5.10.2 Storage Troubleshooting Facts

This lesson covers the following topics:

- Resource Troubleshooting
- Storage drive types
- Common storage issues

Resource Troubleshooting

Several commonly observed issues with storage devices are shown here. Be aware that this lesson cannot cover every storage issue and its cause. Instead, several of the more common issues and their causes are addressed. For more complex issues, use all of the resources available in order to identify the problem. This includes the following:

- System docs
- Knowledge bases
- Service manuals
- User forums

Storage Drive Types

When troubleshooting storage drives, it is important to know the type of drive you are working with. There are two main types of storage drives that are used in computers: mechanical hard disk drives (HDDs) and solid state hard drives (SSDs). Mechanical hard disks have moving parts that wear out over time. It's not a matter of if an HDD will fail, it's a matter of *when* it will fail. SSDs don't have any moving parts, but the storage medium they use has finite read/write counts. The more use an SSD gets, the faster it will wear out.

All storage devices have a Mean Time Between Failure (MTBF) rating that is an estimated lifespan for the device. Because of the sealed nature of storage devices, there's really no maintenance you can perform. Instead, you need to decide when it is time to replace the disk. Accordingly, you should implement a data backup plan for your hard disks to ensure the data on them is protected in the event of a failure.

Common Storage Issues

Some common storage device issues and associated resolutions are listed in the following table:

Issue	Device Type	Resolution
Slow Performance	HDD	Several things can help increase the performance of a slow HDD: ▪ Maintain a healthy amount of free disk space on the drive. A mostly empty disk runs faster than a mostly full disk. If a disk is getting full, migrate to a newer, bigger disk. ▪ Keep the disk defragmented. A heavily fragmented disk can run quite slowly. You'll need ample free space to fully defragment the drive. ▪ Check the disk rotational speed. A disk that spins faster will perform better. ▪ Check the speed of the disk interface. If your system uses an older disk interface, upgrade to a faster interface (if possible).

	SSD	The more an SSD is used, the slower the read/write speed will be. ▪ Make sure the file system being used is optimized for an SSD. Because SSDs store data differently than HDDs, they require special techniques to extend the life of the drive, such as wear leveling support. ▪ Update the SSD's firmware. Newer firmware versions are released to fix bugs and optimize how the SSD stores data. ▪ Run a manufacturer-specific SSD software utility. Most SSD manufacturers have specialized utilities that can check for errors and optimize an SSD's performance. ▪ Check the speed of the SATA connection. Older SATA versions have slower transfer speeds than newer SATA versions. If performance is too slow, consider upgrading components to the latest SATA version. ▪ When the SSD is too full, performance will decrease significantly. If this happens, try enabling features such as TRIM support in the OS. While features such as TRIM will help to an extent, the best way to maintain high performance is keeping an SSD below 90% capacity.
Failure to Boot (OS not Found)	HDD/ SSD	A failure to boot with an error message that reads something to the effect of "OS Not Found" could be trivial or serious. Common causes include the following: ▪ You're booting from the wrong disk ; one that doesn't have an operating system installed. This is a very common issue. It frequently occurs when a CD or DVD is in your optical drive at system boot and the BIOS/UEFI is configured to boot from the optical drive first. The error message is displayed when an operating system can't be found on the optical disc. To fix this issue, simply remove the optical disc from the drive and reboot. This error could also be caused in situations where you have multiple hard disks in the system, but only one has an operating system installed. If the boot device setting gets inadvertently changed in the BIOS/UEFI, it will try to boot the system from the wrong hard disk. ▪ Your master boot record (MBR) has been overwritten or is corrupt. The MBR is the first sector of your hard drive that tells the BIOS where to look for the operating system on the disk. If the MBR is damaged or corrupt, then the operating system will fail to load. On Windows, you have to boot from the installation disc to enter the recovery environment and select the Automatic repair option. Alternatively, you can select the Command prompt option and run the **bootrec** command to rebuild the boot configuration data. You can also run the bootrec command with the following switches: ▪ **/fixmbr**: Repairs the master boot record ▪ **/fixboot**: Repairs the boot sector ▪ **/rebuildbcd**: Rebuilds the boot configuration data
Drive not Recognized by the BIOS/UEFI	HDD/SSD	A modern BIOS/UEFI automatically detects your drives and their geometry during POST. In older systems, you had to manually enter the disk geometry and it was very common for a wrong value to be entered. In

		modern systems, this rarely happens. If the BIOS can't detect your drive, it's usually caused by one of three things. ▪ The power connector is unplugged. ▪ The SATA cable is unplugged. ▪ The drive is malfunctioning.
Application Crash		If an application you are using crashes, an error has occurred that gives you no choice except to exit the application. Sometimes you can fix the problem by rebooting the computer. You may need to debug your system. Check log files for errors that provide clues about what might have caused the crash.
Crash Screens		If you experience a Blue Screen of Death (BSOD) on a Windows machine or Spinning Pinwheel of Death (SPOD) on a MAC, several events may have occurred. You could have a fatal system error that is preventing the system from operating safely, or just one application may have failed. Often, rebooting the computer solves the problem. If that doesn't work, you can attempt to revert the system to a previous state to undo any software or hardware changes that are causing problems. Scan your computer for viruses, roll back drivers, update drivers, update your operating system, update BIOS or return them to their factory settings, repair permissions, or clear the dyld cache.
Drive Noise	HDD	Excessive or unusual drive noise is almost always indicative of a failing hard disk. For example, a clicking noise coming from the drive usually indicates one or more failing heads.