

MODULE 4:
MAINTAINING COMPUTER AND NETWORK SYSTEMS

Content Standard	Performance Standard
The learner demonstrates understanding of the underlying concepts and principles on configuring computer systems and networks.	The learner independently demonstrates skills in configuring computer systems and networks as prescribed by TESDA Training Regulations.

Number of Sessions (Time Allotment):60 HOURS

 **•Introduction**

Computer Hardware Servicing: This course provides an excellent introduction to the Information and Communications Technology (ICT) industry and in-depth exposure to personal computers, hardware, and operating systems in accordance to local industry requirements and standards. You will learn the functionality of various hardware and software components and best practices in maintenance and safety issues.

In this module, topics will be introduced progressively, for easy understanding. After carefully answering the pre- assessment, reading all the lessons, answering all the guide questions, performing all the activities, showing pieces of evidences of learning and answering the summative test, you will have a considerable knowledge and skills in installing computer systems and networks essential to be successful in computer hardware servicing as one of the career options in ICT.



• Learning Competencies /Objectives

There will be three (3) major topics that you will encounter: (1) will be maintaining computer systems; (2) maintaining network systems; (3) inspecting and testing configured/repaired computer systems and networks. The three major topics contains sub-topics which the ultimate goal to teach you how to maintain computer and network systems. This module contains what to KNOW, what to PROCESS, what to REFLECT and UNDERSTAND as well as what to TRANSFER. The competencies for this module are:

LO 1. Plan and prepare for the maintenance of computer system and networks

- Plan on how to maintain computer systems and networks
- Identify tools in maintaining computer systems and networks
- Inspect testing equipment and devices
- Check PC specifications
- Verify network functions and specifications

LO 2. Maintain computer systems

- Identify faulty computer systems
- Test normal functions of computer systems
- Perform repair and replacement of faulty computer systems
- Adhere to the recommended schedule and techniques in maintaining and cleaning computer systems
- Respond to sudden breakdowns of computer systems in accordance with established procedures

LO 3. Maintain network systems

- Follow OHS procedures in maintaining network systems
- Identify procedures in maintaining network systems
- Check or run the diagnostic software
- Adhere to the recommended schedule and techniques in maintaining and cleaning network systems
- Respond to sudden breakdowns of network systems in accordance to established procedures
- Run the burn-in test on computer systems

LO 4. Inspect and test configured/repaired computer systems and networks

- Maintain the computer systems and networks to ensure safe operations
- Run or conduct computer-to-computer communications
- Connect computer systems to the internet
- Check computer system and network to ensure safe operations
- Run the burn-in test on computer systems
- Conduct final inspection on the tests undertaken
- Prepare technical reports that comply with the job requirements

In order to master the above listed competencies, you must be knowledgeable of the topics under what to KNOW, perform activities required under what to PROCESS, accomplish additional meaningful tasks under what to REFLECT and UNDERSTAND and finally show some pieces of evidence of your learning by transferring what you have learned in a different context under what to TRANSFER.



• Pre- Diagnostic / Assessment

You will be challenged to dig deeper into your prior knowledge and previous experiences about computer hardware servicing.

SKILLS TEST

Directions: Listed below are some of the most important skills that you must master in order to render quality service when you enter the industry of Computer Hardware Servicing. Read the skills carefully. Write “YES” if you can do the skill and “NO” if not. Feel free to answer each skill. Write your answers in your notebook.

I can...	YES	NO
plan and prepare work to ensure occupational health and safety (OHS) policies and procedures are followed.		
obtain materials, tools, equipment and testing devices needed to conform with job requirements.		
interpret work instructions according to job requirements.		
obtain computer components/ devices/ systems and determine its location prior to installation.		
install equipment / devices / systems in accordance to job requirements.		
check / test devices / systems and / or installations to determine the conformity to job requirements.		
check computer systems and networks for configuration in accordance with specifications and requirements.		
diagnose fault or problem in the computer systems and networks in line with standard operating procedures (SOP).		
configure the identified systems and networks based on specifications and job requirements.		
inspect and test configured computer systems and networks in conformity with manufacturer's instructions / manual.		
correct / adjust components or parts of computer systems and networks in accordance with job requirements.		

test computer systems and networks to ensure safe operation.		
perform scheduled / periodic maintenance in accordance with manufacturer's requirements.		
make needed repairs / replacements in accordance with established procedures, when necessary.		
clean and clear worksite of all surplus/excess materials in accordance with company SOP.		



• **Reading Resources / Instructional Activities**

Lesson 1. Procedures in Planning and Conducting Maintenance

Preventive Maintenance

Preventive maintenance can be described as maintenance of equipment or systems before fault occurs. It can be divided into two subgroups: Planned Maintenance and Conditioned-Based Maintenance.

Planned Maintenance (PM) is any variety of scheduled maintenance to an object or item of equipment. Specifically, PM is a scheduled service visit carried out by a competent and suitable agent, to ensure that an item of equipment is operating correctly to avoid any unscheduled breakdown and downtime of an equipment.

Condition Based Maintenance (CBM) is a maintenance strategy that uses the actual condition of the asset to decide what maintenance needs to be done. CBM dictates that maintenance should only be performed when certain indicators show decreasing performance or upcoming failure. Checking a machine for these indicators may include non-invasive measurements, visual inspection, performance data and scheduled tests. Condition data can be gathered at certain intervals, or continuously.

The purpose of systematic inspection, detection and correction of existing / future problems is very important to maintain equipment / facilities in satisfactory condition before it may cause major problem.

Maintenance, including tests, measurements, adjustments, and parts replacement, performed specifically to prevent faults from occurring.

Maintenance is divided into two (2) general type. Preventive maintenance is given for maintaining equipment and facilities in satisfactory operating condition to extend the life of the equipment. Corrective maintenance is task performed to identify, isolate and rectify a fault so that the failed equipment or system can be restored to an operational conditions within the tolerances or limits.

Common methods of determining what preventive (or other) failure management policies should be applied are: Original Equipment Manufacturer (OEM) recommendations, requirements of codes and legislation within a jurisdiction, what an "expert" thinks ought to be done, or the maintenance that is already done to similar equipment, and most important measured values and performance indications.

Maintenance Procedures

In preparing maintenance procedure, you also have to consider designing a systematic plan for both for hardware and software. This saves time, money and frustration and ensures safe conditions to prevent injury to people and damage to computer equipment.



Figure 123. Computer Inspection

Planning Maintenance Procedures for Computer System and Networking:

A. Design a systematic maintenance plan for hardware.

1. Design a monitoring, evaluating and updating plan.
2. Place your computer in a well-ventilated area.
3. Schedule the use of computer for its longer life.
4. Move the computer only when it is turned off and unplugged.
5. Treat your computer properly.

B. Design a systematic maintenance plan for your software.

1. Backup your files.
2. Install or secure passwords.
3. Delete temporary files.
4. Update anti-virus and spyware.

Design a systematic monitoring, evaluating and updating plan for hardware.

Computers have significantly changed the working environment, simplifying and speeding up many tasks across many work areas. However, with these advances are some potential problems and maintenance issues. These guidelines describe how computer technicians, students and computer users can work together to achieve a productive workplace environment. The guidelines reflect current knowledge and best practice for the use of computers so you can achieve maximum efficiency and safety in your workplace.

SAMPLE MONITORING PLAN

	Date:					
	Comp 1	Comp 2	Comp 3	Comp 4	Comp 5	Recommendations
Monitor is functional.						
Printer Cartridges are replaced.						
Storage devices are functional.						
Optical Drives are functional.						

Place your computer in a well-ventilated area.

- This will allow proper circulation of air inside the computer unit.



Figure 124. Computer Laboratory

Schedule the use of computer for its longer life.

- This will help lessen the attacks of viruses and increases the life span of your computer.



Figure 125. Computer Usage

Move the computer only when it is turned off and unplugged.

- To avoid damage to the computer unit always turn off and unplug it when transferring the computer to another location.



Figure 126. Unplugged Power Cable

Treat your computer properly.

- This means taking care of your computer. PCs and laptops should be properly turned off.



Figure 127. Computer care

Do systematic maintenance plan for your computer software.

Back-up your files

- Protecting your files means creating backups, storing your file backups on your hard drive or any removable storage device regularly.



Figure 128. Backup Media

Install or secure passwords.

- Installing passwords makes your files more secure.



Figure 129. Installing Passwords

Delete temporary files.

- Deleting the temporary files on your computer will enhance its speed and will create more disk space for your files.

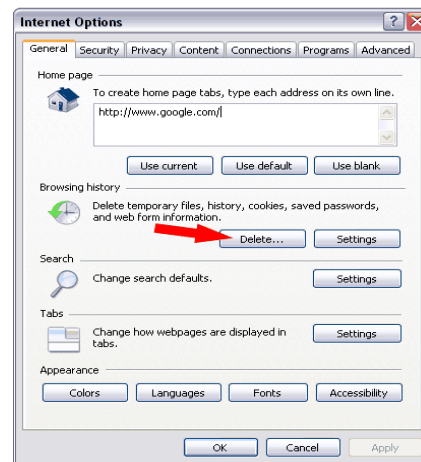


Figure 130. Deleting Temporary Files

Update anti-virus and spy ware.

- Regularly update your anti-virus for your computer protection against viruses.



Figure 131. Updating Anti-Virus



•What to KNOW

Diagnoses and Identification of Faulty Computer and Network Systems

The following topics will familiarize you with planning and preparing for installation; installing equipment and devices; and conducting test on the installed computer system. Read carefully all the topics and apply the skills you have gained from the lessons provided in this module.

A. Preventing Computer Systems Failure

Computers, in general, are pretty stable, and you can usually rely on them to not fail you. However. If you develop some basic habits, you can postpone serious computer problems, if not avoiding them entirely.

1. **Computer issues.** Know that your computer is going to fail. You need to treat your computer as if it were a doomed failure. Always assume that failure is imminent.

A fatal error results in data loss, damage to your computer and/or its ability to function, hardware failure, or other serious issues.

Signs of imminent failure might include regular poor performance, frequent errors and/or popups, unknown programs being installed, frequent power loss (the computer shuts down automatically frequently), frequent crashes, or certain parts not working.

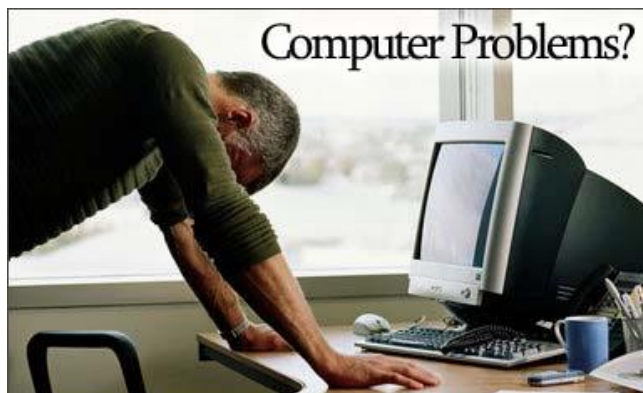


Figure 132. Computer issues

2. **Dust issues.** Preventing failure means making sure your computer is physically clean in its operations. Make sure that there is not too much dust inside, especially on the fans. Dust can reduce performance and cause overheating.

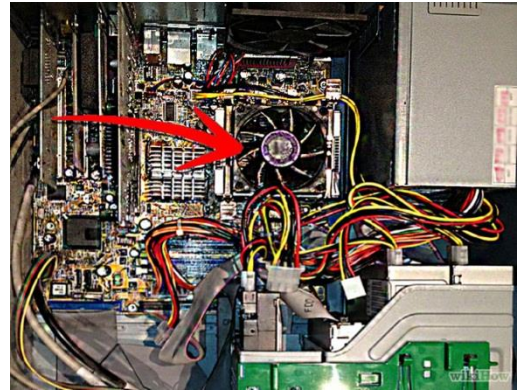


Figure 133. Inside the System Unit

3. **RAM issues.** Know your computer's specifications and its limits. RAM runs even the PC is running idly. It consumes RAM storage capacity making you difficult to open a program if RAM storage had been consumed.

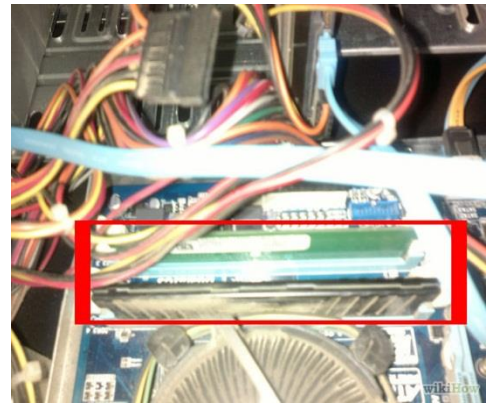


Figure 134. Random Access Memory

4. **Malware issues.** Make sure that your anti-virus software is updated to be able to scan unnecessary files that enter your PC. Do not install programs that you're not familiar with or if do not fully trust.

5. **Hardware issues.** When something is not working properly, either diagnose the problem yourself and fix it, to prevent further damage or contact a professional and have them look at it for you. Take advantage of warranties on parts if they fail.



Figure 135. Hardware

6. **Warning issues.** If the same error message shows up every time you log in, be sure to investigate it. Although unlikely, these errors could be important.



Figure 136. Error Messages



Figure 137. Power Off

7. **Usage issues.** Give your computer a break. Believe it or not, your computer likes rest, too. Leaving it on all of the time wears out hardware, and puts unnecessary wear and tear on the hardware. Giving your computer a break also saves you money (electrical bills).

8. **Warranty issues.** Always take advantage of warranties. Get a warranty to protect your hardware, so it can be replaced in case of failure.



Figure 138. Warranty Sticker



Figure 139. Storage Media

9. **Backup issues.** Back-up everything. Run regular backup of your important files to other disks, computers, or an online backup service.

10. **Error message issues.** If your PC fails to function, diagnose the problem. Write down the necessary info such as error messages or things don't work properly. If you know how to fix it, do it, to avoid further damage but if not then seek for professional help.

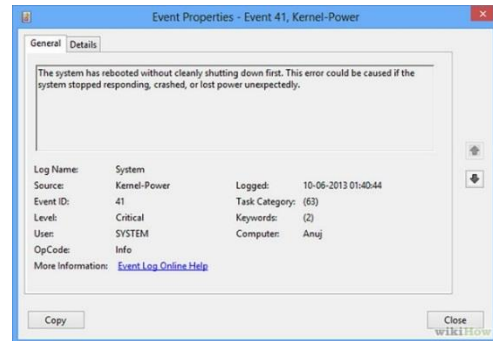


Figure 140. Error Messages

Network Problems

When you suddenly cannot connect to the Internet, any of several things could be wrong. Use this checklist to find and solve common Internet connection problems.

1. Unplugged Network Cable

Unplugged or loose network cables are one of the most common reasons why you might suddenly find yourself unable to connect to the Internet. That's a problem on wireless networks, but on most laptops the wireless-fidelity (Wi-Fi) radio can be inadvertently shut off instead. On home networks, it's also possible that someone unplugged the router.

Action: Ensure your wired or wireless network hardware is switched on and plugged in.

2. Website Temporarily Offline

What may seem to be a network problem connecting to the Internet is sometimes simply a Web site (or whatever server is on the other end of the connection) being temporarily offline.

Action: Before assuming your Internet connection is faulty, try visiting several popular Web sites rather than just one.

3. IP Address Conflicts

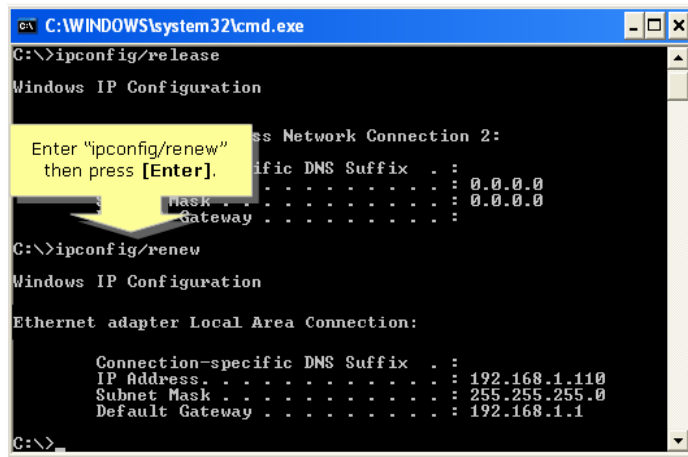
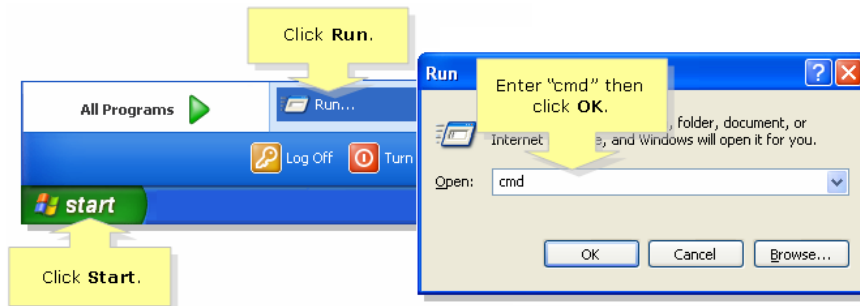
If your computer and another on the network both have the same IP address, the conflict between them will prevent either from working properly online.

Action: To resolve an IP conflict, follow these instructions to release and renew your IP address. If your network uses static IP addresses, manually change your IP to a different number.

Windows XP

Step 1:

Click **Start > Run**. In the **Run** window, enter “**cmd**” then click **OK**.



Step 2:

On the command prompt, enter “**ipconfig/release**” then press **[Enter]**.

Step 3:

Once the IP address becomes **0.0.0.0**, enter “**ipconfig/renew**” then press **[Enter]**.

4. Computer Firewall Malfunctions

Firewall software running on most computers is intended to prevent unwanted network traffic from disrupting its operation. Unfortunately, these software firewalls can malfunction and start blocking valid Internet traffic. When two software firewalls, such as Windows Firewall plus a third-party

product, are installed on the same computer, contention between the two can also incorrectly block traffic.

Action: If you have recently installed or upgraded software firewalls on your computer, temporarily disable them to determine whether it may be the cause of Internet connection problems.

5. Outside Wireless Signal Range

The performance of Wi-Fi network connections depends on distance between the device and the wireless access point. The farther away a Wi-Fi device is, the slower the local connection generally runs, until it breaks altogether. Wireless signal interference in the area can also limit the effective range of a Wi-Fi connection. Whenever you are unable to reach the access point, you also cannot connect to the Internet, obviously.

Action: Use one of the options written below to measure the strength of your wireless signal and try these ideas to expand the range of your Wi-Fi.

Ideally, you should place the router at a height in some central location and away from other cordless devices. Make sure that the router is not placed near something metallic (like an almirah or window grills) as that will weaken the wireless signals. Avoid mirrors as they can reflect the wireless signals away from the desired direction.

Wireless routers generally ship with omni-directional antennas but you can replace them with more powerful uni-directional antennas and that will keep the signal from getting broadcast in all directions.

6. Wireless Network Configuration

Wi-Fi networks with encryption options like WPA or WEP turned on require computers to use matching security keys when connecting. If someone changes the encryption keys or password on the access point, devices that worked before will suddenly be unable to establish sessions and Internet connections. Likewise (though less likely), if the access point settings are changed to require using a specific Wi-Fi channel number, some computers may be unable to discover it.

Action: Confirm that the Wi-Fi channel number and encryption keys on your router have not recently changed (check with the network administrator if necessary). When using a hotspot, follow the provider's instructions for signing in carefully.

7. Broadband Router or Access Point Malfunctions

Home networks that use broadband routers are easier to manage than those without one, but technical glitches with the router can also prevent computers from connecting to the Internet. Router failures are caused by overheating, excessive traffic, or simply a faulty unit. Typical symptoms of a flaky router include computers on the network not being able to obtain IP addresses, or the router console not responding to requests.

Action: Check the router's lights and console if possible to ensure it is running and responding properly. Troubleshoot and reset the router if necessary. Change the old router if necessary.

8. Blocked By Your Service Provider

Internet Service Providers (ISPs) can choose to block access from your account if you fail to make payment or otherwise violate the provider's Terms of Service. Especially when using paid hotspots that charge by the hour or day, sometimes people forget to keep their subscription updated. Other common reasons an ISP might block your account include exceeding bandwidth caps, sending spam e-mail, and downloading illegal or inappropriate content.

Action: Contact your ISP if you suspect your account has been blocked.

9. Computer Glitches

Computers suffer from technical glitches or malfunctions. Although relatively uncommon nowadays, a computer's network adapter hardware might suddenly fail due to overheating or age. Failures in the operating system software that control the adapter, on the other hand, can occur frequently especially with computers that are heavily used. Viruses and worms also may disable or block a computer's network interfaces from functioning properly. If using a laptop or other mobile device, transporting it from one location to another can corrupt the state of its network.

Action: Check the computer and remove any malware that you will find. On Windows computers, try resetting the network connection. Reboot the computer if necessary.

10. Network Downtime

Those using satellite Internet service may notice they cannot connect to the Internet during periods of very bad weather. Providers in dense urban areas (including cellular Internet carriers) sometimes are unable to support

peaks in network traffic that causes sporadic outages for some customers. Finally, those who subscribe to newer or more complex forms of Internet services (such as fixed wireless broadband) may experience more downtime than others as providers encounter more issues with relatively less mature equipment.

Action - If all else fails, contact your Internet provider to verify whether they are experiencing an outage. Some providers also give advice on troubleshooting problems connecting to their network.



• What to PROCESS

Slide Show Computer and Network Errors

Directions: In this worksheet, you will write the computer errors/problems, error messages and the network problems you encountered. Create a Powerpoint presentation.

Be prepared to discuss your answers.

Computer Problems	Network Problems



• What to REFLECT / UNDERSTAND

Pictorial Tour

Directions: Form a group of five members and make an additional research on the different diagnoses on faulty computer and network systems. Visit computer shops in your community. You can also interview/observe a practitioner while lending a quality service in computer hardware servicing.





• What to TRANSFER

Video Demo

Application of Diagnosis on Faulty Computer and Network Systems

Directions: After the interview and observation with a practitioner, your group will showcase what you have learned through video demo. You can use a video camera to record the event stressing the diagnosis on faulty computers and networks system. This event will be presented through a video presentation using projectors or monitors. You will be rated based on the rubrics written below:

CRITERIA	PERCENTAGE	SCORE
Accuracy (Role and function of a device was accurately shown)	30%	
Presentation (Organization or sequence of the play and appropriate gestures were used)	30%	
Clarity (Diagnosis clearly delivered)	30%	
Team work (Cooperation of each member was evident)	10%	
Performance Rating		



• What to KNOW

Maintain Computer and Network System

As a future computer technician, you must be diligent and eager to know the different procedures in using the tools for configuring computer and network systems because this will guide you to carry out a particular job in a proper manner. Once you already identify the competencies, you must also acquire the appropriate skills to apply it in real time situations.

This part will help you to find out some of the required procedures in computer system configuration. Some of them are intentionally not included so that you will have a chance to explore and learn through your own experience and study.

The subsequent statements below describe the varied procedures in using **Action Center** in the **Control Panel**:

Windows and other Microsoft products have their own built-in troubleshooting tools that bear little or no resemblance to the Fix It troubleshooters. Windows 7's Action Center Control Panel applet alerts you to system problems via an icon in the taskbar's notification area. You can also use the **Action Center** to view the machine's security and maintenance status.

Go to the Action Center's link to the Control Panel's Troubleshooting applet to find about a dozen options for fixing problems related to program compatibility, hardware and audio, networking, security, Windows Update, performance, and power usage. (Information for troubleshooting Vista and Windows XP is available on Microsoft's TechNet site.) Here is how:

- 1) Click on the Start Button.
- 2) Choose Control Panel.
- 3) Select System and Security.
- 4) Choose Action Center.
- 5) On the Action Center, browse and check all the options for systems check.

- Security (View Anti-Spyware Programs, update virus protection)
- Maintenance (Perform System Maintenance, Check for Solutions for unreported problems, Setup Backup)
- Troubleshooting
- Recovery

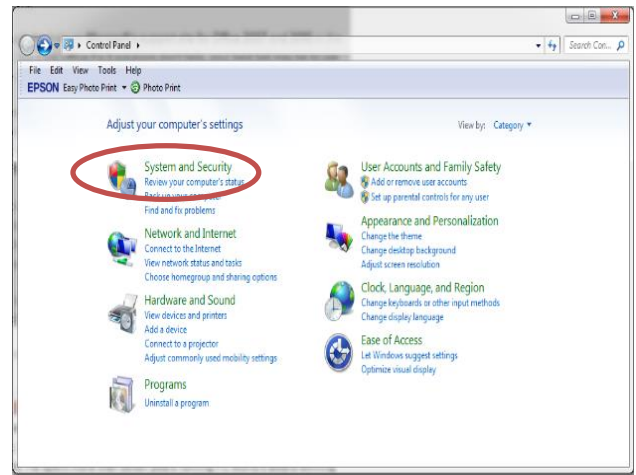


Figure 141. Control Panel

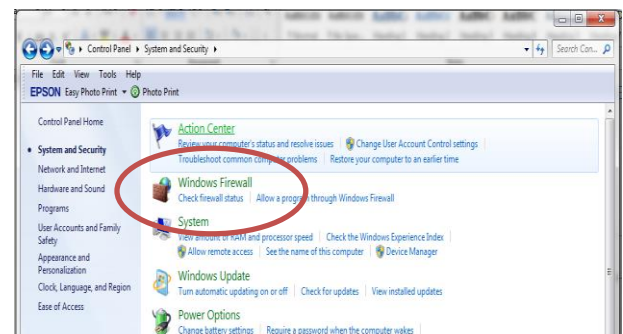


Figure 142. System and Security

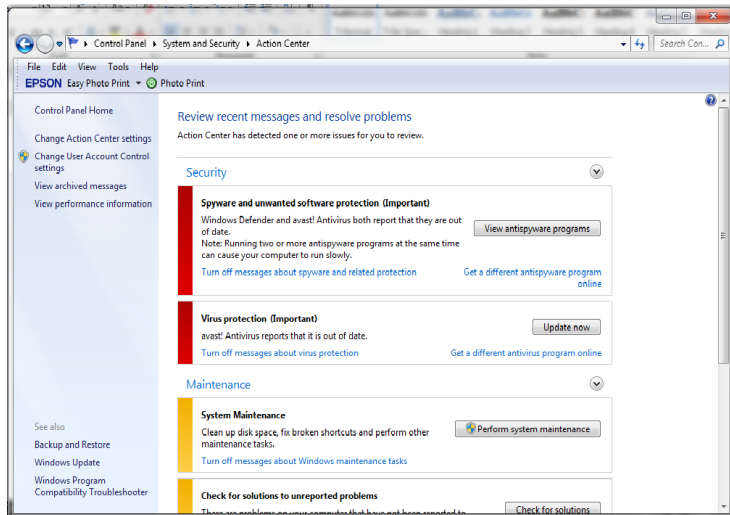


Figure 143. Action Center Dialogue Box

Windows Security Center can help enhance your computer's security by checking the status of several security essentials on your computer, including firewall settings, Windows automatic updating, anti-malware software settings, Internet security settings, and User Account Control settings. If Windows detects a problem with any of these security essentials (for example, if your antivirus program is out of date), Security Center displays a notification and places a Security Center icon Picture of the red Security Center shield in the notification area. Click the notification or double-click the Security Center icon to open Security Center and get information about how to fix the problem.

When it comes to problems with Office applications, you are not likely to find much help in the programs' built-in help systems. (Note that Office 2007 apps include a built-in diagnostic routine. See the Microsoft Support site for more information.)

You could attempt to sort through the links on Microsoft's support site for Office 2007 and 2010 or the equivalent site for Office 2003, but if the Office Fix It solutions do not help, your best bet may be to use the repair feature of the Office installer.

To do so, open the Control Panel Programs and Features applet (Add or Remove Programs in Windows XP), select your version of Office, click the Change button at the top of the list, then select Repair button in the wizard that opens, and follow the wizard's instructions. The Microsoft Support site provides more information about repairing Office 2010, Office 2007, and Office 2003.

Even if your system appears to be running well, you may benefit from using Microsoft's Fix It and other diagnostic tools. Most PC users rely on automatic updates of their system, security, and application software. But programs sometimes conflict in ways their vendors cannot predict. Few of these software glitches slam the brakes on your system but they are likely to slow it down a little or a lot.



•What to PROCESS

Investigate and Interpret: Computer Systems Check

Directions: In this worksheet, you will check and write down the current status of your computer systems before the updates and after the updates with regard to the different area listed below. Be prepared to discuss your answers and the updates made.

Area	Status (Before Updates)	Status (After Updates)
Security		
1) Anti-Spyware Programs		
2) Anti-Virus		
Maintenance		
1) System Maintenance		



• What to REFLECT / UNDERSTAND

Investigative Report

Directions: To deepen your understanding about computer systems status, search online or you can also interview a practitioner while rendering a quality service in computer hardware servicing. Present your report to the class.

Ask their Profile (Name, Job description, Age, Business Name).

1. Interview them about procedures in maintaining their computer and network systems or usual problems they encountered.

CRITERIA	PERCENTAGE	SCORE
Accuracy (Details in maintaining computer and network systems were elaborated well).	30%	
Clarity (Clearly delivered each topic)	30%	
Presentation (Organization or sequence of information)	10%	
Performance Rating		



• What to TRANSFER

Magazine Article

Directions: Make an article regarding to the effects of ignoring computer problems. Use the questions below as your guide in writing your article. Use striking title and be creative. Be ready for an oral presentation.

1. What is the risk of turning off messages about spyware and related protection?
2. What is the risk of turning off messages about virus protection?

	Contents	Excellent (5)	Good (3)	Poor(1)
Spelling	Almost all words spelled correctly			
Capitalization	Begins all sentences but one with uppercase letters.			
Punctuation	Correct ending punctuation in every			



	sentence but one.			
Grammar	Simple sentences are grammatically correct.			
Handwriting	Legible. Good spacing and alignment.			
	Total Points			



• What to KNOW

COMPUTER SPECIFICATIONS

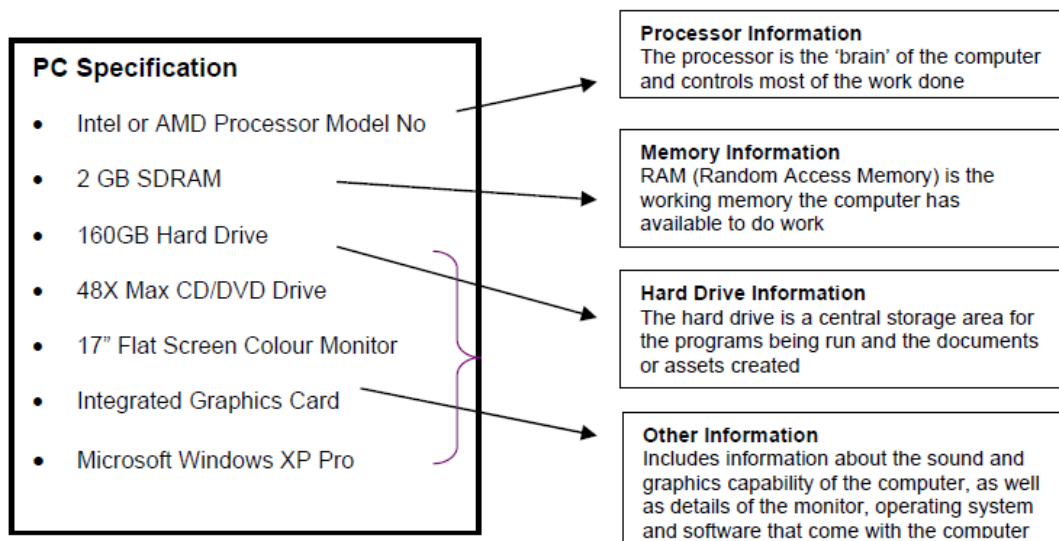
What is Specification?

The specification or 'spec' is a list of the key components that make up the computer. It is provided by retailers to help buyers decide which PC, and which combination of features, they need. When buying a PC you start by deciding what you want your PC to do. This tells the specification you actually need.

When reviewing a computer specification, the most important component to take are the processor, the size of RAM and the size of the hard drive as these are central to the overall capability of the system. If it is planned to use specialized programs for students with special needs, it is advisable to purchase a suitable specification computer to meet the system requirements for these programs.

Understanding a Specification

Sample specification for a certain desktop computers:



Processors

Two companies - Intel Inc. and AMD Inc. – are the manufacturers of most of today's PC processors and both offer a range that balances price and performance. Processors are generally defined by their speed, in megahertz (MHz) or in gigahertz (GHz), and this relates to the number of operations they can perform per second. The higher the value, the faster the PC will perform and the more expensive it is. More recent and more powerful processors use a 64 Bit architecture, rather than the previous 32 Bit models.

Memory (RAM)

	Entry-level processors	Mid-range processors	High-end processors
IDEAL FOR	<ul style="list-style-type: none"> • Office applications • Internet browsing • Basic graphics programs • Home computing 	<ul style="list-style-type: none"> • Educational software • Office applications • General multimedia applications • Internet browsing 	<ul style="list-style-type: none"> • Processor intensive multimedia creation applications, e.g. 3D graphics and video editing • Office applications • Internet browsing
PROCESSOR TYPES	<ul style="list-style-type: none"> • Intel Celeron D • AMD Sempron 	<ul style="list-style-type: none"> • Intel Pentium 4 • AMD Athlon (32 Bit) • AMD Opteron 	<ul style="list-style-type: none"> • Xeon • AMD Athlon 64 X2

The main working memory in a computer is called random access memory or RAM. The processor uses this memory to run programs. RAM is measured in megabytes (MB). Most modern computers use DDR 2 RAM.

A minimum of 2024 MB (2GB) of RAM is recommended for general purpose PCs. 2048 MB (2GB) of RAM is also sufficient for PCs running multimedia applications, i.e., those on which digital music, digital video or high-end graphics are being created/edited.

Storage – The Hard Drive

The hard drive is the computer's primary storage area. It stores the applications and programs that run on the PC, as well as any work created by users. From a school's perspective, the capacity of the hard drive, measured in gigabytes (GB), is a key criterion and should be given due consideration when reviewing PC specifications.

A hard drive capacity of at least 80GB is recommended for general purpose PCs. A hard drive capacity of 200GB or more is recommended if working with multimedia applications where large graphics and digital audio/video files are being created and stored.

Other Specifications

Monitors

The older Cathode Ray Tube (CRT) have been largely replaced by Liquid Crystal Display (LCD) and Light Emitting Diode (LED) flat-screens. A 15" LCD/LED has the same viewing area as the older 17" CRT.

Average entry-level PCs usually come with a 17" flat-screen and this is adequate for most general purpose applications.

Larger 19" flat-screens are available and may be appropriate if video editing and advanced graphics work is being carried out.

Teachers of students with special needs may want to consider using larger monitors with their students.

Optical Drives

CD R/W drives are standard on PCs and allow the information on a compact disc (either data or audio) to be *read* and written to by the PC. It is defined by its speed (i.e., 48x or 48 speed).

DVD drives can *read* both CDs and DVDs. Standard on entry level computers are 48x DVD-ROM/CD_RW drives and allows you to copy blank CDs. High performance computer use 52x DVD-RWs. Educational software is being developed in both DVD and CD formats, but a DVD can hold over 25 times more data than a CD.

Graphics and Sound Cards

These cards are installed inside a PC and are responsible for determining the quality of the audio and visuals (graphics and video) output by the computer. They hold their own memory (in MB), which is why they add to a computer's capability.

An integrated graphics card with 256MB of memory is recommended for general purpose PCs.

Computers running high-end applications generally require a separate 256MB graphics card.

A sound card generally comes as standard in most PCs purchased today. If students intend to work extensively with digital music, the school should consider getting a high-end sound card as this will create greater depth, complexity and realism of sound.

Speakers and Headphones

Most computers come with either built-in or external speakers. Schools may also consider buying headphones to control sound levels within a classroom or computer room. Cheap 'headphone splitters' can also be purchased — these enable two sets of headphones to be used per computer.

Network Interface Card (NIC)

It is recommended that all PCs be purchased with a suitable network interface card (NIC). A network card allows a computer to be connected to a network. A 10/100/1000 Mbps (Megabits per second) card is the standard network card today. Few school networks currently operate at speeds higher than 100Mbps.

Operating Systems (OS)

PCs are generally purchased with an operating system pre-installed. It is worth checking that your existing software will still work with the operating system of any new systems being purchased. It may be possible to choose a particular operating system and, if so, this may help standardize new machines with existing school PCs.

At present, Microsoft's newer OS is Vista, which generally performs the same functions as Win XP. Microsoft XP Professional is still the most common and recommended OS found in schools that meets their general needs very well and is recommended for schools. As Vista operating system can come in various types and configurations, schools should check that the version of Vista will be suitable and compatible for the software and network infrastructure of the school. Vista Home or XP home versions are not recommended for use in schools, however when ordering computers schools need to specify a base operating system. The choice of base operating system should be made along with their choice of operating system license. Operating system license costs depend on a number of factors including type of school, or type of license, example once off purchase via Microsoft's select

agreement or purchasing software per year via Microsoft's schools agreement.

Linux is an open source free operating system which is not widely used by schools at present, though it may be suitable for schools who are aware of its capabilities. The most widely used open source data base is Ubuntu. It is a Linux based operating system and is distributed free along with the source code. Its desktop looks somewhat similar to that of Windows, with window controls and icons. There is reasonable large software support available on Ubuntu; the common applications include Mozilla Firefox web browser, LibreOffice office application suite, GIMP image editor.

OpenSolaris is a computer operating system developed by Sun Microsystems. It runs well on desktops, laptops, servers and data centers. OpenSolaris is GUI based like Ubuntu and has rich graphical desktop and windows for easy navigation. It is now available in version 11 and can be downloaded without any cost from the Oracle website.

Purchasing Considerations

Consider the following points when purchasing PCs

- What is the intended use of the PC and will the chosen specification fulfill these aims?
- Is the PC compatible with existing computer equipment and software?
- Is the technical support service satisfactory?
- a minimum 1 year warranty including replacement if needed and full parts and labor is recommended
- Will added peripherals be required such as headphones, and optical mice.
- Easy access of multiple USB ports
- Operating System licensing options





•What to PROCESS

Internet Research

In this worksheet, you will use the Internet, a newspaper, or a local store to gather information about the components you will need to complete your customer's computer. Be prepared to discuss your selections.

Instructor Note: All the components a student chooses must be compatible with the components provided. (For example, the selected CPU and RAM must work in the provided motherboard) No budget has been given. Answers may vary.

Your customer already owns the case described in the table that follows.

Brand and Model Number	Features	Cost
Cooler Master CAC-T05-UW	ATX Mid Tower ATX, Micro ATX compatible form factor 2 External 5.25" drive bays 2 External 3.5" drive bays 2 Internal 5.25" drive bays 7 Expansion slots USB, FireWire, audio ports	

Search the Internet, a newspaper, or a local store to research a power supply compatible with the components that your customer owns. Enter the specifications in the table that follows:

Brand and Model Number	Features	Cost
Sea Sonic SS-550HT	550 watt Dual +12V SLI Certified Up to 88% efficiency ATX12V/EPS12V form factor	

Brand and Model Number	Features	Cost
GIGABYTE GIA-965P-DS3	LGA 775 DDR2 800 PCI Express X16 SATA 3.0 Gbps interface 1.8V-2.4V RAM Voltage 1066/800/533 MHz Front side bus 4 memory slots Dual-channel memory supported ATA 100 connector RAID 0/1 4 USB 2.0 ports ATX form factor	

Answer the following:

1. List three components that must have the same or compatible form factor.
2. List three components that must conform to the same socket type.
3. List two components that must use the same front side bus speed.
4. List three considerations when choosing memory.
5. What component must be compatible with every other component of the computer?



• What to REFLECT / UNDERSTAND

Making a Checklist

Directions: Make a market study on components, its brand, functionality and cost. You can ask computer vendors of the price lists and inquire of its specifications. Choose two brands then make comparisons. Be ready for an oral presentation.

Components	Brand No.1	Cost	Cost	Strengths	Weakness
Processor					
Motherboard					
Memory					
Graphic Card					
Sound Card					

Components	Brand No.2	Cost	Cost	Strengths	Weakness
Processor					
Motherboard					
Memory					
Graphic Card					
Sound Card					

Performance Score Card

	Details	Points
0 =	Brand model is precisely given	
	Cost is based on the market selling price	
1 =	Strength/weakness are accurate	
2 =	Presentation skills (Clarity of the voice)	
	TOTAL	

Score Reference:

0 = Some facts are clearly inconsistent with source material

1 = Some facts are questionable/unrealistic

2 = All facts seem accurate/good.



• What to TRANSFER

Computer Specifications

Directions: In this activity, you will create a complete list of specifications of a one set desktop computers including its brand name and cost. Total all the amount and present it to the class.

Performance Score Card

	Details	Points
	Brand Model is precisely given	
	Cost is based on the market selling price	
	Complete list of the given hardware were enumerated well	
	Presentation (Clarity of the thought and voice)	
	TOTAL	

Score Reference:

0 = Some facts are clearly inconsistent with source material

1 = Some facts are questionable/unrealistic

2 = All facts seem accurate/good.



• What to KNOW

Networking Hardware Requirements

Although setting up a home network is not necessarily an expensive or difficult project, you just need to have few basic pieces of hardware to connect your computers, printers, gaming consoles, and assorted gadgets to each other — and to the Internet.

Need	Purpose
DSL or Cable Modem	A DSL or cable modem connects your computer to a high-speed DSL or cable Internet connection. Although dial-up modems are still available for slower dial-up Internet connections, the connection speeds are far too slow for a home network.
Wired or wireless router	A wired or wireless router connects your DSL or cable modem to your home network. Many DSL/cable modems now have built-in routers that allow you to connect your network directly to your Internet connection.
Wired or wireless network adapters	A wired or wireless network adapter is the device in your computer (or printers, gaming consoles, and other networking equipment) that connects your computer to your network.
Ethernet cabling	Ethernet cabling is used to connect your wired network adapters to a router or network switch. Even if you are using a wireless router, you will need at least one Ethernet cable to connect your wireless router to your DSL or cable modem.

In a network, computers and other devices are connected to share resources. Network connections vary in many ways depending on the setup the user would want to, availability of the network devices and the location or map area of links. One may either use wireless throughput or wired throughput. The next lesson will guide you on how to setup these connections.

Router Basics

Your router is the glue that holds your home network together. It connects all your computers to one another, either through Ethernet cables or a wireless connection. A router is different than a modem: your modem connects you to the internet, while your router connects your computers to one another. When you hook up your router to the modem, however, you are then able to share that internet connection with all of the computers on your network. Sometimes modems come with built-in routers.

Devices that connect to your router—that is, the computers, tablets, smartphones, DVRs, game systems, and so on—are called *clients*. Each client on the network is given an IP address, which helps your router direct traffic. Clients within the network get a *local* IP address, while your modem gets a *global* IP address. Global IP addresses are like street addresses, while local IP addresses are like apartment numbers: one lets you find the building in relation to the rest of the world, while the other lets you find the specific location within the complex. These addresses make sure the right information from the outside world gets to the right computer on your network.

Routers have a number of different features, so we'll go through some of the most common router specs and how they affect your home network.

Most people have a mix of wired and wireless devices on their network, so most of the discussion will be focused on wireless routers. Since wireless routers allow for both wired and wireless connections, you can wire up when necessary, and connect over Wi-Fi everywhere else.

Wireless Throughput

Throughput is the speed at which a router can transfer data. The transfer speed of your wireless connection is dependent on the wireless standard it uses. The most common standards today are 802.11g and 802.11n (also known as "wireless G" and "wireless N",



Figure 144. Wireless Throughput

respectively). Wireless N is faster than wireless G, though routers that support wireless N are also more expensive. Most new devices—like smartphones and laptops—support the faster wireless N.

Wired Throughput

The wired half of your router will come in one of two speeds: 10/100 Mbps and 10/100/1000 Mbps (also known as "gigabit"). 10/100 routers are cheaper, but will not transfer data between computers as quickly as gigabit routers will. If you are only using your router to connect to the internet, 10/100 is fine, since your internet connection is probably slower than 100Mbps, meaning you will not be able to actually take advantage of the router's full speed. If you are transferring data between computers, however, you may want to go with a gigabit router, since it will transfer that data much faster than a 10/100 model.

Range

Wireless routers can only reach a limited area of distance. If you have a big house and have the router on one side, you might not be able to access the network from the other side of the house. Your range, like your speed, is determined by the wireless standard you use. Wireless N has a longer range than wireless G, so if range is important you will want to use wireless N.

That said, there are many other ways to connect to your network from afar. Wireless extenders (also called wireless repeaters) are products you can buy that do exactly what the manuals say to extend your network further. Alternatively, you can buy a powerline adapter, which lets you use your home's electrical wiring to hook a distant device up to your router with an Ethernet cable (and thus get a faster connection than wireless would allow for).

Number of Ports

Routers have two types of ports in the back: LAN ports and WAN ports. Your WAN port hooks up to your modem (which, again, is what connects to the internet), while the LAN ports hook up to your computers and other clients. Most routers have one WAN



Figure 144.Router ports

port, but you will need as many LAN ports as the wired devices you have. If

you have more wired devices than can fit on a router, you can plug them all in using a wired switch. A switch is like a power strip for your router: it lets you plug in more devices than the router originally allowed.

Wireless Security



Figure 145. Wireless Security

Unless you do not mind strangers eating your bandwidth and potentially accessing your networked files, you should always protect your wireless network with a password. WPA2 is currently the most secure type of wireless encryption, so make sure you use WPA2 if you can. Some old wireless devices do not support WPA, in

which case you will have to use the less secure WEP instead. Basically, every devices made in the last four years supports WPA2 encryption.

Sample Network Components Specifications

Item	Minimum Requirements	Recommended
Modems		
Cable	Cat-5 UTP	Cat-5 UTP
network adapters	Ethernet 100Base-TX	Ethernet 1000Base-T
Hub/Switch	100 Megabit Hub	1.0 Gigabit Switch
Power	Surge Protector	Surge Protector & UPS



•What to PROCESS

Network Layout

Directions: In a short coupon bond, draw a simple schematic diagram of a computer connected to a network. Label the parts and present your drawing to the class. Your work will be rated according to the following criteria:

CRITERIA	Excellent 4	Good 3	Fair 2	Poor 1
Adherence to the proper network setup (50%) -drew the diagram with right setup				
Workmanship (20%) -organized materials and tools while accomplishing the task and exhibited effective time management				
Quality of work (30%) -presented the final output neatly.				



• What to REFLECT / UNDERSTAND

Critical Review

Directions: Make a market study on network hardware equipment, its brand, functionality and costs. You can ask computer vendors of the price lists and inquire of its specifications. Choose two brands then make comparisons. Be ready for an oral presentation.

Components	Brand No.1	Cost	Brand No.2	Functionality	Cost
Router					
Hub 8-port					
UTP cable					
Rj45 connector					
Sound Card					

Performance Score Card

Details	Points
Brand Model is precisely given	
Cost is based on the market selling price	
Complete list of the given hardware were enumerated well	
Presentation (Clarity of the thought and voice)	
TOTAL	

Score Reference:

0 = Some facts are clearly inconsistent with source material

1 = Some facts are questionable/unrealistic

2 = All facts seem accurate/good



• What to TRANSFER

Computer Shop Network Layout

Directions: Draw on a short bond paper, layout plan of a computer café connected to a network. Write the specifications of the network hardware and incorporate the following requirements. Draw your diagram in a short coupon bond.

- one computer server
- 20 client computers
- one DSL modem
- UTP cables
- hub

Performance Rubrics

CRITERIA	Percentage	Score
1. Originality of network layout	40%	
2. Neatness of the drawing	40%	
3. Proper use of equipment and materials is observed.	10%	
4. Observance of Safety Precautions.	10%	
PERFORMANCE RATING		



• Reading Resources / Instructional Activities

Lesson 2: Maintaining Computer Systems

This lesson is intended to develop your skills in planning and preparing for installation of computer devices and operating system. At the end of this lesson, you are expected to:

- Follow OHS procedures in maintaining computer systems
- Diagnose and identify faulty computer systems
- Test normal functions of computer systems
- Perform repair and replacement of faulty computer systems
- Adhere to the recommended schedule and techniques in maintaining and cleaning computer systems
- Respond to sudden breakdowns of computer systems in accordance with established procedures

As a future computer technician you must be diligent and eager to know the different procedures in maintaining computer system because this will guide you in carrying out a particular job in a proper manner. Once you already identify the procedures, you must also be able to apply it in real life situations.



• What to KNOW

Safety Precautions

Occupational Health and Safety (OHS) Policy –An Information and Communication Technology (ICT) student should know how to behave when working in the computer laboratory, as well as implement a safe way of accomplishing every task. Safety practices should be learned early and always adheres in working with any electrical and electronic device, including personal computers and its peripherals. This is for your protection as well as to the people working with you, and for the devices that you are using. The basis for this process begins with Occupational Health and Safety Policies.



Occupational Health and Safety standards

Each student has a responsibility to their colleagues and their organization to report and act upon any potential workplace hazard. Students need to be aware of the *type of hazards* that are possibly present in their work environment.

Procedure

1. Identify the hazard.
2. Clear the area close to the hazard.
3. Partition the hazard off or clearly identify the area to protect other people from harm.
4. If the hazard is can be easily and safely cleared, then do so.
5. Report the hazard to the appropriate person (such as teacher in charge, principal etc.) to obtain assistance.
6. After clearing of the hazard, fill out the correct documentation to assist in identifying improved practice to reduce further incidence of hazards.



•What to KNOW

MAINTENANCE OF COMPUTER SYSTEM

Perhaps you have handpicked the finest computer with the selected fastest processor and graphic card and with a few gigabytes of memory. So you thought to yourself that your machine is probably going to sustain you for the next five (5) years. But little did you discover that some six months down the road, your computer is behaving like a Pentium 2 computer, perpetually flustering you with its choppy images, frustrating pop-ups and tremendously slow disk access. Gradually, your computer crashes and all your data is lost on one fine afternoon.

One thing you have probably missed out is the need for system maintenance. The basic routine maintenance comprises of the 3 basic processes:

1. Data Backup
2. Malware Maintenance
3. Disk or File System Maintenance

Let us address each of the processes in detail so that you can better understand how you can apply them in your system to extend its longevity.

DATA BACKUP

Backing up basically means creating a redundant copy of a data so that in case anything happens to the original data, you have a spare copy. This is typically a simple thing to do.

First, you must ask yourself why should you back up the data or system?



Figure 146. Data Backup

If you feel that you should backup your valuable data, then you should decide and select what are the data to be backup. Depending on your needs, you may choose to backup your windows registry, or your Outlook Express mail data, or even your windows security keys.

Windows operating system's friendly interface allows you to drag and drop computer files from one storage device to another. And this can be as simple as copying a document file from your desktop into a thumb drive.

But when these files gradually occupies a lot of disk space, you may need to seek help from archiver utilities such as Winzip which enables you to compact your files into a single compressed file. You can then break up this large file into several pieces to be stored in several mediums such as a span of CD or DVD-Recordable.

Winzip also allows you to protect your file with encryption and a software password to prevent any unauthorized access. There are a number of backup methods you could use.

How to backup files in Windows XP:

1. To use the built in Windows XP backup tool, follow the instructions.

2. Click the Start button > All Programs > Accessories > System Tools > Backup.

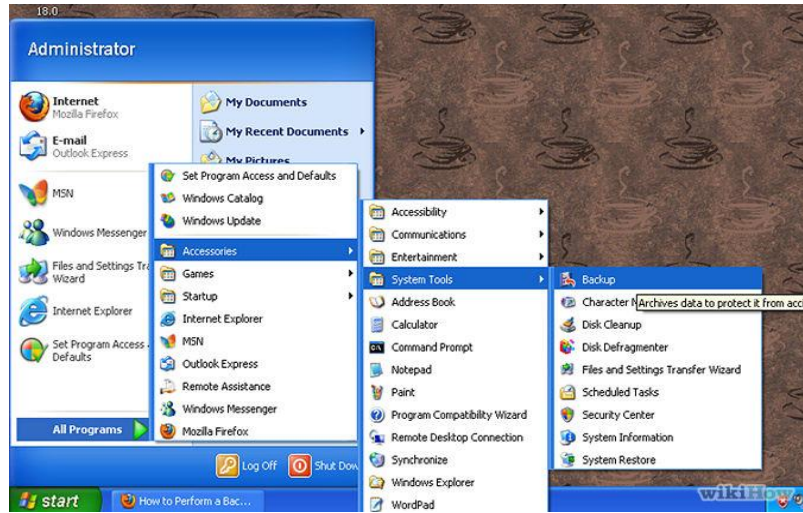


Figure 147. Step No.2 How to Backup your files

3. The Windows XP backup tool allows backing up all user files in just one task. If you select the option of the My Documents backup, it will copy the entire contents of the Documents and Settings folder including MS Outlook/Outlook Express messages and settings as well as your profile settings.



Figure 148. Step No.3

The Windows XP backup tool allows backing up all user files in just one task. If you select the option of the My Documents backup, it will copy the entire contents of the Documents and Settings folder including MS Outlook/Outlook Express messages and settings as well as your profile settings.

4. However, in most situations full backup is not necessary. In all likelihood the My Documents folder of your computer will be large in size and contain a

lot of irrelevant information. If this is the case, Windows XP backup tool suggests that you manually specify files that you want to include or exclude from the backup set.

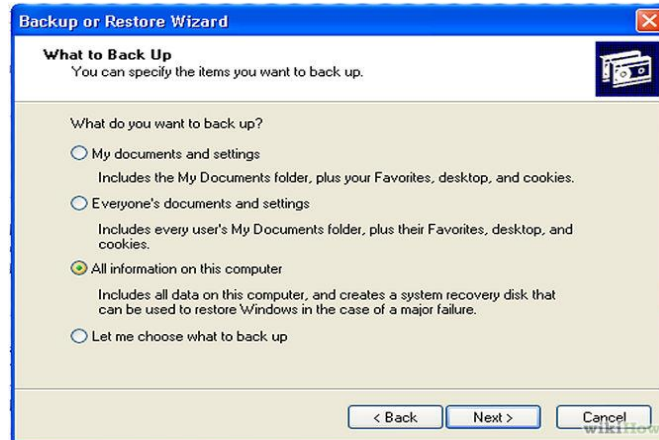


Figure 149. Step No.4

5. Lastly, do not forget to back-up your Internet Explorer favorites from within IE. You can export them from the Menu.

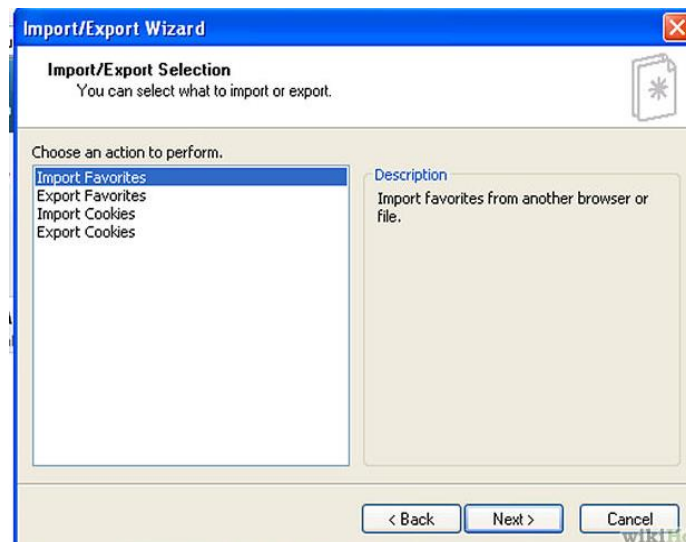


Figure 150. Step No.5

MALWARE MAINTENANCE

Malware refers to any kind of malicious codes, objects or content that infiltrates your computer, resulting in damage and causing your system to act in an undesirable manner. Commonly, these include viruses, spyware, worms, trojan horses, spams and many more. When you are infected, you can lose your privacy, confidential data and access to your system when software and hardware are damaged. Fortunately, there are a couple of preventive measures you can take to protect yourself from malware.

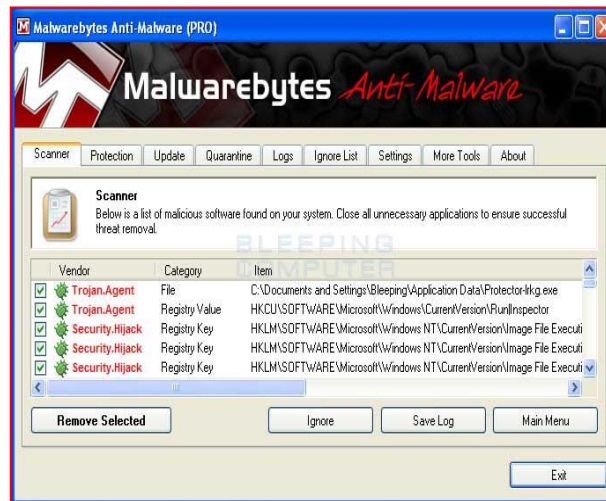


Figure 151. Anti-Malware Application

One thing you can do to scan the file for any virus infection before you attempt to open it. If the scan shows nothing, it is probably a safe file. But then again, it may be a new virus yet to be updated in your virus scan. You can either wait and apply the next virus signature update and perform a second scan or risk it all and open the file.

DISK MAINTENANCE

Did anyone tell you that your hard disk is a pretty tricky machine? When you first installed your operating system, you may be pleased to know how smooth and efficient your software applications are running. But gradually, it slows down and this bothers you. What truly causes the decline in performance? You may argue that your disk is just a couple of months old. This has much to do with the way you operate on your system.

Try to imagine a big tool bucket filled with gadgets. Initially, the bucket only contains a few spanners, a hammer and some screws. So every time you search for a particular item, it is relatively easy to find. But soon as you keep filling the bucket with all sorts of items and especially when the amount of items grows, you will discover that you may need more time just to search

for a particular screw head. In such cases, uninstall any unnecessary software and defragment your disk. Typically, your system performance will decline when the amount of data in your hard disk starts to grow.

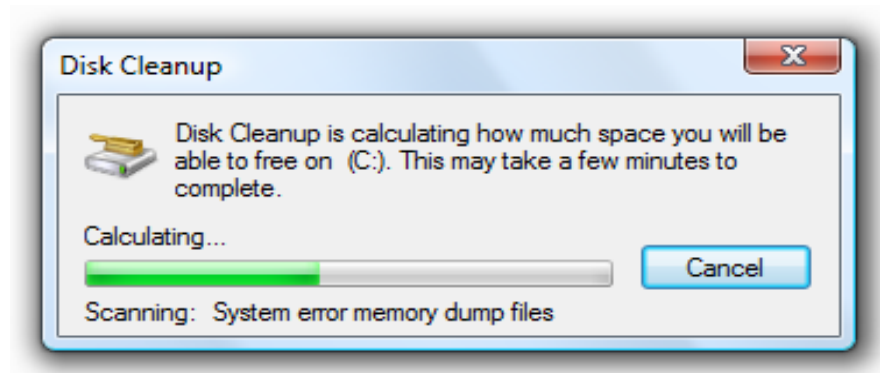


Figure 152. Disk Cleanup Window



•What to PROCESS

Essay Writing Activity

Directions: Write an essay about the importance of Data Backup. Relate your statements to the most treasured skills you acquired in the lesson. Give also your own title for the essay (minimum of 400 words).

Contents		Excellent (3)	Good (2)	Poor(1)
Spelling	Almost all words spelled correctly			
Capitalization	Begins all sentences but one with uppercase letters.			
Punctuation	Correct ending punctuation in every sentence but one.			
Grammar	Simple sentences are grammatically correct.			
Handwriting	Legible. Good spacing and alignment.			
	Total Points			



• What to REFLECT / UNDERSTAND

Research and Investigate

Directions: Form a group of five members and make a research on the different advantages and disadvantages of data backup, malware maintenance and disk maintenance. You can also interview/observe a practitioner while lending a quality service in computer hardware servicing. Report this to the class.



• What to TRANSFER

Demonstration

Application on Maintenance of Computer System

Directions: After the interview and observation with a practitioner, your group will showcase what you have learned through a demonstration. You will be rated base on the rubrics below:

Criteria	Excellent 4	Good 3	Fair 2	Poor 1
Content (40%) -Conveys full understanding of the content				
Enthusiasm (10%) -Facial expression and body language generates strong enthusiasm				
Interest and Purpose (10%) -Displays interesting purpose				
Speak Clearly (10%) -Group members speaks clearly at all times				
Volume (10%) -Loud volume				
Preparedness (10%) -Group is prepared with props and costumes				
Cooperation (10%) -displays teamwork				



•What to KNOW

DIAGNOSIS AND IDENTIFICATION OF FAULTY SYSTEM

More than 70% of all computer problems are related to cabling and connections. Ensure all cables are connected and connected firmly. IDE and floppy ribbon cables and power cables can often go loose. Ensure microprocessor, memory modules, and adapters such as video card are inserted correctly and do not "pop-up" due to vibration.

Problem 1: System has no power at all. Power light does not illuminate, fan inside the power supply does not turn on, and indicator light on keyboard does not turn on.

PROBABLE CAUSE	DIAGNOSIS	SOLUTION
Power cable is unplugged	Visually inspect power cable.	Make sure power cable is securely plugged in.
Defective power cable	Visual inspection or try another cable.	Replace cable.
Power supply failure	Power cable and wall socket are OK, but system is still dead.	Contact technical support.
Faulty wall outlet; circuit breaker or fuse blown	Plug device into socket and test.	Use different socket, repair outlet, reset circuit breaker or replace fuse.

Problem 2: System is inoperative. Keyboard lights are on, power indicator lights are lit, and hard drive is spinning.

PROBABLE CAUSE	DIAGNOSIS	SOLUTION
Expansion card is partially dislodged from expansion slot on the motherboard.	Turn off computer. Remove the cover of the system unit. Check all expansion cards to ensure they	Using even pressure on both ends of the expansion card, press down firmly on

	are securely seated in slots.	expansion card.
Defective floppy disk drive or tape drive	Turn the system off. Disconnect the cables from one of the floppy drives. Turn on the system, check to see if the keyboard operates normally. Repeat until you have located defective unit.	Contact Technical Support.
Defective expansion card	Turn the computer off. Remove an expansion card.	Make sure expansion card is secure in expansion socket.

Problem 3: System does not boot from hard disk drive, but can be booted from floppy disk drive.

PROBABLE CAUSE	DIAGNOSIS	SOLUTION
Connector between hard drive and system board is unplugged.	When attempting to run the FDISK utility described in the HARD DISK section of the manual you get a message, INVALID DRIVE SPECIFICATION	Check cable running from disk to disk controller on the board. Make sure both ends are securely plugged in; check the drive type in the Standard CMOS Setup (in your motherboard manual).
Damaged Hard Disk or Disk Controller	Format hard disk; if unable to do so, the hard disk may be defective.	Contact Technical Support.
Hard Disk directory or FAT is scrambled	Run the FDISK program, format the hard drive(See HARD DRIVE section of manual). Copy your	Backing up the hard drive is extremely important. All Hard Disks are capable of breaking down at any

	backup data back onto hard drive.	time.
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Problem 4: System only boots from Floppy Disk. Hard Disk can be read and applications can be used, but booting from Hard Disk is impossible.

PROBABLE CAUSE	DIAGNOSIS	SOLUTION
Hard Disk boot program has been destroyed.	Corrupted system files	Back up data and applications files. Reformat the Hard Drive as described in the Hard Drive section of the manual. Re-install applications and data using backup disks.

Problem 5: Error message reading "SECTOR NOT FOUND" or other error messages indicators that certain data is not allowed to be retrieved.

PROBABLE CAUSE	DIAGNOSIS	SOLUTION
Sector Not Found Error	Hard drive is likely bad itself.	You may be able to resolve this issue by running scandisk and having scandisk mark the sectors as bad.

Problem 6: Disk formatted on IBM PS/2 will not operate with this system.

PROBABLE CAUSE	DIAGNOSIS	SOLUTION
The IBM PS/2 uses a different format than other computers.	IBM PS/2 disk format will not work in an AT type computer.	Format disk in the AT type computer. Insert disk into the IBM PS/2 and copy the files you wish.

Problem 7: After installing an expansion card (network card, tape drive card, etc.), the system no longer works properly.

PROBABLE CAUSE	DIAGNOSIS	SOLUTION
Monitor has no power.	All or part of the system may be inoperable. The new card may work but a mouse or COM port may not work.	Change the interrupt or RAM address on the new expansion card. See the documentation that came with the new card in order to change pin settings. Many expansion devices come with proprietary software that will assist you in doing this.

Problem 8: Screen message says "Invalid Configuration" or "CMOS Failure."

PROBABLE CAUSE	DIAGNOSIS	SOLUTION
Incorrect information has entered into the configuration (setup) program.	Check the configuration program. Replace any incorrect information.	Review system's equipment. Make sure correct information is in setup.

Problem 9: Screen is blank.

PROBABLE CAUSE	DIAGNOSIS	SOLUTION
Monitor has no power.	Power connectors may be loose or not plugged in.	Check the power connectors of the monitor and the system. Make sure monitor is connected to display card, change I/O address on network card if applicable.
	Monitor is not connected to computer.	See connections of the video cable from the video adapter card going to the monitor.

Problem 10: System does not boot from hard disk drive, but can be booted from floppy disk drive.

PROBABLE CAUSE	DIAGNOSIS	SOLUTION
Connector between hard drive and system board unplugged.	When attempting to run the FDISK utility described in the HARD DISK section of the manual you get a message, INVALID DRIVE SPECIFICATION.	Check cable running from disk to disk controller on the board. Make sure both ends are securely plugged in; check the drive type in the Standard CMOS Setup (in your motherboard).

Problem 11: Memory Module Problem

PROBABLE CAUSE	DIAGNOSIS	SOLUTION
Memory problem, display card jumpers one not set correctly.	Loose installation of the RAM on the memory slot	Reboot computer. Re-install memory, make sure that all memory modules are installed in correct sockets. Check jumper and switch settings on display card. See display card section for information of settings.
Computer virus	Computer system becomes too slow and experiencing hang-up.	Use anti-virus programs (McAfee/PC-cillin, E-port, etc.) to detect and clean viruses.

Problem 12: Screen goes blank periodically.

PROBABLE CAUSE	DIAGNOSIS	SOLUTION
Screen saver is enabled.		Disable screen saver.

Problem 13: Keyboard failure

PROBABLE CAUSE	DIAGNOSIS	SOLUTION
Keyboard is disconnected.	Loose keyboard cable connection	Reconnect keyboard. Check keys again if there is no improvement, replace keyboard.

Problem 14: No color on screen

PROBABLE CAUSE	DIAGNOSIS	SOLUTION
Faulty monitor		If possible, connect monitor to another system. If no display, replace monitor.

Problem 15: Floppy drive light stays on.

PROBABLE CAUSE	DIAGNOSIS	SOLUTION
Floppy Drive cable is not connected correctly.	Shorted power wire for floppy	Reconnect floppy cable making sure PIN1 on the Floppy Drive corresponds with PIN1 on floppy cable connector.

Problem 16: Error reading drive A:

PROBABLE CAUSE	DIAGNOSIS	SOLUTION
Bad floppy disk		Try new floppy disk.
Floppy disk is not formatted.		Format floppy disk (type ENTER)

Problem 17: Windows system drive failure

PROBABLE CAUSE	DIAGNOSIS	SOLUTION
SETUP program does not have correct information.		Boot from drive A: using DOS system disk. Input correct information to SETUP program.
Hard Drive cable is not connected properly.		Check Hard drive cable.

Problem 18: Cannot boot system after installing second hard drive.

PROBABLE CAUSE	DIAGNOSIS	SOLUTION
Master/Slave jumpers are not set correctly.		Set master /slave jumpers correctly.
The Hard Drive is incompatible.		Run SETUP program and select correct drive types. Call drive manufacturers for compatibility with other drives.

Problem 19: Missing operating system on Hard Drive

PROBABLE CAUSE	DIAGNOSIS	SOLUTION
CMOS setup has been changed.		Run setup and select correct drive type.

Problem 20: Certain keys do not function.

PROBABLE CAUSE	DIAGNOSIS	SOLUTION
Keys are jammed or defective.		Replace keyboard.

Problem 21: Keyboard is locked, no keys function.

PROBABLE CAUSE	DIAGNOSIS	SOLUTION
Keyboard is locked.		Unlock keyboard.



• What to PROCESS

Critical Review: Problems Encountered

Directions: In this activity, list down at least five (5) problems, error messages or incidents you encountered while working or using a computer and the actions taken in every problem/error message or incidents encountered.

Problems Encountered	Actions Taken
1.	
2.	
3.	
4.	
5.	



• What to REFLECT / UNDERSTAND

Slide Show Presentation

Directions: In this activity, you will learn how useful the Internet can be for a Personal Computer (PC) support technician.

1. Using a personal computer, pretend that the motherboard manual is not available and you need to replace a faulty processor. Identify the manufacturer and model of the motherboard by looking for the manufacturer's name and model number stamped on the board. Research the Web site for that manufacturer. Print the list of processors the board can support. Afterwards, make a slide show presentation and report it to the class.



Video Tutorials Application on Diagnosis of Faulty Systems

Directions: In this activity, your class will be grouped into three (3) and will make an interview and observation with a practitioner. The group will showcase what they have learned through a video demo or tutorials. Use digital cameras or cellphones on recording the video. You will be rated based on the rubrics written below:

Criteria	Excellent 4	Good 3	Fair 2	Weak 1
Content (40%) -Conveys full understanding of the content				
Enthusiasm (10%) -Facial expression and body language generates strong enthusiasm				
Interest and Purpose (10%) -Displays interesting purpose				
Speak Clearly (10%) -Group members speaks clearly at all times				
Volume (10%) -Loud volume				
Preparedness (10%) -Group is prepared with props and costumes				
Cooperation (10%) -Displays teamwork				





•What to KNOW

Diagnostic Software Tools

Diagnostic software is used to identify problems on a computer or piece of equipment. These programs test the onboard systems for issues and help to alert users of potential problems or breakdowns. Over the years, these programs have gone from very basic to complex and highly specialized. With this increase in technology, the skill required to use the software has actually decreased to the point where most people can use this software with little or no training.

Programs that provide diagnostic information are common everywhere. Something as simple as the oil light on a car dashboard is a type of diagnostic software. These hard-coded diagnostic tools usually monitor one specific part of a larger piece of equipment and typically are always operating. While these types of diagnostic programs are the most common, they are usually the least versatile. When people think of true diagnostic software, they usually think of the types used on computers. These programs monitor the computer for problems involving every aspect of the machine, from hardware to software—far more complex and versatile than the change oil light.

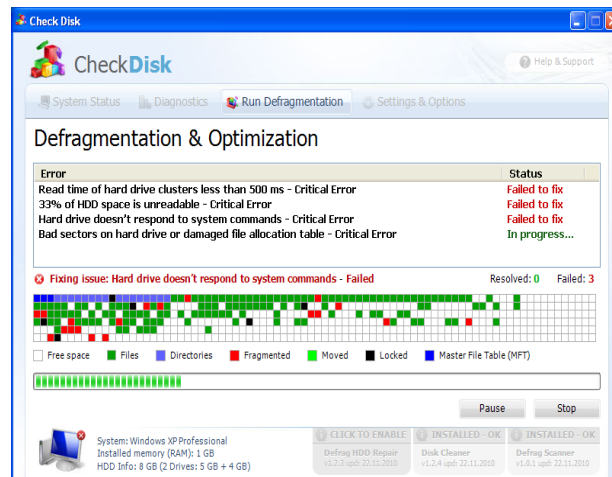


Figure 149: Defragmentation and Optimization of hard drive

Since the introduction of diagnostic software, it has evolved in many ways. The original type could only find the most major of problems. There should be strong indicators or physical damage in order for the software to recognize and report the problem. When computers became more common in people's homes, particularly with the rise of Disc Operating Systems, commonly known as DOS, diagnostic software became more common. Small built-in programs, such as Checkdisk (CHKDISK), allowed users to perform

basic diagnostic routines on their systems. These early programs would often output technical information and esoteric error codes instead of readable information. In recent years, the output reports have changed considerably. The basic outputs are now readable by most users, and they often contain tips or warnings telling users what they should or should not do, all in plain language.

Technological advances have even made Web page-based diagnostic software available for home users. With minimal Web searching, nearly any home user can find a wide range of websites offering to speed up their computer or diagnose problems. Many of these sites are scams, so consumers should perform proper research before using them. General Internet searches can provide a number of resources to check a company's credibility.

Some Downloadable Diagnostic Tools



Yet Another Cleaner

Protects your PC from browser hijacker, malicious plug-ins, malwares, adware, various viruses



ARO 2013

Repairs registry errors, remove "junk" files, and ensure your PC is fully protected



RegDoctor

Improves your system performance and stability by repairing and cleaning the Windows Registry



Wise Registry Cleaner

Cleans the registry portion of the hard drive



Advanced System Care

Tunes up and maintains your PC, with anti-spyware, privacy protection, and system cleaning functions.



CPU-Z

Accesses various information's about your computer



Advanced System Care Pro
Tunes up and maintains your PC automatically



Free Window Registry Repair
Scans, repairs, and optimizes your Windows registry

Disk management tools:

- **Fdisk** - creates and deletes disk partitions.
- **Format** - prepares a hard drive prior to use.
- **Scandisk** or **Chkdsk** - checks for physical errors on the disk surface.
- **Defrag** - optimizes use of space on a disk.
- **Disk Cleanup** - removes unused files.
- **Disk Management** - creates partitions and formats disks (GUI interface).
- **System File Checker (SFC)** – scans the operating system critical files.

Procedure in Cleaning Hardware Components

Cleaning your computer and its components and peripherals helps keep the in good working condition and helps keep the computers from spreading germs.

CLEANING SCHEDULE FOR COMPUTERS AND PERIPHERALS															
Subject	Information and Communications Technology														
Name															
Section/Area	Practical Work Area/Computer Laboratory														
ACTIVITIES	Schedule for the month of _____														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. System Unit															
2. Keyboard															
3. Optical Drive															
4. Mouse															
5. Printer															
6. Hard drive															
7. router															
8. Hub/Switches															
9. AVR/UPS															
10. Monitors															

Figure 150: Cleaning Schedule

How often should I clean my computer?

The frequency of how often you should clean your computer varies on several different factors. To help you determine how often you need to clean your computer, we have created the chart below. Check the appropriate boxes below that apply to your computer's environment to determine how often it should be cleaned.

General Cleaning Tips

Below is a listing of general tips that should be taken when cleaning any of the components or peripherals of a computer, as well as tips to help keep a computer clean.

1. Never spray or squirt any liquid onto any computer component. If a spray is needed, spray the liquid onto a cloth and then use that cloth to rub down the component.
2. You can use a vacuum to clean up dirt, dust, or hair around the computer on the outside case. However, do not use a vacuum for the inside of your computer as it generates a lot of static electricity that can damage the internal components of your computer. If you need to use a vacuum to clean the inside of your computer, use a portable battery powered vacuum designed to do this job or try using compressed air.
3. When cleaning a component or the computer, turn it off before cleaning.
4. Be cautious when using any cleaning solvents; some individuals may have allergic reactions to chemicals in cleaning solvents and some solvents can even damage the case. Try to always use water or a highly diluted solvent.
5. When cleaning, be careful not to accidentally adjust any knobs or controls. In addition, when cleaning the back of the computer, if anything is plugged in, make sure turn off the PC and unplug the power cable.
6. When cleaning fans, especially the smaller fans within a portable computer or laptop it is suggested that you either hold the fan or place something in-between the fan blades to prevent it from spinning. Spraying compressed air into a fan or cleaning a fan with a vacuum may cause damage or back voltage to be generated.
7. Never eat or drink around the computer area.

Cleaning Tools

Although many companies have created products to help improve the process of cleaning your computer and peripherals, you can also use household items to clean your computers and peripherals. Below is a listing of items you may need to use while cleaning your computer or computer peripherals.

Keep in mind that some components in your computer may only be cleaned using a product designed for cleaning that component.

- **Cloth** - A cloth is the best tool used when rubbing down a component; although paper towels can be used with most hardware, we recommend using a cloth whenever possible. Caution: It is recommended that you use a cloth when cleaning components such as the outside of the case, a drive, mouse, etc. You should not use a cloth to clean any circuitry such as the RAM or motherboard since they can generate Electro Static Discharge (ESD) that can damage electronics.
- **Water or rubbing alcohol** - When moistening a cloth, it is best to use water or rubbing alcohol. Other solvents may be bad for the plastics used with your computer.
- **Portable Vacuum** - Sucking the dust, dirt, hair, cigarette particles, and other particles out of a computer can be one of the best methods of cleaning a computer. Over time, these items can restrict the airflow in a computer and cause circuitry to corrode. Do not use a standard vacuum as it can generate a lot of static electricity that can damage your computer.
- **Cotton swabs** - Cotton swabs moistened with rubbing alcohol or water are good for wiping hard to reach areas in your keyboard, mouse, and other peripherals.
- **Foam swabs** - It is Always better to use lint-free swabs such as foam swabs.

Procedures in Cleaning Hardware Components

Case cleaning

Why do we need to clean the computer case regularly? It keeps the appearance of the computer looking new. During cleaning, if ventilation locations are found, these can be cleaned helping the case keep a steady

airflow to the computer, keeping components cool and in good working condition.

Procedures:

- 1) The plastic case that houses the PC components can be cleaned with a lint-free cloth that has been slightly dampened with water. For stubborn stains, add a little household detergent to the cloth. It is recommended that you never use a solvent cleaner on plastics.
- 2) Make sure all vents and air holes are hair and lint free by rubbing a cloth over the holes and vents. It is also helpful to take a vacuum around each of the hole, vents, and crevices on the computer. It is safe to use a standard vacuum when cleaning the outside vents of a computer. However, if you need to clean the inside of the computer, use a portable battery powered vacuum to prevent static electricity.

CD-ROM, DVD, and other disc drive cleaning

Why do we need to clean disc drives? A dirty CD-ROM drive or other disc drives can cause errors when reading discs. These read errors could cause software installation and other issues while running the program.

Procedure: To clean the CD-ROM drive, it is recommend to purchase a CD-ROM cleaner from your local retailer. Using a CD-ROM cleaner should sufficiently clean the CD-ROM laser from dust, dirt, and hair.

In addition to cleaning the drive with a special disc designed to clean drives, you can also use a cloth dampened with water to clean the tray that ejects from the drive. Make sure however, that after the tray has been cleaned, it has to be completely dried before putting the tray back into the drive.

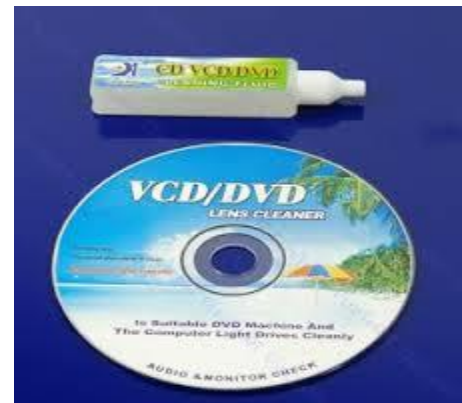


Figure 151. Disk Cleaner



Figure 152. Disc Cleaning

CD and DVD disc cleaning

Why do we need to clean disc? Dirty CDs can cause read errors or total malfunction.

Procedure: Cleaning CDs and DVDs should be done with a cleaning kit but can also be done with a normal clean cotton cloth or shirt. When doing this with a clean cotton cloth or shirt, wipe against the tracks, starting from the middle of the CD or DVD and wiping towards the outer side as shown in the below picture. Never wipe with the tracks; doing so may put more scratches on the disc.

It is recommended to use water when cleaning a CD. However, if the substance on a CD cannot be removed using water, pure alcohol can also be used.

Hard drive cleaning

Why do we need to clean a hard drive? While hard drives cannot be cleaned physically, they can be cleaned with various utilities on the computer to help it run fast and more efficiently. Disk Management is one of the utilities that will prevent the hard drive from slowing down.

Procedure: Disk Management can be accessed in the Control Panel, look for Administrative Tools, then double-click on the Computer Management icon. In the System and Security window, click on the Administrative Tools. In the Administrative Tools window, double-click on the Computer Management icon.

When Computer Management opens, click on Disk Management on the left side of the window, located under Storage. After a brief loading period, Disk Management should now appear on the right side of the Computer Management window.

Keyboard cleaning

Why do we need to clean the keyboard? The computer keyboard is often the most germ infected item in your computer. Often, it will contain more bacteria than your toilet seat. Cleaning it can help remove any dangerous

bacteria. Dirt, dust and hair can also build up causing the keyboard to malfunction.

Procedure: Before cleaning the keyboard, turn off the computer or unplug the USB keyboard. Not unplugging the keyboard can result in causing other computer problems as you may press keys that cause the computer to perform an unwanted task.

Many people clean the keyboard by turning it upside down and shaking. A more effective method is to use compressed air. Compressed air is pressurized air contained in a can with a very long nozzle. Aim the air between the keys and blow away all of the dust and debris that has gathered there. A vacuum cleaner can also be used, but make sure the keyboard does not have loose "pop off" keys that could possibly be drawn up by the vacuum.

After the dust, dirt, and hair had been removed spray a disinfectant onto a cloth or use disinfectant cloths and rub each of the keys on the keyboard. As mentioned in our general cleaning tips, never spray any liquid onto the keyboard.

Substance spilt into the keyboard

Below are a few recommendations to help prevent a keyboard from malfunctioning once a substance has been spilt within it.

If anything is spilt onto the keyboard turn the computer off immediately or at the very least disconnect it from the computer. Then, flip the keyboard over helping to prevent the substance from penetrating the circuits. While the keyboard is upside down, shake the keyboard over a surface that can be cleaned later. While still upside down, use a cloth to help clean out what can be reached. After you have cleaned it to the best of your ability, leave the keyboard upside down for at least one night allowing it to dry. Once dry, continue cleaning the keyboard with any remaining substances.

If after cleaning the keyboard you have keys that stick, remove the keys and clean below the keys and the bottom portion of the key.

Finally, if the keyboard still works but remains dirty or sticky, try washing the keyboard in the dishwasher.

If after doing all the above steps the keyboard does not function properly or at all, it is recommended you buy a new keyboard.

LCD screen cleaning

Why do we need to clean the LCD screen? Dirt, dust, and finger prints can cause the computer screen to project blurry images/texts.

Procedure: Unlike a computer monitor, the LCD or flat-panel display is not made of glass, it therefore requires special cleaning procedures.

When cleaning the LCD screen, it is important to remember not to spray any liquids onto the LCD directly. Press gently while cleaning, and do not use a paper towel as it may cause the LCD to gather scratches.

To clean the LCD screen, use a non-rugged microfiber cloth, soft cotton cloth, or swiffer duster. If a dry cloth does not completely clean the screen, you can apply rubbing alcohol to the cloth and wipe the screen with the damp cloth. Rubbing alcohol is used to clean the LCD before it leaves the factory.

Monitor cleaning

Why do we need to clean the monitor? Dirt, dust, and fingerprints can cause the computer screen to project blurry images/texts.

Procedure: The glass monitor screen can be cleaned with ordinary household glass cleaner. Be sure to remove power from the monitor and spray the cleaner onto a lint-free cloth so the fluid does not leak into the electrical components inside the monitor. Vacuum off any dust that has settled on top of the monitor, and make sure no books or papers have been placed on the air vents. Obstructed monitor vents can cause the monitor to overheat or even catch fire.

Caution: We suggest using a cloth dampened with water when cleaning monitor or a screen that is not made of glass or has any anti-glare protection on the screen. Using ordinary household glass cleaner on special screens, especially cleaners with ammonia can remove anti-glare protection or other special surfaces.

Other good cleaning tools

- Microfiber Towels
- Swiffer Dusters

Motherboard cleaning

Why do we need to clean the motherboard? Dusts can build up and corrode circuitry causing various problems such as computer lockups.

Caution: When working with interior computer parts (e.g. motherboard), take the necessary ESD precautions and avoid unplugging any cables or other connections.

Procedure: Compressed air is recommended when cleaning the motherboard from dust, dirt, or hair. When using compressed air, hold it in the up-right position; otherwise, it is possible that chemicals may come out of the container that could damage or corrode the motherboard or other component within the computer. Also, make sure to always blow the dust or dirt away from the motherboard, or out of the case.

Another good alternative to compressed air is to use a portable battery powered vacuum that can effectively remove the dust, dirt, and hair from the motherboard completely and prevent it from getting trapped within the case. However, do not use a standard electric vacuum as it can cause a lot of static electricity that can damage the computer. When using the vacuum, it is vital that you stay a couple of inches away from the motherboard and all other components to help prevent contact as well as to help prevent anything from being sucked into the vacuum. Ensure that you do not remove any small components with the vacuum such as jumpers.

Optical Mouse cleaning

Why do we need to clean optical mouse regularly? A dirty mouse (mouse with a ball) can be difficult to move. It can also cause strange mouse movement.



Figure 153. Optical Mouse

Procedure: To clean the optical mouse, you must first wipe the bottom cover of the mouse. Turn the mouse upside down to look at the lens.

If there is a smudge on the lens, gently clean the area with a plain cotton-tipped swab. If there is debris in the lens, gently blow the debris away from the area. Check the surface on which you are using the mouse.



Figure 154. Cleaning Optical Mouse

Note: Cleaning your mouse pad with a damp cloth can also help improve a computer's mouse movement.

Why? To help keep a mouse clean and germ free it can be helpful to clean the mouse.

Procedure: Use a cloth moistened with rubbing alcohol or warm water and rub the surface of the mouse and each of its buttons.



<http://www.computerhope.com>

Figure 155. Mechanical Mouse

Mechanical mouse cleaning

Why is it important to clean an optical mouse? A dirty optical-mechanical mouse (mouse with a ball) can be difficult to move. It can also cause strange mouse movement.

Procedure: To clean the rollers of an optical-mechanical mouse, you must first remove the bottom cover of the mouse. To do this, examine the bottom of the mouse to see what direction the mouse cover should be rotated. As you can see in the illustration below, the mouse cover must be moved counter clockwise. Place two fingers on the mouse cover and push the direction of the arrows.

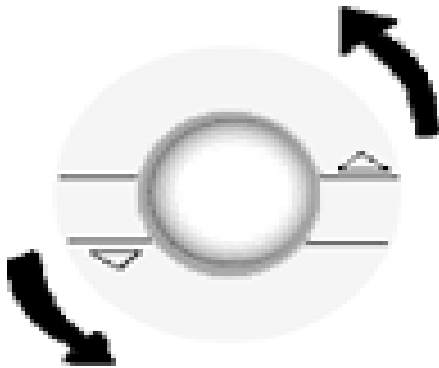


Figure 156. Mouse Opening

Once the cover has rotated about an inch, rotate the mouse into its normal position, covering the bottom of the mouse with one hand and the bottom should fall off including the mouse ball. If this does not occur, attempt to shake the mouse gently.

Once the bottom cover and the ball are removed, you should be able to see three rollers located within the mouse. Use a cotton swab, finger, or fingernail to remove any substance. Usually, there will be a small line of hair and dirt in the middle of the roller, remove as much as this substance as possible.

Once you have removed as much dirt and hair as possible, place the ball back within the mouse and place the cover back on.

If the mouse still appears to be having the same issue, repeat the above process. If after several attempts the mouse is still having the same issues, it is likely that your mouse has other hardware issues and we recommend that it be replaced.

Note: Cleaning your mouse pad with a damp cloth can also help improve a computer's mouse movement.

Why do we need to do this? To help keep a mouse clean and germ free.

Procedure: Use a cloth moistened with rubbing alcohol or warm water and rub the surface of the mouse and each of its buttons.

Printer cleaning

With some printers it may be necessary to clean the inside of the printer to help keep the printer running smoothly.

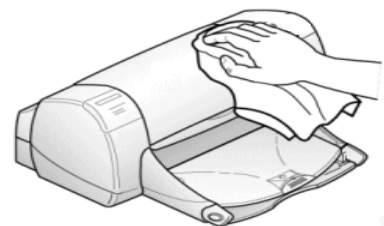


Figure 157. Printer Cleaning

Why do we need to do this? Cleaning the outside of a printer can help keep the printer's appearance looking good; and in the case of a printer that is used by many different people, it will keep the printer clean and free from germs.

Procedure: First, make sure to turn off the printer before cleaning it. Dampen a cloth with water or rubbing alcohol and wipe the case and each of the buttons or knobs on the printer. As mentioned earlier, never spray any liquid directly onto the printer.

Scanner cleaning

Why do we need to do this? Flatbed scanners commonly become dirty with dust, fingerprints, and hair. When a scanner is dirty, the images may have distortions.

Procedure: Clean a flatbed scanner's surface by spraying a window cleaner onto a paper towel or cotton cloth and wipe the glass until clean. As mentioned earlier, never spray a liquid directly onto the component.



Figure 158. Scanner Cleaning

To clean the outside of the scanner, the same towel or cotton cloth can be used.

Miscellaneous Cleaning Steps

Below are listings of miscellaneous computer hardware that is rarely used today, but some people who will use it and therefore need to know how to clean their devices.

Floppy drive cleaning

Why do we need the floppy drive? Because dirty read/write heads on the floppy drive can cause errors during the reading or writing process.

Procedures: The floppy drive can be cleaned in two different ways. The first method of cleaning a floppy drive; (and our recommended method) is to purchase a kit at your local retail store designed to clean the read/write heads on your floppy drive.

The second method of cleaning the floppy drive is only recommended for experienced computer users. Open the floppy drive casing and physically swab the read/write heads with a lint-free foam swab soaked in pure alcohol, or trichloroethane. When performing these steps, be extremely careful when cleaning the heads to ensure that you do not lock them out of alignment causing the floppy drive not to work. To help prevent the heads from becoming out of alignment, use a dabbing motion lightly putting the swab on the head and removing it, do not perform a side-to-side motion with the swab.



•What to PROCESS

Ways to Improve your Computer's Performance

Disk Defragmentation

Fragmentation makes your hard disk do extra work that can slow down your computer. Removable storage devices such as USB flash drives can also become fragmented. Disk Defragmenter rearranges fragmented data so your disks and drives can work more efficiently. Disk Defragmenter runs on a schedule, but you can also analyze and defragment your disks and drives manually.

When you store data into the hard disk, the data will normally occupy the disk in continuous manner if there is sufficient data space on disk. Imagine if you delete some data files, this will then leave some "gaps" in data space. When new data files need to be stored and if the size of these data files could not fit into a single gap, the data files will be segmented and fitted across several gaps with interval. Your hard disk progressively becomes fragmented after excessive usage of writing, deleting and storing of data into your disk.





A file is typically broken into several small parts and stored in various areas on a hard disk. When a read request is executed, the disk will search for the multiple pieces, process and link them and finally present it on screen from the computer when you read a file or execute an application.


Besides improvement in system performance, disk defragmentation will also improve data recovery yield in case your disk needs to be sent in for recovery process.

For a similar reason, you should not perform defragmentation after accidental data deletion as this will overwrite the deleted data when data blocks are moved or replaced.

To defrag your hard disk, follow these steps:

1. Open Disk Defragmenter by clicking the Start button.  In the search box, type Disk Defragmenter, and then, in the list of results, click Disk Defragmenter.
2. Under Current status, select the disk you want to defragment.
3. To determine if the disk needs to be defragmented or not, click Analyze disk.  If you are prompted for an administrator password or confirmation, type the password or provide confirmation.

Once Windows is finished analyzing the disk, you can check the percentage of fragmentation on the disk in the Last Run column. If the number is above 10%, you should defragment the disk.

4. Click Defragment disk.  If you are prompted for an administrator password or confirmation, type the password or provide confirmation.

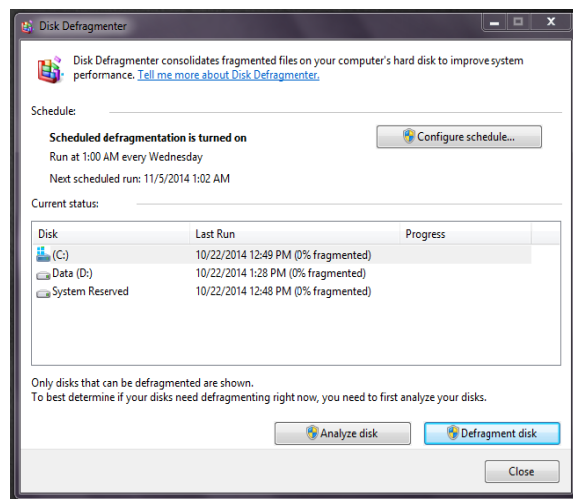


Figure 159. Disk Defragmenter

Disk Defragmenter might take from several minutes to a few hours

to finish, depending on the size and degree of fragmentation of your hard disk. You can still use your computer during the defragmentation process.

Notes:

- If the disk is already in exclusive use by another program or is formatted using a file system other than NTFS file system, FAT, or FAT32, it cannot be defragmented.
- Network locations cannot be defragmented.
- If a disk that you are expecting to see under Current status is not showing up there, it might be because it contains an error. Try to repair the disk first, then return to Disk Defragmenter to try again.

Cleaning Windows Registry

Registry is a system-defined database which is used by an Operating System to store all the information needed to configure the Windows settings for 1 or more users, applications and hardware devices. Information contained in registry includes user's profiles, application installed on the computer, types of documents that are created, setting of properties sheet for each application folder and icon, existing hardware in the system, and all the ports that are being used.

Why Cleaning the registry is important

When using the computer, users may have experienced quite a number of problems relating to registry issues that may result in severe consequences such as error messages pop-up, noticeably slow performance of a system or even system crash. The reasons leading to these problems, however, are mainly caused by missing or invalid registry key(s) from the Windows registry.

Usually, when any particular application is uninstalled from Windows, it is recommended that you should use Add or Remove Programs feature to proceed (Start menu>Control Panel >Add or Remove Programs) However, if you delete any program manually without using this function, you might mistakenly move away the registry key in the OS or even leave behind the orphaned registry key. This, of course, will cause the problem of missing/invalid registry entries. Other actions include deletion of startup programs, installation of software embedded with spyware or changes in hardware.

And because of the above reasons, cleaning Windows registry has become an essential and crucial action that you need to implement regularly.

Do it regularly or you might experience losing all important data due to the system breakdown.

Can I Delete The Registry By Myself?

The answer is "No". When you attempt to remove the registry by your own, the risk that you may remove the valid registry is high because without the registry cleaner software, it is not easy to determine which registry belongs to which application. Therefore this may cause the system to crash or the software to malfunction.

How Do I Clean Windows Registry?

You can either buy Windows Registry cleaner software available in the market or download a free trial package from the Internet to try out before paying a full version. When run, this software will first identify the problems with your Windows registry such as missing/invalid key references. After that, it will proceed to probe your request for registry removal.

Below are some basic and useful features that you must consider when choosing the Registry Cleaner software:

- ability to scan for the whole computer system for invalid/ orphan registry
- ability to backup all the current registry in the system
- have an "undo" feature to restore the cleaning action
- options on which to choose registry key(s) to be deleted
- online updating of the software should be available

Now, with the software running regularly, it will have saved up a large amount of disk space for your PC. The system then will run as smoothly and efficiently like before.

Organizing Disk Drive Partition

What is Disk Partitioning?

Partitioning creates a logical file structure on your hard disk so as to divide various portions of a hard disk to be used for different purposes such as a dual operating systems, storage or organizational purposes.

Why Partition Your Disk?

Partitioning your hard disk helps categorize your files into logical groupings so that you can search for files and make changes more effectively. Folders are made for the same reason too. But partitioning provides better security.

Security

Most default primary partition is the C drive. This is the drive where your operating system and most other software applications are installed in. A useful way of protecting your data is to store your personal information into a separate disk partition. For example, if you are using a 80GB hard disk, you might want to partition it into two drives - drive C & drive D. Drive C will contain your operating system files and software applications such as your Microsoft Office Suite, Adobe Acrobat, Antivirus, Photoshop etc., while drive D can be configured as a storage drive to store all your document files, JPEG, MP3 and other personal data.

It is understood that your most important files are those that are difficult or virtually impossible to replace. For example, if Microsoft Word crashes, you can always reinstall the application to make it work again. However, if your document files are corrupted by a virus or worm, you may need to spend money and precious time trying to recover your data. In some cases, you may not be able to recover them if the damage is too severe. Statistics have shown that most viruses and worms are more likely to infect executable and system files compared to your MP3 or excel spreadsheets. Therefore, if one partition corrupts, only that partition suffers and hopefully not the whole drive.

Convenience

Another reason for storing your document files in a separate drive is the ease of manageability. Say in a scenario where your computer needs to be reformatted due to severe corruption, you can easily reformat drive C and be assured that all your documents in drive D remains intact. This will save you time trying to backup your documents, then restoring them back in your local drive after your computer is reformatted and starts working. In this way, should you decide to refresh your operating system or application, the stored data will not be affected.

Dual Operating System

You may wish to install more than one operating system into your computer. For example, you need to use a Windows and Linux operating system. But both are unable to be installed in the same partition. By partitioning the disk, you separate two logical spaces to include each individual OS.



• What to REFLECT / UNDERSTAND

Evaluating your Needs

Ask yourself the following questions to help you determine the kind of partitions to create:

1. Do you work more on documents than on software?
2. Does your job require you to install multiple software applications?
3. Does the size of your software exceed that of your documents?

The objective here is to study the space ratio to allocate for each partition. The choice of how you partition your disk is important because it affects both disk performance and efficiency. If you are a designer or sound engineer given a computer with 80GB of disk space, you probably would want to assign 25GB of capacity to your primary disk and 55GB to a secondary drive to contain all your media files. You can always adjust this ratio according to your needs. On the other hand, if you are a software tester or a hardcore gamer, you would probably choose to assign 50GB to your primary disk and 30GB to the secondary drive for storage. Again, there is no fixed rule or a standard template and much is directly dependent on your needs and how you operate.



• What to TRANSFER

Defragmentation Issue

Direction: In this activity, you will list down at least five importance of defragmentation and partitioning and its effect a computers performance.



•What to KNOW

UNDERSTANDING PARTITIONS

The master boot record is the first register that resides in your hard disk. It is located at the first sector of the disk and the first program that runs each time you power up your computer. The master boot record contains two important structures - the master boot code and the master partition table. Both provide instruction and information and how your computer boots up. Due to its structure, a single hard disk is limited to four primary partitions. One of it will be assigned as the active partition to contain your operating system. Simply, You can create four primary partitions, or three primary partitions and one extended partition which can be subdivided into multiple logical partitions.

For example, you may want to split your 80GB disk as follows:

- 40GB primary partition for your OS and software applications
- 10GB for MP3 files
- 15GB for Document files
- 5GB for Miscellaneous files
- 10GB for Archival files

First, you create a 40GB primary partition. This will occupy the first of the 4 partitions. Then you can create a 40GB extended partition. And within the extended partition, you create four logical partition - 10GB, 15GB, 5GB & 10GB. So the result of this will be a C drive (40GB), D drive (10GB), E drive (15GB), F drive (5GB) and an H drive (10GB).

MAKING A DISK IMAGE BACKUP

Making a duplicate image or cloning a drive is often used in data recovery to ensure that the original media where data has been lost is untouched while recovery is done on the cloned drive.

It can also be used as a backup procedure. However, it is risky because all the data duplicated will be along with whatever viruses and malware that infected the drive.



BACKUP

Creating a backup of files is one of the most important things people do not do, even though it should be their top priority.

Never recover lost data on the original media. Make a copy or image of it on another storage media, and recover from that copy.

Check Mode of Failure

Before you engage in any self-recovery jobs, do the following first:

- Check if you have heard any sound prior to your data loss.
- notice if the performance of the system degrade.
- Encountered any problems while opening files, folders or saving.

This is simply to make sure that the loss is logical in nature, and not physical. If you encounter any data loss arising from physical data loss, please send it to a professional data recovery outfit.



•What to PROCESS

DUPLICATION - Disk Image Backup

Once you have installed the additional storage media, it is time to duplicate it.

For that, you can use a free software - [ADRC Data Recovery Tools](#).

1. Download and unzip the program. Installation is not required.
2. Run the software.



ADRC_Data_Recovery_Tools

3. Under **tools**, choose the option **"Image Backup / Restore"**.

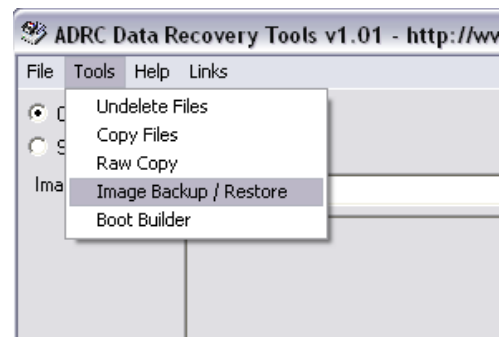


Figure 160. Image Backup / Restore

4. There are two radio buttons. Select **"Create Image from Disk"**.

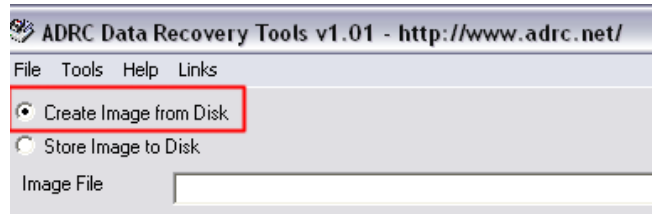


Figure 161. Create Image from Disk

5. Then, in the lower drop down menu, select the drive you want to clone.

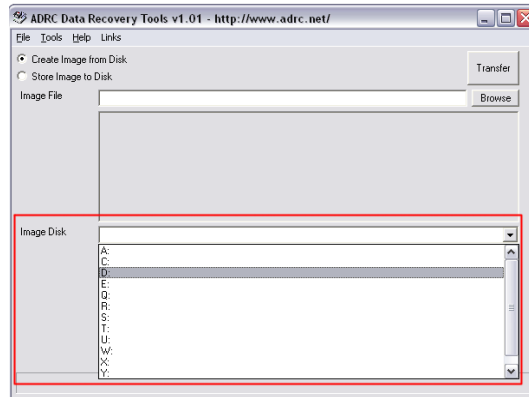


Figure 162. Image Disk Drop-Down Menu

6. Save and indicate an image file name.

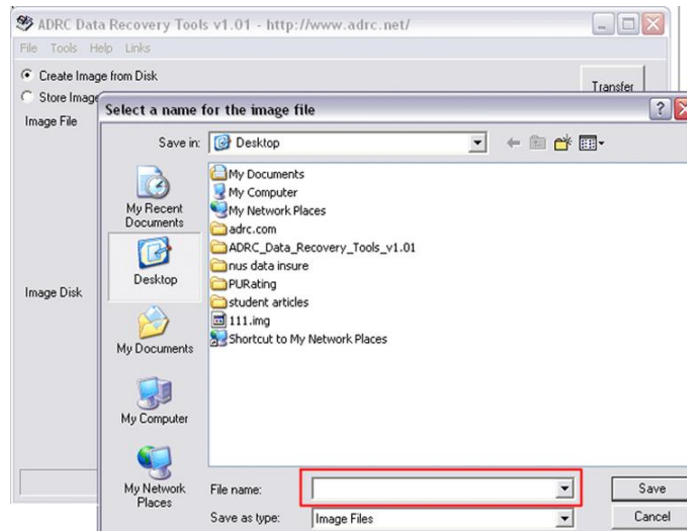


Figure 163. Filename for Image File

7. Then wait for the operation to finish.



Figure 164. Progress Bar

Copy Disk Image to Another Drive

1. Once you have created the disk image, you need to copy the image to another drive.
2. Using the same software, under tools, select "**Image Backup/Restore**".

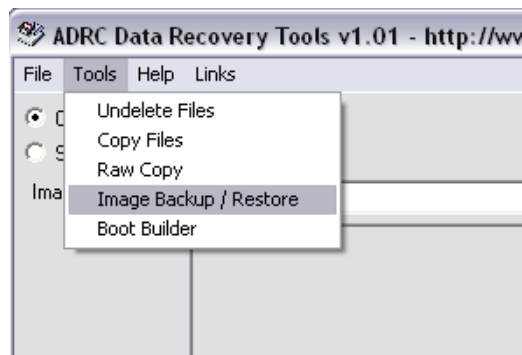


Figure 165. Image Backup / Restore

3. There are two radio buttons. Select "**Store Image Disk**".

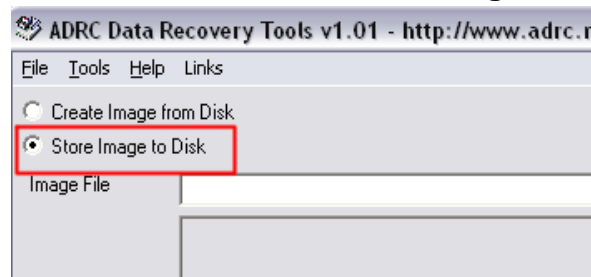


Figure 166. Store Image to Disk

4. Under "**Image File**", browse for the image you just created.
5. Then specify the drive you want to extract the image to be cloned.

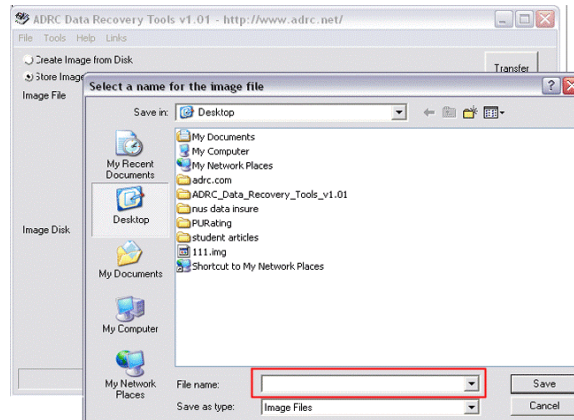


Figure 167. Filename for Image

6. The drive you choose will have all its data destroyed. Be warned.

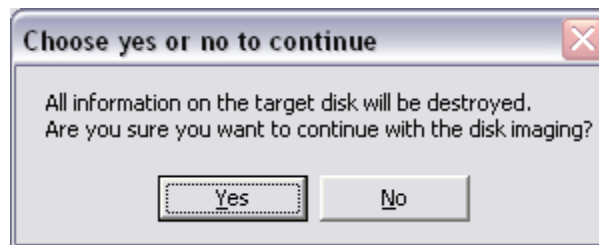


Figure 168. Confirmation Window

7. Click "**Yes**", and transfer of image to disk will be completed.



Critical Review

Now, that you are done with the disk image, read more about disk image through ICT books and other resources. You should consider the following topics for research:

1. Acronis True Image
2. Norton Ghost Image
3. Other disk Image backup software



• What to TRANSFER

Online Review

After the research, watch this video presentation using the URL below:
<https://www.youtube.com/watch?v=rS616jQOURg>

Answer the following questions:

1. What do we need to back-up?
2. Why you need to back-up in the same drive?
3. What other storage media is mentioned on the video?
4. Why is it important to create a system repair disc?
5. What are the different system recovery options?



• What to KNOW

How to Scan Disk

Scan Disk is one of the most common maintenance tools bundled with an operating system. This is an application that checks the computer's hard drive for errors and bad sectors. Once Scan Disk finds an error in the hard drive, it will attempt to fix it.

There are a number of reasons for the errors found inside a hard drive and these include:

- frequent system crashes;
- critical system applications that have been improperly closed; and
- the existence of harmful programs such as viruses, trojans, etc.

What Does Scan Disk Do?

Scan Disk is designed to repair damaged hard drive sectors and clusters on your computer's hard drive. Majority of errors detected with the utility programs permit the application to recover the data stored in the damaged regions of the hard drive. When Scan Disk finds a bad or damaged cluster during a scan, it will move the information stored in that cluster to a new location on the computer's hard drive. Scan Disk also checks and repairs the integrity of file systems such as FAT, FAT32, and NTFS.

Scan Disk requires exclusive access to a drive when it executes. Hence, if one or more of the files are open on the drive that you want to scan, Scan Disk may display a prompt asking if you want to schedule the drive check the next time you restart your computer.

Once Scan Disk finishes its task, it provides a report that contains the errors it has found and the amount of disk space it has scanned. It is therefore important for users to use the Scan Disk application because it ensures that their data is safe from being corrupted. Aside from this, there is a guarantee that their computer will perform at optimum levels.

The earliest Scan Disk version appeared in MS DOS 6.2. In Windows 95 and 98, Scan Disk was given a graphical user interface (GUI). In this graphical environment, the user can find:

- progress bars
- buttons
- information regarding the status of the scan and the errors (if any)

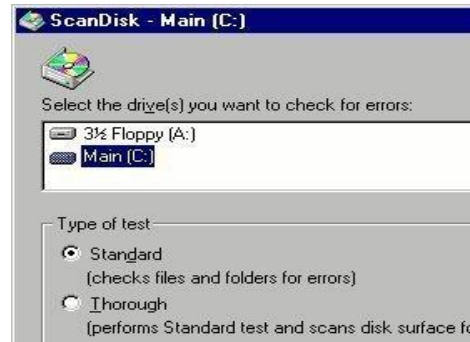


Figure 169. Scan Disk Window



•What to PROCESS

How to Run Scan Disk in Windows 2000 and Windows XP

- Press the Start button on desktop.
- Double click on My Computer.
- Highlight the disk to be scanned for bad sector on the list of Hard Disk Drives.
- Open the File menu and select Properties option.
- Select the Tools tab.
- Click the Check Now button.
- The scanning process will then initiate.

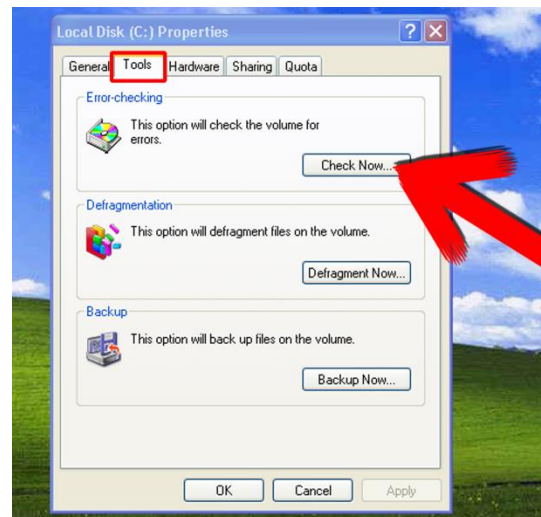


Figure 170. Disk Defragmenter window

How to Run Scan Disk in Windows Vista

- Click the Computer icon on the desktop.
- Right click the drive to be scanned with Scandisk and select Properties.
- Click on the Tools tab. Under the Error-checking sub heading, click the Check Now button.
- A window named Check Local Disk will appear. To attempt to correct errors, check the Scan for and attempt recovery of bad sectors checkbox.
- Click Start to initiate the disk scan. In Vista, it is required to schedule the Scandisk to run at boot time as Vista has mechanisms that do not allow it to run while the system is operating.

Run Scan Disk on Windows 7

In the deployment of Windows 7, the Scan Disk utility underwent a name change and is now called “CHKDSK” that performs the same functions as the legacy application for the Operating System.

Run CHKDSK Using the Graphical User Interface (GUI)

- Step 1** – Select the “Computer” option from the Start menu.
- Step 2** – Right click the drive to check for errors followed by clicking the “Properties” menu button.
- Step 3** – Select the “Tools” menu option followed by the “Check Now” menu button.

If the computer drive is in use, the Operating System will display a dialogue menu asking if you desire to schedule a full scan in the future.

Run CHKDSK from the DOS Command Prompt

Alternatively, CHKDSK can be run from the DOS or Command prompt on the Windows 7 OS.

- Step 1** – Open the DOS prompt on your computer by selecting the “Start” and “Run” menu options.
- Step 2** – Enter “cmd” followed by the “enter” key to open the command prompt.
- Step 3** – Enter “chkdsk c:” to initiate a system check of the local hard drive. If you desire all errors to be fixed through invocation at the DOS

prompt, enter “CHKDSK c: /F /R” to find and fix all errors on the local drive. If your hard drive is labeled with a different letter than “c” just replace the letter in the above example with the actual hard drive letter on your computer.



• What to REFLECT / UNDERSTAND

Answer the following questions in your answer/test notebook.

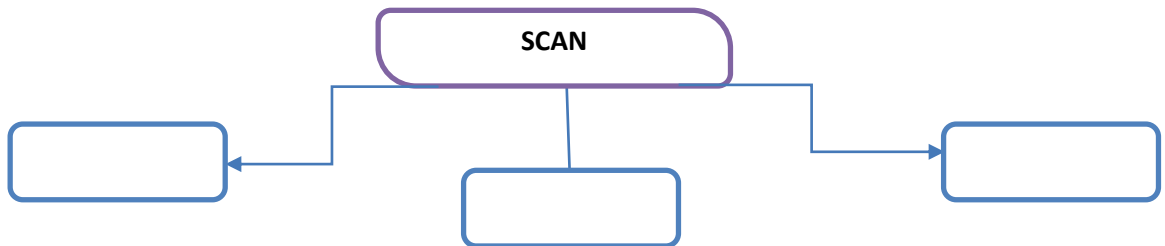
1. What are the things that the scan disk could do in a computer? How often do you use scan disk your computer?
2. Computers should be protected from errors to prevent component malfunction. What are the things you should do to avoid such malfunction?



• What to TRANSFER

1. Concept Mapping

In this activity, write in the figures the concepts that relate to the word “scan”. Add more shapes if you want.



2. Scan Flash Drive

Scanning your flash drive will enable you to check if there are some errors in it.

Here's How:

- a. Press the Start button on desktop or double-click the My



- Computer icon on your desktop.
- b. Select or highlight the flash drive to be scanned for bad sector on the list .
- c. Open the File menu and select Properties option.
- d. Then a window dialogue box will appear, then select the Tools tab.
- e. Click the Check Now button. The scanning process will then initiate.



•What to KNOW

DELETING TEMPORARY FILES

Remove Unnecessary Data Files and Programs

Files and programs that are left idle or cluttering in your computer tend to affect the performance of your system. This happens when the disk space is heavily occupied and more computer resources are allocated to keep track of them. During a read request, the disk needs to bypass all unnecessary files to access the required data. Hence, there is a significant performance dip. In certain situations, poorly written applications can cause undesirable effects such as erratic system hangs, blue screens or conflict with other software.

Unused Software Application

These are usually the software program that you have installed but used rarely if not at all. To remove unwanted programs and applications, follow these steps:

- Click Start, point to Settings, select Control Panel.
- Double click on the Add/Remove Programs icon.



Figure 171. Add or Remove Programs

- Select the unused program and click on the Remove button.



•What to PROCESS

Temporary Internet Files

These are files that accumulate in your computer when you surf the web. Temporary files such as graphics, web pages and cookies are downloaded into a special temporary folder to facilitate efficient web browsing. To delete all temporary Internet files, follow these steps:

- Click Start, point to Settings, select Control Panel.
- Double click on Internet Options.
- Under the Temporary Internet Files group box, click the Delete File button.
- Check the Delete All Offline Content option on the new window and click Ok.



Figure 172. Internet Properties Window



Windows Temporary Files

Windows temporary files are generated and stored in your computer each time you perform a software installation or procedure. Very often, poorly written programs fail to delete them, hence causing them to be left idle in your disk. To delete these temporary files, follow these steps:

- Click Start, point to Programs, point to Accessories.
- Point to System Tools and select Disk Cleanup.
- Select the drive to clean up
- Click OK.



Figure 173. Select Drive Dialogue



Figure 174. Disk Cleanup Dialogue Box



• What to REFLECT / UNDERSTAND

Computer Terminologies

Answer the following questions in your notebook. You may research on the internet for your answers.

- What is the meaning of “cache”? internet cookies?
- How is this concept related to temporary files? What are its effects in the computer operation? Can these files be also removed or deleted to speed up computer operation?



• What to TRANSFER

Deleting Temporary Files

Directions: Choose your partner. Perform the process of deleting of temporary internet files. You will be graded using the Performance Score Card below:

CRITERIA	Passed	Failed
1. Sequence of steps in deleting is followed.		
2. Safety precautions are observed.		
3. The students cooperatively performed the activity.		
PERFORMANCE RATING		



• What to KNOW

Disk Cleanup

Disk Cleanup is a computer maintenance utility that is included in the Microsoft Windows operating system and is designed to free up space on the hard drive. Disk Cleanup helps free up space on your hard drive. Disk Cleanup searches your drive, and then shows you temporary files, Internet cache files, and unnecessary program files that you can safely delete. The cleanup process involves searching and analyzing the hard drive for files that are no longer needed. Then it proceeds to remove them and thus freeing up disk space on the hard drive.

Here is the list of all the files that can be deleted from Windows XP:



1. Downloaded program files
2. Temporary Internet files
3. Offline webpages
4. File for the Recycle Bin
5. Temporary files
6. Web client/publisher
temporary files
7. Compressed old files
8. Catalog files for the content
indexer

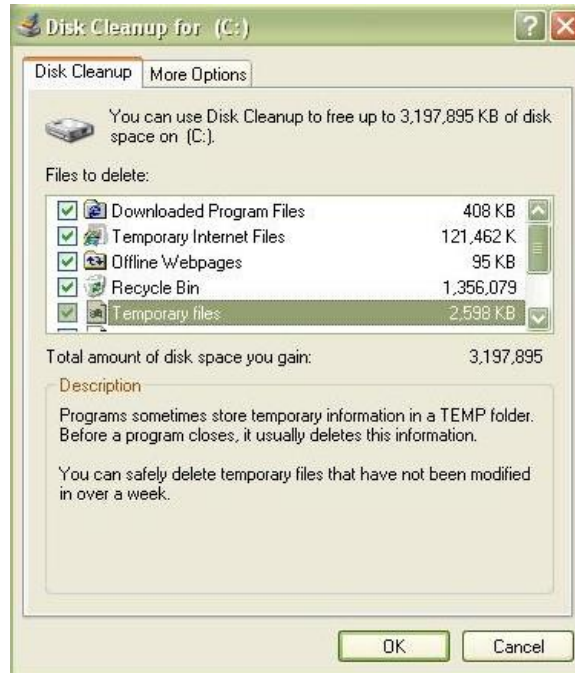


Figure 175. Disk Cleanup Dialogue

Disk Cleanup is a feature of Windows that enables a user to delete system/junk files safely. For example, by using the disk cleanup feature, you can free up a considerable amount of space on your PC, like getting rid of TIF (Temporary Internet Files) and other 'useless', and not required, files.




•What to PROCESS

To reduce the number of unnecessary files on your hard disk to free up disk space and help your computer run faster, use Disk Cleanup. It removes temporary files, empties the Recycle Bin, and removes a variety of system files and other items that you no longer need.

To delete files using Disk Cleanup

The following procedure cleans up files associated with your user account. You can also use Disk Cleanup to clean up all the files on your computer.

1. Open Disk Cleanup by clicking the **Start** button . In the search box, type **Disk Cleanup**, and then, in the list of results, click **Disk Cleanup**.

2. In the **Drives** list, click the hard disk drive that you want to clean up, and then click **OK**.
3. In the **Disk Cleanup** dialog box, on the **Disk Cleanup** tab, select the check boxes for the file types that you want to delete, and then click **OK**.
4. In the message that appears, click **Delete files**.

Remove Unnecessary Startup Programs

Some applications are automatically configured to load each time you boot into Windows. These programs are usually represented by icons that are loaded in your system tray (the panel located at the bottom right corner of your screen). Most of which are unnecessary and tend to take up unnecessary system resources which often slow down your computer. Microsoft provides a tool called the System Configuration Utility that enables you to configure the programs to be loaded during startup.

To use this utility, follow these steps:

1. Click Start, point to Run.
2. Type in: msconfig
3. Click on the Startup tab.

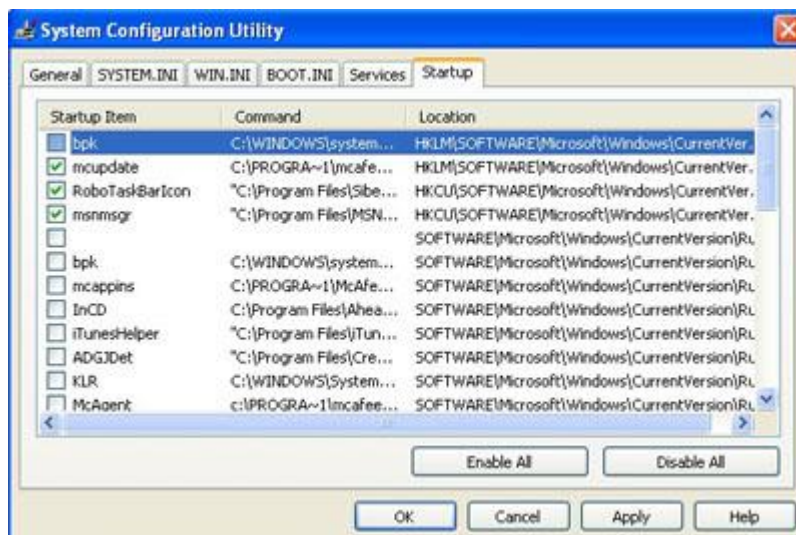


Figure 176. System Configuration Window

4. A list of options will appear indicates that the programs that start up each time you load Windows.
5. Tick only those that are necessary and click OK.
6. Restart your computer. Click Restart.

If you are a Windows 2000 and Windows NT users, you can still use the same program msconfig.exe. Since Microsoft did not include the utility in these two versions of Windows, you have to download it. Once you have downloaded the file into your computer, follow these steps:

1. Unzip the file.
2. Copy the msconfig.exe file into the C:\winnt\system32 folder.
3. To access the utility, click Start, select Run and type in: msconfig. Ignore the error messages about not being able to find the following files:
 - config.sys
 - autoexec.bat
 - win.ini
 - system.ini



• What to REFLECT / UNDERSTAND

Activity: Internet Research

In this activity, you will learn how useful the Internet can be for a PC support technician. Do the following tasks:

1. Research online for the importance of Disk Cleanup and when to apply it.
2. List down the advantages and effects to the computer system.



Activity

Directions: Delete temporary files in different Operating Systems.

1. Delete Temporary Files in Windows 7 and Windows 8
2. Delete Temporary Files in Windows XP

Manually cleaning out the Tempfolder in Window XP is often a necessary maintenance step when the Windows XP Disk Cleanup utility fails to clean out the Tempfolder automatically.

Removing temporary files is a quick and easy task that can help save disk space and keep your PC clean of file clutter. Just follow the step-by-step directions below to manually clean out the Tempfolder:

Time Required: Manually cleaning out the Temp folder in Windows XP usually takes less than 5 minutes.

Here's how:

1. Click on Start and then Run.
2. In the text box in the Run window, type %Temp% and click OK. A folder full of files and other folders will appear.

All of the folders and files you see in this Temp folder are no longer being used by Windows XP and can safely be deleted.

3. To remove individual folders or files, hold down your Ctrl key while left-clicking on each item you want to delete. Release the Ctrl key when you are finished.

To delete these items, press Delete key or choose File and then Delete from the menu.

4. Confirm that you want to delete the files by clicking Yes on the Confirm Multiple File Delete window that opens.
5. If you like to remove everything inside the Temp folder, choose Edit and then Select All from the menu.



Note: If you are prompted that there are hidden files in this folder, just click on OK to bypass the message. A few hidden files hanging out in the Temp folder probably are not important enough to worry about.

6. Now that all of the files and folders are selected, press your Delete key or choose File and then Delete from the menu.
7. Confirm that you want to delete the files by clicking Yes on the Confirm Multiple File Delete window that opens.
8. After all of the files have been deleted you can close the window and empty your Recycle Bin, permanently removing the files from your PC.

Note:

1. You may receive an Error Deleting File or Folder message while the files are being deleted. This just means that one of the files is in use by a program. Click OK, close all open programs, and repeat the steps above. If you still receive the message, try restarting your PC and repeating the process.





•What to KNOW

Lesson 3. Maintain Network Systems

Maintaining computer system and network increases efficiency and saves you from the hassle and expense associated with major repairs. However, it is essential to understand how to schedule maintenance plans and implement it accordingly. By learning when maintenance is practical and developing a scheduling strategy, you can set up maintenance strategies that are beneficial to your computer system and network.

The following are the procedures on how to maintain computer system and networks:

Create an Equipment Maintenance Schedule

In order to perform the maintenance of your computer efficiently, a maintenance schedule is made to guide the personnel in the proper maintenance procedure. This will help them remember the maintenance task that needs to be done in order to improve the functionality of the computer system and networks.

Create a Maintenance Checklist

To determine if the maintenance program is implemented according to what is planned, an assessment must be done. The result of the assessment will then be recorded and reported to the proper authorities for immediate action.

The assessment is through regular inspections which assure that the maintenance activities are done on the date and time they were planned and that the performance levels adhered to the defined standard.

Below is a sample Maintenance Inspection Checklist. This checklist will confirm if the maintenance activities have been performed in order to prolong the life of this particular equipment. The inspection items are stated in question form as these serve as the criteria or standards of maintenance.

EQUIPMENT MAINTENANCE SCHEDULE

EQUIPMENT MAINTENANCE SCHEDULE							
EQUIPMENT TYPE		Desktop Computer					
EQUIPMENT CODE		Computer 1					
LOCATION		Practical Work Area / Computer Laboratory					
ACTIVITIES		Schedule for the Month of <u>February</u>					
MANPOWER		Daily	Every Other Day	Weekly	Every 15th Day	Monthly	Remarks
1. Clean computers and printers	IT Personnel			X			
2. Check computer for viruses	IT Personnel			X			
3. Clean computer peripherals	IT Personnel		X				
4. Check electric and computer connections	IT Personnel				X		
5. Turn off the unit when not in use	IT Personnel	X					

Perform the computer maintenance task regularly.

Just knowing all the basics of computer maintenance task schedule clearly will not be enough. Find time to apply all of the maintenance procedure regularly and frequently. Make computer maintenance activities a regular practice, so that you always have a fine tuned computer with good performance.

Perform Network Maintenance Procedures

Networks are used to transmit information and electricity through cables. When installing these networks, at most care must be applied to protect the network installers from injury. Procedures must also be followed to ensure that those around the network cables do not become the victims of electrical fires or other hazards.

1. Duct Systems

Networks are sometimes installed in duct systems. There is a concern that the network cables might become damaged during construction, so the ducts must be built away from planned future road construction and utilities, according to the International Telecommunication Union. The manholes placed

in the roads must be kept away from intersections so that the network installation and repair workers are not at risk of being hit by a vehicle.

Optical Lasers

Networks that use optical lasers uses invisible radiation that is emitted by these lasers. Before installing the laser, the laser operation manual and safety guide must be read, according to Net Ap. No one should stare inside the optical ports from where the lasers emit their light or else blindness could result. When working with the laser, safety goggles must always be worn.

Falling

Many networks are run along utility poles, which are wooden poles that have network cables raised high above the ground. When installing these cables, falling can be disastrous given the height of the utility poles. Therefore, network installers should wear safety harnesses to ensure that they do not fall.

De-Energize

Some networks have cables that are electrically charged. These cables must be de-energized and tests should be used to ensure that the cables do not have any remaining electricity in them. The tools that are used for repairing the cables are insulated so that electricity does not travel through them and into the hands of the line repairer.

Cable Safety Standards

Network cables must have certain characteristics to be legally used for networks. The cables must not produce flames that can ignite anything. They must not have halogen. They must not produce acidic fumes. They must be resistant to ionizing radiation. Cables must be coded so that those working with the cables can identify what they are.

Cable Inspection

Networks must only be installed by licensed professionals. Building inspectors must check the network cables to ensure that they are installed properly and that they will not create a fire

hazard. These building inspections are especially important when the property containing the network cables is sold.

General Safety

Safe working conditions help prevent injury to people and damage to computer equipment. A safe work space is clean, organized, and properly lighted. Everyone must understand and follow safety procedures.

Follow the basic safety guidelines to prevent cuts, burns, electrical shock, and damage to eyesight. As a best practice, make sure that a fire extinguisher and first-aid kit are available in case of fire or injury. Poorly placed or unsecured cables can cause tripping hazards in a network installation. Cables should be installed in conduit or cable trays to prevent hazards.

These are some of the basic safety precautions to observe when working on a computer:

- Remove your watch and jewelry and secure loose clothing.
- Turn off the power and unplug equipment before performing service.
- Cover sharp edges inside the computer case with tape.
- Never open a power supply or a CRT monitor.
- Do not touch areas in printers that are hot or that use high voltage.
- Know where the fire extinguisher is located and how to use it.
- Keep food and drinks out of your work space.
- Keep your work space clean and free of clutter.
- Bend your knees when lifting heavy objects to avoid injuring your back.

Electrical Safety

Follow electrical safety guidelines to prevent electrical fires, injuries, and fatalities in the home and the workplace. Power supplies and CRT monitors contain high voltage.

CAUTION

Only experienced technicians should attempt to repair power supplies and CRT monitors.

Some printer parts become hot during use, and other parts might contain high voltage. Check the printer manual for the location of high-voltage components. Some components retain a high voltage even after the printer is turned off. Make sure that the printer has had time to cool before making the repair.

Electrical devices have certain power requirements. For example, AC adapters are manufactured for specific laptops. Exchanging power cords with a different type of laptop or device may cause damage to both the AC adapter and the laptop.

Follow fire safety guidelines to protect lives, structures, and equipment. To avoid an electrical shock and to prevent damage to the computer, turn off and unplug the computer before beginning a repair.

The following are general information on electrical safety:

- Electrical equipment that is plugged into a power source should NEVER be handled if your hands or feet are wet.
- Do not allow cables and plugs to get wet. Thus, keep liquids away from electrical equipment.
- Unplug equipment by pulling on the plug, not the cord.
- Damaged electrical equipment that constitute an electrical hazard are not to be used until properly repaired or replaced.
- Never connect electrical cords in series.
- All electrical circuit disconnects or panels must not be blocked.
- Ground pins on the plugs and the devices plugged into the receptacles must be intact.
- Do not store flammable liquids near electrical equipment.

Fire Safety

Fire can spread rapidly and can be very costly. Proper use of a fire extinguisher can prevent a small fire from getting out of control. When working with computer components, be aware of the possibility of an accidental fire and know how to react. Be alert to notice odors being emitted from computers and electronic devices. When electronic components overheat or short out, they emit a burning odor. If there is a fire, follow these safety procedures:

- Never fight a fire that is out of control or not contained.
- Always have a planned fire escape route before beginning any work.
- Get out of the building quickly.
- Contact emergency services for help.
- Locate and read the instructions on the fire extinguishers in your workplace before you use them.

Be familiar with the types of fire extinguishers used in your country or region. Each type of fire extinguisher has specific chemicals to fight different types of fire.

Types of Fires

Not all fires are the same. Different fuels create different fires and require different types of fire extinguishing agents.



Class A

Class A fires are fires in **ordinary combustibles** such as **wood, paper, cloth, trash, and plastics**.



Class B

Class B fires are fires in **flammable liquids** such as **gasoline, petroleum oil and paint**. Class B fires also include **flammable gases** such as **propane and butane**. Class B fires do not include fires involving cooking oils and grease.



Class C

Class C fires are fires involving **energized electrical equipment** such as **motors, transformers, and appliances**. Remove the power and the Class C fire becomes one of the other classes of fire.



Class D

Class D fires are fires in **combustible metals** such as **potassium, sodium, aluminum, and magnesium**.



Class K

Class K fires are fires in **cooking oils and greases** such as **animals fats** and **vegetable fats**.

Some types of fire extinguishing agents can be used on more than one class of fire. Others have warnings where it would be dangerous for the operator to use a particular fire extinguishing agent.

Different types of fire extinguishers are designed to fight different classes of fire. The three most common types of fire extinguishers are: Water (APW), Carbon Dioxide (CO₂), Dry Chemical (ABC,BC,DC).

Water and Foam fire extinguishers snuff the fire by taking away the heat element of the fire triangle. Foam agents also separate the oxygen element from the other elements.

Water extinguishers are for Class A fires only - they should not be used on Class B or C fires. The discharge stream could spread the flammable liquid in a Class B fire or could create a shock hazard on a Class C fire.

Carbon Dioxide fire extinguishers snuff fire by taking away the oxygen element of the fire triangle and also be removing the heat with a very cold discharge.

Carbon dioxide can be used on Class B & C fires. They are usually ineffective on Class A fires.

Dry Chemical fire extinguishers extinguish the fire primarily by interrupting the chemical reaction of the fire triangle. Today's most widely used type of fire extinguisher is the multipurpose dry chemical that is effective on Class A, B, and C fires. This agent also works by creating a barrier between the oxygen element and the fuel element on Class A fires.

It is important to know how to use a fire extinguisher. Use the memory aid P-A-S-S to remember the basic rules of fire extinguisher operation:

- **P:** Pull the pin.
- **A:** Aim at the base of the fire, not at the flames.
- **S:** Squeeze the lever.
- **S:** Sweep the nozzle from side to side.



• What to PROCESS

Accomplish the maintenance inspection checklist below. Put a check mark on the column which states an action taken. Do this on your notebook.

MAINTENANCE INSPECTION CHECKLIST		
Equipment Type	PERSONAL COMPUTER	
Property Code	PC001	
Location	Practical Work Area	
YES	NO	INSPECTION ITEMS
		1. Are the stability of the male plug and other power connections checked regularly?
		2. Is the machine regularly cleaned?
		3. Is the monitor checked and cleaned regularly?
		4. Are the peripherals cleaned and checked regularly?
		5. Is the hard disk checked and cleaned regularly?
		6. Are the applications regularly updated?
		7. Are backing-up of files done regularly?



• What to REFLECT / UNDERSTAND

Video Tutorial

Directions:

Watch the video on <http://www.youtube.com/watch?v=cMCCLKDHXql> and make an outline of steps on maintenance procedure or the action taken shown in the video.



• What to TRANSFER

Weekly Maintenance Checklist

Directions: Create a weekly maintenance checklist for the computer laboratory. Include all the computer and network hardware. You will be given 40 minutes to complete the task. You can use any applications in creating the checklist. Present your output to the class.

		Excellent (3)	Good (2)	Poor (1)
Hardware/Peripherals	All hardware/peripherals were enumerated			
Format	Layout of the checklist is good.			
Details	Important details were included such as dates, checker's name, area/room, remarks, conditions, etc.			
Handwriting	Legible. Good spacing and alignment.			
	Total Points			



• What to KNOW

Burn-In Testing

Burn-in testing enables you to run test scripts and to create new scripts. The Diagnostics main menu provides two burn-in selections, Immediate Burn-In Testing and Deferred Burn-In Testing.

- Immediate Burn-In enables you to run an existing script and to select configuration options. Deferred Burn-In enables you to create a new script.

Standard Scripts

Sun provides three ready-made scripts designed to test the general health of the devices on your system. These scripts include:

- quick.tst

This script performs a series of tests that require the user to interact with the test software. When they require a user interaction, they stop and do not time out. These tests are faster than the full.tst but they are less thorough. For example, they do not run all the tests associated with a DIMM.

- noinput.tst

This script performs a non-detailed test of most hardware components, excluding those components that require user input (keyboard, mouse, sound, and video). This test does not require user input. It is normally the first test performed for hardware-related problems.

- full.tst

This script performs a detailed and comprehensive test on all hardware components, including those that require user input. It includes external port tests and requires loopback connectors on COM ports, parallel ports, and USB ports. You must interact with the test utility to progress through these interactive tests.



• What to PROCESS

Performing Immediate Burn-In Testing

Use Immediate Burn-In Testing to run test scripts.

To Perform Immediate Burn-In Testing

1. From the Diagnostics main menu, select Immediate Burn-In Testing. The screen displays a list of settings shown in [TABLE 6-3](#) and a Burn-In menu.
2. From the menu, select Load Burn-In Script. A text box appears.
3. Type the name of the script you want to run, for example quick.tst, noinput.tst, or full.tst.
4. To change any of the options, select Change Options at the bottom of the screen.

This opens the Burn-In Options menu, which enables you to modify the options listed in [TABLE 6-3](#) for the currently loaded test script.

5. Select Perform Burn-In Tests.

The diagnostics software executes the test script as configured.

TABLE 6-3 Continuous Burn-In Testing Options

Option	Default - General	Default using quick.tst, noinput.tst, or full.tst Script	All Possible Choices
Pass Control	Overall Time	Overall Passes	Individual Passes, Overall Passes, or Overall Time
Duration	01:00	1	Enter any number to choose the time duration of the test
Script File	N/A	quick.tst, noinput.tst, or full.tst	quick.tst, noinput.tst, or full.tst
Report File	None	None	User defined
Journal File	None	D:\noinput.jrl, D:\quick.jrl, or D:\full.jrl	User defined
Journal Options	Failed Tests	All Tests, Absent Devices, and Test Summary	Failed Tests, All Tests, Absent Devices, and Test Summary
Pause on Fail	N	N	Y or N
Screen Display	Control Panel	Control Panel	Control Panel or Running Tests
POST Card	N	N	Y or N
Beep Codes	N	N	Y or N
Maximum Fails	Disabled	Disabled	1-9999

Show Results Summary

Selecting show results summary on the diagnostics main menu displays the tests that have been run and lists the results, which can be Pass, Fail, or Not Applicable.

- Processor

This section shows the following tests conducted against the processor: Core Processor Tests, AMD 64-Bit Core Tests, Math Co-Processor Tests - Pentium Class FDIV and Pentium Class FIST, MMX Operation, 3DNow! Operation, SSE Instruction Set, SSE2 Instruction Set, and MP Symmetry.

- Motherboard

This section shows the following tests conducted against the motherboard: DMA Controller Tests, System Timer Tests, Interrupt Test, Keyboard Controller Tests, PCI Bus Tests, and CMOS RAM/Clock Tests.

- Memory, Cache Memory, and Video Memory

This section shows the following tests conducted against the various types of memory: Inversion Test Tree, Progressive Inversion Test, Chaotic Addressing Test, and Block Rotation Test.

- Input Device

This section shows the following tests conducted against the input device: Verify Device, Keyboard Repeat, and Keyboard LEDs.

- Mouse

This section shows the following tests conducted against the mouse: Buttons, Ballistics, Text Mode Positioning, Text Mode Area Redefine, Graphics Mode Positions, Graphics Area Redefine, and Graphics Cursor Redefine.

- Video

This section shows the following tests conducted against the video: Color Purity Test, True Color Test, Alignment Test, LCD Test, and Test Cord Test.

- Multimedia

This section shows the following tests conducted against the multimedia components: Internal Speaker Test, FM Synthesizer Test, PCM Sample Test, CD/DVD Drive Read Test, CD/DVD Transfer (KB/Sec),

CD/DVD Transfer Rating, CD/DVD Drive Seek Test, CD/DVD Seek Time (ms), CD/DVD Test Disk Read, and CD/DVD Tray Test.

- ATAPI Devices

This section shows the following tests conducted against ATAPI devices: Linear Read Test, Non-Destructive Write, and Random Read/Write Test.

- Hard Disk

This section shows the following tests conducted against the hard disk: Read Test, Read Verify Test, Non-Destructive Write Test, Destructive Write Test, Mechanics Stress Test, and Internal Cache Test.

- USB

This section shows the following tests conducted against the USB: Controller Tests and Functional Tests.

- Hardware ID

The compare test is used to determine the machine ID for the system. This test is not available for the Sun Blade X6275 server module.

Print Results Report

The Print Results Report option enables you to print results of the diagnosis of your server if it is connected to a printer through a parallel port.

Exit

The Exit option exits the PC-Check software and reboots the server module.

Viewing the PC-Check Results

You can use the text file editor to view the results when you run PC-Check manually. To do this, you need to know the name of the file or files produced by the tests.

PC-Check Filenames

When you run a test, the header of the screen where you invoke the test shows you the name of the output file. For example, when you run the

continuous burn-in test, the name of the output file is PCCHECK.BRN, as you can see in the following figure.

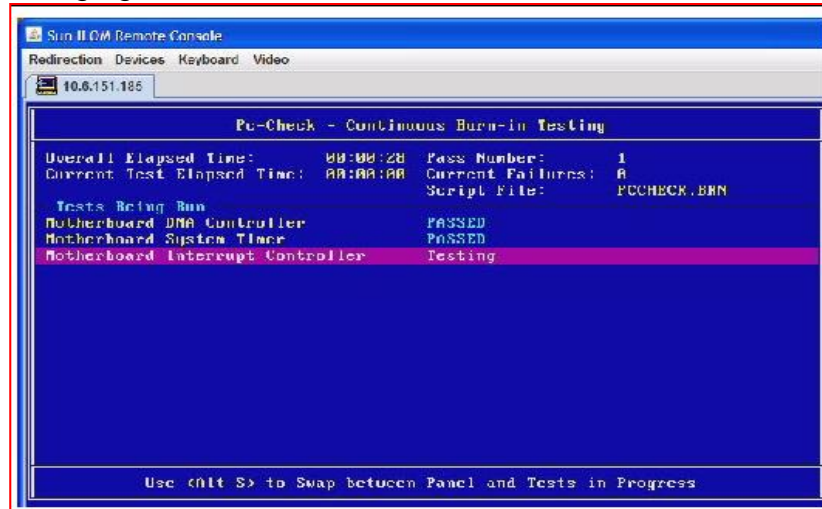


FIGURE 177. PC-Check Continuous Burn-in Testing

Other files are named PCCHECK.xxx, for example, PCCHECK.JNL or PCCHECK.HII. The .HII file is especially important because it shows the entire host configuration at the time of failure.

Viewing PC-Check Files with the Text File Editor

When you know the name of the output file, you can use the text file editor to view the file.

1. Select the System Information Menu option on the PC-Check Main Menu and press Enter.

The System Information Menu appears, as shown here:



FIGURE 178. PC-Check System Information Menu

2. Select the Text File Editor and press Enter. You are prompted for a file name.

3. Type in the file name (for example, PCCHECK.JNL) and press Enter.

The editor opens with the file displayed, as shown here:

```
PCCHECK.JNL
-
          Pc-Check D.21-s Journal File
12/01/2002 01:27:12  Testing Started
12/01/2002 01:27:12  Pass 1 Started
12/01/2002 01:27:12  Testing Ended, 0 Failures

          Pc-Check D.21-s Test Summary
12/01/2002 01:28:20  Testing Started
12/01/2002 01:20:20  Pass 1 Started

          Use +1+ <PgUp> <PgDn>, Alt-X to Exit
```

FIGURE 179. PC-Check Journal File in Text Editor



Lesson 4. Inspect Computer Systems and Networks

OHS Procedures in Maintaining Network Systems

In general, testing is finding out how well something works. In terms of human beings, testing tells what level of knowledge or skill has been acquired. In computer hardware and software development, testing is used at key checkpoints in the overall process to determine whether objectives are being met. For example, in software development, product objectives are sometimes tested by product user representatives. When the design is complete, coding follows and the finished code is then tested at the unit or module level by each programmer; at the component level by the group of programmers involved; and at the system level when all components are combined together. At early or late stages, a product or service may also be tested for usability.

Safety Precautions

Occupational Health and Safety (OHS) Policy –An Information and Communication Technology (ICT) student should know how to behave when working in the computer laboratory, and how to implement a safe way of accomplishing every task. Safety practices should be learned early and always adhered to in working with any electrical and electronic device, including personal computers and its peripherals. This is for your protection as well as to the people working with you, and for the devices that you are using. The basis for this process begins with Occupational Health and Safety Policies.

Occupational Safety and Health (OSH) is a planned system of working to prevent illness and injury where you work by recognizing and identifying hazards and risks. Health and safety procedure is the responsibility of all persons in the computer and technology industries. You must identify the hazards where you are working and decide how dangerous they are. Eliminate the hazard or modify the risk that it presents.

Occupational Health and Safety standards

Each student has a responsibility to their colleagues and their organization to report and act upon any potential workplace hazard. Students need to be aware of the *type of hazards* that are possibly present in their work environment.

Procedure

1. Identify the hazard.
2. Clear the area close to the hazard.
3. Partition the hazard off or clearly identify the area to protect other people from harm.
4. If the hazard can easily and safely be cleared, then do so.

If not...

5. Report the hazard to the appropriate person (such as teacher in charge, principal etc.) to obtain assistance.
6. Following clearing of the hazard fill out the correct documentation to assist in identifying improved practice to reduce further incidence of hazards.



Maintenance of the Computer Systems and Networks

Diagnostic Software for Network

Network Diagnostic Tool is an efficient and reliable tool to help you determine and identify the possible network issues that prevent you from using your computer to the fullest. With Network Diagnostic Tool, you can quickly identify the problems you may be having, which sometimes occur with home computers that are connected to the web via cable or DSL modems.

The Network Diagnostic Tool is a utility that analyzes your system and performs a wide range of tests to determine the cause of your connectivity issues by investigating all your network-related services and programs, looking into your IP configuration and default gateway, but it will also test out the DNS and Firewall.

Moreover, Network Diagnostic Tool can also run an Internet connection validation test, in the interest of discovering the underlying

problems and gathering all the information you may need with a minimal level of effort for you.

The program will assist you during the troubleshooting operation, enabling you to save significant amounts of time by sparing you from finding the causes of your network problems by yourself.

There are free available network diagnostic tools that can be download online, such as Wireshark and TCPdump. It will help you monitor your network performance and highlight discrepancies that might point to underlying malicious activity.



• What to PROCESS

Testing Demonstration

To check the vulnerability or stability of your network connection, go to the internet and download a free network diagnostic tool.

- Go to any search engine and type – network diagnostic tool.
- After downloading the application, run the setup file of the program and install it into your computer.
- If the program was already installed, run the application. Take note of the diagnosis. Do some action if there are problems or errors encountered.



• What to REFLECT / UNDERSTAND

Network Diagnostics for Windows XP tool

Directions: Visit the link on <http://support.microsoft.com/kb/914440>. Follow the instructions given and apply them to your computer. You are to be rated according to the rubric below.

Rubric for your Performance Test

CRITERIA	Excellent 4	Good 3	Fair 2	Poor 1
Adherence to the sequence of setup -Followed carefully the given instructions.				
Workmanship -Had organized materials and tools while accomplishing the task and has time management.				
Quality of work -Presented a neat final output.				



• What to TRANSFER

Schedule and Techniques in Maintaining Systems

Regular maintenance is essential to keep a network running well. You should also be prepared to upgrade equipment and software periodically to take advantage of improving technology.

System Restore

System Information maintains a history of device drivers that are installed on your computer. If you are unsure of a computer's recent history, you can use System Information to better understand what has happened in the past. If a device does not work correctly, and its history indicates a recent upgrade to a new driver, replace that driver with the original driver, and test to see if doing so resolves the issue.

System Information also provides access to tools you can use for troubleshooting your computer.

If you install an update from the Windows Update Web site, and it fails to meet your expectations, restore the original files by running the Update Wizard Uninstall from the Tools menu in the System Information tool. If your computer worked fine yesterday, but is not working properly today, try restoring yesterday's configuration files by running the System Restore utility from the Tools menu in the System Information tool.

To start Microsoft System Information, use either of the following methods:

- Click Start, point to Programs, point to Accessories, point to System Tools, and then click System Information.
- Click Start, click Run, type msinfo32.exe in the Open box, and then click OK.

To start System Restore

- Click Start, point to Programs, point to Accessories, point to System Tools, and then click System Restore; or
- Click Start, click Run, type System Restore in the Open box, and then press Enter key. Then, it will prompt you to the dialogue box shown below:

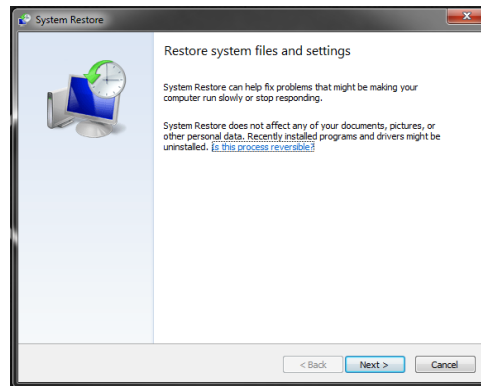


Figure 180. System Restore Window

- Click Next button, then it will prompt you to restore your computer to the state it was working properly. Tick on Show More Restore Points then check the box below to display other possible options you can choose.

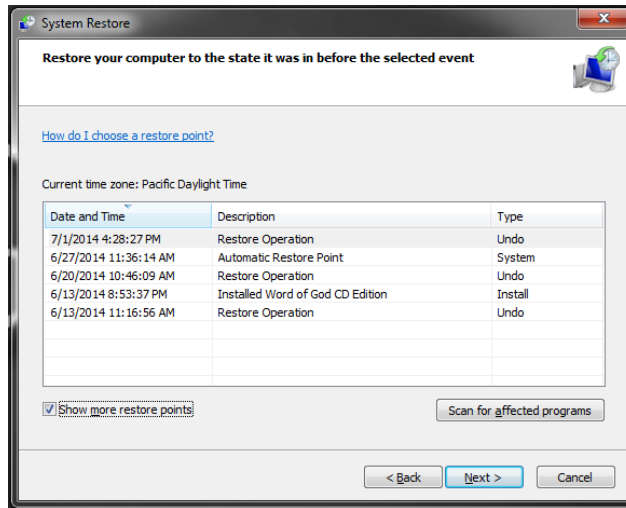


Figure 181. System Restore Window with More Restore

- Choose a Restore Point given on the list and select Next.
- Finally, choose Finish button to proceed with the process. Wait for the computer to automatically restart as it undergoes system restore.

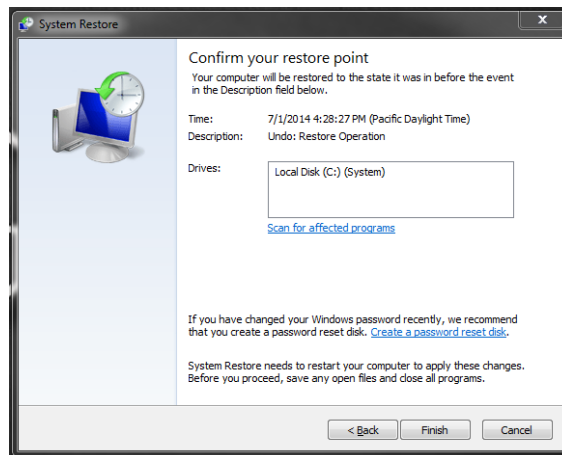


Figure 182. Confirm Restore Point Window

After doing the performed task, you will be assessed using the following criteria:

CRITERIA	Excellent (3)	Good (2)	Poor (1)
1. Sequence of steps is followed.			
2. Safety precaution is observed.			
4. Speed (Worked in a fast manner).			
PERFORMANCE RATING			



•What to KNOW

Network Monitoring

Network monitoring refers to the practice of overseeing the operation of a computer network using specialized management software tools. Network monitoring systems are used to ensure availability and overall performance of computers (hosts) and network services.

Network Monitoring Software Tools

The **ping** program is one example of a basic network monitoring program. Ping is a network administration utility or tool used to test connectivity on an Internet Protocol (IP) network. It also measures the latency or delay between two computers. Ping is a software tool available on most computers that sends Internet Protocol (IP) test messages between two hosts. Anyone on the network can run these basic ping tests to verify the connection between two computers is working and also measure the current connection performance.



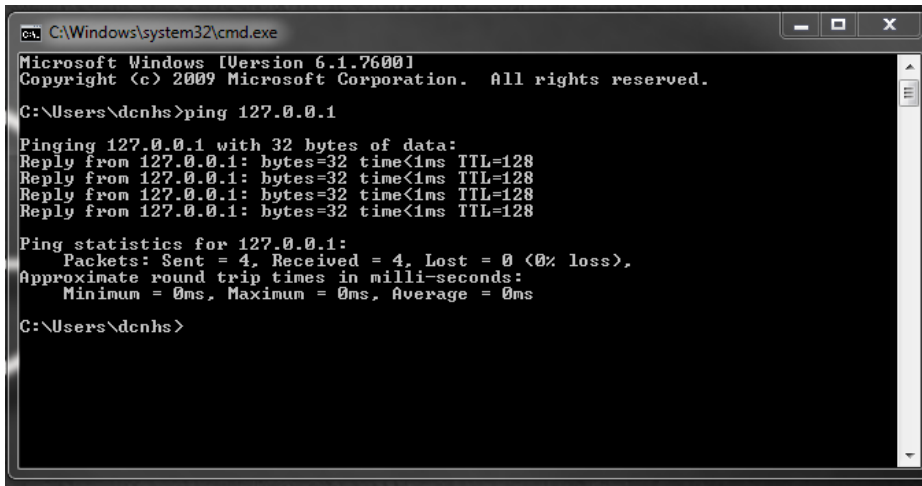
•What to PROCESS

Testing Network Connection with Ping Symptoms:

- wants to test the network using Ping
 - wants to test the latency of the network
1. Open the Command Prompt or Terminal. Every operating system has a command line interface that will allow you to run the Ping command. The Ping command operates virtually and identically on all systems. If using Windows, open the Command Prompt. Click the Start button and enter "cmd" into the Search field. Windows 8 users can type "cmd" while on the Start screen. Press Enter to launch the Command Prompt.
 2. Type ping followed by an IP address or a website address then press Enter key to execute the command. Here is a brief explanation of commonly used ping commands:
 - ping 127.0.0.1 (This is a "loopback ping" - your computer trying to talk to itself. If the loopback step fails, it might be because the TCP drivers are corrupted, the network adapter might not be working, or another service is interfering with IP.)
 - ping <IP address> (This will ping the IP address of a device like a local computer, remote server or any client that receives an IP address to verify that it is reachable and that you can communicate with it properly.) Example: ping 192.168.1.1 (this is the default IP address of NETGEAR routers)
 - ping<website address> (This command will test for the Internet connectivity and DNS functionality.) Example: ping www.netgear.com, ping google.com



Here is a screenshot of a successful ping test:



```
C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7600]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

C:\Users\dcnhs>ping 127.0.0.1

Pinging 127.0.0.1 with 32 bytes of data:
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128

Ping statistics for 127.0.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\dcnhs>
```

Figure 183. Command Prompt with Ping command

The first arrow shows the computer we are trying to reach is responding. (The DNS address "www.netgear.com" is displayed into the equivalent IP address, 10.1.1.86.) This also shows that the computer is online and it has Internet access.

The second arrow shows that all of the sent packets are received showing that there is 0% loss. This means that the connection is available and stable.

The third arrow shows the average time it took to answer. "Average = 0ms" is the best possible result. This kind of result is usually received if the device you tried to reach is within the same network.

Common Ping Test Problems

1. **Request Timed Out.** This message indicates that no reply messages were received within the default time of 1 second. This can be due to many different causes; the most common causes are network congestion, failure of the ARP request, packet filtering, routing error, or a silent discard. Most often, it means that a route back to the sending host has failed. This might be because the destination host does not know the route back to the sending host, or one of the intermediary routers does not know the route back, or even that the destination host's default gateway does not know the route back. Check the routing table of the destination host to see whether it has a route to the sending host before checking tables at the routers.

2. **Unknown Host**

This error message indicates that the requested host name cannot be resolved to its IP address; check that the name is entered correctly and that the DNS servers can resolve it.

3. **Destination Host Unreachable**

This message indicates one of two problems: either the local system has no route to the desired destination, or a remote router reports that it has no route to the destination. The two problems can be distinguished by the form of the message. If the message is simply "Destination Host Unreachable," then there is no route from the local system, and the packets to be sent were never put on the wire. Use the Route utility to check the local routing table.

If the message is "Reply From < IP address >: Destination Host Unreachable," then the routing problem occurred at a remote router, whose address is indicated by the "< IP address >" field. Use the appropriate utility or facility to check the IP routing table of the router assigned the IP address of < IP address >.

If you pinged using an IP address, retry it with a host name to ensure that the IP address you tried is correct.



• What to REFLECT / UNDERSTAND

Practicing TCP/IP Networking Skills

While connected to the Internet or another TCP/IP network, answer these questions:

1. What is your current IP address?
2. Release and renew your IP address. What is your new IP address?
3. Are you using dynamic or static IP addressing? How do you know?
4. What is your adapter address for this connection?
5. What is your default gateway IP address?



• What to TRANSFER

Network Checking

Direction: Check the network status by using the ping command. Make a status report on the results.

1. Ping a website.
2. Ping the router.
3. Ping a terminal/computer.

Rubric for your performance Test

Criteria	Percentage	Grade
Accuracy	50 %	
Adherence to the procedures	20%	
Workmanship(applied safety precautions)	20%	
Speed	10%	
Performance Rating		



•What to KNOW

Computer Communications

Although computers communicate on many different levels and there is a great deal of variation between the different types of computer systems involved, the basic communication process is relatively uniform and standardized. Essentially, computers communicate with one another over networks that are connected via wire or wireless communication methods. There are many different types of networks, and there are many different types of network-connection methods as well.

As mentioned before, there are many types of networks. From smallest to biggest, the most common network types are personal area network, local area network, campus area network, metropolitan area network, wide area network, global area network and internetwork. The basic difference between these network types is their size (how many remote computer systems are connected to them) and their method of connection.

Methods of Connection Commonly Used

There are many different types of connection media that are used in contemporary society to connect computer networks to one another. In terms of wired connections, there is coaxial cable, fiber-optic cable, USB cable and traditional telephone lines. These are the most common network connections. Wireless technologies differ hugely from one another, but the most popular kinds are Bluetooth and WiFi.

How network works - Computers in network

General Network Techniques - When computers communicate on a network, they send out data packets without knowing if anyone is listening. Computers in a network all have a connection to the network and that is called to be connected to a network bus. What one computer sends out will reach all the other computers on the local network.



Figure 184. General Network

For the different computers to be able to distinguish between each other, every computer has a unique ID called MAC-address (Media Access Control Address). This address is not only unique on your network but unique for all devices that can be hooked up to a network. The MAC-address is tied to the hardware and has nothing to do with IP-addresses. Since all computers on the network receive everything that is sent out from all other computers, the MAC-address is primarily used by computers to filter out incoming network traffic that is addressed to the individual computer.

When a computer communicates with another computer on the network, it sends out both the other computer's MAC-address and the MAC-address of its own. In that way the receiving computer will not only recognize that this packet is for it but also who sent this data packet so a return response can be sent to the sender.

In an Ethernet network as described here, all computers hear all network traffic since they are connected to the same bus. This network structure is called multi-drop.

One problem with this network structure is that when you have, let say ten (10) computers on a network and they communicate frequently and due to that they send out data packets randomly, collisions occur when two or more computers sends data at the same time. When that happens, data gets corrupted and has to be resent. On a network that is heavy loaded, even the resent packets collide with other packets and have to be resent. In reality this soon becomes a bandwidth problem. If several computers communicate with each other at high speed they may not be able to utilize more than 25% of the total network bandwidth since the rest of the bandwidth is used for resending previously corrupted packets.

The way to minimize this problem is to use network switches.



•What to PROCESS

Set up a DSL or cable connection

To set up a Digital Subscriber Line (DSL) or cable connection, you first need an account with an Internet Service Provider (ISP). For DSL, the ISP is usually a phone company; for cable, it is usually a cable TV provider.

You will also need a modem, a router, or a device that combines the two. When you have your modem and router or your combination device, follow the corresponding steps below.

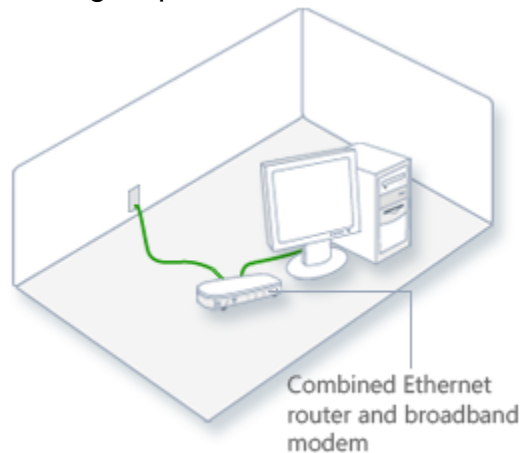


FIGURE 185. Combined Modem and Router

How to plug in a combined modem and router properly

1. Plug the device into an electrical outlet.
2. Plug one end of a phone cord or cable into the wide area network (WAN) port of the device, and then plug the other end into the wall jack. The WAN port should be labeled "WAN." (DSL users: Do not use a DSL filter on the phone line.)
3. Plug one end of an Ethernet cable into the local area network (LAN) port on the device, and then plug the other end into the networking port of the computer that you want to connect to the Internet. The LAN port should be labeled "LAN." (If you are connecting wirelessly, skip this step.)
4. Start (or restart) the computer.
5. Open the Connect to the Internet wizard by clicking the Start button, clicking Control Panel, click Network and Internet, click Network and Sharing Center, click Set up a connection or network, and then click Connect to the Internet.



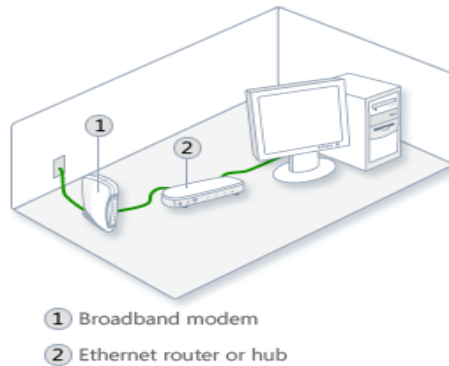



FIGURE 186. Modem and Router properly

How to plug in modem and router properly

1. Plug the modem into an electrical outlet.
2. Plug one end of a phone cord or cable into the modem, and plug the other end into the wall jack. (DSL users: Do not use a DSL filter on the phone line.)
3. Plug one end of an Ethernet cable into the modem, and plug the other end into the wide area network (WAN) port on the router.
4. Plug the router into an electrical outlet.
5. Plug one end of an Ethernet cable into the local area network (LAN) port on the router, and plug the other end into the networking port on the computer that you want to connect to the Internet. (If you are connecting wirelessly, skip this step.)
6. Start (or restart) the computer.
7. Open the Connect to the Internet wizard by clicking the Start button , clicking Control Panel, clicking Network and Internet, clicking Network and Sharing Center, clicking Set up a connection or network, and then clicking Connect to the Internet.



• What to REFLECT / UNDERSTAND

Video Tutorial

Directions:

Watch the video on <http://www.youtube.com/watch?v=KBHyDd2cJBs> and make an outline of steps or procedure of the action taken presented or shown in the video.



• **What to TRANSFER**

Network Connection Demo

You are required to make a network connection using the devices provided. You will be rated according to the criteria given below.

Equipment, Tools and Materials Required:

- UTP cables
- 1 router
- 1 hub
- 2 PC unit
- DSL connection

Given the following materials, set-up a network connection on one computer.

CRITERIA	1	2	3	4	5
• Safety Precautions are observed.					
• All the UTP cables are properly connected to the computer and hub.					
• Computer is properly connected and seen in the network.					
• Proper boot-up and shutdown of the computer is observed.					
Total:					





•What to KNOW

Identify Safety Procedures and Potential Hazards for Users and Technicians

Safety in the lab and in the work place is an important issue when working on computers and other electrical devices. General safety guidelines and fire safety guidelines protect the technician and the equipment.

General Safety Guidelines

Follow the basic safety guidelines to prevent cuts, burns, electrical shock, and damage to eyesight. As a best practice, make sure that a fire extinguisher and first aid kit are available in case of fire or injury.

Installing network cables, whether copper or fiber-optic, can be dangerous. Often, cables must be pulled through ceilings and walls where there are unexpected obstacles or toxic materials. You should wear clothing that protects you from these materials. For example, wear long pants, a long-sleeved shirt, sturdy shoes that cover your feet, and gloves. Most importantly, wear safety glasses. If possible, ask building management, or someone responsible for the building, if there are any dangerous materials or obstacles that you need to be aware of before entering the ceiling area.

Cable, Cable Cutters, and Cable-Cutting Safety Hazards

All levels of technicians should know the hazards before working with network cables and equipment. This section describes the safety hazards of working with copper cables, which, like fiber-optic cables, can be dangerous to handle.

Caution

When handling cable, always wear eye protection. Never touch the ends of any type of cable to bare skin.

When you cut copper cable, the small copper strands can puncture your skin or cut you. The small pieces that come off after cables are cut often fly into the air. Remember to always wear safety glasses when cutting any type of

cable.

The cutting and crimping tools used to repair set of terminate copper cables can be dangerous if not used properly. Read the instructions that comes with the tool. Practice using the tool on scrap cable, and ask an experienced installer for help if you need it.

Remember that copper cable conducts electricity. A faulty equipment, static electricity, or lightning can energize even a disconnected cable. If in doubt, test the cable you are working on with a simple voltage detector before touching it.



• What to KNOW

Preparing Technical Reports

The main purpose of a technical report is to deliver information. Technical reports are intended primarily for the long-term archival of results and descriptions and for monitoring the conditions of laboratory facilities such as the computers, network status and other hardware facilities.

A good report needs careful planning. As part of the planning stage, you should answer the following questions.

- What is the report about? What are you trying to say? You should arrange things so that the key facts and conclusions are very accessible. Not everyone will read the whole report, so ensure that your message is concise even if a person only skims the document.
- Who are you writing for? It is simply impossible to write a technical document that will be equally easy for everybody to read: the level of explanation you need for an expert audience is totally different from the explanation needed for readers who are unfamiliar with the subject. It is absolutely essential that you identify the potential readers — the professional group, not the individuals — before you start your work.
- How long can the report be? It is difficult to predict in advance exactly how long a report will be. Technically speaking, writing reports for hardware and other facilities should be specific and itemized.



A hardware report can help you to:

- identify the hardware components inside your computer – CPU, memory, motherboard etc;
- understand conflicting hardware inside your computer; and
- help the computer repair person to understand your computer with a written, detailed hardware report (therefore he can find the missing drivers faster, for example).



•What to PROCESS

Fill-up the following reports.

Sample of simple Technical Reports.

BREAKDOWN / REPAIR REPORT

Area / : _____
Section

Area / : IT Personnel (Name)
Section

FACILITY TYPE	NATURE OF BREAKDOWN	RECOMMENDATION

Reported by:

Date

 Signature Over Printed
 Name

Sample Detailed Technical Report

Computer Problem/Repair

Date: _____ Time _____

Informaton:

Name: _____ Position/Title: _____

Room #: _____ Extension: _____

Email: _____

Computer Information:

Desktop: ____ Laptop: ____ PC: ____ Serial # _____

Problem Description:

When did the problem start? _____

Do you have any idea what caused the problem?

What were you doing when the problem occurred?

Please try the following before submitting this form:

1. Check Power Plugs/Connections:
Is everything plugged in, connected and seated firmly?
2. Check the Network Cable:
Is it plugged into both the computer and the wall outlet?
Are there blinking lights where the blue network cord plugs into the computer?
3. Log off and back on again.
4. Restart: Start>Shutdown>Restart>Then log back in.

What other things have you tried?



• What to REFLECT / UNDERSTAND

Computer Item Enumeration

Directions: Enumerate the hardware items that can be seen inside the computer laboratory, applications installed in a computer, network devices, computer tools and others.



• What to TRANSFER

Creating Computer Hardware – Software – Tools Report

Directions: Create Computer Hardware – Software – Tools Report on the available devices in your computer laboratory. Reports will be based on the items inspected in the laboratory. Create your own format. You are to be rated according to the score card below.

PERFORMANCE SCORE CARD

CRITERIA	Percentage	Score
1. Originality of format and layout	40%	
2. Content of the report	40%	
3. Proper use of equipment and materials is observed.	10%	
4. Observance of Safety Precautions	10%	
PERFORMANCE RATING		



• Summative Test

I. Identify what maintenance procedure is described in each situation.

_____ 1. This will allow proper circulation of air inside the computer unit.

_____ 2. This will help lessen the attacks of viruses and will increase the life span of your computer.

_____ 3. This means taking care of your computer.

_____ 4. Protecting your files means creating backups, storing your file backups on your hard drive or any removable storage device regularly.

_____ 5. By deleting the temporary files on your computer, it will enhance its speed and will create more disk space for your files.

_____ 6. Regularly update your anti-virus for your computer protection against viruses.

_____ 7. To avoid damage to the computer unit always turn off and unplugged it when trying to transfer the computer to another location.

_____ 8. Installing passwords makes your files more secure.

_____ 9. Maintenance of equipment or systems before fault occurs

_____ 10. This will allow proper circulation of air inside the computer unit.

II. Choose the letter of the correct answer:

1) It refers to a list of the key components that make up the computer.

- | | |
|-----------------|--------------|
| a. Specs | c. Brand |
| b. Manufactures | d. Checklist |

2) The main working memory in a computer is called _____.

- | | |
|--------|-----------------|
| a. ROM | c. Processor |
| b. RAM | d. memory chips |

- 3) It stores the applications and programs that run on the PC, as well as any work created by users.
 - a. CD/DVD
 - b. RAM
 - c. Hard drive
 - d. Zip drive

- 4) These cards are installed inside a PC and are responsible for determining the quality of the visuals output by the computer.
 - a. Audio Card
 - b. Graphics Card
 - c. LAN Card
 - d. Adapter card

- 5) These are the two leading companies when it comes to manufacturing processors.
 - a. HP and Dell
 - b. Epson and Canon
 - c. AMD and Intel
 - d. Acer and Asus

- 6) This card allows a computer to be connected to a network. A 10/100/1000 Mbps (Megabits per second) card is the standard card specifications today
 - a. Audio Card
 - b. Graphics Card
 - c. Network Card
 - d. Adapter card

- 7) It is a free open source operating system.
 - a. Microsoft Windows
 - b. Linux
 - c. Mac OS
 - d. Chrome OS

- 8) A cabling is used to connect your wired network adapters to a router or network switch.
 - a. Internet
 - b. Ethernet
 - c. coaxial
 - d. fiber optic

- 9) A glue that holds your home network together
 - a. router
 - b. DSL
 - c. Hub
 - d. Ethernet cable

- 10) The standard transfer speed of your wireless connection is _____.
 - a. 802.11g
 - b. 801.11g
 - c. 802.11m
 - d. 802.11j

- 11) The wired half of your router has a speed of _____.
 - a. 10/100 Mbps
 - b. 10/10/100 Mbps
 - c. 100/1000 Mbps
 - d. 10/10/1000 Mbps

- 12) Routers have two types of ports available at the back. Which is not part of it?
- a. LAN
 - b. WAN
 - c. MAN
 - d. WLAN
- 13) It basically means to create a redundant copy of a data.
- a. Data Backup
 - b. Image copy
 - c. System restore
 - d. hardcopy
- 14) It refers to any kind of malicious codes, objects or content that infiltrates your computer, resulting in damage and causing your system to act in an undesirable manner.
- a. Software
 - b. Spyware
 - c. Malware
 - d. Firmware
- 15) Software is used to identify problems on a computer or piece of equipment.
- a. Network software tool
 - b. Hardware Software tool
 - c. Diagnostic Software tool
 - d. Firmware software tool
- 16) Disk _____ rearranges fragmented data so your disks and drives can work more efficiently.
- a. Defragmenter
 - b. Fragmenter
 - c. software
 - d. defrag
- 17) It is a system-defined database which is used by an Operating System to store all the information needed to configure the Windows settings.
- a. Registry
 - b. Register
 - c. Registration
 - d. Registering
- 18) This is an application that checks the computer's hard drive for errors and bad sectors.
- a. Scan
 - b. System Restore
 - c. Scan Disk
 - d. Data backup
- 19) It is a computer maintenance utility that is included in the Microsoft Windows operating system and it is designed to free up space on the hard drive.
- a. Network software tool
 - b. Data Backup
 - c. Scan Disk
 - d. Disk Cleanup
- 20) Network Diagnostic Tool is an efficient and reliable tool to help you determine and identify the possible network issues that prevent you from using your computer to the fullest.
- a. Burn-in
 - b. Hardware Software tool
 - c. Diagnostic Software tool
 - d. Network Diagnostic tool

III. Match Column A with Column B

Column A	Column B
1. Creates and deletes disk partitions	A. Scan disk
2. Optimizes use of space on a disk	B. Format
3. Prepares a hard drive prior to use	C. Defrag
4. Removes unused files.	D. Disk Cleanup
5. Checks for physical errors on the disk surface	E. Fdisk