

## Week 3

### Hardware & Software Troubleshooting

**Aim:** Diagnosis of PC malfunction, types of faults, common errors and how to fix them. Basic hardware & software troubleshooting steps, PC diagnostic tools.

#### Identify Problem Symptoms:

Start by observing and identifying symptoms of the problem. You need to learn more about the circumstances in which problems occur and become familiar with system behavior when issues arise. Here are some questions that you can use to help identify symptoms:

- ***Do error messages appear?***

If error messages appear, record the error numbers, the exact message text, and a brief description of the activity. This information is useful when researching the cause of the problem or when consulting with technical support. In your description, include events that precede or follow a problem and the time and date of the error. For complex or lengthy messages, you can use a program such as Microsoft Paint (Mspaint.exe) to record the error message as a bitmap.

- **To capture an on-screen error message**

1. Click the window or dialog box that contains the error message.
2. To capture the contents of the entire desktop, press PRINT SCREEN (or PrtScn).
3. In the Run dialog box, in the Open box, type: **mspaint**
4. On the Edit menu, click **Paste**.
5. If the prompt **The image in the clipboard is larger...** appears, click **Yes**.
6. On the **File** menu, type a file name for the image and then click **Save**.

Error messages might appear before Windows XP Professional starts. For example, motherboard or storage adapter firmware might display an error message if self-tests detect a hardware problem. If you are unable to record the message quickly enough, you can pause the text display by pressing PAUSE BREAK. To continue, press Ctrl+Pause Break.

- ***Did you check Event Viewer logs?***

Entries in Event Viewer's application, security, and system logs might contain information helpful for determining the cause of the problem. Look for symptoms or signs of problems that occur at frequent or regular intervals. For more information about Event Viewer, see Windows XP Professional Help and Support Center and Appendix C, "Tools for Troubleshooting."

- ***Did you check log files on your computer?***

Error messages sometimes direct you to view a log file on your computer. The operating system or an application typically saves log files in text format. By using Notepad or an equivalent text editor, you can view the contents of a text log file to determine whether it contains information useful for troubleshooting your problem.

- ***Is incompatible or untested software installed?***

Are you using unsigned or beta drivers? Installing software not fully tested for compatibility with Windows XP Professional or using unsigned drivers can cause erratic behavior or instability.

- **Check Technical Information Resources**

After you gather information about key symptoms, check internal and external technical information sources for ideas, solutions, and similar or related symptoms reported by others. Information resources such as Windows XP Professional–related newsgroups and the Microsoft Knowledge Base can save you time and effort. The ideal situation is that your problem is a known issue, complete with solutions or suggestions that point you in the right direction. See sources of information shown in Table.

### Help and Information Sources

Source	Description
Help and Support Center	<p>Provides access to troubleshooting tools, wizards, information, and links that cover a wide range of Windows XP Professional–related topics, including:</p> <ul style="list-style-type: none"> <li>• Hardware devices, such as modems and network adapters</li> <li>• Networking and the Internet</li> <li>• Multimedia applications and devices</li> <li>• E-mail, printing, and faxing</li> <li>• Working remotely</li> <li>• Remote assistance and troubleshooting</li> <li>• System information and diagnostics</li> <li>• Troubleshooting tools and diagnostic programs provided by Windows XP Professional</li> </ul> <p>To do a search using this feature, on the Start menu, click Help and Support.</p>
Help Desk, Problem Management Department	Technicians who have access to a wide range of information and history, including common problems and solutions.
International Technology Information Library (ITIL) and Microsoft Operations Framework (MOF) Web sites	<p>Sites that provide information for developing, troubleshooting, planning, organizing, and managing information technology (IT) services. The ITIL Web site provides an online glossary of commonly used industry terms used in IT-related documents. For more information, see the International Technology Information Library (ITIL) link and the Microsoft Operations Framework (MOF) link on the Web Resources page at <a href="http://www.microsoft.com/windows/reskits/webresources">http://www.microsoft.com/windows/reskits/webresources</a>.</p>
Internet newsgroups	<p>Technical newsgroups such as those available at <a href="http://news://msnews.microsoft.com">news://msnews.microsoft.com</a> offer peer support for common computer problems. You can exchange messages in an appropriate forum to request or provide solutions and workarounds. Newsgroup discussions cover a wide range of topics and provide valuable information that might help you track down the source of your problem. Viewing newsgroup messages generally requires newsreader software, such as Outlook Express. An alternative approach is to use a Web-based newsgroup reader such as the</p>

	one available on the Microsoft Technical Communities Web site at <a href="http://www.microsoft.com/communities">http://www.microsoft.com/communities</a> .
Manufacturers' Web sites	Web sites offered by manufacturers of computers, peripherals, and applications to provide Web support for their products.
Microsoft Knowledge Base	An extensive list of known problems and solutions that you can search. If you are unfamiliar with searching the Microsoft Knowledge Base, see article 242450, "How to Query the Microsoft Knowledge Base Using Keywords." To find this article and for more information about the Microsoft Knowledge Base, see the Microsoft Knowledge Base link on the Web Resources page at <a href="http://www.microsoft.com/windows/reskits/webresources">http://www.microsoft.com/windows/reskits/webresources</a> .
Microsoft Product Support Services	A Web site that contains technical information, useful links, downloads, and answers to frequently asked questions (FAQs). To access the support options available from Product Support Services, see the Microsoft Product Support Services link on the Web Resources page at <a href="http://www.microsoft.com/windows/reskits/webresources">http://www.microsoft.com/windows/reskits/webresources</a> .
Microsoft TechNet	A subscription-based service for IT professionals that enables you to search technical content and topics about Microsoft products. For more information about TechNet, see the Microsoft TechNet link on the Web Resources page at <a href="http://www.microsoft.com/windows/reskits/webresources">http://www.microsoft.com/windows/reskits/webresources</a> .
Other online information Web sites	Many Web sites maintained by individuals and organizations provide troubleshooting information for Microsoft Windows 98, Microsoft Windows Me, Microsoft Windows NT version 4.0, Microsoft Windows 2000, Microsoft Windows Server™ 2003, and Windows XP Professional. Some of these Web sites specialize in hardware issues; others, in software.
Readme files	Files that contain the latest information about the software or driver installation media. Typical file names are "Readme.txt" or "Readme1st.txt."
Reference books	Reference books such as the <i>Microsoft Windows 2000 Server Resource Kit</i> , the <i>Microsoft Windows Server 2003 Deployment Kit</i> , and the <i>Microsoft Windows Server 2003 Resource Kit</i> provide helpful information for diagnosing problems.
Technical support	Technical support can help you solve a complex problem that might otherwise require substantial research time.
Training	Instructor-led or self-paced training can increase your troubleshooting efficiency.
Windows Update Web site	A site that contains downloadable content, including current information about improving system compatibility and stability. For more information

	about Windows Update, see the Windows Update link on the Web Resources page at <a href="http://www.microsoft.com/windows/reskits/webresources">http://www.microsoft.com/windows/reskits/webresources</a> .
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Before you apply a solution or workaround, or test an upgraded or updated application, use Backup to back up your system. Backups allow you to restore the computer to the previous state if you are not satisfied with the results.

## **Types of faults**

**No sound from speakers:** Please check the back of the computer. Some computers may have speaker connections on both the soundcard and modem. You will need to plug the single stereo speaker plug into the socket on the soundcard usually marked **Audio Out** (or in some cases **Speaker**)

**Computer seems to start up as normal but nothing appears on screen:** As obvious as this may sound it is probably a cable not attached correctly, or the monitor power button being turned off. Please unplug all the cables and replace them carefully.

**Fuzzy image on monitor:** Monitors are sensitive to electro magnetic interference. Ensure that your speakers are not too close to the monitor and that there is no other source of interference, especially from TVs, radios, microwaves, dishwashers and washing machines. Mobile phones are frequently the cause of this problem.

**Modem error message says, "No Dial Tone":** Do not attempt to change any COM port or other modem settings. This problem is ALWAYS external to the computer. Not all modem cables are the same. Always use the one supplied with your modem. The telephone cable from your wall socket should go into the modem socket marked **Line In**. Consider that the telephone socket is faulty. It could also be a faulty telephone extension line (just because it works on a phone doesn't necessarily mean it will work on a modem - and don't ask me why), or some other external factor. We repeat: Please do not change any of the modem settings. "No-Dial Tone" is always an external problem.

**Color on screen is limited to 16 colors:** The default setting for Windows is 16 colors. You can only get 256 or more colors if you have installed the video drivers correctly.

**Problem with power supply or CPU chips:** Make sure the power connector is connected correctly and fitted firmly in the mother board socket, some mother boards require two connectors from the power supply, refer to mother board manual. If the problem persists try using a different power supply. Check CPU fan, remove chip and clear dust, and make sure it is mounted properly.

**Video card problem:** Remove video card and inspect for cracks or bad connectors. Make sure the video card mounted correctly in the slot; try using a different video card.

**Keyboard error:** Either the key board is not functioning or is not attached correctly, try a different key board, if its has a PS/2 connector then make sure its not plugged into the mouse connector.

### **RAM error**

Remove ram inspect for cracks, bad connectors or dust. Insert the chip back into the slot and make sure its firmly seated properly in the slot, if the mother board has more than one slot then make sure the chip is in the first slot (i.e. closest to the CPU). If the problem persists change ram.

### **Your home page, default search engine, or web browser has changed itself.**

This is also known as "high-jacking". Spyware has been installed on your computer via social networking or from email link. This action has allowed spyware to install a java script into your web browser. The spyware then sends a message to your browser to change your user settings. For example change your home page to another web page.

As you have discovered from reading the article, the most common computer problems can be handle quite easily by simple maintenance of your PC. Net time you are suffering from computer problems. Take a few minutes to run some diagnostic test before rushing out to computer technical center claiming your PC is broken. When all you need to do was just make sure it was plugged in.

### **Slow Computer**

This is a common computer problem often after owning using a computer frequently for a long period of time, downloading trial software, installing new applications etc etc. Your computer is habitually trying to load a hundred different programs on start up that you do not even need (do you have loads of icons down by the clock?). This is taking up precious computer resources and will end up slowing your machine down. Either uninstall any programs no longer required or disable them from the start-up menu.

## **Common types of computer bugs**

- Conceptual error (code is syntactically correct, but the programmer or designer intended it to do something else)

**Arithmetic bugs:** Division by zero, Arithmetic overflow or underflow, Loss of arithmetic precision due to rounding or numerically unstable algorithms.

**Logic bugs:** Infinite loops and infinite recursion, off by one error, counting one too many or too few when looping.

**Syntax bugs:** Use of the wrong operator, such as performing assignment instead of equality test. In simple cases often warned by the compiler; in many languages, deliberately guarded against by language syntax

**Resource bugs:** Null pointer dereference, Using an uninitialized variable, Using an otherwise valid instruction on the wrong data type (see packed decimal/binary coded decimal), Access violations.

**Multi-threading programming bugs:** Deadlock, Race condition, Concurrency errors in critical sections, mutual exclusions and other features of concurrent processing. Time-of-check-to-time-of-use (TOCTOU) is a form of unprotected critical section.

**Interfacing bugs:** Incorrect API usage, Incorrect protocol implementation, Incorrect hardware handling.

**Performance bugs:** Too high computational complexity of algorithm, Random disk or memory access.

**Team working bugs:** Unpropagated updates; e.g. programmer changes "myAdd" but forgets to change "mySubtract", which uses the same algorithm. These errors are mitigated by the Don't Repeat Yourself philosophy.

- Comments out of date or incorrect: many programmers assume the comments accurately describe the code
- Differences between documentation and the actual product

### **Prevention/How to Fix**

The software industry has put much effort into finding methods for preventing programmers from inadvertently introducing bugs while writing software. These include:

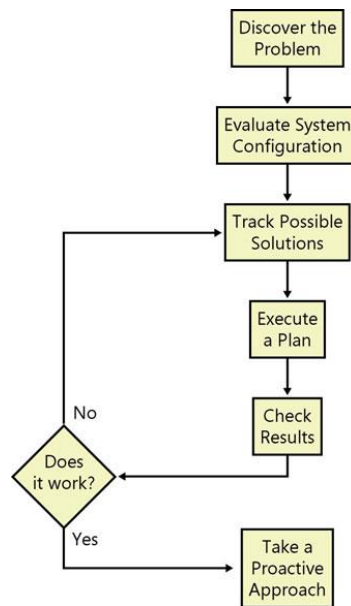
- **Programming style**
- **Programming techniques**
- **Development methodologies**
- **Programming language support**

### **Debugging**

Finding and fixing bugs, or "debugging", has always been a major part of computer programming. Maurice Wilkes, an early computing pioneer, described his realization in the late 1940s that much of the rest of his life would be spent finding mistakes in his own programs. As computer programs grow more complex, bugs become more common and difficult to fix. Often programmers spend more time and effort finding and fixing bugs than writing new code. Software testers are professionals whose primary task is to find bugs, or write code to support testing. On some projects, more resources can be spent on testing than in developing the program.

### **Troubleshooting**

**Troubleshooting** is a form of problem solving, often applied to repair failed products or processes. It is a logical, systematic search for the source of a problem so that it can be solved, and so the product or process can be made operational again. Whether an issue stems from a hardware or software problem, you need a reliable troubleshooting plan. An effective troubleshooting plan starts with gathering information, observing symptoms, and doing research.



**Fig: Troubleshooting model**

## **Hardware troubleshooting**

### **Computer Power on boot flowchart**

You can start the easy **step-by-step** computer repair flowchart [here](#). Answer the questions by a YES or NO and you'll get a **diagnostic for your PC**.



Fig: Computer boot-up troubleshoot Flowchart

## About your BIOS



BIOS (Basic Input Output System), Is the first piece of software loaded when you boot your PC. It has all the software's necessary to control the monitor, hard drive, keyboard, etc...

The BIOS code is stored on a CMOS (complementary metal oxide semiconductor) chip on your motherboard, but because RAM is faster than ROM, the BIOS is copied from the CMOS to the RAM when the computer is booted. This is called **shadowing**.

There are different BIOS from different companies. The most used BIOS are Phoenix and Amibios.



## How to Reset?

Boot your computer and as soon as you hear a beep or see the "Press DEL to enter setup" start pressing the "DEL" button on your keyboard a few times.



As soon as you press the "DEL" button, The BIOS Setup Utility launches.



## Checking the monitor:



Try disconnecting your monitors cable from your video card!  
If your monitor is working you should see a message like "No Signal".  
It doesn't matter what is on the screen as long as it shows something.  
Verify your cable. Are you missing pins from the head of the cable?  
Reset all monitor Settings to default (contrast, Brightness, color, ...)

## Computer beeping?



When there is a failure of any of the hardware parts that are connected to your computer (RAM, CPU, PCI,...), the computer makes a series of beeps. The pattern of beeps represents the diagnostic. The motherboard is telling you what part is failing.

### Modifying your boot sequence:

Reboot the computer and press the "DELETE" key as soon as you hear the beep.

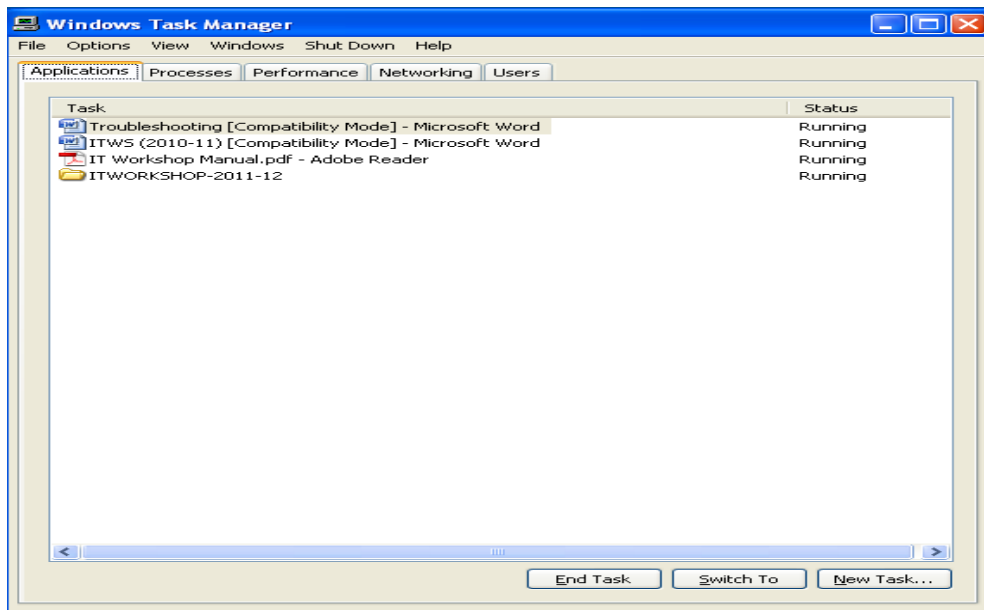
On the top of the page look for the Boot TAB and select it (use the arrows to navigate). You should have your floppy drive in first position. Your CD-ROM should be on second position and your Hard Drive third (change positions by pressing enter while the drive is selected and then use the + & - buttons to change the relative positions). Go to the Exit TAB and select "Exit Saving Changes".

## Software Troubleshooting

### **1. Free up RAM by closing other open programs**

Every piece of software that's installed on your machine needs Random Access Memory (RAM) in order to run. The more software that's running on your computer at once, the more RAM it will consume. So if a certain program refuses to load or is running sluggishly, the first step you should take is to close all other open applications.

In Windows, you can locate RAM-usage statistics by hitting Ctrl+Alt+Delete, then choosing the Task Manager option. From the window that appears, click the Processes tab, then click the menu item labeled "Mem Usage," which arranges all open applications according to the amount of RAM they're using. You can shut down a process or application by clicking the End Task button, but before you do so, you may want to perform a Web search on the name of the process or application; that way you won't accidentally stop a process or program that's necessary in order for your system to run.

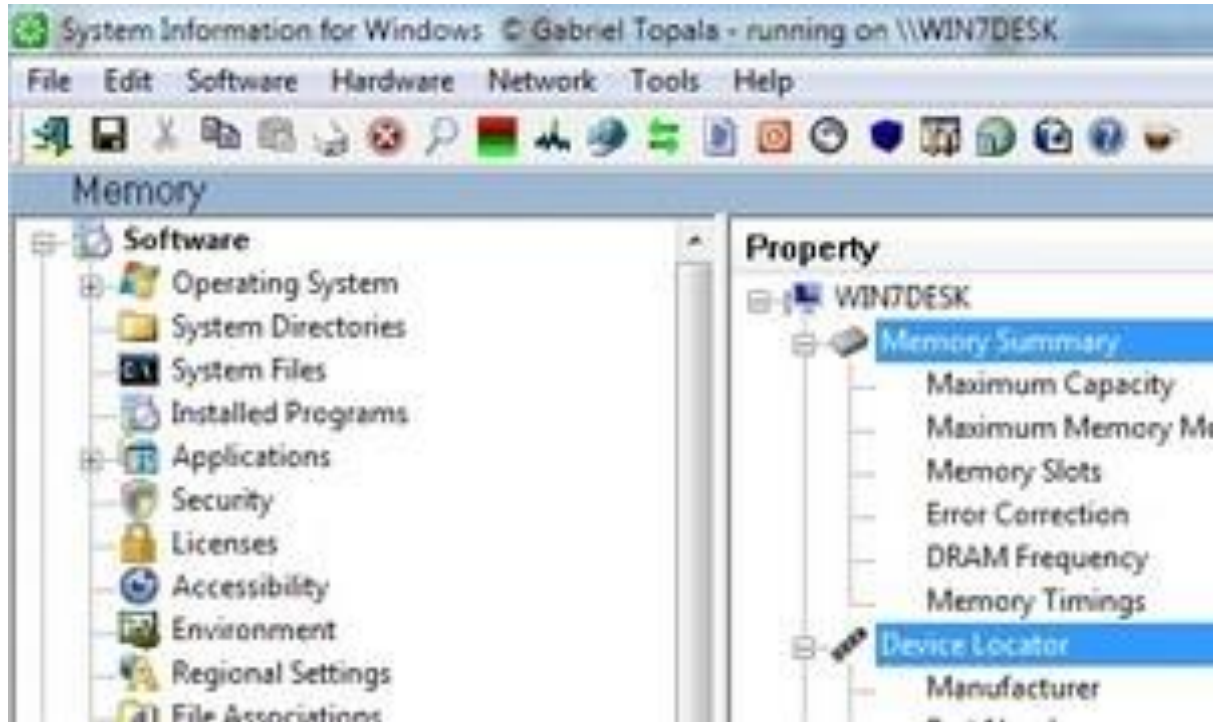


**Fig. Windows Task Manager**

- 2. Use the Internet to find help.**
- 3. Undo any recent hardware or software changes.**
- 4. Uninstall the software, then reinstall it.**
- 5. Look for software patches.**
- 6. Scan for viruses and malware.**
- 7. Check for a firewall conflict.**
- 8. Boot up in Safe Mode.**
- 9. Defragment your hard drive.**

### **PC diagnostic tools**

## SIW



If things haven't gotten bad enough that you're forced to take refuge with a Live CD, SIW is a Windows-based diagnostic tool that can help you get to the bottom of things. SIW is incredibly detailed in its analysis, next to nothing is left uncatalogued from the timings of your memory modules to the DLL files loaded to what applications you have set to auto run at startup. Even if you're not currently experiencing any computer issues, SIW gives you a really interesting peek inside your computer.

**Google/Search Engines (Web-based, free)**



Your first reaction to the phrase "computer diagnostic tool" might not be "Google!", but every computer diagnosis begins with the user wondering what the error code or chain of events leading up to the error means.

**For more Info:**

**[www.fixingmycomputer.com](http://www.fixingmycomputer.com)**