



**Independent
Skill Development
Mission**



ISDM (INDEPENDENT SKILL DEVELOPMENT MISSION)

DIAGNOSING & FIXING COMMON MOBILE SOFTWARE ISSUES

INTRODUCTION TO MOBILE SOFTWARE ISSUES

Mobile devices rely on **operating systems (Android, iOS, Windows)** and firmware to function properly. However, **software-related problems** can occur due to **bugs, outdated firmware, corrupted system files, or incompatible applications**.

Common software issues include:

- ✓ **Boot loops and stuck-on-logo problems**
- ✓ **App crashes and freezing screens**
- ✓ **Battery draining due to software glitches**
- ✓ **Slow performance caused by excessive background processes**
- ✓ **Network-related issues such as WiFi, Bluetooth, and mobile signal problems**

This guide provides **step-by-step solutions** for diagnosing and fixing common mobile software issues.

DIAGNOSING MOBILE SOFTWARE PROBLEMS

1. Identifying the Root Cause of the Issue

Before fixing a software issue, it is crucial to **identify its cause** using the following methods:

- ✓ **Checking System Logs & Crash Reports** – Use Android **Developer Mode** or iOS **Analytics** to check for error logs.
- ✓ **Observing Patterns** – Note when the issue occurs (e.g., after installing an update or specific app).
- ✓ **Performing Basic Troubleshooting** – Restart the device, check available storage, and test in **Safe Mode**.

Example:

- A user's phone **randomly restarts** after updating to the latest firmware.
- Checking system logs reveals **a corrupted update file**.
- Solution: **Reinstall the firmware using fastboot or recovery mode**.

FIXING COMMON MOBILE SOFTWARE ISSUES

1. Boot Loop & Stuck on Logo Issues

✓ **Symptoms:** The phone gets stuck at the **manufacturer's logo** or continuously reboots.

✓ **Possible Causes:**

- Corrupt **system files** or **firmware updates**.
- Incorrect modifications (rooting, flashing custom ROMs).

Step-by-Step Solution:

1. **Reboot the device into Recovery Mode.**

- Android: Hold **Power + Volume Up**.
 - iPhone: Press **Volume Up, Volume Down, then hold Power**.
2. **Wipe Cache Partition** – Select **Wipe Cache Partition** in recovery mode.
 3. **Perform a Factory Reset (If Needed)** – If the boot loop persists, perform a **Factory Reset**.
 4. **Reinstall the Firmware via Fastboot or iTunes**.

✓ **Outcome:** The phone successfully boots up without getting stuck on the logo.

2. App Crashes & Freezing Issues

✓ **Symptoms:** Apps close unexpectedly or the screen freezes.

✓ **Possible Causes:**

- Incompatible apps after a system update.
- Corrupt app cache and data.

Step-by-Step Solution:

1. **Clear App Cache & Data** – Go to **Settings** → **Apps** → **Select App** → **Clear Cache & Clear Data**.
2. **Check for Updates** – Ensure both the app and OS are updated.
3. **Reinstall the App** – If crashing continues, uninstall and reinstall the app.
4. **Check for RAM Overload** – Use **Developer Mode** to monitor RAM usage.

✓ **Outcome:** Apps run smoothly without crashing or freezing.

3. Slow Performance & Lagging Issues

✓ **Symptoms:** The device is slow, apps take longer to open, and animations stutter.

✓ **Possible Causes:**

- Too many background apps consuming RAM.
- Outdated software or excessive cached files.

Step-by-Step Solution:

1. **Free Up RAM & Storage** – Close unused apps and delete unnecessary files.
2. **Disable Background Processes** – Go to **Developer Options** → **Limit Background Processes**.
3. **Update the Firmware & Apps** – Keeping the system updated improves speed.
4. **Perform a Factory Reset** – If lagging continues, reset the device to factory settings.

✓ **Outcome:** The device runs **faster and more efficiently**.

4. Battery Draining & Overheating Issues

✓ **Symptoms:** The battery drains quickly, even with minimal usage.

✓ **Possible Causes:**

- Background apps using too much power.

- Battery calibration issues after firmware updates.

Step-by-Step Solution:

1. **Check Battery Usage** – Go to **Settings** → **Battery** → **Check app usage**.
2. **Disable Unnecessary Features** – Turn off **Bluetooth**, **Location**, and **Auto-Sync** when not needed.
3. **Calibrate the Battery** –
 - Let the battery **drain completely**.
 - Charge it to **100% without interruptions**.
4. **Use Battery Saver Mode** – Enables system optimizations for better power management.

✓ **Outcome:** The battery life improves, and overheating is reduced.

5. Network Issues: WiFi, Bluetooth, & Mobile Signal Problems

✓ **Symptoms:** The phone doesn't connect to WiFi, Bluetooth devices, or mobile networks.

✓ **Possible Causes:**

- Network driver corruption.
- Airplane Mode or incorrect APN settings.

Step-by-Step Solution:

1. **Restart the Network Connections** – Toggle **Airplane Mode ON & OFF**.

2. **Forget & Reconnect to WiFi/Bluetooth** – Remove the saved network and reconnect.
3. **Reset Network Settings** – Go to **Settings** → **Reset** → **Reset Network Settings**.
4. **Update Network Drivers** – Flash updated modem firmware if necessary.

✓ **Outcome:** The device connects to WiFi, Bluetooth, and cellular networks without issues.

CASE STUDY: RESOLVING A BOOT LOOP ON A SAMSUNG GALAXY S20

Scenario:

A user's **Samsung Galaxy S20** gets stuck in a **boot loop** after installing a **beta software update**. The device keeps **restarting but never fully boots**.

Solution:

- ✓ **Step 1:** Booted into **Recovery Mode** (Power + Volume Up).
 - ✓ **Step 2:** Performed **Wipe Cache Partition** to remove temporary files.
 - ✓ **Step 3:** Since the issue persisted, **flashed the official firmware** using Odin.
 - ✓ **Step 4:** Phone booted normally, and the user **restored their data**.
- ✓ **Result:** The device was fully functional, and the boot loop was **resolved** without a factory reset.
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Comparison of Common Software Issues & Fixes

Issue	Causes	Fixes
Boot Loop	Corrupt firmware, failed update	Wipe cache, reinstall firmware
App Crashes	Incompatible app version	Clear cache, update or reinstall app
Slow Performance	Too many background apps, low storage	Free up RAM, update system software
Battery Drain	High CPU usage, background processes	Optimize battery settings, disable background apps
WiFi/Bluetooth Issues	Incorrect settings, driver corruption	Reset network settings, update modem firmware

Exercise

1. What is the first step to diagnosing a boot loop issue?
2. Explain why clearing cache and data can fix app crashes.
3. How does resetting network settings help fix connectivity problems?
4. List three ways to improve battery life on a smartphone.
5. What should be done before performing a factory reset?

CONCLUSION

- ✓ Diagnosing software issues involves checking logs, observing patterns, and performing basic troubleshooting.
- ✓ Boot loops, app crashes, battery drain, and slow performance are common software problems.
- ✓ Factory reset should be the last resort; always try clearing cache and updating firmware first.
- ✓ A structured approach to troubleshooting ensures effective and quick resolution of mobile software issues.

RESOLVING IMEI & BASEBAND PROBLEMS

UNDERSTANDING IMEI & BASEBAND IN MOBILE DEVICES

What is IMEI (International Mobile Equipment Identity)?

The **IMEI (International Mobile Equipment Identity)** is a **unique 15-digit number** assigned to every mobile device. It helps in **identifying and tracking devices on mobile networks**. The IMEI number plays a crucial role in:

- ✓ **Network Registration** – Allows the device to communicate with mobile networks.
- ✓ **Theft Prevention** – IMEIs can be **blacklisted** by carriers to block stolen phones.
- ✓ **Hardware Authentication** – Helps in differentiating between fake and original devices.

The IMEI can be checked by dialing ***#06#** on any phone.

What is Baseband in Mobile Devices?

The **Baseband Processor (BP)** is responsible for handling **cellular network communication**. It allows the phone to:

- ✓ **Make calls & send messages**
- ✓ **Connect to mobile data (2G, 3G, 4G, 5G)**
- ✓ **Authenticate with the carrier network**

A damaged or corrupted baseband firmware can lead to **IMEI loss, signal problems, and mobile network failure**.

COMMON IMEI & BASEBAND PROBLEMS

IMEI and baseband issues can result in:

- ✓ **No Service / No Signal on SIM Cards**
- ✓ **Invalid IMEI (IMEI Null or 0000000000000000)**
- ✓ **Unknown Baseband Version**
- ✓ **Emergency Calls Only or Not Registered on Network**

Possible Causes of IMEI & Baseband Problems

- ✓ **Corrupt EFS (Encrypted File System) partition**
- ✓ **Flashing incompatible firmware or custom ROMs**
- ✓ **Using unofficial IMEI change tools**
- ✓ **Physical damage to the baseband chip on the motherboard**

FIXING IMEI & BASEBAND PROBLEMS

1. Checking for IMEI & Baseband Issues

Before repairing the issue, follow these steps to **check IMEI & Baseband status**:

- ✓ **Dial *#06#** – If IMEI is missing, the device may have a software or hardware issue.
- ✓ **Go to Settings → About Phone → Status → IMEI Information** – Check if IMEI appears.
- ✓ **Check Baseband Version in Settings → About Phone**. If it shows **Unknown Baseband**, the issue is related to baseband corruption.

2. Restoring IMEI Using ADB & Fastboot Commands

If the IMEI is missing due to firmware flashing or corruption, it can sometimes be restored using ADB commands.

Step-by-Step Guide:

1. Enable Developer Options & USB Debugging:

- Go to **Settings** → **About Phone**
- Tap **Build Number 7 times** to enable Developer Mode
- Enable **USB Debugging** under **Developer Options**

2. Connect the Device to a PC & Open CMD (Command Prompt):

3. adb devices

4. adb shell

This confirms that the device is recognized.

5. Write a New IMEI Using Fastboot Commands:

6. fastboot erase modem

7. fastboot flash modem modem.img

8. fastboot reboot

✓ **Outcome:** This method restores the original IMEI if it was erased due to baseband corruption.

3. Fixing "Unknown Baseband" by Flashing Modem Firmware

If the baseband version is missing, the modem firmware may be corrupt.

STEP-BY-STEP GUIDE:

1. **Download the correct modem firmware for your device.**
2. **Boot into Fastboot Mode (Power + Volume Down).**
3. **Flash the modem firmware using Fastboot:**
4. fastboot flash modem NON-HLOS.bin
5. fastboot reboot
6. **Check Baseband Version in Settings → About Phone.**

✓ **Outcome:** The phone restores its baseband functionality and connects to the network.

4. Restoring IMEI Using Qualcomm QPST/QFIL Tool (For Qualcomm Devices)

For Qualcomm devices, **QPST (Qualcomm Product Support Tool)** can restore IMEI.

Step-by-Step Guide:

1. **Install QPST & Qualcomm Drivers on PC.**
2. **Enable DIAG Mode on the phone:**
3. adb shell
4. setprop sys.usb.config diag,adb
5. **Open QPST Configuration & Select the Device.**
6. **Go to Restore NV & Select IMEI Backup File.**
7. **Click Write & Restart the Phone.**

✓ **Outcome:** The device recovers its original IMEI number and can now register on the network.

CASE STUDY: REPAIRING AN INVALID IMEI ISSUE ON A XIAOMI REDMI NOTE 10

Scenario:

A customer **flashed a custom ROM** on their **Xiaomi Redmi Note 10**, but after rebooting, the phone **lost its IMEI** and displayed "**No Service**".

Solution:

✓ **Step 1:** Checked IMEI status by dialing ***#06#** (IMEI was missing).

✓ **Step 2:** Verified Baseband in **Settings** → **About Phone** (Baseband showed "Unknown").

✓ **Step 3:** Used **Fastboot** to flash modem firmware:

```
fastboot flash modem modem.img
```

```
fastboot reboot
```

✓ **Step 4:** Restored IMEI using **QPST IMEI Write Tool**.

✓ **Result:** The device **regained network connectivity**, and the IMEI was successfully restored.

COMPARISON OF IMEI & BASEBAND REPAIR METHODS

Method	Best For	Difficulty Level	Success Rate

Fastboot IMEI Restore	Missing IMEI due to flashing	Medium	Moderate
Flashing Modem Firmware	Unknown Baseband issue	Medium	High
QPST IMEI Write Tool	Qualcomm-based devices	Hard	Very High

Exercise

1. What is the function of an IMEI number in mobile networks?
2. How do you check if a phone has an unknown baseband issue?
3. Describe the process of restoring IMEI using Fastboot commands.
4. Why does flashing an incorrect firmware cause IMEI loss?
5. What steps should be taken before attempting to modify an IMEI number?

CONCLUSION

- ✓ IMEI and baseband are essential for network communication in mobile devices.
- ✓ Loss of IMEI or baseband corruption can lead to no signal, invalid IMEI, or "unknown baseband" errors.
- ✓ IMEI restoration can be done using Fastboot, QPST, or modem firmware flashing.

✓ Technicians should always back up NV data before modifying IMEI settings.

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FIXING APPLICATION & OS PERFORMANCE ISSUES

INTRODUCTION TO APPLICATION & OS PERFORMANCE ISSUES

Smartphones and tablets rely on their **Operating System (OS)** and **installed applications** to function properly. Over time, users may experience **slow performance, app crashes, lagging UI, freezing screens, and battery drainage** due to various factors, including **software bugs, low system resources, and background processes consuming too much memory**.

Performance issues can arise due to:

- ✓ **Outdated OS versions or unoptimized firmware**
- ✓ **Incompatible or poorly coded applications**
- ✓ **Too many background processes consuming RAM**
- ✓ **Corrupt cache files slowing down system response**
- ✓ **Insufficient storage causing system lag**

This guide provides **step-by-step solutions** to diagnose and fix **app crashes, slow OS performance, and related issues** effectively.

Diagnosing Performance Issues

1. Identifying Performance Bottlenecks

Before applying fixes, the first step is to diagnose **what is causing the slow performance or app malfunctions**.

- ✓ **Check CPU & RAM Usage:**

- Go to **Developer Options** → **Running Services** (Android) or **Settings** → **Battery & Performance** (iOS) to check system resources.

✓ Monitor Background Processes:

- Identify if any **unnecessary apps** are running in the background and consuming resources.

✓ Check Storage Usage:

- Go to **Settings** → **Storage** and check **available space**. If storage is below **10%**, it can slow down system performance.

✓ Observe App Crash Logs:

- Android: **Developer Options** → **Take Bug Report**
- iOS: **Settings** → **Privacy** → **Analytics & Improvements** → **Analytics Data**

✓ Restart in Safe Mode:

- Booting into **Safe Mode** helps determine if **third-party apps** are causing performance issues.

FIXING OS & APPLICATION PERFORMANCE ISSUES

1. Speeding Up Slow OS Performance

✓ Symptoms:

- Phone takes **longer to open apps**, **freezes randomly**, and **animations stutter**.

✓ Possible Causes:

- Too many background apps consuming **RAM and CPU power**.
- Outdated **system firmware or app versions**.
- **Insufficient storage space**.

Step-by-Step Solution:

1. Free Up RAM & Close Background Apps:

- Go to **Settings** → **Apps** → **Running Apps** and force close unused apps.
- Use **Lite versions of apps** (e.g., Facebook Lite, Messenger Lite).

2. Clear System Cache & Temporary Files:

- Boot into **Recovery Mode** → Select **"Wipe Cache Partition"**.

3. Disable Unnecessary Animations:

- Enable **Developer Options** → Set **Window/Transition Scale to 0.5x**.

4. Keep OS & Apps Updated:

- Ensure the device is running **the latest firmware**.
- Update apps via **Google Play Store / Apple App Store**.

✓ **Outcome:** The device runs **smoother and faster**, with less lag and stuttering.

2. Fixing App Crashes & Freezing Issues

✓ Symptoms:

- Apps **close unexpectedly**, stop responding, or freeze.

✓ **Possible Causes:**

- Corrupt **app cache and data**.
- Incompatibility with the **OS version**.

Step-by-Step Solution:

1. **Clear App Cache & Data:**

- Go to **Settings** → **Apps** → **Select App** → **Clear Cache & Clear Data**.

2. **Check for App Updates:**

- Update the app via the **Play Store or App Store**.

3. **Reinstall the Problematic App:**

- If clearing cache doesn't work, uninstall and reinstall the app.

4. **Reset App Preferences:**

- Go to **Settings** → **Apps** → **Reset App Preferences** to restore default settings.

✓ **Outcome:** Apps run **without crashing or freezing**, ensuring a better user experience.

3. Improving Battery Life & Preventing Overheating

✓ **Symptoms:**

- The phone **heats up quickly**, and battery drains rapidly.

✓ Possible Causes:

- **High CPU usage** from background apps.
- **Overheating** from prolonged gaming or video streaming.

Step-by-Step Solution:

1. Check Battery Usage:

- Go to **Settings** → **Battery Usage** and identify apps consuming excessive power.

2. Use Power-Saving Mode:

- Enable **Battery Saver Mode** to optimize performance.

3. Disable Auto-Sync & Location Services When Not Needed:

- Turn off GPS, Bluetooth, and background data.

4. Monitor CPU Temperature & Performance:

- Use apps like **CPU-Z** or **AIDA64** to check CPU usage and heat levels.

✓ **Outcome:** The battery lasts **longer**, and overheating is prevented.

CASE STUDY: FIXING SLOW PERFORMANCE ON A SAMSUNG GALAXY S21

Scenario:

A customer's **Samsung Galaxy S21** has become **extremely slow**, with apps freezing and lagging after a major system update.

Solution:

- ✓ **Step 1:** Checked storage and found only 2GB free space.
 - ✓ **Step 2:** Cleared **system cache partition** via **Recovery Mode**.
 - ✓ **Step 3:** Disabled unnecessary background processes in **Developer Options**.
 - ✓ **Step 4:** Updated firmware and reinstalled key apps.
- ✓ **Result:** The **Samsung Galaxy S21** regained speed, and apps stopped freezing.

Comparison of Performance Issues & Fixes

Issue	Causes	Fixes
Slow Performance	Background apps, low RAM, storage full	Clear cache, close apps, update firmware
App Freezing	Corrupt app cache, outdated apps	Clear cache, reinstall app, check app updates
Battery Drain	High CPU usage, auto-sync ON	Enable battery saver, disable location services
Overheating	Excessive gaming, poor thermal management	Monitor CPU, avoid heavy apps, update software

Exercise

1. What are the most common causes of slow OS performance?

2. **How does clearing the cache improve app performance?**
 3. **What is the best method to fix a battery draining issue?**
 4. **How can Safe Mode help diagnose software problems?**
 5. **Why do system updates sometimes cause performance slowdowns?**
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CONCLUSION

- ✓ OS and app performance issues are often caused by background processes, cache buildup, or outdated firmware.
- ✓ Clearing cache, optimizing RAM, and updating software significantly improve system performance.
- ✓ Battery draining and overheating can be managed by reducing CPU workload and disabling auto-sync.
- ✓ Performing a factory reset should be a last resort if all other fixes fail.

VIRUS REMOVAL & MALWARE CLEANING

UNDERSTANDING MOBILE VIRUSES & MALWARE

What is a Mobile Virus or Malware?

A **mobile virus or malware** is a **malicious software program** designed to harm mobile devices by **stealing personal data, disrupting performance, and injecting harmful scripts**. Mobile malware can spread through:

- ✓ **Malicious Apps** – Fake apps on **untrusted sources** can install spyware or adware.
- ✓ **Phishing Attacks** – Fraudulent links trick users into **downloading malware**.
- ✓ **SMS & Email Links** – Clicking on suspicious links can lead to **ransomware infections**.
- ✓ **Infected USB Connections** – Connecting to an infected PC can spread **trojans and worms**.

Malware can cause **data theft, financial fraud, unauthorized access to apps, and complete system crashes**.

TYPES OF MOBILE MALWARE

1. Spyware & Keyloggers

- ✓ **Function:** Monitors keystrokes, collects passwords, and sends user data to hackers.
- ✓ **Symptoms:** Unauthorized transactions, strange logins, and excessive battery drain.
- ✓ **Example:** **Pegasus Spyware** infected high-profile targets to steal data.

2. Ransomware

✓ **Function:** Encrypts device files and demands **payment to unlock access**.

✓ **Symptoms:** Locked screen with **ransom messages** demanding cryptocurrency payments.

✓ **Example: WannaCry Mobile Ransomware** locked user files and demanded Bitcoin payments.

3. Adware & Pop-Up Malware

✓ **Function:** Displays excessive pop-up ads and redirects users to malicious websites.

✓ **Symptoms:** Sudden app crashes, unusual browser behavior, and high data consumption.

✓ **Example: HiddenAds Malware** disguised as a legitimate app to serve ads.

4. Banking Trojans

✓ **Function:** Steals banking credentials by **cloning login pages of financial apps**.

✓ **Symptoms:** Unauthorized transactions, fake login pages, and duplicate apps.

✓ **Example: Anubis Trojan** targeted Android users to steal banking credentials.

5. Rootkits

✓ **Function:** Hides itself deep in the system, allowing hackers to control the device remotely.

✓ **Symptoms:** Unexpected system reboots, app installations, and blocked security updates.

✓ **Example: HummingBad Rootkit** infected millions of devices to steal personal data.

DIAGNOSING MALWARE INFECTIONS

Step 1: Checking Unusual Behavior

✓ Symptoms of a Malware Infection:

- Excessive battery drain and overheating.
- Slow device performance and frequent crashes.
- Unexpected pop-ups and ads appearing on the home screen.
- New, unfamiliar apps installed without user permission.
- Excessive mobile data usage without explanation.

Step 2: Checking Installed Apps & Permissions

✓ Go to Settings → Apps & Notifications → App Permissions to identify suspicious apps.

✓ Review the apps requesting unnecessary permissions (camera, location, contacts, SMS, banking access, etc.).

Step 3: Scanning the Device with Security Tools

✓ Use antivirus software like:

- Malwarebytes Mobile Security
- Kaspersky Mobile Antivirus
- Avast Mobile Security

✓ Perform a full device scan to detect hidden malware.

VIRUS & MALWARE REMOVAL TECHNIQUES

1. Removing Malware Using Safe Mode

✓ Steps to Boot into Safe Mode:

1. Press and hold the Power button → Tap and hold "Power Off" → Select Safe Mode.
2. In Safe Mode, open Settings → Apps & Notifications.
3. Uninstall any suspicious apps manually.

✓ **Outcome:** The device runs without malware-infected applications.

2. Using Antivirus & Malware Removal Tools

✓ Steps to Remove Malware via Antivirus Apps:

1. Install an antivirus app (Malwarebytes, Kaspersky, Avast).
2. Perform a deep scan and quarantine infected files.
3. Remove flagged applications and restart the device.

✓ **Outcome:** The device is free from malware infections.

3. Factory Reset for Severe Infections

✓ When to Perform a Factory Reset:

- If malware persists after removal attempts.
- If ransomware locks files and prevents access.

✓ Steps to Perform a Factory Reset:

1. **Backup important data (excluding suspicious files).**
2. **Go to Settings → System → Reset → Factory Data Reset.**
3. **Confirm and restart the phone.**

✓ **Outcome:** The device returns to a **clean factory state**, free from viruses.

4. Removing Malware Using ADB & Fastboot Commands

✓ For Advanced Users:

1. **Connect the phone to a PC via USB.**
2. **Enable USB Debugging (Developer Mode).**
3. **Use ADB Commands to Remove Malware Apps:**
4. `adb shell pm list packages | grep "suspiciousapp"`
5. `adb uninstall -k --user 0 "com.malicious.app"`
6. `adb reboot`

✓ **Outcome:** The malware is removed using command-line methods.

CASE STUDY: REMOVING RANSOMWARE FROM A XIAOMI DEVICE

Scenario:

A Xiaomi user installed a **fake PDF reader app** that **locked the phone with a ransomware message** demanding payment.

Solution:

- ✓ **Step 1:** Booted the device into **Safe Mode**.
 - ✓ **Step 2:** Used **ADB** commands to force **uninstall the ransomware app**.
 - ✓ **Step 3:** Ran **Malwarebytes Antivirus** to remove hidden files.
 - ✓ **Step 4:** Cleared **cache and reset permissions** for all apps.
 - ✓ **Result:** The Xiaomi device was successfully unlocked and malware-free.
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Preventing Future Malware Attacks

- ✓ **1. Only Download Apps from Trusted Sources**
 - Use **Google Play Store, Apple App Store, or official developer websites**.
 - ✓ **2. Avoid Clicking on Suspicious Links**
 - Do not open links in **unknown emails, SMS, or pop-ups**.
 - ✓ **3. Keep the OS & Apps Updated**
 - Regular updates fix security vulnerabilities.
 - ✓ **4. Enable Play Protect (Android Users)**
 - Go to **Google Play Store → Play Protect → Enable Scan Apps Automatically**.
 - ✓ **5. Use a Secure Browser & VPN**
 - Prevents unauthorized data tracking and phishing attacks.
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Comparison of Malware Removal Techniques

Method	Best For	Difficulty Level	Success Rate
Safe Mode App Uninstallation	Removing adware & suspicious apps	Easy	High
Antivirus Scan & Removal	Detecting spyware & Trojans	Medium	High
Factory Reset	Ransomware & persistent malware	Hard	Very High
ADB & Fastboot Commands	Removing hidden malware	Expert	Very High

Exercise

1. What are the common symptoms of mobile malware infection?
2. Explain how adware affects mobile performance.
3. Describe the steps to remove a virus using Safe Mode.
4. How can users protect themselves from ransomware?
5. Why is factory resetting the last option for malware removal?

CONCLUSION

✓ Malware can steal data, slow down phones, and even cause financial losses.

- ✓ Safe Mode & antivirus tools help remove most viruses, while factory resets fix severe infections.
- ✓ Users must avoid downloading untrusted apps and clicking on phishing links.
- ✓ Proactive security measures, such as Play Protect and VPNs, can prevent malware attacks.

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SYSTEM CRASHES & BOOT FAILURE SOLUTIONS

INTRODUCTION TO SYSTEM CRASHES & BOOT FAILURES

A mobile device **crashes or fails to boot** when it encounters **critical software or hardware malfunctions**. These issues prevent the **operating system from loading**, making the device unusable.

Common causes of **system crashes and boot failures** include:

- ✓ **Corrupt firmware or OS updates**
- ✓ **Failed custom ROM or kernel flashing**
- ✓ **Incompatible or buggy applications**
- ✓ **Malware infections affecting system files**
- ✓ **Hardware failures, such as a damaged motherboard or storage chip**

This guide explains **step-by-step troubleshooting methods** to diagnose and fix **mobile boot failures and system crashes**.

DIAGNOSING SYSTEM CRASHES & BOOT FAILURES

1. Identifying the Type of Boot Failure

- ✓ **Soft Brick (Recoverable)**
 - The phone is stuck in a **boot loop or frozen on the logo**.
 - Can be fixed by **clearing cache, reflashing firmware, or performing a factory reset**.
- ✓ **Hard Brick (Non-Recoverable Without Hardware Repair)**

- The device is completely **unresponsive (black screen, no boot, no charging LED)**.
- May require **professional motherboard repair or JTAG flashing**.

✓ No Boot, But Can Access Recovery/Fastboot Mode

- The device does not boot into the OS but **enters recovery mode or fastboot mode**.
- Can be fixed by **reinstalling stock firmware or performing a system restore**.

2. Checking for Software or Hardware Causes

✓ **Try Booting into Safe Mode** – If the device boots in **Safe Mode**, the issue is likely caused by a **faulty third-party app**.

✓ **Check Battery & Power Circuit** – If the phone does not turn on, it could be a **battery, power IC, or motherboard failure**.

✓ **Connect the Phone to a Computer** – If the PC detects the phone, but it doesn't boot, the **bootloader or OS may be corrupted**.

FIXING SYSTEM CRASHES & BOOT FAILURES

1. Fixing Boot Loop & Stuck on Logo Issues

✓ Symptoms:

- The phone **keeps rebooting** but never reaches the home screen.
- The device is stuck on the **manufacturer's logo**.

✓ Possible Causes:

- Corrupt **system files** due to a failed update.
- Incompatible custom ROM or kernel.

Step-by-Step Solution:

1. Boot into Recovery Mode

- Android: **Power + Volume Up**
- iPhone: **Press Volume Up, then Volume Down, then hold Power**

2. Wipe Cache Partition

- Navigate to **Wipe Cache Partition** → **Confirm**.

3. Reinstall the System Firmware (Using Fastboot or Odin)

- Download the correct firmware for the device.
- Use the following fastboot command:
- `fastboot flash system system.img`
- `fastboot reboot`

✓ **Outcome:** The phone **boots successfully** without getting stuck on the logo.

2. Fixing "No Boot" or Black Screen Issues

✓ Symptoms:

- The phone does not **turn on** or **show any signs of life**.
- No response when **pressing the power button**.

✓ Possible Causes:

- Battery completely drained or faulty power circuit.
- Corrupt bootloader or firmware failure.

Step-by-Step Solution:

1. Perform a Forced Restart

- Hold **Power + Volume Down** for 30 seconds.

2. Charge the Device for at Least 30 Minutes

- Use a different charger and cable to rule out a power issue.

3. Check for Bootloader Corruption

- Connect the phone to a PC and enter fastboot mode:
- fastboot devices
- If the device is detected, flash the bootloader:
- fastboot flash boot boot.img
- fastboot reboot

✓ **Outcome:** The phone successfully boots up after repairing the bootloader.

3. Restoring a Corrupted OS via Recovery Mode

✓ Symptoms:

- The device boots into recovery mode automatically.

- Error messages like **"No Command"** or **"System Corrupt"** appear.

✓ **Possible Causes:**

- **Malware infection affecting system files.**
- **Corrupt update installation.**

Step-by-Step Solution:

1. **Boot into Recovery Mode**
 - Use **Power + Volume Up** to access recovery.
2. **Select "Wipe Data / Factory Reset"**
 - This removes **corrupt system files**.
3. **Reinstall Firmware via ADB or SD Card**
 - Use **ADB sideload** to reinstall system software:
 - adb sideload update.zip

✓ **Outcome:** The phone **boots successfully with a fresh OS installation.**

4. Fixing Hard Brick (No Response, No LED, No Charging)

✓ **Symptoms:**

- The phone **does not power on, charge, or show any screen activity.**

✓ **Possible Causes:**

- **Damaged bootloader partition.**

- **Faulty motherboard components (Power IC, NAND chip failure).**

Step-by-Step Solution:

1. **Connect the Phone to a PC & Check for Qualcomm EDL Mode**
 - If detected as **Qualcomm HS-USB QDLoader 9008**, proceed with unbricking.
2. **Use Qualcomm QFIL Tool to Flash Stock Firmware**
 - Load the correct **MBN firmware** and flash the device.
3. **If Still Unresponsive, Perform JTAG Repair**
 - A JTAG box like **RIFF Box** can be used for **hardware repair**.

✓ **Outcome:** The device is **revived using low-level firmware flashing or hardware repair**.

CASE STUDY: FIXING A BOOT LOOP ON A ONEPLUS 8 PRO

Scenario:

A user **flashed a custom ROM** on their **OnePlus 8 Pro**, but the phone entered a **boot loop** and wouldn't start.

Solution:

- ✓ **Step 1:** Booted into **Fastboot Mode (Power + Volume Up)**.
- ✓ **Step 2:** Flashed the original bootloader using:

`fastboot flash boot boot.img`

fastboot reboot

✓ **Step 3:** Reinstalled **stock firmware** via **TWRP Recovery**.

✓ **Result:** The OnePlus 8 Pro **booted successfully** after restoring stock firmware.

Comparison of Boot Failure Solutions

Issue	Causes	Fixes
Boot Loop	Corrupt update, failed ROM flash	Wipe cache, reinstall firmware
Black Screen (No Boot)	Dead battery, corrupt bootloader	Force restart, flash bootloader
"No Command" Error	Corrupt system files	Factory reset, reinstall OS
Hard Brick	NAND chip failure, damaged bootloader	Qualcomm QFIL, JTAG repair

Exercise

1. What is the difference between a soft brick and a hard brick?
2. How can you fix a boot loop issue on an Android device?
3. Explain the role of the bootloader in system crashes.
4. What are the steps to recover a device stuck on a logo screen?

5. Describe the process of flashing stock firmware using Fastboot.

CONCLUSION

- ✓ System crashes and boot failures can occur due to software corruption, malware, or hardware issues.
- ✓ Boot loops can be fixed by clearing cache, flashing firmware, or restoring system files.
- ✓ Black screen issues often require bootloader fixes or firmware reinstallation.
- ✓ A hard-bricked device may need Qualcomm QFIL or JTAG repair.

ASSIGNMENT 4:

✓ CREATE A STEP-BY-STEP
TROUBLESHOOTING GUIDE FOR RESOLVING
SOFTWARE CRASHES.

✓ PERFORM VIRUS REMOVAL ON A TEST
DEVICE AND DOCUMENT THE PROCESS

STEP-BY-STEP TROUBLESHOOTING GUIDE FOR RESOLVING SOFTWARE CRASHES

Software crashes occur when a mobile device experiences **app failures, freezing, unexpected restarts, or system crashes** due to **software bugs, corrupted data, insufficient memory, or malware infections**. This guide provides a **structured approach** to diagnosing and fixing software crashes effectively.

Step 1: Identify the Type of Software Crash

✓ Check if the crash is app-specific or system-wide.

- **App-Specific Crash:** Only one app is crashing, but the system runs normally.
- **System-Wide Crash:** The entire OS becomes unresponsive or keeps restarting.

✓ Observe when the crash happens.

- Does it occur **after installing an app or system update**?
- Is it triggered by a **specific action (e.g., opening the camera, making a call, etc.)**?

✓ Check for error messages or logs.

- On Android: **Developer Options → Take Bug Report**
 - On iOS: **Settings → Privacy → Analytics & Improvements → Analytics Data**
-

Step 2: Perform a Soft Reset (Basic Restart)

✓ **Restart the device to clear temporary memory issues.**

- **Android: Hold Power Button → Select Restart**
- **iPhone: Press and hold Power + Volume Down until the Apple logo appears.**

✓ **Test if the issue persists after restarting.**

- **If the crash continues, proceed to clearing app cache or system optimizations.**

Step 3: Clear App Cache & Data (For App-Specific Crashes)

✓ **Steps to clear app cache & data:**

1. **Go to Settings → Apps & Notifications → Select the crashing app.**
2. **Tap "Storage & Cache" → Select "Clear Cache."**
3. **If the issue persists, select "Clear Data" (this will reset the app).**

✓ **Outcome:**

- **The app should now run without crashing or lagging.**
- **If the crash persists, proceed to update or reinstall the app.**

Step 4: Update or Reinstall the Problematic App

✓ **Steps to update the app:**

1. **Go to Google Play Store / Apple App Store → Check for App Updates.**

2. If an update is available, install it and restart the device.

✓ **Steps to reinstall the app:**

1. Uninstall the app from Settings → Apps → Uninstall.
2. Reboot the phone and reinstall the app from the official store.

✓ **Outcome:** The app should now work **without crashing**.

Step 5: Free Up RAM & Optimize Background Processes

✓ **For Android Devices:**

1. Go to Developer Options → Running Services.
2. Identify apps using excessive RAM and force-stop unnecessary apps.
3. Disable auto-start apps from Settings → Apps → Auto Start Management.

✓ **For iOS Devices:**

1. Close background apps from the App Switcher (Swipe Up & Close).
2. Disable Background App Refresh in Settings → General → Background App Refresh.

✓ **Outcome:** The device will run **faster and more efficiently**.

Step 6: Check for System Updates

✓ Steps to update the OS:

1. Go to Settings → System → Software Update.
2. If an update is available, download and install it.
3. Restart the phone and check if the issue is resolved.

✓ **Outcome:** The latest update often fixes software bugs causing crashes.

Step 7: Boot into Safe Mode (Identify Problematic Apps)

✓ **Safe Mode** disables all third-party apps, allowing users to determine if a crash is caused by a rogue app.

✓ Steps to enter Safe Mode:

- **Android:** Hold Power Button → Tap & Hold "Power Off" → Select "Safe Mode."
- **iPhone:** Hold Power + Volume Down → Release Power, Keep Holding Volume Down until the Apple logo appears.

✓ What to do in Safe Mode:

1. Check if the crash persists in Safe Mode.
 - If the issue disappears, an installed app is causing the crash.
2. Uninstall recently installed or suspicious apps.
3. Reboot the phone normally.

✓ **Outcome:** If the issue does not occur in Safe Mode, a third-party app was the culprit.

Step 8: Reset App Preferences (Fix System-Level Conflicts)

✓ Steps to reset app preferences:

1. Go to **Settings** → **Apps** → **Reset App Preferences**.
2. Restart the device and check if the issue is fixed.

✓ **Outcome:** This restores **default permissions and configurations**, preventing system crashes.

Step 9: Perform a Factory Reset (Final Solution)

If all other methods fail, a **factory reset** is the last option to remove deep-rooted system bugs.

✓ Steps to factory reset:

1. Backup important data.
2. Go to **Settings** → **System** → **Reset Options** → **Factory Reset**.
3. Confirm and wait for the phone to reset.

✓ **Outcome:** The phone returns to **factory condition**, free of software issues.

CASE STUDY: FIXING SYSTEM CRASHES ON A SAMSUNG GALAXY S22

Scenario:

A Samsung Galaxy S22 user reports that the phone **keeps freezing and randomly restarting** after a system update.

Solution:

✓ **Step 1:** Checked **system logs** and found high CPU usage due to a buggy **third-party app**.

✓ **Step 2:** Booted into **Safe Mode** and confirmed the issue stopped.

✓ **Step 3:** Uninstalled the problematic app and updated the firmware.

✓ **Step 4:** Cleared **system cache partition via Recovery Mode**.

✓ **Result:** The phone **ran smoothly without freezing or crashing**.

Comparison of Software Crash Solutions

Issue	Causes	Fixes
App Crashes	Corrupt cache, outdated app	Clear cache, update/reinstall app
Slow Performance	Background apps, RAM overload	Close apps, disable auto-start
OS Freezing	Buggy update, corrupt system files	Update firmware, clear system cache
Boot Loop	Incomplete installation, custom ROM issue	Factory reset, flash firmware

Exercise

1. What is the first step in diagnosing a software crash?

2. **How does Safe Mode help in troubleshooting app crashes?**
 3. **Explain why clearing app cache can fix app freezing issues.**
 4. **When should a factory reset be performed?**
 5. **How does updating the OS fix software bugs?**
-

CONCLUSION

- ✓ **Software crashes are often caused by outdated apps, low system resources, or corrupted system files.**
- ✓ **Safe Mode helps identify whether third-party apps are responsible for crashes.**
- ✓ **Clearing cache, updating software, and freeing up RAM can resolve most app-related issues.**
- ✓ **A factory reset should only be used as a last resort.**

STEP-BY-STEP GUIDE TO PERFORM VIRUS REMOVAL ON A TEST DEVICE

Objective:

This guide provides a **structured process** to detect and remove **viruses, malware, spyware, or adware** from a mobile device.

Step 1: Identify Symptoms of Virus Infection

Before starting virus removal, check if the device has any of the following symptoms:

- ✓ Unusual battery drain & overheating
- ✓ Frequent app crashes & slow performance
- ✓ Excessive pop-up ads & unknown app installations
- ✓ Unauthorized SMS, emails, or transactions
- ✓ Random device restarts & network issues

If any of these signs appear, proceed with virus scanning and removal.

Step 2: Boot the Device into Safe Mode

- ✓ Safe Mode disables third-party apps, preventing malware from running.

How to enter Safe Mode:

For Android:

1. Press and hold the Power button.
2. Tap and hold "Power Off" until "Safe Mode" appears.

3. Select "OK" to reboot into Safe Mode.

For iPhone (Check Installed Profiles for Malware Apps):

1. Go to Settings → General → VPN & Device Management.
2. Check for unknown configuration profiles and remove them.

✓ **Outcome:** If the phone runs normally in Safe Mode, a third-party app is likely causing the virus infection.

Step 3: Uninstall Suspicious Apps

1. Go to Settings → Apps → Manage Apps.
2. Look for unknown or suspicious apps (e.g., with no name or random symbols).
3. Uninstall the malware app manually.

✓ **Outcome:** Removing the malware-infected app can stop malicious activity on the device.

Step 4: Use an Antivirus or Malware Scanner

If the virus persists, perform a **deep scan using antivirus software.**

Recommended Antivirus Apps:

- ✓ Malwarebytes Mobile Security
- ✓ Avast Mobile Security
- ✓ Kaspersky Mobile Antivirus
- ✓ Bitdefender Mobile Security

How to perform a scan:

1. **Download and install the antivirus app from Play Store/App Store.**
2. **Run a full device scan to detect hidden malware files.**
3. **Remove or quarantine any detected threats.**

✓ **Outcome:** The malware is identified and removed safely.

Step 5: Clear Cache & Browser Data

Malicious scripts or adware may hide in browser cache files.

1. **Open Chrome / Safari → Go to Settings → Privacy.**
2. **Select "Clear Browsing Data" and check "Cache & Cookies."**
3. **Tap "Clear Data" to remove any injected malware.**

✓ **Outcome:** Any hidden browser-based malware is removed.

Step 6: Reset App Permissions & Security Settings

If a virus modified system settings, restoring **default permissions** can prevent further infection.

1. **Go to Settings → Apps → Reset App Preferences.**
2. **Check App Permissions and disable unnecessary access.**

✓ **Outcome:** Any unwanted permissions granted to malware are revoked.

Step 7: Perform a Factory Reset (Final Solution)

If the virus **persists even after removal**, a **factory reset** is the last option.

✓ **Backup important data first!**

Steps to Perform a Factory Reset:

1. **Go to Settings → System → Reset Options → Factory Reset.**
2. **Confirm and wait for the phone to reset.**
3. **Reinstall apps only from trusted sources (Play Store/App Store).**

✓ **Outcome:** The device returns to a **clean state**, free from malware.

CASE STUDY: REMOVING A VIRUS FROM A SAMSUNG GALAXY S21

Scenario:

A Samsung Galaxy S21 was experiencing **random ads, battery drain, and unknown app installations**.

Solution:

✓ **Step 1:** Booted into **Safe Mode** and identified a rogue app called **"Android Security Update"** (fake).

✓ **Step 2:** Uninstalled the fake app via **Settings → Apps**.

✓ **Step 3:** Cleared browser cache and reset app permissions.

✓ **Step 4:** Ran **Malwarebytes Antivirus** to scan and remove additional threats.

✓ **Result:** The phone was restored to **normal performance without malware issues**.

Comparison of Virus Removal Methods

Method	Best For	Difficulty Level	Success Rate
Safe Mode Uninstallation	Removing adware & malicious apps	Easy	High
Antivirus Scan	Detecting & removing hidden malware	Medium	High
Factory Reset	Severe virus infections & ransomware	Hard	Very High

Exercise

1. What are the first signs of a virus infection on a mobile device?
 2. How does Safe Mode help in removing viruses?
 3. What are the risks of downloading apps from unknown sources?
 4. Describe the steps to clear browser malware.
 5. When should a factory reset be performed?
-

CONCLUSION

- ✓ Malware infections can slow down phones, steal data, and compromise security.
- ✓ Safe Mode and antivirus tools help remove most mobile viruses.
- ✓ A factory reset is a last-resort solution for severe infections.
- ✓ Users should avoid downloading apps from untrusted sources and regularly update their devices.

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