Introduction to IT System Lab Manual

Course Code- PR 1(b)

(Common to 1st & 2nd semester)

PNS SCHOOL OF ENGINEERING & TECHNOLOGY

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Experiment No-1: Browsing and Searching

Practical Statement:-

Browser features, browsing, using various search engines, writing search queries.

Practical Significance:-

In the world of the internet, there are more consumers of information than the producer. The principle is also propounded by the ISP's data allocation patterns. Higher bandwidth is offered for data downloading than for uploading. Web browsers are user agents to search the available information on www. The process of information retrieval while navigating from one page to another through hyperlinks is termed browsing. Browsing & searching on the internet are now an integral part of day-to-day computing.

Practical Outcomes (Pr0):-

The learners will be able to:
Pr01: use different features of web browsers.
Pr02: browse the world, wide, web in a convenient manner.
Pr03: acquainted with web interfaces of search engines and use different search engines.
Pr04: fetch the most relevant search engine result pages by writing effective search queries.

Practical Setup (Work Situation):-

1. Learners have to use the features of web browsers for convenient browsing and searching.
2. Learns have to find the search query (as of step 1) on various search engines with a fixed browser and analyze the search results.
3. Refine your search results by search engines interface or by writing queries.

Resources Required:-

1. A computer system Le.., any PC/Laptop/Tablet/Smartphone.
2. An internet connection,
3. An installed web browser software i.e., Mozilla Firefox, Google Chrome, Microsoft Edge, etc.
4. Access to various search engine websites (i.e., google.com, yahoo.com, duckduckgo.com, bing.com, yandex.com, etc.) or installed browser extensions of your preferred search engine.

Precautions:-

1. Use an updated web browser to protect from security breaches and browser vulnerabilities.
2. Browse valid search engine websites with HTTPS& enabled padlock icon in the address bar.
3. Download extensions from authenticated app stores and verified vendors.

Observations:-

Table 1: Browsing Results tor Search Term

Sr. No	Browser	Search Engine	Results		
			#of results and time taken	URL of first 3 Image results	URL of first 3 mage results after applying any filter {i.e., size, colour, type, time etc.}
1	Mozilla Firefox	gocgle.com	4,10,00, 000 (0.57 seconds)	1	1
				2	2
				3	3
2	Microsoft Edge	google.Com			
3	Google Chrome	google.Com			
4	Google Chrome	yahoo.com			
5	Google Chrome	duckduckgo.com			
6	Google Chrome	bing.com			
7	Google Chrome	bing.com			

Table 2: Search Queries

Sr. No	Search Query ongoogle.com	Results		
		#of results and tine taken	URL of first 3 Image results	Screen Shot of the First page of SERP
1	nep 2020 filetype:ppt		1	
			2	
			3	
2	nep 2020 filetype:pdf site: (gov.in/nic.in)		1	

Conclusions:-

1. The same search query requested by different web browsers fetches some different results even on the same search engine. Which is likely due to browser settings, cookies, etc.
2. The search results of different search engines vary drastically.
3. The different browser has their interfaces to perform browsing & searching tasks
4. Web results are dynamic, depends on various factors like internet speed, time of day, search traffic on that between request machine and server, etc.

Experiment No-2: Digital India Portals

Practical Statement

Visit various e-governance/Digital India portals, understand their features, services offered.

Practical Significance:-

The Digital India program has become a unique example of the world in providing various public welfare services to its citizens through digital technology.

Practical Outcomes (Pr0)

The learners will be able to:
Pr01: browse various Digital India portals.
Pr02: analyze key services and features of the portals.

Practical Setup (Work Situation)

In the practical, we will browse www.uidai.gov.in, swayan.gov.in, and mygov.in Digital India portals one each from infrastructure, service based, and empowerment category respectively.

Resources Required:-

1. A computer system I e, any PC/Laptop/Tablet/Smartphone.
2. An internet connection. Precautions
3. An installed web browser software I e., Mozilla Firefox, Google Chrome, Microsoft Edge, etc.

Precautions:-

1. Use an updated web browser to protect from security breaches and browser vulnerabilities.
2. Browse only valid websites with HTTPS and padlock-enabled icon in the address bar.

Suggested Procedure:-

1. Open any web browser of your choice.
2. Type URL. Www. https://uidai.gov.in into the address bar of the browser.
3. The home page of the above web portal will be shown as depicted below:

Observations:-

Table 3: Key Services and Features of e-governance/Digital India Portals

SR NO	Digital India Portal	Key Services Offered	Features
1	https://uidai.gov.in/	Book appointment, Check status, etc.	Multilingual, Screen Reader, customizable fonts, size, chat-bot, social media feeds.
2	https://swayam.gov.in		
3	https://www.mygov.in/		

Conclusions:-

1. UIDAI's portal is robust in terms of offered services and the use of technology in portal creation. It offers Aadhaar related services from creation to maintenance.
2. Swayam MOOC platform has the capability of a complete online education portal. It provides an online facility to enroll, deliver content, and managing student's exams and credit details.
3. MyGov portal envisages citizen's role in government decision-making. The concept of participatory government is achieved via various Groups, Discussions, Polls, Blogs, and Talks.

Experiment No-3: Computer Hardware Components

Practical Statement

Read Wikipedia pages on computer hardware components, look at those components in the lab, identify them, recognize various ports/interfaces and related cables, etc.

Practical Significance

The usefulness of the computer is proved by its ubiquity. 'The maintenance needs of such ubiquitous equipment cannot be ignored. Identifying various hardware components, Connecting them, and Correcting common errors has now become an essential general skill.

Computer ports:-

Computer port: Is a connector on the motherboard or on a separate adapter that allows a device to connect to a computer; these may include keyboard, mouse, serial, parallel, network, sound, or video ports. Ports vary with the type of equipment that connects to the ports.

Male ports: Have pins that protrude out from the connector and require a cable with a female connector.

Female ports: Have holes in the connector to accept the male cable's pins.

PS/2: Most desktop computers have two of these round ports for six pin connectors, one for the mouse and one for the keyboard.

USB: It is a 4-wire connector type of port. It has different models (USB 1.0, USB 2.0, and USB 3.0). In modern computers connects all kinds of external USB devices e.g., external hard disk, printer, scanner, mouse, keyboard, etc. Data travels at 2 megabits per second. USB compliant devices can gel power from a USB port.

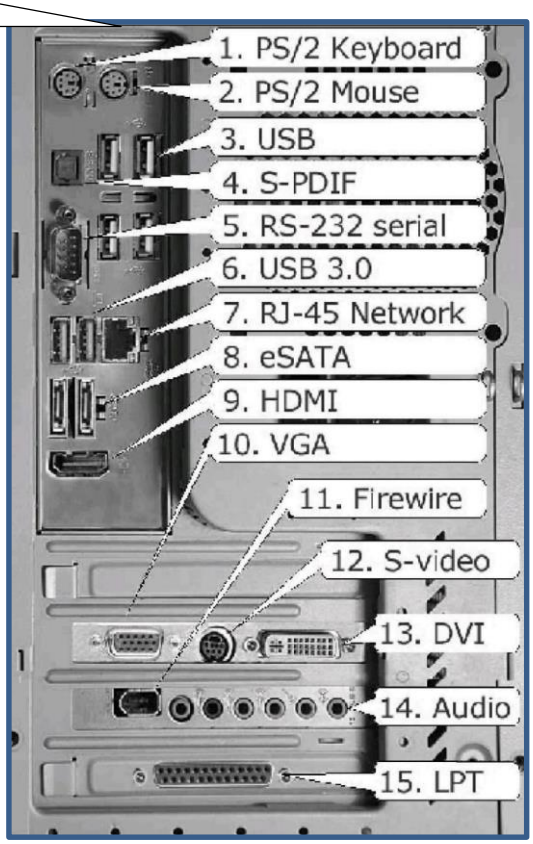

Figure 1 Computer ports

Serial Port: These connectors use pin connectors of D type. Generally used for long distance communication. Also known as a C0M port. Data travels al 115 kilobits per second.

Ethernet Port: Connects to a network and high speed Internet. Connect the network cable to a computer, this port resides on an Ethernet Card. Data travels at 1) megabits to 1000 megabits per second depending upon the network bandwidth.

VGA: A three row, 15-pin female D-shell connector for newer VGA, VGA, XGA, SXGA, or UXGA monitors. Connects monitor to a computer's vide0 card. Similar to the serial port connector but serial port connector has pins, it has holes.

FireWire: is a personal computer/consumer electronic serial bus interface standard offering high speed communications and isochronous real-Lime data services. Olen implemented in consumer electronics devices, digital video cameras, VCRS, some other multimedia hardware, and computers.

S-video: connector widely used on ATI and other graphics cards, Carry s-video and composite signals.
DVI: The Digital Visual Interface (DVI) is a video interface standard designed to maximize the visual quality of digital display devices such as flat panel LCD computer displays and digital projectors.

ECP Parallel LPT port: The Extended Capabilities port is found in some old PCs. ECP is an extension of the EPP design.

Practical Outcomes (Pro)

The learners will be able to:
Pr01: browse Wikipedia web pages developed in various languages.
Pr02: convert Wikipedia pages into other languages.
PrO3: identify various hardware components of the computer system.
PrO4: recognize ports/interfaces and cables of the computer system.

Practical Setup (Work Situation)

In this practical, we will browse www.wikipedia.org an online, multilingual free encyclopedia lo find several web pages related to computer hardware components. Thereafter a computer system should be disassembled and each component will be identified and categorized in a prescribed table according to its functionality.

Resources Required

1. A computer system i.e., PC/Laptop.
2. An internet connection.
3. An installed web browser software i.e., Mozilla Firefox, Google Chrome, Microsoft Edge, etc.

Observations:-

Table 4 : Recognized Hardware Components

Sr. No	Input	Output	processing	storage

Conclusion:

Examining computer hardware components in a lab setting reinforces theoretical knowledge gained from resources like Wikipedia.

By identifying various components such as CPUs, motherboards, RAM, and storage devices, one gains practical insights into their functions and interconnections. Recognizing different Male ports and Female ports with interfaces like USB, HDMI, and SATA etc. Along with their corresponding cables, further enhances understanding of how these components communicate and work together within a system. Overall, combining theoretical learning with practical observation is crucial for developing a thorough grasp of computer hardware.

Experiment No-4:

(Peripherals and Device Driver Installation)

Practical Statement:-

Connect various peripherals (printer, scanner, etc.) to computer, explore various features of peripheral and their device driver software.

Practical Significance:-

It is a Well Known fact that hardware components from different manufacturers are assembled to make a complete computer system. Although operating systems are equipped to install a large list of standard hardware. But some hardware devices are not automatically installed during the operating system installation and some don't work properly post-installation. Further, the capability of the driver is updated from time to time by the hardware manufacturers.

(a) Connect Peripheral devices:-

Connect various peripherals (printer, scanner, etc.) to computer, explore various features of peripheral and their device driver software. Total Computers are all about input and output, both within the system box and between the system box and a variety of external devices. The term input/output (I/0) covers both types of these interactions. Examples of common input devices include the keyboard and any pointing device (mouse, trackball, pen, etc.). Data can also be input from devices that also take the output, such as storage devices and network cards. The most common output devices are the display, sound card, and printer.

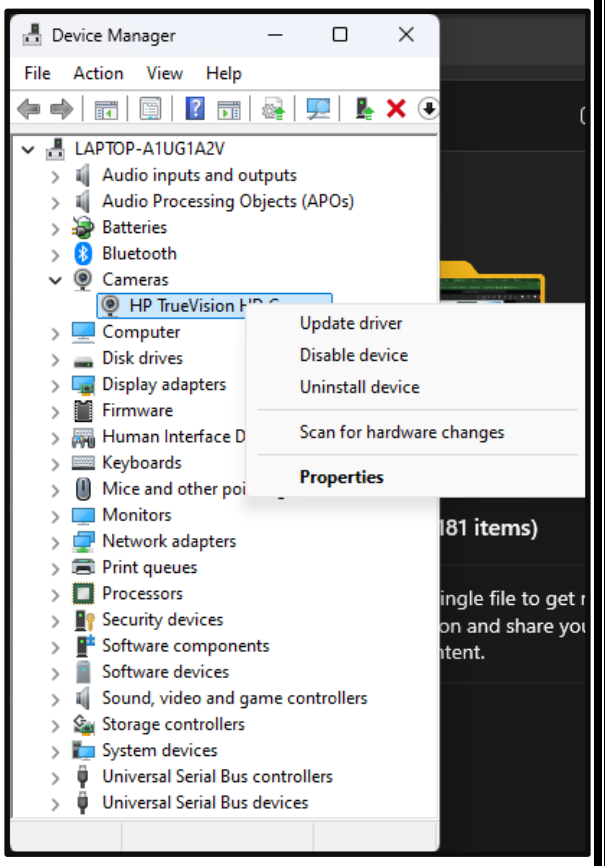

Figure 2 Device Manager

(b) Device driver installation:-

Device Manager is the primary Windows tool for managing hardware. It lists all installed hardware devices and the drivers they use. Using Device Manager, you can disable or enable a device, update its drivers, uninstall a device, and undo a driver update. Device manager can be accessed via any of the below methods.

Start menu: The easiest way to open the Device Manager on Windows 10 is to click on the Start menu and type Device Manager in the search box.

Run: Press the Windows key with the letter R (Windows Key+ R) where the Run engine will appear. Type in 'devmgmt.msc' and click OK. The device manager window will be shown as depicted in Fig.0

Practical Outcomes (Pro)

The learners will be able to:
Pr01: connect various peripherals to the computer system.
Pr02: explore various features of peripherals.
Pr03: install the device drivers of Hardware.

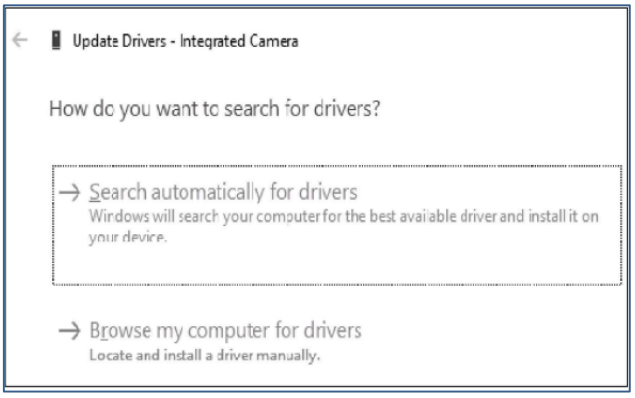

Figure 3 update drivers

Practical Setup (Work Situation)

This practical will discuss a universal method for device driver installation and a specific method for local scanner/printer installation.

Resources Required

1. A computer system i.e., PC/Laptop.
2. An internet connection.

Precautions

You must log on with administrator privilege to make any changes via device manager.

Suggested Procedure

Follow these steps to use Device Manager to update device drivers of your system.

1. For best results, locale and download the latest driver files from the manufacturer's website to your hard drive. Be sure to use 64-bit drivers for a 64-bit OS and 32-bit drivers for a 32-bit 0S.
2. Using Device Manager, right-click the device and select Properties from the shortcut menu (See fig 1). The Properties window for that device appears. Select the Driver tab and click Update Driver. The Update Driver Software box opens (See Fig 2).
3. To search the Internet for drivers, click Search automatically for updated driver software. If you have already downloaded drivers to your PC, click Browse my computer for driver software, and point to the downloaded files. Note that Windows is looking for a. in file to identify the drivers. Continue to follow the directions on the screen lo complete the installation.

Install or add a local scanner/printer on Windows 10

In most cases, all you have to do to set up a scanner is to connect it to your device. Plug the USB cable from your scanner into an available USB port on your device, and turn the scanner on, If that doesn't work, here's a way to do it manually.

1. Select Start→ Settings→ Devices →Printers & scanners.
2. Select Add a printer or scanner. Wait for it to find nearby scanners/printers, then chose the one you want to use and select Add device.

Observations

Table 5: Administering Hardware with Device Manager

Sr. No	Action taken	Reflection in Device Manager	Screenshot
1	Install, update, disable or uninstall	Current version no. and new version no of drivers in case or install and update.	

Conclusion:

In conclusion, exploring various peripherals and their corresponding device driver software highlights the integral relationship between hardware and software. Device drivers are crucial for ensuring that peripherals operate effectively, allowing users to access advanced features and optimize performance. This understanding not only enhances the user experience but also equips individuals with the knowledge to troubleshoot and manage peripheral devices more effectively. As technology continues to evolve, familiarity with these components will remain vital for maximizing productivity in any computing environment.

Experiment No-5 : Operating System Installation

Practical Statement

Install Linux and Windows operating systems on identified lab machines, explore various option, do it multiple times.

Practical Significance

The maintenance of the existing system or upgradation requirements are two key reasons behind the installation of the operating system. An upgraded, updated OS provides robust services to its users. 'The OS installation skills are necessary for computer users.

Practical Outcomes (Pr0)

The learners will be able to:

Pr01: clean install Ubuntu Linux operating system on an identified lab machine.

Pr02: clean install Windows l0 operating system on an identified lab machine.

Practical Setup (Work Situation)

In this practical, we will clean install Ubuntu and Windows operating system. For the precautionary measure, we must choose a computer machine with no important data.

Resources Required

1. A computer system i.e., PC/Laptop.
2. An internet connection.
3. A bootable media (CD/DVDUSB) having the operating system on it.

Precaution

1. All important data should be backed up before starting the installation process.
2. Recommended system requirements should be checked before the installation process.
3. Besides minimum system requirements, you must also consider the compatibility of the specific components installed in the PC i.e. check whether all of your software and hardware will be available in a newer version of OS?
4. If you are installing Windows OS, Keep the serial key handy.

Observations

Table 6:OS Installation Facts

Sr. No	You're System Configuration (HDD, CPU, RAM, etc.)	OS Version to be Installed	New File New System	New Partition Sizes	Time Taken for installation	Key Features for of the OS

Conclusion:

In conclusion, the process of installing and exploring both Linux and Windows operating systems on lab machines enhances understanding of operating system functionality and user interfaces. Repeated installations provided insights into the nuances of each OS, including system requirements, installation procedures, and available features.

This hands-on experience not only builds technical skills in operating system management but also fosters familiarity with troubleshooting common issues, such as driver compatibility and partitioning challenges. Understanding the differences between operating systems is crucial for any IT professional and will be beneficial in future tasks involving system administration and user support. Overall, this exercise serves as a foundational skill set for navigating diverse computing environments.

Experiment No-6:

(Hyper Text Markup Language)

Practical Statement

Practice HTML commands, try them with various values, and make your own Webpage.

Practical Significance

HTML is a markup language used for creating web pages and web applications. Nowadays that online services are expanding for daily essential services as well, by taking advantage of this, we can also create online solutions for our needs and domain. The process of creating web pages will also make internet surfing and searching easier. As HTML programming is a fundamental skill for web development it is significant lo be versed with it.

Practical Outcomes (Pr0)

The learners will be able to:
Pr01: create a webpage with basic formatting tags, graphics, and table.
Pr02: create a personal webpage with various formatting, listing, hyperlinking and graphics tags.

Practical Setup (Work Situation)

We will write HTML programs for two scenarios mentioned in practical outcomes.
Scenario 1: Create a webpage having HTML Table to display the department wise list of faculties.
Scenario 2: Create a personal webpage to show your basic details, objective, work experiences, skills, and social media handles. Webpage should have the use of basic formatting tags, ordered and unordered lists, graphics, text, and image hyperlinks.

Resources Required

1. A computer system I e, PC/Laptop.
2. A normal text editor software I e., notepad, notepad++, etc. Precautions
3. An installed web browser software i.e., Mozilla Firefox, Google Chrome, Microsoft Edge, etc.

Suggested Procedure

Follow these steps to create and run an HTMI. Webpage.

1. Open any text editor of your choice. And type the source code of your HTML program (source code for both scenarios are mentioned in table 4).
2. Now we have to save this file with an .html or .html extension. To do so, click on the Files→ "save as" option. It will show Save as dialog box. We have to select the "All Files (*)" list option from Save as type.

3. Now change the name of the current file from Untitled.txt to 'myWebpage.html and click on the Save option. The icon of the current file will change to your default browser's icon.
4. The saved file can be now opened in any web browser using one of the below methods.
    a) Just browse the file and double-click on the file, it will be opened in the default browser.
    b) Open your browser, press Ctrl + 0'keys, and select file by browsing its location.
    c) Open your browser and Drag & Drop' your html/htm file on the browser window

```
<!DOCTYPE html>
<html>
 <head>
  <title>Hello, World!</title>
  <link rel="stylesheet" href="styles.css" />
 </head>
 <body>
    <h1 class="title">Hello World! </h1>
    <p id="currentTime"></p>
    <script src="script.js"></script>
 </body>
</html>
```

3:54 pm

Figure 4 html basic coding

Observation

Table 7HTML Tags and Attribute used in Both Scenarios

Sr. No	Scenario	Name of HTML Tag	Attribute	Description
1				

Conclusion

In conclusion, creating a personal webpage using HTML commands has been an invaluable exercise in understanding the structure and syntax of web development. By experimenting with various tags, including headings, lists, images, and hyperlinks, I gained hands-on experience that solidifies my theoretical knowledge.

The process of designing a webpage taught me how to organize content effectively and enhance visual presentation through simple styling. Additionally, learning to incorporate links and images helped me appreciate the interconnected nature of web content. As I continue to refine my skills, this foundational experience will serve as a stepping stone for more complex web projects in the future.

Experiment No-7: Open Office Tools

Practical Statement

Explore features of Open Office tools, create documents using these features, and do it multiple times.

Practical Significance

The spread of information technology has ensured the computer has its place in every office. Word processing, mathematical work, and presentation work have an important role in the daily computer tasks of an office. In this practical, we will see the Writer, Impress, Cali component of Apache's Open office Software suite.

Practical Outcomes (Pr0)

The learners will be proficient in working AOO tools and:

Pr01: creating a general office pro form in the Writer component of AOO.

Pr02: creating a receipt pro form in the CALC component of AO0.

Pr03: creating a presentation in the Impress component of AO0.

Practical Setup (Work Situation)

In this practical, students should be provided with the different scenarios lo work on and let them choose the AOO component of their choice.

Scenario1: Suppose you are working in the education department and assigned to create a pro form to collect the teacher's profile. Fields for data collection with a sample pro form are provided as in Fig 4, 4.34. **Scenario 2:** Considering yourself as an employee of a service provider company, prepare the receipt pro form given to you. Calculations should be done automatically in the electronic version (softcopy) of the pro form. The sample receipt, given to your customer should be as depicted in Fig 5. 4.35. Scenario 3: Assuming yourself a government official, prepare an informative presentation on the Start-up India campaign. The sample template is depicted in Fig. 6.

Resources Required

1. A computer system i.e., PC/Laptop.

2. Installed Apache Open office software.

TEACHER'S PROFILE

YEAR.....

Employee's code	:	C-DISE Cade No.	:
Name of the lecher	:	State/UT	:
Date of Birth	:	District	:
Designation	:	Block	:
School's Address	:		

Academic/Professional Qualifications:

Academic Qualifications:			
Examination	University/ Board	Year	Subjects
Graduation			
Post-Gradation			
Ph.D.			
Professional Qualifications:			
D.Ed./ D.El.Ed /Ed.			
B.Ed./Equivalent			
M.Ed.			

Experience:

Experience	**Period**		**Total**	
	From	**To**	**Year**	**Month**
Teaching				
Administrative				
Other				

Achievements Awards (if any):

1._____

2._____

Signature of Teacher

Figure 5 A Template Pro forma for Teacher's Profile

Precautions

1. Back up and save your working document periodically to protect it from data loss.
2. Analyze page size, page layout, and slide layout as per pro forma/slide being created.

Figure 6 A Template Pro forma for Receipt

Shyam Techno Services

RECEIPT

[Street Address]
[City, ST ZIP]
Phone: 8001234567

INVOICE#	DATE
20215	10/08/2024

BILL TO	CUSTOMER ID	TERMS
[Name] [Company Name] [Street Address] [City, ST ZIP] [Phone] [Email Address]	564	Due upon Receipt

DESCRIPTION	QTY	UNIT PRICE	AMOUNT
Service Fee	1	200.00	200.00
Labour: 5 hours at 200 ₹ /hr.	5	200.00	200.00
Parts	1	1750.00	1,750.00

Thank you for your business!	SUBTOTAL	2,950.00
	GST	18.00%
	TAX	531
	TOTAL	INR 3,481.00

If you have any questions about this invoice, please contact
[Name, Phone, email@addres.com]

Suggested Procedure

(a)Pro forma for Teacher's Profile

The sample pro forma depicted in Fig. 4.34 should be created in Writer program for quick formatting and provided layout, although it can be created in other components as well.

1. Open a new Writer document
2. Go to the format→ page→ page tab, choose paper size, margins, etc.
3. Type the top 7 rows and format the rows to look like in the given pro forma, using the basic formatting command available in the formatting toolbar.
4. Create a table having 4 columns and 9 rows to accommodate content provided in pro forma tor academic professional qualification. To do go to Insert → Table or press Cirl+F12.
5. Merge columns of row l and row6 by selecting their cell → right→ click → Cells Merge. Adjust the size of columns by dragging the borders.
6. Apply text formatting commands like center, background color, font size, and type as specified in the given pro forma.
7. Create another table for Experience details via the following steps similar lo steps 4 to 6.
8. Create a numbered list for collecting experience details. Type underscore three times and then press Enter to insert a line as given in pro forma.

(b)Pro forma for Receipt

The sample pro forma depicted in Fig. 4.35 should be created in CALC program for quick formatting. Layout, and calculation needs. 'There may be different ways to prepare such document. One sequence of steps is mentioned below.

1. Open a new CALC document.

2. Go to the format page→ page tab, choose paper size, margins, etc.

3. As depicted, content has a maximum of 4 columns of data so all text layout can be adjusted in 4 columns

4. Merge first 3 cells of row l and Type name of the company i.e., Shyam Techno Services. Merging can be done via the Merge cells command provided on the Formatting toolbar.

5. Insert and merge other content as per the given layout.

6. Apply various text formatting commands e.g., Font type, size, background color, alignment of text to make our document identical to the given pro forma (as much as possible). You may use "formal Paintbrush" for quicker formatting.

7. To. present numbers with decimal fractions: Right-click on cell → formal Cells → Number → Options, set decimal places to 2.

8 Apply formulas for calculating Amount. Subtotal, Tax & Total.

(c) Presentation on Start-up India campaign

By looking at both the slide we have to develop the slide. First Slide is having one image (right upper corner) and 5 text sections with different formatting, numbering styles. Slide 2 is having six text segments for info graphics and one for the heading of the slide. The slide is also having some numbering on the left upper corner of text segments. We may follow the below steps to create our presentation to lock like the given template.

1. Open a new impress presentation with Presentation Wizard (refer to unit 4, section 4.3)

2. Select blank layout from Tasks pane.

3. Insert Text with Text icon front text toolbar or drawing toolbar or by pressing the F2 key.

4. Similarly, insert other text segments and input desired data on them, Apply formatting options like background color, font size, font color, font style, numbering.

5. Find the Start-up India logo on a search engine, insert and place it on right upper corner.

6. Insert new slide by right click on the Slides pane and then click New Slide.

7. Insert a text segment for heading and apply formatting options as given in the template.

8. Insert another text segment and type the text for the first information, Apply text formatting.

9. Select the text box and fill it with color by Properties pane→ Area→ Fill drop down to color and choose the desired color.

10. To insert numbering with a circle; create a circle with help of an ellipse icon. Double click lo insert the numbering value. Fill it with the desired color as in the previous step.

11. Select text box and circle; shape and recreate another text segment with numbering by copying & pasting. Make desired changes as per the second information box of the slide.

12. Place the segments by drag and drop or by keyboard navigational keys.

13. Repeal step 11, for the next four text segments and numbering.

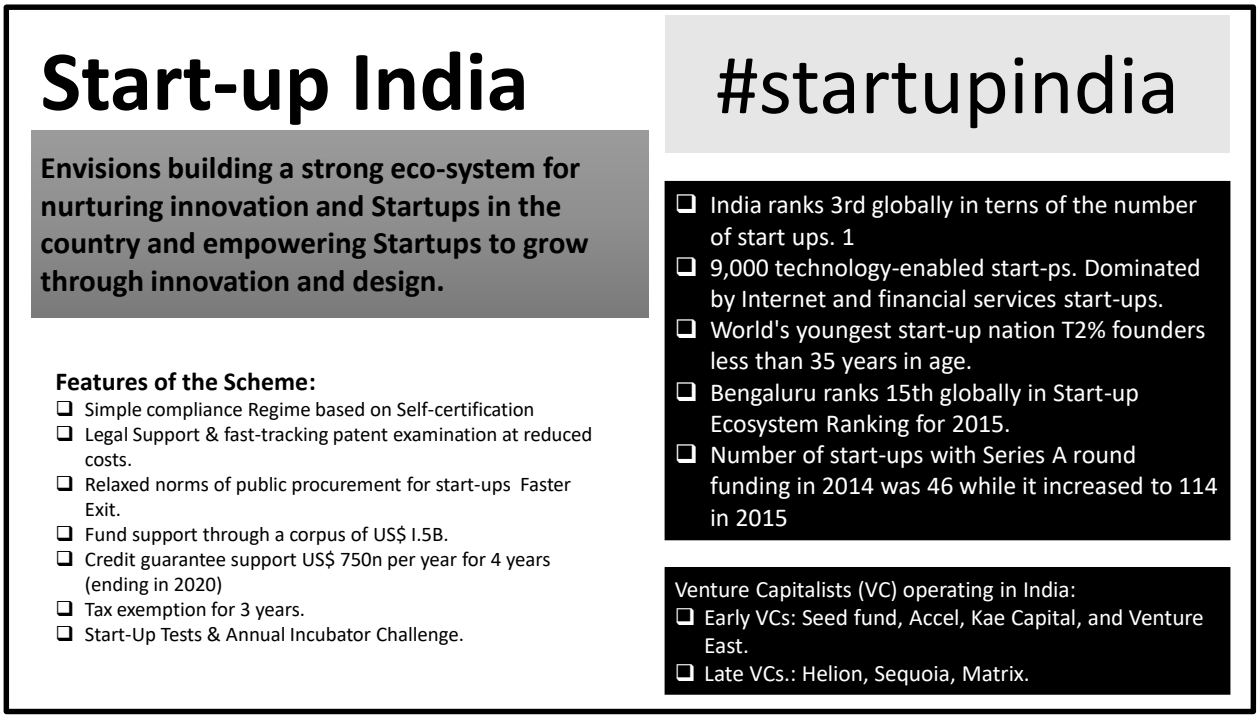

Figure 7 A Template- Presentation Slides

Conclusion

Open Office tools provide a versatile suite for document creation and management, suitable for a variety of tasks—from word processing and spreadsheets to presentations and graphics. By leveraging features such as templates, formulas, and multimedia support, users can produce professional-quality documents efficiently. The ability to create and edit multiple types of documents enhances productivity and fosters creativity, making Open Office a valuable resource for individuals and organizations alike. Regular use of these features can significantly improve workflow and document presentation, confirming Open Office's utility in both personal and professional contexts.

Experiment No-8:

(Operating System Security Features and Tools)

Practical Statement:

Explore security features of Operating Systems and Tools, try using them, and see what happens.

Practical Significance:

The built-in security features provided by any operating system are considered as one of the core properties of an operating system. It is important for every computer user to use these features and tools provided by the OS to protect their privacy and valuable data.

Relevant Theory

Protection with BIOS and UEFI

Modern computers come with Unified Extensible firmware Interface (UEI). The firmware selling can control our computer systems hardware at the lowest level. We can enable or disable, any hardware like USB ports, cameras, sound cards, etc. If the physical access to our computer system goes into the wrong hands, then it is possible that our system may be breached through live USB / DVD. To avoid such a situation, it is necessary to secure the b00l order change of the BIOS and allow booting (rom the hard disk only. Security should be enhanced by setting a password on UFI and enabling secure boot settings.

User Accounts

When we are logged on to the computer with some user account there are some privileges associated with the user. Windows OS specifies two types of user accounts i.e., the standard user and privileged user. The standard user account is given less privilege to change the settings of the system or install other software, than the privileged account. In the standard user account, the system becomes secure due to the malware not getting the necessary permissions. Therefore, understand it as a thumb rule that if we want to make changes in the settings of the system, then only log on with the Privilege user Account.

Data Encryption

Encryption is used in computer systems to protect data from evil eyes. Current operating systems also provide the facility of full disk encryption and our entire hard disk can be encrypted, the feature is present in Ubuntu 20 core and Windows 19 (except Home editions). Windows 10 has a utility called BitLocker for the same. In addition to 0$ tools, privacy and security can be enhanced from third-party software e.g., DiskCryptor, Veracrypt, 7-Zip, etc.

Firewall

Firewalls act as a barrier between our network and the outside world. These are used lo iller incoming packets based on certain parameters such as packet size, source IP address, protocol, and destination port, Various rules can be defined to allow or deny packet movement from inside to outside or vice versa. Ubuntu has a firewall named "Uncomplicated Firewall" (UFW) whereas "Windows Defender Firewall" is used in windows 10.

Backup & Recovery

There are backup and recovery tools i operating systems that act as a panacea in tough times. There is also such an option in Windows 10 by which we can back up the desired folders. Through this, the frequency and time interval of backing up are also configured.

Practical Outcomes (Pro)

The learners will be able to:

Pr01: protect themselves with help of Bios and UEFI.
Pr02: define user accounts and create a standard user account in Windows 10.
Pr03: encrypt hard disk drive with BitLocker utility of Windows 10.
Pr04: configure backup for desired folders, set backup frequency and retention time.
Pr05: urn on the Microsoft Defender firewall on Windows 10.

Resources Required

1. A computer system i.e., any of PC, Laptop.
2. An installed Operating system i.e., Windows 10 or Ubuntu.

Precautions

Setting UEFI Password

1. Turn on the computer and press either the Escape, Delete, F2, F10, or F12 key.

2. Enter the Setup/BIOS/UETI and navigate lo the advance settings page (F7)

3. Click on the Security tab.

4. Under the Security tab, you will see the Administrator and User Password. Go ahead and set two separate passwords for the Administrator in User accounts.

5. You should now see the Administrator and User password status showing as "Installed".

6. Proceed over to Save & Exit to save and exit. You might have to hit F-10 on the keyboard to Save & Exit.

7. The computer should now restart prompting you for a password immediately. You can also go back into the UEFI and test the Administrator or Supervisor password as well.

Restricting Boot Order

Figure 8: UEFI Password Screen

1. Boot the system into the UEFI settings.
2. Navigate to the Advanced (F7) portion of the UEFL.
3. Click on the Boot Options tab.
4. You will see Boot Option #1"Set this Lo your internal Hard Drive.
5. If you have "Boot Option #2" or more, you should disable each one.
6. Navigate to Save and Exit or press FI0 on your keyboard.
7. Go back into the UEFI setting and verify the changes are set.

Creating a Standard User Account

1. Click on the Windows "Start" Icon.
2. Scroll down to be "Windows System" folder and click the arrow lo expand.
3. Navigate to Control Panel →User Accounts→ User Accounts by clicking each option.
4. Now, click on Manage another Account →Add a user account.
5. at the bottom, click on "Sign in without a Microsoft Account "(not recommended)".
6. At the bottom, click on "Local account" and fill in the "User name, Password, and Password hint. Click next when complete.

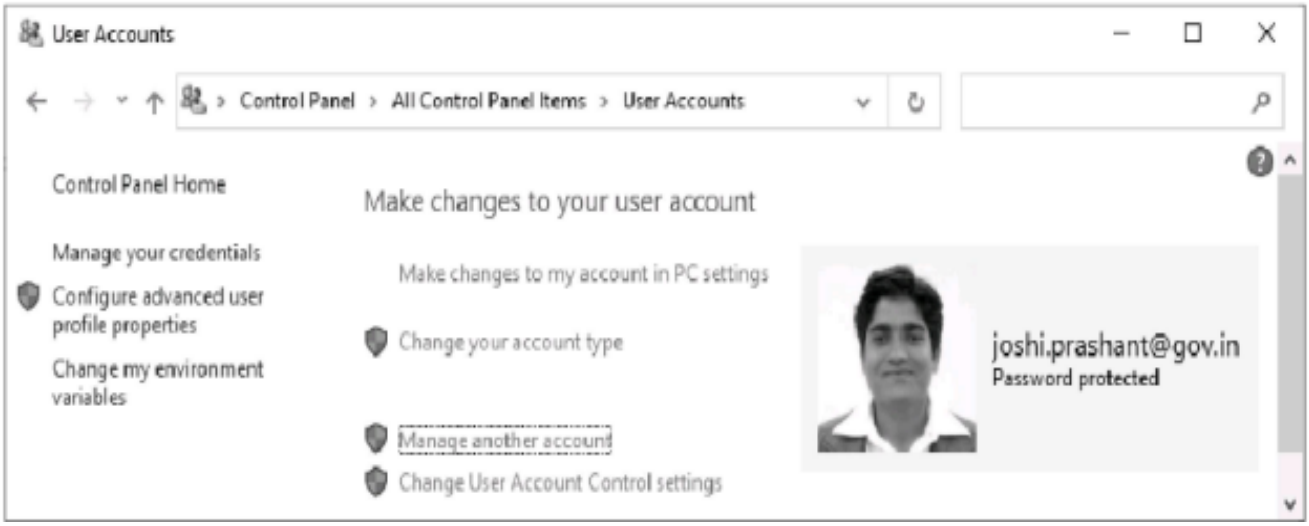

Figure 9: A Standard User Account in Window 10

Encrypt Hard Drive with BitLocker

1. Locate the hard drive you want to encrypt under "This PC in Windows Explorer.

2. Right-click the target drive and choose "Turn on BitLocker:"

3. Choose the “Enter a Password option and enter a secure password.

4, Select How to Enable Your Recovery Key" which you’ll use to access your drive if you lose your password. Various options are provided like print, save it as a file to your hard drive, save it as file to a USB drive, or save the key to your Microsoft account.

5. Choose "Encrypt Entire Drive." This option is more secure and encrypts files you marked for deletion.
6. Unless you need your drive to be compatible with older Windows machines, choose "New Encryption Mode".

7. Click "Start Encrypting" to begin the encryption process. Note that this will require a computer restart if you’re encrypting your boot drive. The encryption will lake some lime, but it will run in the background, and you'll still be able to use your computer while it runs.

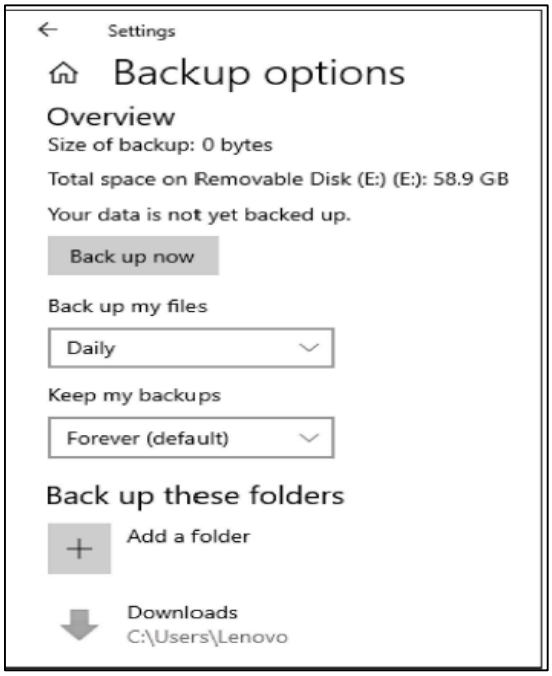

Figure 10: Windows 10 Backup Options

Backup in Windows 10

1. Navigate to Update & Security by navigating to Start→ Settings→ Update & Security

2. Select the backup' option from the left pane and then on the right pane Under "Back up Using File History" click Add a Drive. A window will open asking you to select the drive you wish to back the files up to. By this time your computer system should have a USB Pen drive or other internal hard disk installed. 3. Click on "More Options" under "Back Up Using File History”.

4. The folders which will be backed up are listed under "Back-Up These Folders. If you sec a folder you do not wish to backup, click on be folder and click "Remove.

5. If you wish to back up a folder not listed under the "Back Up These Folders”, you will want to click on "Add a Folder" The "Select Folder" window will open. Click on the desired folder and click “Choose This Folder".

6. Under "Overview; you can set when and how long to keep files backed up. Under "Back Up Piles", I set mine to "Daily" and under "Keep My Backups”, I leave it at the default setting "Forever" When ready, you will need to click "Back Up Now".

Turning on Microsoft Defender Firewall

1. Select the Start button Settings Update & Security Windows Security and then firewall & network protection. Open Windows Security settings.

2. Select a network profile.

3. Under Microsoft Defender Firewall, switch the setting to on. If your device is connected to a network, network policy settings might prevent you from completing these steps. For more info, contact your administrator.

4. To turn it off, switch the setting to Off, Turning off Microsoft Defender Firewall could make your device (and network, if you have one) more vulnerable to unauthorized access. A self-explaining cays GUI is depicted in Fig. 7.

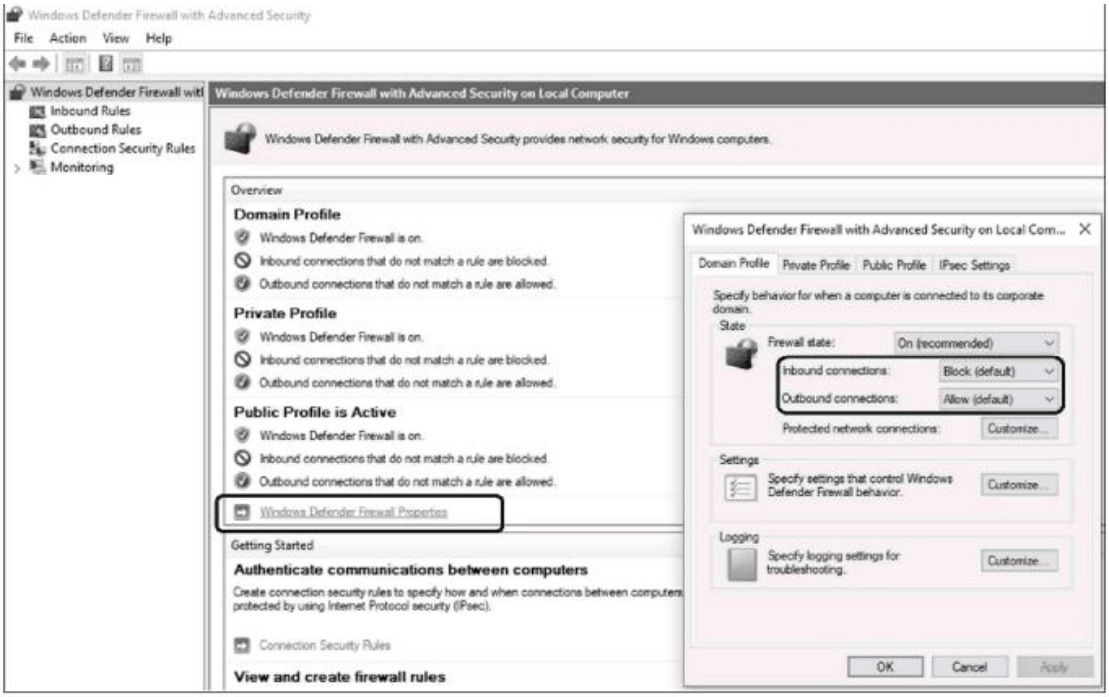

Figure 11 Windows Defender Firewall

Conclusion

The security features of operating systems and associated tools are crucial for protecting user data and system integrity. Practical experimentation reveals that while each feature has its strengths, they work best in conjunction. For example, effective user authentication paired with robust access control significantly enhances overall security. Regular updates and active monitoring are also essential in maintaining a secure environment. Adopting a multi-layered security approach is essential for mitigating risks in today's complex digital landscape.