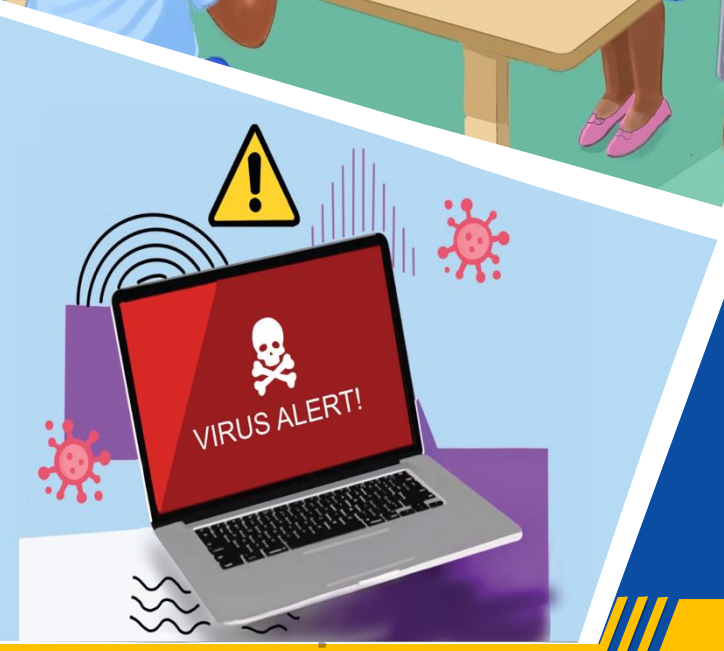
RQF LEVEL 4



CCMCS402

ALL TRADES

Information and Communication Technology (ICT)

TRAINEE'S MANUAL

August 2024

INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)

2024

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KIGALI-RWANDA

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LIST OF ABBREVIATIONS AND ACRONYMS

ACLs:	Access Control Lists
API:	Application Programming Interface
CBET:	Competence Base Education and Training
CD:	Compact Disc
CL:	Command Line
CPU:	Central Possessing Unit
DOS:	Disk Operating System
DVD:	Digital Versatile Disc or Digital Video Disc
EFS:	Encrypted File System
FAT:	File Allocation Table
GUI:	Graphic User Interface
HDD:	Hard Disk Drive
Lynx:	Lynx Real-Time Operating System
MTOS:	Multitasking Operating System
OS:	Operating System
PC:	Personal Computer
PPE:	Personal Protective Equipment
RQF:	Rwanda Qualification Framework
RS:	Rwandan Standard
RSB:	Rwanda Standards Board
RTB:	Rwanda TVET Board
RTX:	Real-Time eXecutive
SD:	Secure Digital
SOC:	System on Chip
TVET:	Technical and Vocational Education and Training
USB:	Universal Serial Bus

INTRODUCTION

This trainee's manual encompasses all necessary skills, knowledge and attitudes required to Apply ICT skills. Students undertaking this module shall be exposed to practical activities that will develop and nurture their competences. The writing process of this training manual embraced competency-based education and training (CBET) philosophy by providing practical opportunities reflecting real life situations.

The trainee's manual is subdivided into units, each unit has got various topics. You will start with a self-assessment exercise to help you rate yourself on the level of skills, knowledge and attitudes about the unit.

A discovery activity follows to help you discover what you already know about the unit.

After these activities, you will learn more about the topics by doing different activities by reading the required knowledge, techniques, steps, procedures and other requirements under the key facts section, you may also get assistance from the trainer. The activities in this training manual are prepared such that they give opportunities to students to work individually and in groups.

After going through all activities, you shall undertake progressive assessments known as formative and finally conclude with your self-reflection to identify your strengths, weaknesses and areas for improvement.

Do not forget to read the points to remember section which provides the overall key points and takeaways of the unit.

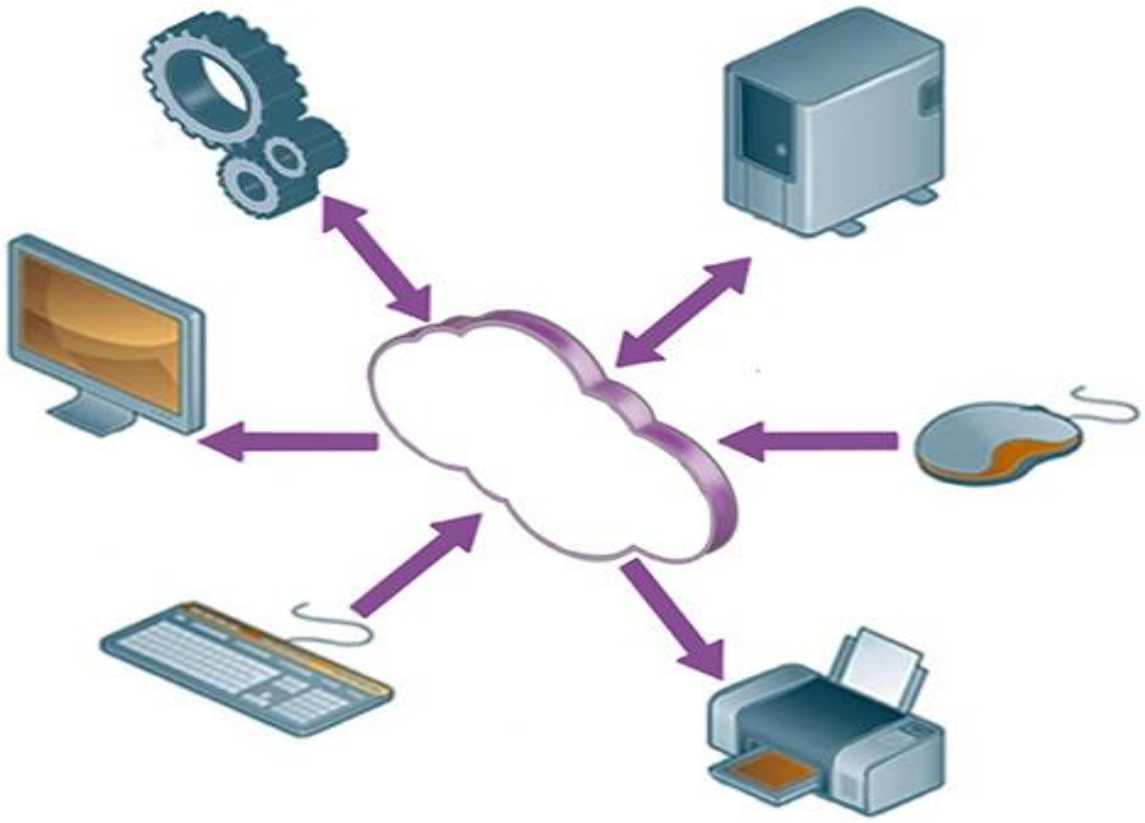
Module Units:

Unit 1: Describe the operating system

Unit 2: Customize the computer features

Unit 3: Protect computer system

UNIT 1: DESCRIBE THE OPERATING SYSTEM



Unit summary

This unit provides you with the knowledge, skills and attitudes required to describe the operating system required to apply Computer Skills. It covers the Introduction to the operating system, Identification of the main components of operating system, explanation of the types of operating system, and description of the operating system file system

Self-Assessment: Unit 1

1. Observe the figure in Unit 1 and answer the following questions
   a. What do you see in the illustration?
   b. Name the components in the illustration?
   c. What do you think this unit is about based on the illustration?
2. Fill in and complete the self-assessment table below to assess your level of knowledge, skills and attitudes under this unit. Try to answer truthfully. It is for your own interest to figure out your weakness and take necessary action during this unit. Think about yourself: do you think you can do this? How well? Read the statements across the top. Put a check in the column that best represents your situation. At the end of this unit, you will take this assessment again.

My experience Knowledge, skills and attitudes	I do not have any experience doing this.	I know a little about this.	I have some experience doing this.	I have a lot of experience with this.	I am confident in my ability to do this.
Define the operating system					
Explain the features of operating system					
Describe the components of operating system					
Identify the composition of operating system					
Identify various features of operating system					
Able to identify different operating system components					

My experience Knowledge, skills and attitudes	I do not have any experience doing this.	I know a little about this.	I have some experience doing this.	I have a lot of experience with this.	I am confident in my ability to do this.
Attentively get to know what an operating system					
Understand clearly various features of operating system					
Carefully understand various operating system components					

Key Competencies:

Knowledge	Skills	Attitudes
1. Define the operating system	1. Identify the composition of operating system	1. Attentively get to know what an operating system
2. Explain the features of operating system	2. Identify various features of operating system	2. Understand clearly various features of operating system
3. Describe the components of operating system	3. Able to identify different operating system components	3. Carefully understand various operating system components

Discovery activity:

Task 1:

Observe clearly the above illustration and answer the questions below:

1. What do you see on the above illustration?
2. Describe each of the components in the illustration above.
3. What is the most important component that make a computer to operate?

Topic 1.1: Introduction to the Operating System

Activity 1: Problem Solving

Task 2:

Read the following scenario and answer the questions that follow

Imagine you're a professional intern in cybercafé in a busy city center. Your café offers a variety of services, including internet access, printing, gaming, and online ordering of food and drinks. However, you've been encountering numerous challenges lately, such as long queues, slow computers, frequent crashes, and security breaches. You need to find a solution to streamline operations, enhance customer experience, and ensure the smooth functioning of your cybercafé.

a. As an intern who is equipped with knowledge, skills, and attitude of application of computer skills, you are tasked is to identify the functions of an operating system in a computer.
b. Come up with solutions to address the challenges faced by the cybercafé and recommend a suitable Operating System with features that will facilitate smooth running of the cybercafé.

Key Facts 1.1: Introduction to the Operating System

- **Description of Operating system**
  - ✓ **Definition**
    - An operating system (OS) is software that manages computer hardware and provides common services for computer programs. It acts as an intermediary between the hardware and the various software applications running on a computer system.
    - The OS helps you to communicate with the computer without knowing how to speak the computer's language. It is not possible for the user to use any computer or mobile device without having an operating system.
    - An operating system (OS) is the program that, after being initially loaded into the computer by a boot program, manages all of the other application programs in a computer.
    - The application programs make use of the operating system by making requests for services through a defined application program interface (API).
    - In addition, users can interact directly with the operating system through a user interface, such as a command-line interface (CLI) or a graphical UI (GUI).[1]
  - ✓ **Features of operating system[2]**
    - Operating systems (OS) offer a wide range of features that facilitate the management of computer hardware resources and the execution of software applications.
    - The following are features found in modern operating systems:

[1] https://www.geeksforgeeks.org/what-is-an-operating-system/
[2] https://www.tutorialspoint.com/what-are-the-features-of-operating-systems

- Protected and supervisor mode
- Allows disk access and file systems Device drivers Networking Security
- Program Execution
- Memory management Virtual Memory Multitasking
- Handling I/O operations
- Manipulation of the file system
- Error Detection and handling
- Resource allocation
- Information and Resource Protection

✓ **Basic functions of operating system[3]**

The basic functions of an operating system (OS) are essential for managing computer hardware resources and providing an environment for software applications to run efficiently.

The fundamental functions of OS include:

- **Process management:** It involves assigning priorities, resources, states, and identifiers to processes, creating inter-process communication channels, handling process synchronization and deadlock issues, etc.
- **Memory management:** Operating systems manage system memory, including both physical RAM and virtual memory. They allocate memory to processes, handle memory swapping and paging, and implement memory protection mechanisms to prevent unauthorized access.
- **File system management**: OS provides a file system that organizes and stores data on storage devices such as hard drives and SSDs. It manages files, directories, and file permissions, allowing users and applications to store, retrieve, and manipulate data efficiently.
- **Security**: Operating systems implement security features to protect the system and user data from unauthorized access, malware, and other threats. This includes user authentication, access control mechanisms, encryption, and firewall protection.

[3] https://www.javatpoint.com/functions-of-operation-system

- **Job accounting:** It keeps track of time and resources used by various tasks and users, this information can be used to track resource usage for a particular user or group of users.
- **Coordination between other software and users:** It coordinate and assign interpreters, compilers, assemblers, and other software to the various users of the computer systems. In simpler terms, think of the operating system as the traffic cop of your computer.
- **Device management:** It regulates device connection using drivers. The OS allocates and deallocates devices to different processes, keeps records of the device and decides which process can use which device for how much time.
- **Error-detecting aids:** The operating system constantly monitors the system to detect errors and avoid malfunctioning computer systems. From time to time, the operating system checks the system for any external threat or malicious software activity. It also checks the hardware for any type of damage.

Activity 2: Guided Practice

Task 3:

Referring to scenario in Task 2 and after having knowledge on the operating system, answer the questions given below:

a. How does the operating system manage processes, memory, and files on the company's computers?
b. Are there any security features or mechanisms provided by the operating system that could be strengthened to prevent security breaches?
c. How can the operating system's user interface be optimized to enhance user productivity and experience?

Activity 3: Application

Task 4:

According to scenario in Task 2, perform the following task

The cybercafé still is experiencing issues with its IT infrastructure. The company's computers are running slow, experiencing frequent crashes and encountering security breaches. As it is a busy place, employees are facing a problem to respond to the customer appropriately; as an intern who has skills and knowledge on operating system, Identify the root causes of these issues and propose solutions to improve their system security. Document the work done and submit to your trainer.

Topic 1.2: Description of components of Operating System

Activity 1: Problem Solving

Task 5:

Read the following scenario and answer the questions that follow

Imagine you have been selected among others at your workplace to be a member of the technical support team who are responsible for troubleshooting issues reported by users of a new operating system called "windows 10." Users have been experiencing difficulties with various aspects of the operating system, including the user interface, kernel operations, and file management.

a. A client has called the team reporting an issue of not accessing desktop icons, how would you resolve this problem?
b. Explain common problems related to the user interface, kernel operations and file management in windows 10 OS.
c. Identify the root causes of the problems mentioned in b) and propose solutions to improve the functionality and usability of window 10 operating system.

Key Facts 1.2: Description of components of Operating System

- **Components of operating system**

  An operating system consists of several components that work together to provide the functionality and performance of the system.

  The main components of OS are:

  ✓ **User interface**

  - A user interface (UI) refers to the part of an operating system, program, or device that allows a user to enter and receive information. User interface is either graphical interface or shell commands.
  - A Graphical User Interface, clicking or moving buttons, icons and menus by means of a pointing device carry out the functions.

- A Command Line Interface (CLI) or Shell commands displays text, and its commands are usually typed on a command line using a keyboard. To display the Command prompt(cmd) in windows, open the Start menu and type cmd. Press Enter on the keyboard to launch the command prompt in a separate window. With the cmd, you can type your commands from the keyboard instead of using the mouse.

✓ **Kernel**

- The operating system is the most fundamental piece of software and runs in kernel mode (supervisor mode). A Kernel is the central component of an Operating System.
- It is responsible for managing all the processes, memory, files, etc. The Kernel functions at the lowest level of the Operating System. It acts as an interface (bridge) between the software (user-level application) and the hardware. the communication between the software and the hardware is done via the Kernel.[4]

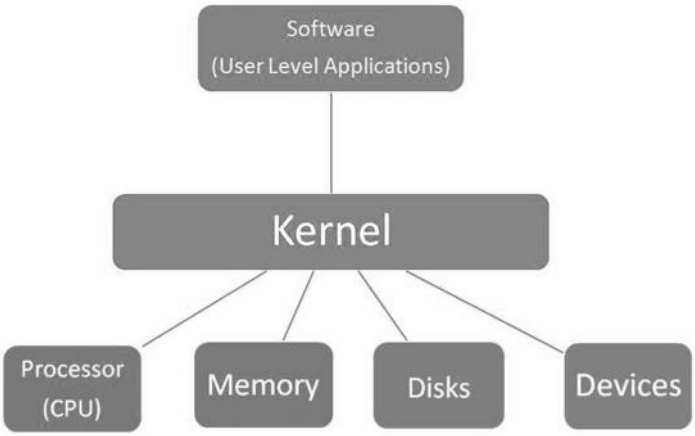


Figure 1: Kernel

- The kernel is the indispensable and therefore most important part of an operating system. Roughly, an operating system itself consist of two parts: the kernel space (privileged mode) and the user space (unprivileged mode). Without that, protection between the processes would be impossible.
- There are two different concepts of kernels: **monolithic kernel and microkernel**.

[4] https://ramnauth.github.io/cs%20101/2018/11/07/operating-systems/

- **Monolithic kernel** is an older approach, of which Unix, MS-DOS and the early Mac OS are typical represent. It runs every basic system service like process and memory management, interrupt handling and I/O communication, file system in kernel space. (Figure 1 shows monolithic kernel).

  The inclusion of all basic services in kernel space has three big drawbacks: the kernel size, lack of extensibility and the bad maintainability. To overcome these limitations of extensibility and maintainability, the idea of µ-kernels(microkernel) appeared at the end of the 1980's. The aim was to reduce the kernel
- **A microkernel** is a type of operating system kernel that aims to provide only the essential functions required for managing hardware resources and communication between components. It keeps the core functionalities minimal, delegating other tasks to user-space processes, which enhances flexibility and reliability.

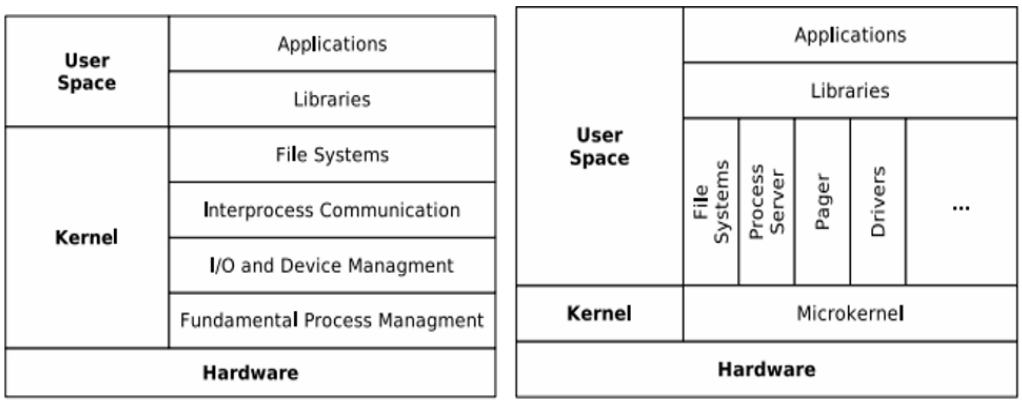


Figure 2:Monolithic kernel and microkernel based on OS[5]

✓ **File management system**

File management is one of the basic and important features of operating system. Operating system is used to manage files of computer system. All the files with different extensions are managed by operating system.

- Before you can perform actions on files such as move, copy or delete you need to select (highlight) them.

[5] https://www.javatpoint.com/what-is-kernel

- To select a single file or directory, click on the icon of the file or directory. A blue highlight will appear round the name
- To select a group of adjacent files or directories
  - Steps:
    - Click on the icon of the first file in the list.
    - Hold down the Shift key and click on the icon of last file in the list. All the files between the two will also be selected
- To select a group of non-adjacent files or directories
  - Steps:
    - Click on the icon of the first file in the list.
    - Hold down the Ctrl key and click on the icons of each of the files you wish to select.
- Duplicate files/folders
  - Steps:
    - Select the files or directories you wish to duplicate. These can include both directories and files.
    - Right click on file/folder then choose Copy.
    - Navigate to the directory in which to wish to duplicate the files and directories.
    - Right click on mouse then choose Paste.
- Move files/folders
  - Steps:
    - Select the files or directories you wish to move. These can include both directories and files.
    - Right click on file / folder then choose Cut.
    - Navigate to the directory in which to wish to move the files and directories.
    - Right click on mouse then choose Paste.
- Delete file/folder
  - Steps:

- Select (highlight) the files you wish to delete.
- Right click on File/folder then choose Delete or press the Delete key.
- Click yes when asked to confirm that you wish to move the files to recycle bin

- Downloading file/folder
  - Steps:
    - On your computer, open browser (e.g. Google Chrome).
    - Go to the webpage where you want to download the file.
    - Save the file: Most files: Click on the download link. ...
    - If asked, choose where you want to save the file, then click Save. Executable files (. exe, ...)
    - When the download finishes, you'll see it at the bottom of your browser (Chrome) windows[6]

Activity 2: Guided Practice

Task 6:

Referring to the scenario in Task 5, answer the following questions

a. Describe how OS's performance could be improved through kernel optimizations.

b. Discuss the various components of the operating system,

[6] https://www.customguide.com/windows-10/organize-folders-and-files

Activity 3: Application

Task 7:

Read the following scenario and come up with the solution to the challenge.

You and your classmates are part of a computer science club tasked with exploring and understanding the inner workings of an operating system (OS). To dig deeper into the OS, your club has been presented with a challenge of a computer system running very slow and occasionally freezing. Your task is to identify the cause of the performance issue, which involves managing files, navigating the user interface, and troubleshooting a kernel-related problem.

Topic 1.3: Description of types and the characteristics of operating system

Activity 1: Problem Solving

Task 8:

Read the following scenario and answer the questions that follow

You're among the members who have been chosen to work upon different projects within your school. Those projects will compete at the district level and the best three will be awarded a good prize your trainer for computer skills has given you a task to choose the best operating system (OS) to be installed in the desktops that will be used for those projects. However, you've encountered a dilemma as you explore the various types of operating systems available. Each type offers distinct features and advantages, making the decision more challenging. To come up with the best solution first answer the following questions.

a. Describe the available different types of OS on the market today
b. Outline the features of common Desktop Operating Systems used now days and note down your answers.

Key Facts 1.3: Description of types and the characteristics of Operating System

- **Types of operating system**
  - ✓ **Batch operating system:** This type of operating system does not interact with the computer directly. There is an operator which takes similar jobs having the same requirement and groups them into batches. It is the responsibility of the operator to sort jobs with similar needs
  - ✓ **Distributed operating system**: These types of operating system is a recent advancement in the world of computer technology and are being widely accepted all over the world and, that too, at a great pace. Various autonomous interconnected computers communicate with each other using a shared communication network.

- ✓ **The Real Time Operating System (RTOS):** is similar as multitasking operating system. However, these operating systems are specially designed to handle real time applications.

  Real time applications are those applications which have to execute within a specific period of time. Therefore, time is major constraint for these applications. The different examples of real time applications are robots, machine learning.

  There are mainly two types of real time Operating System.

  - Hard real time Operating System
  - Soft real time Operating System.

  Examples of real time operating systems are MTOS, Lynx, RTX, etc.

- ✓ **Network Operating System:** These systems run on a server and provide the capability to manage data, users, groups, security, applications, and other networking functions. These types of operating systems allow shared access to files, printers, security, applications, and other networking functions over a small private network.

  One more important aspect of network operating systems is that all the users are well aware of the underlying configuration, of all other users within the network, or their individual connections. and that's why these computers are popularly known as tightly coupled systems.

- ✓ **Time –sharing Operating System:** Each task is given some time to execute so that all the tasks work smoothly. Each user gets the time of the CPU as they use a single system. These systems are also known as Multitasking Systems. The task can be from a single user or different users also. The time that each task gets to execute is called quantum. After this time interval is over OS switches over to the next task

- ✓ **Mobile Operating System:** Mobile operating systems such as Android OS, Apple and Windows mobile OS run exclusively on small devices such as smartphones, tablets and wearables.

  The system combines the features of a personal computer with additional features useful for a handheld device. Mobile operating systems start when a device is powered on to provide access to installed applications. Mobile operating systems also manage wireless network connectivity

- ✓ **Embedded Operating System**: is a computer operating system designed for use in embedded computer systems. It has limited features. The term "embedded operating system" also refers to a "real-time operating system".

  The main goal of designing an embedded operating system is to perform specified tasks for non-computer devices. It allows the executing programming codes that deliver access to devices to complete their jobs.[7]

- **Characteristics of Operating System**
  - ✓ **Multi-user:** Two or more users can work with programs and share peripheral devices, such as printers, at the same time.
  - ✓ **Multi-tasking**: The computer is capable of operating multiple applications at the same time.
  - ✓ **Multi-processing**: The computer can have two or more central processing units (CPUs) that programs share.
  - ✓ **Multi-threading:** A program can be broken into smaller parts that can be loaded as needed by the operating system. Multi-threading allows individual programs to be multi-tasked

Activity 2: Guided Practice

Task 9:

From scenario in Task 8 and after studying the types and characteristics of operating system, answer the following questions.

a. What are mobile operating systems, and how are they different from desktop operating systems?

b. How do single-user, multi-user, real-time, and distributed operating systems differ in terms of their features and functionalities?

c. Can you provide examples of devices or applications that use RTOS?

[7] https://www.uomus.edu.iq/img/lectures21/MUCLecture_2021_10241280.pdf

Activity 3: Application

Task 10.

Read the following scenario and practice the task given.

Your school is part of a computer science fair organized by all technical school all over the country to show what is really studied in computer skills, your class has been tasked with organizing an operating system showcase exhibition. The goal of the exhibition is to educate visitors about the various types and characteristics of operating systems through interactive demonstrations and presentations. Practice on how to use a mobile operating System and to access downloaded documents from WhatsApp.

Topic 1.4: Description of the operating system file system

Activity 1: Problem Solving

Task 11:

Read the following scenario and answer the questions that follow

You are working on a group project for school and need to organize all your project files in a structured way. This includes documents, images, presentations, and notes. You've discovered that some files scattered randomly within your project folder. Your task is to organize the files into subfolders based on their file types (e.g., documents, images, videos), with file extensions (e.g., .txt, .jpg, .mp4) and provide access restrictions.

a. Describe different types of file system.

b. What is the role of a file system?

c. Why is it important to have a well-structured folder system for a project?

Key Facts 1.4: Description of the Operating System file system

- **Introduction**

  In computing, a file system controls how data is stored and retrieved. Without a file system, data placed in a storage medium would be one large body of data with no way to tell where one piece of data stops and the next begins.

  By separating the data into pieces and giving each piece a name, the data is easily isolated and identified.[8]

  Group of data is called a "file. The structure and logic rules used to manage the groups of data and their names is called a "file system.

[8] https://en.wikipedia.org/wiki/File_system

✓ **The primary roles of a file system in an Operating System**

- **File Organization**:
  - **Directories and Subdirectories**: Provides a hierarchical structure to organize files into directories (folders) and subdirectories.
  - **File Naming**: Enforces naming conventions and rules, including restrictions on characters and length.
- **Storage Management**:
  - **Space Allocation:** Manages how space on storage devices is allocated to files, ensuring efficient use of available storage.
  - **Free Space Management:** Keeps track of free and used space on the storage device.
- **File Access and Retrieval**:
  - **Access Methods:** Supports different methods for accessing files, such as sequential and random access.
  - **Permissions and Security:** Controls access to files and directories through permissions, ensuring authorized access only.
- **Data Integrity and Recovery**:
  - **Error Detection and Correction:** Implements mechanisms to detect and correct errors in data storage and retrieval.
  - **Backup and Recovery:** Supports features for backing up data and recovering it in case of corruption or loss.

- **Types of File system**

The type of file system is used to determine how data and programs are accessed. It also determines the level of accessibility available to users. Different operating systems use different types of file systems, each with its own set of features and characteristics. The following are the different types of file systems

✓ **FAT File System**

FAT stands for “File Allocation Table”. The file allocation table is used by the

operating system to locate files on a disk. A file may be divided into many sections and scattered around the disk due to fragmentation.

FAT keeps track of all pieces of a file. In DOS systems, FAT is stored after boot sector. The file system has been used since the advent of PC.

- ✓ **FAT12 File system**

The FAT12 is the file system on a floppy disk. The number "12" is derived from the fact that the FAT consists of 12-bit entries.

The storage space on a floppy disk is divided into units called sectors. In larger storage devices, a bunch of sectors form a cluster. However, for the floppy disk, the number of sectors in a cluster is one. Also, the size of a sector (and hence a cluster) is 512 bytes for a floppy disk.

- ✓ **FAT16 File system**

FAT16: The FAT used for most older systems, used a 16-bit binary number to hold cluster numbers. A volume using FAT16 can hold a maximum of 65,526 clusters, FAT16 was used for hard disk volumes ranging in size from 16 MB to 2,048 MB.

- ✓ **FAT32 File System**

FAT32 is an advanced version of FAT file system. It can be used on drives from 512 MB to 2TB in size. One of the most important features of FAT and FAT32 is that they offer compatibility with operating systems other than Windows 2000 also.

- ✓ **NTFS File System**

NTFS stands for "New Technology File System". It is the default file system for modern Windows operating systems, including Windows NT, 2000, XP, Vista, 7, 8, 10, and 11. **File Size Limit**: Supports very large file sizes,

theoretically up to 16 EB (exabytes), practically limited by the OS and hardware.

- **Features**:
  - Security: Supports file-level security with access control lists (ACLs) to define permissions.
  - Compression: Built-in file compression to save disk space.
  - Encryption: Encrypting File System (EFS) allows for file encryption to enhance security.
  - Journaling: Uses a transaction logging system to improve reliability and recoverability in case of crashes or power failures.
  - Disk Quotas: Allows administrators to set limits on the amount of disk space users can consume.
  - File System Indexing: Improves file search and retrieval performance.

✓ **How a file system works**

- **When you save a file:**
  - Allocation: The file system allocates space on the storage device for the file's data.
  - Metadata: It stores metadata (information about the file, such as its name, size, and location on the disk) in a specific structure.
  - Directory Update: It updates the directory structure to include the new file, making it accessible to users and applications.
- **When** you open a file:
  - Locate Metadata: The file system locates the file's metadata to find where its data is stored.
  - Read Data: It retrieves the data from the storage device and delivers it to the application requesting the file.
- **When** you delete a file:
  - Mark Space as Free: The file system marks the space previously occupied by the file as free, making it available for new data.

- Remove Metadata: It updates the directory structure to remove references to the deleted file.[9]

Activity 2: Guided Practice

Task 12:

From scenario in task 11 and after studying the operating system file system, answer the following questions.

a. Discuss the importance of organizing files and directories, understanding file permissions, and maintaining file system integrity.
b. Open the file explorer or command-line interface on your computer to access the file system.
c. Explain the concept of file attributes and how they define various properties of files, such as size, creation date, and file permissions.

Activity 3: Application

Task 13:

Referring to the scenario in task 11, perform the following task

Locate the project folder, investigate the folder's properties, modify the setting and restrict the file access permissions with a password. Document a report for the work done showing all steps taken by taking screenshots.

[9] https://www.diskpart.com/articles/what-is-file-system-1984.html

Formative Assessment

Qn1. Which of the following is not an operating system?

a. Windows
b. Linux
c. Oracle
d. DOS

Qn2. Common operating systems include Windows, macOS, and Linux.

a. True
b. False

Qn3. What is the full name of FAT?

a. File attribute table
b. File allocation table
c. Font attribute table
d. Format allocation table

Qn4. An operating system is unnecessary for a computer to function.

a. True
b. False

Qn5. When you delete a file in your computer, where does it go?

a. Recycle bin
b. Hard disk
c. Taskbar
d. None of these

Qn6. Multitasking allows multiple programs to run seemingly simultaneously.

a. True
b. False

Qn7. Match the following correctly Column A with B and write your responses into column Answer

Answer	A	B
	1. Device Driver	a. Provides a way for users to interact with the operating system.
	2. User Interface	b. Allocates and manages memory for running programs
	3. Memory Management	c. The core of the operating system, responsible for low-level tasks
	4. Process Management	d. Software that allows the operating system to communicate with specific hardware devices
	5. Kernel	e. Controls the creation, execution, and termination of programs
		f. Its where programs are executed

Qn8. Define the Operating system with examples

Qn9. Describe any four characteristics of Operating system

Qn10. State four file system types

Points to Remember

- A computer cannot run without an Operating System
- Different Operating Systems have different file systems
- The speed of an Operating System in performing its roles depend on CPU speed and memory size.

Self-Reflection.

1. Re-take the self-assessment you did at the beginning of the unit.
2. Read the statements across the top. Put a check in a column that best represents your level of knowledge, skills and attitudes.

My experience Knowledge, skills and attitudes	I do not have any experience doing this.	I know a little about this.	I have some experience doing this.	I have a lot of experience with this.	I am confident in my ability to do this.
Define the operating system					
Explain the features of operating system					
Describe the components of operating system					
Identify the composition of operating system					
Identify various features of operating system					
Able to identify different operating system components					

My experience Knowledge, skills and attitudes	I do not have any experience doing this.	I know a little about this.	I have some experience doing this.	I have a lot of experience with this.	I am confident in my ability to do this.
Attentively get to know what an operating system					
Understand clearly various features of operating system					
Carefully understand various operating system components					

3. Fill in the table below and share results with the trainer for further guidance.

Areas of strength	Areas for improvement	Actions to be taken to improve
1. **2.** **3.**	**1.** **2.** **3.**	**1.** **2.** **3.**

UNIT 2: CUSTOMIZE THE COMPUTER FEATURES

Unit summary

This unit provides you with the knowledge, skills and attitudes required to customize the computer features required to apply computer skills. It covers Identification of the customer requirements for an operating system, Identification of the minimum hardware requirements for an operating system, and customization of the operating system topics.

Self-Assessment: Unit 2

1. Observe the figure in Unit 2 and answer the following questions
   a. What is the person in the image doing?
   b. What do you see on her monitor?
2. Fill in and complete the self-assessment table below to assess your level of knowledge, skills and attitudes under this unit. Try to answer truthfully. It is for your own interest to figure out your weakness and take necessary action during this unit. Think about yourself: do you think you can do this? How well? Read the statements across the top. Put a check in the column that best represents your situation. At the end of this unit, you will take this assessment again.

My experience Knowledge, skills and attitudes	I do not have any experience doing this.	I know a little about this.	I have some experience doing this.	I have a lot of experience with this.	I am confident in my ability to do this.
Describe customer requirements for an operating system					
Describe the minimum hardware requirements for an operating system					
Describe the steps for customizing the operating system					
Identify the customer requirement for an operating system					

My experience Knowledge, skills and attitudes	I do not have any experience doing this.	I know a little about this.	I have some experience doing this.	I have a lot of experience with this.	I am confident in my ability to do this.
Identify Minimum hardware requirement for an operating system					
Customize the operating system					
Understand the customer's needs when identifying requirements for an operating system					
Capable of upgrading common hardware and software					
Be able to personalize an operating system to suit user needs					

Key Competencies:

Knowledge	Skills	Attitudes
1. Describe customer requirements for an operating system	1. Identify the customer requirement for an operating system	1. Understand the customer's needs when identifying requirements for an operating system
2. Describe the minimum hardware requirements for an operating system	2. Identify Minimum hardware requirement for an operating system	2. Capable of upgrading common hardware and software
3. Describe the steps for customizing the operating system	3. Customize the operating system	3. Be able to personalize an operating system to suit user needs

Discovery activity:

Task 14:

Observe clearly the above illustration and answer the questions below:

a. What existing software or hardware must the operating system be compatible with?

b. What are the minimum hardware requirements for an operating system?

c. How would you prefer to customize the appearance and functionality of the operating system's interface of your computer?

Topic 2.1: Identification of the customer requirements for an Operating System (OS)

Activity 1: Problem Solving

Task 15:

Read the following scenario and answer the questions that follow

You are a trainee in a class tasked with selecting a new Operating System (OS) for your school's computer lab. Your trainer has created a simple survey to gather your classmates' preferences and needs for an operating system. The survey includes questions about ease of use, compatibility with software, and specific features they would like to see.

a. Based on the survey responses, what are the most common requirements identified by your classmates for the new Operating System?
b. What specific features or functionalities did the focus group participants mention as important for the new OS?
c. What challenges or limitations did your classmates encounter with the current Operating System, and how can they be addressed with the new OS?

Key Facts 2.1: Identification of the customer requirements for an Operating System (OS)

- **Requirements when choosing operating system(0S)**

  When selecting an Operating System (OS), it's crucial to identify and consider various customer requirements to ensure that the chosen OS meets their specific needs.

  The key requirements for an OS include:

  ✓ **Total cost of the 0S**

  - Licensing Costs: Evaluate the upfront costs of purchasing the OS licenses.
  - Total Cost of Ownership: Consider ongoing costs such as maintenance, support, updates, and potential upgrade fees.

- Cost-Benefit Analysis: Assess the value provided by the OS relative to its cost, including potential savings from efficiency and productivity gains.

✓ **Compatibility with current hardware**

- Processor and Architecture: Ensure the OS supports the existing CPU architecture (e.g., x86, x64, ARM).
- Memory Requirements: Verify that the OS can operate efficiently within the available RAM.
- Peripheral Devices: Check compatibility with existing peripherals like printers, scanners, and external storage devices.

✓ **Compatibility with new hardware**

- Futureproofing: Ensure the OS supports or will support any planned hardware upgrades or additions.
- Driver Availability: Confirm that drivers for new hardware components (e.g., GPUs, networking cards) are available and supported by the OS.
- Performance Optimization: Evaluate how well the OS can take advantage of new hardware features and capabilities.

✓ **How the computers will be used**

- General Use: Determine if the computers will be used for general tasks such as web browsing, email, and office applications.
- Specialized Use: Assess if there are specific requirements for tasks such as graphic design, video editing, software development, gaming, or scientific computing.
- User demographics: Consider the technical proficiency of the users, which can influence the choice of a user-friendly or highly configurable OS.

✓ **Compatibility with existing applications**

- Critical Software: Identify any mission-critical applications that must run on the new OS.

- Version Compatibility: Ensure the OS is compatible with the current versions of these applications or consider the cost and feasibility of upgrading the applications.
- Cross-Platform Needs: If using applications across different OS platforms, ensure compatibility or availability of equivalent software.

✓ **Types of new applications to be used**

- Application Availability: Verify that the new OS supports the desired new applications, either natively or through third-party solutions.
- Performance Requirements: Assess the performance demands of new applications and ensure the OS can meet these requirements.
- Software Ecosystem: Consider the availability and quality of software in the OS's ecosystem, including both proprietary and open-source options

✓ **To select the proper operating system:**

- Create an accurate profile of your customer by analyzing the daily, weekly, and monthly computer activities
- Select appropriate software and hardware to satisfy existing and future requirements[10]

Activity 2: Guided Practice

Task 16:

Referring to the scenario in task 15, answer the questions below

a. How important is it for the new operating system to be easy to use for trainees and trainers?

b. Which software applications do you frequently use in the computer lab, and how crucial is it for the new OS to be compatible with these programs?

[10] https://pcfixercomputerrepairs.co.uk/how-to-choose-the-right-operating-system-for-your-computer/

c. Have you encountered any compatibility issues with the current operating system that you would like to avoid with the new OS?
d. What security features would you like to see implemented in the new OS to ensure the safety of your data and privacy?

Activity 3: Application

Task 17:

Read the following scenario and answer the questions that follow

You are working in an organization which is a medium-sized company with offices in multiple locations. The current OS used across the network is outdated and no longer meets the organization's evolving needs. As someone with skills, and knowledge on computer skills and have all the capabilities to support your organization though you're not part of the IT team, you have been tasked with evaluating potential OS options and recommending the most suitable one for adoption across the organization. Prepare your evaluation report and recommendations for the new OS basing on the following questions.

a. What are the primary user needs that must be considered when selecting a new OS for the organization?
b. How do these needs vary among different user groups and departments within the organization?
c. What security features and capabilities are essential for protecting the organization's sensitive data and information?

Topic 2.2: Identification of the minimum hardware requirements for an Operating System

Activity 1: Problem Solving

Task 18:

Read the scenario below and answer the questions that follow

Your school is planning to upgrade the computer lab's operating system to the latest version of Windows 10. Before proceeding with the installation, it is crucial to determine whether the existing hardware in the computer lab meets the minimum requirements for the new OS. You have been tasked to analyze and propose solutions for any hardware that does not meet the requirements.

a. What are the basic requirements for installing windows 10 operating system?

b. What are the common hardware upgrades in a computer system?

Key Facts 2.2: Identification of the minimum hardware requirements for an operating system

- **Basic requirements for installing windows 10 on PC**

To install Windows 10 on a PC, there are certain minimum hardware and software requirements that need to be met to ensure the operating system runs smoothly. Here are the basic requirements for installing Windows 10:

- ✓ **Processor (CPU):**
  - **Requirement:** 1 gigahertz (GHz) or faster processor or System on a Chip (SoC).
  - **Explanation:** The processor must be capable of running at a minimum speed of 1 GHz. Modern multi-core processors are recommended for better performance.
- ✓ **Memory (RAM):**
  - **Requirement:**1 gigabyte (GB) for the 32-bit version,2 GB for the 64-bit version

- **Explanation:** RAM is crucial for the OS to run applications and manage system tasks efficiently. More RAM is recommended for improved performance, especially if running multiple applications simultaneously.

✓ **Storage (Hard Drive):**

- **Requirement:**16 GB for the 32-bit OS,32 GB for the 64-bit OS
- **Explanation:** This space is necessary for the OS files, updates, and basic applications. Additional storage will be needed for personal files and installed applications.

✓ **Graphics Card:**

- **Requirement**: DirectX 9 or later with a WDDM 1.0 driver.
- **Explanation:** A compatible graphics card ensures that the visual elements of the OS (such as the user interface and graphics-intensive applications) run smoothly.

✓ **Display:**

- **Requirement**: 800 x 600 resolution**.**
- **Explanation:** This is the minimum resolution required to display the Windows 10 user interface correctly. Higher resolutions are recommended for a better visual experience

✓ **Internet Connection:**

- **Requirement:** Internet connectivity is necessary for performing updates and downloading additional features.
- **Explanation**: An internet connection is required for activating the OS, installing

✓ **Software and Drivers:**

- **Requirement**: The PC must have up-to-date software and drivers compatible with Windows 10.
- **Explanation:** Ensuring that all hardware components have the latest drivers is crucial for system stability and performance.

updates, and accessing online features and services provided by Microsoft[11][12]

[11] https://www.microsoft.com/en-us/windows/windows-10-specifications

[12] https://recoverit.wondershare.com/windows-tips/windows-10-hardware-requirements.html

- **Common hardware upgrades**[13][14]

  Customer may need to upgrade or purchase additional hardware to support the required applications and OS. A cost analysis will indicate if purchasing new equipment is a better idea than upgrading.

Upgrade Type	Description	Benefits	Considerations
RAM Capacity	Increasing the total amount of RAM installed in the system	Allows the computer to handle more applications simultaneously and improves performance for memory-intensive tasks.	Ensure the new RAM is compatible with the existing motherboard and does not exceed the maximum supported capacity.
Hard Drive Size	Replacing or adding a hard drive to increase storage capacity or upgrading to a Solid-State Drive (SSD) for faster performance	Provides more space for files, applications, and games; SSDs offer significantly faster data access and boot times	Determine the appropriate form factor (e.g., 2.5", 3.5") and interface type (e.g., SATA for HDDs/SSDs
CPU	Upgrading the CPU to a more powerful model	Enhances overall system performance, allowing faster processing of complex tasks and better multitasking.	Ensure compatibility with the existing motherboard socket and chipset and consider the thermal design power (TDP) and cooling needs.

[13] https://www.edgeit.co.uk/5-hardware-upgrades-to-extend-life-of-pc/
[14] https://techshedonline.com/how-to-upgrade-your-computer-hardware/

Video Card Memory and Speed	Upgrading the GPU to improve video and graphics performance.	Provides better performance in gaming, video editing, 3D rendering, and other graphics-intensive applications.	Verify that the power supply unit (PSU) can handle the new GPU's power requirements, ensure there is adequate physical space in the case, and check compatibility with available PCIe slots.
Motherboard	Upgrading the motherboard to support new technologies and components.	Allows the use of newer CPUs and RAM, provides more and faster connectivity options (e.g., USB 3.1, PCIe 4.0), and may offer better overall system stability and performance.	Compatibility with existing components (CPU, RAM, case), potential need to reinstall the operating system, and ensuring that the new motherboard fits within the case.

Activity 2: Guided Practice

Task 19:

From the scenario in task 18 and perform the given task below

Visit the computer lab and assess one of the computer's current hardware, compare it with the minimum requirements for Windows 10, and propose necessary upgrades if any hardware falls short of the requirements. Briefly explain the importance of meeting minimum hardware requirements for a successful OS upgrade.

Activity 3: Application

Task 20:

Read the scenario below and perform the task given

You are selected among others at your school, tasked with upgrading the computer lab to the latest version of Windows 10. Before you begin the installation, it's essential to ensure that all computers in the lab meet the basic requirements for running Windows 10 smoothly. Assess the hardware requirements, install windows 10 in the lab and perform any necessary hardware upgrades.

Topic 2.3: Customization of the operating system

Activity 1: Problem Solving

Task 21:

Read the following scenario and answer the questions that follow

A technical secondary school wants to customize the operating systems in their computer labs to better suit the needs of different users, including administration, trainers, and trainees. The goal is to configure the OS to include specific educational applications, user-friendly interfaces, and appropriate security settings for each group.

a. Which operating system would you choose for this customization project and why?
b. How would you customize the user interface to make it more user-friendly for trainees?
c. What interface customizations would help school trainees be more productive?

Key Facts 2.3: Customization of the operating system (OS)

- **Creating a local user account/administrator account in window 10**

  You can now create new accounts whenever you want, and all users will be able to easily access their own files and customize the appearance of Windows 10 while they're logged in to their respective accounts.

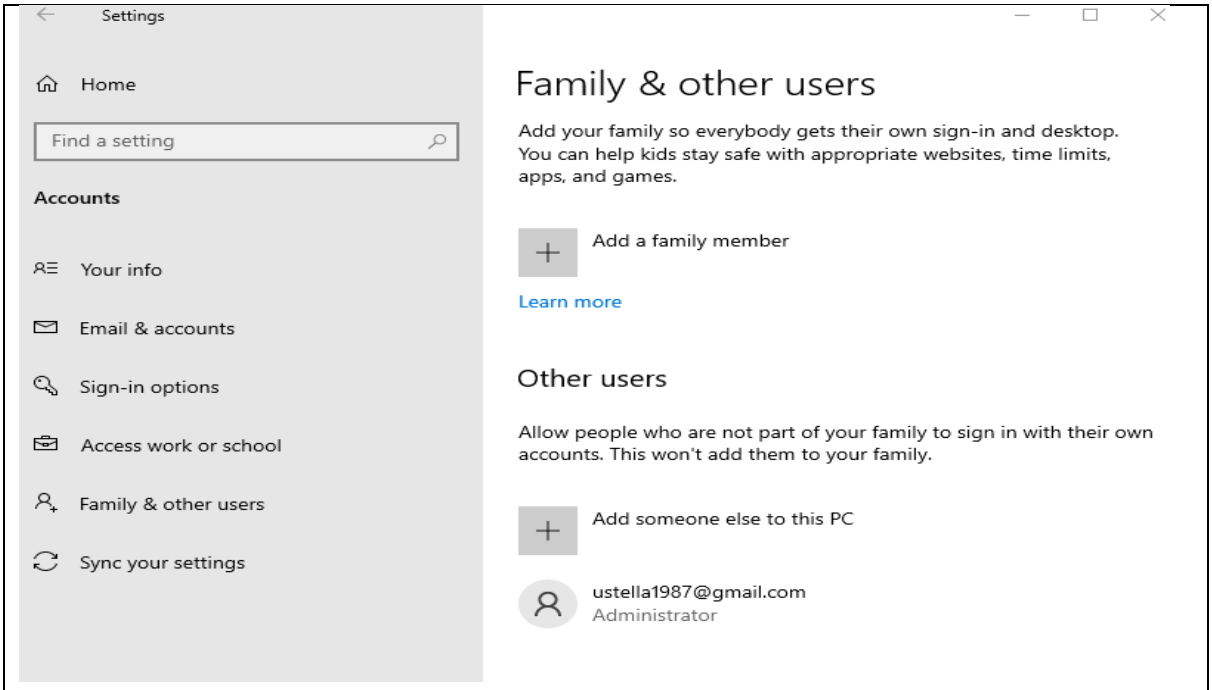
- **Create a local user account in Windows 10:**

  Create a local account for a someone else who doesn't have a Microsoft account. And if needed, you can give that account administrator permissions.

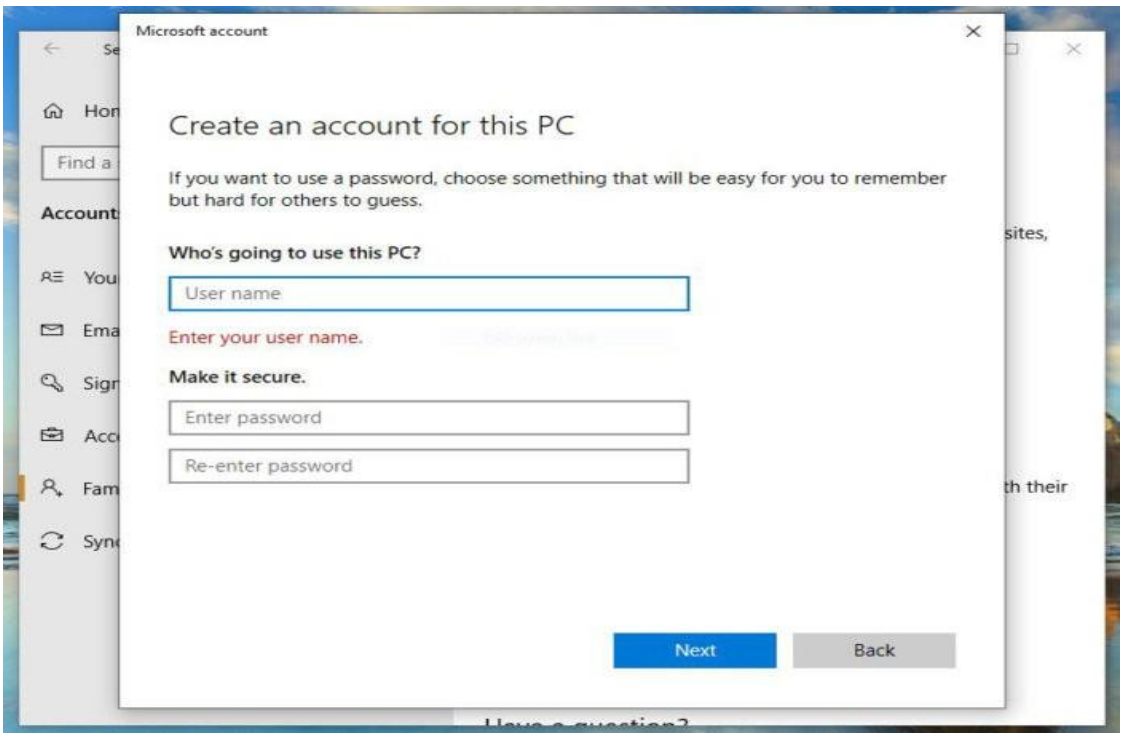
  An offline account is just another term for local account.

  ✓ Select the Start button, select Settings > Accounts and then select Family & other users. (In some editions of Windows, you'll see other users.)

  - Select Add someone else to this PC.

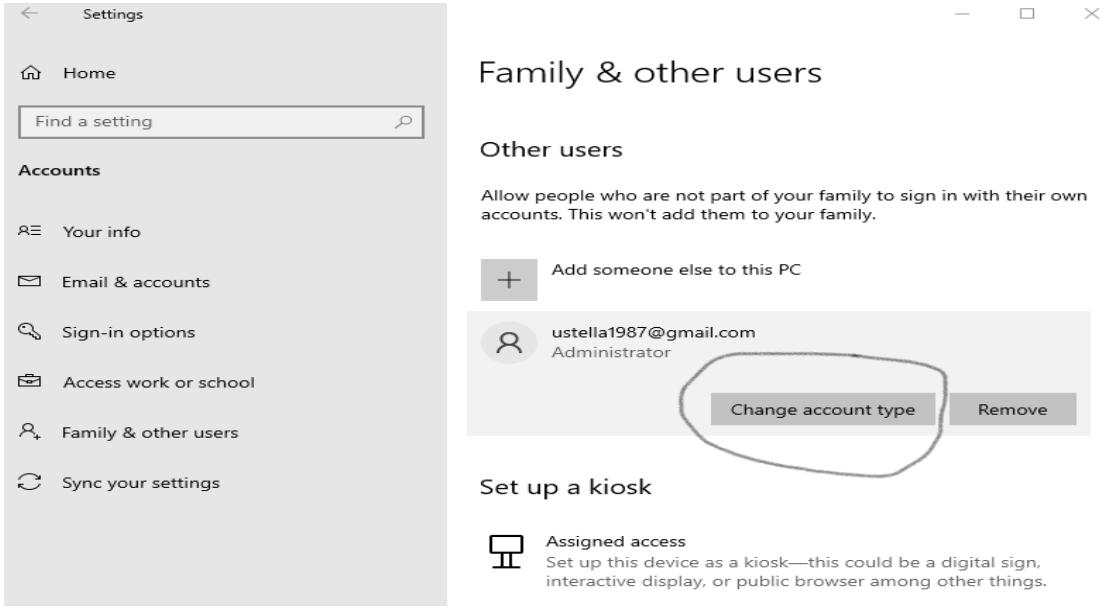


✓ Enter a username, password, password hint or choose security questions, and then select Next.



✓ **Change a local user account to an administrator account**

- Under Settings > Accounts > Family & other users, select the account owner name, then select Change account type.



- Under Account type, select Administrator and OK.
- Sign in with the new administrator account[15]

- **Window personalization**

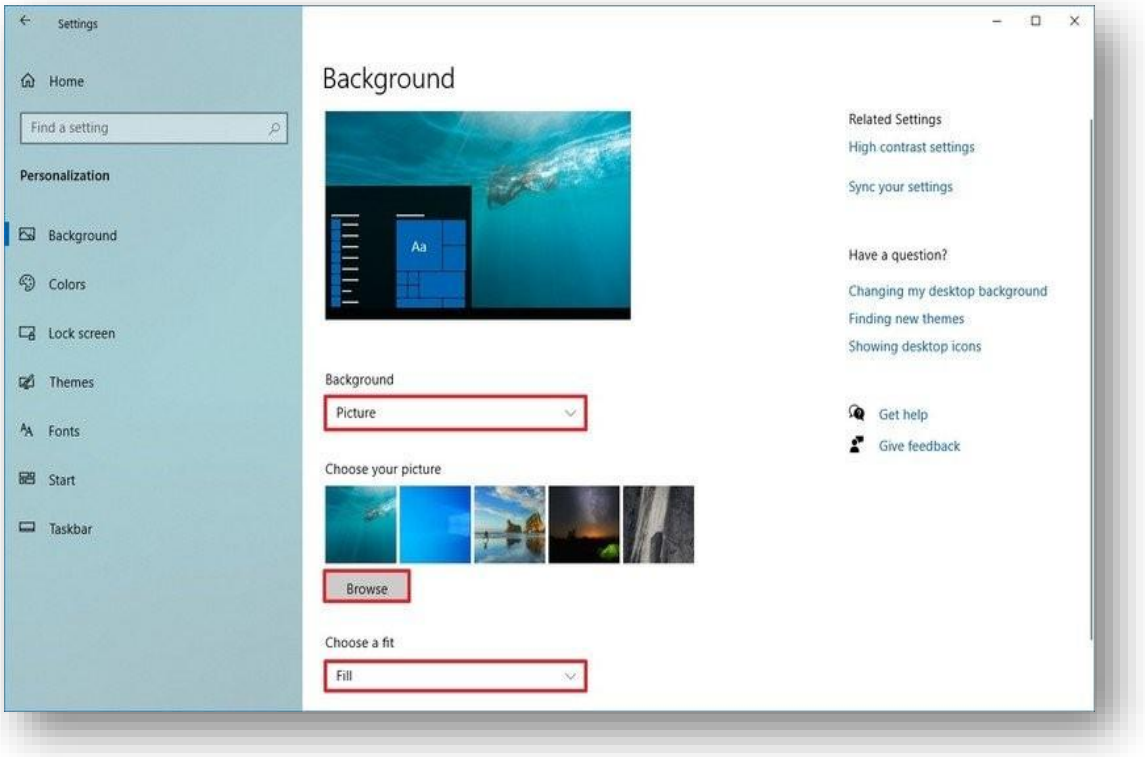
Windows 10 includes a wide range of settings to customize the appearance to make the desktop and apps look better and reflect your personality.

✓ **Changing desktop wallpaper**

To change the Windows 10 desktop background, use these steps:

- Open Settings.
- Click on Personalization.
- Click on Background.
- Using the "Background" drop-down menu, select the Picture option.
- Click the Browse button to select the new wallpaper image.
- Using the "Choose a fit" drop-down menu, select the fit that best suits the images:

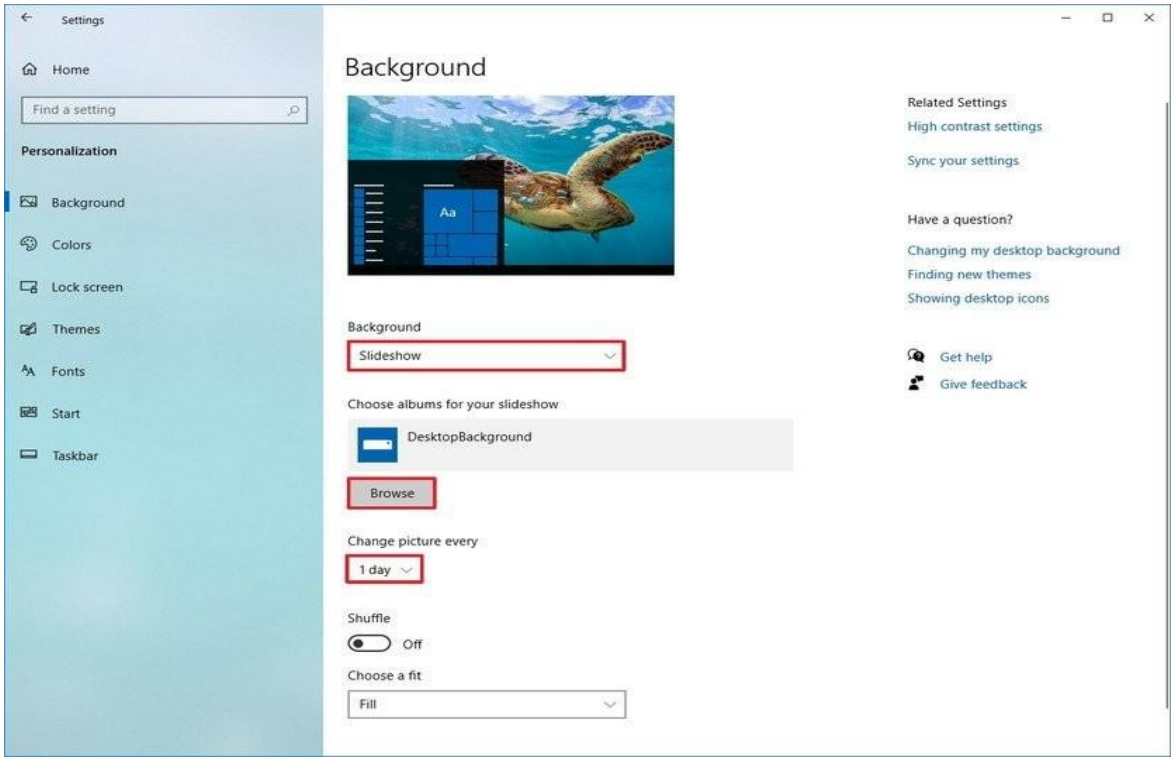
[15] https://www.isumsoft.com/windows-10/3-ways-to-create-administrator-account-in-windows-10.



✓ **Setting up a desktop slideshow**

To showcase a picture collection on the desktop, use these steps:

- Open Settings.
- Click on Personalization.
- Click on Background.
- Using the "Background" drop-down menu, select the Slideshow option.
- Click the Browse button to select the folder with the picture collection.
- Use the "Change picture every" drop-down menu and select how often images should rotate.

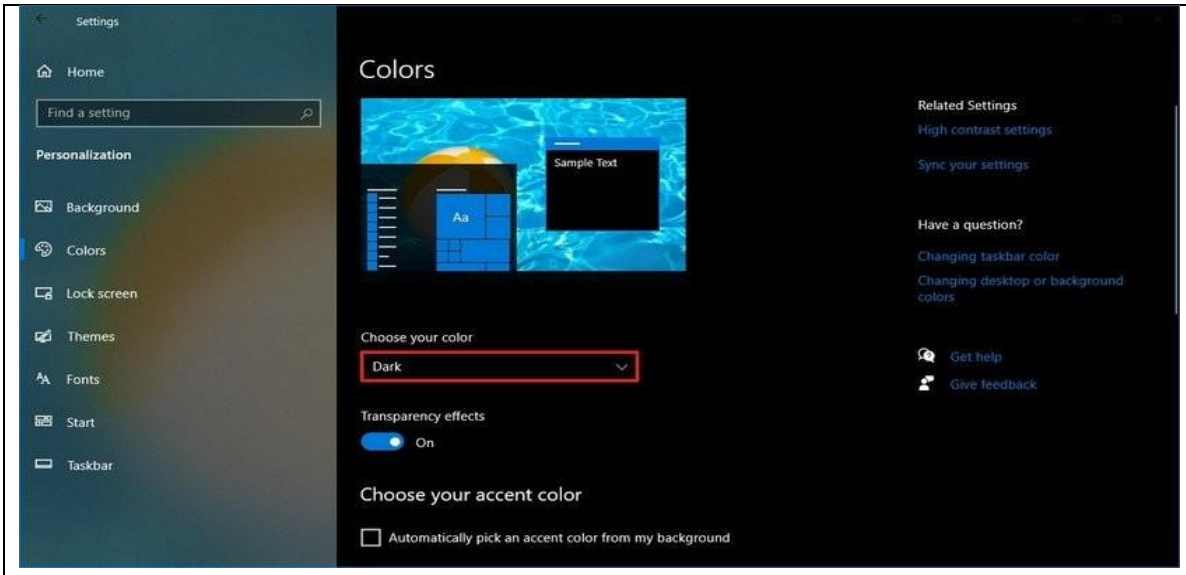


✓ **Enable dark or light mode**

Windows 10 includes two personalization modes. The light mode is the default mode and works well during daytime, and then there's the dark mode that uses a dark color scheme in backgrounds and other parts of the OS and supported apps. Also, it's an option more suited for a low-light environment.

To switch between the light and dark mode, use these steps:

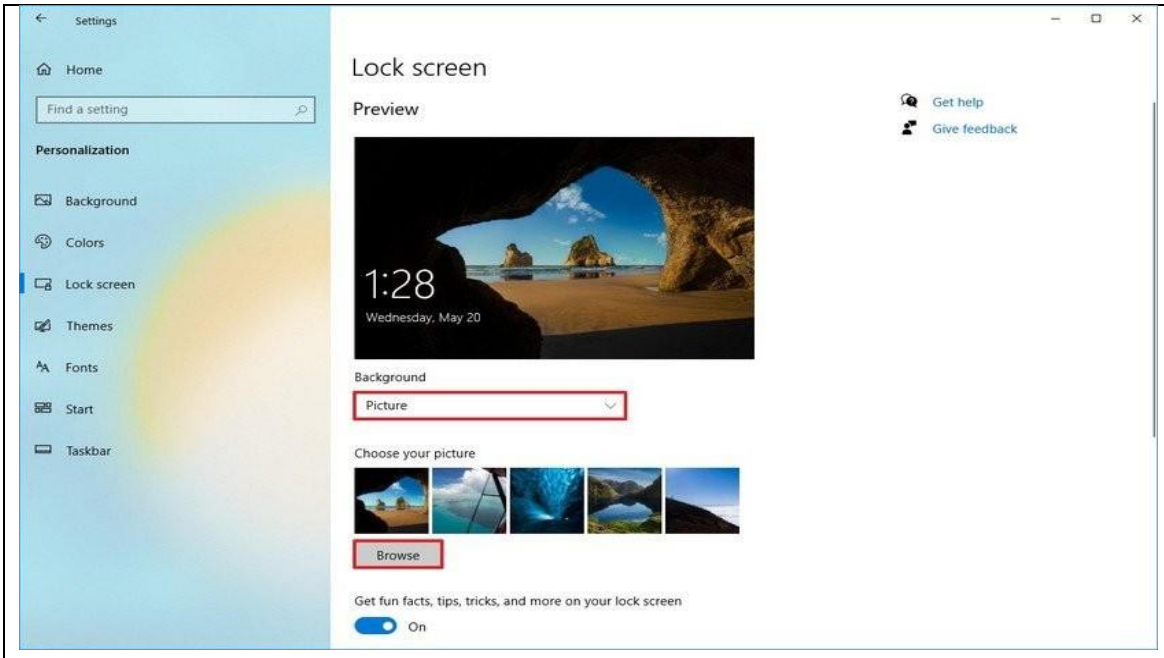
- Open Settings.
- Click on Personalization.
- Click on Colors.
- Use the "Choose your color" drop-down menu and select the Light or Dark mode.



The lock screen uses "Windows spotlight" as the default option to display different backgrounds every time you sign in to Windows 10, and while this option pulls stunning images from the cloud, you can also set any image you want.

To use a custom image on the Windows 10 Lock screen, use these steps:

- **Open** Settings.
- Click on Personalization.
- Click on Lock screen.
- Use the "Background" drop-down menu and select the Picture option.
- Click the Browse button.
- Select the picture you want to use.
- Click the Choose picture button.



Once you complete the steps, the Lock screen will show the custom image that you selected.

- **Disk management**

  Disk Management in Windows 10 allows you to efficiently manage your storage by partitioning disks, formatting them, and cleaning up unnecessary files. These tasks help optimize your computer's performance and ensure that your storage is organized and properly utilized. Always back up important data before making significant changes to your disk configurations to avoid data loss.[16][17]

  Managing disks in Windows 10 involves several key tasks: disk partitioning, disk formatting, and disk cleanup. Below are ways of how to handle each of these tasks using the Disk Management tool and other built-in utilities.

  ✓ **Accessing Disk Management**

  - **Using the Start Menu**:
    - Right-click on the **Start** menu (Windows logo) in the bottom-left corner.

[16] https://support.microsoft.com/en-us/windows/disk-cleanup-in-windows-
[17] https://www.hp.com/us-en/shop/tech-takes/how-to-use-disk-cleanup-windows-10

- Select **Disk Management** from the context menu.

Using the Run Dialog:

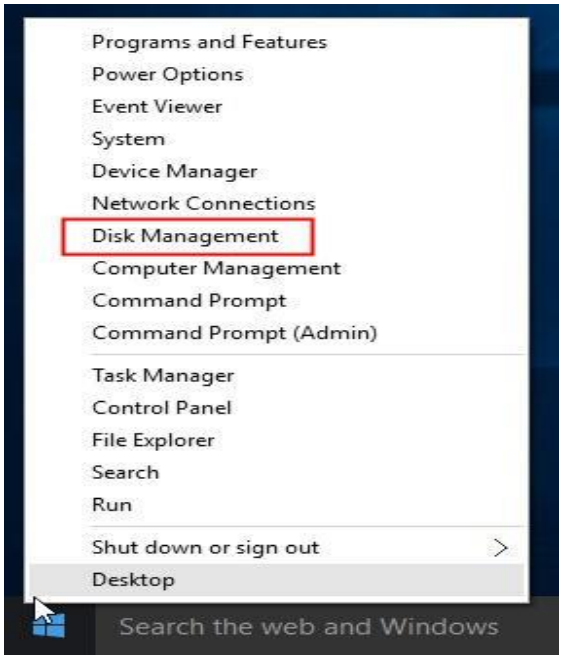
- Press Win + R to open the Run dialog box.
- Type diskmgmt.msc and press Enter.

Disk Partitioning

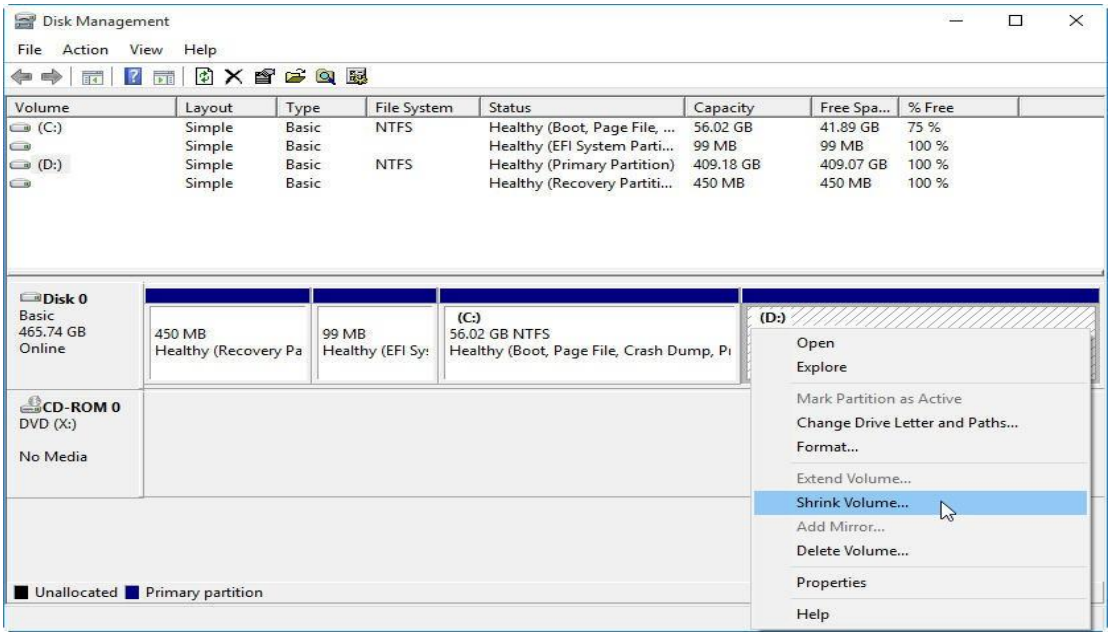
Disk Management is a tool built in all Windows versions to manage hard disk partitions, such as create, delete and format partitions, change drive letter, shrink volume, extend volume and perform other disk-related tasks.

- **Steps for disk partitioning**

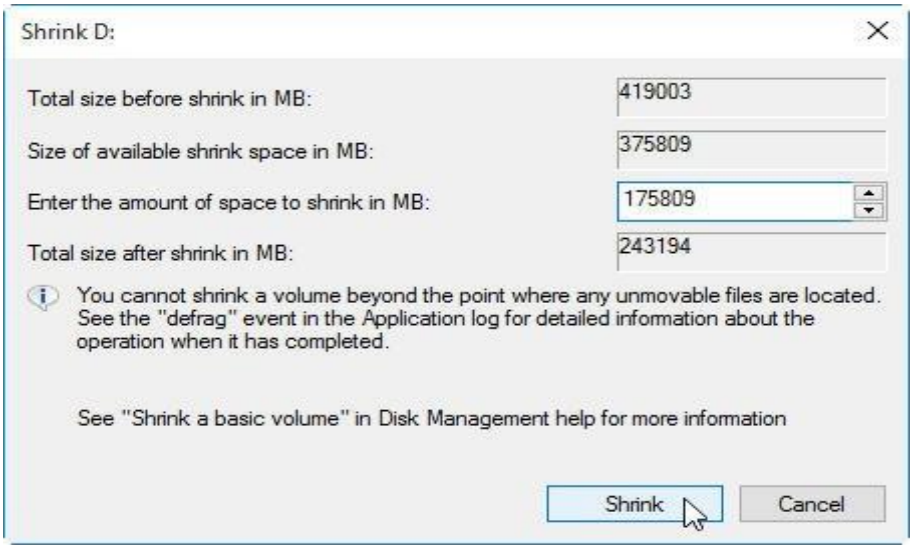
Step 1: To partition Windows 10 hard drive, let's get started from opening Disk Management Tool in Windows 10. The easiest way is to right click Start Menu and select "Disk Management".



Step 2: Select the hard drive you want to partition. Right click a partition (here is D: drive) and select "Shrink Volume".

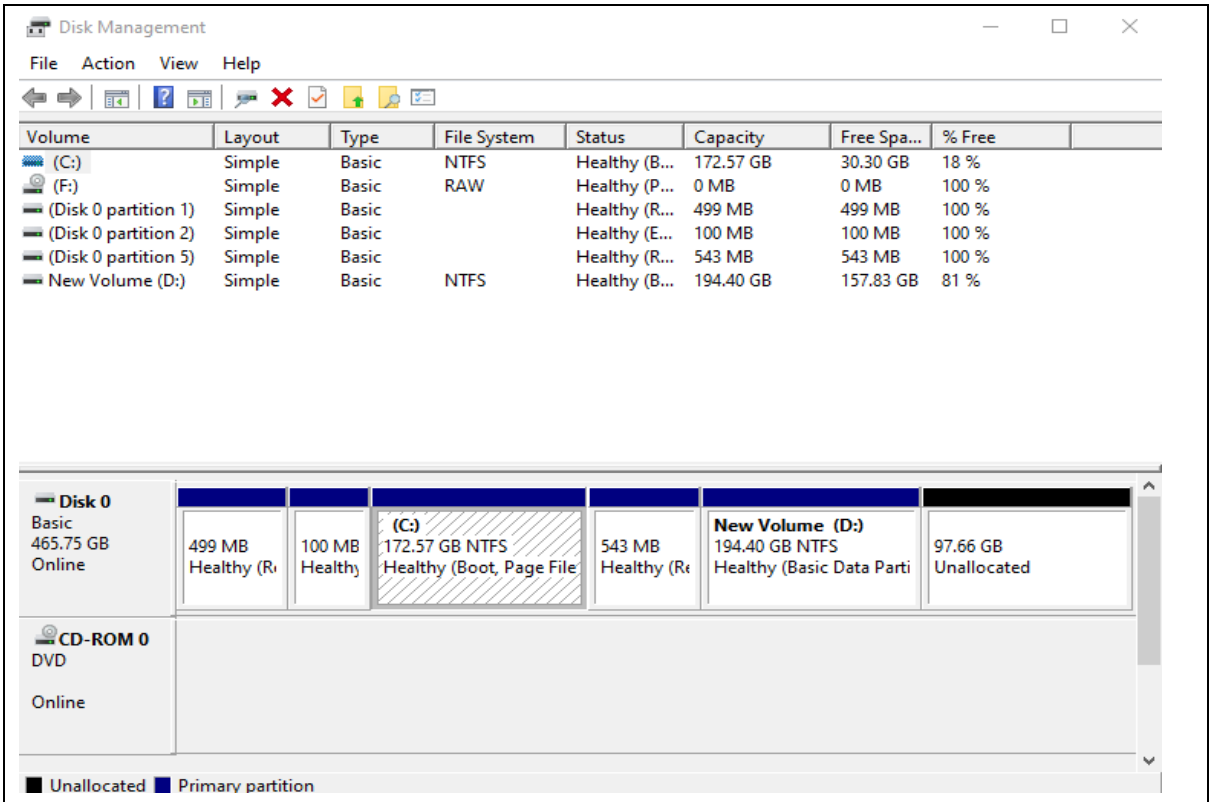


Step 3: In the pop-up window, you can modify the amount of space to shrink. And then click "Shrink".

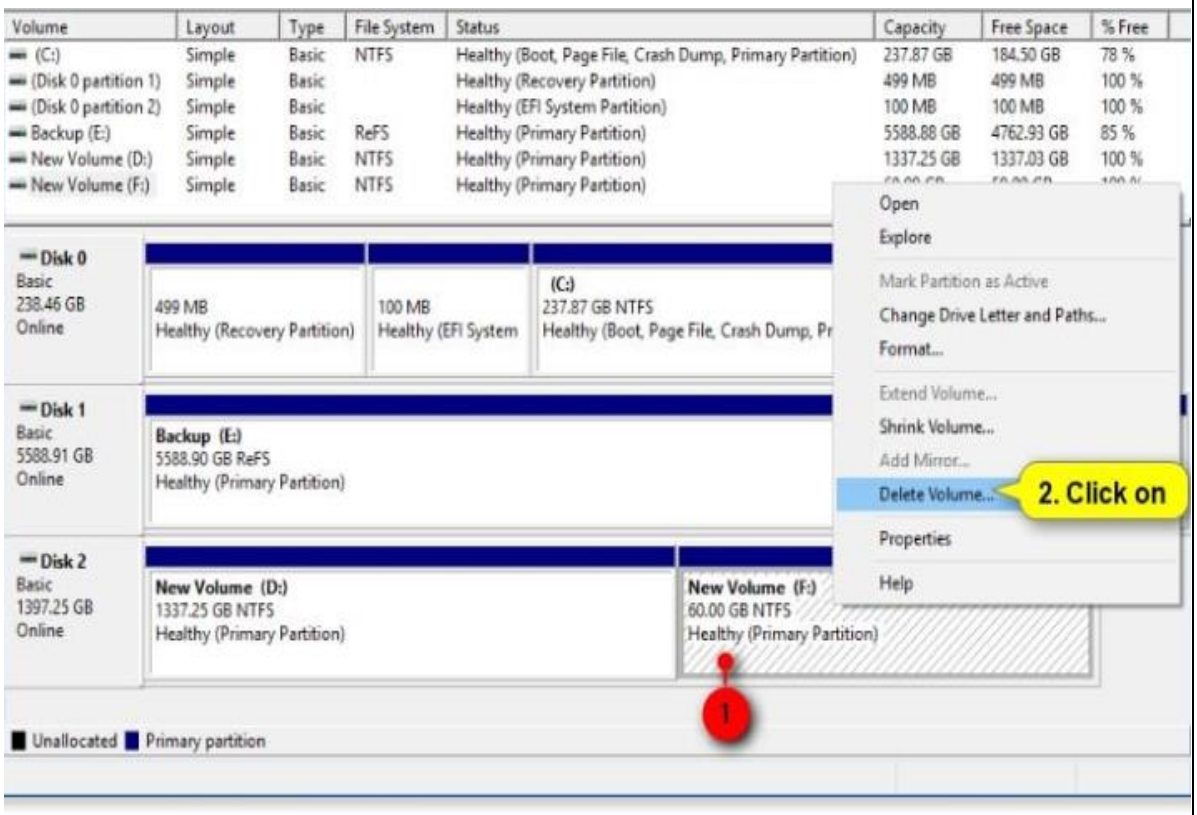


Step 4: After Step 3, you will find an unallocated space behind D drive. Then, right click on it and select "New Simple Volume" and follow the wizard to format and create a new partition.

- ✓ **Deleting a Partition**
  - **Open Disk Management**.

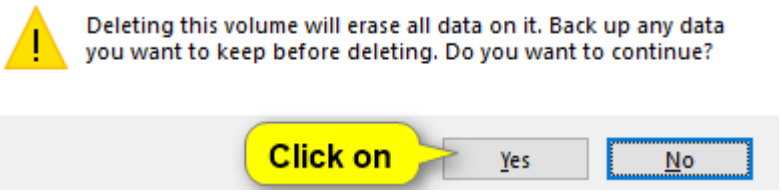


Right-click on the Partition to Delete and Select Delete Volume.



- **Confirm Deletion**:

  Click **Yes** to confirm. Note that this will erase all data on the partition.

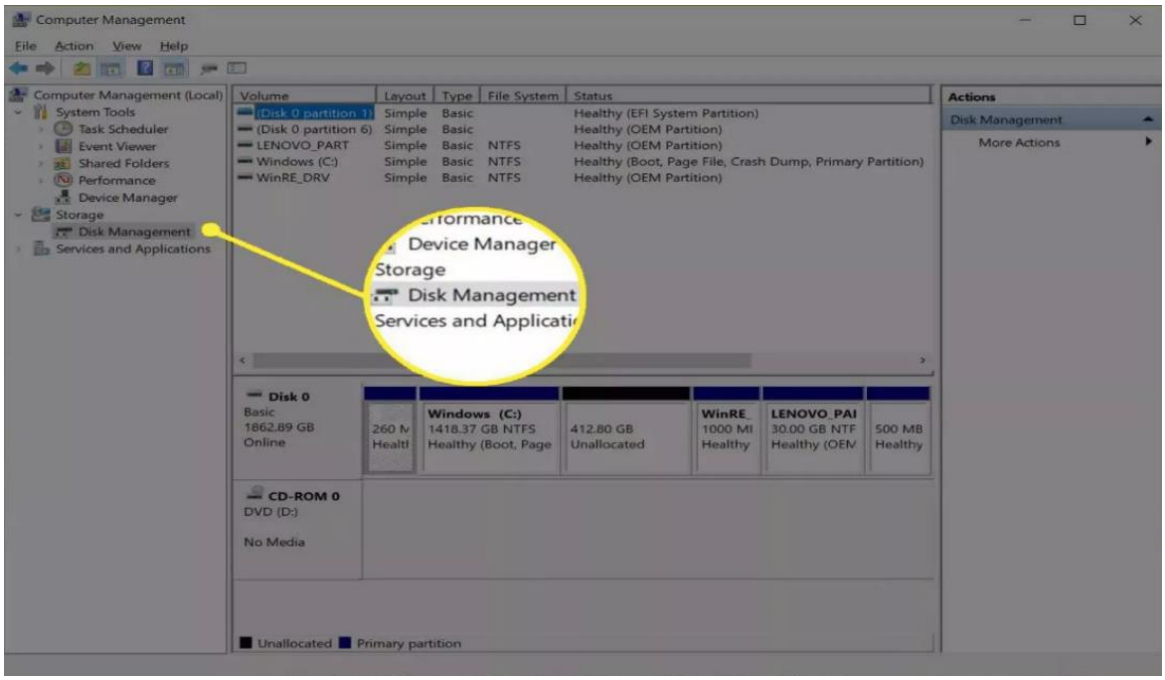


✓ **Disk Formatting**

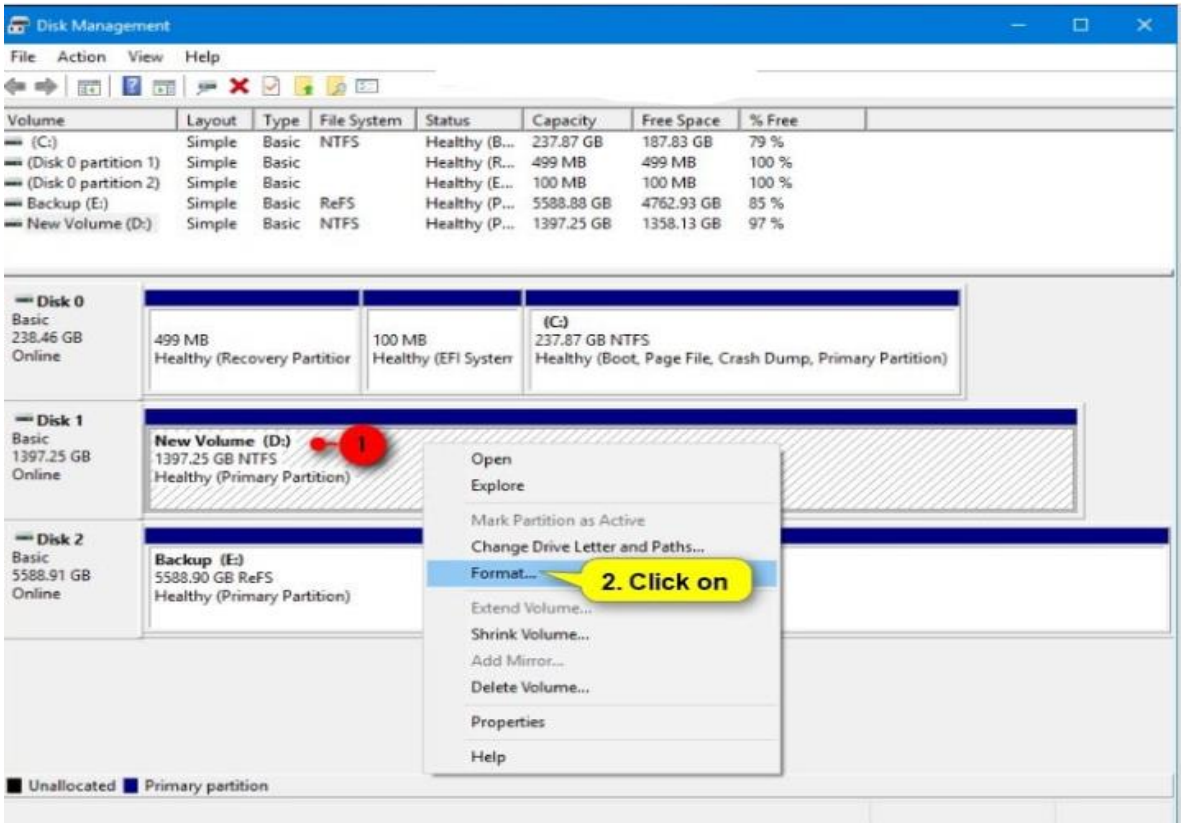
Formatting a disk prepares it for use by setting up a file system.

- **Formatting an Existing Partition**

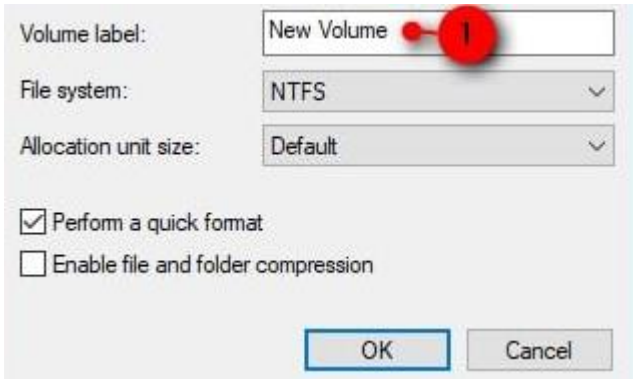
  - Open Disk Management.



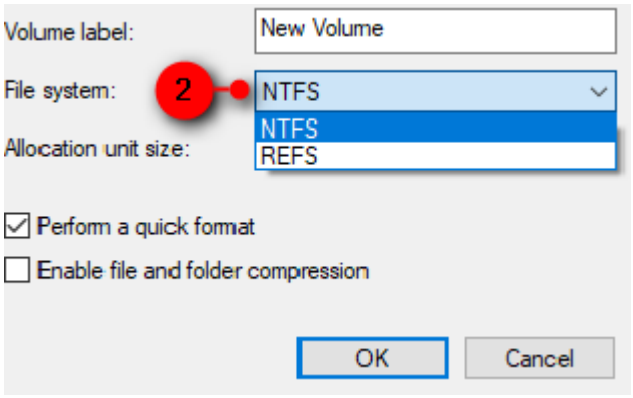
  - Right-click on the Partition to Format and Select Format



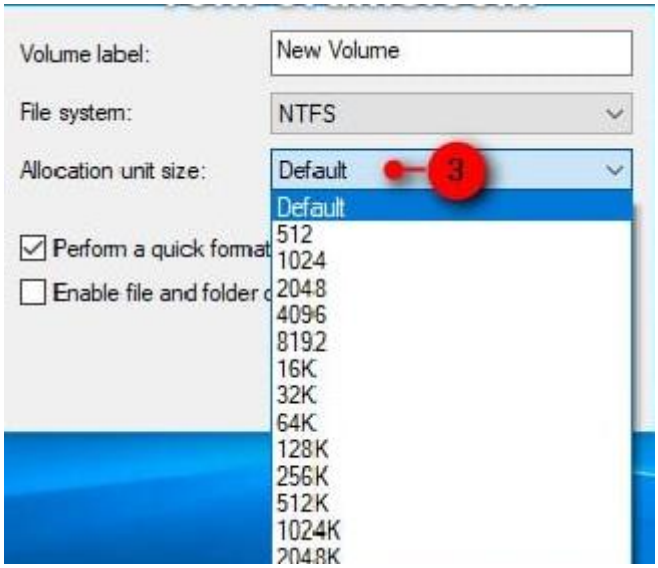
- Format dialog box then enter a volume label.



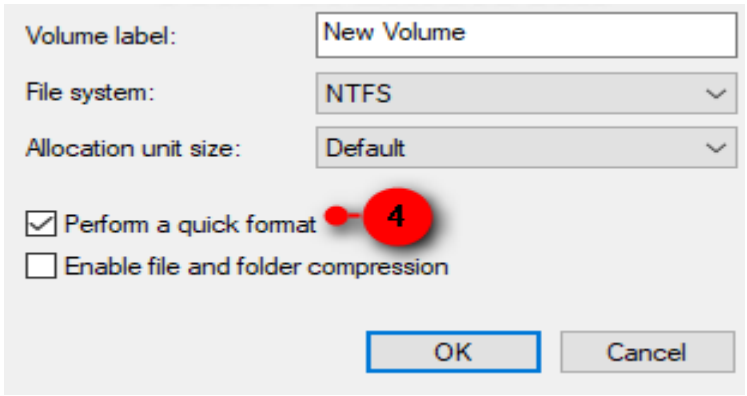
- Choose the file system (usually NTFS).

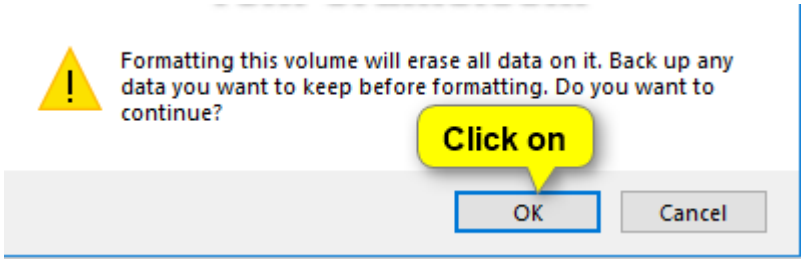


- Select the allocation unit size (default is typically fine).

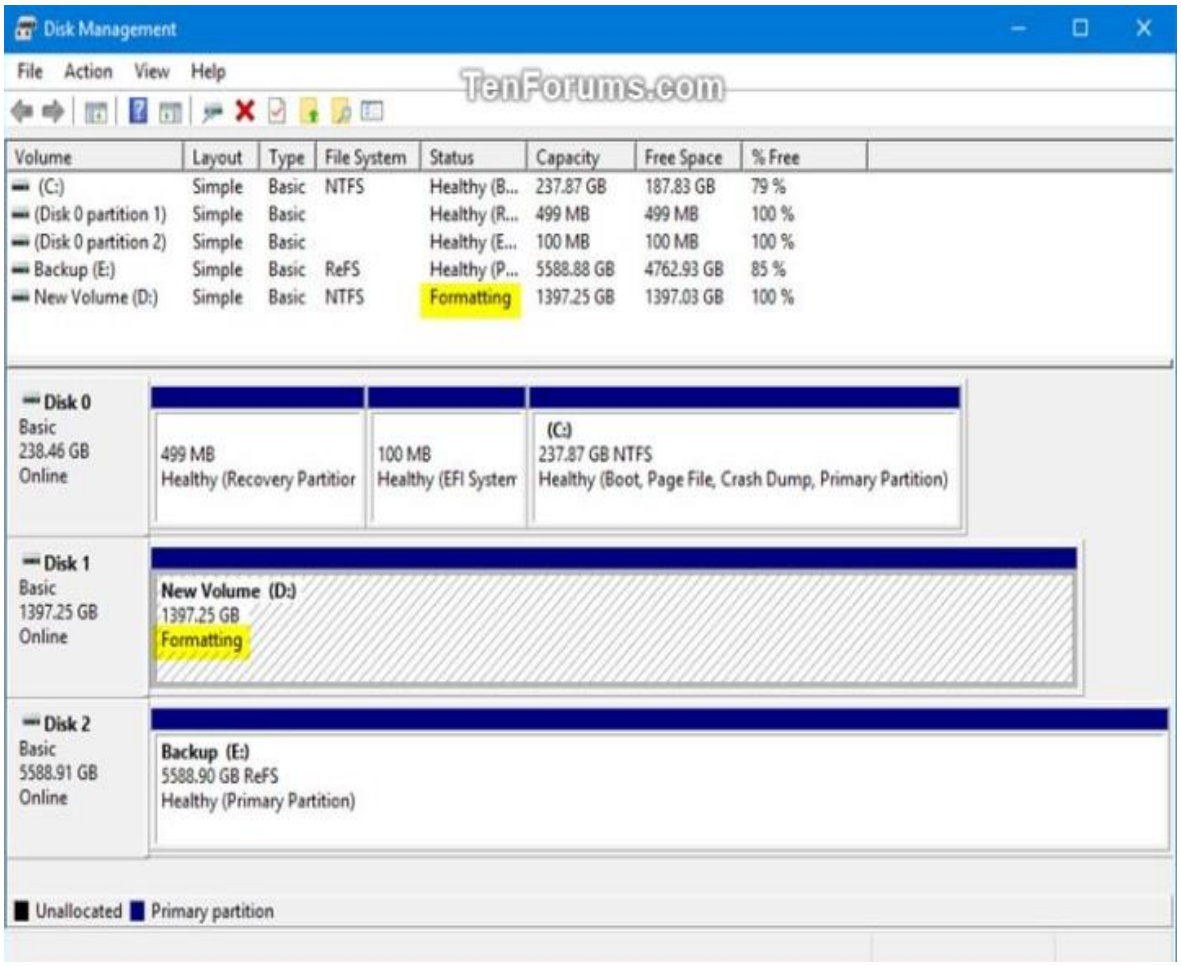


- **Optionally**, check the **Perform a quick format** box for faster formatting.





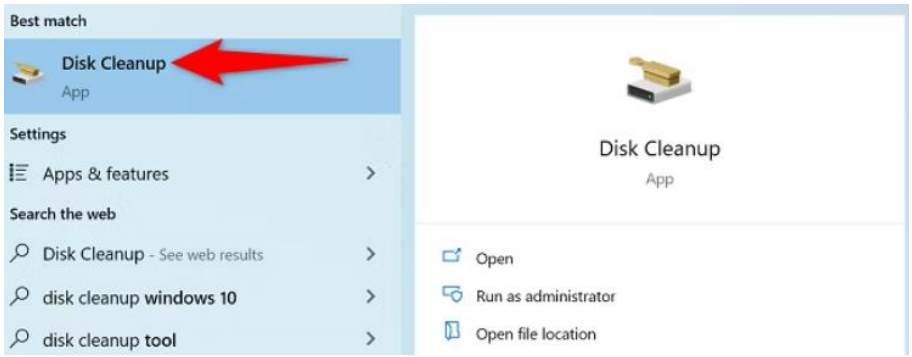
- **Confirm** the action by clicking **OK**.



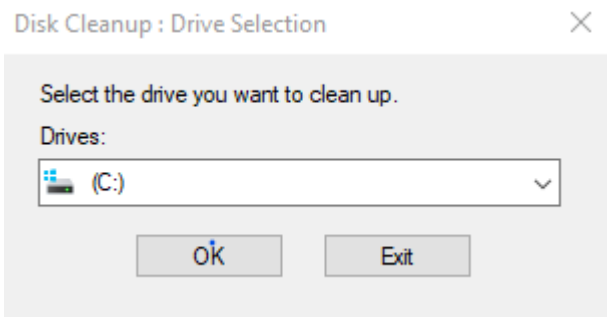
✓ **Disk Cleanup**

Disk Cleanup helps free up space on your hard drive by deleting unnecessary files.

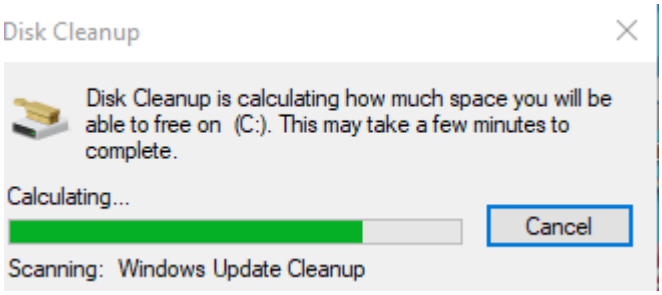
- **Open Disk Cleanup**:
  - Press **Win + S** to open the search bar.
  - Type **Disk Cleanup** and select the Disk Cleanup app.



- **Select the Drive to Clean Up**:
  - Choose the drive you want to clean and click **OK**.

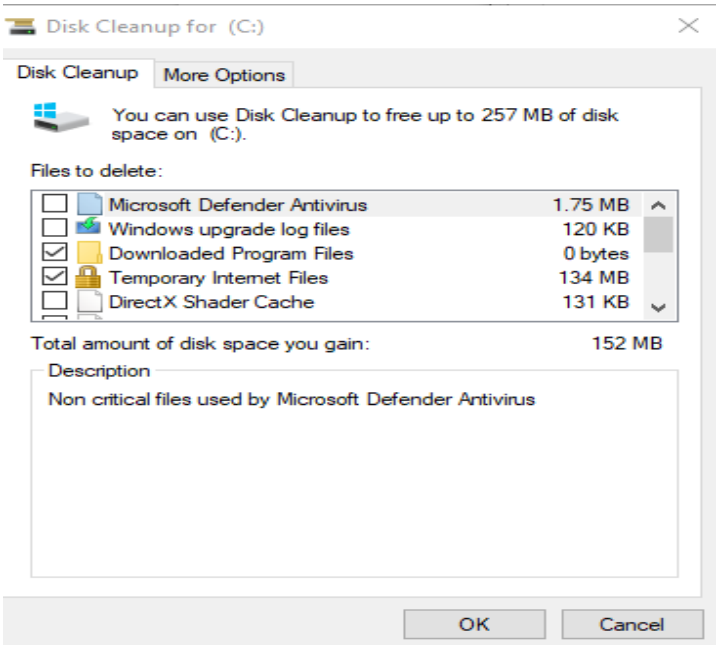


- **Select Files to Delete**:
  - Disk Cleanup will calculate the space you can free up.

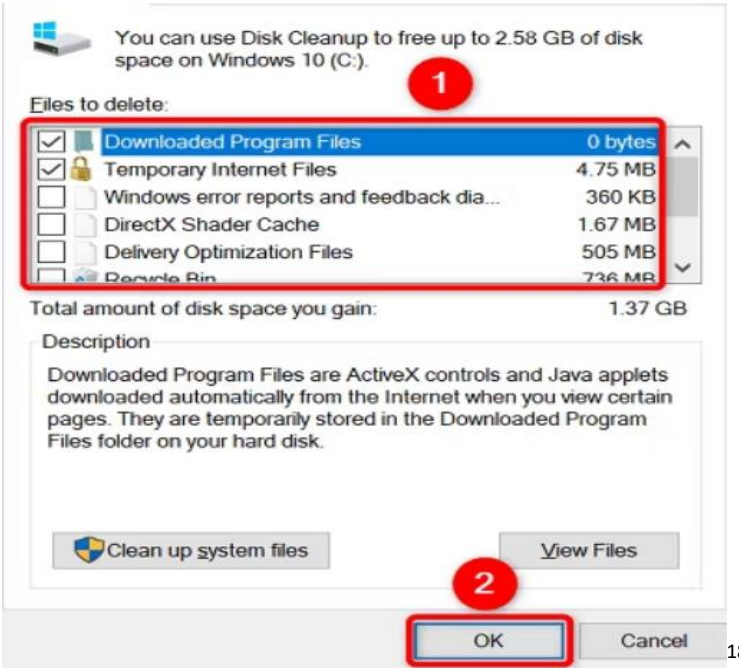


- In the Disk Cleanup dialog, check the boxes next to the types of files you want to delete (e.g., Temporary files, Recycle Bin).

  Click OK:



- Confirm by clicking **Delete Files**.



[18]

- **Additional Disk Cleanup Steps**

  For more thorough cleanup:

- **Clean Up System Files**:

  - In the Disk Cleanup dialog, click on **Clean up system files**.

[18] https://eshop.macsales.com/tech_center/formatting/OWC_Windows_10_Formatting%20Guide.pdf

- Select the drive again and click **OK**.
- Check additional file types to delete, such as previous Windows installations or system error memory dump files.

Remove Unused Programs:

- Open **Settings** > **Apps** > **Apps & features**.
- Uninstall programs you no longer need.

- **Windows administrative tools**

Windows administrative tools are a set of utilities and management consoles designed to help administrators configure, monitor, and troubleshoot Windows operating systems. These tools provide access to various system settings and diagnostic utilities.

They include the following:

✓ **Task Scheduler**

Description: Allows you to schedule tasks to run automatically at predefined times or in response to specific events.

Key Features:

- Create and manage scheduled tasks.
- Set triggers and conditions for task execution.
- Monitor task status and history.

✓ **Event Viewer**

Description: Provides a centralized location for viewing and analyzing system events and logs.

Key Features:

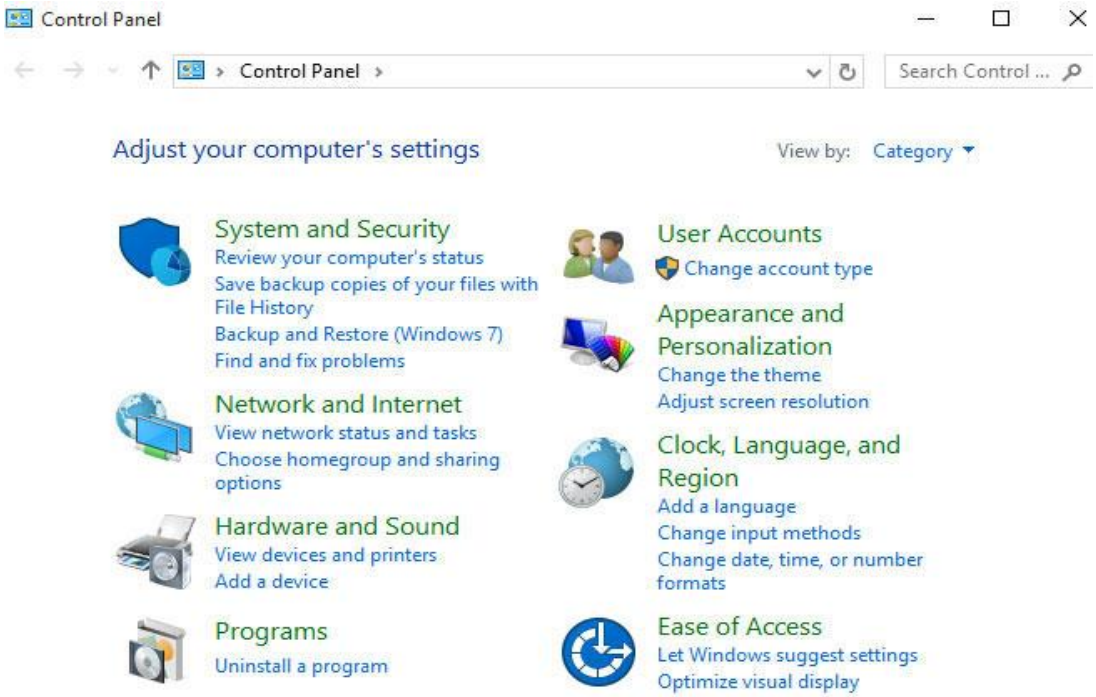
- View logs for system, application, security, setup, and forwarded events.
- Filter and search event logs based on various criteria.
- Create custom event views and subscriptions.

- **Control panel settings**

  Control Panel is a vital component of the Windows operating system, providing users with access to a wide range of system settings and configurations. Here's an overview of the categories and settings available within Control Panel:

  There are eight main areas on the Control Panel, containing different tools designed to optimize your computer.

  ✓ **Window 10 Control Panel**



  - **System and Security** - A section to check your computer's status, backup and restore, and others.
  - **Network and Internet** - View network status.
  - **Hardware and Sound** - View which devices are on your computer and add devices.
  - **Programs** - Uninstall programs.
  - **User Accounts** - Change user accessibility.
  - **Appearance and Personalization** - Change desktop options, like fonts and screen readers.
  - **Clock and Region -** Change date and time.
  - **Ease of access** - Optimize your display settings.[19][20]

[19] https://www.tenforums.com/tutorials/34661-open-administrative-tools-windows-10-a.html
[20] https://www.serverwatch.com/guides/windows-server-administrative-tools/

Activity 2: Guided Practice

Task 22:

Read the following scenario and answer the questions that follow

You are tasked with customizing the operating system (OS) on a set of computers in your organization. Your goal is to tailor the OS to meet the specific needs of different user groups, such as administrators, trainers, and general users. This involves installing necessary applications, configuring settings, and optimizing the user experience for each group.

a. What are the specific needs of each user group, and how can you address them during the customization process?
b. Describe the system settings you can configure for the administration, trainers, and general users
c. Explain their importance of configuring system settings for each user group

Activity 3: Application

Task 23:

Read the following scenario and perform the task given

You're a s.6 graduate trainee who has just received a new laptop after your studies. You want to personalize the operating system (OS) on your laptop to make it more efficient and enjoyable to use for your daily tasks. Customize the OS on your laptop to suit your preferences and needs as follows:

a. Customize the desktop background and theme or image to reflect your style
b. Organize and name your files and folders on the desktop in a way that makes sense to you
c. Configure system settings, such as display brightness, power management, and notification preferences.
d. Customize the user interface by adjusting settings for taskbar appearance, window colors, and font sizes.

Formative Assessment

Qn1. Which of the following is a common customization option for personalizing the appearance of the desktop in Windows?

a. Changing the wallpaper
b. Upgrading the CPU
c. Adding more RAM
d. Installing a new hard drive

Qn2. What feature in most operating systems allows users to adjust the brightness and contrast of their display?

a. Screen resolution
b. Device Manager
c. Power settings
d. Display settings

Qn3.Which utility in Windows enables users to change the default web browser?

a. Task Manager
b. Control Panel
c. Registry Editor
d. Disk Cleanup

Qn4. Effective identification of customer requirements ensures that the chosen operating system aligns closely with the needs and goals of its users, leading to higher satisfaction and productivity.

a. True
b. False

Qn5.What function allows users to organize and customize the layout of icons and shortcuts on the desktop?

a. Taskbar settings
b. Desktop customization
c. Control Panel

d. System Preferences

Qn6. Which of the following is NOT a common customization option in the Control Panel of Windows?

a. Changing the date and time
b. Adjusting display settings
c. Configuring network connections
d. Installing new hardware drivers

Qn7. Customer requirements for an operating system can vary widely depending on factors such as industry, application types, and user demographics.

a. True
b. False

Qn8. Which utility in Windows allows users to manage startup programs and services?

a. Task Manager
b. Control Panel
c. Registry Editor
d. Disk Cleanup

Qn9. How can users customize the sounds and notifications on their computer?

a. Through the BIOS settings
b. Using the Control Panel
c. Editing system files
d. Installing new hardware

Qn10. What feature allows users to customize the appearance and behavior of their desktop icons?

a. Taskbar settings
b. Desktop customization
c. Control Panel
d. System Preferences

Qn11. Changing the wallpaper is the only way to customize the look and feel of the operating system.

a. True

b. False

Qn12. An internet connection is always necessary during the initial installation of an operating system.

a. True

b. False

Qn13. How would you go about identifying the essential components needed to run an operating system smoothly?

Qn14. Can you explain why it's important to match hardware specifications with the requirements of the operating system?

Qn15. Match the following columns A and B correctly and write your responses in column Answer

Answer	**A**	**B**
	1. Theme	a. A small application that provides quick access to information or functionality on the desktop
	2. Widget	b. A collection of visual elements that define the overall look and feel of the operating system
	3. Desktop Icon	c. The program that automatically opens when you double-click on a specific file type
	4. Default Program	d. A graphical representation of a file or program on the desktop
		e. A named file location in a directory

Points to Remember

- Disc clean up helps optimize system performance
- You add your own features like images to use as background themes
- Personalization of Operating System features improves user experience

Self-Reflection

1. Re-take the self-assessment they did at the beginning of the unit.
2. Read the statements across the top. Put a check in a column that best represents your level of knowledge, skills and attitudes.

My experience Knowledge, skills and attitudes	I do not have any experience doing this.	I know a little about this.	I have some experience doing this.	I have a lot of experience with this.	I am confident in my ability to do this.
Describe customer requirements for an operating system					
Describe the minimum hardware requirements for an operating system					
Describe the steps for customizing the operating system					
Identify the customer requirement for an operating system					
Identify Minimum hardware requirement					

My experience Knowledge, skills and attitudes	I do not have any experience doing this.	I know a little about this.	I have some experience doing this.	I have a lot of experience with this.	I am confident in my ability to do this.
for an operating system					
Customize the operating system					
Understand the customer's needs when identifying requirements for an operating system					
Capable of upgrading common hardware and software					
Be able to personalize an operating system to suit user needs					

3. Fill in the table below and share results with the trainer for further guidance.

Areas of strength	Areas for improvement	Actions to be taken to improve
1. **2.** **3.**	**1.** **2.** **3.**	**1.** **2.** **3.**

UNIT 3: PROTECT COMPUTER SYSTEM

Unit summary

This unit provides you with the knowledge, skills and attitudes required to protect computer system required to apply computer skills. It covers the Installation of software utilities, scanning and eliminating virus, and backing up and restoring computer data.

Self-Assessment: Unit 3

1. Observe the figure in Unit 3 and answer the following questions
   a. What do you think the padlock with the key represents?
   b. Can you identify which icon might be related to data storage?
   c. What measures can be taken to ensure the safety of data represented by the hard drive icon?
   d. What measures can be taken to ensure the safety of data represented by the hard drive icon?
2. Fill in and complete the self-assessment table below to assess your level of knowledge, skills and attitudes under this unit. Try to answer truthfully. It is for your own interest to figure out your weakness and take necessary action during this unit. Think about yourself: do you think you can do this? How well? Read the statements across the top. Put a check in the column that best represents your situation. At the end of this unit, you will take this assessment again

My experience Knowledge, skills and attitudes	I do not have any experience doing this.	I know a little about this.	I have some experience doing this.	I have a lot of experience with this.	I am confident in my ability to do this.
Describe software tools /utilities					
Describe the computer system scan process					
Describe backup types					
Install software utilities					
Scan and eliminate viruses					
Backup computer data					

My experience Knowledge, skills and attitudes	I do not have any experience doing this.	I know a little about this.	I have some experience doing this.	I have a lot of experience with this.	I am confident in my ability to do this.
Be able to safely backup data					
Be able to scan a computer system and eliminate viruses					

Key Competencies:

Knowledge	Skills	Attitudes
1. Describe software tools /utilities	**1.** Install software utilities	**1.** Be able to safely backup data
2. Describe the computer system scan process	**2.** Scan and eliminate viruses	**2.** Be able to scan a computer system and eliminate viruses
3. Describe backup types	**3.** Backup computer data	

Discovery activity:

Task 24:

Clearly observe the illustration and answer the questions below:

a. What do you see in the illustration?
b. Describe each of the components in the illustration.
c. What does that yellow icon in form of padlock explain in the above illustration

Topic 3.1 Installation of software utilities

Activity 1: Problem Solving

Task 25:

Read the scenario below and answer the questions that follow

Trainees in the hospitality program are preparing for their future roles in various areas such as food and beverage operations, front office management, housekeeping operations, and tourism. As part of their training, they are tasked with setting up computers in a hotel environment and installing software utilities relevant to their respective areas. However, they encounter several challenges during the installation process regarding software utilities and tools because they have little knowledge about them.

a. What kind of software utilities would they need?
b. Discuss the importance of software utilities.
c. Explain different types of software utilities
d. Enumerate the steps they need to take in order to install well the required utilities.

Key Facts 3.1: Installation of software utilities

- **Description of utilities software**

  Utility software is essential system software that supports the smooth operation and maintenance of a computer system.

  It works alongside the operating system to manage, organize, optimize, and ensure the efficient functioning of the computer. Utility software performs various tasks such as virus detection, software installation, data backup, deletion of unnecessary files, and more.

  These utilities enhance system performance, security, and overall user productivity by automating routine tasks and resolving system maintenance issues.

- ✓ **Types of Utility Software**
  - **Anti-virus**:

    A computer virus is malicious software that attaches itself to other software you install and spreads throughout your system. As it multiplies, it can slow things down and even damage your files, making your computer sluggish and unreliable.

    An antivirus is a utility software that helps to keep the computer virus-free. It notifies when any malicious file is detected and removes such files. In addition, it scans any new device attached to the computer and discards any virus if there.

    It also scans the system from time to time for any threats and disposes of them.

    Examples of antivirus are McAfee antivirus, Avast antivirus and windows Defender.

    - **Key functionalities of Anti viruses**
      - Virus Scanning: Antivirus software scans your computer for known viruses and other malware threats. It compares files and programs on your system to a database of malware signatures, which are unique identifiers for specific threats.
      - Real-time Protection: Many antivirus programs offer real-time protection, constantly monitoring your computer for suspicious activity. This can include scanning files that are downloaded from the internet, opened from email attachments, or transferred from external storage devices.
      - Threat Detection and Blocking: When antivirus software detects a potential threat, it can take various actions depending on the program's configuration. It might quarantine the infected file, delete it altogether, or prompt you to act.

- Protects from Data Loss: Malware can damage or steal your important files. Antivirus software can help prevent this from happening.
- Protects Your Privacy: Some malwares can steal your personal information, such as your credit card numbers or passwords. Antivirus software can help protect your privacy.
- Improves System Performance: Malware can slow down your computer. By removing malware, antivirus software can help improve your system's performance

- New malware threats are constantly emerging, and antivirus software may not be able to detect them all. Below are additional security practices that can be followed:
  - Keep your software up to date: This includes your operating system, antivirus software, and web browser.
  - Be careful about what you click on: Don't click on links or open attachments from unknown senders.
  - Be cautious when downloading files: Only download files from trusted sources.
  - Use strong passwords: Create strong and unique passwords for all your online accounts.
  - By using antivirus software and practicing safe computing habits, you can help protect your computer from malware and other security threats.

✓ **File management system.**

This utility software is used to manage files of the computer system. Since files are an important part of the system as all the data is stored in the files. Therefore, this utility software helps to browse, search, arrange, find information, and quickly preview the files of the system.

Windows Explorer is a default file management tool present in the system. Some other examples of file management tools are Google Desktop, Double Commander, Directory Opus.[21]

- ✓ **Disk Management Tools.**

  This utility software is used to manage data on disks. Moreover, they perform functions like partitioning devices, manage drives, these include Disk defragmenters, disc clean up.

  - Disk Defragmenters are utility software designed to optimize the performance of hard disk drive (HDD) by rearranging fragmented data on the disk. It works by analyzing the files and data stored on the hard disk. Over time, as files are created, modified, and deleted, the data on the disk can become fragmented. This means that parts of a single file may be scattered across different physical locations on the disk rather than being stored contiguously in one place. Examples of disk defragmenters are Perfect disk, Deflaggler, etc.
  - Disk Cleanup Tool: is a utility software program included with most operating systems like Windows and mac OS. It helps you free up storage space on your computer's hard drive by identifying and removing unnecessary files. Examples are Razer Cortex, Piriform Cleaner.

- ✓ **Backup software**: are computer programs used to perform a backup; they create supplementary exact copies of files, databases or entire computers. These programs may later use the supplementary copies to restore the original contents in the event of data loss

- ✓ **Backup media:** These refer to the physical storage devices or media used to store copies of data and files for backup purposes. These devices provide a reliable and secure way to create backups of important information, ensuring that data is protected against loss due to hardware failure, human error, or

[21] https://www.toppr.com/guides/computer-science/computer-fundamentals/software-concepts/utility-software/

malicious attacks.

- **Common types of backup media include:**
  - ✓ **External Hard Drives:** External hard drives are standalone storage devices that connect to a computer via USB, Thunderbolt, or other interfaces. They offer large storage capacities and fast data transfer speeds, making them ideal for storing large backup files and data archives.
  - ✓ **USB Flash Drives:** USB flash drives, also known as thumb drives or memory sticks, are portable storage devices that connect to a computer's USB port. They are compact, lightweight, and easy to use, making them convenient for storing small backup files or transferring data between devices.
  - ✓ **Tape Drives:** Tape drives use magnetic tape cartridges to store data sequentially in a linear fashion. While tape drives are less common than other backup media, they offer high storage capacities and long-term archival capabilities, making them suitable for large-scale backup and archival applications.
  - ✓ **Optical Discs:** Optical discs, such as CDs, DVDs, and Blu-ray discs, can be used to create backup copies of data and files. While optical discs offer relatively low storage capacities compared to other backup media, they are inexpensive and can be useful for storing small amounts of backup data or creating archival copies of important files.[22][23]
- **Installation of software tools\utilities**
  - ✓ **How to install an anti-virus**
    - **Download an antivirus installer or use storage device**

      Download the installer for the antivirus program you are going to use and save it in a suitable location (such as Downloads or Documents). some

[22] https://www.geeksforgeeks.org/utility-software/
[23] https://www.toppr.com/guides/computer-science/computer-fundamentals/software-concepts/utility-software/

popular antivirus programs: Avast free antivirus, AVG antivirus (free edition), Microsoft Security Essentials.

- **Downloads**: Most antivirus software is obtained by downloading the installer file from the developer's website or an authorized online store. Make sure you download the installer compatible with your operating system (OS).
- **Avoid untrusted sources:** Downloading from unknown websites can introduce malware risks. Stick to reputable sources.
- **Physical Media:** Some antivirus software might still come on CDs, DVDs, or USB drives. Insert the media into your computer's drive.

Choosing the right version

Make sure you pick the right version to download. Avast! And AVG offer basic free antivirus but also trial versions for more advanced software.

Remove any existing antivirus programs

It's always important to remove any existing antivirus software before installing a new one. New computers often come with a trial version of antivirus software.

If you decide not to buy it when the trial expires, you should uninstall it and replace it with one of the free programs.

You can uninstall an antivirus program using add/remove programs in the Control panel or, if it is available, with a specialized removal tool provided by the manufacturer.

Run the new antivirus

- When complete, go back to the installer you downloaded earlier and double click on the file to install it.
- Most antivirus software will launch an installation wizard, a step-by-step guide that walks you through the installation process.
- Wizard prompts: The wizard might prompt you to:

- Accept a license agreement: Read the agreement carefully before proceeding. It outlines the terms and conditions for using the software.
- Choose an Installation Location: Specify the location on your hard drive where you want to install the software. The default location is usually recommended but you can choose a different folder if desired.
- Select Components: Some utilities offer the option to install specific components or features. You can choose a full installation or select only the features you need (e.g., real-time protection, email scanning).
- Create a Desktop Shortcut: This option allows you to create an icon on your desktop for easy access to the program after installation.
- Upon successful installation, you'll usually be presented with a completion screen. This might offer options to launch the program immediately or close the wizard.
- When the installation has completed, the software will update itself with the latest information about the viruses it needs to be looking for.
- This can take some time (up to twenty or thirty minutes) but when it's finished, it should confirm that you are protected.
- Most antivirus software gives you the opportunity to run a scan of your computer to check for potential problems.
- This can take a long time to complete (several hours for a full scan) but it's a good idea to do this soon after you install a new program.[24]

Additional Considerations:

- **Administrator Privileges:** Some antivirus software might require administrator privileges to be installed. If prompted, provide the administrator username and password to proceed.

[24] https://www.javatpoint.com/how-to-install-an-antivirus-program-on-a-computer

- **Antivirus Software Conflict:** If you already have antivirus software installed, your new installer might prompt you to uninstall the old one first to avoid conflicts.
- **System Restart**: In some cases, the installation might require you to restart your computer for changes to take effect[25]

Activity 2: Guided Practice

Task 26:

According to scenario in activity 1 and after having knowledge about software tools \utilities, answer the following questions

a. How would you describe the role of antivirus software in computer security?
b. Can you explain the process of scanning for viruses and removing threats using antivirus software?
c. Why is backup and recovery software important for data protection?

Activity 3: Application

Task 27:

Read the following scenario and perform the task given

You are part of a school project team preparing for a special event attended by students, teachers, and parents. As an ICT trainee, show how you would use computer software tools like antivirus, anti-malware, and anti-spyware programs to ensure the security of guest registration data, protect against potential cyber threats, and safeguard the smooth operation of computer systems during the event? Prepare a document detailing the steps for the use of any three-security tools that you can use to safe the computer system.

[25] https://softkeys.uk/blogs/blog/how-to-install-antivirus-in-windows-10-step-by-step

Topic 3.2: Scanning and eliminating virus

Activity 1: Problem Solving

Task 28:

Read the scenario below and answer the questions that follow

You are part of a school project team responsible for organizing a special event for students, teachers, and parents. As the event approaches, you notice that some of the computers in the school's front office, used for managing event registrations and guest information, are acting strangely. The computers are running slowly, displaying pop-up ads, and occasionally crashing unexpectedly. You suspect that the computers may be infected with viruses or malware.

a. How would you approach the problem of potential virus or malware infections on the school's computers?
b. Outline the steps you would take to scan for and eliminate viruses, ensuring the security of guest information and the smooth operation of computer systems during the event.

Key Facts 3.2: Scanning and eliminating virus.

- **Description of computer system Scanning**

  Computer system scanning refers to the process of automatically checking your computer's files and system resources for various threats and vulnerabilities. This process involves using specialized software tools to analyze the system for various issues, such as malware, viruses, performance bottlenecks, and system errors.

  ✓ **Purpose of System Scanning**

  - **Malware Detection and Removal:** System scans aim to identify malicious software like viruses, worms, Trojans, spyware, and ransomware. These threats can wreak havoc on your system by corrupting files, stealing sensitive information, or even hijacking control.

Scans detect these malicious programs by comparing them against databases of known malware signatures or by analyzing their behavior for suspicious patterns.

- Vulnerability assessment and patching: System scans also assess your system for weaknesses in the operating system, software applications, and configurations.

  These vulnerabilities could be security holes, outdated software versions, or misconfigured settings that attackers could exploit to gain unauthorized access or control.

✓ **Benefits of system scanning**

- **Enhanced security:** Regular system scanning ensures that the computer is protected against the latest malware threats, reducing the risk of data breaches and cyberattacks.
- **System stability and reliability:** identifying and fixing system errors, scanning helps reduce the frequency of crashes and software malfunctions, leading to a more stable system
- **Data integrity and recovery:** Scanning helps identify potential issues that could lead to data loss, allowing users to take preventive measures. By keeping the system organized and identifying errors early, scanning makes it easier to recover data in case of a system failure.
- **Improved performance:** leaning up unnecessary files and optimizing data storage can significantly improve the system's speed and responsiveness.
- **Cost savings:** Regular system scanning, and maintenance can reduce the need for costly repairs and professional technical support.
- **Proactive threat prevention:** Regular scans act as a first line of defense, identifying and eliminating potential threats before they can cause harm. This helps prevent malware infections, data loss, and system disruptions[26]

[26] https://softkeys.uk/blogs/blog/how-to-install-antivirus-in-windows-10-step-by-step

- **Description of scan types**

  Scan types refer to the different methods or approaches used by antivirus and security software to detect and identify malicious threats, such as viruses, malware, and spyware, on a computer system.

  - ✓ **Full System**: Scan checks all boot records, files, and running processes to which the user has access. This scans your computer thoroughly and takes a longer time.
  - ✓ **On demand scan**: scans your computer system for viruses only when prompted to do so by the computer user
  - ✓ **On access scan**: scans your computer system constantly for viruses and other malicious threats, for the entire duration that your system is powered on, unless paused by the computer user.[27]

- **Description of scan mode**
  - ✓ **Manual Scan Mode:** are initiated and controlled by the user, who selects the files, folders, or drives to be scanned. Users can choose the scan type (quick, full, custom) and configure settings based on their requirements.
  - ✓ **Scheduled Scan Mode:** are automated scans set to run at predefined times or intervals, such as daily, weekly, or monthly. Users configure the scan schedule and settings in advance, ensuring regular scanning without manual intervention.
  - ✓ **Real-time Protection Mode:** Real-time protection, or on-access scanning, continuously monitors the system for malware in real-time. Files are scanned as they are accessed, executed, or modified, providing immediate detection and blocking of threats.[28]

- **Description of Virus elimination**

Virus elimination refers to the process of detecting and removing malicious software, known as viruses, from a computer system.

[27] https://www.makeuseof.com/tag/antivirus-scan-types/

[28] https://docs.trendmicro.com/en-us/documentation/article/worry-free-business-security-services-67-server-help-scan-methods_001

- ✓ **The virus elimination process typically works:**
  - **Elimination by neutralization:** is defined as the elimination or reduction of the virus's ability to replicate, it does not imply a particular mechanism of interference with the process of replication
  - **Elimination by deleting:** is a straightforward method of removing viruses and malware from a computer system by permanently deleting the infected files or programs.
  - **Elimination by quarantine:** is a method used to isolate and contain viruses and malware, preventing them from causing further harm to a computer system[29]

[29] https://www.lifewire.com/clean-quarantine-or-delete-3972276

Activity 2: Guided Practice

Task 29:

Read the scenario below and answer the questions that follow

Our computer laboratory has 50 computers each installed with Kaspersky antivirus but recently the computers are functioning very slowly. We think it's because of viruses caused by flash disks being used by trainee Individually, open your computers and apply full scan after make sure you quarantine all viruses and malwares;

a. Write down the process you passed through during the scan process.
b. What measures would you put in place to prevent future infections and protect sensitive guest information stored on hotel's computers?

Activity 3: Application

Task 30:

Read the scenario below and answer the question given

You are one of the staff members at JX Hotel. Several staff members have reported that their computers are acting strangely, with frequent pop-ups and crashes. You suspect a virus may be affecting the hotel's network. How would you proceed with scanning and removing the virus?

Topic 3.3: Backing up and restoring of computer data.

Activity 1: Problem Solving

Task 31:

Read the following scenario and answer the questions that follow

Jack have been working on a school project for weeks, storing all files on his computer. One day, he accidentally spill water on his laptop, and it stopped working. When he took it to the repair shop, they inform him that they might not be able to recover any data.

a. Is there any way in which Jack can retrieve his data?
b. What steps would he take to prevent this from happening again in the future?

Key Facts 3.2: Backing up and restoring of computer data.

- **Description of backup**
  - ✓ **Definition of back up**

    Backup refers to the process of making copies of data or data files to use in the event the original data or data files are lost or destroyed. This ensures you have a copy of your valuable information in case the original becomes inaccessible or damaged due to various reasons.[30]
  - ✓ **Why Back Up Your Computer?**

    Data loss can be devastating, leading to lost work documents, cherished photos, irreplaceable financial records, and more.
  - ✓ **Backups protect your information from:**
    - Hardware Failure: Hard drive crashes, solid-state drive malfunctions, or other hardware issues can render your data inaccessible.

[30] https://en.wikipedia.org/wiki/Backup

- Software Issues: System crashes, accidental deletions, or malware attacks can corrupt or erase your data.
- Theft or Loss: If your computer is stolen or lost, a backup ensures you don't lose all your data.
- Natural Disasters: Fire, floods, or other natural disasters can damage your computer and the data stored on it.

✓ **While copying files can be a starting point, a robust backup strategy involves a few key stages:**

- **Backup:** Creating a copy of your data using various methods like full backups (copying everything), incremental backups (copying only changed files since the last backup), or differential backups (a balance between the two).
- **Restore:** The process of retrieving your data from the backup copy and placing it back onto your original device or a new one. This allows you to access your information again after a data loss event.
- **Recover:** Sometimes, data might be corrupted or damaged on the original device but still recoverable through specialized software or data recovery services. Recovery attempts may not always be successful, highlighting the importance of having a clean backup.
- **Repair:** In some cases, hardware failures might be repairable, potentially allowing you to access the original data storage device. However, even if the hardware is repaired, having a backup ensures your data is safe regardless of the device's condition.[31]

✓ **Description of backup types**

computer backups are essential for safeguarding your valuable data from various threats. But with different backup types available, choosing the right approach can be confusing.

Here are several types of backups namely.

[31] https://www.computerhope.com/jargon/b/backup.htm

- **A Full Backup** is a complete copy of all the data and files on a system or within a specific set of directories.
- **An Incremental Backup** is a backup only copies data that has changed since the last backup, whether it was a full back up or another incremental backup

- **A Differential Backup** copies all data that has changed since the last full backup.
- **Mirror Backup**: is an exact copy of the source data, reflecting any changes made to the original files.
- **Daily Backup:** all selected files and folders that have changed during the day are backed up based on the files modify date.
- **Copy backup:** is a type of backup that involves making an exact duplicate of selected files or data without altering the archive bit of the files. The archive bit is a file attribute used by many backup systems to determine whether a file has been modified since the last backup. Since copy backups do not change this bit, they can be used without interfering with other regular backup routines, such as full, incremental, or differential backups.

✓ **Selection of common backup devices.**

- **Tape drive**: Virtually unlimited backup capacities available, easy to store and transport media, tape backups are usually fully automatic requiring no user intervention aside from changing tape cartridges.
- **Optical Discs:** is a rewritable disk that makes use of both magnetic disk and optical technologies. It is like a magnetic diskette except for its larger size. Magneto-optical disks are seldom

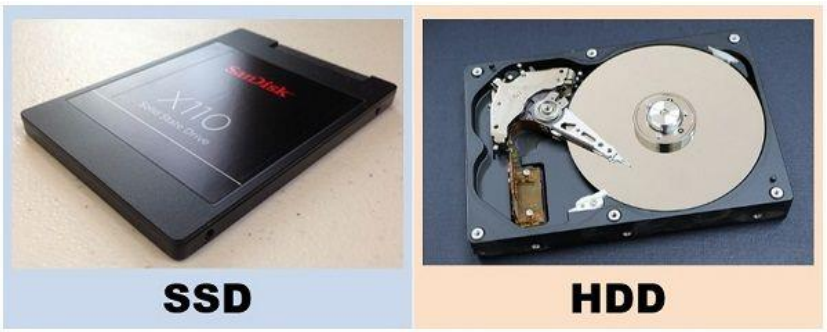
manufactured and used due to the advent of flash drives and DVD/CD drives, which are

less expensive and have better writing time

and reliability.[32]

- **USB flash drivers:** Small, portable storage devices that plug into a USB port.[33]
- **SD card:** are compact, portable storage devices commonly used in digital cameras, smartphones, tablets, and other electronic devices to store data like photos, videos, and documents. They come in various capacities and speed classes to accommodate different storage needs and performance requirements.
- **HDD/SSD/Hard Disk Drive/ Solid State Drive:** are data storage devices. SSDs store data in flash memory, while HDDs store data in magnetic disks. SSDs are a newer technology that uses silicon's physical and chemical properties to offer

more storage volume, speed, and efficiency.



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✓ **Selection of common restore devices**

- HDD/SSD: Portable storage devices that connect to computers via USB, eSATA, or Thunderbolt.

[32] https://www.javatpoint.com/what-is-an-optical-disc
[33] https://www.techtarget.com/searchstorage/definition/USB-drive
[34] https://me.pcmag.com/en/storage-devices/1009/ssd-vs-hdd-whats-the-difference

- USB flash Drivers: Compact and portable storage devices that connect via USB
- Tape drive: Magnetic tape systems used for backing up large amounts of data, primarily in enterprise environments
- SD Card and Optical drives: are compact, portable storage devices widely used in digital cameras, smartphones, tablets, and other electronic devices for storing data such as photos, videos, and documents.[35]

[35] https://www.minitool.com/backup-tips/computer-backup-devices.html

Activity 2: Guided Practice

Task 32:

Read the scenario below and answer the questions that follow

You work as a front desk agent in a hotel. During check-in, the computer system storing guest reservations suddenly crashes, leaving you unable to access vital booking information. Guests are waiting impatiently, and you risk overbooking rooms or making errors without this data.

a. How would you apply your understanding of backing up and restoring computer data to swiftly resolve this issue?
b. What strategies would you implement to ensure the smooth functioning of the front office system and minimize disruptions to guest service?

Activity 3: Application

Task 33

Read the scenario below and perform the task given

As an employee in reputable company, imagine encountering a situation where important documents, guest records, or operational data are accidentally deleted or corrupted on the computer systems used in your department. Your task is to apply your knowledge of backing up and restoring computer data to resolve the issue effectively. Utilize available backup software and external storage devices to create backups of critical files and restore them to their original state.

Formative Assessment

1. What is the purpose of installing antivirus software on a computer system?
    a. To increase internet speed
    b. To protect against malware and viruses
    c. To organize files and folders
    d. To enhance gaming performance
2. Which of the following is NOT a common method for protecting a computer system from unauthorized access?
    a. Installing a firewall
    b. Using strong, unique passwords
    c. Disabling automatic updates
    d. Enabling two-factor authentication
3. What is the primary function of a backup system for computer data?
    a. To delete unnecessary files
    b. To encrypt sensitive data
    c. To recover lost or corrupted files
    d. To improve computer performance
4. Which of the following is a recommended practice for preventing malware infections?
    a. Clicking on suspicious email attachments
    b. Downloading software from unknown sources
    c. Keeping operating systems and software up to date
    d. Disabling antivirus software
5. Antivirus software can detect and remove most known viruses, but new viruses may emerge before detection.
    a. True
    b. False

6. Which of the following is NOT a potential consequence of failing to protect a computer system?
    a. Data loss or theft
    b. Slower internet speed
    c. Identity theft
    d. System crashes or errors
7. Backing up data involves creating copies of files and storing them in a separate location.
    a. True
    b. False
8. What is the purpose of a firewall in computer security?
    a. To protect against physical damage
    b. To prevent unauthorized access to a network
    c. To increase internet speed
    d. To organize files and folders
9. What is the best practice for creating secure passwords?
    a. Using simple, easy-to-remember passwords
    b. Using the same password for multiple accounts
    c. Using a combination of letters, numbers, and symbols
    d. Sharing passwords with friends or family members
10. Which of the following is an example of phishing?
    a. Installing antivirus software
    b. Clicking on a suspicious link in an email
    c. Updating operating system software
    d. Creating a strong password
11. Uninstalling software utilities completely removes all associated files and registry entries from your system.
    a. True
    b. False

12. It is important to verify your backups regularly to ensure they are accessible and not corrupted.
    a. True
    b. False
13. Viruses can spread through email attachments, malicious websites, and infected USB drives.
    a. True
    b. False
14. It is safe to disable your antivirus software once your computer is virus-free.
    a. True
    b. False
15. Software utilities are programs designed to enhance the performance or functionality of a computer system.
    a. True
    b. False
16. Quarantining a virus-infected file means deleting it from your computer
    a. True
    b. False
17. What precautions do you take before installing software packages on your device?
18. How often do you perform virus scans on your computer, and what prompts you to do so?
19. Explain computer virus scanning process?
20. Match the contents in columns A to B in the table below correctly and write your responses in column Answer

Answer	A	B
	1. Antivirus Software	a. Process of removing software from a computer system, including associated files and registry entries.

Answer	A	B
	2. Quarantine	b. Program designed to detect, prevent, and remove viruses and malware from computers.
	3. Malware	c. Isolating infected files to prevent them from causing harm to the system
	4. Scheduled Scan	d. Software tool that removes unnecessary files and optimizes storage space on a computer's hard drive
	5. Uninstall	e. Automatic scanning of the system at predefined times to detect and eliminate viruses.
	6. Disk Cleanup Utility	f. Generic term for malicious software designed to harm or exploit a computer system.

Points to Remember

- Secure your PC by installing antivirus software and keep it updated.
- Keep operating systems and software up to date.
- Use strong, unique passwords for accounts.
- Regularly back up important data to prevent loss.

Self-Reflection

1. Re-take the self-assessment they did at the beginning of the unit.
2. Read the statements across the top. Put a check in a column that best represents your level of knowledge, skills and attitudes.

My experience Knowledge, skills and attitudes	I do not have any experience doing this.	I know a little about this.	I have some experience doing this.	I have a lot of experience with this.	I am confident in my ability to do this.
Describe software tools /utilities					
Describe the computer system scan process					
Describe backup types					
Install software utilities					
Scan and eliminate viruses					
Backup computer data					
Be able to safely backup data					
Be able to scan a computer system and eliminate viruses					

3. Fill in the table below and share results with the trainer for further guidance.

Areas of strength	Areas for improvement	Actions to be taken to improve
1. **2.** **3.**	**1.** **2.** **3.**	**1.** **2.** **3.**

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