Topic 3D: Troubleshoot System and Display Issues:

The scenarios like:

- **System lockups**: The computer freezes and stops responding.
- **Intermittent shutdowns**: The computer powers off randomly.
- **Continuous rebooting**: The system restarts again and again.
- **Blue Screen of Death (BSOD)**: Windows shows an error message on a blue background.
- **Application crashes**: Apps close suddenly without warning.

Real-Life Example: Imagine you're playing a game, and suddenly the screen freezes. You can't move the mouse or type anything. Then, the computer restarts on its own. Or you're working on a document, and an application just shuts down without saving your progress.

Most of the time, issues like these are caused by software errors or **malware.** So try to do the following things:

- Make sure your OS and applications are up-to-date.
- Malware could be causing instability. Use a trusted antivirus software to scan and clean your system.
- Run tools like **chkdsk (check disk)** on Windows or **fsck** on macOS/Linux to find and fix corrupted files.

If the problem doesn't happen all the time, try to find a pattern. Does it occur after you've been using the PC for a while? Or does it happen randomly?

- **If it happens after some time**: It might be a thermal (overheating) issue.
- **If it's random**: It could be hardware or power related.

Real-Life Example: Imagine your laptop crashes only when you play games or watch high-definition videos. This points to overheating because these activities make the CPU and GPU work harder.

Another reason could be **overheating.** Check or feel the bottom of the laptop for excessive heat. Otherwise, use tools like **HWMonitor** or **Core Temp** to check the CPU/GPU temperature. Ensure also the cooling fans are spinning and not clogged with dust.

Another problem for these could be faulty power supply as well. Then use a **multimeter** to test the voltages from the power supply. In case, replace the **PSU** with a known good one to rule out the issues.

Another way to troubleshoot also involves checking RAM, CPU, or Motherboard as well. So, try to diagnose these components.

Steps to Diagnose:

1. Use diagnostic tools:
    - **Windows Memory Diagnostic** or **MemTest86** for RAM.
    - Vendor-provided tools (e.g., Dell Diagnostics, HP Support Assistant) for CPU and motherboard.
2. Look for physical symptoms:
    - **Burn marks** on the motherboard.
    - **Bulging capacitors** (small cylindrical components on the motherboard).
    - **Loose connections** for RAM or CPU.

Overheating:

Excessive heat can damage the sensitive circuitry of a computer. A burning smell may arise because the case and/or fan vents are clogged with dust.

Steps to take:

- Most systems come with internal temperature sensors that we can check via driver or management software. So check the components are working in that level that is suggested by the vendor.
- Ensure that CPU fan is working. If the processor is running too hot, the it can decrease performance.
- Make sure the heat sink is properly fitted. It might be necessary to clean away the old **thermal paste** and replace it to help processor to run at lower temperatures.
- Always use blanking plates to cover up the holes in the back or front of the PC.
- Verify whether the room is too warm or whether the PC is directly positioned near heater or sunlight.

Physical Damage:

Steps to take:

- The motherboard components could be damaged by electro-static discharge, electrical spikes, or overheating. So make sure to check the physical damages by closely observing.
- The pins may be damaged.
- Sometimes, error may be caused by dirts, so be sure to clean it.
- If a system has had liquid spilled on it or if fans or the keyboard are clogged by dust or dirt, there may be visible signs of this.
- Sometimes, you will see some kind of **black mark** on the certain components in the motherboards. This is called "**Capacitor Swelling".** This will also disrupt the flow of powers.

If there is physical damage to the motherboard, you will almost certainly need diagnostic software to run tests that confirm whether there is a problem.

Troubleshooting Performance Issues:

Performance issues are one of the hardest things to diagnose and troubleshoot because there could be variety of reasons behind this.

Steps to take:

- **Check for overheating:** If temperature is too high, then surely it affects the performance. CPU and other components reduce the performance level to cope with this high temperature. This is called as **throttling**. Check temperature sensors and fan speeds. If these are high, check whether the computer needs cleaning or if cooling systems need to be replaced or upgraded.

- **Check for misconfigurations:** Means verify if certain thing that is done with the computer is actually compatible with motherboard or not. For example, if you use the component that is not compatible with motherboard, then it may cause performance issues.

- **Verify the Problem:** Check and determine actually what is causing the problem for slower performance. Use diagnostic tools or may be check the task manager.

Bottleneck Situation: A bottleneck is an underpowered component that slows down the whole system. For example, a PC might have a fast CPU, dedicated graphics, and lots of system memory, but if the fixed disk is an HDD, then performance will be very slow.

Troubleshoot Inaccurate System Date/Time:

An inaccurate system date and time can cause major issues, such as failed authentication, unreliable backups, and problems with scheduled tasks, as many computer functions depend on accurate time synchronization. The Real-Time Clock (RTC), located on the motherboard, keeps the system's date and time running even when the computer is off, powered by a coin cell battery, typically a CR2032. This battery is called **CMOS Battery. (Complementary Metal Oxide Semiconductor).** If the clock resets frequently or the date and time in the BIOS/UEFI setup are wrong, it is often a sign of a failing RTC battery. To resolve this, replace the battery by turning off the computer, locating the round coin cell on the motherboard, and swapping it with a new one of the same type. After replacement, reconfigure the BIOS/UEFI settings to set the correct date and time. While older systems stored firmware settings in CMOS RAM, newer computers use NVRAM (**Non-Volatile RAM) (flash memory)**, which doesn't require battery backup, leaving the RTC battery to handle only the clock. Ignoring a failing RTC battery can lead to persistent issues, such as secure websites failing to load or backups not running on time, making it essential to address the problem promptly for smooth computer operation.

Burned-out-Bulb Issues:

Projector bulbs have a limited lifetime and will often need to be replaced. You might notice the image generated by the projector start to dim. There may also be a bulb health warning indicator light. A completely failed bulb is referred to as a burned-out bulb. You might hear the bulb "pop" and observe scorch marks on the inside or a broken filament.

The projector's bulb will be very hot. So, wait for the projector to cool down before doing anything.

Intermittent Projector Shutdown Issues:

Intermittent projector shutdown is typically caused by overheating. Check that the projector's fan is working, that the vents are free from dust and are not obstructed, and that the ambient temperature is not too high. If you can rule out overheating, check for loose connector cables and verify that the bulb is secured properly.

Troubleshooting Video Quality Issues – Key Points

1. **Dim Image**:
    - Check brightness and contrast settings using the On-Screen Display (OSD).
    - Disable adaptive brightness or power-saving modes.
    - If the image is nearly invisible, the backlight may have failed, requiring repair or replacement.
2. **Fuzzy Image**:
    - Ensure the output resolution matches the display's native resolution (e.g., 1920x1080).
    - Update or correctly configure the video card driver.
3. **Flashing Screen**:
    - Check and secure video cables and connectors at both ends.
    - Test the display with another computer to isolate issues.
    - Symptoms like bands, lines, or edge spots may indicate a failing backlight or circuitry.
4. **Dead Pixels**:
    - Stuck pixels (bright) might be reactivated using software utilities or by gently tapping the area.
    - Dead pixels (black) typically cannot be fixed and may require a replacement if under warranty.
5. **Burn-In**:
    - Avoid static images for long periods to prevent ghosting on OLED or plasma screens.
    - Use animated screen savers or auto-off settings to protect the display.
6. **Incorrect Color Display**:
    - Calibrate the screen using a color profile (via the Color Management utility).
    - Address color glitches (e.g., purple/green lines) by securing or replacing faulty cables.

    - Persistent issues may point to hardware faults in the monitor or graphics adapter.
7. **Audio Issues**:
    - HDMI/DisplayPort carry video and audio; DVI/VGA do not.
    - Check speaker power, connectors, and audio output settings in the OS if sound is missing.

These quick checks will help identify and resolve most video quality issues. For severe hardware faults, repairs or replacements may be necessary.

Some Questions and Answers:

What causes might you suspect if a PC experiences intermittent lockups?

- **Answer**: Assuming the issue is not software or driver-related, the most likely causes are thermal or power problems, loose connections, faulty system components (like the motherboard, CPU, or RAM), or corrupted OS files due to bad disk sectors.

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2. True or false: Running the fans continually at maximum speed is the best way to prevent overheating.

- **Answer**: **False.** Running fans at maximum speed can damage them, draw more dust into the case, and create excess noise. To prevent overheating, place the PC in a well-ventilated location, avoid direct sunlight, and maintain regular cleaning.

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3. You receive a support call from a lecturer. A projector is only displaying a very dim image. Which component should you prioritize for investigation?

- **Answer**: The most likely cause is a blown or failing bulb in the projector. Check the bulb first. If the bulb appears undamaged, ensure the brightness settings are not turned all the way down.

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4. A user reports a thick green band across the middle of a replacement monitor. How can you diagnose the cause?

- **Answer**: Replace the video cable with a known good one. If the issue persists, the problem likely lies with the monitor itself. Since the same PC worked fine with another monitor, the video card is unlikely to be the issue.