

## **Purpose statement**

The use of ICT in several areas has grown appreciably in recent years. ICT products are now used by most people, ranging from mobile phones and digital TVs through to personal computers and the World Wide Web. This qualification focuses on providing skills, experience and confidence for those learners who struggle to make the most of technology to demonstrate creative thinking, problem solving and knowledge construction. It focuses on completing workplace tasks, such as creating documents with text, graphics and numerical information using commonly used tools such as: Microsoft Office – Excel, PowerPoint. Also the leaner will have the skills on how to protect the data in the computer systems.

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## Learning Unit 1 – Describe the operating system

## LO 1.1 – Describe components of operating system

Topic 1: Description of Graphical User Interface and Shell commands

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, the functions are carried out by clicking or moving buttons, icons and menus by means of a pointing device. The following figure shows a graphical User Interface on window 10 operating system.



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.





## Topic 2: Description of Kernel mode

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. Therefore, the communication between the software and the hardware is done via the 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**  $\mu$ **-kernel (microkernel).** 

**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  $\mu$ -kernels(microkernel) appeared at the end of the 1980's. The aim was to reduce the kernel. (See Figure2)





Figure 1: Monolithic kernel based operating system



Topic 3: Description of 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. To select a single file or directory, click on the icon of the file or directory. A blue highlight will appear round the name

## 1. To select a group of adjacent files or directories:

## Steps:

 $\checkmark$  Click on the icon of the first file in the list.

 $\checkmark$  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.



Name	Date modified	Туре	Size
CSTRCT3001-TVET CERTIFICATE III IN ROA	12-Jul-20 03:53 AM	PDF File	4,302 KB
CSTRCT4001-TVET CERTIFICATE IV IN RO	07-Jul-20 02:32 PM	PDF File	3,843 KB
CSTRCT5001-TVET CERTIFICATE V IN ROA	12-Jul-20 03:53 AM	PDF File	4,064 KB
CurrCode_CCMCS401	30-Jul-20 05:42 PM	Microsoft Word D	8,748 KB
E_Computer_Skills	12-Jul-20 04:13 AM	Microsoft Word D	8,159 KB
E-learning Notes Template 2020May29	07-Jul-20 08:59 AM	Microsoft Word D	8,159 KB
📴 File management	30-Jul-20 04:39 PM	PDF File	1,407 KB
📴 File system	13-Jul-20 02:24 PM	PDF File	3,089 KB
MFMWLD3001_WLDPF301v4	07-Jul-20 08:59 AM	PDF File	2,171 KB
📴 microkenel	13-Jul-20 10:54 AM	PDF File	141 KB
Microkernel_operating_system_architectur	13-Jul-20 02:21 PM	PDF File	215 KB
🚾 Monotolic kernel vs microkenel	13-Jul-20 11:04 AM	PDF File	222 KB
🚾 North_China_Electrical_Power_University	15-Jun-20 09:49 PM	PDF File	179 KB
POF os book	13-Jul-20 02:26 PM	PDF File	366 KB
📴 towards-ukernels	13-Jul-20 11:06 AM	PDF File	140 KB
📴 unit7 GUI	12-Jul-20 05:27 AM	PDF File	580 KB
De User interface	12-Jul-20 09:56 AM	PDF File	27 KB

## 2. Select a group of non-adjacent files or directories

## Steps:

 $\checkmark$  Click on the icon of the first file in the list.

 $\checkmark$  Hold down the Ctrl key and click on the icons of each of the files you wish to

select.			
Name	Date modified	Туре	Size
📴 CSTRCT3001-TVET CERTIFICATE III IN ROA	12-Jul-20 03:53 AM	PDF File	4,302 KB
CSTRCT4001-TVET CERTIFICATE IV IN RO	07-Jul-20 02:32 PM	PDF File	3,843 KB
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📴 towards-ukernels	13-Jul-20 11:06 AM	PDF File	140 KB
📴 unit7 GUI	12-Jul-20 05:27 AM	PDF File	580 KB
📴 User interface	12-Jul-20 09:56 AM	PDF File	27 KB
win 10 GUI	12-Jul-20 05:34 AM	JPG File	57 KB

## 3. Duplicate files/folders



## Steps:

 $\checkmark$  Select the files or directories you wish to duplicate. These can include both directories and files.

 $\checkmark$  Right click on file/folder then choose Copy.



 $\checkmark$  Navigate to the directory in which to wish to duplicate the files and directories.

 $\checkmark$  Right click on mouse then choose Paste.



4. Move files/folders

Steps:



 $\checkmark$  Select the files or directories you wish to move. These can include both

directories and files.

✓ Right click on file / folder then choose Cut.



 $\checkmark$  Navigate to the directory in which to wish to move the files and directories.

 $\checkmark$  Right click on mouse then choose Paste.



#### 5. Delete file/folder

Delete files, directories/folders to the recycle bin

#### Steps:

 $\checkmark$  Select (highlight) the files you wish to delete.



 $\checkmark$  Right click on File/folder then choose Delete or press the Delete key.

 $\checkmark$  Click yes when asked to confirm that you wish to move the files to recycle bin.

## 6. Downloading file/folder

## Steps:

On your computer, open browser (eg. 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) window.

## LO 1.2 – Describe the characteristics of operating system

Topic 1: Description of Multi-user, multi-tasking, multi-processing and multi-threading

**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.

## LO 1.3 – Describe the types of operating system

Topic 1: Description of types of operating system

**Single-user, single task**: As the name implies, this operating system is designed to manage the computer so that one user can effectively do one thing at a time. The following are good examples of a modern single-user, single-task operating system.

Android, Blackberry, iOS (iPhone OS), Windows 8 phone

**Multi-user, multi-task**: is an operating system that permits several users to utilize the programs that are concurrently running on a single network server. The single network server is termed as "Terminal server". "Terminal client" is a software that supports user sessions. Examples includes Unix, Linux, Windows 2000 and VM - 386.

**Single user, multi-tasking**: is an operating system that allows a single user to perform more than one task at a time. Examples include Windows xp, Windows vista, Windows 7, Windows 8, Windows 10, Mac OS.



**The real time operating system:** 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 etc.

There are mainly two types of real time operating system. Hard real time operating system and soft real time operating system.

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

## LO 1.4 – Describe the functions of operating system

## Topic 1: Description of memory management, processor management, security management and device management.

An operating System acts as a communication bridge (interface) between the user and computer hardware. The purpose of an operating system is to provide a platform on which a user can execute programs in a convenient and efficient manner.

An operating system is a piece of software that manages the allocation of computer hardware. The coordination of the hardware must be appropriate to ensure the correct working of the computer system and to prevent user programs from interfering with the proper working of the system. The following are basic functions of operating system.

#### Memory Management

It manages the allocation of memory of system for different processes. It manages both the primary memory and secondary memory.

#### **Processor Management**

It manages all the running processes in computer system. A process is simply a program that is run by a user on computer system.

#### **Security Management**

It ensures the security of computer system from the various threats and viruses attacks. An operating system uses various techniques such as authentication, authorization, cryptography etc. for ensuring security of compute system.

#### **Device Management**

This function of operating system is used to manage different devices that are connected with the computer system. An operating system interact with hardware device through specified device drivers.

#### File Management

An operating system manages the files and directories of computer system. A file can be defined as a collection of information or data that is store in the memory of computer system. An operating system allow us to create, delete, save, edit files in a computer system.

## Job scheduling

Job scheduling is a work of operating system. It is the process of allocating system resources to many different tasks by an operating system (OS). The system handles prioritized job queues that are awaiting CPU time and it should determine which job to be taken from which queue and the amount of time to be allocated for the job.

## LO 1.5 – Describe the operating system file system

## Topic 1: Explanation of role and type of file system

## File system role

In computing, a file system or 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.

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."

## File system type:

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.

The following are the different types of file systems.

## 1. 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.

## 2. 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.

## 3. 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.

## 4. 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.

## 5. NTFS File System

NTFS stands for "New Technology File System". Windows 2000 professional fully supports NTFS. It has the following characteristics.

## 6. Apple File System

Apple File System replaces HFS Plus as the default file system for iOS 10.3 and later, and for macOS High Sierra and later. Apple File System offers improved file system fundamentals as well as several new features, including cloning, snapshots, space sharing, fast directory sizing, atomic safe-save, and sparse files.

## 7. Hierarchical File System (HFS and HFS+)

Hierarchical File System (HFS) is a proprietary file system developed by Apple Inc. for use in computer systems running Mac OS. Originally designed for use on floppy and hard disks, it can also be found on read-only media such as CD-ROMs. HFS is also referred to as Mac OS Standard (or "HFS Standard"), while its successor, HFS Plus, is also called Mac OS Extended (or "HFS Extended").

HFS Plus or HFS+ is a journaling file system developed by Apple Inc. It replaced the Hierarchical File System (HFS) as the primary file system of Apple computers with the 1998 release of Mac OS 8.1. HFS+ continued as the primary Mac OS X file system until it was itself replaced with the release of the Apple File System (APFS) with macOS High Sierra in 2017. HFS+ is also one of the formats used by the iPod digital music player.

## 8. VERITAS File System

The VERITAS File System (or VxFS; called JFS and OnlineJFS in HP-UX) is an extent-based file system. It was originally developed by VERITAS Software. Through an OEM agreement, VxFS is used as the primary file system of the HP-UX operating system. With online defragmentation and resize support turned on via license, it is known as OnlineJFS. It is also supported on AIX, Linux, Solaris, OpenSolaris, SINIX/Reliant UNIX, UnixWare and SCO OpenServer. VxFS was originally developed for AT&T's Unix System Laboratories. VxFS is packaged as a part of the Veritas Storage Foundation (which also includes Veritas Volume Manager).



## Learning Unit 2: Customize computer features

# Learning Outcome 2.1: Identify the customer requirement for an operating system

## Topic 1: Consideration when choosing operating system

When selecting an operating system for a computer, the following factors may be considered:

- 1. The hardware configuration of a computer e.g. memory capacity, processor speed and hard disk capacity.
- 2. The type of computer in terms of size and brand. For example, some earlier Apple computers would not run on Microsoft Operating systems
- 3. The application software intended for the computer
- 4. User friendliness of the operating system
- 5. The documentation available
- 6. The cost of the operating system
- 7. Reliability and security provided by the operating system
- 8. The number of processors and hardware it can support
- 9. The number of users it can support

There are many operating systems to choose from, each with features that should be considered when consulting with a customer. When selecting an operating system for a customer, you should select hardware that meets or exceeds the minimum requirements for equipment called for by the operating system.

## 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

# Learning Outcome 2.2: Identify minimum hardware requirements for operating system to be used

#### Topic 1: Identification of Possible hardware upgrades

Operating systems have minimum requirements for hardware. These are the basic requirements for installing Windows 10 on a PC.



Processor:	1 gigahertz (GHz) or faster processor or System on a Chip (SoC)
RAM:	1 gigabyte (GB) for 32-bit or 2 GB for 64-bit
Hard drive space:	16 GB for 32-bit OS 32 GB for 64-bit OS
Graphics card:	DirectX 9 or later with WDDM 1.0 driver
Display:	800x600

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. The following are common hardware upgrades:

- 1. RAM capacity
- 2. Hard drive size
- 3. CPU
- 4. Video card memory and speed
- 5. Motherboard

## Learning Outcome 2.3: Customize the operating system

#### Topic 1: 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 user name, password, password hint or choose security questions, and then select Next.

ſ	~	Se	Microsoft account	×	= ×
A REPORT OF	Gî Fii Acc	Hon nd a	Create an account for this PC If you want to use a password, choose something that will be easy for you to remember but hard for others to guess.		sites,
	RE	You	Who's going to use this PC? User name		
		Ema	Enter your user name.		
	Q	Sigr	Make it secure.		
	۲	Acc	Enter password		
	٩,	Fam	Re-enter password		th their
	С	Sync			
			Next Back		
			Llava a question?	_	1

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.

#### Topic 2: Managing windows services

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:

- 4 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.
- 4 Using the "Choose a fit" drop-down menu, select the fit that best suits the images:





## Setting up a desktop slideshow

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

- 4 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.





## Set custom image on Lock screen

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:

- 4 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.

(Optional) Turn off the Get fun facts, tips, tricks, and more on your lock screen option.

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

Topic 3: Partitioning hard drive in windows 10

Windows 10 Disk Management tool and third-party free partition software like AOMEI Partition Assistant Standard will help you partition hard drive easily and safely.

Method 1: Partition Hard Drive in Windows 10 with Disk Management Tool

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.

**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".



Programs and Features	
Power Options	
Event Viewer	
System	
Device Manager	
Network Connections	
Disk Management	
Computer Management	
Command Prompt	
Command Prompt (Admin)	
Task Manager	
Control Panel	
File Explorer	
Search	
Run	
Shut down or sign out	
Desktop	

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

B Disk Manager File Action \ ← → I III III	ment /iew Help ] 🎫 🔯 🗙 📽 🚘	; 💩 😼						
Volume (C:) (D:) (D:)	Layout Ty Simple Ba Simple Ba Simple Ba Simple Ba	pe File Syste sic NTFS sic sic NTFS sic	m Status Healthy (Boot, Page File, Healthy (EFI System Parti Healthy (Primary Partition) Healthy (Recovery Partiti	Capacity 56.02 GB 99 MB 409.18 GB 450 MB	Free Spa 41.89 GB 99 MB 409.07 GB 450 MB	% Free 75 % 100 % 100 % 100 %		
Disk 0 Basic 465.74 GB Online	450 MB Healthy (Recovery Pa	99 MB Healthy (EFI Sy:	<b>(C:)</b> 56.02 GB NTFS Healthy (Boot, Page File, Crash De	ump, Pi	Open Explore	////////		////
CD-ROM 0 DVD (X:)		<u>.</u>	17 		Mark Partition Change Drive Format	as Active Letter and Pa	ths	
	Primary partition				Extend Volume Shrink Volume Add Mirror Delete Volume Properties	e 		
	Primary partition				Help			

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



Shrink D:	×
Total size before shrink in MB:	419003
Size of available shrink space in MB:	375809
Enter the amount of space to shrink in MB:	175809
Total size after shrink in MB:	243194
You cannot shrink a volume beyond the point v See the "defrag" event in the Application log for operation when it has completed.	where any unmovable files are located. or detailed information about the
See "Shrink a basic volume" in Disk Managem	ent help for more information

**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.

Volume	Lavout	Tune	File System	Statur		Canacity	Free Sna	% Free	<u> </u>
⇒ (C;)	Simple	Basic	NTFS	Healthy (Boot	Page File,	56.02 GB	41.89 GB	75 %	14
	Simple	Basic		Healthy (EFI Sy	stem Parti	99 MB	99 MB	100 %	
🗈 (D:)	Simple	Basic	NTFS	Healthy (Prima	ry Partition)	237.50 GB	237.38 G	B 100 %	
	Simple	Basic		Healthy (Recov	ery Partiti	450 MB	450 MB	100 %	
Basic									11111
Basic 465.74 GB Online	450 MB Healthy (Recov	99 MB Healthy (El	56.02 GB NTF Healthy (Boot	S t, Page File, Cras	237.50 GB N Healthy (Pr	ITFS imary Partition)	17 Un	1.69 GB allocated	
Basic 465.74 GB Online	450 MB Healthy (Recov	99 MB Healthy (El	56.02 GB NTF Healthy (Boot	S t, Page File, Cras	237.50 GB N Healthy (Pr	ITFS imary Partition)	17 Un	1.69 GB allocated New Simple Volu	ume
Basic 465.74 GB Online	450 MB Healthy (Recov	99 MB Healthy (El	56.02 GB NTF Healthy (Boot	S t, Page File, Cras	237.50 GB N Healthy (Pr	ITFS imary Partition)	17 <sup>-</sup> Un	1.69 GB allocated New Simple Volu New Spanned V	ume olume
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**Notes:** The unallocated space created by shrinking a partition can be only used to create new partitions. You cannot use it to extend volume. That's why you may find "Disk Management extend volume greyed out".

**Method 2:** Partition Hard Drive in Windows 10 with AOMEI Partition Assistant (Recommended)

AOMEI Partition Assistant Standard is a free, complete and easy-to-use partition manager and disk utility to optimize disk space usage, change disk partition type and perform other tasks based on disk partitions. It offers two ways to create a partition. One is to create partition

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with unallocated space; the other is to create partition without unallocated space. You can choose the way that is suitable for you.

**Step1:** Download, install and launch AOMEI Partition Assistant. Select the hard drive in your Windows 10 system that you want to partition (here is Disk 1). Right click on a drive (here is D: partition) and then choose "Resize Partition" (If there is an unallocated disk space on hard drive, you can start from Step3).

🧠 AC	OMEI Partition Assistan	t Standard E	dition - Safely Partil	tion Your Hard I	Drive				೦ ≡ _		×
~					\$	<u>R</u> esize Partition $\square$	)	6	Û	2	
Apply	/ Discard Und	o Redo	Migrate OS	Wipe Disk		Mo <u>v</u> e Partition	tition	Free Backup	Sys Upgrade	Regist	ter
Wiza	ırds	^	Partition	File Syste		Merge Partitions	ed Space	Free Space	Flag	Status	^
-	Migrate OS to SSD		D:	NTFS		Split Partition	73.53MB	348.41GB	GPT	None	
	Partition Recovery Wizard		*	Unallocat		Allocate Free Space	0.00KB	118.70GB	GPT	None	
1000			E:	NTES		Conv Dantition	20.78MB	256.93GB	GPT	None	
	Make Bootable Media		*	Unallocat		Copy Par duori	0.00KB	133.57GB	GPT	None	
	All Tools	•	ni-li a		<b>5</b> 5	Create Partition					
			E DISK Z		亩	Delete Partition					
Part	ition Operations		H:	FAT32	6	Eormat Partition	50.03MB	199.95GB	Primary	None	~
<b>459</b>	Resize/Move Partition					Change Label					
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	Create Partition		931.32GB	45 99	9	Partition Backup	INIES	118.70	257.05GB N	133	
1	Delete Partition					<u>A</u> dvanced					
	Delete Partition		💻 Disk 2		(i)	Properties					
<b>*</b>	Format Partition		Basic MBR	H: 200.00CB EAT	22		-				
•	Change Label		200.00GB	200.0000 TAT.	12						
*	Wipe Partition										
٢	Partition Backup										
ø	Change Drive Letter										
Ð	Convert to NTFS										
¥	Hide Partition	~									

**Step2:** Drag the slider bar leftwards to decide the size of unallocated space, and then click "OK".



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					Þ			$ $ $\oplus$	6		22	2+
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Wiza	ards	Move ar	nd Resize P	artition						? ×	Status	1
-	Migrate	-				ation of the partiti					None	2
	-										None	2
920	Partition	Sizi	e and Positio	n							None	2
<b>.</b>	Make Bo		c ana r osido								None	2
	All Tools								· ·			
1001000		ľΨ	H: 158.38GB F/	AT32				( <del>.</del>				
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6	Convert	t to NTES										
*	Hide Par	rtition		~								

**Step3:** After Step2, you will see there is an unallocated space behind D partition. Then, right click on the unallocated space and choose "Create Partition".

🏟 AOMEI Partition Assistant Standard	Edition - Safely Parti	tion Your Hard Drives			೦ ≡	_ 🗆 ×
$\checkmark \otimes \frown$			$\bigcirc$   $\bigcirc$	Resi	ize Partition	2+
Apply Discard Undo Red	do Migrate OS	Wipe Disk Allocat	e Space Safely Partiti	o Mo <u>v</u>	e Partition	ean Register
Wizards	Partition	File System	Capacity Used S	🕯 🖬 Men	ge Partitions	Status ^
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Partition Decovery Wizard	E:	NTES	257.05GB 120.	Allo	cate Free Space	None
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Partition Operations	*	Linallocated	105 92GB 0	Forr	nat Partition	None
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<ol> <li>Properties</li> </ol>	931.32GB	45 99 16	72.1 349.26GB N		Itton Backup	133
	_				anceu /	
	Disk 2	H:	I [	*:		
	200.00GB	94.08GB FAT32		105.92GB Un	allocated	

**Step4:** You can drag the slider bar to decide the size, change drive letter and file system. Besides, you also can click "Advanced>>" to set other property. Click "OK" to continue.

#### Page **24** of **44**

🧐 A	OMEI Partitio	on Assista	ant Star	ndard Editi	on - Safely Part	iition Your Hard D	rives			ಧಿ ≡ _	. 🗆	×
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Appl	y Discar	d U	ndo	Redo	Migrate OS	Wipe Disk	Allocate Space	Safely Partitio	on Free Backup	System Clean	Regis	ter
Wiz	ards		_	Р	artition	File Syster	n C	apacity Used S	Space Free Space	Flag	Status	^
5	Migrate OS to	Create F	Partition							0 ×	None	
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<b>*</b>	Make Bootab			-			-					
**	All Tools	Pa	artition siz	ze: 105.920	GB	Drive Lett	er: F: 🔻		File System: EX			
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	Create Partit								exF	AT	None	~
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**Step5:** You will preview there is a new drive (F: partition) on the hard drive. If you want to perform the operation, please click "Apply".

🧌 A0	MEI Partition Assistant Stand	lard Editi	on - Safely Partit	ion Your	Hard D	rives					೦ ≡ _	. 🗆	×
 Apply	Discard Undo		Migrate OS	Wipe	) Disk			( Safely	) Partition	Free Backup	System Clean	Regis	+ ter
Wizaı	rds	F	Partition	F	ile Syster	n	Сара	city	Used Space	Free Space	Flag	Status	^
	Migrate OS to SSD		8	L	inallocate	d	118.7	'OGB	0.00KB	118.70GE	GPT	None	
	Partition Recovery Wizard	1	3	N	ITFS		257.0	5GB	120.78MB	256.93GE	GPT	None	
<b>.</b>	Make Bootable Media		•	L	Inallocate	d	133.5	7GB	0.00KB	133.57GE	GPT	None	II.
	All Tools	•	Disk 2										
Deutit	ti 0ti		4:	F	AT32		94.0	8GB	23.69MB	94.05GE	Primary	None	
Parti			۴ <u>:</u>	E	xt3		105.9	2GB	0.00KB	105.92GE	Primary	None	~
	Copy Paration		-			_				_		_	
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	nue Paruuon												
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	Change Partuuon Type 10												
	Proper ues												
Pendi	ing Operations												
1.Crea	ate (*:) on disk 2												

Topic 4: Working with Task Scheduler and event viewer

#### 1. Task Scheduler

To create a task using basic settings on Windows 10, use these steps:

- \rm Open Start.
- **4** Search for Task Scheduler, and click the top result to open the experience.
- Right-click the "Task Scheduler Library" branch, and select the New Folder option.



File Action View Help						
🗧 🔿 🖄 📅 🖬 🛅						
Task Scheduler (Local)	Name	Status	Triggers	Actions		
<ul> <li>Task Scheduler Library</li> <li>Microsoft</li> <li>MyTasks</li> </ul>	Create Basic Task Create Task Import Task Display All Running Task Enable All Tasks History	5	Multiple triggers defined At 2:27 PM every day - After triggered, repeat every 1 hour for a duration of 1 At 8:48 AM every day At 8:48 AM every day - After triggered, repeat every 1 hour for a duration of 1 At 4:00 AM on 5/1/1992 - After triggered, repeat every 1.00:00:00 indefinitely. At 1:51 PM every day - Trigger expires at 1/29/2029 1:51:30 PM.	Task Scheduler Library         Import Basic Task         Create Task         Import Task         Import Task         Import Task		
	New Folder	3		Enable All Tasks History		
	View	>		New Folder		
	Help		ons Conditions Settings History (disabled)	Refresh		
	Name:	Google	UpdateTaskMachineCore	Help		
	Location:	1		Selected item		
	Author: Description: Kee Goo aris is nu		your Google software up to date. If this task is disabled or stopped, your e software will not be kept up to date, meaning security vulnerabilities that ma anot be fixed and features may not work. This task uninstalls itself when ther loogle software using it.	<ul> <li>Run</li> <li>End</li> <li>Disable</li> <li>Export</li> <li>Properties</li> </ul>		
	Security op When run	tions iing the	task, use the following user account:	X Delete Help		
	SYSTEM Run on	y when u	iser is logged on			
	Run wh	ether use	er is logged on or not			

- ➡ Type a name for the folder. For example, MyTasks. (This step isn't a requirement, but it's a recommended step to keep your tasks separate from the system and apps tasks.)
- Click the OK button.
- **4** Expand the "Task Scheduler Library" branch, and select the MyTasks folder.
- 4 Click the Action menu.
- **4** Select the Create Basic Task option.

🕑 Tasl	: Scheduler				x c	
File A	ction View Help	4.5				
÷ -	Create Basic Task					
④ Ta ▼ 20 >	Create Task Import Task Display All Running Tasks	ame GoogleUp GoogleUp	Status       Triggers         p       Ready       Multiple triggers defined         p       Ready       At 2:27 PM every day - After triggered, repeat every 1 hour for a duration of 1         p       Ready       At 3:48 AM every day - After triggered, repeat every 1 hour for a duration of 1         p       Ready       At 8:48 AM every day - After triggered, repeat every 1 hour for a duration of 1         s       Ready       At 4:00 AM on 5/1/1992 - After triggered, repeat every 1.00:00:00 indefinitely.         d       Ready       At 1:51 PM every day - Trigger expires at 1/29/2029 1:51:30 PM.	Actions Task Scheduler Library Create Basic Task		
	New Folder	GoogleUp GoogleUp		Create Task		
-	Refresh Help	ConeDrive S. User_Feed Ceneral Trigg Name:		Display All Running Tasks     Enable All Tasks History     New Folder		
			ers Actions Conditions Settings History (disabled) GoogleUpdateTaskMachineCore	View Refresh Help	,	
		Location: Author:	\ \	Selected item		
		Description: Security op When runn	Keeps your Google software up to date. If this task is disabled or stopped, your Google software will not be kept up to date, meaning security vulnerabilities that ma arise cannot be fixed and features may not work. This task uninstalls itself when ther is no Google software using it.	<ul> <li>End</li> <li>Disable</li> <li>Export</li> <li>Properties</li> </ul>		
			ing the task, use the following user account:	X Delete		
		Run only     Run whe	when user is logged on ther user is logged on or not v			
			,			

In the "Name" field, type a short descriptive name for the task. For example, Notepad Launcher.



Create Basic Task Wizard		×					
🔟 Create a Basi	c Task						
Create a Basic Task Trigger Monthly Action	Use this wiza or settings su command in Name:	ard to quickly schedule a common task. For more advanced options uch as multiple task actions or triggers, use the Create Task the Actions pane. Notepad Launcher					
Start a Program Finish	<u>D</u> escription:	This task launches Notepad every last Wednesday of the month at 9am.					
		< <u>B</u> ack <u>N</u> ext > Cancel					

- **4** (Optional) In the "Description" field, create a description for the task.
- Click the Next button.
- Select the Monthly option.
- Click the Next button.
- Using the "Start" settings, specify when the task should start running and the time (very important).
- Use the "Monthly" drop-down menu to the months of the year that you want to run the task.
- ↓ Use the "Days" or "On" drop-down menu to specify the days that the task will run.

## Quick Tip:

- Using the "On" setting may be your best option if you're planning to run a task during a specific day of the week.
- Click the Next button.
- Select the Start a program option to launch an app, run a command, or execute a script file.
- You can select the Send an e-mail or Display a message option, but these are deprecated features, which means that they may or may not work because Microsoft is no longer maintaining them.

**Send an e-mail**: Triggers an email notification with a custom message on schedule, but it requires to specify an email server to work.



Display a message: Allows to display a text message on the screen on schedule.

Create Basic Task Wizard				×
Start a Program				
Create a Basic Task				
Trigger	Program/script:			
Monthly	C:\Windows\System32\notepad.exe			B <u>r</u> owse
Action				
Start a Program	Add arguments (optional):			
Finish	S <u>t</u> art in (optional):			
		< Pack	Novt >	Cancal
		Dack	INEXL >	Cancel

In the "Program/script" field, specify the path for the application.

## Quick Tip:

- If you don't know the path of the app, click the Browse button to find it.
- (Optional) In the "Add arguments" field, you can specify arguments to run the task with special instructions.
- (Optional) In the "Start in" field, specify the folder in which the program will start. (Usually, you can leave this setting empty.)
- 4 Click the Finish button.



Create Basic Task Wizard					×	
5 Summary						
Create a Basic Task						
Trigger	Name:	Notepad Launcher				
Monthly	Description:	This task launches Notepad	every Monday	at 9am.		
Action						
Start a Program						
Finish						
	Trigger:	Monthly; Runs on the Last W	ednesday, each	h January, Febr	ruary, Mar	
	Action:	Start a program; C:\Windows\System32\notepad.exe				
				ritk		
	U Open the	Properties dialog for this tas	k when I click	Finisn		
	Windows sch	iedule.	e created and	added to you	1	
			< <u>B</u> ack	<u>F</u> inish	Cancel	

Once you've completed the steps, the task will be saved, and it'll run automatically on the schedule you specified.

## 2. Event Viewer

The Event Viewer is a tool in Windows that displays detailed information about significant events on your computer.

#### To access the Event Viewer in Windows 10

Right click on the Start button and select Control Panel > System & Security and doubleclick Administrative tools

Double-click Event Viewer





Select the type of logs that you wish to review (ex: Application, System)

Event Viewer			×
<u>F</u> ile <u>A</u> ction <u>V</u> iew <u>H</u> elp			
🗢 🔿 🙋 📰 🛛 🖬			
Event Viewer (Local)	System Number o	f events: 1,974	
<ul> <li>Gustom Views</li> <li>Windows Logs</li> </ul>	Level	Date and Time	^
🛃 Application	(i) Information	10/17/2017 4:05:05 PM	
Security	Error	10/17/2017 4:05:05 PM	
Setup	Information	10/17/2017 4:05:04 PM	
System	1 Information	10/17/2017 4:05:04 PM	~
Forwarded Events	<		>
Subscriptions	Event 16, Kernel-Ger	neral	×

**NOTE:** To access the Application Logs once in Event Viewer, go to Windows Logs > Application, for shutdown errors refer to Application and System logs.



## Learning Unit 3: Protect computer system

## Learning Outcome 3.1: Install software utilities

## Topic 1: Description of software tools utilities

**Anti-virus:** Antivirus software is a program or set of programs that are designed to prevent, search for, detect, and remove software viruses, and other malicious software like worms, Trojans, adware, and more.

**Anti-malware:** An anti-malware is a software that protects the computer from malware such as spyware, adware, and worms. It scans the system for all types of malicious software that manage to reach the computer. An anti-malware program is one of the best tools to keep the computer and personal information protected. An anti-malware is designed to eliminate malware from the computer. Although it has similarities with antivirus, an anti-malware program is different from antivirus. An anti-malware program has more advanced features and broader coverage. It addresses spyware, spam, and other threat issues that antivirus doesn't.

**Anti-spyware:** Similar to antivirus programs, anti-spyware programs help to block and prevent spyware and other malware infections on computers. Anti-spyware programs monitor incoming data from e-mail, websites, and downloads of files and stop spyware programs from getting a foothold in the computer operating system. They are also frequently updated by the developer, to keep it up-to-date and able to block the most recent spyware programs known to exist. Some anti-spyware programs are designed only to block spyware, while others prevent both viruses and spyware.

Adware: Adware, or advertising supported software, is software that displays unwanted advertisements on your computer. Adware programs will tend to serve you pop-up ads, can change your browser's homepage, add spyware and just bombard your device with advertisements. Adware is a more succinct name for potentially unwanted programs. It's not quite a virus and it may not be as obviously malicious as a lot of other problematic code floating around on the Internet. Make no mistake about it, though, that adware needs to come off of whatever machine it's on. Not only can adware be really bothersome every time you use your machine, it could also cause long-term issues for your device.

**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:** where you store your backup data. Backing up data can consume a lot of storage space so it is important to consider carefully how best to store it.



## Topic 2: Installing anti-viruses

## Steps:

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

## 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.

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.

## Example of antivirus installation (Avast)

Step 1: Click on set up where it is stored and follow the instruction

**Step 2:** choose the language then click on Next.



avast! P	ro Antivirus Setup	
	avast! Installation	
Javasti Pro Antivirus	English •	
	Next :	Cancel

Step3: Uncheck participation and check custom installation & click Next to continue

avast! P	ro Antivirus Setup
	avast! Installation
	Thank you for choosing avast!.
	This program will install avast! on your computer. The installation will take just a minute or two.
S	By clicking the Next button, you agree to the
<u>i</u>	User License Agreement
Anti	Installation options
문	Participate in the avast! community
asti	By enabling this option, you are giving your consent to anonymously forward certain security-related information to avast! (on an as-needed basis).
è	Privacy policy
শ্ব	Custom installation
	Next > Cancel

Step4: Click on Next





Step5: Choose Install in trial mode and click on Next

License		
Install in trial me	de	
Installs the proc	fuct together with a time-limited	I trial license.
Please note that trial license is d	It this option requires an Intern ownloaded from the Internet.	et connection as the
Supply a licens	e file	
If you have alle product with yo	ady purchased the product us ur license file.	e this option to install the
License file:		
Supply an activ	ration code	Bjowse
An alternative v	vau to activate your icense.	
An alternative v	way to activate your license.	
An alternative v	vay to activate your license. It 4.x license <u>k</u> ey	
An alternative v	vay to activate your license. It 4 x license jegy	
An alternative v	vay to activate your license. It 4.x license <u>k</u> ey	

Continue following the instructions of installation until gets finished.

## Learning Outcome 3.2: Scan and Eliminate virus

## Topic 1: Explanation of scan types

**Full System Scan** checks all boot records, files, and running processes to which the user has access. This scans your computer thoroughly and takes 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.

### Topic 2: Scan mode and elimination of Viruses

### 1. Scan mode:

A manual scan is one that you run on-demand on a drive, file/folder, or your entire computer

For example, these options will be used when you click 'Scan Now' on the home screen or 'Run A Scan' in the antivirus tasks menu.

**Scheduled Scan:** A Scheduled Scan is similar to Manual Scan but scans all files at the configured time and frequency.

**Real-time (automated) Scan**: Real-time Scan is a persistent and ongoing scan. Each time a file is received, opened, downloaded, copied, or modified, Real-time Scan scans the file for threats.

## 2. Virus elimination:

You can usually remove a computer virus by using an antivirus software program. After scanning your PC, you can remove threats that are on your computer by neutralization (to make virus ineffective), deleting (remove virus permanently) or quarantine (isolate virus).

## Learning Outcome 3.3: Backup of computer data based on OS

#### Topic 1: Description of backup type

A Full Backup is a complete backup of all files on the designated hard drive.

An Incremental Backup is a backup of all changed files since the last Full or Incremental backup. For example:

A Differential Backup is a backup of all changed files since the last Full Backup.

A backup copy is a duplicate instance of a data file, application, system or server that's created using backup software. It's used as a means to restore original data in case it's deleted, corrupted or lost.

**Daily Backup** All selected files and folders that have changed during the day are backed up based on the files modify date.

#### Topic 2: Identifying 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.



**Digital audio tape(DAT) drives:** is a signal recording and playback medium developed by Sony and introduced in 1987. In appearance it is similar to a Compact Cassette. The recording is digital rather than analog. DAT can record at sampling rates equal to, as well as higher and lower than a CD at 16 bits quantization.



A magneto-optical disk: is a rewritable disk that makes use of both magnetic disk and optical technologies. It is similar to 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.





**Removable disks:** A disk or disk cartridge that is inserted into the drive for reading and writing and removed when not required.



A disk drive: is a device that reads and/or writes data to a disk. The most common type of disk drive is a hard drive (or "hard disk drive"), but several other types of disk drives exist as well. Some examples include removable storage devices, floppy drives, and optical drives, which read optical media, such as CDs and DVDs.



## Learning Outcome 3.4: Restore computer data based on OS installed

Topic 1: Creation of backup with system image tool in windows 10

The tool allows you to save a backup in different locations, such as inside a network folder or secondary hard drive. However, it's recommended to use a removable storage, which you can easily disconnect and store in a safe place.

## To create a full backup of Windows 10 with the system image tool, use these steps:

- 4 Open Settings.
- Click on Update & Security.
- Click on Backup.
- Under the "Looking for an older backup" section, click the Go to Backup and Restore (Windows 7) option.





Source: Windows Central

4 On the left pane, click the Create a system image option.

-	Control Panel\System and Sec	curity/Backup and Restore (Windows 7)	×
4	🔿 🕤 🕆 😻 « System a	and Security > Backup and Restore (Windows 7) v 0 🖉 Search Control Panel	
	Control Panel Home	Back up or restore your files	0
0	Create a system image	Backup	
0	Create a system repair disc	Windows Backup has not been set up.	
		Restore	
		Windows could not find a backup for this computer.	
		Select another backup to restore files from	
	See also		
	Security and Maintenance		
	File History		

Source: Windows Central

- Under "Where do you want to save the backup?" select the On a hard disk option.
- Using the "On a hard disk" drop-down menu, select the storage location to save the full backup of Windows 10.



Create a system image
Where do you want to save the backup?
A system image is a copy of the drives required for Windows to run. It can also include additional drives. A system image can be used to restore your computer if your hard drive or computer ever stops working; however, you can't choose individual items to restore.
On a <u>hard disk</u>
👡 backup (F:) 59.90 GB free 🗸 🗸
On one or more <u>D</u> VDs
On a network location
<u>Select</u>

- Click the Next button.
- Select any additional drives that you may want to include in the backup (if applicable).

🟥 Create a system image Which drives do you want to include in the backup? The drives that are required for Windows to run will be included by default. You cannot include the drive that you are saving the backup to. Your backups are being saved on backup (F:). Drive Total size Used space data (E:) 10.00 GB 46.20 MB System Reserved (System) 579.00 MB 400.79 MB 🗹 🌉 Windows 10 (C:) (System) 44.43 GB 35.35 GB Space required to save a backup of the selected drives: 35.74 GB Space available on backup (F:): 59.90 GB Next Cancel

- Click the Next button.
- Click the Start backup button.

÷	Create a system image	×
	Confirm your backup settings	
	Backup location:	
	backup (F:)	
	The backup could take up to 36 GB of disk space.	
	The following drives will be backed up:	
	System Reserved (System)	
	Windows 10 (C:) (System)	
5	Start backup Cance	

🜲 Click the No button.

## Quick note:

After the process, you'll see an option to create a system repair disc, but because most devices no longer include an optical disk drive, you can skip the prompt. If you ever need to restore a backup, you can use a bootable USB flash drive to access the recovery environment.

Click the Close button.

Once you complete the steps, the tool will create a backup of your computer, including everything on the main hard drive as well as system reserved partition, and additional drives that you may have selected during the wizard.



The System Image Backup tool uses the "Shadow Copy" technology that allows backing up files while they're open, and apps are running, which means that you can continue to work during the process.

The last thing left to do is to disconnect the external drive with the backup and store it in a safe place.

**Notes:** The following are possible restore drives

- 1. HHD/SSD
- 2. USB/ Flash Driver
- 3. Tapes drives
- 4. Magnetic optical drives
- 5. CDs or DVDs
- 6. Disc drive



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