1.4.1.1 What are Snapshots ?

A Proxmox snapshot is a point-in-time capture of a virtual machine or container’s complete state, including data, configuration files, and optionally memory (RAM). This powerful feature allows system administrators to create instant restore points before making changes, ensuring they can quickly revert to a known good state if something goes wrong.

How Snapshots Work in Proxmox VE

Snapshots operate using a copy-on-write mechanism. When you create a snapshot, the hypervisor stops writing new data to the original disk image and creates a new ‘child disk’ for all future write operations. Proxmox then marks the current state as the snapshot baseline and tracks any changes made afterward. Only modified blocks require additional storage space.

For running VMs, the process differs significantly from powered-off VMs:

- **Running VM snapshots**: Can include memory state, capturing active processes, network connections, and system state
- **Powered-off VM snapshots**: Only capture disk and configuration data, requiring a cold boot upon restoration

Storage requirements vary depending on your configuration. Memory snapshots need additional space equal to the VM’s allocated RAM, while disk-only snapshots initially consume minimal space but grow as data changes.

Why Proxmox Snapshots are Essential for Virtualization

Snapshots provide critical advantages for modern virtualization environments:

Primary use cases include pre-update testing, where administrators create snapshots before installing patches or software updates. This approach allows safe rollback if updates cause system instability or data corruption.

Development environments benefit enormously from snapshots. Developers can create branching points for testing different code paths, comparing performance, or reverting to clean states for repeated testing scenarios.

Risk mitigation represents perhaps the most valuable benefit. Snapshots enable safe experimentation with system changes, configuration modifications, and security updates without fear of permanent damage to production systems.

The speed advantage over traditional backups cannot be overstated. While full backup restoration might take 30-60 minutes, snapshot rollback typically completes in 2-5 minutes, minimizing downtime and improving operational efficiency.

Snapshots vs Backups

Aspect	Snapshots	Backups
Storage Location	Same storage as VM/container	Separate storage or remote location
Recovery Time	2-5 minutes	30-60 minutes
Data Protection Level	Short-term, same-host protection	Long-term, disaster recovery
Use Cases	Testing, quick rollback, development	Data archival, disaster recovery
Storage Requirements	Incremental space usage	Full VM/container size
Hardware Failure Protection	No (stored locally)	Yes (stored separately)

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