila	54	46	
Sona Sajeev	69	84	
Aliya	54	73	
Neelima	89	51	
Anna	52	50	
Rahul	74	72	
Varun Prakash	62	49	
Elizabeth	59	72	
Praveen	85	68	

Step 1: In Office 365, Select cell E5 and enter the following formula.

	E	p	
c	alculating Total M	arks of Studer	vts
Name	Matha	Science	Total Mark
Arun	95	76	#C5:C14+D5:
Akhila	54	46	1
Sona Sajeev	69	84	
Aliya	54	73	
Neelima	89	51	
Anne	52	50	
Rahul	74	72	
Varun Prakash	62	49	
Elizabeth	59	72	
Praveen	85	68	

## =C5:C14+D5:D14



• After that, press ENTER.

Calc	ulating Total M	arks of Studen	ts-
			15570
Neme	Mathe	Science	Total Mark
Arun	95	76	171
Akhila	54	46	100
Sona Sajeev	69	84	153
Aliya	54	73	127
Neelima	89	51	140
Anna	52	50	102
Rahul	74	72	146
Varun Prakash	62	49	111
Elizabeth	59	72	131
Praveen	85	68	153

Note: Check the image carefully until you see a light blue line around the cells in Column E. This is because they are in an array. We didn't use the Fill Handle or anything like that to fill these cells.

Here, we're using Microsoft Excel 365 version. So, we can run the array formula by pressing ENTER. But, in the older version do the following steps.

- So, first select E5:E14 and type the above formula in cell E5.
- After that, press CTRL + SHIFT + ENTER at a time.

	10	D	- E
Cale	ulating Total M	arks of Studen	da :
Name	Mathe	Science	Total Mark
Arun	95	76	171
Akhila	54	46	100
Sona Sajeev	69	84	153
Aliya	54	73	127
Neelima	89	51	140
Anna	52	50	102
Sahul	74	72	146
Varun Prakash	62	49	111
Elizabeth	59	72	131
Praveen	85	68	153

Note: After pressing these buttons, a pair of curly brackets will automatically be applied within two sides of the formula. You don't have to write them manually.

Also, you can't make any changes inside the cell of an array. Excel will not allow you to do this. If you ever try to do this kind of thing, the following phenomena will happen.

- Here, go to cell E8 and change the cell element to 5.
- After that, press ENTER.

Immediately, Excel will show a warning box on the display like the image below.

11 8 4 61	C	0	1.041
Calc	ulating Total M	arks of Studen	its.
Name	Maths	Science	Total Marks
Arun	95	76	171
Akhila	14	46	100
Sona Sajeev	69	84	153
Aliya	54	73	5
Neelima	89	51	140
Anna	52	50	102
Rahul	74	72	146
Varun Prakash	62	49	111
Elizabeth	50	72	131
Praveen	85	68	153
(enc	minuth Excert	×	
	A CONTRACTOR OF	a part of an array	
	a	Canal	

## TASK 2 : Determining Highest Marks Obtained

Now, we want to discover the highest marks obtained by the students on any of the two subjects. So, let's begin.

- Firstly, we've made an output range in **B16:C16**.
- Secondly, select cell C16 and write down the formula below.

### =MAX(C5:D14)

Here, the MAX function returns the maximum value among the numbers in this range.

• Lastly, press ENTER on the keyboard.

Determin	ning Highest M	larks
Name	Matha	Science
Arun	95	76
Akhila	54	46
Sona Sajeev	69	84
Aliya	54	23
Neelima	89	53
Anna	52	50
Rebut	74	72
Varun Prakash	62	49
Elizabeth	59	72
Prayeen	85	68

### TASK 3 : Excel Array Formula with Multiple Criteria

In this task, will show an array formula that will return a two-dimensional array with multiple criteria. Here, will be got the Name, Section, Subject, and Mark in columns B, C, D, and E consecutively. Also, will got Section A and Maths as the Subject in cells in the B16:E17 range

Now, we'll filter out the above array in the B5:E14 range with the criteria in the B16:E17 range. We can clearly see there are two criteria. One is Section, another is Subject. So, obviously, there are multiple criteria for filtering. So, without further delay, let's dive in!

• At first, copy the headings in the B4:E4 range and paste them into the B19:E19 range.

6 A	(20)	¢	0	. E	
	Агтау	Formula wi	th Multiple C	riteria	¢.
	tiama	Section	Subject	Mark	
	Arun	A	Mathu	26	
	Akhila	¢	English	46	
8	Sona Sajeev	A	Science	84	
	Aliya	- 0	History	73	
	Neelime	¢	Mathe	51	
ř.	Anna	A	English	50	
	Rahul	- 10	English	$\overline{n}$	
5	Varun Prakash	A	Maths	49	
8	Enzaboth	Elizabeth C Science	Science	72	
6	Praveen	A	Maths.	68	
	L. C.				
6	Sectio	n -	51	bject	
6	A			Aaths	

• Then, go to cell B20 and paste the following formula into that cell.

=FILTER(B5:E14,(C5:C14=B17)*(D5:D14=D17),"")

Here, **B5:E14** represents the range of the array. **C5:C14** serves as the Section column. B17 performs as the section to be filtered. **D5:D14** means the Subject column. Lastly, D17 acts as the subject to be filtered.

The FILTER function has three arguments. Here, B5:E14 is the array argument. And (C5:C14=B17)*(D5:D14=D17) is the include argument. Basically, this works like a Boolean array; it carries the condition or criteria for filtering. In this case, we've two criteria combined by a (*) sign.

• After that, tap **ENTER**.

110		9		and the second second	1.18	1.00	1.04
	heres	Formula wi	th Multiple Cr	iteria			
	. Neite	Inclusion	Tabjert	Mark			
	Anim	A .	Mathin.	16			
	Abhla	C	English	46	1		
	String Salaray	A	Science		1		
	Aliya .		History'	23			
	Newlinia	£	Silatin.	91	1		
	Alvia	A .	English	50	3		
	Rahul		Emglish	28			
	Varue Paskesh	A	Matho	-49			
	Elizabeth:	e	Science	72			
	Prevent	A	Mathie.	68			
					-		
	Secto		34	ujace .			
	A		- M	atha .	1		
		-	land -	CARE L			
	fierre	Section	Subject.	Mark			
	Arun	A	Mathe	196			
	Varue Prakash	A.	Mathe	0.4911	1		

Note: Filter function available in Excel 2021 and Above Versions.



400

### TASK 4 : Computing Total Cost based on Quantity

This example is actually fun to learn. You can apply this theory to other problems as well. Here, in Column B, we have the Quantity of Unit. And, in Column C, there is their corresponding Unit Price. In essence, we want to know how much this will cost if we order a certain quantity of units.

A	B	c	. 4
	Computing Total Cost ba	ised on Quantity	
		the state of the second	
	Quantity of Unit	Unit Price	
	1 to 10	₹ 20	
	11 to 20	₹ 19	
/	21 to 50	₹ 16	
	51 to 100	₹ 15	
	101 to 200	₹ 13	
0			
1	Quantity	80	
2	Total Cost		

From the picture above, we can see that the unit price is decreasing gradually with the increase in order amount. So, it will cost us less if we order in bulk. Let's see it in action.

• Initially, go to cell C12 and put the following formula into the cell.

=C11*IF(C11>=101,C9, IF(C11>=51, C8, IF(C11>=21, C7, IF(C11>=11, C6, IF(C11>=1, C5, "")))))

#### Formula Breakdown

IF(C11>=1, C5, " ") →The IF function checks whether a condition is met, and returns one value if TRUE, and another one if FALSE. Here, C11>=1 is the logical_test argument which compares the value of the C11 cell with 1. If this value is greater than or equal to 1 then the function returns the value of cell C5 (value_if_true argument) otherwise it returns blank(value_if_false argument).

#### Output $\rightarrow$ 20

• IF( C11>=11, C6, IF(C11>=1, C5, "")) → this becomes IF( C11>=11, C6, 20).

### Output $\rightarrow$ 19

• IF(C11>=21, C7, IF( C11>=11, C6, IF(C11>=1, C5, ""))) → this becomes IF(C11>=21, C7, 19).

#### $Output \rightarrow 16$

IF(C11>=51, C8, IF(C11>=21, C7, IF( C11>=11, C6, IF(C11>=1, C5, "")))) → this becomes IF(C11>=51, C8, 16).

#### $Output \to 15$

IF(C11>=101,C9, IF(C11>=51, C8, IF(C11>=21, C7, IF( C11>=11, C6, IF(C11>=1, C5, ""))))) → this becomes IF(C11>=101,C9, 15).

#### $Output \rightarrow 13$

C11*IF(C11>=101,C9, IF(C11>=51, C8, IF(C11>=21, C7, IF( C11>=11, C6, IF(C11>=1, C5, ""))))) → this becomes C11*15.

#### $Output \rightarrow 80^*15 \rightarrow 1200$

• Following this, press the ENTER key.

	1	6	0 T	F.:	(f)
¢	omputing Total Cost be	sed on Quantity	-		
	Quantity of Unit	Unit Price			
	1 to 10	< 20			
	11 to 20	₹19			
	21 to 50	₹16			
-	51 to 100	R15			
	101 to 200	<b>113</b>			
1	Quantity	80			
	Total Cost	1200			

## TASK 5 : Finding out Average of Positive Numbers

In this worksheet, you see there are some numbers in Column B of the worksheet. Some numbers are positive, and some numbers are negative. We are going to find out the average of the positive numbers in this range.

A	В	c	D
1			
2	Finding out Average	of Positive Numbers	
3			
4	Numbers	Average	
5	15		
6	-5		
7	14		
8	-8		
9	-98		
10	45		
11	78		
12	65		
13	54		
14	-25		

You can do it in two ways. The first way is: separate the positive numbers manually, create a new range, and at the end use the AVERAGE function to find out the average of the positive numbers. Another way is: we can use an array formula. It will save us time and effort. So, without further delay, let's see how we can do it.

### Steps:

• Primarily, go to cell C5 and enter the following formula.

### =AVERAGE(IF(B5:B14>0,B5:B14,FALSE))

#### Formula Breakdown

Observe closely the arguments of the IF function. You know how the IF function works. If the first argument of the function is TRUE, then the second argument is returned by the IF function. If the first argument is FALSE, then the third argument is returned by the IF function. Arguments are separated by commas.

In our case, the third argument is FALSE, so if the first argument is FALSE, then the IF function will return the FALSE statement.



OKAY! The main focus is now on the first argument and the second argument. You see the first argument is a range, and the second argument is also a range. And the whole formula is an array formula.

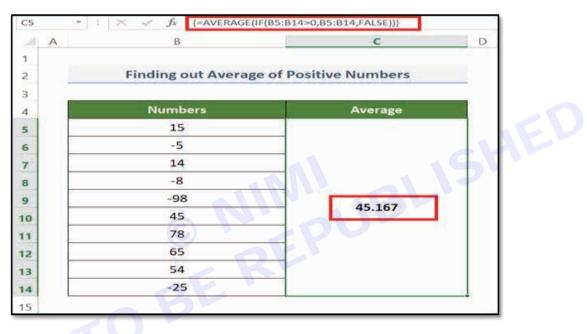
- IF(B5:B14>0,B5:B14,FALSE) → here Excel will create an array internally with the positive numbers and False statements.
- Output  $\rightarrow$  {15, FALSE, 14, FALSE, FALSE, 45, 78, 65, 54, FALSE}

AVERAGE(IF(B5:B14>0,B5:B14,FALSE))  $\rightarrow$  this becomes AVERAGE({15, FALSE, 14, FALSE, FALSE, 45, 78, 65, 54, FALSE}).

### • Output $\rightarrow$ 45.167

The AVERAGE function finds out the average of the values in the array, except the FALSE values, the False values are not numbers, so the AVERAGE function neglects the FALSE values.

• As usual, press ENTER.



### **Related Exercises:**

- You are managing a bookstore and want to calculate the total revenue generated by each genre of books over a specific period. Create an Excel spreadsheet with the following details:
  - Column A: Book titles.
  - Column B: Genre of each book.
  - Column C: Unit price for each book.
  - Column D: Number of units sold for each book.
  - Row 1: Use an array formula to calculate the total revenue generated by each genre by summing the revenue from each book sold in that genre. Ensure that the array formula adjusts correctly for each genre as you copy it across.
- You are organizing a charity event and want to track the donations received from different sources. Create an Excel spreadsheet with the following details:
  - Column A: Donation amounts.
  - Column B: Donation sources (e.g., Individuals, Corporations, Organizations, etc.).
  - Row 1: Use an array formula to calculate the total donations received from each source by summing the donations from each source. Ensure that the array formula adjusts correctly for each donation source as you copy it across.

- You are analyzing the performance of different marketing campaigns and want to calculate the conversion rate for each campaign based on the number of leads generated and the number of conversions. Create an Excel spreadsheet with the following details:
  - Column A: Campaign names.
  - Column B: Number of leads generated by each campaign.
  - Column C: Number of conversions from leads for each campaign.
  - Row 1: Use an array formula to calculate the conversion rate for each campaign by dividing the number • of conversions by the number of leads generated. Ensure that the array formula adjusts correctly for each campaign as you copy it across.
- You are managing a restaurant and want to analyze the popularity of different menu items. Create an Excel spreadsheet with the following details:
  - Column A: Menu item names.
  - Columns B through G: Weekly sales figures for each menu item for the past six weeks (varying values).
  - .e.s .e.sales figur. .s you copy it acros

# **EXERCISE 69 : Audit excel formula**

## **Objectives**

### At the end of this exercise you shall be able to

- use various Audit Excel formulas in your task for trouble shooting errors in large data sheets
- · check the accuracy of financial reports quickly.

## Requirements

### **Tools/Materials**

- PC/Laptop with Windows OS
- MS Excel 2013 or Higher

## Procedure

#### TASK 1 : Trace Precedents

Trace Precedents displays tracer arrows from the cells showing the direction of information flow. You see a blue box around the cells when this method is active. However, one can press this button multiple times to catch additional levels.

• Choose a cell (D5), and visit the Trace Precedents option from the Formulas tab.

AutoSum *	Logical *      Logical *     Text *     Date & Time *     Date & Time *	ORMULAS DATA C Define N Name Manager Create fr Defined Nar	ormula - et Trace D rom Selection	recedents ependents e Arrows * Formula Auditing	Calculation Calculation
	fx .		-	F	
A B	C Using Trace F	D Precedents Tool	E	F	G
Loan Types	Principal Amount	Interest Amount	Monthly Payment		
Gold Loan	₹1,50,000	₹ 15,000	₹ 13,750		
Personal Loan	₹ 3,20,000	₹ 32,000	₹ 29,333		
Education Loan	₹ 1,00,000	₹ 10,000	₹ 9,167		
Housing Loan	₹ 6,80,000	₹ 68,000	₹ 62,333		
Vechicle Loan	₹ 3,40,000	₹ 34,000	₹ 31,167		
Interest Rate	10%				

 As a result, we will see two arrows from cell (C5) and cell (C11) indicating towards cell (D5) as the interest amount is calculated using the principal amount and interest rate.



121111111	_6 −c5*8c514				
-44	6	0		· · · · ·	-41 100
	Using Trace I	Precedents Tool			
Loso Types	Principal Amount	Interest Amount	Monthly Payment		
Gold Loan	+5 1,50,000	¥ 15,000	₹ 13,790		
Personal Loan	4.1,20,000	4 32,000	4.29,333		
Education Loan	11,00,000	1 10,000	13,167		
Housing Loan	16,80,000	4 68,000	4.62,333		
Vechicle Loan	1 3,49,000	9.34,000	1 33,567		
Interest Rate	10%				

#### TASK 2: Trace Dependents

In order to visually highlights the cells that depend on the value of a selected cell, you can try the Trace Dependents feature in Excel. This is a powerful tool for understanding the relationship between cells. Here, let's see how the interest rate is dependent on the cells.

• Simply, choose a cell (C11), and then visit the Trace Dependents feature from the Formulas tab.

FIL fo	E	RT PAGE LAYOUT	ORMULAS DATA	REVIEW VIEW		100	Sign ir
Inco	Recently Used		Defined		Calculati		
Funct	ion 🔲 Financial -	Date & Time *	i turire a		Options	s -	
	Function			Formula Auditing	Calcul	ation	
C11		fr 10%					
	АВ	с	D	E	F	G	н
1		Holes Trees F	and and Total				
2		Using Trace L	Dependents Tool				
3	Project	Principal Amount	Interest Amount	Monthly Payment			
5	Gold Loan	₹ 1,50,000	₹ 15,000	₹ 13,750			
6	Personal Loan	₹ 3,20,000	₹ 32,000	₹ 29,333			
7	Education Loan	₹ 1,00,000	₹ 10,000	₹ 9,167			
8	Housing Loan	₹ 6,80,000	₹ 68,000	₹ 62,333			
9	Vechicle Loan	₹ 3,40,000	₹ 34,000	₹ 31,167			
10							
11	Interest Rate	10%	]				
12							
13							
14							
15							
16							
17							
18							
19							

Finally, you will see the arrows from the cell (C11) to other cells indicating the cells that are dependent on the value
of the selected cell.



1		Using Trace D	Dependents Tool				
	Project	Principal Amount	Interest Amount	Monthly Payment			
	Gold Loan	₹ 1,50,000	₹ 15,000	₹ 13,750			
	Personal Loan	₹ 3,20,000	₹ 32,000	₹ 29,333			
	Education Loan	₹ 1,00,000	* * 10,000	₹ 9,167			
	Housing Loan	₹ 6,80,000	₹ 68,000	₹ 62,333			
	Vechicle Loan	₹ 3,40,000	₹ 34,000	₹ 31,167			
	Vecnicie Loan	13,40,00	1 34,000	131,107			
i i	Interest Rate	10%					

#### TASK 3: Remove Arrows

After inserting arrows using the above features, you can also delete them by utilizing the Remove Arrows option.

• Start with, selecting the cell (C11) and clicking the Remove Arrows option from the Formulas tab

∑ AutoSum * Recently Used Financial * Function	Date & Time -	Names - IS Remove	pendents 4 - GO	Calculation Calculation	
B	fr 10%	D	E	F	
	Using Remove	e Arrows Feature			
Project	Principal Amount	Interest Amount	Monthly Payment		
Gold Loan	₹ 1,50,000	₹ 15,000	₹ 13,750		
Personal Loan	₹ 3,20,000	32,000	₹ 29,333		
Education Loan	₹ 1,00,000	₹ 10,000	₹ 9,167		
Housing Loan	₹ 6,80,000	₹ 68,000	₹ 62,333		
Vechicle Loan	₹ 3,40,000	₹ 34,000	₹ 31,167		
Interest Rate	10%	1			

• Within a blink of an eye, the arrows will be removed.

#### TASK 4: Show Formulas

Show Formulas in Excel is a helpful tool that allows you to view the actual formulas within cells instead of their calculated results. This feature offers transparency into complex calculations, aiding in formula debugging and verification.

• While the worksheet is open, visit the Formulas tab and press the Show Formulas option.

Nimi)

In			Audit-Formulas -	Microsoft Excel	- 0 ×
9	Home Ins	ert Page Layout	Formulas Da	ta Review View	Developer 🥑 – 🕾 🗙
ns	ert tion 😰 Financial	lsed - 🙀 Text -	ile - Name Manager	Define Name - PUse in Formula - Create from Selection Defined Names	Formula Auditing
1	<b>7</b> - 04 +				Se Trace Precedents
	B13				Watch
	A B	c	D	Ε	Remove Arrows * A Evaluate Formula Window Formula Auditing
		Using Shov	v Formulas Tool		
	Project	<b>Principal Amount</b>	Interest Amount	Monthly Payment	
	Gold Loan	₹ 150,000	₹ 15,000	₹ 13,750	=
	Personal Loan	₹ 320,000	₹ 32,000	₹ 29,333	
	Education Loan	₹ 100,000	₹ 10,000	₹9,167	
R	Housing Loan	€ 680,000	₹ 68,000	₹ 62,333	
	Vechicle Loan	₹ 340,000	₹ 34,000	₹ 31,167	
(s					
0	10 C	h and a start of the start of t	2		

Immediately, all the cells with formulas will represent the formulas inside the cells.

	Usin	g Show Formulas Tool	
Project	Principal Amount	Interest Amount	Monthly Payment
Gold Loan	150000	#C5*\$C\$11	=(C5+D5)/12
Personal Loan	320000	=C6*\$C\$11	=(C6+D6)/12
Education Loan	100000	=C7*\$C\$11	=(C7+D7)/12
Housing Loan	680000	=C8*\$C511	=(C8+D8)/12
Vechicle Loan	340000	=C9*\$C\$11	=(C9+D9)/12
Interest Rate	0.1		

## TASK 5: Error Checking (Includes Error Checking, Trace Error, Circular References)

Sometimes while applying formulas, you will get errors like #DIV/0!, #VALUE!, #NAME? Errors. To check why it's happening you can visit Error Checking option from the Formula tab.

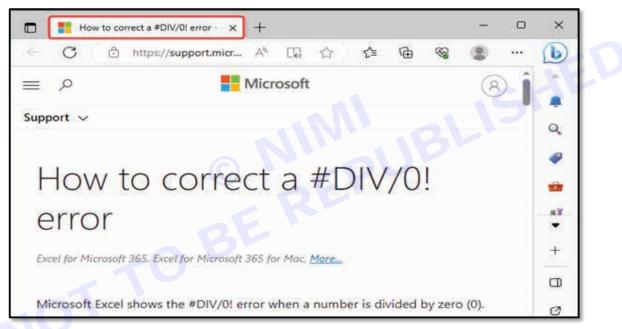
• Select a cell (E5), and hit the Error Checking option from the Formulas tab.

f		Processories Pro-	a arian	rinen Ville 1 Iales - 1 Iales -	- C × C Tenter W - T × Tenter Frankry Frankry
1 -	A Provide	a posta	10.02		Place Presents & Deer Presents
1	10 · · ·	C A 401-	05)/9 D		Antonia Artan - De Courterant
	-		hecking Feature		Trans Draw 22 Constat Spiftman (1. 7
	Project	Principal Amount	AT WORKPORT AND LAND AND ADDRESS	and the second s	
	Project 8	\$320,000		#D/V/0/	
	Antiject C	\$100,000	\$10,000	#D/V/0	
	Project (b	\$660,000			
	Project 8	\$340,000		122110	
	-	1			
t)	Interest Rate	10%			



Error Checking	? ×			
Error in cell E5 =(C5+D5)/0	Help on this error			
Divide by Zero Error	Show Calculation Steps			
The formula or function used is dividing by zero or empty cells.	Ignore Error			
	Edit in <u>F</u> ormula Bar			

• As a result, a new window will open in your browser providing you details about the error and its solution.



• In order to trace from which cells these are happening, click the Trace Error option from the Formulas tab.

Ini	- Au	68-Formulat - Microso	At Eacol	-	D X D	
fre E Andrehum -	A Text - Date for Toxes -			Talatan Relations Calculation		
19.00 1	and the second s			De Trans Pressadants	Shave Farmulas	53
15 ·	( JF =(C5+	65)/0		< Trace Dependents	and the average of the local division of the	in the local days
A1. 9	E.	0			Den Checking.	
Project	Principal Amount	Interest Amount	Monthly Payn	nent		
Project A	\$150,000	\$15,000	#DIV/01			
Project B	\$320.000	\$32,000	HOIV/01			
Project C	\$100,000	\$10,000	HD(V/01			
Project D	\$680,000	\$68,000	HDIV/01			
Project 8	\$340,000	\$34,000	#DIV/01			
1	2.5.1,035			2		
Interest Rate	10%					

		Aut	dit-Formulas - Microso	ft Excel	1.000		×
-	Home Insert	Page Layout For	mulas Data R	eview View Deve	loper	<b>@</b> -	e x
fs Inse Funct	ion 😰 Financial * Function	🚰 Date & Time + 🎁	- SP Use in				
<b>"</b>	- (** *						
	(10.0.0)	the second se	D5)/0				*
- A	В	С	D	E		F	-
1							
2		Using Error C	hecking Feature				
з							
4	Project	Principal Amount	Interest Amount	Monthly Payment			-
5	Project A	• \$150,000	• \$15,000	- #DIV/0!			
6	Project B	\$320,000	\$32,000	#DIV/0!			
7	Project C	\$100,000	\$10,000	#DIV/0!			
8	Project D	\$680,000	\$68,000	#DIV/0!			
	Project E	\$340,000	\$34,000	#DIV/0!			
9							
9 10							

• Immediately, an arrow will appear to indicate the error and its corresponding cells.

## TASK 6: Evaluate Formula

When you are dealing with complex formulas and you are having trouble understanding the formulas, at that time you can visit the Evaluate Formula option to have a better understanding.

• Simply, choose a cell (E5) consisting of the formula and hit the Evaluate Formula option.

9	Home Insert	Page Layout		s - Microsoft Excel Data Review Vi	ew Developer	
	fx Σ AutoSum → Sert ction Pinancial → Function	Date & Time	Name Manage	Define Name * fc ² Use in Formula * EF EF Create from Select Defined Names	ion Auditing	-
2	uŋ - (ci - ≑				Trace Precedents	- TT - 2
	E6 🔹	( fe =	(C6+D6)/12			Wat
	A B		С	D		Evaluate Formula     Wine
2 3 4	Project		g Evaluate Fo		Monthly Payment	<u>.</u>
5	Gold Loan	4	₹ 150,000	₹ 15,000	₹ 13,750	
6	Personal Loan		₹ 320,000	₹ 32,000	₹ 29,333	
7	Education Loan	1	₹ 100,000	₹ 10,000	₹ 9,167	
8	Housing Loan		₹ 680,000	₹ 68,000	₹ 62,333	
9	Vechicle Loan	1	₹ 340,000	₹ 34,000	₹ 31,167	
3						
10						

- Immediately, a window will open evaluating the formula.
- From there to evaluate more deeply click the Evaluate option.



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Evaluate Formula	?	×
<u>R</u> eference: 'Evaluate Formula'!\$E\$6 =	Evaluation: ( <u>C6</u> +D6)/12	-
To show the result of the und appears italicized.	erlined expression, click Evaluate. The most recent result	v

• Another update will come describing the formula. Click Evaluate again to get the result.

Evaluate Formula		1
<u>R</u> eference: 'Evaluate Formula'!\$E\$6	= (320000+ <u>D6</u> )/12	BL
To show the result of the unappears italicized.	derlined expression, dick Evaluate. Th	ne most recent result           Step Out         Close

• After completing the evaluation, you will get the cell value in the window.

Evaluate Formula				?	×
Reference: <b>Evaluate Formula'!\$E\$6</b> = ₹29,333					^
To show the result of the underlined expre	ssion, click Evali	uate. The mo	st recent result		-
Res		ep In	Step Out	<u>C</u> los	se

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#### TASK 7: Watch Window

While working with a large dataset sometimes you might need to look over some cell values immediately and all time in a specific space. For that, you can add a watch window at the top of the spreadsheet. Here, we have calculated the total monthly payment amount using the SUM function in Excel. Now we will add a watch window for this specific cell.

• Choose a cell (C12), apply the below formula, and hit ENTER.

=SUM(E5:E9)

	2		Audit-Formulas	- Microsoft Excel	-	
9	2	Home Insert Page Lay	out Formulas D	Data Review V	ew Developer	😧 – 🖙 >
In	fx	E AutoSum - Recently Used - AutoSum - Control Control -	10 - Hame	☆ Define Name ~ ☆ Use in Formula ~ r ☆ Create from Select Defined Names	ion Auditing Calculati	on
	5	- (Ci			😤 Trace Precedent	s 🧏 Show Form
		C12 • 🕤	<i>f</i> _x =SUM(E5:E9)		Strace Depender	
4	Α	В	с	D	Remove Arrows	<ul> <li>Evaluate F</li> <li>Formula Auditing</li> </ul>
1						- ormula Additing
2			Using Watch Wind	low Feature		
3						1
4		Project	<b>Principal Amount</b>	Interest Amount	Monthly Payment	
5		Gold Loan	₹ 150,000	₹ 15,000	₹ 13,750	
5		Personal Loan	₹ 320,000	₹ 32,000	₹ 29,333	
7		Education Loan	₹ 100,000	₹ 10,000	₹ 9,167	
		Housing Loan	₹ 680,000	₹ 68,000	₹ 62,333	
3		D				
8 9		Vechicle Loan	₹ 340,000	₹ 34,000	₹ 31,167	
			₹ 340,000	₹ 34,000	₹ 31,167	
•			₹ 340,000	₹ 34,000	₹31,167	

• Now choosing the cell (C12), hit the Watch Window feature from the Formulas tab.

<b>H</b> )		Audit-Formula	+ Microsoft Excel			
2	Home Insert Page Lay	rout Formulas E	Data Review V	ew Developer	10 - 7 ×	
fx	Recently Used - A Text -	10	Son Define Name * Son Use in Formula * Till Create from Select Defined Names	ion Auditing		
5	C12 - (7	5 =SUM(E5:E9)	1	SP Trace Precedents	Show Formulas	Watch
A		c	D	Remove Arrows *	C Evaluate Formula	Windo
	Gold Loan	₹ 150,000	₹ 15,000	₹13,750	-	
	Project			Monthly Payment	-	
	Personal Loan	₹ 320,000	₹ 32,000	₹ 29,333		
	Education Loan	₹ 100,000	\$ 10,000	₹9,167		
	Housing Loan	₹ 680,000	₹ 68,000	\$ 62,333		
		10001000	100,000	100,000		
	Vechicle Loan	₹ 340,000	₹ 34,000	₹ 31,167	and the second se	
	Vechicle Loan	₹ 340,000	₹ 34,000	₹ 31,167		
	Vechicle Loan	₹ 340,000 10%	* 34,000	₹ 31,167		

• Within a glimpse, a window will open at the top of the spreadsheet showing cell value and formula. This watch window is really a helpful tool for making a summary of your dataset. And if you scroll or jump to another sheet the watch window will always be visible on that place.

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Book Audit-	Sheet Name Cell	No. Contraction of the Contracti	rmula SUM(E5:E9)		
	C12 • (0	<i>f</i> _x =SUM(E5:E9)			
14	A B	С	D	E	F
1		Using Watch Wind	low Feature		
3					
3	Project	Principal Amount	Interest Amount	Monthly Payment	
3 4 5	Gold Loan	Principal Amount ₹ 150,000	Interest Amount ₹ 15,000	₹13,750	
3 4 5 6	Gold Loan Personal Loan	Principal Amount ₹ 150,000 ₹ 320,000	Interest Amount ₹ 15,000 ₹ 32,000	₹13,750 ₹29,333	
3 4 5 6 7	Gold Loan Personal Loan Education Loan	Principal Amount ₹ 150,000 ₹ 320,000 ₹ 100,000	Interest Amount ₹ 15,000 ₹ 32,000 ₹ 10,000	₹13,750 ₹29,333 ₹9,167	
3 4 5 6 7 8	Gold Loan Personal Loan	Principal Amount ₹ 150,000 ₹ 320,000	Interest Amount ₹ 15,000 ₹ 32,000 ₹ 10,000 ₹ 68,000	₹13,750 ₹29,333 ₹9,167 ₹62,333	
3 4 5 6 7 8 9	Gold Loan Personal Loan Education Loan Housing Loan	Principal Amount ₹ 150,000 ₹ 320,000 ₹ 100,000 ₹ 680,000	Interest Amount ₹ 15,000 ₹ 32,000 ₹ 10,000	₹13,750 ₹29,333 ₹9,167	
3 4 5 6 7	Gold Loan Personal Loan Education Loan Housing Loan	Principal Amount ₹ 150,000 ₹ 320,000 ₹ 100,000 ₹ 680,000	Interest Amount ₹ 15,000 ₹ 32,000 ₹ 10,000 ₹ 68,000	₹13,750 ₹29,333 ₹9,167 ₹62,333	

#### **Related Exercises:**

- 1 You are reviewing a complex financial model and want to trace precedents to understand how a particular calculation is derived. Perform the following tasks:
  - · Identify a cell containing a formula that you want to audit.
  - Use the "Trace Precedents" feature in Excel to visually trace the cells that contribute to the formula's calculation.
  - Document the path of precedents to understand the formula's logic.
- 2 You are troubleshooting errors in a large dataset and suspect that circular references may be causing incorrect calculations. Perform the following tasks:
  - Use the "Error Checking" feature in Excel to check for circular references within the worksheet.
  - If circular references are found, analyze the affected cells to identify and resolve the circular dependency.
- 3 You are verifying the accuracy of a financial report and want to identify any external references to cells in other workbooks. Perform the following tasks:
  - Use the "Workbook Audit" feature in Excel to audit external references to cells in other workbooks.
  - Review the list of external references and ensure that they are accurately referencing the intended data sources.
- 4 You are collaborating on a spreadsheet with multiple colleagues and want to track changes made by each user. Perform the following tasks:
  - Enable the "Track Changes" feature in Excel to track changes made to the workbook by different users.
  - · Review the change history to identify who made specific changes and when they were made.

# **EXERCISE 70 : Create and modify simple macros**

## **Objectives**

At the end of this exercise you shall be able to

- create simple macros
- modify macros.

## Requirements

#### **Tools/Materials**

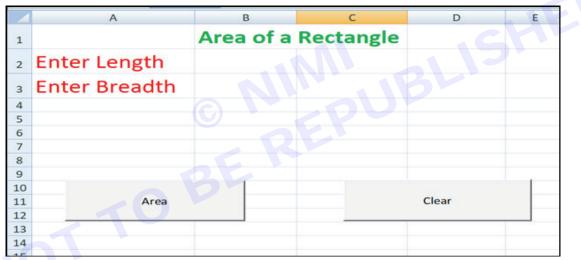
- PC/Laptop with Windows OS
- MS Excel 2013 or Higher

## **Procedure**

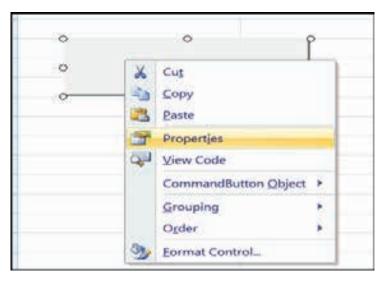
## TASK 1: Area of a rectangle

Step 1 : Open MS Excel and press Alt+F11 to activate Visual Basic Editor

**Step 2**: Develop the Interface i.e., Place the required Controls from Developer tab in the Excel Sheet and Set the Properties .



**Step 2.1:** To set the property Right Click on each controls (CommandButton1& CommandButton2) and select 'properties' from the drop down menu.





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Step 2.2: Set the required properties as follows:

Properties		198
cmdarea Comm Alphabetic   Cate		<u>.</u>
(Name)	cmdarea	
Accelerator		
AutoLoad	False	
AutoSize	False	
BackColor	8.H800000F&	
BackStyle	1 - fmBackStyleOpaque	
Caption	Area	
Enabled	True	
Font	Calibri	
ForeColor	BH800000128	
Height	43	
Left	27	
Locked	True	
MouseIcon	(None)	
MousePointer	0 - fmMousePointerDefault	
Picture	(None)	
PicturePosition	2 - fmPicturePositionAboveCenter	
Placement	2	
PrintObject	True	
Shadow	False	
TakeFocusOnClin	tk True	
Төр	174.5	
Visible	True	
Width	145.5	
WordWrap	False	

### For Example:

SI. No	Control	Property	Value
1	CommndButton1	Name	cmdarea
		Caption	Area
2	CommandButton2	Name	cmdclear
		Caption	Clear

Step 3: Double Click on each Control and write down the Code .

Private Sub cmdarea_Click()

Dim length As Integer, breadth As Integer

length = Range("B2")

breadth = Range("B3")

Range("A5") = "Area is"

Range("B5") = length * breadth

End Sub

Private Sub cmdclear_Click()

Range("A5,B2:B5") = " "

End Sub

Step 4 : Then save the workbook type as a 'Excel Macro- Enabled Workbook'

Step 5: Run the Macro

Step 5.1: Click on the Design mode icon to turn of the Design mode .

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Home Insert Page Lay	out Formulas Data	Review Vi	ew Developer		
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A	В	С	D	E	F
1	Area of a	Rectan	gle		
2 Enter Length					
3 Enter Breadth					
4					
5					
6					
7					
8					

**Step 5.2:** Enter the values of Length in Cell B2 and Breadth in Cell B3 AND Click on the Area Button to view the Area in the Cell B5.

	- · · · <b>·</b>					pri
	Home Insert Page Layout	Formulas D	ata Review	View	Developer	1
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2	Enter Length	2	0			
3	Enter Breadth	1	0			
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5	Area is	20	0			
6						
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10						
11	Area				Clear	
12			_			
13						

Step 5.3: Clear Button is used to clear the input data and result .

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1	A	В	C	D	E
1		Area of a	Rectangle		
2	Enter Length				
3	Enter Breadth				
4					
5					
6					
7					
8					
9		1.000			40
10			1		
11	Area			Clear	
12					
4.5			25		

### **Explanation :**

This VBA macro is designed to calculate the area of a rectangle based on the length and breadth entered into specific cells in an Excel worksheet. Let's break down the code:

- 1 Variable Declarations:
  - Two integer variables, length and breadth, are declared to store the dimensions of the rectangle.
- 2 Assigning Values:
  - The length variable is assigned the value of the cell B2, which presumably holds the length of the rectangle.
  - The breadth variable is assigned the value of the cell B3, which presumably holds the breadth of the rectangle.
- 3 Calculating Area:
  - The area of the rectangle is calculated by multiplying the length and breadth variables.
  - The result is then displayed in cell B5 of the Excel worksheet.
- 4 Displaying Result:
  - The message "Area is" is displayed in cell A5, followed by the calculated area in cell B5.

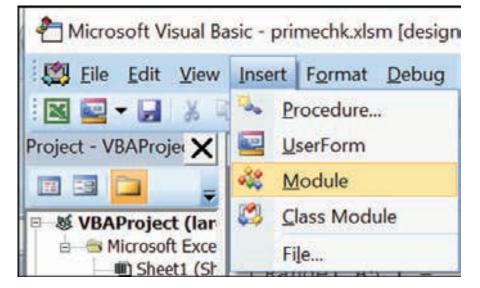
#### **Explanation Summary:**

- The macro retrieves the length and breadth of a rectangle from specific cells in the Excel worksheet.
- It calculates the area of the rectangle using the formula: Area=lengthxbreadthArea=lengthxbreadth.
- The calculated area is displayed in another cell of the worksheet, along with a descriptive label.

This macro simplifies the process of calculating the area of a rectangle in Excel, allowing users to quickly obtain results based on the provided dimensions.

TASK 2: Create and modify a simple macro in Excel to calculate Body Mass Index (BMI) based on user input of weight in kilograms and height in meters

**Step 1:** Open Ms Excel and press Alt+F11 to activate VBE(Visual Basic Editor) and go to Insert Module as follows:



```
Step 2: Type the following Sub Procedure and save it in a macro enabled work book
```

```
Sub Calculate_BMI()
```

```
Dim weight As Double
```

Dim height As Double

Dim bmi As Double

Dim result As String

```
' Prompt user to enter weight in kilograms
```

weight = InputBox("Enter your weight in kilograms:")

' Prompt user to enter height in meters

```
height = InputBox("Enter your height in meters:")
```

```
' Check if weight and height are greater than 0
```

```
If weight > 0 And height > 0 Then
```

' Calculate BMI using the formula: weight / (height * height)

```
bmi = weight / (height * height)
```

```
' Determine the BMI category
```

```
If bmi< 18.5 Then
```

```
result = "Underweight"
```

```
Elselfbmi>= 18.5 And bmi< 25 Then
```

```
result = "Normal weight"
```

```
Elselfbmi>= 25 And bmi< 30 Then
```

```
result = "Overweight"
```

Else

```
result = "Obese"
```

```
End If
```

```
' Display the calculated BMI and category
```

```
MsgBox "Your BMI is: " &Round(bmi, 2) &vbCrLf& "BMI Category: " & result
```

### Else

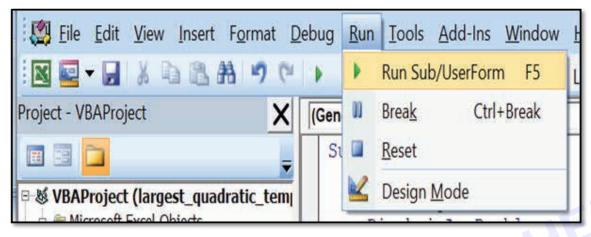
' Display error message if weight or height is not valid

MsgBox "Invalid input. Please enter valid weight and height."

End If

End Sub

Step 3 : Run the Macro and view the result.



Output:

Microsoft Excel	x X
Enter your weight in kilograms:	ОК
	Cancel
70	

Microsoft Excel	×
Enter your height in meters:	ОК
	Cancel
1.70	



Microsoft Excel		×
Your BMI is: 24. BMI Category:		t
	ОК	1

## **Explanation:**

This VBA subroutine named Calculate_BMI calculates the Body Mass Index (BMI) based on the weight and height entered by the user and categorizes the BMI into different weight categories such as underweight, normal weight, overweight, and obese. Here's an explanation of the code:

- 1 Variable Declarations:
  - weight, height, bmi: These variables of type Double are used to store the weight, height, and calculated BMI, respectively.
  - result: This variable of type String holds the category of BMI.
- 2 Prompt for Weight and Height:
  - The user is prompted to enter their weight in kilograms and height in meters using the InputBox function.
- 3 Check for Valid Input:
  - The code checks if the entered weight and height are greater than 0.
- 4 Calculate BMI:
  - If the weight and height are valid, the BMI is calculated using the formula weight / (height * height).
- 5 Determine BMI Category:
  - The BMI is categorized based on standard BMI ranges:
  - BMI less than 18.5 is considered "Underweight".
  - BMI between 18.5 and 24.9 is considered "Normal weight".
  - BMI between 25 and 29.9 is considered "Overweight".
  - BMI 30 or greater is considered "Obese".
- 6 Display Results:
  - The calculated BMI, rounded to two decimal places using the Round function, along with its corresponding category, is displayed in a message box using the MsgBox function.
- 7 Error Handling:

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• If the user enters invalid input (weight or height less than or equal to 0), an error message is displayed using MsgBox.

This subroutine provides a simple way to calculate BMI and categorize it, offering users insights into their weight status.



#### TASK 3: Quadratic Equation Solver

#### Step 1: Develop the interface

			La Macros Amacro Security							Ose Relative References         Insert         Design         Insert         Design         Run Dialog         Expansion Packs         Exposit           Macro Security         Mode         Run Dialog         Source         Sale Refresh Data         Source         Sale Refresh Data						Visua Basic
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								Enter the value of b								
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#### Step 2: Set the property of the controls

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3	Enter the value of b					0		Copy Paste	
4	Enter the value of c	9. ·					T	Properties	
	itter the value of c					Г	4	View Code	
5								CommandButton (	2bject +
6								Grouping Ogder	
20							3	Eormat Control	

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(Name)	cmdsolution	
Accelerator	10.587	
AutoLoad	False	
AutoSize	False	-
BackColor	8H800000F&	
BackStyle	1 - fmBackStyleOpaque	
Caption	Solution	
Enabled	True	
Font	Calibri	
ForeColor	&H80000012&	
Height	26.5	
Left	379.5	
Locked	True	
MouseIcon	(None)	
MousePointer	0 - fmMousePointerDefault	
Picture	(None)	
PicturePosition	7 - fmPicturePositionAboveCenter	
Placement	2	
PrintObject	True	
Shadow	False	
TakeFocusOnClick	True	
Тор	33.5	
Visible	True	
Width	101	
WordWrap	False	

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**Property Box** 

S. No.	Control	Property	Value
1	CommndButton1	Name	cmdsolution
		Caption	Solution
2	CommandButton2	Name	cmdclear
		Caption	Clear

Step 3: Double click on the Clear button and write down the following code:

Private Sub cmdclear_Click()

Range("B2:B9,A6:A8") = " "

End Sub

© NIMUBLISHED BEREPUBLISHEB Step 4: Double click on the Solution button and write down the following code:

Private Sub cmdsolution_Click()

Dim a As Integer, b As Integer, c As Integer

Dim d As Single, root1 As Single, root2 As Single

a = InputBox("Enter the value of a")

b = InputBox("Enter the value of b")

c = InputBox("Enter the value of c")

Range("B2") = a

Range("B3") = b

Range("B4") = c

d = b * b - 4 * a * c

Range("A6") = "Discriminent"

```
Range("B6") = Round(d, 2)
```

If d = 0 Then

```
root1 = -b / (2 * a)
```

```
Range("A7") = "Root is "
```

Range("B7") = Round(root1, 2)

```
Range("B9") = " Roots are real and Equal"
```

Elself d > 0 Then

root1 = (-b + Sqr(d)) / (2 * a)

root2 = (-b - Sqr(d)) / (2 * a)

Range("A7") = "Root1 is "

Range("B7") = Round(root1, 2)

Range("A8") = "Root2 is "

Range("B8") = Round(root2, 2)

Range("B9") = " Roots are real and UnEqual"

Else

Range("B9") = " Roots are imaginary"



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#### End If

End Sub

Step 5: Then save the workbook type as a 'Excel Macro- Enabled Workbook'

**Step 6:** Run the Macro and view the result.

Microsoft Excel	X	
Enter the value of a	OK Cancel	
-1		
Microsoft Excel	×	ED
Enter the value of b	OK Cancel	
0	Br	
Microsoft Excel	×	
Enter the value of c	OK Cancel	
1		



A	1 C	D E F G
1 Quadratic	Equation Solver	
2 Enter the value of a	-1	Solution
3 Enter the value of b	0	
4 Enter the value of c	1	
5		Clear
5 Discriminant	4	
7 Root1 is	-1	
8 Root2 is	1	
9	Roots are Re	eal and UnEqual
10		

This VBA (Visual Basic for Applications) macro is designed to solve quadratic equations of the form  $ax^2 + bx + c = 0$  and display the roots and nature of the roots (real and equal, real and unequal, or imaginary) in an Excel worksheet.

#### Here's an explanation of the macro:

#### 1 Variable Declarations:

- Three integer variables a, b, and c are declared to store the coefficients of the quadratic equation.
- Three single precision variables d, root1, and root2 are declared to store the discriminant and roots of the equation.

#### 2 User Input:

• The macro prompts the user to input the values of a, b, and c using InputBoxes.

#### 3 Calculating the Discriminant:

- The discriminant d is calculated using the formula: b2- 4ac
- The calculated discriminant is rounded to 2 decimal places.
- 4 Displaying the Discriminant:
  - The calculated discriminant is displayed in cell B6 of the Excel worksheet under the heading "Discriminant".

#### 5 Determining the Roots:

- The macro checks the value of the discriminant d to determine the nature of the roots.
- If d is equal to 0, there is one real root, which is calculated and displayed.
- If d is greater than 0, there are two real roots, which are calculated and displayed.
- If d is less than 0, the roots are imaginary.

#### 6 Displaying the Roots:

- The roots, along with their nature, are displayed in cells A7, B7 (for root 1), and A8, B8 (for root 2) of the Excel worksheet.
- If the roots are real and equal or real and unequal, the nature of the roots is displayed in cell B9.

#### **Explanation Summary:**

- The macro prompts the user for coefficients of a quadratic equation.
- It calculates the discriminant and determines the nature of the roots.
- The roots and their nature are displayed in an Excel worksheet.

This macro offers a handy tool for quickly solving quadratic equations and understanding their nature within Excel.

#### **Related Exercises:**

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- 1 Develop a macro to perform temperature conversion( Celsius to Fahrenheit and Vice versa)
- 2 Develop a macro for interest calculation(I=PNR)
- 3 Develop a macro to do Simple Arithmatic Operations

# EXERCISE 71 : Perform form controls and create simple data entry form with macros

### **Objectives**

At the end of this exercise you shall be able to

• create simple data entry form with macros.

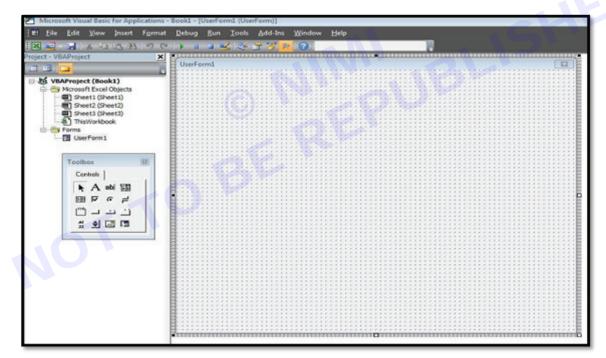
# Procedure

User form is a customised interface, developed in VBA. It enables a user to interact, using a form, in an organised and logical manner or to enter data and retrieve data with an Excel Worksheet or Run a VBA application.

• User Forms acts as a container in which you add multiple controls, each of which has a specific use and associated properties.

TASK 1: Create a User Form – Employee Salary Details

• Step 1: Navigate to VBA Window by pressing Alt+F11 and Navigate to "Insert" Menu and select "User Form". Upon selecting, the user form is displayed as shown in the following screenshot.



• Step 2: Design the forms using the given controls.

Userform2				
	EMPLOYEE SALARY DETAILS			
Employee Name				
Senic Pay			1	
DA.		CALCULATE		
	1	5,8457	0	
Deduction				
		CLEAR		
Total salary		CANCEL		
Net Salary				
				Activate Windows

• Step 3: After adding each control, the controls have to be named through property settings. Caption corresponds to what appears on the form and name corresponds to the logical name that will be appearing when you write VBA code for that element.

Project - VBAPr	oject X		
		UserForm1	83
a manufacture of the Advention of the Advention of the	oject (User_form.xdsm) ^	possession or second se	123333
G S Ma	osoft Excel Objects Sheet1 (Sheet1) Sheet2 (Sheet2)	Employee ID	
112	Sheet3 (Sheet3)		
Properties - em	pid Logical ×		2222
empid Label Alphabetic Ca	Name *		
(Name)	empid		9999 1
	False		
BaddStyle	aH800000Fa		
	aH800000000		121121
	Employee ID		
Enabled	True		1999
ForeColor	Tahoma 8H800000128		
Height HelpContextID	36 0		12111
Left	6 (None)		
MousePointer	0 - fmMousePointerDefault		121121
PicturePosition	(None) 12 - fmPicturePositionCenter 6 - fmSpecialEffectBump		

• Step 4: Add the code for the form load event by performing a right-click on the form and selecting 'View Code'

#### **COMPUTER SOFTWARE APPLICATION - CITS**

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Project - VBAProject	×	(General)				
Microsoft Excel Ob  Sheet1 (Sheet  Sheet2 (Sheet  Sheet3 (Sheet  ThisWorkbook  Forms  UserForm	1) 2) 3)		Þ			
	VBAProject Prop Insert Import File Export File	•				
4	Remove UserFor	m1				

Step 5: Select 'Userform' from the objects drop-down and select 'Initialize' method as shown in the following screenshot.

	te Sub UserForm_Initialize()		🔆 🕜 Ln 4, Col 1	
	te Sub UserForm_Initialize()	erForm	BE	Initialize
Private Sub UserForm Initialize()		Private Sub UserF	orm Initialize()	

• Step 6: Upon Loading the form, ensure that the text boxes are cleared.

Private Sub UserForm_Initialize()

txtname.Value = " " txtbp.Value = " " txtda.Value = " " txthra.Value = "" txtded.Value = " " txtts.Value = " " txtns.Value = " " txtid.SetFocus End Sub

txtid.Value = " "

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when the user form is initialized, all text boxes' contents are cleared or set to default values, and the focus is set to the txtid text box. This ensures a clean and focused user interface when the form is opened, providing a clear starting point for user input or interaction.

Step 7: Now add the code to the Calculate and Submit button. Upon clicking the submit button, the user should be able to add the values into the worksheet. The following VBA code seems to be part of a user interface for calculating salaries based on certain inputs such as employee ID, name, basic pay, and deductions.

Dim row As Long 'in general declaration

Private Sub cmdcalculate Click()

Dim eid As Integer, ename As String, bp As Single, da As Single, hra As Single, ts As Single, ns As Single, ded As Single

Cells(2, 1).Value = "Employee Id"

Cells(2, 2).Value = "Employee Name"

Cells(2, 3).Value = "Basic Pay"

Cells(2, 4).Value = "DA"

Cells(2, 5).Value = "HRA"

Cells(2, 6).Value = "Deduction"

© NINI BLISHED BERE Cells(2, 7). Value = "Total Salary"

Cells(2, 8).Value = "Net Salary"

```
eid = txtid.Value
```

ename = txtname.Text

bp = txtbp.Value

da = bp * (107 / 100)

txtda.Text = da

hra = bp * (25 / 100)

txthra.Text = hra

ded = txtded.Value

txtts.Value = bp + hra + da

txtns.Value = txtts.Value - ded

End Sub

This VBA code seems to be part of a user interface for calculating salaries based on certain inputs such as employee ID, name, basic pay, and deductions. Let's break down the code and explain each part:

#### **1** Variable Declarations:

- row As Long: This declares a variable named row as a Long data type. However, this variable is not used in the provided code snippet.
- eid As Integer, ename As String, bp As Single, da As Single, hra As Single, ts As Single, ns As Single, ded As Single: These lines declare several variables:
- eid as an Integer to store Employee ID,
- ename as a String to store Employee Name,
- bp, da, hra, ts, ns, and ded as Single data types to store Basic Pay, Dearness Allowance, House Rent Allowance, Total Salary, Net Salary, and Deductions respectively.

2 Command Button Click Event (cmdcalculate Click()):

This subroutine is executed when the user clicks the "Calculate" button.



- The values from text boxes (txtid, txtname, txtbp, txtded) are assigned to respective variables (eid, ename, bp, ded).
- Dearness Allowance (da) is calculated as 107% of the Basic Pay (bp) and stored in the da variable.
- House Rent Allowance (hra) is calculated as 25% of the Basic Pay (bp) and stored in the hra variable.
- Total Salary (ts) is calculated as the sum of Basic Pay (bp), Dearness Allowance (da), and House Rent Allowance (hra) and displayed in the txtts textbox.
- Net Salary (ns) is calculated as the Total Salary (ts) minus Deductions (ded) and displayed in the txtns textbox.

#### 3 Worksheet Cell Values:

The lines setting values in Cells(2, 1) through Cells(2, 8) are meant to label the columns in the worksheet. These cells are likely the headers for the data being entered or calculated.

#### 4 Displaying Calculated Values:

The calculated values for Dearness Allowance (da) and House Rent Allowance (hra) are displayed in text boxes txtda and txthra respectively. However, these text boxes are not shown in the provided code snippet.

, uetails , given the refe "A:A")) + 1 Overall, this code snippet captures the process of calculating and displaying employee salary details based on input provided through a user interface. It seems to be designed to work with Excel VBA given the references to cells and text boxes.

Private Sub cmdsubmit Click()

Dim row As Long

'Make Sheet4 active

Sheet4.Activate

'Determine emptyRow

row = WorksheetFunction.CountA(Range("A:A")) +

Cells(row, 1).Value = txtid.Value

Cells(row, 2).Value = txtname.Value

Cells(row, 3).Value = txtbp.Value

Cells(row, 4).Value = txtda.Value

- Cells(row, 5).Value = txthra.Value
- Cells(row, 6).Value = txtded.Value
- Cells(row, 7).Value = txtts.Value

Cells(row, 8).Value = txtns.Value

End Sub

This VBA code is associated with the click event of a button named cmdsubmit. Here's what the code does:

#### 1 Variable Declaration:

 row As Long: Declares a variable named row as a Long data type. This variable will be used to determine the row where the new data will be entered.

#### 2 Activating Sheet4:

Sheet4.Activate: This line makes sure that Sheet4 is the active sheet where the data will be entered.

#### **3** Determining the Next Empty Row:

 row = WorksheetFunction.CountA(Range("A:A")) + 1: This line calculates the next empty row in column A of the active worksheet (Sheet4) by counting the number of non-empty cells in column A and adding 1. It uses the CountA function of the WorksheetFunction object.

#### 4 Assigning Values to Cells:

- The subsequent lines assign values to cells in the active worksheet (Sheet4) based on the inputs provided in various text boxes (txtid, txtname, txtbp, txtda, txthra, txtded, txtts, txtns).
- Each value is assigned to a specific column in the determined row, allowing for the storage of employee information and salary details.

#### 5 Data Entry:

• The data from the text boxes (txtid, txtname, etc.) are entered into the next empty row in the specified columns of Sheet4.

This code essentially allows users to enter employee details and their corresponding salary information into Sheet4 of the Excel workbook by clicking the "Submit" button (cmdsubmit). It automates the process of determining the next empty row and filling in the necessary information accordingly.

• Step 8: Add a method to close the form when the user clicks the Cancel button.

Private Sub cmdcancel_Click()

Unload Me

End Sub

The above VBA code is associated with the click event of a button named cmdcancel. Here's what the code does:

#### 1 Unload Form:

- Unload Me: This line unloads (closes) the user form associated with the VBA code. The Me keyword refers
  to the current instance of the form where the VBA code is located. Unload Me effectively closes the form
  when the user clicks the "Cancel" button (cmdcancel).
- Step 9: Add a method to clear the form when the user clicks the Clear button. Private Sub cmdclear_Click()

```
txtid.Value = " "

txtname.Value = " "

txtbp.Value = " "

txtda.Value = " "

txthra.Value = ""

txtded.Value = " "

txtts.Value = " "

txtns.Value = " "

txtid.SetFocus

End Sub
```

This action provides a convenient way for users to clear out all input fields and start fresh if needed. when the user clicks the "Clear" button (cmdclear), all the text boxes' contents are cleared, and the focus is set back to the txtid text box, ready for new input or interaction.

• **Step 10:** Execute the form by clicking the "Run" button. Enter the values into the form and click the 'Calculate' button and the click the 'Submit' button. Automatically the values will flow into the worksheet as shown in the following screenshot.

#### **Output:**

1 CLICK ON CALCULATE BUTTON

0106	Introduction Interview References Add- Ex Security into Add-	Control COM Sheet Design Sheet Control International Control Int	Elliport									~
• 1	Userform2			×								
A		EMPLOYEE SALARY DETAILS			1	J	K	L	м	N	0	P =
oloyee Id	Employee M	239										
	Employee Name	Mahri		0								
-	Basic Pay	3000		0								
-		52500	OLOUATE									
_	BA.		5.847	1								
-	HDA	12500										
-	Deduction	1990	O.BAR									-
-	Total salary	116000										
-		125000	CANCEL									
_	Net Salary											
-												
1												
										Windows		

#### 2 CLICK ON SUBMIT BUTTON

	iome Insert Page Layout For		March Day	0.00	ne what you want to									Sign in	•
	E Record Macro	Excel COM Add-ins Add-ins Add-ins	Propert		Map Properties 🕃 Expansion Packs 📑 Refresh Data 304.	Import									
10	• 1 × × 4														
6	A 8	C	D	1	1	G	н	1	1	К	L	М	N	0	P
Employ	Freihung Name		ployee Salary		dual a	Teleffelies N	at Calman								
Employ	yee Id Employee Name 200 veena	Basic Pay DA 30000	H8 32100	7500 Di	eduction 500	Total Salary N 69600	iet Salary								
	500 Sree	50000	53500	12500	1000	116000	69100 115000								
	300 beena	60000	64200	15000	500	139200	138700								
	350 lekshmi	50000	53500	12500	1000	116000	115000								
	per sales				1.000										
1															
1															
1															
t i															
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t i															
2 3 4												Activate			

#### **Related Exercise:**

1 Create a User Form - Student's Result Sheet (Hints: Design a form with Roll No, Name, Marks of 3 subjects(each subject out of 100), calculate the total marks, percentage and grade and display the details in the Excel sheet).Grade can be calculated based on the following conditions



Percentage	Grade
>=90	A+
>=80 and <90	А
>=70 and <80	B+
>=60 and <70	В
>=50 and <60	C+
>=40 and <50	С
>=35 and <40	D+

If marks of any subject less than 35 then Grade = 'F' otherwise :

- 2 Build a form to input student grades for different assignments and exams. Include fields for Assignment Scores, Exam Scores, and weights for each category. Calculate the overall grade based on weighted averages.
- . ields fo .ased on weig . item Name, Quantity I. calculated inventory level for 3 Create an Excel form for inventory management. Include fields for Item Name, Quantity In, Quantity Out, and a button to calculate the current inventory level. Display the calculated inventory level for each item.

# **EXERCISE 72 : Look up data by using functions**

## **Objectives**

At the end of this exercise you shall be able to

• lookup data by using functions VLOOKUP ,HLOOKUP & INDEX formula.

# Procedure

#### Method 1: VLOOKUP

VLOOKUP is a powerful function in Excel used to search for a value in the first column of a range (table or array) and return a value in the same row from a column you specify.

#### Syntax:

#### =VLOOKUP(lookup_value, table_array, col_index_num, [range_lookup])

- **lookup_value:** The value you want to search for.
- **table_array:** The range of cells that contains the data you want to search in. The first column of this range should contain the lookup values.
- col_index_num: The column number in the table_array from which to return the value.
- [range_lookup] (optional): A logical value that specifies whether you want an exact match or an approximate match. If TRUE or omitted, it will find an approximate match. If FALSE, it will find an exact match.

# TASK 1: Create a new dataset with columns ID, Product, and Price. Use the VLOOKUP function to find the price of a product with ID 201

#### **Products Details**

ID	Product	Price
101	Laptop	80000
102	Smartphone	50000
103	Camera	350000
104	Smartwatch	30000
201	Headphones	2000

Now, suppose you want to look up the Price of the Product with ID 201. You can use the **VLOOKUP** function. In cell D2, you can enter the formula:

#### =VLOOKUP(A7,A3:C7,3,FALSE)



B	<b>5</b> • ∂					
D3	}	▼ : × ✓	<i>f</i> ∗ =∨LC	OKUP(A7,	43:C7,3,FA	LSE)
	А	В	с	D	E	F
1		Product Deta	ils			
2	ID	Product	Price			
з	101	Laptop	80000	=VLOOKU	P(A7,A3:C7	7,3,FALSE)
4	102	Smartphone	50000			
5	103	Camera	350000			
6	104	Smartwatch	30000			
7	201	Headphones	2000			
8						

#### **Explanation:**

- lookup_value: This is the value you want to search for in the first column of the table array (in this case, cell A7).
- table_array: This is the range of cells that contains the data. It must include the column containing the lookup value and the column containing the data you want to retrieve (in this case, cells A3:C7).
- col_index_num: This is the column number in the table_array from which the matching value should be returned (in this case, 3, indicating the third column of the table_array).
- range_lookup: This is an optional argument that specifies whether to find an exact match or an approximate match. If set to FALSE, it will find an exact match.

In the given example, the VLOOKUP function searches for the value in cell A7 within the range A3:C7. It then returns the value from the third column (index 3) of the range if it finds an exact match. If no exact match is found, it returns an error or a value specified in the function.

After entering this formula, it will return the Price of the Product with ID 201.

D4			J Se	
4	A	В	с	D
1		Product De	tails	
2	ID	Product	Price	2
3	101	Laptop	80000	2000
4	102	Smartphone	50000	
5	103	Camera	350000	
6	104	Smartwatch	30000	
7	201	Headphones	2000	
8		6.	12	1

#### **Related Exercises:**

1 Create a new dataset with columns ID, Product, and Price, Department. Use the VLOOKUP function to find the price of a product with ID 104.



- 2 Create a dataset with columns EmployeeID, Name, Department, and Salary. Use VLOOKUP to find the salary of an employee with a given EmployeeID.
- 3 Create a dynamic table that allows users to input an EmployeeID, and VLOOKUP should automatically fetch and display the corresponding employee name, department, and salary.

#### Method 2: HLOOKUP

HLOOKUP is a function in Excel used to search for a value in the first row of a table (or array) and return a value in the same column from a row you specify. Here's how to use HLOOKUP in Excel:

#### Syntax:

#### =HLOOKUP(lookup_value, table_array, row_index_num, [range_lookup])

#### =HLOOKUP(lookup_value, table_array, row_index_num, [range_lookup])

- lookup_value: The value you want to search for.
- **table_array:** The range of cells that contains the data you want to search in. The first row of this range should contain the lookup values.
- row_index_num: The row number in the table_array from which to return the value.
- [range_lookup] (optional): A logical value that specifies whether you want an exact match or an approximate match. If TRUE or omitted, it will find an approximate match. If FALSE, it will find an exact match.

# TASK 1: Create a dataset with columns Product, Samsung_Price, Apple_Price, and Realme_Price. Use HLOOKUP to find the price of a specific product in row 2.

Step 1: Create the Dataset

Product	Laptop	Smartphone	Tablet
SamSunng_Price	80000	100000	60000
Apple_price	120000	125000	80000
Realme_Price	50000	90000	60000

#### Step 2: Use HLOOKUP for Price Lookup

Assuming you want to find the price of the product "Smartphone," here is the HLOOKUP formula:

#### =HLOOKUP(C1,A1:D4,2,FALSE)

H	5∗ ঔ⊸ ⊽					
A	j • •	× ✓	<i>f</i> ∗ =HLOO	KUP(C1,A1	:D4,2,FALS	SE)
	А	В	с	D	E	F
1	Product	Laptop	Smartphone	Tablet		
2	SamSunng_Price	80000	100000	60000		
3	Apple_price	120000	125000	80000		
4	Realme_Price	50000	90000	60000		
5						
6	=HLOOKUP(C1,A1:D	4,2,FALSE)				
7						

#### **Explanation:**

- C1: The value we are looking for in the first row of the table.
- A1:D4: The table array where the lookup value is located.
- 2: The row number in the table from which to retrieve the value.
- FALSE: Exact match for the lookup value.

#### Step 3: Result

The formula would return the price of the "Smartphone" from row 2 of the table, which is Rs.100000/-

A	7 🔻 :	× ✓	$f_{x}$		
	А	В	с	D	E
1	Product	Laptop	Smartphone	Tablet	
2	SamSunng_Price	80000	100000	60000	
3	Apple_price	120000	125000	80000	
4	Realme_Price	50000	90000	60000	
5					
6	100000				
7					

#### **Related Exercises:**

- 1 Create a dataset with columns representing different cities (Chandigarh, Bhopal, Indore, Patna, Thiruvananthapuram, Kochi, Surat, Visakhapatnam) and rows representing temperature data for each month. Use HLOOKUP to find the temperature in Patna for the month of March.
- 2 Create a dataset with columns representing different months (January, February, March) and rows representing sales data for each product. Use HLOOKUP to find the sales of a specific product in January.

#### Method 3: Index Formula

The INDEX function in Excel is used to return the value of a cell in a specified row and column of a given range. It is particularly useful when you want to retrieve a specific value from a table of data.

The syntax of the INDEX function is as follows:

#### INDEX(array, row_num, [column_num])

- array: This is the range of cells from which you want to retrieve the value.
- row_num: This is the row number within the array from which to retrieve the value.
- column_num: (Optional) This is the column number within the array from which to retrieve the value. If omitted, INDEX returns the entire row specified by row_num.

#### TASK 1: Consider the following table representing the sales data for different products

#### Step 1: Create Data Set

**Product Details** 

Product	January	February	March	April
Item A	100	120	80	150
Item B	75	90	110	85
Item C	120	100	130	95
Item D	90	80	75	110

#### Step 2: Use Index Formula

Using the INDEX function, find the sales value of "Item B" in February.

A8       •       I       Image: Sector of the sector of
Product Details Product January February March April
Product January February March April
Item A 100 120 80 150
4 Item B 75 90 110 85
5 Item C 120 100 130 95
6 Item D 90 80 75 110
=INDEX(A3:E6,2,3)
8 =INDEX(A3:E6,2,3)

#### **Result:**

The result of the formula is the sales value of "Item B" in February, which is 90.

A	3	•	XY	$f_{\mathcal{R}} = IN$	DEX(A3:E6,	2,3)
4	A	В	c	D	E	F
1		Pr	oduct Deta	ils		
2	Product	January	February	March	April	
3	Item A	100	120	80	150	
4	Item B	75	90	110	85	
5	Item C	120	100	130	95	
6	Item D	90	80	75	110	

#### **Related Exercises:**

- 1 Create a data range in cells A1 to D10. Use the INDEX function to retrieve the value located in the 4th row and 3rd column.
- 2 Create a dataset in column A, starting from A1. Create a formula using INDEX to create a dynamic range that automatically expands as new data is added in column A.



# **EXERCISE 73 : Use advanced date functions**

# **Objectives**

#### At the end of this exercise you shall be able to

• use advanced date functions.

## **Procedure**

#### TASK 1: Change Dates from/to Text

#### **Using DATEVALUE Function**

The DATEVALUE function in Excel converts a date represented as text into a serial number that Excel recognizes as a date.

Syntax of DATEVALUE function:

#### =DATEVALUE(date_text)

	А	В	С	D
1				
2		Change Dates from Text t	o Serial Number	<b>AG</b>
3				
4		Formula	Serial Number	
5		=DATEVALUE("28 March 2023")	45013	
6		=DATEVALUE("12/10/2023")	45270	
7		=DATEVALUE("23-June-23")	45100	
8		=DATEVALUE("August 5, 2023")	45143	
9 10				

Note: Dates are stored in Excel as consecutive integers, and it is only the formatting of a cell that permits a number to be shown as a date. All dates are recorded as integers denoting the number of days from January 1, 1900 (number 1) to December 31, 9999 (number 2958465). You can change the serial number back to date format by pressing Ctrl+1.

#### TASK 2: Applying TEXT Function

The TEXT function is used to convert a numeric value, date, or time into a text string with a specified format.

Syntax of TEXT function:

=TEXT(value,format_text)



A	В	C	D	E	
15					
2	TEXT Function Cha	ange Dates from Te	xt to Custom Format		
3					
4	Dates	Dates as Text	Formula		
5	5/10/2023	10-May-23	=TEXT(B5,"d-mmm-yy")		
6	10/12/2023	12 October, 2023	=TEXT(86,"dd mmmm, yyyy")		
7	Monday, September 18, 2023	18/09/2023	=TEXT(B7,"dd/mm/yyyy")		
8	6/10/2023	Saturday, Jun 10, 2023	=TEXT(B8,"dddd, mmm d, yyyy")		
9	3/12/2021	2021, 12 March	=TEXT(B9,"yyyy, dd mmmm")		

In the format text argument type your preferred formatting.

#### TASK 3: Fetch Dates

### Using DAY Function

The DAY function extracts the day of the month from a given date and returns it as a numeric value.

Syntax of DAY function:

=DAY(date)

A	В	С	D	E
	Get the D	Day from	Date Using DAY Func	tion
	Dates	Day	Formula	Remarks
	5/1/2024	1	=DAY(B5)	5
	2024-10-03	3	=DAY(B6)	DAY function returns day
	Monday, September 18, 2023	18	=DAY(B7)	number of a date as an
		25	=DAY(DATE(2015,10,25)	integer from 1 to 31.
		21	=DAY(TODAY())	

#### TASK 4: Using MONTH Function

The MONTH function extracts the month from a given date and returns it as a numeric value.

Syntax of MONTH function:

=MONTH(date)

	8	C	D	E	
	Get the M	onth from D	Date Using MONTH Fun	ction	
-	Get the M	ontar nom e	ate osing month fun		
	Dates	Month	Formula	Remarks	
	5/10/2023	5	=MONTH(B5)	MONTH function	
	2023-10-12	10	=MONTH(B6)	returns the month of a	
	Friday, July 21, 2023	7	=MONTH(B7)	date as an integer ranging from 1	
		2	-1400174/0015 2 25	in the second	
		3	=MONTH(DATE(2015,3,25)	(January) to 12	

#### TASK 5: Applying YEAR Funcion

The YEAR function extracts the month from a given date and returns it as a numeric value.

Syntax of YEAR function:

	(date)					
15.	$C_{\beta} \leftarrow \Delta$			MI.	. el	
14	• a 🛪	🖌 🕺				
A	В		G	D	E	F G
		Get the	Year from [	Date Using YEAR Func	tion	
	Date		Year from I	Date Using YEAR Func	tion Remarks	
	Date		Year			
	Date		Year 2023	Formula	Remarks	
	1	5/10/2023	Year 2023 2019	Formula =YEAR(B5)		
C	1	5/10/2023 2019-10-12	Year 2023 2019 2022	Formula =YEAR(B5) =YEAR(B6)	Remarks YEAR function returns the year of a date as an integer from 1900 to	
C	1	5/10/2023 2019-10-12	Year 2023 2019 2022 2025	Formula =YEAR(B5) =YEAR(B6) =YEAR(B7)	Remarks YEAR function returns the year of a date as an integer from 1900 to	

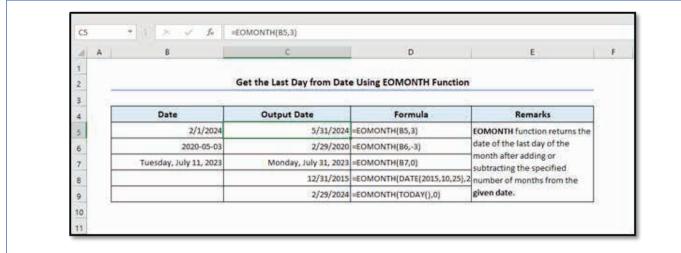
#### TASK 6: Utilizing EOMONTH Function

The EOMONTH function finds the last day of the output month based on a specified number of months before or after a referenced date.

Syntax of EOMONTH function:

=EOMONTH(start_date, months)





#### TASK 7: Applying WEEKDAY Function

<u>The WEEKDAY function</u> returns the day of the week for a given date and returns it as a numeric value. Syntax of WEEKDAY function:

=WEEKDAY(date, [return_type])

B		c	D	- E	E	G
Get th	e Day Serial	Number of th	e Week from Date Using V	VEEKDAY Function		
Dat	e.	Day Serial No.	Formula	Remarks		
	5/10/2023	4	=WEEKDAY(B5)	Each day of the week is		
	2018-10-12	5	=WEEKDAY(86,2)	represented by a number from 1 to 7 in		
Friday, Septer	mber 18, 2020	2	+WEEKDAY(B7,14)	Excel and WEEKDAY		
		i	=WEEKDAY(DATE(2015,10,25),1			
		6	=WEEKDAY(TODAY(),15)	number from the given date		
Return	Туре		Weekday Value	\$	1	
	1 or omitted	1 through 7, Sur	nday to Saturday		8	
	ž	1 through 7, Mo	nday to Sunday			
	3	0 through 6, Mo	nday to Sunday		0	
	11	1 through 7, Mo	nday to Sunday		10	
	12	1 through 7, Tue	esday - Monday		0	
	13	1 through 7, We	dnesday - Tuesday			
2	14	1 through 7, Thu	ursday - Wednesday		3	
2	15	1 through 7, Frid	day - Thursday		2	
	16	1 through 7, Sat	urday - Friday		2	
	17	1 through 7, Sur	nday to Saturday			

#### TASK 8: Using WEEKNUM Function

<u>The WEEKNUM function</u> calculates the week number of a given date based on a specified numbering system. Syntax of WEEKNUM function:

=WEEKNUM(date, [return_type])

The WEEKNUM function can be used in two different ways based on return type:

Way 1: Week 1 specifies the week which contains January 1st;

Way 2: Week 1 is the week that contains the first Thursday of the year.

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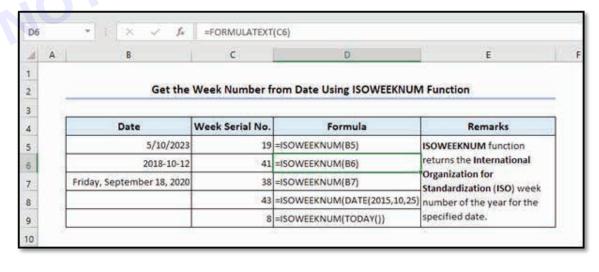
A	8	c	D	E
	Get th	e Week Number	from Date Using WEEKNUM I	Function
	Date	Week Serial No.	Formula	Remarks
	5/10/2023	19	=WEEKNUM(B5)	WEEKNUM function returns
	2018-10-12	42	=WEEKNUM(B6,12)	the week number of the
	Friday, September 18, 2020	38	=WEEKNUM(B7,21)	year for the referenced
		44	=WEEKNUM(DATE(2015,10,25),17	date as a integer from 1 to
		8	=WEEKNUM(TODAY(),15)	53.
	Return Type	Week Begins on	System	
	1 or omitted	Sunday	1	
	2	Monday	1	
	11	Monday	1	
	12	Tuesday	1	0
	13	Wednesday	1	
	14	Thursday	1	
	15	Friday	1	
	16	Saturday	1	
	1777	A COMPANY A		
	17	Sunday		

#### TASK 9: Utilizing ISOWEEKNUM Function

The ISOWEEKNUM function gives the ISO week number of the year of a given date.

Syntax of ISOWEEKNUM function:

=ISOWEEKNUM(date)



#### TASK 10: Applying DAYS360 Function

<u>The DAYS360 function</u> calculates the difference between two dates using a 360-day year, assuming each month has 30 days.

Syntax of DAYS360 function:

=DAYS360(start_date, end_date, [method])

E5		* 1 ×	✓ f _x =FOR	MULATEXT(D	5)	
à	A	В	с	D	E	F
1			at Difference of C	Dave Boture	en Dates Using DAY	S260 Function
2	-		let Difference of L	ays betwe	en Dates Using DAT.	5500 Function
				(15) A		
4	Γ	Start Date	End Date	Difference	Formula	Remarks
	F	Start Date 25-May-21	End Date 21-Oct-28			
Ś			21-Oct-28	2666	=DAYS360(B5,C5) =DAYS360(B6,C6,TRUE)	Remarks DAYS360 function calculates the number of days between two dates, based on 360-day year.

Note: Method is an optional argument to specify the day-count method. TRUE means the function counts European method and FALSE means the method will be the US method. The default is FALSE.

#### TASK 11: Applying EDATE Function

<u>The EDATE function</u> adds or subtracts a specified number of months to a given date and returns the resulting date.

Syntax of EDATE function:

=EDATE(start_date, months)

	Ad	d/Subtract Mo	onths from Dat	es Using EDATE Function
Ī	Start Date	End Date	Formula	Remarks
	25-May-21	25-Mar-22	=EDATE(B5,10)	EDATE function returns the date of a
1	1/31/2023	4/30/2024	=EDATE(B6,15)	future or past month where the day of the month is identical to the date being
1	March 3, 2021	April 3, 2020	=EDATE(87,-11)	specified.



# **EXERCISE 74 : Demonstrate advanced charts**

### **Objectives**

At the end of this exercise you shall be able to

• prepare the advanced charts and graphs in excel.

## **Procedure**

#### TASK 1: Prepare 3D Chart based on the following table

**Step 1:** First open the MS-EXCEL and then write your data there in the sheet.

B2	S - 370 I	× ~ 50	Product_Name	
1	A	8	C	
1		Sales Detail	s	
2	Product_Code	Product_Name	Sales_Quantity	
3	P1001	Keyboard	100	
4	P1002	Mousre	200	
5	P1003	Printer	50	
6	P1004	Scanner	7	
7	P1005	RAM	150	
8	P1006	Hard Disk	56	
9	P1007	SSD	42	
10	P1008	Pendrive	400	
11				

**Step 2:** Then select all your required data. Go to the insert option, from this you can insert any type of chart and graph according to your data.

	empl 1 [Compa ile Home Insert		ymaterial@gmail.com Pata Review View De		Q Tell r	11	
-	ne nome inser	Page Lay   Formula   D	ata Review view De	velop   Help	A tent	ne	~
Tab		Recommended Charts Charts	PivotChart			ters	
H	¢						
в2	▼ 1	$\times \checkmark f_{\rm x}$	Product_Name				
	А	В	С	D	Е	F	[
1		Sales Details	5				
2	Product_Code	Product_Name	Sales_Quantity				
3	P1001	Keyboard	100				
4	P1002	Mousre	200				
5	P1003	Printer	50				
6	P1004	Scanner	7				
7	P1005	RAM	150				
8	P1006	Hard Disk	56				
9	P1007	SSD	42				
10	P1008	Pendrive	400				
11				1			_
12							
13							
14							
1.5							

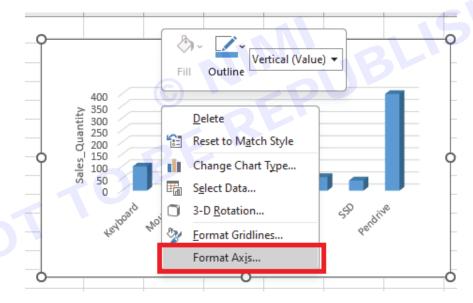


For example here selected a 3D column chart for our dataset. Excel will automatically create the following chart based on your data.

Ch	art 2 🔻 🗄	X 🗸 fx									
4	А	В	с	D	E	F	G	н	1	J.	к
1		Sales Details		0			0				
2	Product_Code	Product_Name	Sales_Quantity	Ť			Sales_Det	ails			+
3	P1001	Keyboard	100								
4	P1002	Mousre	200		400						1
5	P1003	Printer	50		400 400 400 400 250						-
6	P1004	Scanner	7		A 350 250 200						Y
7	P1005	RAM	150		0 200			-			
8	P1006	Hard Disk	56	Y	볼 100		_				Y
9	P1007	SSD	42		v 50						
10	P1008	Pendrive	400		6 and	10 M	6 6	the the	9 x114	0.0	
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12					4		Developed				
13							Product,	_wame			
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15											

#### Step 3: Format Axis

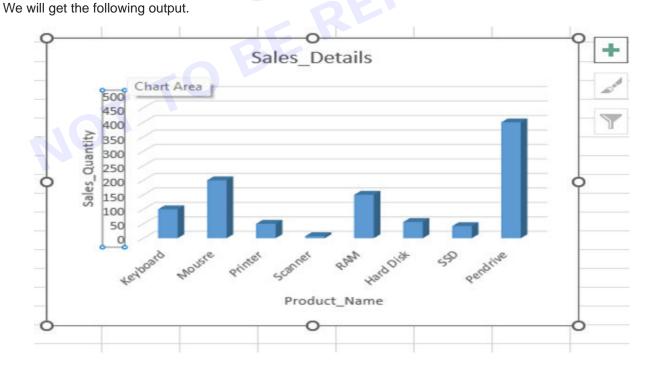
In this step, we will format the chart axis. First, Select Axis, then Right-Click on it, and then select Format Axis.



Once we click on the Format Axis option, Excel will automatically open a Format Axis Pane.Using the format axis pane, we can format our chart axis according to our requirements. Here, we are going to change units to display in **Major Unit with an increment of '50'**.

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Format Axis	~ ×	
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✓ Axis Options	<b>^</b>	
Bounds		
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Ma <u>x</u> imum	500.0 Reset	
Units		
Major	50.0 Reset	
Minor	10.0 Auto	
Floor crosses at		
O Automatic		
Axis value	0.0	
O <u>M</u> aximum axis value		
Display <u>u</u> nits	None 👻	
Show display units label on chart		
Logarithmic scale	Base 10	
☐ <u>V</u> alues in reverse order		
> Tick Marks	. 19	
> Labels		
	•	



**Step 4:** Similarly you can format the chart area by Right Clicking anywhere inside the chart area and choose format chart area option as follows.

### **COMPUTER SOFTWARE APPLICATION - CITS**

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#### TASK 2: Create a Combination Chart

Combination of two or more chart types in a single chart is known as a combination chart. To create a combination chart, follow the steps

	А	В	С
1		Article De	tails
2	Year	No of Employees	No of Articles
з	2015	108	305
4	2016	104	410
5	2017	102	421
6	2018	107	375
7	2019	105	322
8	2020	111	427
9	2021	109	437
10	2022	114	461
11	2023	112	451
12			

**Step1:** First open the MS-EXCEL and then write your data there in the sheet.

Step 2: Create a basic chart and here we are going to plot a column chart for our dataset.

Article De	Auth	
	talls	
r No of Employees	No of Articles	Article Details
5 108	305	500
6 104	410	36g 400
7 102	421	<u><u> </u></u>
8 107	375	000 di Articles & Employee
9 105	322	
0 111	427	5 100
1 109	437	2 0 2015 2016 2017 2018 2019 2020 2021 2022 2023
2 114	461	Years
3 112	451	No of Employees No of Articles
	5     108       5     104       7     102       8     107       9     105       0     111       1     109       2     114	5         108         305           5         104         410           7         102         421           8         107         375           9         105         322           0         111         427           1         109         437           2         114         461

**Step 3:** We have created a basic chart and now it's time for complex graphs to play their role. Click either on the orange bars or blue bars.

Note: Here, we are going to click on the blue bars which are representing the No of Employees. Go to the design tab, click on the change chart type.

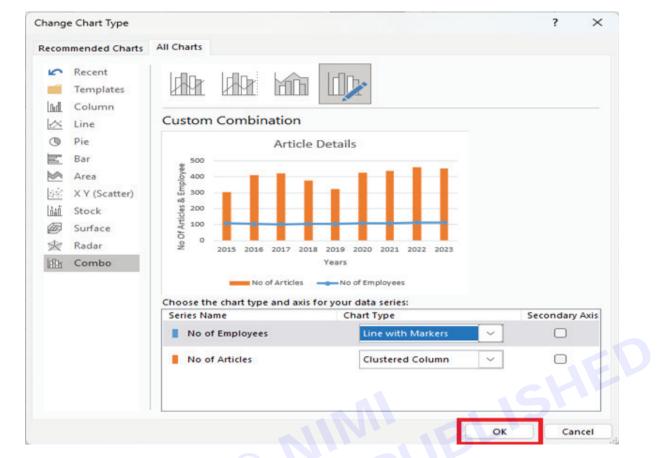


Change Chart Type			? ×
Recommended Charts	All Charts		
Recent Templates	Later Later Later		
🖄 Line	Custom Combination		
O Pie	Arti	le Details	
Bar	g 500		
Area	6 400 6		
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協的 Stock	100 L		
Radar	8 6 6 6 6 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7		
Combo	22 2015 2016 2017	2018 2019 2020 2021 2022 2025 Years	
and Combo	No of Emplo	yees No of Articles	
	Choose the chart type and axis fo		
	Series Name	Chart Type	Secondary Axis
	No of Employees	Clustered Column 🛛 🗸	
	No of Articles	Clustered Column 🛛 🗸	

In that dialog window, navigate to combo from the left side of the panel and click on the employees chart type drop down menu.

Change Chart Type					?	$\times$
Recommended Charts	All Charts					
Recent Templates	lahar lahar					
Line	Custom Combin	ation	E Bar			
O Pie Bar	500	Article Det				
Area	askoldma 300	LL L			1	
Litai Stock 囫 Surface	000 de muitor de la compañía de la compa					ine with
Radar	1015	2016 2017 2018 20 Ye	Area	•		
	Choose the chart type Series Name					xis
	No of Employees	8	Clustered Column	~		
	No of Articles		Clustered Column	~		
				ок	Car	icel

Choose the first graph under the line and press ok.



#### Once the steps are followed, the following output appears

2	Α	В	C	D	E	F	G	Н	Ē.	1
1		Article Deta	ails							
2	Year	No of Employees	No of Articles			Articl	e Details			
3	2015	108	305	500		1.11.11.11	e becano			
4	2016	104	410	¥ 400	-					
5	2017	102	421	E 300	-					
6	2018	107	375	No Of Articles & Employee						
7	2019	105	322	100 E	- <b>-</b> -					
8	2020	111	427	Of A	2015 20	16 2017 20	18 2019 2	020 2021	2022 2023	
9	2021	109	437	Ŷ	121201202	2010/25100	Years	10080000	1997 (PR1997)	
10	2022	114	461			lo of Articles	Noo	f Employees		
11	2023	112	451			to or Afticles	NOO	a control sec		
12										

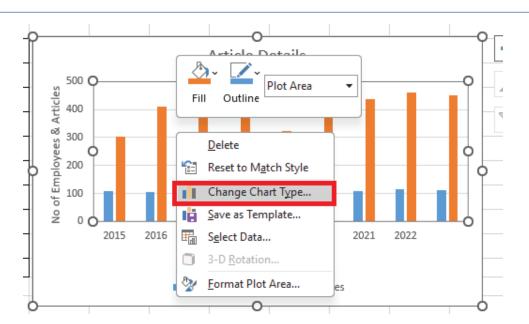
#### TASK 3: Dual-Axis Chart

The primary axis is the x-axis and the y-axis which is usually on the right side of the chart is known as the secondary axis. Now add a secondary axis to our Excel chart to make it more understandable and look presentable.

**Step 1:** Click on the chart. Go to the Design tab and click on the change chart type, a dialog window appears.



#### **COMPUTER SOFTWARE APPLICATION - CITS**



Click on the change chart type. Then the following dialogue box will appear

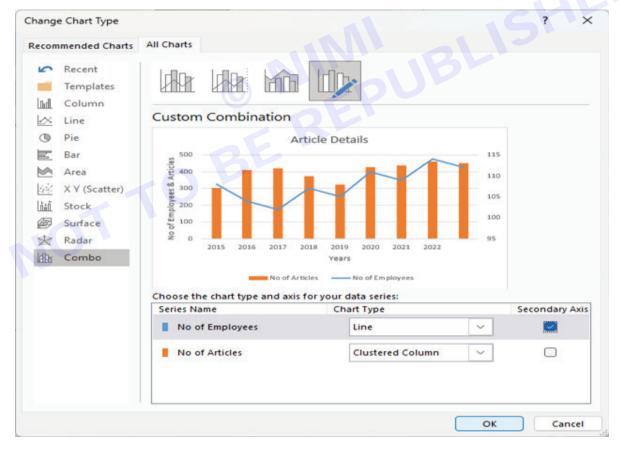
hang	e Chart Type		? ×
Recon	nmended Charts	All Charts	
5	Recent Templates		
Indl	Column		
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0	Pie	Article Details	
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42	X Y (Scatter)		
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ø	Surface	Iss of longitudes     No of longitudes	
*	Radar		
liffin	Combo		
		ОК	Cancel

In that dialog window, navigate to combo from the left side of the panel and click on it. You will get the following screen

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hange Chart	Туре				? ×
Recommended	d Charts All Charts				
Recent Templ Colum	ates	ed Column - Li	ne literation		
<ul> <li>Pie</li> <li>Bar</li> <li>Area</li> <li>公 X Y (See</li> <li>話 Stock</li> <li>圖 Surface</li> <li>次 Radar</li> <li>图 Comb</li> </ul>	e 000 0	2015 2016 2017 No ef t	YearsNo of Articles	2022	
	Choose the Series N		is for your data series: Chart Type		Secondary Axi
	No e	f Employees	Clustered Column	· ·	
	No c	Articles	Line	~	

In the screen select the required chart type for No of Employees and No of Articles and check the Secondary Axis.



Finally, press ok to get the chart like this.

4	A	B	с	D	E	F	G	н	1	J	K	1
1		Article Deta	ails	0							0-	
2	Year	No of Employees	No of Articles	T			Article D	etails			Ĭ.	F
3	2015	108	305	500							115	1
4	2016	104	410	Articles							-	
5	2017	102	421		~						110	
6	2018	107	375	500							105	
7	2019	105	322	o ^{Aold 200} yo 100							0	
8	2020	111	427		-					-	100	
9	2021	109	437	× o	_						95	
10	2022	114	461		2015 2	016 2017		ars 2020	2021 202	12		
11	2023	112	451									
12 13 14						No of	Articles -	No of Em	ployees			

Note: To insert the upcoming charts, follow the steps

Step 1: Open a MS Excel worksheet and click on the "Insert" button from the menu bar.

**Step 2:** From the Insert tab, go to the "Charts" option, there you would find different types of charts. You can choose the desired chart from it.

Note: Choose the chart as required. For example: Radar Chart, Filled Radar etc.

Step 3: Then we need to select the data for which the graph has to be plotted

#### Eg 1: Spider/Radar Chart

Displays multivariate data on a circular grid, with each axis representing a different variable. Spider charts are useful for comparing the performance of multiple entities across different metrics.

These charts represent the values relative to a centre point. Radar with Markers charts represents the markers for the individual points and Radar charts are represented without the markers for the individual points. The user uses the Radar and Radar with Marker charts when the categories are not directly comparable.

	A		¢	D	E	F	G	H	L	3	K	L	M	N	0
	COMPANY	YEAR	EMPLOYEE	NO.OF ARTICLES											
	DATA HUB	2015	108	305											
2	DATA HUB	2016	104	410											
	DATA HUB	2017	102	421											
	DATA HUB	2018	107	375											
2	DATA HUB	2019	105	322											
	DATA HUB	2020	111	427											
	DATA HUB	2021	109	437											
	DATA HUB	2022	114	461											
	DATA HUB	2023	112	451							DATA HU	B			+
										EMPU	OVER	NO.OF ARTICI	25		2
											2015				T
										2023	400	2016			
										1	200	1			
									20	122	200	>> > ·	017		
										1	5				
										2021		201			
											~	1/-			
										20	30	2029			

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#### Eg 2: Filled Radar

In filled radar charts, the data series is filled with a colour. This chart represents the values relative to a centre point.

n	B	C .	D	E	F	G	н	1	J	ĸ	L	M	N	- 1
COMPANY	YEAR	EMPLOYEE	NO.OF ARTICLES											_
DATA HUB	2015	108	305											_
DATA HUB	2016	104	410											
DATA HUB	2017	102	421											
DATA HUB	2018	107	375											
DATA HUB	2019	105	322											
DATA HUB	2020	111	427											
DATA HUB	2021	109	437											
DATA HUB	2022	114	461											
DATA HUB	2023	112	451				0.4	TA HU				+		
							DA	IA HU	в					
							CEMPLOYE	E SCNO.OF	ARTICLES			1		- 1
								2015				Y		-1
							2023 4	00	2016					- 1
								00	11					
						2022		OGantas .	2017					-1
									1.1					-1
						203	1.1	-/-	2018					
								and the second second	/					
							2020	20	19					-
														-1

#### **Related Exercise**

Here's a simple table of a sales data containing ProductCode, product Name, QuantitySold and Rate:

Product Code	Product Name	Quantity Sold	Rate
ABC123	Widget A	100	500
XYZ456	Widget B	75	400
DEF789	Widget C	150	250
GHI012	Widget D	200	800
AHF213	Widget E	560	300
RFE033	Widget F	70	350
GF456	Widget G	220	340

Using the above sales data table containing Product codes, Product names, Quantities sold and Rate, create an advanced chart in Excel that visually compares the sales performance of the top 5 best-selling products. Ensure that the chart includes labels, appropriate formatting, and any necessary visual enhancements to effectively communicate the sales insights.



# **EXERCISE 75 : Demonstrate pivot tables**

# **Objectives**

#### At the end of this exercise you shall be able to

• make pivot tables for summarizing and analyzing data sheets.

### **Procedure**

#### **Demonstrate PivotTables**

A PivotTable in Microsoft Excel is a powerful tool used for summarizing, analyzing, exploring, and presenting large amounts of data from various sources. It allows users to rearrange and summarize selected columns and rows of data into a more useful format without altering the original data set. Here's a step-by-step guide on how to create a PivotTable in Excel:

- 1 **Prepare your data:** Ensure that your data is organized in rows and columns with a clear header row. There should be no blank rows or columns within the data set. Each column should have a header that describes the data it contains.
- 2 Select your data: Click anywhere within the range of data you want to analyze.

#### 3 Insert a PivotTable:

- Go to the "Insert" tab on the Excel ribbon.
- Click on the "PivotTable" button. This will open the "Create PivotTable" dialog box.

#### 4 Choose your data range:

- In the "Create PivotTable" dialog box, Excel will automatically detect the range of your data. Ensure that this range is correct.
- You can also manually specify the data range if Excel doesn't detect it automatically.

#### 5 Choose where to place your PivotTable:

- Decide whether you want the PivotTable to be placed in a new worksheet or an existing worksheet.
- Select the location where you want your PivotTable to be placed and click "OK".

#### 6 Design your PivotTable:

- Once the PivotTable is inserted, you'll see the PivotTable Field List pane on the right.
- Drag and drop the fields from your data into the "Rows", "Columns", "Values", or "Filters" area, depending on how you want to summarize and analyze your data.
- You can also apply functions (e.g., sum, count, average) to the values in the PivotTable by clicking on the drop-down arrow next to the field in the "Values" area and selecting "Value Field Settings".

#### 7 Customize your PivotTable:

- You can further customize your PivotTable by formatting the cells, changing the layout, applying filters, sorting data, and more.
- Experiment with different arrangements and configurations to see what best suits your analysis needs.

#### 8 Refresh your PivotTable (if needed):

If your source data changes, you can refresh your PivotTable to reflect those changes. Right-click anywhere
in the PivotTable and select "Refresh".

#### 9 Save your workbook:

• Once you're done creating and customizing your PivotTable, make sure to save your Excel workbook to preserve your work.

By following these steps, you can create and customize PivotTables in Excel to analyze your data more effectively.

**TASK 1:** Let's say we wanted to answer the question: **What is the amount sold by each salesperson?** for the sales data in the example below. Answering this question could be time consuming and difficult-each salesperson appears on multiple rows, and we would need to total all of their different orders individually. We could use the **Subtotal** command to help find the total for each salesperson, but we would still have a lot of data to work with.

Fortunately, a **PivotTable** can instantly **calculate** and **summarize** the data in a way that's both easy to read and manipulate. When we're done, the PivotTable will look something like this:

Once you've created a PivotTable, you can use it to answer different questions by rearranging-or **pivoting**-the data. For example, if we wanted to answer the question: **What is the total amount sold in each month?** we could modify our PivotTable to look like this:

#### To create a PivotTable:

1 Select the table or cells (including column headers) containing the data you want to use.

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2 From the **Insert** tab, click the **PivotTable** command.

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4	Flores Tia	East	748300	₹ 87,500	February				
5	Post Melissa	East	9000099	₹ 50,000	February				
6	Thompson Shannon	East	748300	₹ 35,000	March				
7	Brennan Michael	West	82853	₹ 40,000	January				
8	Dumlao Richard	West	72949	₹ 85,000	January				
9	Walters Chris	West	9000044	₹ 1,50,000	January				
0	Albert Nelson	West	82853	₹ 55,000	February				
11	Jijo George	West	72949	₹ 40,000	March				
12	Davis William	South	55223	₹ 23,500	February				
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3 The **Create PivotTable** dialog box will appear. Choose your settings, then click **OK**. In our example, we'll use **Table1** as our source data and place the PivotTable on a **new worksheet**.

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Select a table or ra	nge	
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O Use an external dat	ta source	
Choose Con	nection	
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Choose where you want t	the PivotTable report to be placed	
• New Worksheet		

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4 A blank PivotTable and Field List will appear on a new worksheet.

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5 Once you create a PivotTable, you'll need to decide which **fields** to add. Each field is simply a **column header** from the source data. In the **PivotTable Field List**, check the box for each field you want to add. In our example, we want to know the total **amount** sold by each **salesperson**, so we'll check the **Salesperson** and

Order	Amount	fields.
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Choose fields t	o add to
report:	
Salespersor	1
Region	
Account	
✓ Order Amo	ount
Month	
MORE TABLES.	<u>a</u>

6 The selected fields will be added to one of the four areas below the Field List. In our example, the **Salesperson** field has been added to the **Rows** area, while the **Order Amount** has been added to the **Values** area. Alternatively, you can click, hold, and drag a field to the desired area.

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Account	_		
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7 The PivotTable will calculate and summarize the selected fields. In our example, the PivotTable shows the amount sold by each salesperson.

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Just like with normal spreadsheet data, you can sort the data in a PivotTable using the Sort & Filter command in the Home tab. You can also apply any type of number formatting you want. For example, you may want to change the Number Format to Currency. However, be aware that some types of formatting may disappear when you modify the PivotTable.

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1	A	2	B	C
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3	Row Labels		Sum of Order Amount	
4	Albert Nelse	on	55000	
5	Albertson K	athy	92000	
6	Brennan Mi	chael	40000	
7	Davis Willia	m	23500	
8	Dumlao Ric	hard	85000	
9	Flores Tia	Dumlao	Richard (Salesperson)7500	
10	Jijo George	Row: Du	imlao Richard 0000	
11	Post Meliss	a	50000	
12	Thompson	Shanno	an 35000	
13	Walters Chi	ris	150000	
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15				

If you change any of the data in your source worksheet, the PivotTable will not update automatically. To manually update it, select the PivotTable and then go to Analyze > Refresh.

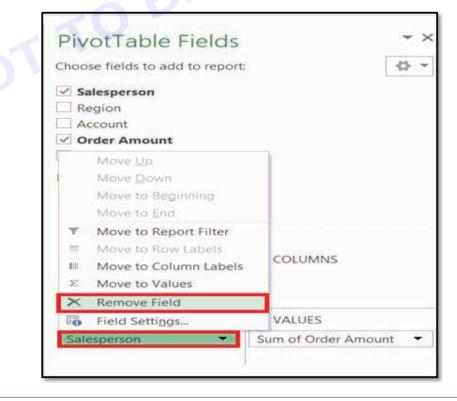
#### **Pivoting data**

One of the best things about PivotTables is that they can quickly pivot—or reorganize—data, allowing you to look at your worksheet data in different ways. Pivoting data can help you answer different questions and even experiment with the data to discover new trends and patterns.

In our example, we used the PivotTable to answer the question: What is the total amount sold by each salesperson? But now we'd like to answer a new question: What is the total amount sold in each month? We can do this by simply changing the field in the Rows area.

#### To change the row:

1 Click, hold, and drag any existing fields out of the Rows area. The field will disappear.





2 Drag a new field from the Field List into the Rows area. In our example, we'll use the Month field.

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Region	
Account	
Order Amount	
Month	
MORE TABLES	
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MORE TABLES	

3 The PivotTable will adjust-or pivot-to show the new data. In our example, it now shows the total order amount for each month.

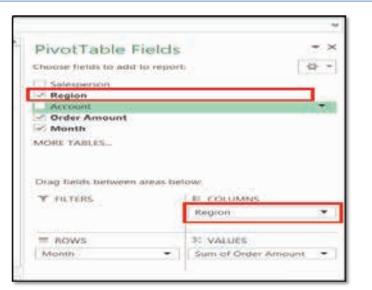
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#### To add columns:

So far, our PivotTable has only shown one column of data at a time. In order to show multiple columns, you'll need to add a field to the Columns area.

1 Drag a field from the Field List into the Columns area. In our example, we'll use the Region field.

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2 The PivotTable will include multiple columns. In our example, there is now a column for each region.

	Sum of Order Amount Row Labels	Column Labels • East	South	West	Grand Total
No. COLORA	January February March	92000 137500 35000	23500	275000 55000 40000	367000 216000 75000
1	Grand Total	and the second se		370000	658000

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#### Filters

Sometimes you may want focus on just a certain section of your data. Filters can be used to narrow down the data in your PivotTable, allowing you to view only the information you need.

### To add a filter:

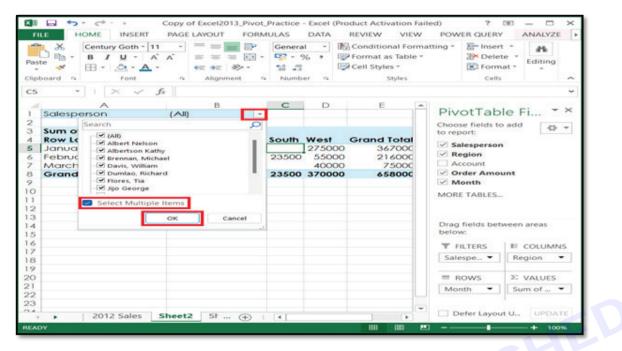
In our example, we'll filter out certain salespeople to determine how they affect the total sales.

1 Drag a field from the Field List to the Filters area. In this example, we'll use the Salesperson field.

Choose fields to to report:	o add
Salesperso	0
Region	
Account	
Order Amo	ount
Month	
Drag fields be below:	
Drag fields be	tween areas
Drag fields be below:	
Drag fields be below: T FILTERS	tween areas



2 The filter will appear above the PivotTable. Click the drop-down arrow, then check the box next to Select Multiple Items.



3 Uncheck the box for any items you don't want to include in the PivotTable. In our example, we'll uncheck the boxes for a few different salespeople, then click OK.

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4 The PivotTable will adjust to reflect the changes.

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6	February	1375	00	23500	55000	216000	
7	March	350	00			35000	
8	Grand Total	2645	00	23500	290000	578000	
9	010000111111111111111111111111111111111						

#### Slicers

Slicers make filtering data in PivotTables even easier. Slicers are basically just filters, but they're easier and faster to use, allowing you to instantly pivot your data. If you frequently filter your PivotTables, you may want to consider using slicers instead of filters.

#### To add a slicer:

- 1 Select any cell in the PivotTable.
- 2 From the Analyze tab, click the Insert Slicer command.

A       B       C       D       E         Salesperson       (Multiple Items) ▼         PivotTable Fi ▼ ×         Sum of Order Amount       Column Labels ▼         Choose fields to add to report:          January       92000       235000       32700        Salesperson       ▼         January       92000       235000       32700        Salesperson       ▼         February       137500       235000       32700        Salesperson       ▼         March       35000       35000       35000       35000        Account         Ørand Total       Sum of Order Amount       O       290000       57800        Month         MORE TABLES       Column: East            Drag fields between areas below:         T       FiltTERS       COLUMNS       Salespe ▼       Region ▼ <th>8</th> <th>LE HOME INSERT</th> <th>ert Slicer</th> <th>AULAS Change Change Data</th> <th>DATA RE</th> <th>VIEW VIEW</th> <th>Ied) ? IE - X POWER QUERY ANALYZE &gt; Cools Show</th>	8	LE HOME INSERT	ert Slicer	AULAS Change Change Data	DATA RE	VIEW VIEW	Ied) ? IE - X POWER QUERY ANALYZE > Cools Show
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4  Drag fields between areas    5  below:    6  T FILTERS    7  Salespe •    9  T    0  T    1  Month •	0		Sum of Order An Value: 264500 Row: Grand Total	nount 00	290000		Month
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	21						

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3 A dialog box will appear. Select the desired field. In our example, we'll select Salesperson, then click OK.



4 The slicer will appear next to the PivotTable. Each selected item will be highlighted in blue. In the example below, the slicer contains a list of all salespeople, and six of them are currently selected.

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	Salesperson	(Multip	le Items	1.1								
3 9	Sum of Order Amou	nt Colum	n Labels	-								
	Row Labels	- East			South	West	Grand Tota					
5	January		920	000		235000	327000	)				
	February		137:	500	23500	55000	216000	>				
	March			000			35000					
3	Grand Total		264	500	23500	290000	578000	)				
0						Salespe	rson	Tre	Υ H			
i l					1		Nelson					
2												
3						Albert	son Kathy					
4						Brenn	an. Michael					
5						E and a	William	- U.				
67						Davis,	william		8			
8						Dumlo	io, Richard					
2						Flores,	Tia					
ó												
1						Jijo Ge	sorge					
2						Post, N	Aelissa					

5 Just like filters, only selected items are used in the PivotTable. When you select or deselect items, the PivotTable will instantly reflect the changes. Try selecting different items to see how they affect the PivotTable. Press and hold the Ctrl key on your keyboard to select multiple items from a slicer.

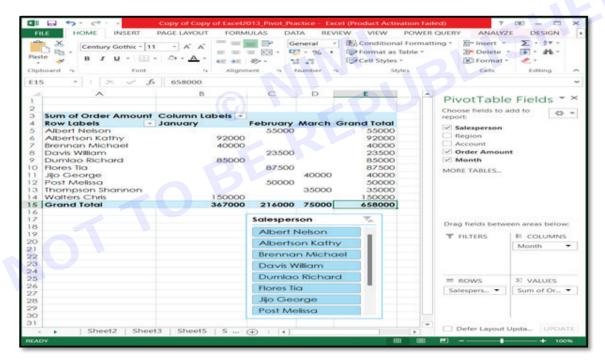
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You can also click the Filter icon in the top-right corner to select all items from the slicer at once.

### TASK 2: Create Pivot Chart from above table



1 Select any cell in your PivotTable.

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2 From the Insert tab, click the PivotChart command.

	Insert Chart	? ×
All Charts Recent Templates Column Column Column Pie Bar Bar Area X Y (Scatter)		
<ul> <li>X Y (Scatter)</li> <li>Stock</li> <li>Surface</li> <li>Radar</li> <li>Combo</li> </ul>		
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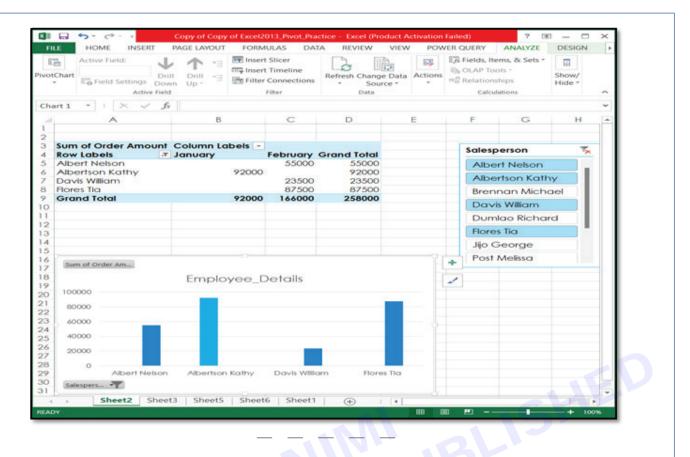
3 The Insert Chart dialog box will appear. Select the desired chart type and layout, then click OK.

	В	C	D	E	F	G	H
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		February	March	Grand Total	sciespe	ison	1
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Jijo George Post Melissa		50000	40000	40000	I Personal and the second		
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Walters Chris	150000		55000	150000	Jijo Ge	eorge	
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tunouvy	Employee D	R ^R Haller Start	and Cont	<ul><li>January</li><li>February</li></ul>		2	

4 The PivotChart will appear.

Try using slicers or filters to change the data that is displayed. The PivotChart will automatically adjust to show the new data.

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TASK 3: By using the following product details data

- a Create a Pivot Table to display the Order ID and Sum of Total Cost
- b Create a Pivot Chart based on that Pivot Table

### To create a PivotTable:

1 Select the table or cells (including column headers) containing the data you want to use.

		Pro	duct Detai	ls	
(	Order ID	Product	Unit Price	Quantity	Total Cost
	10248	Apple	140	10	1400
	10249	Banana	45	8	360
	10250	Orange	170	3	510
	10251	Mango	250	10	2500
	10252	Strawberry	85	9	765
	10253	Grape	200	5	1000
	10254	Pineapple	100	9	900
)	10255	Watermelon	55	40	2200
	10256	Kiwi	180	22	3960
2			1		

2 From the Insert tab, click the PivotTable command.

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2	Order ID	Product	Unit Price	Quantity	Total Cost						
3	10248	Apple	140	10	1400						
4	10249	Banana	45	8	360						
5	10250	Orange	170	з	510						
6	10251	Mango	250	10	2500						
7	10252	Strawberry	85	9	765						
8	10253	Grape	200	5	1000						
9	10254	Pineapple	100	9	900						
10	10255	Watermelon	55	40	2200						
11	10256	Kiwi	180	22	3960						
12											

3 The Create PivotTable dialog box will appear. Choose your settings, then click OK. In our example, we'll use Table1 as our source data and place the PivotTable on a new worksheet.

Create PivotTable ? ×
Choose the data that you want to analyze
Select a table or range
Table/Range: Table1
O Use an external data source
Choose Connection
Connection name:
Choose where you want the PivotTable report to be placed
New Worksheet
<u>Existing Worksheet</u>
Location:
Choose whether you want to analyze multiple tables
Add this data to the Data <u>M</u> odel
OK Cancel

4 The selected fields will be added to one of the four areas below the Field List. In our example, the Order ID field has been added to the Rows area, while the Total Cost has been added to the Values area. Alternatively, you can click, hold, and drag a field to the desired area.



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	6 Chart	HOM Active Field -	Insert S	licer imeline	Refresh	FORMUL Change Da Source - Data	ta Actions (	REVIEW		~
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2							Choose fie	Ids to add	to	21
3	Row L	abels	- Sum of	Total Cost			report		4	<u> </u>
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5	1024	10248	(Order ID)	360	2		Produc	No. of Concession, Name		
6	1025	Row: 10	0248	510	0		Unit Pr			
7	10251			2500	)		Quanti			
	10252			765	5		Total C	and the owner where the owner w		
	10253			1000	- D		Total	COST		
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5 The PivotTable will calculate and summarize the selected fields.

1			
2			
3	Row Labels	Sum of Total Cost	
4	10248	1400	
5	10249	360	
6	10250	510	
7	10251	2500	
8	10252	765	
9	10253	1000	
10	10254	900	
11	10255	2200	
12	10256	3960	
13	Grand Total	13595	
14			

6 From the Insert tab, click the PivotChart command.



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4	10248	14	00											
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7	10251	25	00											
8	10252	7	55											
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7 The Insert Chart dialog box will appear. Select the desired chart type and layout, then click OK.

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区	Line	Clustere	d Column							
	Pie Bar Area X Y (Scatter) Stock Surface Radar Combo			0.5 0.04 0.00	0.76					
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8 The PivotChart will appear.

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1	-										
2	Pour Labels	Sum of Total Cost	Commencements					+			
4	10248	1400	Sum of Total C								
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#### **Related Exercise.**

1 "By using the provided employee data, create a pivot table to analyze the total salary expenditure by department. Additionally, identify the department with the highest total salary expenditure and the average salary within that department."

S.No.	EmployeeName	Designation	Department	Salary
1	John	Manager	Sales	50000
2	Alice	Assistant Manager	Marketing	40000
3	Bob	Sales Executive	Sales	36000
4	Emma	Marketing Analyst	Marketing	32000
5	David	Sales Associate	Sales	28000
6	Sarah	HR Assistant	HR	25000
7	Michael	Finance Manager	Finance	60000

Customize your pivot table further by applying filters, formatting, and rearranging fields as needed. Also prepare the Pivot Chart.

2 "By using the following product sales data, analyze the total sales revenue generated by each product. Additionally, visualize this data by creating both a pivot table and a pivot chart. Identify the product with the highest total sales revenue and its corresponding sales quantity.

Product Code	Product Name	Sales Quantity	Unit Price	Total Price
001	Widget A	100	\$10	\$1000
002	Widget B	150	\$8	\$1200
003	Widget C	200	\$15	\$3000
004	Widget D	75	\$20	\$1500
005	Widget E	120	\$12	\$1440
006	Widget F	90	\$18	\$1620

# EXERCISE 76 : Demonstrate a power query, power query function. Invoking the power query function and combining queries. Organize the workbook queries

# **Objectives**

At the end of this exercise you shall be able to

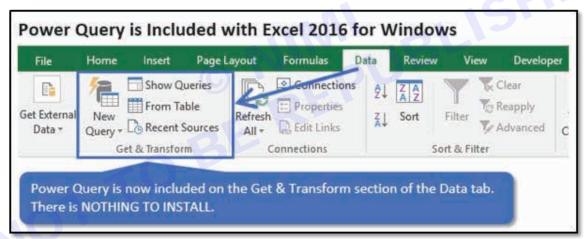
- install power query
- · demonstrate a power query, power query function
- invoking the power query function and combining queries.

# **Procedure**

# How to Install Power Query

# Excel 2016

Power Query is included with Excel 2016 (Office 365). It has been renamed and is now on the Data tab of the Ribbon in the Get & Transform section.



This means there is nothing to install. If you are using Excel 2016, go to the Data tab on the ribbon and press the New Query button to create a query and open the Power Query editor.

Power Query is available with all levels of Office 365 subscriptions.

# Excel 2010 & 2013

For Excel 2010 and 2013 you will need to download the Power Query add-in and install it.

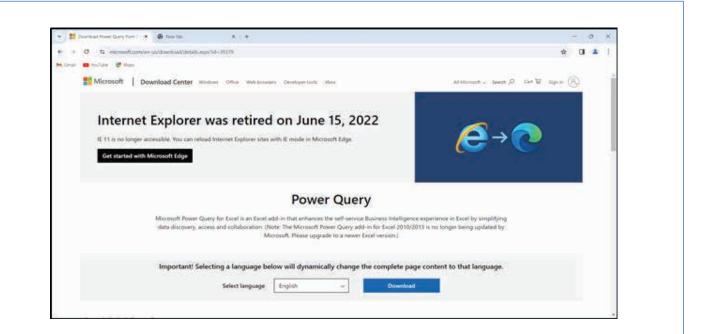
The installation steps are about the same in Excel 2010 and 2013.

- 1 Close (exit) Excel completely.
- 2 Click the following link to go to the download page.

https://www.microsoft.com/en-us/download/details.aspx?id=39379

3 Click the Download button.



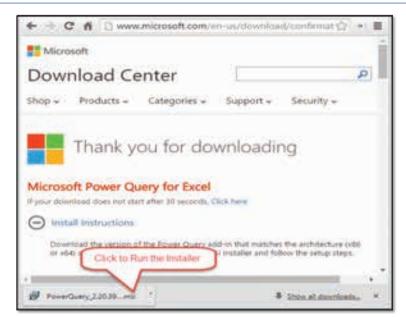


4 Click the checkbox for the bit version you are using. Most likely you will be using 32-bit.

← → C fi D www.microsoft.com/en-us/download/details.a	spx: ☆ » 🔳
Choose the download you want	$\otimes$
File Name	Size
PowerQuery_2.20.3945.242 (32-bit) [en-a_1	10.8 MB
PowerQuery_2.20.3945.242 (64-bit) [en Select your bit version	10.9 MB
Release Notes (English-only).docx	30 KB
2	Next

5 Click Next

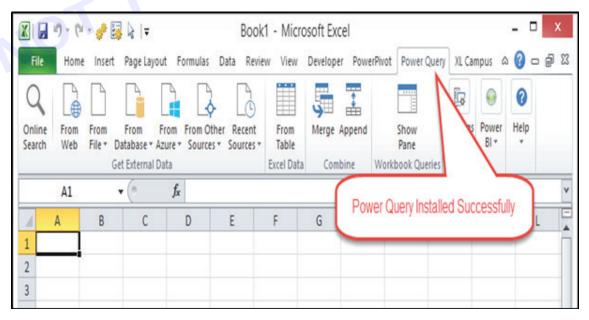
6 The add-in installation file will download. Click the file to run the installation.



7 The Setup Wizard window will open. Follow the steps to install Power Query.



8 Once the installation is complete, open Excel. You should now see the Power Query tab in the Ribbon.



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### My Power Query Tab Disappeared

If your **Power Query tab ever goes missing**, you can usually re-enable the add-in by going to the COM Add-ins menu.

There are a few ways to get to the COM Add-ins menu.

- 1 File menu.
- 2 Click Options on left side menu.
- 3 Click Add-ins on left side menu.
- 4 Select COM Add-ins from the Manage drop-down.
- 5 Click the Go... button.

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avanced	Ec_Tab_Control	C:\ents\Excel Campus\EC_Tab_Control.xlam	Excel Add-in	
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6 That will open the COM Add-ins Window. If the Power Query check box is not selected, just select it to reload the add-in.

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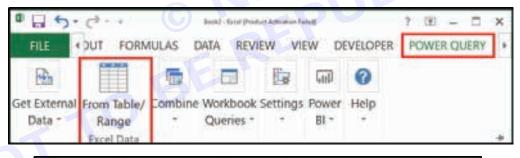
#### TASK 1: Create a simple Power Query program using a sample Excel file

#### 1 Load Data:

- Open Excel and create a new workbook.
- Enter some sample data into a worksheet.

1			T CALCULA	
2	SI No	Name	Principal Amount	No of Years
3	1	ANU.R	4700	5
4	2	ARUNIMA.R	3500	4
5	3	ARYA.A.R	1100	8
6	4	ASWATHY.K	2500	3
7	5	BISMINA.S	4000	2
8	6	ISHA.S.S	4500	7
9	7	KARTHIKA. B.B	1500	6
10	8	RESHMA.R	5500	3
11	9	RIYA.L	3800	4
12	10	SREEDHA.A	6000	9
13				

 Go to the "Data" tab and click "Get Data" > "From Table/Range."/ Go to the "Power Query" tab and click "From Table/Range."



1		11	T CALCULA	1997 (1998)
2	SI No	Name	Principal Amount	No of Years
3	1	ANU.R	4700	5
4	2	ARUNIMA.R	3500	4
5	3	ARYA.A.R	1100	8
6	4	ASWATHY.K	2500	3
7	5	BISMINA.S	4000	2
8	6	ISHA.S.S	4500	7
9	7	KARTHIKA. B.B	1500	6
10	8	RESHMA.R	5500	3
11	9	RIYA.L	3800	4
12	10	SREEDHA.A	6000	9
13				



<ul> <li>✓</li> <li>From Table</li> <li>Where is the data for your table?</li> <li>          [\$E\$21         [\$] </li> <li>          My table has headers  </li> </ul> OK Cancel	
From Table Where is the data for your table? \$ES21 My table has headers Range Selection ? × Select a range SA52:SD512 OK Cancel	HED
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# 2 Power Query Editor:

- The Power Query Editor will open, displaying a preview of your data.
- You can see the "SL NO"," "NAME," "Salary," and "NO OF YEAR" columns.

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# 3 Transform Data:

 Let's add a new column that calculates a bonus based on the Principal Amount. Click on "Add Column" > "Custom Column."

	The Contem	nditional Column Sex Column • gittate Column •		Thereford Scientific	Theorements - Th	
Comm C	2 4 1 2 3 4 5 6 7 8 9 10		ničelanni ⁷ rpisi (Soorter, (1 ⁴ 5 1 ⁹ 3 Principal Annual 100 100 200 400 400 100 100 100 100 100 100 100 1			*

- Name the new column: "Interest"
- Enter the formula: = [Principal Amount] * [No of Years] *0.12 (Assuming a 12% Interest)

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Custom Column	
Add a column that is computed from the other columns.	
New column name	
Interest	
Custom column formula	Available columns
*[Principal Amount]*[No of Years]*12/100	St No.
	Name
	Principal Amount No of Years
	THE OF YEARS
	<< insert
Learn about Power Query formulas	

• Click "OK" to create the new column.

1 Table13		Ŧ	A ^B _C Name	123 Principal Amount	No of Years ABC Interes	t 🔻		
Table13 (2)	1	-	ANU.R	4700	5	2820	PROPERTIES	
	2	2	ARUNIMA.R	3500	4	1680	Name	
	3	3	ARYA.A.R	1100	8	1056	Table13 (2)	
	4	4	ASWATHY.K	2500	3	900	All Properties	
	5	5	BISMINA.S	4000	2	960	APPLIED STEPS	
	6	6	ISHA.S.S	4500	7	3780		
	7	7	KARTHIKA, B.B	1500	6	1080	Source	
	8	8	RESHMA.R	5500	3	1980	Changed Type	м
	9	9	RIYA.L	3800	4	1824	X Added Custom	÷.
	10	10	SREEDHA.A	6000	9	6480		

### 4 Load Transformed Data:

• Once you're satisfied with the transformations, click "Close & Apply" to load the data back into Excel.

e Home Tr	ansform	Ad	Id Column View					^
	Properties Advanced Manage •	Editor	Manage Columns • Reduc		Data Type: Any • Use First Row as Headers • Log Replace Values Transform	Combine	Manage barameters Data source parameters Data Sources	New Source •
Close & Load To			. 1	Healung (Bricksoned 7			7	
Table13			nges to this query, y Editor window,	acolumn(# changed i	ype", "Interest", each	~	Query setting	s ×
	and load	i result	ts to the default	Principal Amount	123 No of Years ASC In	nterest		
Table13 (2)	destinat	ion.		4700	5	282		
	2	2	ARUNIMA.R	3500	4	168		
	3	3	ARYA.A.R	1100	8	105	6 Table13 (2)	
	4	4	ASWATHY.K	2500	3	90	0 All Properties	
	5	5	BISMINA.S	4000	2	96	0	
	6	6	ISHA.S.S	4500	7	378	APPLIED STEPS	
	7	7	KARTHIKA, B.B	1500	6	108	o Source	
	8	8	RESHMA.R	5500	3	198	Changed Type	
	9	9	RIYA.L	3800	) 4	182	Added Custom	¥
	10		SREEDHA.A	6000		648		

• The transformed data will appear in your existing workbook.

À	A	В	c	D	E	F
1	SI No 💌	Name 💌	Principal Amount 💌	No of Years 💌	Interest 💌	
2	1	ANU.R	4700	5	2820	
3	2	ARUNIMA.R	3500	4	1680	
4	3	ARYA.A.R	1100	8	1056	
5	4	ASWATHY.K	2500	3	900	
6	5	BISMINA.S	4000	2	960	
7	6	ISHA.S.S	4500	7	3780	
8	7	KARTHIKA. B.B	1500	6	1080	
9	8	RESHMA.R	5500	3	1980	
10	9	RIYA.L	3800	4	1824	
11	10	SREEDHA.A	6000	9	6480	

# TASK 2: Create a simple Power Query program using a sample Excel file

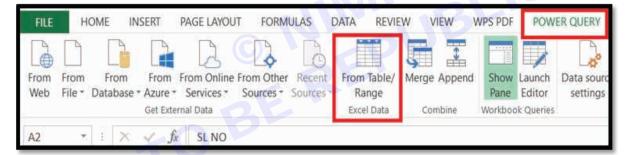
### Step 1: Load Data

- 1 Open Excel and create a new worksheet.
- 2 Enter some sample data in a table. For example:



4	- A/	8	c	D	E	- 3
		In	terest Calculat	ion		
	SI No	Name	Principal Amount	No of Years	Interest	
	1	ANU.R	4700	(5)	2820	
	2	ARUNIMA_R	3500	4	1680	
	3	ARYA.A.R	1100	8	1056	
	4	ASWATHY.K	2500	3	900	
	5	8ISMINA.S	4000	2	960	
	6	ISHA.S.S	4500	7	3780	
	7	KARTHIKA, B.B	1500	6	1080	
e	8	RESHMA.R	5500	3	1980	
	9	RIYAL	3800	4	1824	
I	10	SREEDHA.A	6000	9	6480	

• Select the data and Go to the "Data" tab and click "Get Data" > "From Table/Range."/ Go to the "Power Query" tab and click "From Table/Range.



	A	В	c	D	E	F
1		In	terest Calculat	ion		
2	SI No	Name	Principal Amount	No of Years	Interest	
8	1	ANU.R	4700	5	2820	
4	2	ARUNIMA.R	3500	4	1680	
5	3	ARYA.A.R	1100	5	1056	
6	4	ASWATHY,K	2500	3	900	
7	5	BISMINA.S	4000	2	960	
8	6	ISHA.S.S	4500	7	3780	
9	7	KARTHIKA, B.B	1500	6	1080	
0	8	RESHMA,R	5500	3	1980	
11	9	RIYA.L	3800	4	1824	
12	10	SREEDHA.A	6000	9	6480	

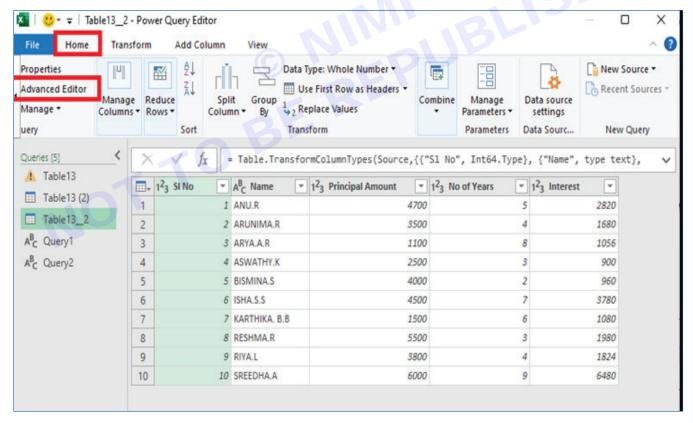
• Then Power Query Editor will open. Here, you can see a preview of your data.



# **COMPUTER SOFTWARE APPLICATION - CITS**

💁   😃 File	+ ∓   Tab Home		- Pov	ver Query Add	Editor Column	View										
Close & Load • Close	Refresh Preview •		vance nage	d Editor	Manage Columns	Reduce Rows V	A Z↓ Z↓ Sort	Split Column		Use	First	/hole Number ▼ Row as Headers ▼ √alues	Combin	Manage Parameter Parameter	5 -	Data source settings Data Sourc
Queries [3	3]	<	X	~	fx	= Table.T	ransf	ormCol	umnTypes	(Source	,{{"	S1 No", Int64.Ty	/pe}, {	"Name", typ	pe te	xt}, v
🔔 Tab	ble13			123 SI No	o ▼	A ^B _C Name		123 F	Principal A	mount	¥	123 No of Years	- 1 ² 3	Interest	-	
III Tak	ble13 (2)		1		1	ANU.R					4700		5	2	2820	
III Tak	ble13_2		2		2	ARUNIMA	R				3500		4		1680	
			3		3	ARYA.A.R					1100		8		1056	
			4		4	ASWATHY	.K				2500		3		900	
			5		5	BISMINA.S					4000		2		960	
			6		6	ISHA.S.S					4500		7	33	3780	
			7		7	KARTHIKA	B.B				1500		6		1080	
			8		8	RESHMA.F	1				5500		3		1980	
			9		9	RIYA.L					3800		4		1824	
			10			SREEDHA.					6000		9		6480	

• Then Click "Advanced Editor" to open the script editor.





	Advanced Editor		
	Query1		ø
	let Source = "" in Source		
Write the other oth	✓ No syntax errors have been detected.	[	Done Cancel
Advanced Editor		B	>
Advanced Editor	3_2	EPUB	>
Advanced Editor	3_2 Excel.CurrentWorkbook(){[Name="Table13_2"]}[Content], Nguery=Table.AddColumn(Source,"Sum",each[Principal Amount]+[]	(interest])	
Advanced Editor	32 Excel.CurrentWorkbook(){[Name="Table13_2"])[Content], Query=Table.AddColumn(Source,"Sum",each[Principal Amount]+[] Query	<pre>interest])</pre>	



// Add a new column "Sum" by adding the values from the referenced cells

CombinedQuery = Table.AddColumn(Source, "Sum", each [Principal Amount] + [Interest])

- Excel.CurrentWorkbook(): Function that references the entire current workbook.
- {[Name="Table13_2"]}: Accesses a specific table in the workbook named "Table13_2."
- [Content]: Retrieves the content of the "Table13_2" table.

#### Add a New Column "Sum"

// Add a new column "Sum" by adding the values from the referenced cells

CombinedQuery = Table.AddColumn(Source, "Sum", each [Principal Amount] + [Interest])

- Table.AddColumn(Source, "Sum", each [Principal Amount] + [Interest]): Adds a new column named "Sum" to the Source table.
- **each** [Principal Amount] + [Interest]: Defines the operation to be performed in each row of the new "Sum" column. It adds the values from the "Principal Amount" and "Interest" columns.

Table13		ABC 123 SI No	123 Name	ABC 123 Principal Amount	ABC 123 No of Years	ABC Interest	123 Sum
Table13 (2)	1	1	ANU.R	4700	5	2820	7520
Table13_2	2	2	ARUNIMA.R	3500	4	1680	5180
C Query1	3	3	ARYA.A.R	1100	8	1056	2156
^B C Query2	4	4	ASWATHY.K	2500	3	900	3400
	5	5	BISMINA.S	4000	2	960	4960
	6	6	ISHA.S.S	4500	7	3780	8280
	7	7	KARTHIKA, B.B	1500	6	1080	2580
	8	8	RESHMA.R	5500	3	1980	7480
	9	9	RIYA.L	3800	4	1824	5624
	10	10	SREEDHA.A	6000	9	6480	12480

Click "Close & Apply" to apply the changes and load the data into your Excel workbook or Power BI report.

lose	& Refresh	roperties dvanced I lanage •	Manage		Split Column + By Column + Column + Col	t Row as Headers  Cor	mbine Parameters • Parameters	Data source settings Data Sourc
¢	Close & Load To Table13	×			lumn(Source, "Sum", each[Pr:			^{ABC} 123 Sum ▼
	Table13 (2)	1		ANU.R	4700		2820	
	Table13_2	2	2	ARUNIMA.R	3500	4	1680	5180
ABC	Query1	3	3	ARYA.A.R	1100	8	1056	2156
	Query2	4	4	ASWATHY.K	2500	3	900	3400
ABC		5	5	BISMINA.S	4000	2	960	4960
ABC		-			4500	7	3780	8280
ABC		6	6	ISHA.S.S	4500			
A ^B C				ISHA.S.S KARTHIKA. B.B	1500		1080	2580
ABC		6	7			6	1080 1980	0.000
A ^B C		6 7	7	KARTHIKA. B.B	1500	6		7480

À	A	В	C	D	E	F	G	н
1	SI No 🔻	Name 💌	Principal Amount 💌	No of Years 💌	Interest 💌	Sum 💌		
2	1	ANU.R	4700	5	2820	7520		
3	2	ARUNIMA.R	3500	4	1680	5180		
4	3	ARYA.A.R	1100	8	1056	2156		
5	4	ASWATHY.K	2500	3	900	3400		
6	5	BISMINA.S	4000	2	960	4960		
7	6	ISHA.S.S	4500	7	3780	8280		
8	7	KARTHIKA. B.B	1500	6	1080	2580		
9	8	RESHMA.R	5500	3	1980	7480		
10	9	RIYA.L	3800	4	1824	5624		
11	10	SREEDHA.A	6000	9	6480	12480		
12								
12								

This code assumes that you have a table named "Table13_2" in your workbook with columns named "Principal Amount" and "Interest." The result is a new table **(CombinedQuery)** that includes the original columns from "Table13_2" and an additional column named "Sum" containing the sum of the "Principal Amount" and "Interest" values for each row.

# TASK 3 :

Create a table named "OrderDetails" containing columns for "Product", "Quantity", and "UnitPrice". Apply a 10% discount to the "UnitPrice" for orders where the quantity purchased is greater than or equal to 10.

# **Order Details**

Product	Quantity	Unit Price
Product A	8	20.00
Product B	15	30.00
Product C	5	10.00
Product D	12	25.00
Product E	20	15.00
Product F	9	18.00
Product G	7	22.00
Product H	14	28.00
Product I	6	12.00
Product J	11	35.00

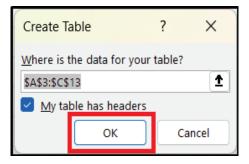
#### 1 Load Data:

- Open Excel and create a new workbook.
- Enter some sample data into a worksheet.

A	В	C	D	
	Order Details	Details		
Product	Quantity	UnitPrice		
Product A	8	20		
Product B	15	30		
Product C	5	10		
Product D	12	25		
Product E	20	15		
Product F	9	18		
Product G	7	22		
Product H	14	28		
Product I	6	12		
Product J	11	35		

 Go to the "Data" tab and click "Get Data" > "From Table/Range."/ Go to the "Power Query" tab and click "From Table/Range."

	Get Get	n Web	From Picture •	\$	Refresh E	Queries &			
		Get & Transform	n Data		Que	ries & Conne	ctions		
A	3	$1 \times \sqrt{f_{x}}$	Product						
	A	1	0	D	E	1. F	G	н	
12		Order Details	ei.						
1.00	Product	Quantity	UnitPrice						
4	Product A		20						
5	Product 8	15	30						
6	Product C	5	10						
7	Product D	12	25						
8	Product E	20	15						
9	Product F	9	18						
10	Product G	7	22						
11	Product H	14	28						
12	Product I	6	12						
13	Product J	11	35						



# 2 Power Query Editor:

Г

- The Power Query Editor will open, displaying a preview of your data.
- You can see the "Product", "Quantity," and "Unit Price" columns.

	y 123 UnitPrice	A ^B _C Product 🔽 1 ² 3 Qua	J. ∧ ⁸ c
20	8	Product A	1 Pro
30	15	Product B	2 Pro
10	5	Product C	3 Pro
25	12	Product D	4 Pro
15	20	Product E	5 Pro
18	9	Product F	5 Pro
22	7	Product G	7 Pro
28	14	Product H	B Pro
12	6	Product I	9 Pro
35	11	Product J	0 Pro

#### 3 Transform Data:

 Let's add a new column that calculates a DiscountedPrice based on the Quantity. Click on "Add Column" > "Custom Column."

Column From Custom Punchon Examples * Column General	ide 翻:	dd Column Vi ondifional Column ndex Column • Naplicate Column	Format	部の	Werge Columns Extract * Parse * m Text	XO Solitics Standard	10 ² Trigone Scientific III Information m Number	ng
Quartes [3]	(X	√ fr	+ Tabl	e.Tr	ansformColum	mTypes(Source,	(["Product", ty	pe text), {
Table1	113-	AR Product			123 Quantity	- 12	3 UnitPrice	
A ^B C Query1	1	Product A						20
Table4	2	Product #				25		
	3	Product C				5		30
	4	Product D				12		23
	5	Product E				20		15
	6	Product F						28
	7	Product G				7		22
	8	Product H				- 14		28
	9	Product I						12
	10	Product J				22		35



- Name the new column: "DiscountedPrice"
- Enter the formula: = if [Quantity] >= 10 then [UnitPrice] * 0.1 else 0

DiscountedPrice	
Custom column formula:	Available columns:
=if [Quantity] >= 10 then [UnitPrice] * 0.1 else 0	Product
	Quantity UnitPrice
	<< insert
Learn about Power Query formulas	

Click "OK" to create the new column.

			'Changed Type", "Dis 1 ² 3 UnitPrice	countedPrice", V	_ Query Settin	gs
1	Product A	8	20	0	PROPERTIES	
2	Product B	15	30	3	Name	
3	Product C	5	10	0	Table1	
4	Product D	12	25	2.5	All Properties	
5	Product E	20	15	1.5	APPLIED STEPS	
6	Product F	9	18	0		
7	Product G	7	22	0	Source Changed Type	
8	Product H	14	28	2.8	× Added Custon	
9	Product I	6	12	0	A Audeu Custon	u >
10	Product J	11	35	3.5		
10	Product J	11	35	3.5		

• Let's add a new column that calculates Net Price based on the Quantity, Unit Price and Discounted Price. Click on "Add Column" > "Custom Column."

New column name	
Net Price	
Custom column formula:	Available columns:
= [Quantity]*([UnitPrice]-[DiscountedPrice])	Product
	Quantity
	UnitPrice
	DiscountedPrice
	<< Insert
Learn about Power Query formulas	1.15

• Click "OK" again to create the new column.

	A ^B _C Product = 1 ² ₃	Quantity 💌 1	1 ² 3 UnitPrice	ABC DiscountedPrice	ABC Net Price 💌
1	Product A	8	20	0	160
2	Product B	15	30	3	405
3	Product C	5	10	0	50
4	Product D	12	25	2.5	270
5	Product E	20	15	1.5	270
6	Product F	9	18	0	162
7	Product G	7	22	0	154
8	Product H	14	28	2.8	352.8
9	Product I	6	12	0	72
10	Product J	11	35	3.5	346.5

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# 4 Load Transformed Data:

• Once you're satisfied with the transformations, click "Close & Apply" to load the data back into Excel.

Close I	k Load To.,	- Table.AntColu	uni#"Added Cyston	", "Niet Price", each [(	wartity]*	¥.	Query Settin	QS X
Ξ,	At Product	· SI quality	- St taites	· DiscountedPrice	+ III Bel Polar	•		<b>2</b> 75
1	Product &			20		100	+ PROPERTIES	
2	Product 6		15	30	1	405	Name	
3	Roduct C		5	10	a l	50	Table1	
.4	Woduct 0		48	14	20	-270	All Properties	
13	Walkets		20	- 25	7.5	270	· APPLIED STEPS	
6	Photost F		1.9	- 18	4	162		
1	Product G		3	22	U	154	Source Changed Type	2
1.8	Product H		44	28	24	312.8	Added Custor	
	Product1		1.4	12	0	. 72	2: Addred Custor	
10	Anadact J		44	20	11	246.5	COMPANY COMPANY	

• The transformed data will appear in your existing workbook.

	1	2	3	4	5	б
1	Product -	Quantity 💌	UnitPrice 💌	DiscountedPrice	Net Price 💌	
2	Product A	8	20	0	160	
3	Product B	15	30	.3	405	
4	Product C	5	10	0	50	
S	Product D	12	25	2.5	270	
6	Product E	20	15	1.5	270	
7	Product F	9	18	0	162	
8	Product G	7	22	0	154	
9	Product H	14	28	2.8	352.8	
10	Product I	6	12	0	72	
11	Product J	11	35	3.5	346.5	



#### TASK 4:

As an HR analyst at a company managing employee information, you have been provided with two tables in your Excel workbook: "EmployeeData" and "DepartmentData". The "EmployeeData" table contains details of employees, including their ID, name, and department ID, while the "DepartmentData" table includes information about departments, including their ID and name.

Your task is to perform the following operations:

- 1 Merge the "EmployeeData" and "DepartmentData" tables based on the department ID to create a consolidated dataset.
- 2 Add a new column in the consolidated dataset containing the name of the department for each employee.
- 3 Organize the workbook queries to ensure efficient management.

#### **Employee Data Table:**

Employee ID	Name	Department ID
001	John Smith	101
002	Emily Brown	102
003	David Lee	101

#### **Department Data Table:**

Department ID	Department Name
101	HR
102	Finance
103	Marketing

#### Step 1: Merge Tables

- 1 Open Microsoft Excel and navigate to the "Data" tab.
- 2 Click on "Get Data" > "From File" > "From Workbook" to import both "EmployeeData" and "DepartmentData" tables.

XI	5.0	¢* ₹			Во	ok1 - Excel	(Product	t Activation Faile	ed)			?	<u> </u>	
FILE	HOM	E INSERT	PAGE LA	YOUT	FORMULAS	DATA	REVIEW	V VIEW P	OWER QUERY				Sign	in
	File • Dat	From From tabase - Azure om Excel port data from crosoft Excel v	• Service		m Other Recer purces • Source		ge	Merge Append	Show Launch Pane Editor Workbook Querie		Power BI *	() Help		~
1 2 3 4 5 6 7 8	From the file	om Text/CSV port data from V file. om XML port data from e. om Folder port metadata out files in a fo	n an XML	)	E	F	G	H		J	К	L	M	
9 10 11 12 13 14 15														



### **COMPUTER SOFTWARE APPLICATION - CITS**

	DEVLOOP > Desktop > Power_Query	∽ C Sea	rch Power_Query	P
Organize 🔻 New folder			≣ • [	] (
Screenshots Power_Query	Name S DepartmentData S EmployeeData	Date modified 3/26/2024 6:26 PM 3/26/2024 6:26 PM	Type XLSX File XLSX File	Si
✓ 📮 This PC	<pre> power_query_table </pre>	4/3/2024 2:46 PM	XLSX File	
New Volume (F:)      New Volume (G:)      Network      Microsoft Excel      File name:      Navigator      I      Select multiple items     Display Options -*	power_query_table	√ Ex Tools ▼		ncel
+ 💼 power,query,tablexits				

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	Q	Employee				Ca
Select multiple items		Employee Data	Column2	Column3		
Display Options *	Ca	Employee ID	Name	Department ID		
▲ power_query_table.xlsx [2]		1	1 John Smith	101	t	
		2	2 Emily Brown	102	2	
DepartmentData Table     Employee	_	3	3 David Lee	101	1	

4	A	В	С	D	Ε 🔺		1979	
	Employee Data 💌	Column2	Column3 🛛 💌			Workbook Queries	$\sim$	
	Employee ID	Name	Department ID					
	1	L John Smith	101			1 query		
	2	Emily Brown	102			III Employee		
	3	B David Lee	101			4 rows loaded.		
ł.								
2								
1								

5 Click on the "Merge Queries" dropdown menu and select "Merge Queries as New".



## **COMPUTER SOFTWARE APPLICATION - CITS**

Employee         DepartmentDataTable         1       1         2       2         Employee	Cose     Query	Choose Remove K Columns * Columns * Ri	Keep Remove Split Grou bws* Rows* Column* By Reduce Rows Sort	Use First Row as Headers •	Merge Queries	e Data source rs * settings	rces *
DepartmentDataTable           Image: Provide to the second	Employee		Contractor descent at the second	a du centra com Marco de		query in this workbook to create a	, ("Department ID"
2 2 Emily Brown 102		, 1/3 Employee ID					
		2		-			
3 3 DavidLee 101		3		101			

- 6 Choose "DepartmentData" from the dropdown list and select "Department ID" as the matching column.
- 7 Select an appropriate join type, such as "Inner Join", and click "OK".

			Cà
Employee ID	Department Name	Department ID	Refresh
	1 John Smith	101	
	2 Emily Brown	102	
	3 David Lee	101	
		No preview is available	e
Join Kind		No preview is available	e
covers conference	ll from first, matching		e

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Employee IDDepartment NameDepartment ID1John Smith1012Emily Brown1023David Lee101	Employee ID       Department Name       Department ID         1       John Smith       101         2       Emily Brown       102         3       David Lee       101         0       DepartmentDataTable       •         0       Department ID       Department Name         101       HR       102         102       Finance       103         103       Marketing       •         Join Kind	Employee ID       Department Name       Department ID         1       John Smith       101         2       Emily Brown       102         3       David Lee       101         DepartmentDataTable       •       Image: Compartment Data Table         Department ID       Department Name       Image: Compartment Name         102       HR       Image: Compartment Name         102       Finance       Image: Compartment Name         102       Finance       Image: Compartment Name         102       Finance       Image: Compartment Name         103       Marketing       Image: Compartment Name         Use fuzzy matching to perform the merge       Image: Compartment Name       Image: Compartment Name         Vuzzy matching options       Compartment Compartment Name       Image: Compartment Name       Image: Compartment Name         Merge       Select a table and matching columns to create a merged table.       Image: Compartment Name       Image: Compartment Name       Image: Compartment Name         1 doin Smith       Image: Compartment Name       Image: Compartment Name       Image: Compartment Name       Image: Compartment Name         1 doin Smith       Image: Compartment Name       Image: Compartment Name       Image: Compartment Name       Image: Compartment Nam	Employee ID Department Name Department ID 1 John Smith 100 2 Emily Brown 100 3 David Lee 100 DepartmentDataTable • Department ID Department Name 100 HR 102 Finance 103 Marketing oin Kind Left Outer (all from first, matching from second) • Use fuzzy matching to perform the merge Fuzzy matching to perform the merge Fuzzy matching options OK Cancel Merge elect a table and matching columns to create a merged table. mptoyee 1D repartment Name Department ID 102 John Smith 102 103 Marketing Department DD Department DD 104 John Smith 100 105 John Smith 100 107 John	Employee ID Department Name Department ID 1 John Smith 100 2 Emily Brown 100 3 David Lee 100 DepartmentDataTable • Department ID Department Name 100 HR 102 Finance 103 Marketing Din Kind Left Outer (all from first, matching from second) • Use fuzzy matching to perform the merge Fuzzy matching options CK Cancel	Imployee ID Department Name Department ID   1 John Smith 101   2 Emily Brown 102   3 David Lee 101    Pepartment ID  Department Name    101 HR   102 Finance   103 Marketing    pin Kind    Left Outer (all from first, matching from second)   Verge    OK  Cancel     Aerge    Planter Name     OK   Cancel    Partment Name     102   Finance   103   Marketing    OK  Cancel	Employee ID Department Name Department ID 1 John Smith 102 2 Emily Brown 102 3 David Lee 102 DepartmentDataTable • Department ID Department Name 102 HR 102 Finance 103 Marketing Din Kind Left Outer (all from first, matching from second) • Use fuzzy matching to perform the merge Fuzzy matching to perform the merge Fuzzy matching options OK Cancel Merge elect a table and matching columns to create a merged table. mployee ID 2 Department Name 2 John Smith 102 102 John Smith 102 102 John Smith 102 103 John Smith 102 104 John Smith 102 105 John Smith 102 107 John Smith 107 Joz	Employee ID Department Name Department ID I John Smith J02 2 Emily Brown J02 3 David Lee J02 DepartmentDataTable Department DD Department Name 102 HR 102 Finance 103 Marketing Din Kind Left Outer (all from first, matching from second) Use fuzzy matching to perform the merge Fuzzy matching to perform the merge Fuzzy matching options OK Cancel Merge elect a table and matching columns to create a merged table. mployee 10 perform Name Department ID 102 John Smith J02 103 Marketing OK Cancel 104 Marketing OK Cancel 105 Marketing OK Cancel 105 Marketing OK Cancel 107 Joze	Employee ID Department Name Department ID 1 John Smith 100 2 Emily Brown 100 3 David Lee 100 DepartmentDataTable • Department ID Department Name 100 HR 102 Finance 103 Marketing Oin Kind Left Outer (all from first, matching from second) • Use fuzzy matching to perform the merge Fuzzy matching to perform the merge Fuzzy matching options Kind Cancel Merge elect a table and matching columns to create a merged table. mptoyee ID gepartment Name Department ID 102 John Smith 100 102 John Smith 100 103 John Smith 100 104 John Smith 100 104 John Smith 100 105 John	Employee ID Department Name Department ID 1 John Smith 100 2 Emily Brown 100 3 David Lee 100 DepartmentDataTable • Department ID Department Name 100 HR 102 Finance 103 Marketing Oin Kind Left Outer (all from first, matching from second) • Use fuzzy matching to perform the merge Fuzzy matching to perform the merge Fuzzy matching options Kind Merge elect a table and matching columns to create a merged table. mptoyee ID gepartment Name Department ID 102 Jack	Employee ID       Department Name       Department ID         1       John Smith       101         2       Emily Brown       102         3       David Lee       101         Department Datable         Department ID       Department Name         102       Finance       102         103       Marketing       Image: Select at table and matching columns to create a merged table.         Employee ID       Department Name       Department ID         103       Marketing       Image: Select at table and matching columns to create a merged table.         Employee ID         2       John Smith       102         3	Employee ID       Department Name       Department ID         1       John Smith       202         2       Emily Brown       202         3       David Lee       203         DepartmentDataTable         0       Department Name         102       Finance         103       Marketing	Employee ID Department Name Department ID 1 John Smith 101 2 Emily Brown 102 3 David Lee 201 DepartmentDataTable Department DD Department Name 101 HR 102 Finance 103 Marketing Din Kind Left Outer (all from first, matching from second) Use fuzzy matching to perform the merge Fuzzy matching options Kind Cancel Merge elect a table and matching columns to create a merged table. mployee ID Department Name Department ID 102 John Smith 102	Employee ID       Department Name       Department ID         1       John Smith       101         2       Emily Brown       102         3       David Lee       101         Department DataTable         0       Department ID         101       HR         102       Finance         103       Marketing
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#### **Related Exercises:**

1 Create "Employee Data" table containing information about employees, including their EmployeeID, Name, Department, and Salary. Your task is to perform advanced filtering and parameterization to analyze employee bonuses based on salary levels.

#### **Employee Data:**

EmployeeID	Name	Department	Salary
101	John Smith	П	60000
102	Jane Doe	HR	75000
103	Bob Johnson	Sales	80000
104	Alice Brown	п	70000
105	Mark White	Sales	90000

#### TASKS :

- 1 Load the "Employee Data" into Power Query.
- 2 Create a parameter named "MinSalary" that represents the minimum salary for filtering.
- 3 Use the "MinSalary" parameter to dynamically filter the "Employee Data" table, keeping only the rows where the salary is greater than or equal to the parameter value.
- 4 Add a custom column named "Bonus" based on the following conditions:
  - If the salary is above 65000, assign a bonus of 5%.
  - If the salary is between 60000 and 65000, assign a bonus of 3%.
  - Otherwise, assign a bonus of 1%.
- 5 Load the final table into the Excel workbook.

Create "Sales Data" table with sample data, along with a Python script that performs combining and aggregating operations to analyze the total revenue for each product.

#### Sales Data Table:

OrderID	CustomerID	ProductID	Quantity	Revenue
1	101	201	2	100
2	102	202	1	50
3	103	201	3	150
4	104	203	2	120
5	105	202	1	50

#### TASKS :

- 1 Load the "Sales Data" into Power Query.
- 2 Combine this table with a reference table containing information about each product, such as the "ProductID" and "ProductCategory." Assume this reference table is named "ProductInfo."
- 3 Aggregate the combined data to calculate the total revenue for each product category.
- 4 Create a new column in the final table named "AverageRevenuePerUnit" that calculates the average revenue per unit sold for each product category.

You have a "Monthly Sales" table containing information about sales data over several months. Your task is to perform time series analysis to understand the trends in monthly sales.

Date	Sales Amount
2022-01-01	10000
2022-02-01	12000
2022-03-01	15000

TASKS :

- 1 Load the "Monthly Sales" into Power Query.
- ..um the "Date" cc ..dd it as a new column. .ses in sales. 2 Create a new column named "Month" that extracts the month and year from the "Date" column.
- Calculate the month-to-month percentage change in sales and add it as a new column. 3
- Identify any months with significant increases or decreases in sales. 4



# EXERCISE 77 : Demonstrate Power BI for simple data visualizations

## **Objectives**

At the end of this exercise you shall be able to

• demonstrate power BI for simple data visualizations.

# Procedure

Power BI is a powerful business analytics tool developed by Microsoft. It allows users to visualize and analyze data from various sources in interactive reports and dashboards.

#### Download and Install Power BI Desktop

Here are some requirements of the system to download the Power BI Desktop:

- Window 7, window 8, window 8.1, window 10, and windows server 2008 R2, windows server 2012, windows server 2012 R2.
- It requires internet explorer 9 or higher.
- Power BI Desktop is available for both 32 bit and 64-bit platforms.
- Let's see the downloading process of the Power BI Desktop step by step:

Step 1: Click on the below link to directly download Power BI Desktop. https://powerbi.microsoft.com/en-us/ desktop/

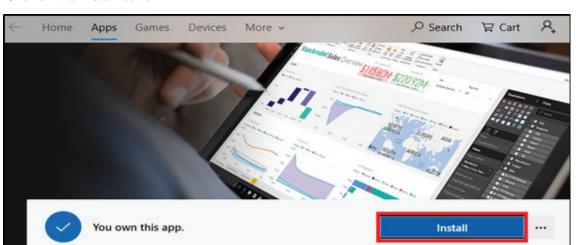
Step 2: Then click on the Download Free button.











Step 4: Click on the Install button.

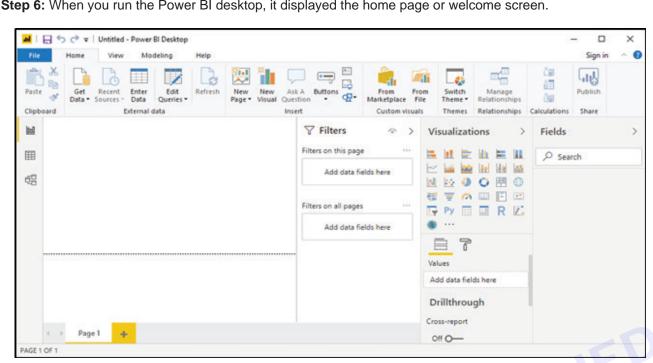
you can see the progress status of the Power BI Desktop on the screen.



Step 5: You can see "welcome to Power BI Desktop" screen and then register yourself on the desktop.

First Name *	
Last Name *	
Email Address *	
Enter your phone number *	
Country/region *	
Company name *	
Company size *	
Job Title*	
icrosoft may use your contact information to provide updates and special of telligence and other Microsoft products and services. You can unsubscribe is bu can read the <u>privacy statement</u> .	



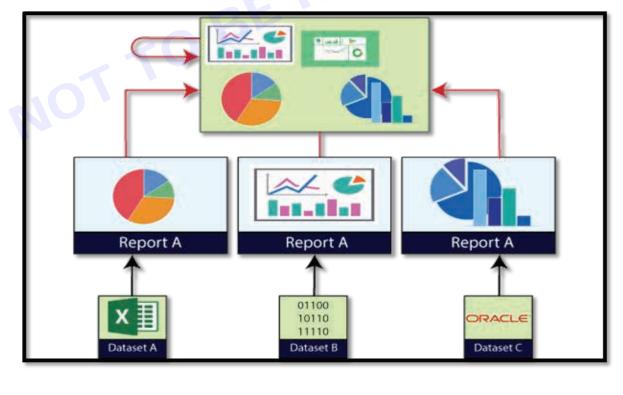


#### **Power BI Dashboard**

Power BI dashboard is a single page, also called a canvas that uses visualization to tell the story. It is limited to one page; therefore, a well-designed dashboard contains only the most essential elements of that story.

The visualizations visible on the dashboard are known as tiles. These tiles are pinned to the dashboard from reports. The visualizations on a dashboard come from reports, and each report is based on one data set.

A dashboard can combine on-premises and cloud-born data. And they are providing a consolidated view regardless of where the data lies.



#### **Creating Dashboard in Power BI**

We need to import one sample datasets of the Power BI and use it to create a new dashboard.

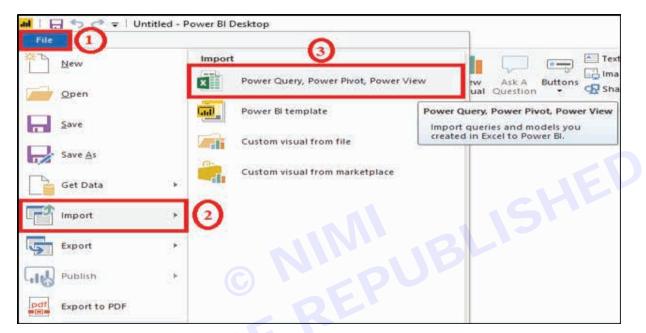
For example, suppose a sample such as **Procurement Analysis.** This sample is an excel workbook with two PowerView sheets.

When Power BI imports the workbook, it adds a dataset and a report to the workspace. Let's see step by step.

Step 1: Open the Power BI Desktop and click on the File pane.

Step 2: Go to the Import option.

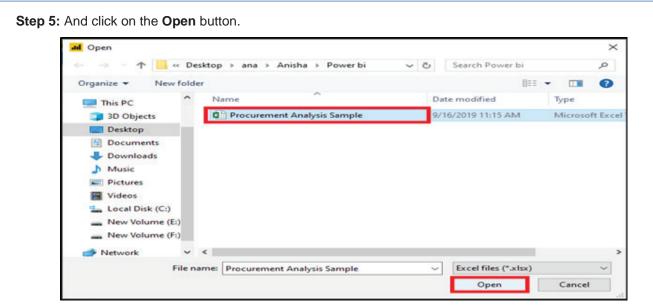
Step 3: And select the Excel dataset file to import the file.



Step 4: Select the procurement analysis sample file. Eg: You can select the sample data set from the link https:// www.kaggle.com/datasets

	A	В	C	D	E	F	(
	Currency	Exchange Rate	Location	Vendor	Date	Invoice	
2	\$141,604	20	United States	Emily Davis	4/8/2016	E00530	
3	\$99,975	15	China	Theodore Dinh	11/29/1997	E04239	
4	\$163,099	21	United States	Luna Sanders	10/26/2006	E03496	
5	\$84,913	20	United States	Penelope Jordan	9/27/2019	E00549	
6	\$95,409	20	United States	Austin Vo	11/20/1995	E00163	
7	\$50,994	21	China	Joshua Gupta	1/24/2017	E00884	
8	\$119,746	21	United States	Ruby Barnes	7/1/2020	E04116	
9	\$41,336	22	United States	Luke Martin	5/16/2020	E04625	
10	\$113,527	22	United States	Easton Bailey	1/25/2019	E03680	
11	\$77,203	23	United States	Madeline Walker	6/13/2018	E04732	
12	\$157,333	23	United States	Savannah Ali	2/11/2009	E03484	
13	\$109,851	24	United States	Camila Rogers	10/21/2021	E00671	
14	\$105,086	24	United States	Eli Jones	3/14/1999	E02071	
15	\$146,742	25	China	Everleigh Ng	6/10/2021	E02206	
16	\$97,078	25	United States	Robert Yang	11/4/2017	E04545	
17	\$249,270	26	United States	Isabella Xi	3/13/2013	E00154	
8	\$175,837	26	United States	Bella Powell	3/4/2002	E03343	
19	\$154,828	27	United States	Camila Silva	12/1/2003	E00304	
20	\$186,503	27	United States	David Barnes	11/3/2013	E02594	
21	\$166,331	28	China	Adam Dang	7/9/2002	E00402	
22	\$146,140	28	Brazil	Elias Alvarado	1/9/2012	E01994	
23	\$151,703	29	United States	Eva Rivera	4/2/2021	E03549	
24	\$172,787	29	Brazil	Logan Rivera	5/24/2002	E03247	
25	\$49,998	30	United States	Leonardo Dixon	9/5/2019	E02074	
26	\$207,172	30	China	Mateo Her	3/2/2014	E04152	
-	A+10 000	24	11		111710015	FOLOOO	





Step 6: For the exercise, select the Start button.

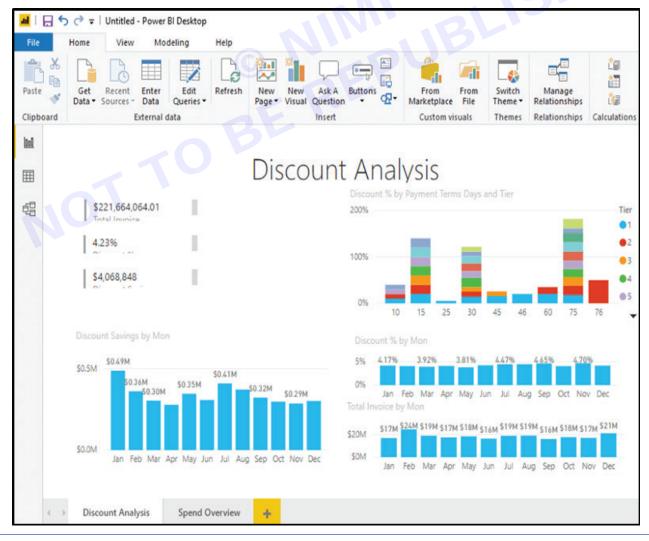


It starts import excel workbook and creating report view worksheets shown in the below screenshot.

Import Excel work	
Creating report view worksheet	Serie Contraction of the Contrac
Creating report view worksheet	3
Creating report view worksheet	3-+
Creating report view worksheet	

× Import Excel workbook contents Migration completed Queries (8 items) Currency ExchangeRate Invoice Line Item Item Location Vendor Date Invoice Close

In the below screenshot, you can see the discount analysis of the imported dataset in the form of tiles.



Step 7: When the completed message appears, then select the Close button to dismiss it.

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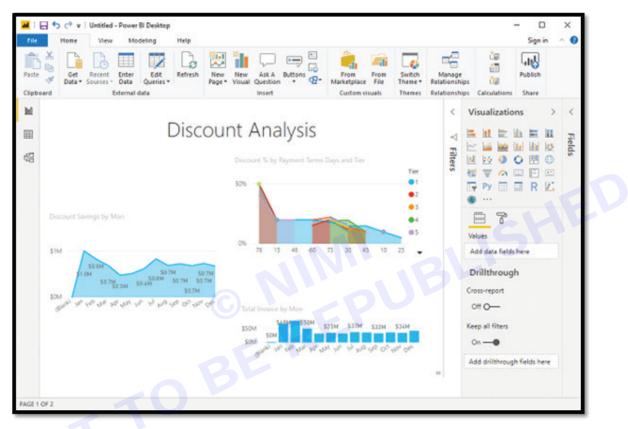


#### **Power BI Reports**

A Power BI **report** is a multi-perspective view into the dataset, with visualizations which represent different findings and insights from that dataset.

A report can have a single visualization or multiple visualizations. The visualizations in a report represent something like a dashboard does but serve a different purpose.

These visualizations are not static. These are highly interactive & highly customizable visualizations which update, as the underlying data changes. You can add and remove the data, change visualization types, and apply filters in your model to discover insights.



#### **Related Exercises:**

#### Simple Data Visualizations in Power BI

#### Scenario:

You have been provided with a dataset containing information about monthly sales for a retail business. The dataset includes columns such as Date, Product Category, Sales Amount, and Region.

#### TASKS:

#### 1 Import Data:

· Load the provided dataset into Power BI.

#### 2 Data Cleaning and Transformation:

• Perform any necessary data cleaning and transformation steps to ensure the data is suitable for analysis.

#### 3 Create Visualizations:

- Design the following visualizations:
- Line Chart: Display the trend of total sales over different months.

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- Bar Chart: Compare sales amounts for different product categories. ٠
- Map: Show the geographical distribution of sales using the Region information.

#### 4 Implement Slicers:

Add slicers to enable dynamic filtering. For example, create a slicer for the date range to view sales for a • specific period.

#### 5 Calculate Key Metrics:

Create new calculated columns or measures to calculate important metrics, such as monthly growth rate • or total sales.

#### 6 Dashboard Creation:

Assemble the visualizations on a Power BI dashboard for a comprehensive overview.

#### 7 Interactive Elements:

Implement interactive elements such as tooltips, drill-throughs, or bookmarks to enhance user experience.

#### **Dataset Example:**

	Product Category	Sales Amount	Region
2022-01-01	Electronics	10000	North
2022-02-01	Clothing	12000	South
2022-03-01	Home Goods	15000	East