



## Datasheet

# Proxmox Virtual Environment

### AT A GLANCE

- Complete, open-source platform for enterprise virtualization
- Control via web-based management interface
- 100% software-defined architecture
- Two virtualization technologies supported: KVM hypervisor & Linux Container (LXC)
- Easy management with web-based user interface & CLI
- High-Availability (HA) Cluster Manager
- Live/Online Migration
- Integration of Proxmox Backup Server
- Built-in services: firewall, backup/restore, storage replication, etc.
- Open-source license (GNU Affero GPL, v3)
- Enterprise support available

### OVERVIEW

Proxmox Virtual Environment is a complete, open-source solution for enterprise virtualization, that integrates the KVM hypervisor and Linux containers (LXC), software-defined storage and networking functionality, on a single platform. From the central user interface, you can manage VMs and containers, storage resources, network configuration, and high availability for clusters. The interface also provides access to multiple out-of-the-box tools for tasks such as backup/restore, live-migration, storage replication, and firewall configuration.

Proxmox VE is designed to scale to cluster-level and enables you to virtualize even the most demanding of Linux and Windows application workloads. By combining two virtualization technologies on a single platform, Proxmox VE provides maximum flexibility to your data center. It includes strong high-availability (HA) support and—thanks to the unique multi-master design—you don't need any additional management server, thus saving resources and allowing HA without a single point of failure (SPOF).

### ENTERPRISE-READY

Enterprises use the powerful Proxmox VE platform to easily install, manage, and monitor their hyper-converged (HCI) data centers. Multiple authentication sources, combined with role-based user and permission management enable flexible control of HA clusters. The REST API enables easy integration of third-party management tools, such as custom hosting environments.

The future-proof and open-source development model of Proxmox VE guarantees full access to the product's source code as well as maximum flexibility and security.

## KEY FEATURES

### INDUSTRY-LEADING

#### ENTERPRISE VIRTUALIZATION

- Linux and Windows servers, 32- and 64-bit operating systems.
- Support for the latest Intel and AMD server chip sets – for great VM performance.
- Near bare-metal performance for real-world enterprise workloads.
- Management layer containing all the capabilities to manage and monitor an open-source, software-defined data center.

#### FREE & OPEN-SOURCE SOFTWARE

- Licensed under the GNU AGPL, v3.
- Debian-based, using the Proxmox kernel with OpenZFS support.
- Designed for community cooperation.
- Public code repository (Git).
- Open development on transparent mailing list.
- Bug tracker for issue tracking.
- Community support forum.
- Documentation, project page, video tutorials, how-to guides, ...

#### ENTERPRISE SUPPORT AGREEMENT

- Avoid hidden costs with clear subscription model.
- Flexible support options that grow with your needs.
- Access to the stable and extensively tested Enterprise Repositories for Proxmox VE and Ceph.
- Updates and version upgrades via GUI.
- Proxmox Offline Mirror tool to keep air-gapped systems up-to-date.
- Premium technical support from the highly-skilled Proxmox support team.

#### HIGHLY AVAILABLE (HA) CLUSTER

- No single point of failure (no SPOF).
- Multi-master cluster.
- Manage the HA settings for KVM and LXC via GUI.
- Cluster Resource Scheduling (CRS).
- pmxcfs—unique Proxmox VE Cluster File System: database-driven file system for storing configuration files, replicated in real-time across all nodes using Corosync.
- Based on proven Linux HA technologies, providing stable and reliable HA service.
- Resource agents for KVM and containers (LXC).
- Watchdog-based fencing.

### SELF-FENCING

- The Proxmox VE HA Manager uses self fencing, provided by hardware watchdog or kernel softdog timers.
- No simultaneous data access or corruption.
- Works „out-of-the-box“.
- Includes Proxmox VE HA Simulator for testing.

### UNIFIED VIRTUAL GUESTS OPERATION

- Create and maintain VMs and containers on a single platform.
- Set hard and soft limits for CPU and Memory.
- Pin virtual guests to a set of CPU cores.
- Migrate to any cluster node.

### VIRTUAL MACHINES WITH QEMU/KVM

- Independent from OS: Run unmodified Windows, Linux, BSD, or others.
- QEMU/KVM for low overhead.
- Snapshot a full VM; optionally with memory (live).
- Hot-plug network devices, USB devices, disks, CPUs, and memory to a running VM.
- PCI(e) pass-through using the GUI.
- Import VMs from other hypervisors (via OVF).
- Setup UEFI with secure boot and a Trusted Platform Module (TPM) to run modern guest OS.
- View guest display from anywhere with noVNC HTML5 web console or SPICE client (virt-viewer).

### CONTAINERS WITH LXC

- Proxmox Container Toolkit (pct) provides easy and flexible management of Linux Container (LXC).
- Ready-to use images of most common Linux distributions and TurnKey Linux templates available.
- Fine-grained memory and CPU resource control.
- Shares the host kernel: Almost zero overhead.
- Security features like AppArmor, seccomp, Cgroups, and kernel namespaces.
- Snapshot and rollback the full container state at any time.
- Quick maintenance with web console (xterm.js).

### VM HARDWARE PASSTHROUGH

- Assign PCI(e) or USB devices to VMs via the GUI.
- Hot-plug USB devices and ports into running VMs.
- Use virtual functions to share a single device with multiple guests.
- Pass through whole disks using the CLI.

## KEY FEATURES

- Resource mappings for VMs, with hardware passthrough/cluster-wide mapping of PCI/USB devices.

### LIVE/ONLINE MIGRATION

- Move QEMU VMs from one physical host to another with zero downtime.
- Local storage live-migration.

### FLEXIBLE STORAGE OPTIONS

- Local storage such as ZFS, Btrfs, LVM, and LVMthin.
- Shared storage such as CIFS, iSCSI or NFS.
- Distributed storage such as Ceph RBD and CephFS.
- Encryption support for Ceph OSD and ZFS.
- Unlimited number of storage definitions (cluster-wide).

### STORAGE REPLICATION STACK (ZFS)

- Built-in, open-source storage replication framework.
- Redundancy for guests using local storage.
- Data availability without using shared storage.
- Asynchronous replication.
- Minimize data loss in the case of a failure.
- Improve reliability, fault-tolerance, and accessibility of your data.
- Enables fast, live migration (sync only delta since last replication).
- Flexible scheduling options with the calendar events format.

### SOFTWARE-DEFINED STORAGE (SDS) WITH CEPH

- Integrated Ceph, a distributed object store and file system.
- Management via GUI or CLI.
- Easy-to-use installation wizard.
- Run Ceph RBD and CephFS directly on the Proxmox VE cluster nodes.
- Proxmox delivers its own Ceph packages.
- Ceph support is included in the support agreement.
- Add external Ceph clusters as storage via GUI.

### DISK MANAGEMENT

- View all disks and their partitions.
- Check S.M.A.R.T health status of disks.
- Wipe all data from a partition or disk via the GUI.
- Create ZFS (RAID-Z, dRAID, RAID 0/1/10), LVM(-thin) and file based (ext4, XFS) storages.

### VIRTUALIZED NETWORKING

- Flexible network configuration options.
- Each host with up to 4094 Linux bridges.
- Simple configuration via the GUI.
- IPv4 and IPv6 support.
- Support for Linux bridges and VLANs.
- Integrates Open vSwitch (opt-in).

### BACKUP AND RESTORE

- Full backups of VMs and containers.
- Live snapshot backups.
- Define flexible backup job schedules with the calendar event format.
- Configure multiple backup storages.
- GUI and CLI integration.
- Backup and restore via GUI.
- Set up backup retention policies via GUI.
- Run scheduled backup jobs manually in the GUI.
- Monitor backup jobs via the GUI's tab "Tasks".
- Automatically add notes to backups using a template.

### INTEGRATION OF PROXMOX BACKUP SERVER

- Full support for the open-source, enterprise backup solution from Proxmox.
- Incremental, fully deduplicated backups of VMs, containers, and physical hosts.
- QEMU dirty-bitmaps for extremely fast VM backup.
- Strong encryption on the client-side, with easy encryption key management.
- Single-file and directory restore.
- With live-restore, guests start as soon as the restore does.

### TWO-FACTOR AUTHENTICATION

- Providing high security.
- Support for multiple 2<sup>nd</sup> factors for a single account.
- Ability to use a hardware token (Webauthn, TOTP, Yubikey-OTP).
- Generate single-use recovery codes.
- TFA/TOTP lockout to protect against brute-force attacks.

## KEY FEATURES

### MULTIPLE AUTHENTICATION SOURCES

- Proxmox VE supports multiple authentication realms.
- Linux PAM standard authentication (e.g., 'root' and other local users).
- Built-in Proxmox VE authentication server.
- Microsoft Active Directory (MS ADS).
- LDAP
- Single Sign-On (SSO) with OpenID Connect.
- Regular and automated user synchronization for LDAP/AD realms

### FLEXIBLE ACCESS CONTROL

- User and permission management for all objects (VMs, storage systems, nodes, hardware resources, networking zones, etc.) .
- Proxmox VE comes with a number of predefined roles (groups of privileges) which cover common use cases. The contained privileges can be seen in the GUI.
- Permissions to control access to objects (access control lists). Each permission specifies a subject (user or group) and a role (set of privileges) on a specific path.
- Create API Tokens and lock them further down for secure, and easily revocable access.
- Restricted by default: new users or API tokens do not have any permissions.

### VM TEMPLATES AND CLONES

- Deploying VMs from templates is blazing fast, very convenient, and if you use linked clones, highly storage efficient.
- Linked and full clones.

### PROXMOX VE FIREWALL

- Supporting IPv4 and IPv6.
- Linux-based netfilter technology. Stateful firewall for easy, dynamic filtering.
- Distributed: configurations in Proxmox VE cluster file system, with iptables rules applied on each node.
- Cluster-wide IP sets, aliases, and security groups.
- 3 levels of configuration (data center, host, VM/CT).
- Support for custom 'raw' tables; enable SYN flood attack protection.

### WEB-BASED MANAGEMENT INTERFACE

- Integrated - no need to install a separate management tool nor any additional management node.
- Fast and easy creation of VMs and containers.
- Seamless integration and easy management of an entire cluster.
- Fast, search-driven interface able to handle thousands of VMs and containers.
- Based on the Ext JS JavaScript framework.
- Secure HTML5 console, supporting SSL.
- Let's Encrypt TLS certificates via the ACME-based DNS or HTTP challenge mechanism.
- Subscription management via GUI.
- Simple management of APT package repositories, and upgrades via GUI.
- Integrated documentation.
- Available in multiple languages.

### COMMAND LINE (CLI)

- Manage all components of your virtual environment.
- CLI with intelligent tab completion.
- Full UNIX man page documentation.

### REST API

- Easy integration for third-party management tools.
- REST API (JSON as primary data format).
- Alternative human-readable API format with interactive browser, as built-in documentation.
- Full support for API tokens.
- Automatic JSON Schema powered parameter verification.
- Easy means of creating command line tools (use the same API).
- Resource Oriented Architecture (ROA).
- Declarative API definition using JSON Schema.

### ANDROID APP

- Connect to Proxmox VE instances.
- Manage clusters, nodes, VMs, and containers.
- Access SPICE and HTML5 consoles.
- Based on the Flutter framework.

## LEARN MORE

Project page: <https://pve.proxmox.com>

Bugtracker: <https://bugzilla.proxmox.com>

Code repository: <https://git.proxmox.com>

## HOW TO BUY

Visit the Proxmox Online Shop to purchase a subscription: <https://shop.proxmox.com>

Find an authorized reseller in your area:  
<https://www.proxmox.com/partners>

## SALES INQUIRIES

[office@proxmox.com](mailto:office@proxmox.com)

## HELP AND SUPPORT

Proxmox Customer Portal:  
<https://my.proxmox.com>

Community Support Forum:  
<https://forum.proxmox.com>

## TRAINING PROXMOX VE

Learn Proxmox VE easily – Visit a training:  
<https://www.proxmox.com/training>

## ABOUT PROXMOX

Proxmox Server Solutions GmbH is a software provider, dedicated to develop powerful and efficient open-source server solutions. The privately held company is based in Vienna (Europe).



Proxmox Server Solutions GmbH  
Bräuhausgasse 37  
1050 Vienna  
Austria

[office@proxmox.com](mailto:office@proxmox.com)  
<https://www.proxmox.com>