



Chapter 14: Advanced Troubleshooting



IT Essentials v6.0

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14.0 Introduction



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Review of the Six Steps for Troubleshooting

Troubleshooting Steps	
Step 1	Identify the problem.
Step 2	Establish a theory of probable cause.
Step 3	Test your theories to determine the cause of the problem.
Step 4	Establish a plan of action to resolve the problem and implement the solution.
Step 5	Verify full functionality and, if applicable, implement preventive measures.
Step 6	Document your findings, actions, and outcomes.

Apply Troubleshooting Process to Computer Components and Peripherals

Step 1 – Identify the Problem.

Step 1: Identify the Problem	
Open-Ended Questions	<ul style="list-style-type: none"> • What type of computer do you have? • What is the brand and model of the computer? • Can you describe what happens when the computer boots? • How often does the computer fail to start? • What is the first screen you see when you turn on the computer? • What sound does the computer make as it starts?
Closed-Ended Questions	<ul style="list-style-type: none"> • Has anyone done any repair work on the computer recently? • Has anyone else used the computer? • Is any media installed in a floppy or optical drive? • Does the computer have a USB drive attached? • Can the computer be used to connect to a wireless network? • Is the computer secured in a locked room at night?

Apply Troubleshooting Process to Computer Components and Peripherals

Step 2 – Establish a Theory of Probable Cause.

Common causes of hardware problems

- Computer power problems
- Loose external cable connection
- Loose data cable connection
- Loose adapter card
- Faulty RAM
- Incorrect device driver
- Fans are dirty
- Incorrect jumper settings
- CMOS battery problem
- Incorrect firmware
- Failed parts

Step 3 – Test the Theory to Determine Cause.

Common steps to determine cause

- Restart the computer
- Disconnect and reconnect the external cables
- Disconnect and reconnect the internal cables
- Secure the adapter card
- Roll back or reinstall the device driver
- Replace the RAM
- Clean the fans
- Reset the jumpers
- Secure or replace the CMOS battery
- Update the firmware
- Listen for beeps
- Look for error codes or messages

Apply Troubleshooting Process to Computer Components and Peripherals

Step 4 – Establish a plan of action to resolve the problem and implement the solution.

Step 5 – Verify Full System Functionality and, if applicable, Implement Preventive Measures.

<p>Verify Solution and Full System Functionality</p>	<ul style="list-style-type: none"> • Reboot the computer • Restart external devices • Access all drives and shared resources • Print a document • Read and write to all storage devices • Validate the amount of RAM, the CPU, speed, and the date and time • Test network connectivity • Execute commonly used applications
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Step 6 – Document Findings, Actions and Outcomes.

14.1 Computer Components and Peripherals



Computer Components and Peripherals

- Advanced Problems and Solutions for Hardware

Identify the Problem	Probable Causes	Possible Solutions
RAID cannot be found.	<ul style="list-style-type: none"> The external RAID controller is not receiving power. The BIOS settings are incorrect. The RAID controller has failed. 	<ul style="list-style-type: none"> Check the power connection to the RAID controller. Reconfigure the BIOS settings for the RAID controller. Replace the RAID controller.
RAID stops working.	<ul style="list-style-type: none"> The external RAID controller is not receiving power. The RAID controller has failed. 	<ul style="list-style-type: none"> Check the power connection to the RAID controller. Replace the RAID controller
A computer exhibits slow performance.	<ul style="list-style-type: none"> The computer does not have enough RAM. The computer is overheating. 	<ul style="list-style-type: none"> Install additional RAM. Clean the fans or install additional fans.
The computer does not recognize a removable external drive.	<ul style="list-style-type: none"> The OS does not have the correct drivers for the removable external drive. The USB port has too many attached devices to supply adequate power. 	<ul style="list-style-type: none"> Download the correct drivers for the drive. Attach external power to the device or remove some of the USB devices.

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Computer Components and Peripherals

Advanced Problems and Solutions for Hardware (Cont.)

Identify the Problem	Probable Causes	Possible Solutions
<p>After updating the CMOS firmware, the computer will not start.</p>	<p>The CMOS firmware update did not install correctly.</p>	<ul style="list-style-type: none"> • Restore the original firmware from the onboard backup if one is available. • If the motherboard has two CMOS chips, the second CMOS chip can be used. • Contact the motherboard manufacturer to obtain a new CMOS chip.
<p>The computer reboots without warning, locks up, or displays error messages or the displays the Blue Screen of Death (BSOD).</p>	<ul style="list-style-type: none"> • RAM is failing. • The front-side bus is set too high. • The CPU multiplier is set too high. • The CPU voltage is set too high. 	<ul style="list-style-type: none"> • Test each Ram module to determine if they are operating correctly. • Reset to the factory default settings on the motherboard. • Lower the FSB settings. • Lower the multiplier settings. • Lower the CPU voltage settings.
<p>After upgrading from a single core CPU to a multi-core CPU, the computer runs slower and only shows one CPU graph in Task Manager.</p>	<p>The BIOS does not recognize the multi-core CPU.</p>	<p>Update the CMOS firmware to support the multi-core CPU.</p>

Computer Components and Peripherals

Advanced Problems and Solutions for Printers

Identify the Problem	Probable Causes	Possible Solutions
Printer prints unknown characters.	<ul style="list-style-type: none"> An incorrect print driver is installed. The printer cables are loose. 	<ul style="list-style-type: none"> Uninstall the incorrect print driver and install the correct driver. Secure the printer cables.
Printer will not print large or complex images.	The printer does not have enough memory.	Add more memory to the printer.
Laser printer prints vertical lines or streaks on every page.	<ul style="list-style-type: none"> The drum is damaged. Toner is not evenly distributed in the cartridge. 	<ul style="list-style-type: none"> Replace the drum or replace the toner cartridge when it contains the drum. Remove and shake the toner cartridge.
Printer pages show ghost images.	<ul style="list-style-type: none"> The drum is scratched or dirty. The drum wiper blade is worn. 	Replace the drum or replace the toner cartridge when it contains the drum.
The toner is not fusing to the paper.	The fuser is defective.	Replace the fuser.
Paper is creased after printing.	The pickup rollers are obstructed, damaged, or dirty.	Clean or replace the pickup rollers.
Paper is not being fed into the printer.	The pickup rollers are obstructed, damaged, or dirty.	Clean or replace the pickup rollers.
Each time a network printer is restarted, users receive a "Document failed to print" message.	<ul style="list-style-type: none"> Printer's IP configuration set for DHCP. A device on the network has the same IP address as the network printer. 	<ul style="list-style-type: none"> Assign a static IP address to the printer. Assign a different static IP address to the printer.

14.2 Operating Systems



Operating Systems

Advanced Problems and Solutions for Operating Systems

Identify the Problem	Probable Causes	Possible Solutions
<p>The computer displays an “Invalid Boot Disk” error after the POST.</p>	<ul style="list-style-type: none"> • Media that does not have an operating system is in a drive. • The boot order is not set correctly in the BOOS/UEFI settings. • The hard drive is not detected. • The hard drive does not have an operating system installed. • The MBR/GPT is corrupted. • The computer has a boot sector virus. • The hard drive is failing. 	<ul style="list-style-type: none"> • Remove all media from the drives. • Change the boot order in the BIOS/UEFI settings to start with the boot drive. • Reconnect the hard drive cables. • Install an operating system. • Use the bootrec /fixmbr command from the System Recovery options on Windows 7 or Vista. • Run virus removal software. • Replace the hard drive.
<p>The computer displays an “Inaccessible Boot Device” error after the Post.</p>	<ul style="list-style-type: none"> • A recently installed device driver is incompatible with the boot controller. • BOOTMGR is corrupted. 	<ul style="list-style-type: none"> • Use the last known good configuration to boot the computer. • Boot the computer in safe mode and load a restore point from before the installation of new hardware.
<p>The computer displays a “BOOTMGR is missing” error after the POST.</p>	<ul style="list-style-type: none"> • BOOTMGR is missing or damaged. • The boot order is not set correctly in the BIOS/UEFI settings. • The MBR/GPT is corrupted. • The hard drive is failing. 	<ul style="list-style-type: none"> • Restore BOOTMGR using the Windows Recovery Environment. • Change the boot order in the BIOS settings to start with the boot drive. • Run chkdsk /F /R from the recovery console.

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Operating Systems

Advanced Problems and Solutions for Operating Systems (Cont.)

Identify the Problem	Probable Causes	Possible Solutions
<p>A service Failed to start when the computer booted.</p>	<ul style="list-style-type: none"> • A service failed to start when the computer booted. • The service is not enabled. • The service is set to Manual and the failed service requires another service to be enabled. 	<ul style="list-style-type: none"> • Enable the service. • Set the service to Automatic and re-enable the required service.
<p>A device did not start when the computer booted.</p>	<ul style="list-style-type: none"> • The device has been disabled in the BIOS settings. • The device has a conflict with a newly installed device. • The driver is corrupted. 	<ul style="list-style-type: none"> • Enable the device in the BIOS settings. • Remove the newly installed device. • Re-install or roll back the driver.
<p>A program listed in the registry is not found.</p>	<ul style="list-style-type: none"> • The uninstall program did not work correctly. • The hard drive has become corrupted. • The computer has a virus. 	<ul style="list-style-type: none"> • Re-install the program and run the uninstall program again. • Run chkdsk /F /R to fix the hard drive file entries. • Scan for and remove the virus.
<p>The computer continually restarts without displaying the desktop.</p>	<ul style="list-style-type: none"> • The computer is set to restart when there is a failure. • A startup file has become corrupted. 	<ul style="list-style-type: none"> • Press F8 to open the Advanced Options Menu and choose Disable automatic restart on system failure. • Run chkdsk /F /R from the Recovery Environment. • Run the Automatic Repair from the Recovery Environment in Windows 8.

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Operating Systems

Advanced Problems and Solutions for Operating Systems (Cont.)

Identify the Problem	Probable Causes	Possible Solutions
The computer displays a black or blue screen of death (BSOD).	<ul style="list-style-type: none"> A driver is not compatible with the hardware. There is a hardware failure. 	<ul style="list-style-type: none"> Research the Stop error and the name of the module that produced the error. Replace any failing devices with known-good devices.
The computer locks up without any error messages.	<ul style="list-style-type: none"> The CPU or FSB settings are incorrect on the motherboard or in the BIOS settings. The computer is overheating. An update has corrupted the operating system. There is a hardware failure. The computer has a virus. 	<ul style="list-style-type: none"> Check and reset the CPU and FSB settings. Check and replace any cooling devices as necessary. Uninstall the software update or perform a System Restore. Run chkdsk /F /R from the Recovery Environment. Replace any failing devices with known-good devices. Scan for and remove the virus.
An application does not install.	The installation application is not compatible with the operating system.	Run the installation application under compatibility mode.
The search feature takes a long time to find results.	<ul style="list-style-type: none"> The index service is not running. The index service is not indexing the correct locations. 	<ul style="list-style-type: none"> Start the index services using services.msc. Change the settings of the index service in the Advanced Options panel.

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Operating Systems

Advanced Problems and Solutions for Operating Systems (Cont.)

Identify the Problem	Probable Causes	Possible Solutions
The computer is running and has a delayed response.	A process is using most of the CPU resources.	<ul style="list-style-type: none"> Restart the process with services.msc. If the process is not needed, end the process with Task Manager. Restart the computer.
When you run a program, a missing or corrupt DLL message is displayed.	<ul style="list-style-type: none"> One or more programs using the DLL file was uninstalled and removed the DLL file that was needed by another program. The DLL file was corrupted during a bad installation. 	<ul style="list-style-type: none"> Reinstall the program that has a missing or corrupt DLL file. Reinstall the application that uninstalled the DLL. Run sfc /scannow in Safe Mode.
RAID is not detected during installation.	<ul style="list-style-type: none"> Windows does not include the proper drivers to recognize RAID. RAID settings in BIOS/UEFI are incorrect. 	<ul style="list-style-type: none"> Install the proper drivers. Change settings in BIOS/UEFI to enable RAID.
A system file is corrupted.	Computer was shut down improperly.	<ul style="list-style-type: none"> Repair computer from the Advanced Startup Options menu. Boot computer in Safe Mode and run sfc /scannow.
Computer boots to safe mode.	The computer has been configured to boot in Safe Mode.	Use msconfig to adjust the startup settings for the program.

14.3 Networks



Networks

Advanced Problems and Solutions for Network Connections

Identify the Problem	Probable Causes	Possible Solutions
A computer can connect to a network device by the IP address but not by the host name.	<ul style="list-style-type: none"> • Incorrect host name. • Incorrect DNS settings. • DNS server is not operational. 	<ul style="list-style-type: none"> • Re-enter the host name. • Re-enter the IP address of the DNS server. • Restart the DNS server.
The computer does not obtain or renew the IP address on the network.	<ul style="list-style-type: none"> • The computer is using a static IP address from a different network. • Firewall is blocking DHCP. • DHCP server is not operational. • Wireless NIC is disabled. 	<ul style="list-style-type: none"> • Enable the computer to obtain an IP address automatically. • Change the firewall settings to allow DHCP traffic. • Restart the DHCP server. • Enable Wireless NIC.
An IP address conflict message displays when connecting a new computer to the network.	<ul style="list-style-type: none"> • The same IP address is assigned to two devices on the network. • Another computer has been configured a static IP address that was already assigned by the DHCP server. 	<ul style="list-style-type: none"> • Configure each device with a unique IP address. • Configure each device using the <i>ipconfig /release</i> and <i>ipconfig /renew</i> commands.
A computer has network access but does not have Internet access.	<ul style="list-style-type: none"> • The gateway IP address is incorrect. • A router is configured incorrectly. • DNS server is not operational. 	<ul style="list-style-type: none"> • Reboot the modem. • Reboot the router. • Reconfigure the router settings. • Restart the DNS server.

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Networks

Advanced Problems and Solutions for Network Connections (Cont.)

Identify the Problem	Probable Causes	Possible Solutions
<p>The computer automatically obtained the IP address 169.254.x.x, but cannot connect to the network.</p>	<p>The DHCP server is not operational.</p>	<p>Restart the DHCP server.</p>
<p>Users are experiencing slow transfer speeds, weak signal strength, intermittent connectivity on the wireless network.</p>	<ul style="list-style-type: none"> • Wireless security has not been implemented allowing unauthorized users access. • There are too many users connected to the access point. • User is too far away from access point. • The wireless signal is experiencing interference from outside sources. 	<ul style="list-style-type: none"> • Implement a wireless security plan. • Ensure the access point is centrally located. • Restart the access point. • Move the access point. • Turn off unneeded devices that are connected. • Add another access point or a repeater to strengthen signal. • Upgrade the access point. • Change the channels on the wireless network.

Networks

Advanced Problems and Solutions for Email Failures

Identify the Problem	Probable Causes	Possible Solutions
The computer cannot send or receive email.	<ul style="list-style-type: none"> The computer has incorrect email client settings. The email server is down. 	<ul style="list-style-type: none"> Reconfigure the email client settings. Reboot the email server or notify your email service provider.
The computer can send email, but cannot receive email.	<ul style="list-style-type: none"> The inbox is full. The computer has incorrect email client settings. 	<ul style="list-style-type: none"> Archive or delete emails to create space. Reconfigure the email client settings.
The computer cannot receive a specific email with an attachment.	<ul style="list-style-type: none"> The email attachment is too large. The email attachment contains a virus and has been blocked by virus protection. The email attachment file type is not allowed (example: executable file) and is being blocked. 	<ul style="list-style-type: none"> Ask the sender to split the attachment into smaller parts and resend them in individual emails. Ask the sender to scan the attachment before sending it. Ask the sender to compress the attachment and resend.

Networks

- Advanced Problems and Solutions for FTP and Secure Internet Connections

Identify the Problem	Probable Causes	Possible Solutions
A user cannot access the FTP server.	<ul style="list-style-type: none"> FTP is being blocked by the firewall at the router. FTP is being blocked by the Windows firewall. The maximum number of users has been reached. 	<ul style="list-style-type: none"> Ensure that ports 20 and 21 are allowed through the router's outbound firewall. Ensure that ports 20 and 21 are allowed through the Windows outbound firewall. Increase the maximum number of simultaneous FTP users on the FTP server.
The FTP client software cannot find the FTP server.	<ul style="list-style-type: none"> The FTP client has an incorrect server/domain name or port setting. The FTP server is not operational or is offline. The DNS server is not operational and not resolving names. 	<ul style="list-style-type: none"> Enter the correct server/domain name and port settings in the FTP client. Restart the FTP server. Restart the DNS server.
A computer cannot access a specific HTTPS site.	The site is not on that computer's browser's list of trusted sites.	Decide whether to add the security certificate to the browser's list of trusted sites.

Networks

Advanced Problems and Solutions When Using Network Troubleshooting Tools

Identify the Problem	Probable Causes	Possible Solutions
Computer can ping an IP address but not a host name.	<ul style="list-style-type: none"> The host name is incorrect. The DNS settings of the computer are incorrect. The DNS server is not operational. 	<ul style="list-style-type: none"> Enter the correct host name. Enter the correct DNS settings. Restart the DNS server.
A computer on one network cannot ping a computer on another network.	<ul style="list-style-type: none"> There is a broken link between the two networks. ICMP is blocked at the router. ICMP is blocked at the Windows firewall. 	<ul style="list-style-type: none"> Use tracert to locate which link is down and fix the broken link. Configure the router to allow ICMP ping. Configure the Windows firewall to allow ICMP ping.
nslookup reports "Can't find server name for address 127.0.0.0: timed out".	The DNS server is not responding.	<ul style="list-style-type: none"> Restart the DNS server. Change DNS server settings.
A computer cannot connect to a shared network folder using the net use command.	<ul style="list-style-type: none"> The folder is not shared. The computer is not in the same workgroup. 	<ul style="list-style-type: none"> Make sure the network folder is shared using the net share command. Set the computer to the same workgroup as the computer with the shared network folder.

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Networks

Advanced Problems and Solutions When Using Network Troubleshooting Tools (Cont.)

Identify the Problem	Probable Causes	Possible Solutions
<p>When attempting to use the <i>ipconfig /release</i> or <i>ipconfig /renew</i> command, you receive the message: "No operation can be performed on the adapter while its media is disconnected."•</p>	<ul style="list-style-type: none"> • The network cable is unplugged. • The computer has been configured with a static IP address. 	<ul style="list-style-type: none"> • Reconnect the network cable. • Reconfigure the NIC to obtain IP addressing automatically.
<p>The computer cannot Telnet into a remote computer.</p>	<p>The remote computer has not been configured to accept Telnet connections, or the Telnet service has not been started.</p>	<p>Start the Telnet service on the remote computer and configure the remote computer to accept Telnet connections.</p>
<p>The network icon in the notification area shows a yellow exclamation point. When attempting to use the <i>ipconfig /release</i> or <i>ipconfig /renew</i> command, you receive the message: "The operation failed as no adapter is in the state permissible for this operation."</p>	<p>A static IP address has been assigned to the interface.</p>	<p>Reconfigure the NIC to obtain IP addressing automatically.</p>

14.4 Security



Security

Advanced Problems and Solutions for Malware

Identify the Problem	Probable Causes	Possible Solutions
Message "MBR has been changed or modified" appears at boot up.	A boot sector virus has changed the master boot record.	Boot the computer with bootable media and run antivirus software to remove the boot sector virus.
A Windows 7 or Windows Vista computer starts with the error message "Error Loading Operating System".	A virus has damaged the master boot record.	Boot the computer from the installation media. At the Install Windows screen, select Repair your computer . At the command prompt, type <i>bootrec.exe /fixmbr</i> .
A Windows 7 or Windows Vista computer starts with the error message "Caution: this hard disk may be infected by virus!".	A virus has damaged the boot sector.	Boot the computer from the installation media. At the Install Windows screen, select Repair your computer . At the command prompt, type <i>bootrec.exe /fixboot</i> .
A Windows 7 computer will not boot.	A virus damaged Windows system files.	Boot the computer from Windows PE media. Access Windows Startup Repair tool to recover corrupted system files.
Your contacts are receiving spam from your email account.	Your email account has been hijacked by a virus or spyware.	Run antivirus software and repair, delete, or quarantine the infected files. Run antispyware software and remove any spyware infections. After the computer is cleaned, change the email account password.

Security

Advanced Problems and Solutions for User Permissions

Identify the Problem	Probable Causes	Possible Solutions
User can log on but receives an "access denied" message when trying to access some folders and files.	The user is not a member of the group that has access to the folders and files.	<ul style="list-style-type: none"> • Add the user to the correct group. • Add the correct user's permissions to the folders and files.
User can locate a file on the server but cannot download the file.	The user permissions are not correct.	Change the user's permissions on the file to read and execute.
User is gaining access to a subfolder that should be inaccessible.	The subfolder inherited permissions from the upper level folder.	Change the subfolder permission settings so it does not inherit the permissions from the parent folder. Set the proper permissions for the subfolder.
Users of a group cannot see one folder to which they are supposed to have access.	The folder permissions are set to deny.	Change the folder permissions to allow.
Encrypted files that are moved over the network to a new computer are no longer encrypted.	The new computer does not have an NTFS partition.	Convert the partition on the new computer to NTFS and re-encrypt the files.

Security

- Advanced Problems and Solutions for Computer Security Settings

Identify the Problem	Probable Causes	Possible Solutions
Computer runs slowly at the same time every day.	Antivirus software is set to scan the computer at the same time every day.	Configure the antivirus software to scan the computer when the computer is not in use.
User complains that the computer BIOS settings keep changing.	The BIOS password is not set, allowing others to change the BIOS settings.	Set a password to protect access to the BIOS settings.
Trusted Platform Module (TPM) does not show up in Device Manager.	The TPM is disabled.	Enable the TPM in the BIOS.

Security

Advanced Problems and Solutions for Firewall or Proxy Settings

Identify the Problem	Probable Causes	Possible Solutions
<p>Computer cannot ping another computer on the network.</p>	<ul style="list-style-type: none"> • The Windows Firewall is blocking ping requests. • A router is blocking ping requests. 	<ul style="list-style-type: none"> • Configure the Windows Firewall to allow ping requests. • Configure the router to allow ping requests.
<p>Laptop firewall exceptions are allowing unauthorized connections from rogue computers.</p>	<ul style="list-style-type: none"> • The Windows Firewall settings are incorrect. • The Windows Firewall is disabled. 	<ul style="list-style-type: none"> • Set the Windows Firewall to "Do not allow exceptions when using a public network." • Enable the Windows Firewall.
<p>Email program is properly configured but cannot connect to the email server.</p>	<ul style="list-style-type: none"> • The email server is down. • The Windows Firewall is blocking the email software. 	<ul style="list-style-type: none"> • Verify that the email server is operational. • Create a Windows Firewall exception for your email software.
<p>Computer can ping the proxy server, but has no Internet connectivity.</p>	<ul style="list-style-type: none"> • The browser proxy server settings are incorrect. • The proxy server is offline. 	<ul style="list-style-type: none"> • Re-enter the proxy server settings, including the IP address and port of the proxy server, and any exceptions that should be defined. • Reboot the proxy server.

14.5 Chapter Summary



Summary

- This chapter reviewed the six steps for troubleshooting. It also provided more advanced problems and solutions for Computer Components and Peripherals, Operating Systems, Networks, and Security.

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