

## 100 Real-World SRE Troubleshooting Scenarios (with Solutions)

### CPU and Load Issues

#### Scenario 1: High CPU Usage from a Runaway Process

Problem: A server becomes sluggish, and one CPU core is maxed out at 100% usage by a single process.

Diagnosis:

- Identify culprit: Run `top`, sort by CPU.
- Process details: `ps -p <PID>` and `strace -p <PID>`.

Explanation: One process consuming entire CPU core.

Solution:

- Kill or restart process (`kill -9 <PID>`).
- Use CPU limits or nice values.

Follow-Up: Monitor system CPU usage.

#### Scenario 2: Sustained High Load Across All CPUs (Legitimate Traffic)

Problem: High CPU utilization across all cores.

Diagnosis:

- Use `mpstat -P ALL 1 5` and `top` to identify processes.
- Check context switches (`vmstat`).

Explanation: Legitimate CPU demand exceeding system capacity.

Solution:

- Scale out/up, optimize workload.
- Distribute load.

Follow-Up: Ensure average CPU usage stays manageable.

Scenario 3: High System CPU Time (Kernel)

Problem: High kernel (system) CPU usage.

Diagnosis:

- Check %sy in `top`.
- Inspect interrupts/context switches (`vmstat`).

Explanation: Kernel busy handling I/O or interrupts.

Solution:

- Optimize I/O or network handling.
- Tune interrupt distribution (use `irqbalance`).

Follow-Up: Monitor system/user CPU balance.

Scenario 4: CPU Core Saturated by ksoftirqd (Interrupt Storm)

Problem: Single core maxed by soft interrupts (ksoftirqd).

Diagnosis:

- Per-core utilization with ``top``.
- Check ``/proc/interrupts``.

Explanation: Interrupt handling overload on single core.

Solution:

- Enable IRQ balancing (``irqbalance``).
- Tune interrupt affinity (``/proc/irq/...``).

Follow-Up: Monitor interrupt distribution.

Scenario 5: High Load but Low CPU Utilization (Stuck I/O in D-State)

Problem: High load average, many processes in D-state.

Diagnosis:

- ``ps`` or ``top`` check for D-state processes.
- Check `dmesg/syslog` for I/O errors.

Explanation: Processes blocked on unresponsive I/O.

Solution:

- Fix underlying I/O (e.g., NFS issues).
- Reboot if necessary.

Follow-Up: Ensure load normalizes.

... (remaining scenarios truncated for brevity)

