

## Operating System

An operating system is a program that acts as an intermediary between the application programs and the computer hardware. You cannot directly use computer applications (or programs) with computer hardware without a translation system between the hardware and the applications. This translation system is called the operating system (OS). The Windows or Mac OS works “behind-the-scenes” to run your computer (i.e. the software and the hardware). It tells the computer what to do when it starts up and keeps track of your documents, files, and other software. It also provides the standard user interface component (like menus and the desktop) that you see when you look at your computer screen. Both the Windows and the Mac OS operating systems use a graphical interface (pictures or icons instead of text) that allow you to immerse yourself in multitasking (accessing multiple applications and files simultaneously). You work with “windows” in this interface. These windows are a series of boxes, which can be opened and closed as needed.

We shall be using Microsoft Windows Operating System as it is the most common on the personal computers. There are various types of Microsoft Windows. A type of Microsoft Windows is referred to as a version. Examples of versions are Microsoft Windows 3.3, Microsoft Windows 95, Microsoft Windows NT Workstation, Microsoft Windows NT Server, Microsoft Windows 98, Microsoft Windows 98 Second Edition, Microsoft Windows Millennium, Microsoft Windows 2000 Professional, Microsoft Windows 2000 Server, Microsoft Windows XP Home Edition, Microsoft Windows XP Professional, and Microsoft Windows Server 2003.

## Operating System Components

Process management

Networking

Memory management

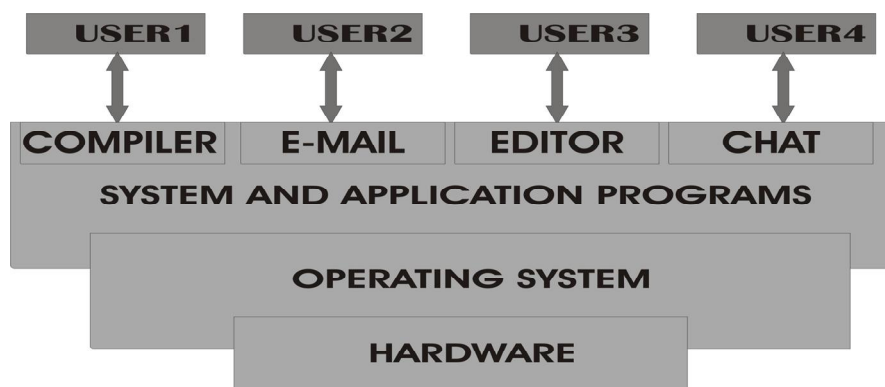
System Protection

File management

Command-interpretter system

Secondary storage management

## *The Operating System Layer*



**Figure 3: Operating System Layers**

Operating System is the basic software that controls the major operation of the computer. It is the master control program, permanently stored in memory, which interprets users commands requesting various kinds of services

such as display, print or copy a data files; list all files in a directory; or execute a particular program. It provides the link between the user, the application program and the computer hardware with a view to controlling and managing the operation of the computer. The operating system has four major functions: It coordinates and manipulates computer hardware, it organizes and manages files on a variety of storage media, it manages the function of processor, and it interfaces with user.

### **Function of the OS**

- Resource sharing: manages resources by ensuring proper and effective use.
- Provision of virtual machine: Hiding the hardware details from the user.
- Memory management: It manages the effective usage of internal memory, RAM while running multi-programs.
- Protector and error handling.
- File management.
- Facilitates booting
- Manages multitasking: determines which application should run, in what order, and how much time should be allowed for each application before giving another application access to run.

### **Classification of OS**

This could be done based on the number of program they can handle at the same time or the number of user(s) that can be accommodated on the system simultaneously. Hence we have single tasking and multitasking (for class1) and, single user and multi-user OS (for class 2).

Single user OS is multitasking but can only allow only one user at a time e.g. PC-DOS, MS-DOS, CP/M, OS/2. Multi-user OS is multitasking and at the same time multi-user. This is done when a number of computers (workstation) connect to a central computer so that all the other computers can use the work on the central computer e.g. UNIX, XENIX, PC-MOS, windows NT, Linux and Novell.

### **The Difference between Windows &Macs**

The personal computer industry has generally sorted itself out along the lines of two major operating systems: Mac and Windows. The Mac OS runs on CPUs made by Apple Computer. The Windows OS, made by Microsoft, runs on CPUs made by many different companies, but not Apple. Some of these companies are: IBM, Dell, Compaq, Gateway, Fujitsu, Sony, etc. When people talk about the differences between Windows and Macs, in general, they are expressing a personal preference about which operating system or hardware they believe to be superior.

### **Utility Software**

This program is produced by the manufacturers to provide useful facilities for performing common computing tasks of a routine nature to many computer system e.g. system generator, text editor, antivirus, dumping routine, housekeeping operations etc.

### **Language translator**

The language the computer understand is machine language (0s and 1s) which is very tedious, time consuming, hard to write/read, or debug. Any program written in another language than this needs language translator which

carries out the translation to this machine language. The 3 main types of translators are Assemblers, Compilers and Interpreter.

## APPLICATION SOFTWARE

Application Software is a computer program designed to help people perform a certain type of task. An application thus differs from an operating system (which runs a computer), a utility (which performs maintenance or general-purpose tasks), or a language translator (with which computer programs are created). Depending on the work for which it was designed, an application can manipulate text, numbers, graphics, or a combination of these elements. Some application packages offer considerable computing power by focusing on a single task, such as word processing, spreadsheet, graphics, and a database program.

**Table 2: Different computer programs with their areas of application**

Application Areas	Package
Word processing	NotePad (text editor), WordPad, Word perfect, WordStar, Microsoft word
Budgeting, accounting	Lotus 1-2-3, Microsoft excel,
Databases	Database 3,4 oracle, Microsoft excel, Corel Paradox, dBase, SQL, M-Access
Graphics	CorelDraw, Adobe Photoshop, Jasc Paint Shop Pro, Instant Artist, Print Artist
Spreadsheets	Microsoft Excel and Access, Corel Quattro Pro, Sun StarCalc
Book publishing	PageMaker, Microsoft publisher
Seminar presentation	PowerPoint
Engineering drawing	AutoCAD, ArchiCAD, electronic desktop
Statistical analysis	SPSS, SPLUS, statistical
Web design	Microsoft FrontPage

## CLASSIFICATION OF COMPUTERS ACCORDING TO SIZE

Computers exist in a wide range of sizes and power. The smallest are embedded within the circuitry of appliances, such as televisions and wristwatches. These computers are typically pre-programmed for a specific task, such as tuning to a particular television frequency, delivering doses of medicine, or keeping accurate time. They generally are “hard-wired”—that is, their programs are represented as circuits that cannot be reprogrammed.

**Mini Computers** (Laptop, Notebook Computers and Desktop PCs) are typically used in businesses and at home to communicate on computer networks, for word processing, to track finances, and for entertainment. They are equipped with a keyboard; a mouse, trackball, or other devices; and a video display monitor or liquid crystal display (LCD) to display information. Laptop and notebook computers usually have similar hardware and software as PCs, but they are more compact and have flat, lightweight LCDs instead of television-like video display monitors. If equipped with a cellular phone, they can connect to worldwide computer networks to exchange information regardless of location.

**Workstations** are similar to personal computers but have greater memory and more extensive mathematical abilities, and they are connected to other workstations or personal computers to exchange data. They are typically found in scientific, industrial, and business environments—especially financial ones, such as stock exchanges—that require complex and fast computations.

**Mainframe computers** have more memory, speed, and capabilities than workstations and are usually shared by multiple users through a series of interconnected computers. The most powerful mainframe computers, called supercomputers, control businesses, industrial works, scientific research and process complex

and time-consuming calculations, such as those used to create weather predictions. Large businesses, scientific institutions, and the military use them. Some supercomputers have many sets of CPUs. These computers break a task into small pieces, and each CPU processes a portion of the task to increase overall speed and efficiency. Such computers are called parallel processors. As computers have increased in sophistication, the boundaries between the various types have become less rigid.

## COMPUTER VIRUSES AND SECURITY

### COMPUTER VIRUSES

Virus is a self-duplicating computer program that interferes with a computer's hardware or operating system. They range from being merely irritating (or disturbing) to the very destructive. Computer viruses activate when the instructions (payload of the virus) or executable code that run programs are opened. Once a virus is active, it may replicate by various means and infect the computer's files or the operating system. For example, it may copy parts of itself to floppy disks, to the computer's hard drive, into legitimate computer programs, or it may attach itself to e-mail messages and spread across computer networks by infecting other shared drives. Viruses attached to e-mail messages can infect an entire local network in minutes (this is specifically called WORM).

Thousands of viruses and worms exist and can quickly contaminate millions of computers. People who intentionally create viruses are computer experts called HACKERS; they also violate confidentiality by observing computer monitors and by impersonating authorised users in order to gain access to the user's computer databases to steal the identities of other people by obtaining privately identified information about them. They also engage in software piracy and deface website on the internet. They develop powerful software "crime tools" such as the following:

- a. Internet eavesdropping sniffers which intercepts internet messages sent to other computers
- b. Password guessers that tries millions of combinations of characters in an effect to guess a computer's password.
- c. Vulnerability testers that look for software weaknesses
- d. Computer services saturator
- e. Automatic computer virus generator.

### Types of Viruses

- a. **A boot sector virus** stores itself at the start of a disk and becomes activated by reading, starting or restarting the computer when that disk is in the boot drive.
- b. **A file infector virus** attaches itself to program files i.e. files that give instructions to a computer. These files usually have extensions like exe, com, or bat. When the program is run, the virus executes.
- c. **A macro virus** affects data files, especially Word documents and Excel workbooks. This virus type accounts for the vast majority of infected files. When the infected document is opened and the macro are run, the virus is triggered and can perform system operations such as creating or deleting files or writing into already existing files and thus have the potential to cause a great deal of damage.
- d. **Worm or an email virus** (for the purpose of this guide) is not really a virus at all (in that it is not self-replicating) but a chain letter phenomenon sent through email. The message will, for some reason or other, tell you to pass this message on to as many people as possible. Hoax virus alerts are typical examples of chain emails. These are distinct from viruses in that they do not have host file like most other viruses but are carried on the internet and can spread from one computer to another by themselves without the need for a user to assist the process by giving someone an infected file or disk. They are usually spread through the

internet as an attachment.

- e. **Trojan horses** are programs that have some hidden, generally malicious functionality that the computer does not expect. They claim to be a thing (e.g. an audio for example), when they are actually another (e.g. code that will overwrite a portion of your hard disk). They do not run their own like a virus does but rely on tricking the user to run them. They don't also replicate themselves which is a major distinction between a virus and a Trojan.

### **How Viruses are Spread**

Viruses are spread by running infected programs or opening infected files. This can occur by using any of the following methods:

Passing floppy disks from PC to PC

Downloading (copying) infected files from the Internet

Opening an email attachment

Booting a PC with an infected bootable disk.

Computer viruses work in two phases: infection phase and the attack phase.

**Infection phase:** in order to infect a computer, a virus has to possess the chance to get executed before it can infect the computer system and spread to others. Events that can trigger the execution of virus are included above.

**Attack phase:** viruses do destructive things such as deleting files, erasing data on a hard disk, sending random emails or slowing down the processor by sending millions of looped instructions. Since most users will try their best to delete the virus once it launches the attack, most virus delay revealing their presence by launching their attack only after they have had ample opportunity to spread. This means the attack may be delayed for a long time after the infection.

### **Prevention of Computer Virus**

Computer users can prepare for a viral infection by creating backups of legitimate original software and data files regularly so that the computer system can be restored if necessary. However, the best prevention may be the installation of current and well-designed antiviral software. Such software can prevent a viral infection and thereby help stop its spread.

Or obtain a virus checker for your own machine then register the program with the manufacturers. They will regularly send you updated versions of the software while your agreement is current. New viruses keep appearing, so out of date virus software will not protect you and the checker is essential. Install the available security patches, particularly for Microsoft products. Keep your floppy disk write-protected whenever possible.

If you are really cautious, change the set-up option in your computer's BIOS so that it will always boot from the hard disk, not from floppies.

Write protect MS Word's Normal template to get limited protection against macro viruses. This template will be a file called Normal.dot. Select the Read Only bod. Note that this will not disinfect existing infected files.

In Word, turn on the Macro Virus Protection Option in Tools, then Options, then Security Tab and finally Macro Security button, by setting the level of security you desire for the macros.. This will warn you if files contain macros. You or a colleague may have created the macros for some legitimate purpose but they could also be viruses. If a warning appears, open the file only if it comes from a trusted source. Note that this procedure will warn you about macros (whether malicious or benign) but will not disinfect existing infected files.

### Virus Detection

Several types of antiviral software can be used to detect the presence of a virus. Scanning software can recognize the characteristics of a virus's computer code and look for these characteristics in the computer's files. Antivirus software packages provide complete protection against viruses. Other types of antiviral software include monitoring software and integrity-shell software. Monitoring software is different from scanning software. It detects illegal or potentially damaging viral activities such as overwriting computer files or reformatting the computer's hard drive.

## COMPUTER SECURITY

These are techniques developed to safeguard information and information systems stored on computers. Potential threats include the destruction of computer hardware and software and the loss, modification, theft, unauthorized use, observation, or disclosure of computer data.

- I **Simple Techniques:** A variety of simple techniques can help prevent computer crimes, such as protecting computer screens from observation, keeping printed information and computers in locked facilities, backing up copies of data files and software, and clearing desktops of sensitive information and materials. Increasingly, however, more sophisticated methods are needed to prevent computer crimes. These include using encryption techniques, establishing software usage permissions, mandating passwords, and installing firewalls and intrusion detection systems. In addition, controls within application systems and disaster recovery plans are also necessary.
- II **Backup:** Storing backup copies of software and data and having backup computer and communication capabilities are important basic safeguards because the data can then be restored if it was altered or destroyed by a computer crime or accident. Computer data should be backed up frequently and should be stored nearby in secure locations in case of damage at the primary site. Transporting sensitive data to storage locations should also be done securely.
- III **Encryption:** Another technique to protect confidential information is encryption. Computer users can scramble information to prevent unauthorized users from accessing it. Authorized users can unscramble the information when needed by using a secret code called a key. Without the key the scrambled information would be impossible or very difficult to unscramble. A more complex form of encryption uses two keys, called the public key and the private key, and a system of double encryption. Each participant possesses a secret, private key and a public key that is known to potential recipients. Both keys are used to encrypt, and matching keys are used to decrypt the message. However, the advantage over the single-key method lies with the private keys, which are never shared and so cannot be intercepted.
- IV **Approved Users:** Another technique to help prevent abuse and misuse of computer data is to limit the use of computers and data files to approved persons. Security software can verify the identity of computer users and limit their privileges to use, view, and alter files. The software also securely records their actions to establish accountability. Military organizations give access rights to classified, confidential, secret, or top-secret information according to the corresponding security clearance level of the user. Other types of organizations also classify information and specify different degrees of protection.
- V **Passwords:** Passwords are confidential sequences of characters that allow approved persons to make use of specified computers, software, or information. To be effective, passwords must be difficult to guess and should not be found in dictionaries. Effective passwords contain a variety of characters and symbols that are

not part of the alphabet. Another advantage of this password is because it is case sensitive (i.e. Advent is different from advent). To thwart imposters, computer systems usually limit the number of attempts and restrict the time it takes to enter the correct password.

**VI Firewalls:** Computers connected to the communication networks such as internet are vulnerable to electronic attack because many people have access to them. They can be protected by firewalls computer software placed between the networked computers and the networks. The firewalls examines filters and reports on all information passing through the network to ensure its appropriateness. These functions help to prevent saturation of input capabilities that might otherwise deny usage to legitimate users.

**VII Intrusion Detection Systems:** These are software that detect unusual and suspicious activities and in some cases, stop a variety of harmful actions.

## BASIC COMPUTER MAINTENANCE

### MAINTENANCE

One of the most common questions computer users ask is, “How do I maintain my computer and keep it running great?” A computer is a lot like a car...it costs more than you think it should, it starts going down in value as soon as you bring it home and it requires regular maintenance to keep it running smoothly.

To properly deal with repairable systems, we need to first understand how components in these systems are restored (i.e. the maintenance actions that the components undergo). In general, maintenance is defined as any action that restores failed units to an operational condition or retains non-failed units in an operational state. For repairable systems, maintenance plays a vital role in the life of a system. It affects the system’s overall reliability, availability, downtime, cost of operation, etc. Generally, maintenance actions can be divided into three types: corrective maintenance, preventive maintenance and inspections.

### Preventive Maintenance

Preventive maintenance is the practice of replacing components or subsystems before they fail in order to promote continuous system operation. The schedule for preventive maintenance is based on observation of past system behaviour, component wear-out mechanisms and knowledge of which components are vital to continued system operation. Cost is always a factor in the scheduling of preventive maintenance. In many circumstances, it is financially more sensible to replace parts or components that have not failed at predetermined intervals rather than to wait for a system failure that may result in a costly disruption in operations.

Here are a few basic guidelines required.

**I Surge Protection:** Power surges, spikes, lightning and brown - outs are all things that can literally burn up your computer and its peripherals. Save yourself lots of money in repairs by buying a decent surge protector (a.k.a. Power strip) for your computer and use it. A UPS (uninterruptible power supply), though slightly more expensive, is even better.

**II Anti-Virus Protection:** Everyone should know about this by now, but we often see computers with either “no virus protection at all, or anti-virus software that is badly out-of-date”. Nothing can wreck your computer faster than a virus (except for may be electricity), but with a small investment in good anti-virus software and making sure you set it to update itself daily.

**III Minimize the number of Software you install:** This is another thing many people overlook. Installing lots of programs on your computer is a lot like pulling a bunch of rowdy children together on a playground. Some of them may not play well together. A good rule of thumb is “if you don’t need, don’t install. This is especially true when you surf the web. You will likely get bombarded with pop-up ads trying to get you to install all kinds of flee utilities they claim your computer can’t live without most of these are spyware, adware and junk.

**IV Backup your important files:** To minimize the potential of loosing important information, always make a  
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...Learn to Know Why and How!

adebisjeleel@yahoo.com or adebisjeleel@gmail.com

backup of your crucial files. To do this, you can use a CD-burner, a backup tape system, or a removable disk drive (such as a Jazz, Zip, floppy or flash drive). Keep copies of these backups in another location, just in case you need to perform a disaster recovery.

**V Firewall Protection:** Symantec's Norton personal Firewall keeps personal data in and hackers out. Right out of the box, it makes your PC invisible on the Internet so that hackers can't find it. The program's Intelligent Intrusion prevention technology blocks suspicious Internet traffic. And easy-to-use privacy controls prevent personal information from being sent out without your knowledge.

**VI Internal/External Component Cleaning:** Dust is one of the leading causes of hardware failure. All moving components are thoroughly cleaned and lubricated during service visits. The case is opened and dust is removed from the motherboard and all system boards. The CPU fan, power supply fan and any other board fans are cleaned, lubricated and tested. All data cables are checked to be sure they are securely heated on system boards. CD and floppy drives are opened, cleaned and tested for data transfer. External components such as keyboard, mouse, monitor and printers are cleaned of dust and debris and all cable connections are checked. Connections to surge protectors or UPS are checked.

**VII Scan and defragment your hard drive on arrive:** Your hard drive stores information in open areas of your hard drive. As you delete data on your drive, open space appears. The computer will utilize this open space to store new information. Sometimes information for a particular file or application is separated on a drive into several different locations. The totality of the information may not fit in the open space in one area, so the computer will divide the information into several pieces. When you scan and defragment your hard drive, you are minimizing the risk of having problems and "slowdowns" caused by separated data on your hard drive. The defragmentation will locate, delete open spaces and place associated files back together again, helping your computer to run smoothly and faster. To do this, Right-Click on the drive → Properties → Tools Tab → Defragmentation section → Defragment now → select the drive → Analyze OR Defragment

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## Disk Defragmenter

Disk Defragmenter is a system utility for analyzing local volumes (an area of storage on a hard disk. A volume is formatted by using a file system, such as FAT or NTFS, and has a drive letter assigned to it. You can view the content of a volume by clicking its icon in windows Explorer or in My Computer. a single hard disk can have multiple volumes, and volumes can also span multiple disks) and locating and consolidating fragmented files and folders. You can also defragment (Defragmentation is the process of rewriting parts of a file to contiguous sectors on a hard disk to increase the speed of access and retrieval. When files are updated, the computer tends to save these updates on the largest continuous space on the hard disk, which is often on a different sector than other parts of the file. When files are thus fragmented, the computer must search the hard disk each time the file is opened to find all of the file's parts, which slows down response time) disks from a command line using the **defrag** command. The best practices for fragmenting a volume are enumerated below.

- **Analyzing before defragmenting**

Analyze volumes before defragmenting them. After analyzing a volume, a dialog box tells you the percentage of fragmented files and folders on the volume and recommends whether to defragment the volume. Analyze volumes regularly and defragment them only when Disk Defragmenter recommends it. A good guideline is to analyze volumes at least once a week. If you seldom need to defragment volumes, analyze volumes monthly instead of weekly.

- **Analyzing after large numbers of files are added**

Volumes might become excessively fragmented when users add a large number of files or folders, so be sure to analyze volumes after this happens. Generally, volumes on busy file servers should be defragmented more often than those on single-user workstations.



- **Ensure that your disk has at least 15% free space**  
A volume must have at least 15% free space for Disk Defragmenter to completely and adequately defragment it. Disk Defragmenter uses this space as a sorting area for file fragments. If a volume has less than 15% free space, Disk Defragmenter will only partially defragment it. To increase the free space on a volume, delete unneeded files or move them to another disk.
- **Defragmenting during low-usage periods**  
Defragment file server volumes during low-volume usage periods to minimize the effect that the defragmentation process has on file server performance. The time that Disk Defragmenter takes to defragment a volume depends on several factors, including the size of the volume, the number of files on the volume, the number of fragmented files, and available system resources.
- **Defragmenting after installing software or installing Windows**  
Defragment volumes after installing software or after performing an upgrade or clean install of Windows. Volumes often become fragmented after installing software, so running Disk Defragmenter helps to ensure the best file system performance.

## Defrag

At times, it might be difficult to even select the drive to be defragmented; hence the use of command line. Locates and consolidates fragmented boot files, data files, and folders on local volumes.

## Syntax

**defrag** *volume*; **defrag** *volume* [/a]; **defrag** *volume* [/a] [/v]; **defrag** *volume* [/v]; **defrag** *volume* [/f]

## Parameters definitions

*Volume* The drive letter or a mount point of the volume to be defragmented.

- /a** Analyzes the volume and displays a summary of the analysis report.
- /v** Displays the complete analysis and defragmentation reports. When used in combination with **/a**, displays only the analysis report. When used alone, displays both the analysis and defragmentation reports.
- /f** Forces defragmentation of the volume regardless of whether it needs to be defragmented.
- /?** Displays help at the command prompt.

## Remarks

- A volume must have at least 15% free space for **defrag** to completely and adequately defragment it. **Defrag** uses this space as a sorting area for file fragments. If a volume has less than 15% free space, **defrag** will only partially defragment it. To increase the free space on a volume, delete unneeded files or move them to another disk.
- You cannot defragment volumes that the file system has marked as dirty, which indicates possible corruption. You must run **chkdsk** on a dirty volume before you can defragment it. You can determine if a volume is dirty by using the **fsutil dirty query** command.
- While **defrag** is analyzing and defragmenting a volume, it displays a blinking cursor. When **defrag** has finished analyzing and defragmenting the volume, it displays the analysis report, the defragmentation report, or both reports, and then exits to the command prompt.
- By default, **defrag** displays a summary of both the analysis and defragmentation reports if you do not specify the **/a** or **/v** parameters.
- You can send the reports to a text file by typing **>filename.txt**, where *filename.txt* is a file name you specify. For example: **defrag volume /v >filename.txt**
- To interrupt the defragmentation process, at the command line, press CTRL+C.

- Running the **defrag** command and Disk Defragmenter are mutually exclusive. If you are using Disk Defragmenter to defragment a volume and you run the **defrag** command at a command-line, the **defrag** command fails. Conversely, if you run the **defrag** command and open Disk Defragmenter, the defragmentation options in Disk Defragmenter are unavailable.

### Formatting legend

#### Format

*Italic*

#### **Bold**

Ellipsis (...)

Between brackets ([])

Between braces ({}); choices separated by pipe (|). Example: {even|odd}

Courier font

#### Meaning

Information that the user must supply

Elements that the user must type exactly as shown

Parameter that can be repeated several times in a command line

Optional items

Set of choices from which the user must choose only one

Code or program output

VIII **Checking Errors on the Hard Drive:** this is done to rectify bad sectors. To do this, Right-Click on the drive → Properties → Tools Tab → Error-Checking Sector → Check Now → Automatically fix file system errors OR Scan for and attempt recovery of bad sectors → Start

### Corrective Maintenance

Corrective maintenance consists of the action(s) taken to restore a failed system to operational status. This usually involves replacing or repairing the component that is responsible for the failure of the overall system. Corrective maintenance is performed at unpredictable intervals because a component's failure time is not known at prior. The objective of corrective maintenance is to restore the system to satisfactory operation within the shortest possible time. Corrective maintenance is typically carried out in three steps:

- Diagnosis of the problem.** The maintenance technician must take time to locate the failed parts or otherwise satisfactorily assess the cause of the system failure.
- Repair and/or replacement of faulty component(s).** Once the cause of system failure has been determined, action must be taken to address the cause, usually by replacing or repairing the components that caused the system to fail.
- Verification of the repair action.** Once the components in question have been repaired or replaced, the maintenance technician must verify that the system is again successfully operating.

### System Diagnosis

The diagnosis practice is usually called troubleshooting. Much of the troubleshooting guide treated here caters for users of Windows operating systems.

Always keep detailed records of all errors and steps taken to correct these errors. Error numbers and codes are important to log. They tell technicians/network administrators specific information about the problems you are having. To document errors, press the "Details" button or simply write down the first couple of lines of information given in the error screen.

Check all cables first. The most frequent problem with computers is a loose or disconnected cable. Don't be afraid to make mistakes. Don't let the machine intimidate' you. Before calling an expert for technical support, always shut your computer down totally and reboot; wait until the CPU is not making any sounds and

then turn it on again, by pressing the power button.

#### 1. Booting Problems

When you press the power button, you give the instruction to the electricity to "wake" up the computer. This instruction causes the computer to start giving its own instructions to internal parts. One of the instructions is called BIOS. The BIOS instruction starts checking "everybody", asking "Are you OK?", "Are you OK?", "What about you?". If a certain part that is important doesn't respond (for example if a certain important object such as the keyboard or mouse is not connected, which means it will not respond when the BIOS asks, "Are you OK?"), then the BIOS may interrupt everything, or it may continue checking. If the BIOS comes to a conclusion that this computer is not worth using, it would display an error and may not let you do anything significant. If the BIOS "thinks" that everything is alright and that the computer can be used, then it gets the hardware parts ready.

- a. I am receiving an error that says, "Invalid system disk, replace and press any key when ready: This error is caused by the presence of a floppy disk in the floppy drive while the computer is booting up. Whenever you turn your computer on, remember to eject all disks from the floppy drive (unless a "bootable" floppy disk). If you get this error, eject the floppy disk and hit enter. Your computer should continue to boot as normal.
- b. Receiving a keyboard related error: This error occurs when the keyboard has become unattached from the rear of the computer. Check behind the computer to see if your keyboard is still firmly attached to the computer. Also check to see if something has been pressing on top of the keyboard during booting. Remove all items that are pressing keys and re-plug the keyboard into the computer. Restart your computer.
- c. I am receiving a "no signal" error, or "there are no visuals on my monitor": A "no signal" error means that the monitor is not receiving a signal from the computer. Check to see if the computer is on and running. Then check the connection (cord) between the computer and the monitor. If everything is connected, turned on, and running, then there might be an internal error causing this error to occur. Contact a technician for assistance
- d. Scan disk appears on a blue screen, stating that Windows was not properly shut down: Scan Disk is a utility that Windows runs automatically when it thinks there might be a problem with your system. This does not mean that there is a problem, but Windows will automatically take this step to ensure that the problem is rectified. Let Scan Disk run and wait, to see if your machine will boot properly after scan disk is complete. If it does not, turn the computer off, and reboot to see if the problem clears up on its own. If rebooting the computer does not solve the problem, contact your technician.

#### 2. Safe Mode Problems

If your computer boots to a screen giving you a choice to boot into safe mode, or it automatically boots into safe mode, Windows has run into an error that it cannot bypass to run smoothly. In most cases, you can reboot and the problem will resolve itself automatically. If you continue to get the safe mode screen, or it goes away and comes back frequently, then contact your technician.

#### 3. The system is ON but it is not responding

My system is locked and nothing I press or click is working. What now? Sometimes your computer will stop responding, or "freeze", either during operation or after unused for a period of time. If the computer has not been used recently, press a few keys and wait several minutes. If the computer "freezes" during operation, stop using the keyboard and the mouse for several minutes. If you continue to use the computer when it is "frozen", it will prolong your waiting period. If, after waiting for several minutes, you cannot get your computer to respond by using the keyboard or the mouse, turn the computer off by pressing the power button on the front of the machine. Let the computer shutdown (the CPU is no longer making any sounds) and then reboot. If you still get no response from the machine, your mouse and keyboard may have become dislodged from the rear of the machine, check those connections and reboot again. If the computer freezes again after plugging the mouse and keyboard into the back of the computer and rebooting, contact your technician.

#### 4. Rebooting Problems

- a. Windows won't shut down, it stays at the "please wait" screen, or won't power down: This is a problem

with the way Windows is talking to your computer. The computer wants to suspend activity, but Windows is telling it to shut down. This is causing confusion for the computer. In some cases, this can be solved with a patch from the Microsoft web site. A patch is an update to a software product that fixes a known problem. You can get this update by downloading it from [www.Microsoft.com](http://www.Microsoft.com). Windows 98 generally has a problem with shutting down, especially when the computer is attached to a network. Generally, this doesn't hurt anything. It is just a bit of a nuisance. See "Booting Problems" on what to do during subsequent reboots.

- b. A window pops up with "End Task," "Shut Down," and "Cancel" buttons, what do I do? This message usually appears when you press and hold "Control", "Alt", and "Delete" while running an application or program. This keystroke tells the computer to shut itself down, despite the fact that applications are running. If you would like to turn off the computer without manually closing or saving anything, click the "Shut Down" button. If you would like to close just the program you are running currently, ensure that the correct program is highlighted in the box and click "End Task." If this window was opened accidentally, click "Cancel" and you will return to the program you were just using.
- c. An internal error or "Kernal32" error box appears suggesting that I restart Windows: This error has occurred because Windows has come across an error that it cannot continue with. If something like this happens and you are in the middle of your work, try to save your work before you click "OK". If your work caused the error to occur, everything, after the last time you saved your work, will be lost. Restart your computer. Remember to always document errors thoroughly. Misbehaving software often causes these errors. If the error occurs repeatedly, call for assistance from your technician.

#### 5. Monitor Problems

My monitor has no display, the monitor turned off for no reason, or my display is faded: Ensure that the monitor and the computer are turned on. Next, check both the power cord to the monitor and the power cord to the computer. If you are using a power strip, ensure that it is turned on. You can also check the settings on your monitor (the buttons are located on the lower front of the monitor). Check the contrast and tint to see if they are set correctly. Next, check the connection between the monitor and computer; at the rear of the computer (this is the cord that connects the monitor to the computer). The next thing to check is your screen saver settings. Right click on your desktop → Properties or you can click Start → Settings → Control Panel → Display (display settings dialog box will appear) → Screen Saver tab. Make sure your screen saver is set to go off in a reasonable amount of time (usually 10 minutes or more). Also, make sure your "Energy Savings" settings are marked correctly. You can locate the energy savings settings button in the Screen Saver box, near the bottom. When you click on "Settings", you will be able to adjust the amount of time that your computer waits to turn off the monitor if the computer is not in use. If you don't ever want the monitor to be shut down by the energy saver mode, choose "Never." If all these things don't fix the problem, contact a technician.

#### 6. Monitor flashes on and off

Usually this is caused by a loose or bad connection at the back of your computer. You should be able to re-tighten the connection, and continue as normal. If that is not the problem, then it needs to be diagnosed by a professional.

#### 7. Mouse Problems

- a. My mouse is sticky and/or the cursor won't move Check to see if your mouse cord is pulled too tightly. If your cord doesn't have enough room to maneuver, then you will have less control over it. Next, check the mouse's connection to the back of the CPU and ensure that it is plugged in. If neither of these possibilities were the problem, you may need to clean the ball on the inside of the mouse. You can flip over the mouse and take the ball out by twisting the round disc that holds it in place (turn the round piece in the direction of the arrows). Once you have taken out the ball, clean the ball off with a clean, dry, and lint-free cloth. Never use water on any computer part! Put the mouse back together again. If that doesn't fettle problem, it might be time to replace the mouse.
- b. My mouse won't right click, or won't double click: Press Ctrl-Alt-Esc and use the arrow key up to get to

- In the left frame, click the drive and click the parent folder. In the right frame, right-click the parent folder, position the mouse on New and click Folder, then give it a name

You can also create a folder when saving a file. To do this, in the dialog box that comes up, click the Create New Folder button and give it a name.

### **Naming a Folder**

There are some suggestions you should follow and various rules you must observe when naming a folder:

- The name of a folder can be a single letter or a digit
- The name of a folder can also be a single special character except the following: | > / : \ < ? \* and "
- The name of a folder can be a combination of letters, digits, and some special characters

As a suggestion, you should use a name that indicates what is stored in the folder. This makes it easy to find information.

### **Archive**

Archives are files that contain other files. Typically the files in an archive are compressed. Archives usually have file names ending with ZIP, LZH, ARJ, or ARC, depending on how they were created. Archives make it easy to group files and make transporting and copying these files faster.

### **Typical Uses of Archives**

- Most files available on the Internet and on electronic services like America Online are distributed as archives. Two benefits of using archives for electronic file distribution are that only one file transfer operation ("download") is required to obtain all related files, and file transfer time is minimized because the files in an archive are compressed.
- It is often useful to send a group of related files to an associate. Rather than distributing individual files it is often easier to distribute the files as an archive to benefit from the file grouping and compression.
- Some files are important but not used often. To save disk space simply compress these files into an archive when they are not used, and decompress them only when needed.

### **Self-Extracting Zip File**

A self-extracting Zip file is an executable program file (.EXE file) that includes both a Zip file and software to extract or "unzip" the contents of the Zip file. Users can extract the contents of a self-extracting Zip file by simply running it. This is convenient, because the end user does not need an unzip program (like WinZip®) to extract files from these self-extracting archives.

WinZip Self-Extractor Personal Edition, included with WinZip, creates Windows self-extracting Zip files.

### **Archive formats:**

- Zip files are the most common archive format. Zip files can span multiple disks, and provide both compression and file grouping. WinZip does not use external programs to work with Zip files.

- TAR, Z, GZ, TAZ, and TGZ files are often found on Unix-based Internet sites. TAR stands for "Tape ARchive". The TAR format does not provide compression; it is used only to group files. GZ and Z files are gzip files. GZ and Z files cannot contain multiple files. TAZ and TGZ files are TAR files compressed in the gzip format. Since almost all new archives are created in Zip format, WinZip does not provide facilities to add to or create files in these formats (however, all other WinZip functions are supported). WinZip does not use external programs when working with files in these formats.
- File formats such as UUencoded, XXencoded, BinHex, and MIME are used primarily to transfer binary files by Internet e-mail. If you encounter one of these files, you can open it and extract its contents with WinZip. You can UUencode an archive using the UUencode entry in the WinZip Actions pull-down menu. WinZip does not use external programs when working with files in these formats.
- WinZip also handles most files in the old Microsoft Compress format (also known as LZEXPAND format). However, there are several variations on this format, and Microsoft has not released documentation on these variations. WinZip issues an appropriate message if you attempt to decompress a file not supported by your version of Windows. Microsoft Compress files usually end with a trailing underscore, for example, "commdlg.dl\_". Like Z and GZ files, Microsoft Compress format files contain only one file. This format is used for many files on the Windows 3.1 distribution disks and many older Microsoft products. Note that not all files ending with an underscore are Microsoft Compress format files. WinZip does not use external programs when working with files in these formats.
- The Microsoft CAB (short for Cabinet) format is used by most Microsoft setup programs, including those used to install Windows. CAB files provide both file compression and file grouping. You can use WinZip to open and extract the contents of CAB files. WinZip will handle most self-extracting CAB files. WinZip does not use external programs when working with CAB files.
- ARC, ARJ, and LZH are older formats that provide both grouping and compression, like Zip files. Unlike other supported file formats, WinZip's optional support for these formats requires external programs that are not included as part of the WinZip distribution.

## Files

In our introductions, we defined a document as what you create in an application. In a word processor, the characters you type constitute a document. For a graphics application, the drawings you perform or the picture you manipulate is called a document. In order to keep such a document for later use, you must store it somewhere. A file is an object used to hold a document. Put it another way, in order to have a file, you must save a document. We have mentioned how to save a document. Like a folder, you must name a file when saving a document. The name of a file follows the same rules we defined for a folder.

## FILE MANAGEMENT

### Bits and Bytes

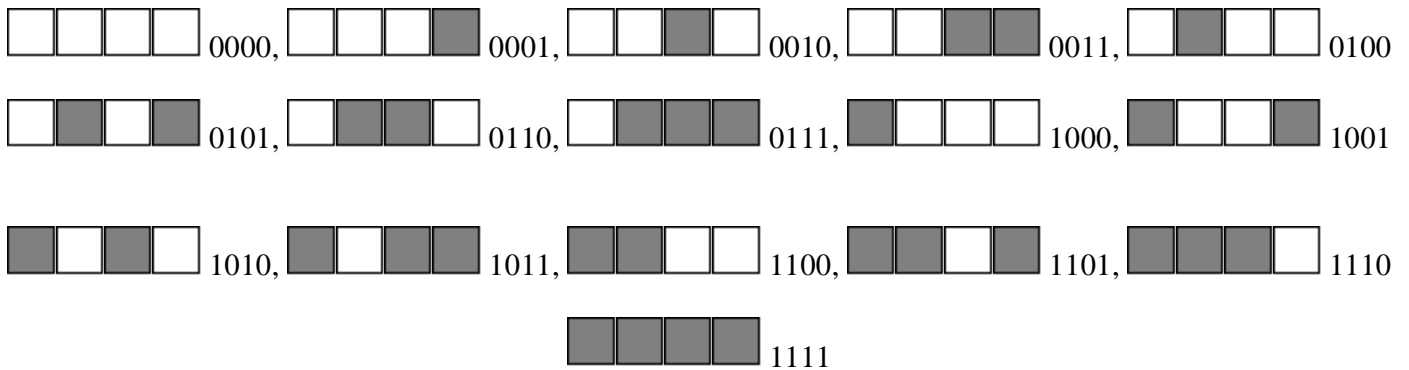
To hold information, a medium such as a hard disk uses a system that resembles a combination of small boxes. Let's illustrate it as follows:



This box can hold only a small piece of information. It can only be either 0 or 1. When the box is empty, it holds a value of 0. When it is full, it holds a value of 1:



You can represent a piece of information with one of two states. This box used to represent a value is called a binary digit; in its abbreviated form, it is called a **bit** (for *binary digit*).

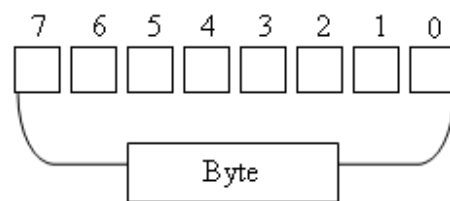


This produces the following binary combinations: 0000, 0001, 0010, 0011, 0100, 0101, 0110, 0111, 1000, 1001, 1010, 1011, 1100, 1101, 1110, 1111 = 16 combinations. When using the decimal system, these combinations can be represented as 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, and 15.

This combination is also a system that the computer uses to count bits internally. This technique is valuable and allows you to always identify a number as a divider of 4.

When all bits of a group of 4 are 0, the combination has the lowest value, which is 0000. Any of the other combinations has at least one 0 bit, except for the last one. When all bits are 1, this provides the highest value possible for a group of 4 bits. The lowest value, also considered the minimum value, can be represented as 0. The highest value, also considered the maximum, can be expressed in decimal value as  $2^4$  (2 represents the fact that there are two possible states: 0 and 1; 4 represents the fact that there are four possible combinations), which is 16. This produces 16 because  $2^4 = 16$ .

A combination of 8 consecutive bits is called a **byte**. The bits are counted from right to left starting at 0:



You can represent a byte using a combination of 0s and 1s. If you have the patience to create combinations of bits using the boxes as we did for the group of 4, you would find out that there are 256 possible combinations. Another way to find it out is by using the base 2 technique:

$$\begin{aligned}
 &2^7 + 2^6 + 2^5 + 2^4 + 2^3 + 2^2 + 2^1 + 2^0 \\
 = &128 + 64 + 32 + 16 + 8 + 4 + 2 + 1 \\
 = &255
 \end{aligned}$$

Therefore, the maximum decimal value you can store in a byte is 255. Remember that the byte with all bits having a value of 0 has its value set to 0. Since this byte also holds a valid value, the number of combinations =  $255 + 1 = 256$ .

The only type of information you can store in a byte is a character or symbol, such as a readable letter from the alphabet: a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z, A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, and Z. Besides these readable characters, a byte can also hold one digit: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. A byte can also hold a readable or non-readable symbols such as ` ~ ! @ # \$ % ^ & \* ( ) - \_ = + [ { ] } \ | ; : ' < ? . / , > "

This means that a combination of 8 bits, called a byte, is enough to represent one symbol recognized in the English language. In this globalization word, a computer also needs to be able to store characters from other Latin-based languages such as letters from Français or Español. To make this possible, instead of 8 bits, the operating system must use 16 bits. A combination of 16 consecutive bits is also called a word.

A group of 1000 bytes is supposed to be called a kilobyte but, based on the way the computer calculates the bits, a group of 1024 bytes is called a kilobyte or KB. A group of 1,000,000 bytes is called a megabyte but actually it is a group of 1,024,000 bytes that is called a megabyte or MB. A group of 1,000,000,000 bytes or actually a group of 1,073,741,824 bytes is called a gigabyte or GB.

### **The Size of a Drive**

Because a drive cannot have unlimited space, it is recognized for its size. The size of a drive can be measured by, or specified in, MB or GB. For example, a typical CD can hold 700MB of data. A regular DVD can hold information up to 4.7GB in size. The sizes of hard drives are very varied. To find the size of a hard drive in your computer, from either Windows Explorer or My Computer, you can right-click the drive letter and click Properties.

### **The Size of a File**

In order to keep track of the various files in a computer, each file has a size. The size of a file can be measured in bytes, kilobytes, or megabytes. To know the size of a file, in either Windows Explorer or My Computer, you can right-click it and click Properties.