HNDIT1032 Computer and Network Systems

Week 10,11- Install OS & System Utilities

Introduction

- OS controls and coordinates the use of hardware among the different application software and the users.
- It provides an interface that is convenient for the user to use, and facilitates efficient operations of the computer system resources.

Operating System Installation

- The installation and initial booting of the OS is called the operating system setup.
- Although it is possible to install an OS over a network from a server or from a local hard drive, the most common installation method for a home or small business is with CDs or DVD.

Steps of OS Installation

- Hard Disk Partitioning
- Hard Disk Formatting
- Default Setting
- Date & Time Setting
- Network Setting
- Accounts Setting
- Reboot the System

Hard Drive Partitioning

- A hard drive is divided into specific areas called partitions.
- Each partition is a logical storage unit that can be formatted to store information, such as data files and applications.
- During the installation process, most operating systems automatically partition and format available hard drive space

Types of Partitions

- Primary partition - This primary partition containing the operating system files is usually the first partition.
- Active partition - Only one primary partition per disk can be marked active. In most cases, the C: drive is the active partition and contains the boot and system files.

Types of Partitions

Extended partition - The extended partition normally uses the remaining free space on a hard drive or takes the place of a primary partition

Hard Drive Formatting

- A clean installation of an OS proceeds as if the disk were brand new. No information that is currently on the hard drive is preserved.
- The first phase of the installation process partitions and formats the hard drive.
- This process prepares the disk to accept the new file system.

File System

Windows operating systems use one of these file systems:

New Technology File System (NTFS)

File Allocation Table, 32 bit (FAT32)

FAT vs NTFS

	FAT32	NTFS	exFAT (FAT64)
Security	Low security	File and Folder Level permissions Encryption	exFAT can support access control lists (ACLs) that define permissions for user access
Compatibility	Compatible with Windows	Compatible with Windows	Compatible with Windows XP with SP2 or SP3, Windows Vista with SP1, Windows 7, Windows Server 2003 with SP2, Windows Server 2008, and Linux
File Size	Limit of 4 GB files Limit of 32 GB volumes	Limit of 16 TB files Limit of 256 TB volumes	Limit of 64 zetabytes (ZBs) files Limit of 512 TB volumes
Files per Volume	4.17 million	4.29 billion	Maximum of 16 exabytes (EBs)

Data Volumes:

- The volume of data in a single file or file system can be described by a unit called a byte.
- However, data volumes can become very large when dealing with Earth satellite data.
- Below is a table to explain data volume units (credit Roy Williams, Center for Advanced Computing Research at the California Institute of Technology).

- Kilo- means 1,000; a Kilobyte is one thousand bytes.
- Mega- means 1,000,000; a Megabyte is a million bytes.
- Giga- means 1,000,000,000; a Gigabyte is a billion bytes.
- Tera- means 1,000,000,000,000; a Terabyte is a trillion bytes.
- Peta- means 1,000,000,000,000,000; a Petabyte is 1,000 Terabytes.
- Exa- means 1,000,000,000,000,000,000; an Exabyte is 1,000 Petabytes.
- Zetta- means 1,000,000,000,000,000,000,000; a Zettabyte is 1,000 Exabytes.
- Yotta- means 1,000,000,000,000,000,000,000,000; a Yottabyte is 1,000 Zettabytes.

Examples of Data Volumes

Unit	Value	Example
Kilobytes (KB)	1,000 bytes	a paragraph of a text document
Megabytes (MB)	1,000 Kilobytes	a small novel
Gigabytes (GB)	1,000 Megabytes	Beethoven's 5th Symphony
Terabytes (TB)	1,000 Gigabytes	all the X-rays in a large hospital
Petabytes (PB)	1,000 Terabytes	half the contents of all US academic research libraries
Exabytes (EB)	1,000 Petabytes	about one fifth of the words people have ever spoken
Zettabytes (ZB)	1,000 Exabytes	as much information as there are grains of sand on all the world's beaches
Yottabytes (YB)	1,000 Zettabytes	as much information as there are atoms in 7,000 human bodies

Quick vs Full Format

- The quick format removes files from the partition, but does not scan the disk for bad sectors. Scanning a disk for bad sectors can prevent data loss in the future.
- The full format removes files from the partition while scanning the disk for bad sectors. It is required for all new hard drives.

Installation with Default Setting

- Install now-Sets up and installs the Windows
- What to know before installing Windows - Opens a Help and Support window describing the Upgrade and Custom options for installing
- Repair your computer - Opens the System Recovery Options utility to repair an installation.

Install Options

- Language to install
- Standards and formats that define currency and numerals
- Keyboard or input method
- Physical location of the installation
- Username and computer name
- Password for the administrative account
- Product key
- Time and date settings
- Network setting

Network Setting

When configuring initial network settings during installation, you are prompted to select one of the following current locations

- Home network
- Work network
- Public network

Account Creation

- When users attempt to log in to a device or to access system resources, Windows uses the process of authentication to verify that the users are who they say they are.
- Authentication occurs when users enter a username and password to access a user account.

Types of Accounts

- A user with administrator privileges can make changes that impact all users of the computer, such as altering security settings or installing software for all users.
- Standard Accounts- has fewer permissions than an administrator account
- Guest Accounts-has limited permissions and must be turned on by an administrator

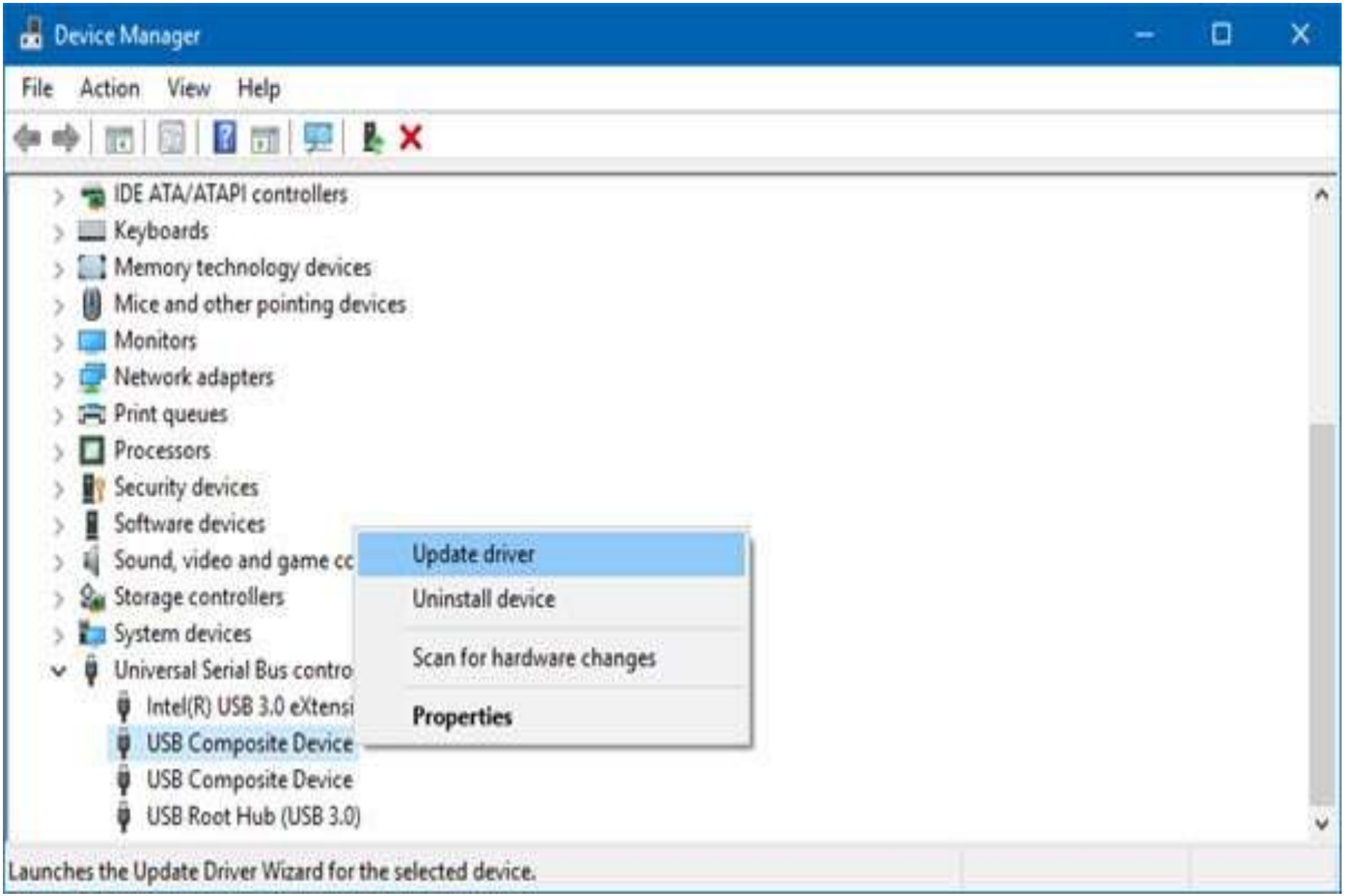
Complete the Installation

- After the Windows installation copies all the necessary OS files to the hard drive, the computer reboots and prompts you to create a user account.
- Microsoft Update Manager from the Start Menu to scan for new software, as well as install service packs and patches.

Device Manager

- A device driver acts as a translator between the hardware and the software that uses the devices.
- In other words, it intermediates between the device and the software, in order to use the device
- Nowadays, the operating system comes preloaded with some commonly used device drivers, like the device driver for mouse, webcam, and keyboard.

Example-Device Driver



Other Installation Methods

- Network Installation
- Preboot Execution Environment (PXE) Installation
- Unattended Installation
- Image-based Installation
- Remote Installation

System Recovery

- The System Recovery Options are a set of tools that allow users to recover or restore an operating system when it has failed.
- The System Recovery Options are a part of the Windows Recovery Environment (WinRE). WinRE is a recovery platform based on the Windows Preinstallation Environment (PE).

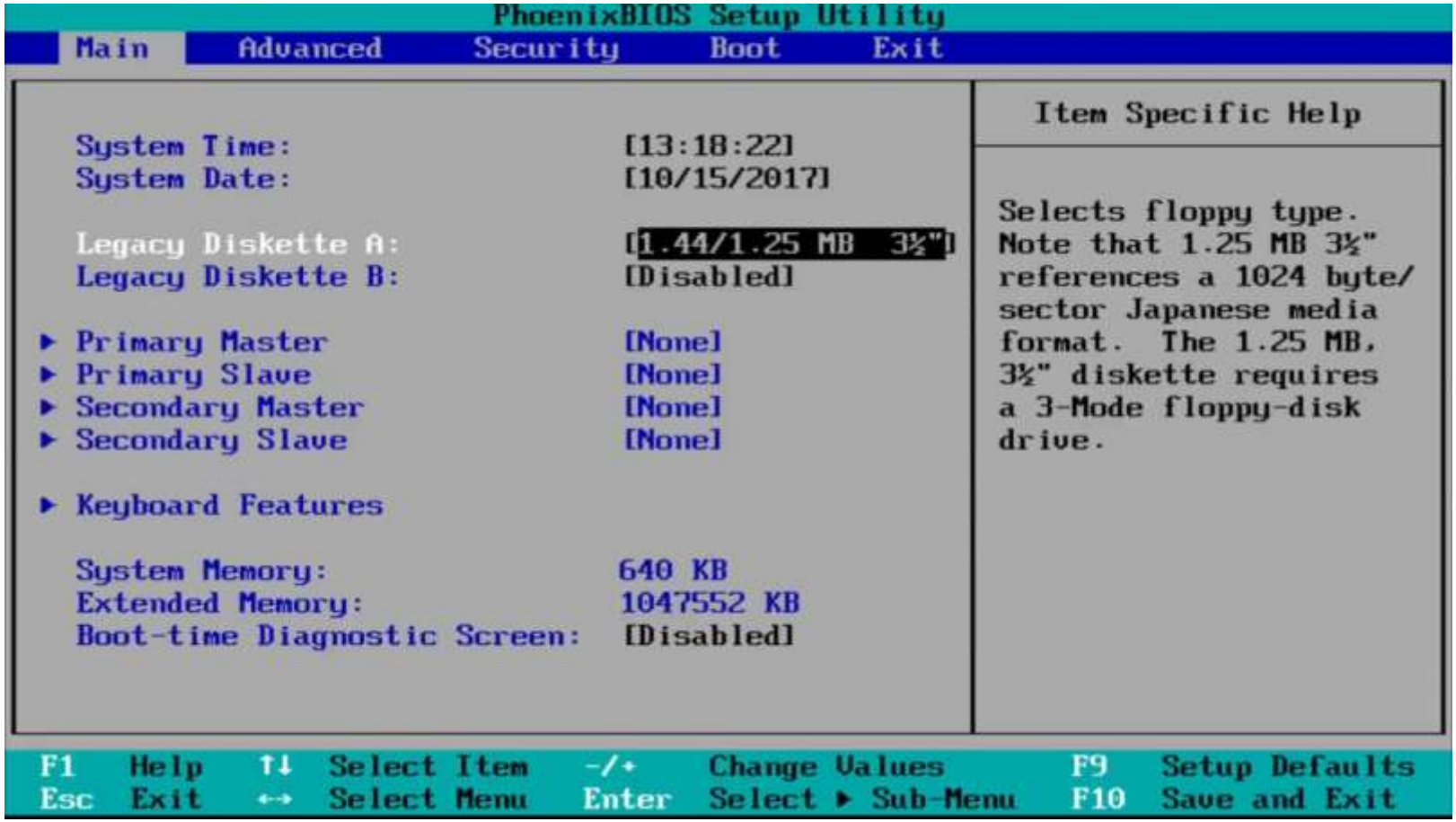
System Image Recovery

It allows users to back up the contents of their hard drive, including personal files and settings, if an operating system needs to be restored

Windows Boot Process

- When the computer is powered on, it performs a Power On Self Test (POST).
- After POST, the BIOS locates and reads the configuration settings that are stored in the CMOS memory.
- The boot device priority is set in the BIOS and can be arranged in any order.

BIOS Setup Utility



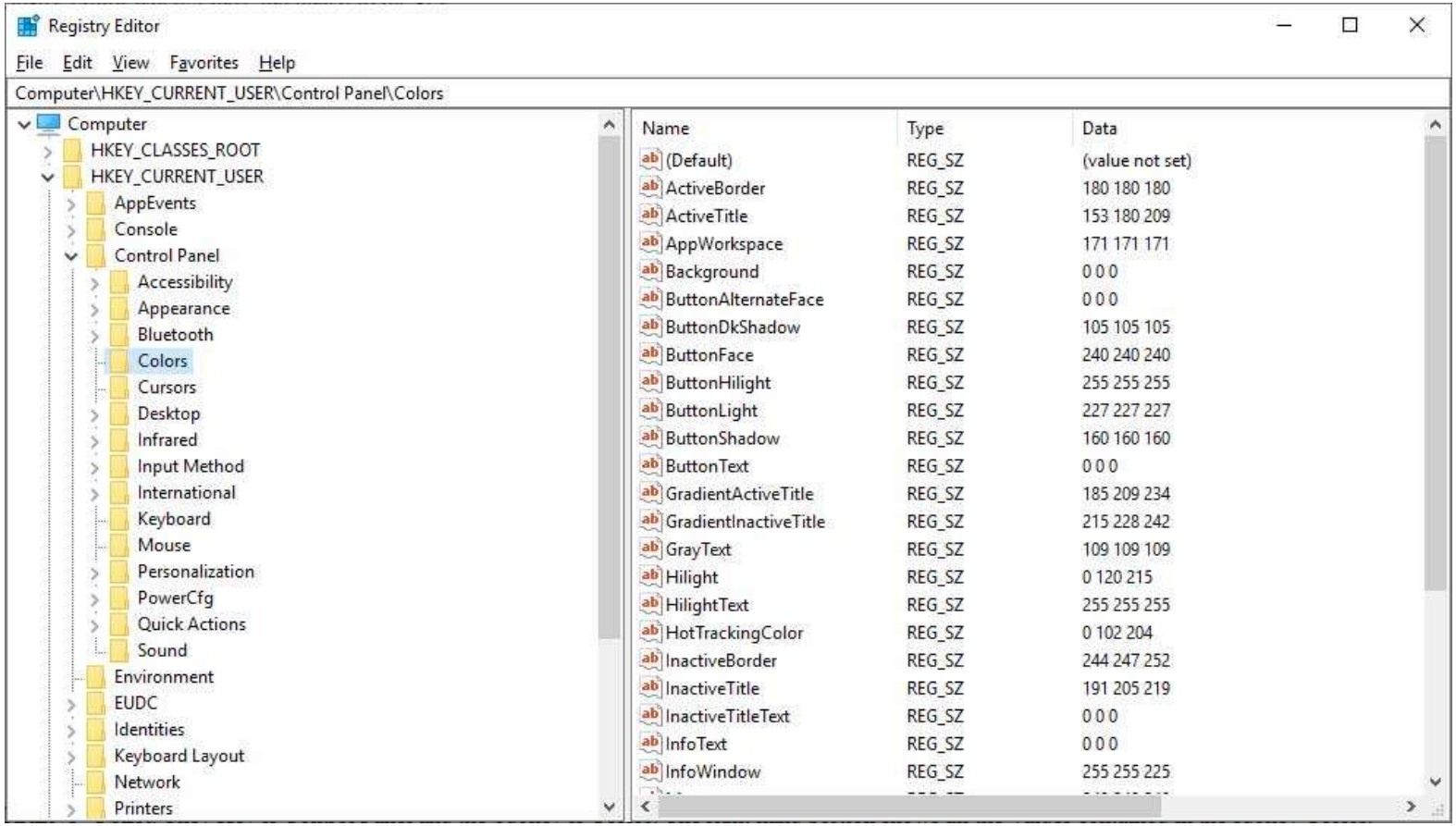
Startup Modes

- Safe Mode - Starts Windows but only loads drivers for basic components
- Safe Mode with Networking-loads the drivers for network components.
- Safe Mode with Command Prompt- loads the command prompt instead of the GUI
- Last Known Good Configuration- configuration settings that were used the last time that Windows started successfully

Windows Registry

- The Windows Registry keys are an important part of the Windows boot process.
- These keys are recognized by their distinctive names, which begin with HKEY_, as shown in the figure, followed by the name of the portion of the OS under their control.
- The Registry is also responsible for recording the location of Dynamic Link Library (DLL) files.

Example-Windows Registry



Multiboot

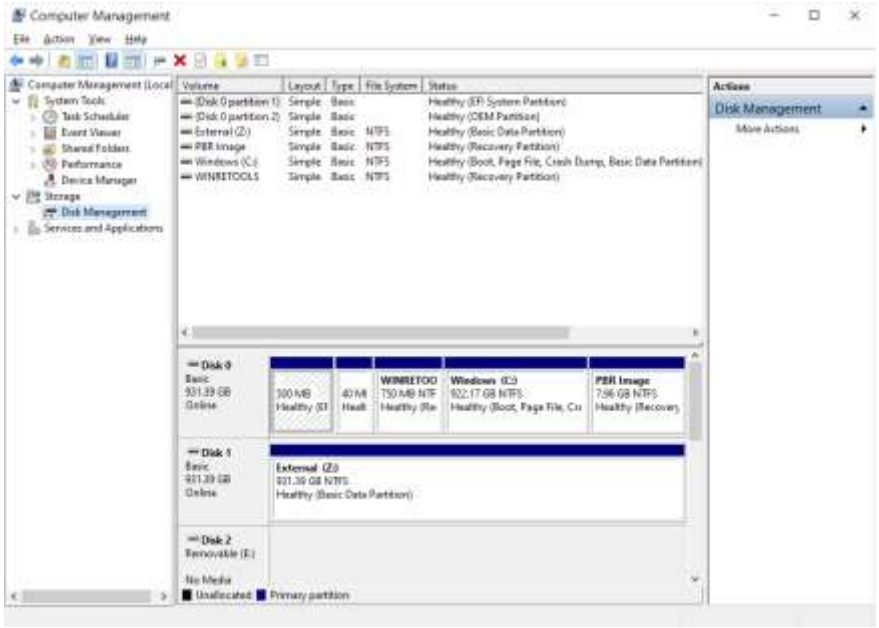
- You can have multiple operating systems on a single computer.
- There is a dual boot process for multiple operating systems on a computer.
- During the boot process, if the Windows Boot Manager (BOOTMGR) determines that more than one OS is present, you are prompted to choose the OS.

System Utilities

- Disk Management
- File Management
- Antivirus
- Compression Tools
- Disk Cleanup Tools
- Disk Defragment Tools
- Backup
- Performance Monitoring Tools

Disk Management

- View drive status
- Extend partitions
- Split partitions
- Assign drive letters
- Add drives
- Add array
- Start > right-click Computer > Manage > select Disk Management



File Management

- File Management Systems are the most basic of all types of software.
- They are used to organize and store files on a computer, as well as index those files for easier retrieval.
- Most computers come with a basic file management system that is built into the operating system.

Antivirus

- Online threats are a serious problem. Viruses, malware, and hackers can ruin your computer and steal your data.
- Antivirus software is used to prevent, detect and remove viruses from your computer.
- A virus is a malicious piece of code that infects other files or computers for the purpose of replicating itself.

Example-Antivirus

- Microsoft Defender
- Norton 360 LifeLock
- Bitdefender Antivirus
- Eset
- McAfee Total Protection
- Quickheal Antivirus

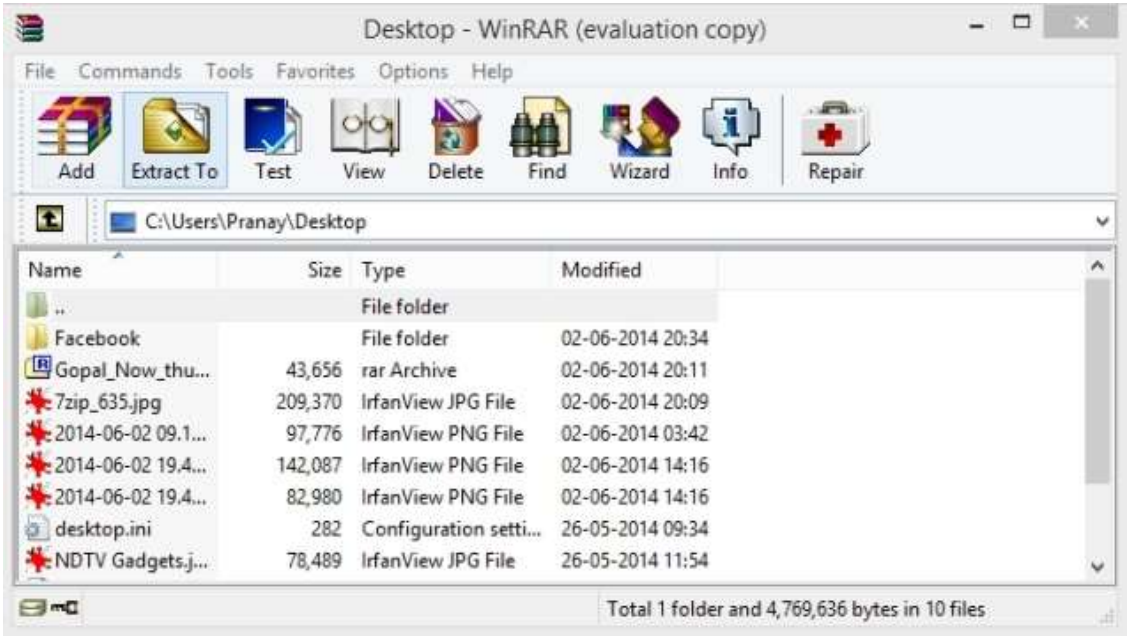
Compression Tools

Compression tools are a set of computer programs that compress files. Compression is the process of taking data from a file and reducing its size of it

A compression tool reduces the file's size by removing blank spaces, repeating characters in a string, or combining two or more redundant files into one file - all without affecting the data in any way.

Example-Compression Tool

- WinZip
- WinRAR
- 7-Zip
- Zip Archiver
- PeaZip



Disk Cleanup Tool

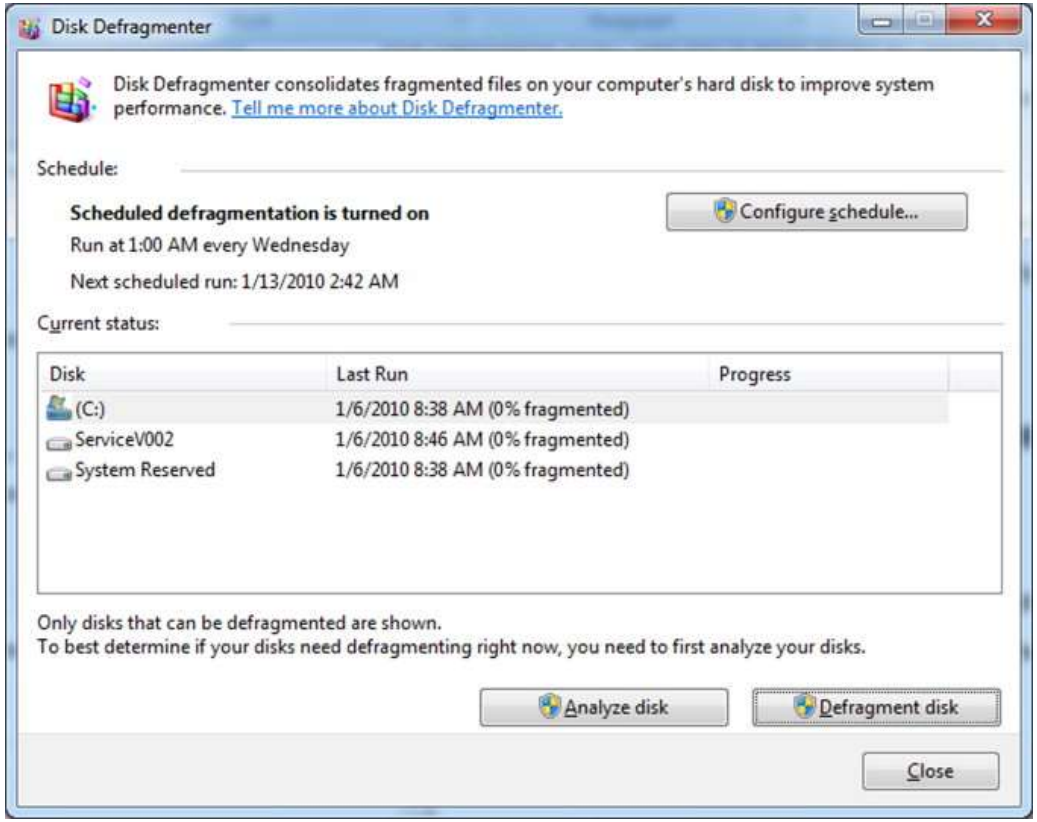
- Cleaning up your disk is one of the best ways to improve your computer's performance.
- Disk Cleanup Tool is a Microsoft utility that you can use to clean up all sorts of temporary files, including internet downloads, web browser cache, temporary Internet files, and much more.
- The Disk Cleanup Tool lets you choose specific types of files to be deleted or removed.
- You can also specify which hard drive to clean up or how much space to free up.

Example-Disk Cleanup Tools

Disk Defragment Tool

- Disk defragmenters are utilities designed to rearrange data on a hard drive so that it is more evenly distributed and can be read from quicker.
- It's important to use disk defragmenters periodically in order to keep the system running smoothly.

Example-Disk Defragment Tools

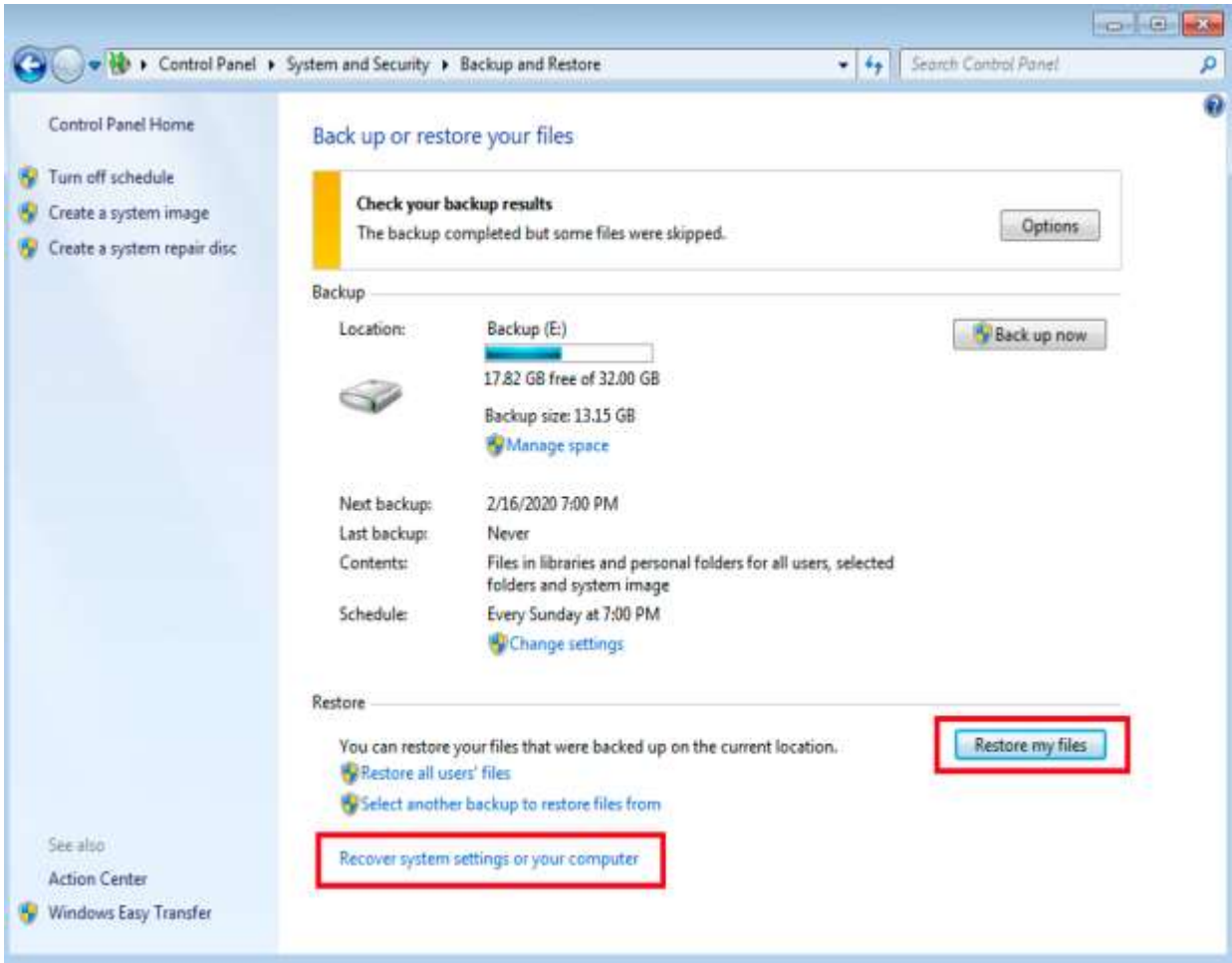


Backup & Restore

- A backup utility is a software application that automatically backs up your data.
- It can be external or internal hard drives, DVDs, CDs, and even online storage.
- When it comes to backing up your data, you have two options: manual or automated.
- Data restore is the process of copying backup data from secondary storage and restoring it to its original location or a new location.

Example-Backup & Restore

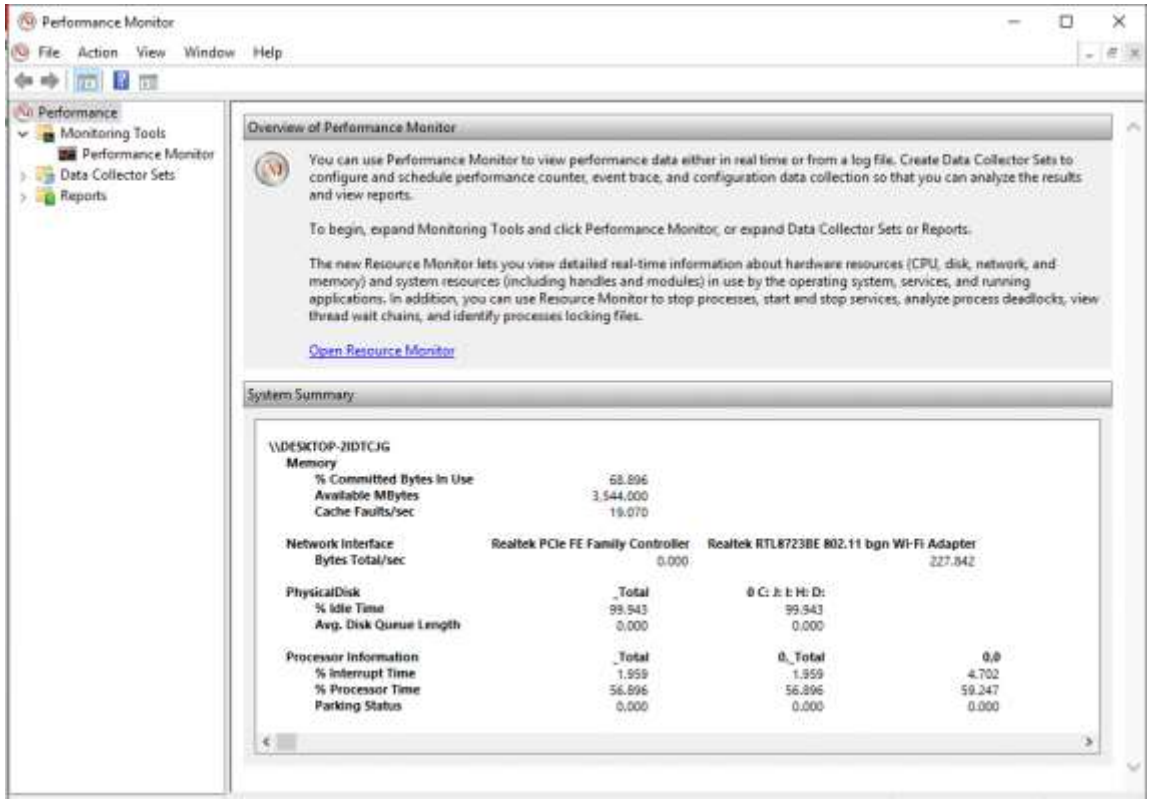
- Acronis True Image
- Backblaze
- Carbonite
- EaseUS ToDo Backup
- NovaBackup



Performance Monitoring Tools

- Microsoft, Windows Performance Monitor uses configuration information, performance counters and event trace data to make a full examination of a computer's performance.
- All of the information can be combined into Data Collector Sets.

Example-Performance Monitor

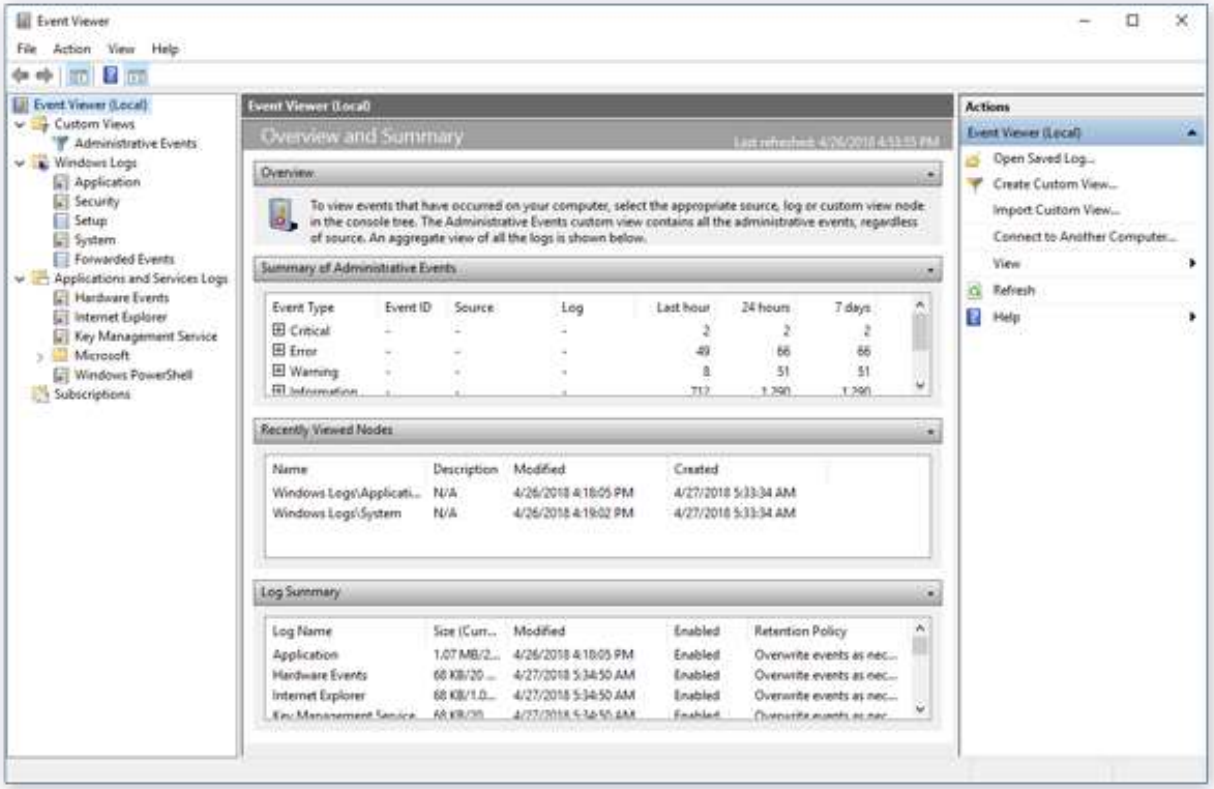


Event Viewer

The Windows Event Viewer shows a log of application and system messages, including errors, information messages, and warnings.

It’s a useful tool for troubleshooting all kinds of different Windows problems.

Example-Event Viewer

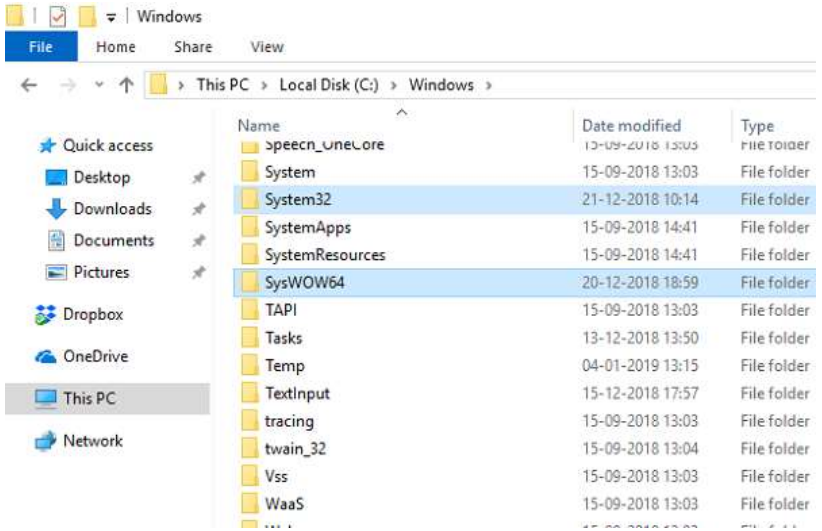


User File Location.

- By default, Windows 7 and Windows Vista stores most of the files created by users in the folder C:\Users\User_name\. Windows XP uses the folder C:\Documents and Settings\User_name\
- Each user's folder contains folders for music, videos, websites, and pictures

System File Location

- When the Windows OS is installed, all files that are used to run the computer are located in the folder C:\Windows\system32.



File Extensions and Attributes

- By default, file extensions are hidden. To display the file extensions you must disable the Hide extensions for known file types setting in the Folder Options control panel utility.
- Start > Control Panel > Folder Options > View > uncheck

Example-File Extension

.docx - Microsoft Word (2007 and later)

.xlsx- Microsoft Excel

.txt - ASCII text only

.jpg - Graphics format

.pptx - Microsoft PowerPoint

.zip - Compression format

References

- Clements, A., The Principles of Computer Hardware, Oxford University Press (4th Ed), 2006.