

Chapter 4: Overview of Preventive Maintenance



IT Essentials v6.0

Chapter 4 - Sections & Objectives

- 4.1 Preventive Maintenance
 - Explain why preventive maintenance must be performed on personal computers.
- 4.2 Troubleshooting Process
 - Explain how to troubleshoot computer problems.
- 4.3 Chapter Summary

4.1 Preventive Maintenance



PC Preventive Maintenance Overview

- **Benefits of Preventive Maintenance**
 - Reduces potential hardware and software problems, computer downtime and repair costs by:
 - Improving data protection
 - Extending the life of the components
 - Improving equipment stability
- **Preventive Maintenance Tasks**
 - Hardware tasks include:
 - remove dust from fans, power supply, internal components and peripherals, clean the mouse, keyboard, and display, check for and secure any loose cables.
 - Software tasks include:
 - review and install appropriate OS, security and driver updates, regularly update virus definition files, regularly scan for virus and spyware, remove unwanted programs, regularly scan hard drive for errors.



Preventive Maintenance Tasks

Hardware Maintenance

- Check the condition of cables, components, and peripherals.
- Repair or replace any components that show signs of excess wear.
- Removing dust from inside the computer and fans should be part of every preventive maintenance plan.
- Keep components clean to reduce the likelihood of overheating.
 - Hold compressed air can upright while spraying
 - Don't spray directly into fans, they can be damaged

Preventive Maintenance Tasks

■ Software Maintenance

- Verify current version.
- Review security, software, and driver updates.
- Update virus definition files.
- Scan for viruses and spyware.
- Remove unwanted programs.
- Scan hard drives for errors.
- Defragment hard drives.

PC Preventive Maintenance Overview (Cont.)

- Clean the Case and Internal Components
 - Dust or dirt can accumulate inside the computer.
 - Accumulated dirt and dust block airflow inside the case.
 - Use a low-air-flow ESD vacuum cleaner
 - Make sure to keep the following internal components clean: Heat sink and fan assembly, RAM, adapter cards, motherboard, fans, power supply and internal drives.
- Inspect Internal Components
 - Examine the computer on a regular schedule.
 - The main components to inspect are: CPU heat sink and fan assembly, RAM, storage devices, adapter cards, screws, cables, power devices, keyboard and mouse.
- A direct spray of compressed air can damage a fan.



PC Preventive Maintenance Overview (Cont.)

- Environmental Concerns
 - Computers should not be operated in harsh environmental conditions.
 - Due to their mobile nature, laptops are subject to various environmental conditions.
- Guidelines to help ensure optimal computer operating performance include:
 - Do not obstruct vents or airflow to the internal components.
 - Keep the room temperature between 45 to 90 degrees Fahrenheit (7 to 32 degrees Celsius).
 - Keep the humidity level between 10 and 80 percent.



4.2 Troubleshooting Process



The Troubleshooting Process

Step	Troubleshooting Process
1	Identify the Problem
2	Establish a Theory of Probable Cause
3	Test the Theory to Determine Cause
4	Establish a Plan of Action to Resolve the Problem and Implement the Solution
5	Verify Full System Functionality and, if Applicable, Implement Preventive Measures
6	Document Findings, Actions, and Outcomes

- Follow an organized and logical procedure.
- Eliminate variables one at a time.
- Troubleshooting is a skill that is refined over time.
- The first and last steps involve effectively communicating with the customer.

Data Protection

- Before troubleshooting problems, **always** follow the necessary precautions to protect data on a computer.
- **User Data, like documents and favorites, should be backed up to a removable drive before starting any diagnostics or repairs..**
- If unsure that a backup has been done, do not attempt any troubleshooting activities until the following are verified:
 - Date of the last backup
 - Contents of the backup
 - Data integrity of the backup
 - Availability of all backup media for data restore
- If no backup can be created, ask customer to sign a release form.



Troubleshooting Process Steps

Introduction to Troubleshooting

- Requires an organized and logical approach to problems.
- Eliminates variables and identifies causes of problems in a systematic order.
- Troubleshooting skills get better with experience.
- **Before troubleshooting, protect user data.**
 - Backup Internet favorites and user created documents.



Troubleshooting Process Steps

Step 1 - Identify the problem

- During the troubleshooting process, gather as much information from the customer as possible, but always be respectful.
- **This information will be used to aid in solving the problem.**
- Use the following strategy during this step:
 - Start by using open-ended questions to obtain general information.
 - Continue using closed-ended (yes/no) questions to get relevant information.
 - Document the responses in the work order and in the repair journal.
 - Verify the customer's description by gathering data from the computer using applications such as:

<ul style="list-style-type: none"> • Event Viewer • Beep Codes • Diagnostic Tools • Device Manager 	<ul style="list-style-type: none"> • Device Manager • BIOS or UEFI Information • Event Viewer • Task Manager
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Troubleshooting Process Steps

Step 2 - Establish a theory of probable cause

- Create a list of the most common reasons why the error would occur. The computer manual and the computer's repair history log can help establish a plan of action.
- List the easiest or most obvious causes at the top and more complex causes at the bottom.
- Research the symptoms.
 - The computer manual
 - The computer repair history log.

Troubleshooting Process Steps

Step 3 – Test the Theory to Determine cause

- Determine the exact cause by testing the theories of probable cause one at a time, starting with the easiest and most obvious first.
- After identifying an exact cause of the problem, determine the steps to resolve the problem.
- If the exact cause of the problem has not been determined after all theories have been tested, establish a new theory of probable causes and test it.
- Document each test tried that did not correct the problem.

Troubleshooting Process Steps

Step 4 – Establish a Plan of Action to Resolve the Problem and Implement the solution

- After the exact cause of the problem is determined, establish a plan of action to resolve the problem and implement the solution.
- Sometimes quick procedures can determine the exact cause of the problem or even correct the problem.
- If a quick procedure does not correct the problem, further research is needed to establish the exact cause.
- Divide larger problems into smaller problems that can be analyzed and solved individually.

Troubleshooting Process Steps

Step 5 – Verify Full System Functionality and, If Applicable, Implement Preventive Measures

- The troubleshooting process is not over until full system functionality is confirmed.
- Have the customer tryout the fixes you implemented.
- Ensure that you have not created another problem while repairing the computer.
- If the system is working properly, implement preventive measures if needed.

Step 5. Verify Solution and Full System Functionality

- Reboot the computer.
- Ensure multiple applications work properly.
- Verify network and Internet connections.
- Print a document from one application.
- Ensure all attached devices work properly.
- Ensure no error messages are received.

Troubleshooting Process Steps

Step 6 – Document Findings, Actions, and Outcomes

- Discuss the solution with the customer, both verbally and in writing.
- Have the customer confirm that the problem has been solved.
- Document the entire process for future reference.
- Document the details and frequency of each maintenance task.
- Document the process:
 - Problem description
 - Steps to resolve the problem
 - Components used in the repair

Common Problems and Solutions

- PC Common Problems and Solutions
 - Computer problems can be attributed to hardware, software, networks, or some combination of the three.
 - Common PC hardware problems include:
 - Storage device problems
 - Motherboard and internal components problems
 - Power supply problems
 - CPU and memory problems

Identify the Problem

The computer will not boot or it locks up.

The CPU fan is making an unusual noise.

The computer reboots without warning, locks up, or displays error messages.

After upgrading from a single core CPU to a dual core CPU, the computer runs more slowly and only shows one CPU graph in the Task Manager.

A CPU will not install onto the motherboard.

The computer does not recognize the RAM that was added.

PC Common Problems and Solutions

- Storage device problems - loose or incorrect cable connections, incorrect drive and media formats, and incorrect jumper and BIOS settings.
- Optical drive discs can be removed by inserting a pin or paper clip into the small hole on the front of the drive.
- Motherboard and internal component problems -incorrect or loose cables, failed components, incorrect drivers, and corrupted updates.
- Power supply problems - faulty power supply, loose connections, and inadequate wattage.
- CPU and memory problems - faulty installations, incorrect BIOS settings, inadequate cooling and ventilation, and compatibility issues.

PC Common Problems and Solutions

- Temperature can affect motherboards, CPUs, and hard drive.
- Antivirus software is out of date or expired. Update or renew, then run a full virus scan.
- Adding RAM can improve performance problems.
- Be sure RAM is install correctly and firmly seated.
- Loose screws, plugging in cables while the computer is on, and unseated cards can cause the motherboard to short-circuit.
- Video problems can be caused by setting in the BIOS.
- Incorrect system time can be caused by the CMOS battery.
- Overheating can cause the computer to shutdown unexpectedly.

4.3 Chapter Summary



Summary

This chapter discussed the concepts of preventive maintenance and the troubleshooting process.

- Regular preventive maintenance reduces hardware and software problems.
- Before beginning any repair, back up the data on a computer.
- The troubleshooting process is a guideline to help you solve computer problems in an efficient manner.
- Document everything that you try, even if it fails. The documentation that you create is a useful resource for you and other technicians.

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