



PROXMOX VIRTUAL ENVIRONMENT

OSSBIG

March 2, 2023

Proxmox Server Solutions GmbH

Established in 2005, Proxmox develops comprehensive yet easy-to-use software solutions to simplify server management.



Proxmox Mail Gateway
[2005]



Proxmox Virtual
Environment
[2008]



Proxmox Backup Server
[2020]

Open Source

- Licensed under AGPL,v3
 - All features available
- Public code repository: <https://git.proxmox.com>
- Development mailing lists: <https://lists.proxmox.com>
- Bug tracker: <https://bugzilla.proxmox.com>

Support Subscriptions

- Access to Enterprise Repository (extensively tested updates)
- Access to technical support
 - Support directly from developers
 - In English and German
 - Guaranteed first response time for critical support requests
- Transparent subscription model
- Flexible and scalable to business needs

Partner Network

- Help with initial planning, develop PoC
- Consulting and implementation services
- On-site help
- Recommendations for best hardware and configuration
- <https://www.proxmox.com/en/partners>

Training Courses

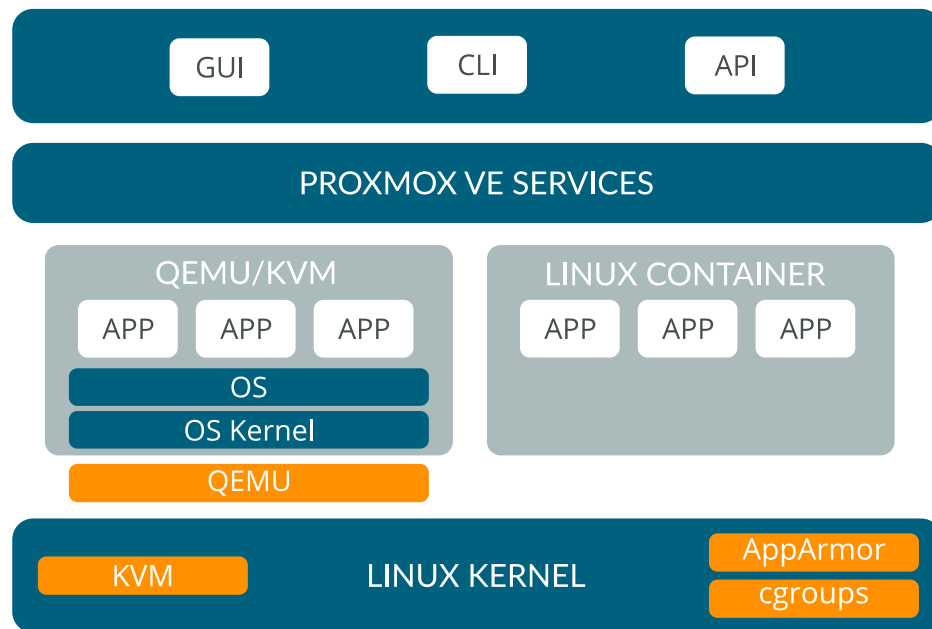
- Certified instructors from Proxmox or Authorized Training Partners
- Virtual or classroom training (both instructor-led)
- From zero to hyperconverged Proxmox VE + Ceph
- <https://www.proxmox.com/en/training>

PROXMOX VIRTUAL ENVIRONMENT (VE)

The open-source management platform for
enterprise virtualization

Technical Overview

- Based on Debian GNU/Linux
- Customized Ubuntu kernel
 - Brings better support for new hardware
- Two types of virtual guests
 - VMs – fully virtualized with KVM/Qemu
 - OS containers (LXC) – run on the host, isolated by cgroups & AppArmor



Virtual Machines & Container (LXC)

Virtual Machines

- Full virtualization
- Windows, Linux, ...
- Move disks live between storage
- Live migration between nodes
- Live restore (with Backup Server)

LXC Container

- OS-level virtualization
- Choose your favorite Linux distribution
- Fast startup times
- Lightweight

Hardware Support

- Depends on the Linux kernel
 - Newer opt-in kernels available over the lifetime of a major version (for example, Proxmox VE 7.x uses kernel 5.15, but 6.1 can be installed too)
 - The Proxmox VE kernel is based on the Ubuntu kernel
- Tested setups available from Proxmox partners, for example [Thomas Krenn](#)

Central Management

- Central, web-based management interface
- Two-factor-authentication (TFA)
- Single node or scale-out to large set of clustered nodes
- Integrated GUI, CLI, API

API

- All you can do in the GUI is possible (and even more)
- API CLI tool: pvesh
- HTTP authentication examples – see [Proxmox VE project page](#)
- [API Viewer](#) lists all endpoints
- Use API tokens for external systems

User & Permissions

- Supports Linux PAM, LDAP, OpenID Connect, and local users for web-based GUI.
- Granular role-based permission schema
- Roles
 - Predefined
 - Create custom roles

Networking

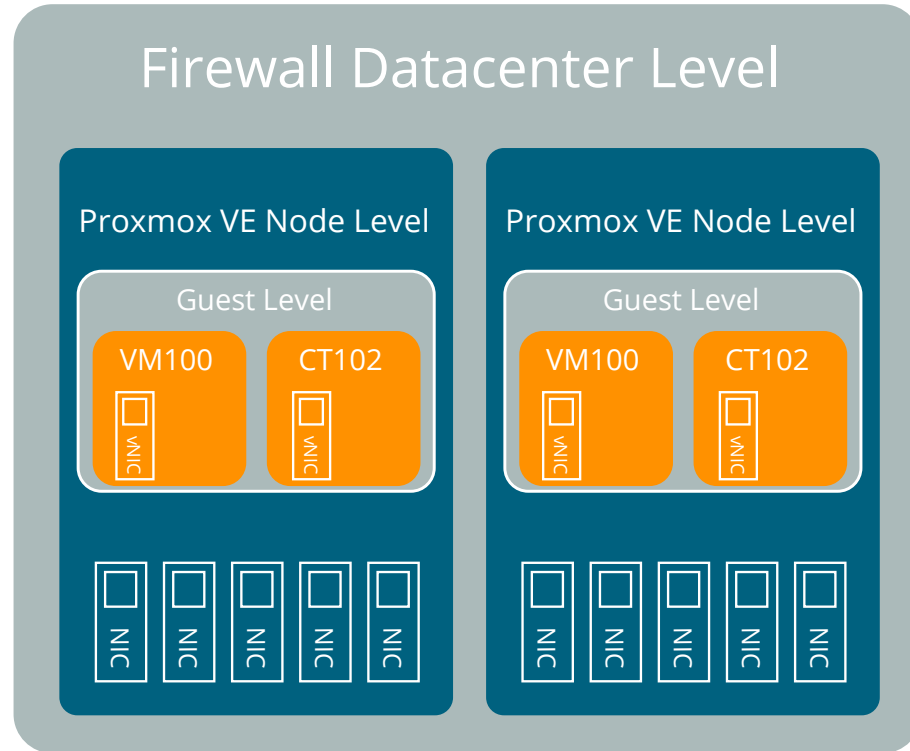
- Linux network stack
 - /etc/network/interfaces
 - [ifupdown2](#)
 - vbrX interfaces are “virtual switches” (Linux bridges)
 - VLANs
- Bonding / LAG
 - LACP
 - active/backup
 - ...
 - Optional: Open vSwitch

Software-Defined Networking (SDN)

- Currently in “preview” state (but already in production-use)
- Permission system for networks
- Manage VLANs & QinQ centrally
- VXLAN
- EVPN
- IPAM integration

<https://pve.proxmox.com/pve-docs/chapter-pvesdn.html>

Firewall



Clustering

- Uses Corosync for cluster communication (Quorum)
- Proxmox Cluster Filesystem ([pmxcfs](#)) to sync configuration
- Manage cluster with the web GUI from any node
- Useful with 3 or more nodes
 - For a 2-node cluster → [Qdevice](#) for 3rd vote
- Multi-cluster management tool on the roadmap

High Availability (HA)

- Requirements
 - Shared or replicated storage
 - Stable cluster (Corosync) network
- Starts guests on other nodes in the cluster if a node is down (or lost cluster connection for too long)

Storage Migration

- VMs
 - Disks can be moved to another storage while the VM is running
- LXC Container
 - Needs to be powered down to move the disk image

Migration of Guests

- VMs
 - Live migration to other nodes in the cluster possible
- LXC Container
 - Shutdown for migration (but shutdown & startup is fast with containers)
- Works with local disks
- Initial technical preview of cross-cluster live migration available

Storage

- Local
 - File systems
 - ZFS
 - LVM (thin)
 - BTRFS (preview)
- Shared
 - iSCSI/FC LUNs (direct or LVM)
 - Network shares (NFS/CIFS)
 - Ceph

Full list of out of the box supported storage types in the [documentation](#).

Hyper-Converged Infrastructure (HCI) Storage Options

- Ceph
 - Synchronous
 - Scalable
 - Low latency
 - Deployed by Proxmox VE
- ZFS
 - With Guest Replication
 - Asynchronous replication
 - Latency independent

Device Passthrough

- PCI(e)
 - For example GPUs, NICs, ...
 - Need to be in their own IOMMU group
- USB
 - Specific device or USB port
- Work underway to make it more flexible (pooling)

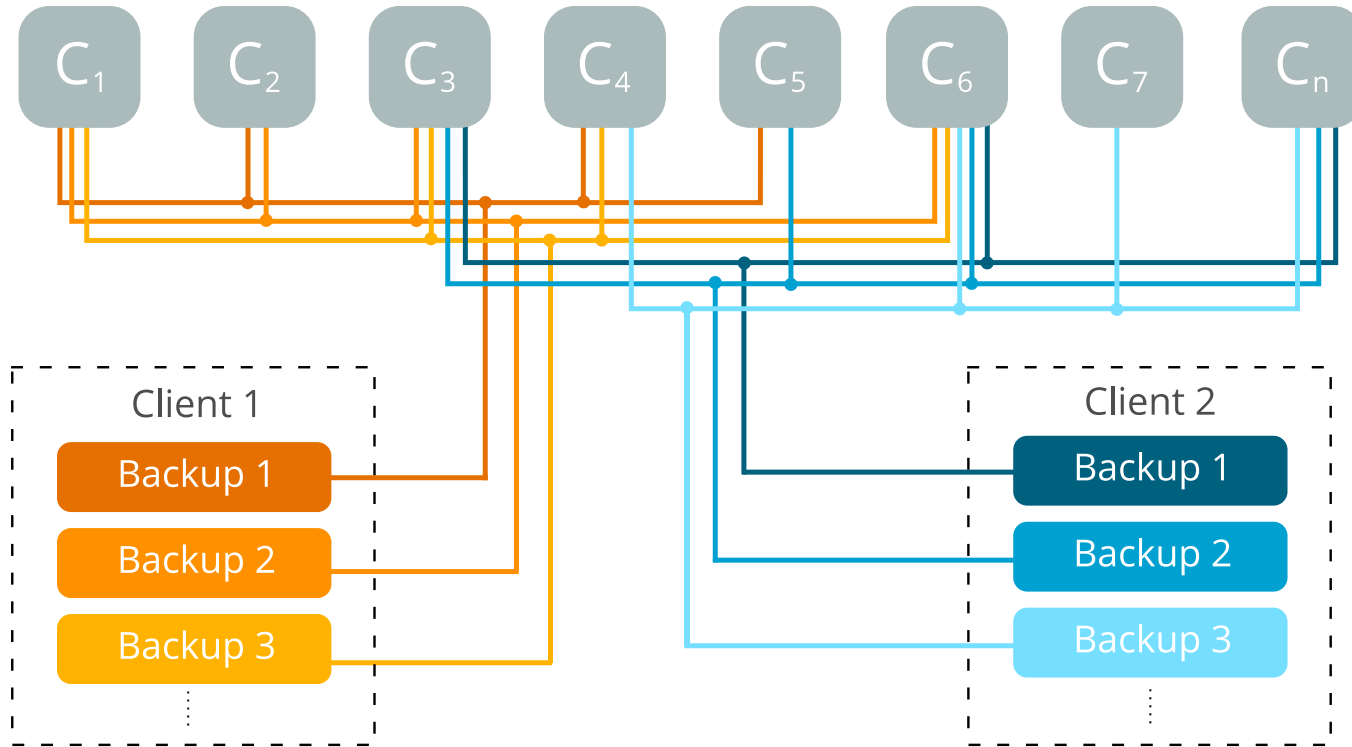
Backup/Restore

- Fully integrated backup tool (vzdump)
- For LXC containers & VMs
- Works out-of-the-box
- Full backups

Proxmox Backup Server

- Enterprise-class backup solution
- Deduplicated backups (file system independent)
- Block & file based backups
- Namespaces
- Encryption (client side)
- Remote sync
- Tape support

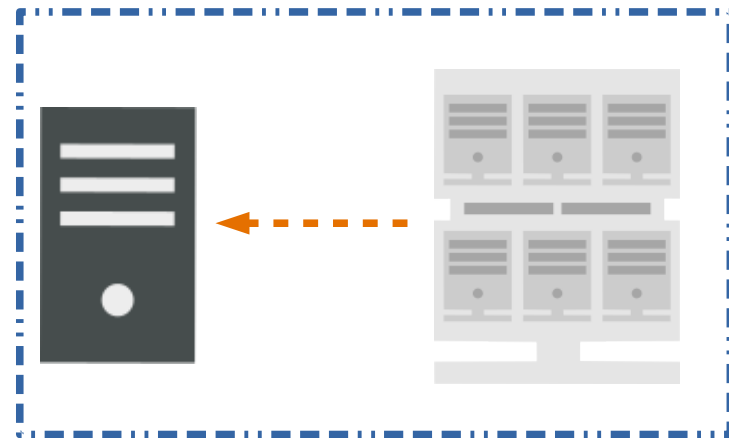
Backup Server Deduplication



Proxmox VE with Backup Server

- File level restore for LXC containers & VMs (Single-file restore)
- Live Restore (VMs)
- Fast incremental backups
 - *qemu-dirty-bitmap* tracks disk changes since last backup
 - Backups are still fully standalone and don't depend on previous backups

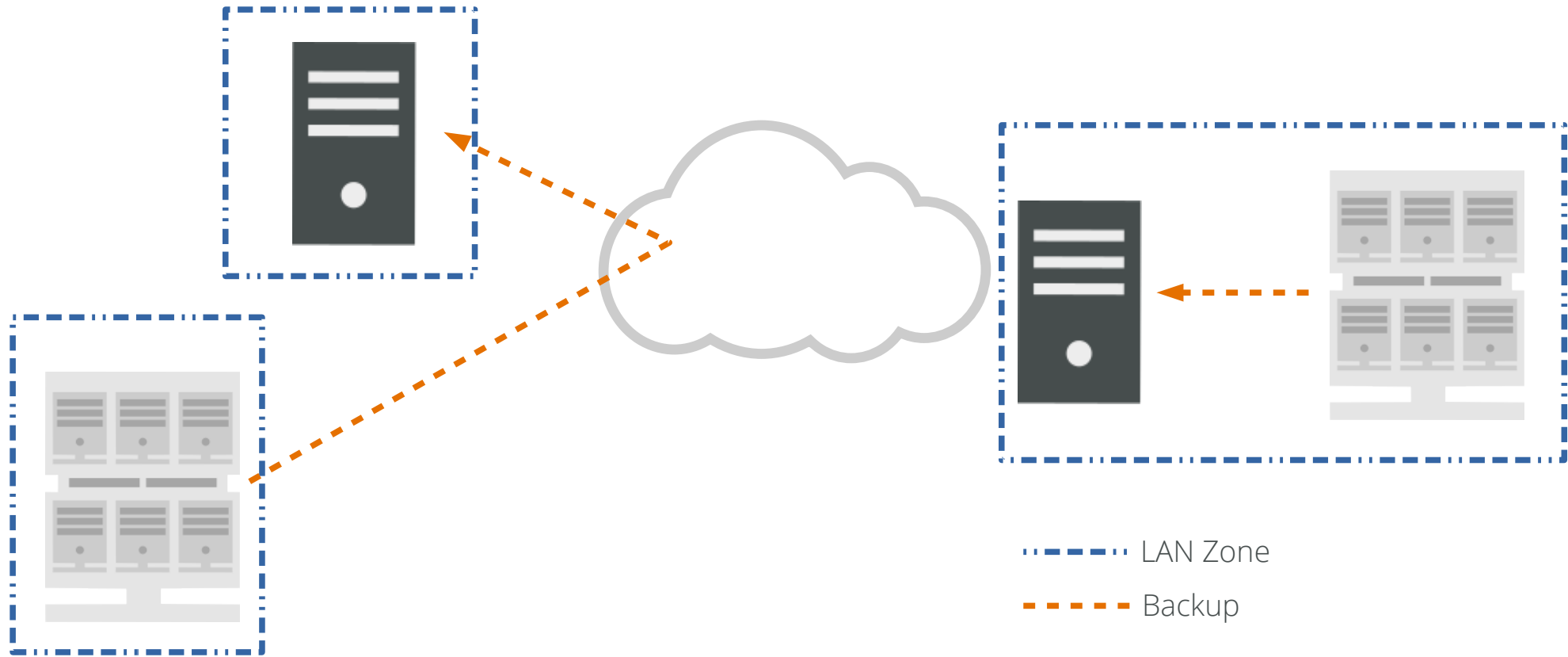
Backup Scenarios with Backup Server



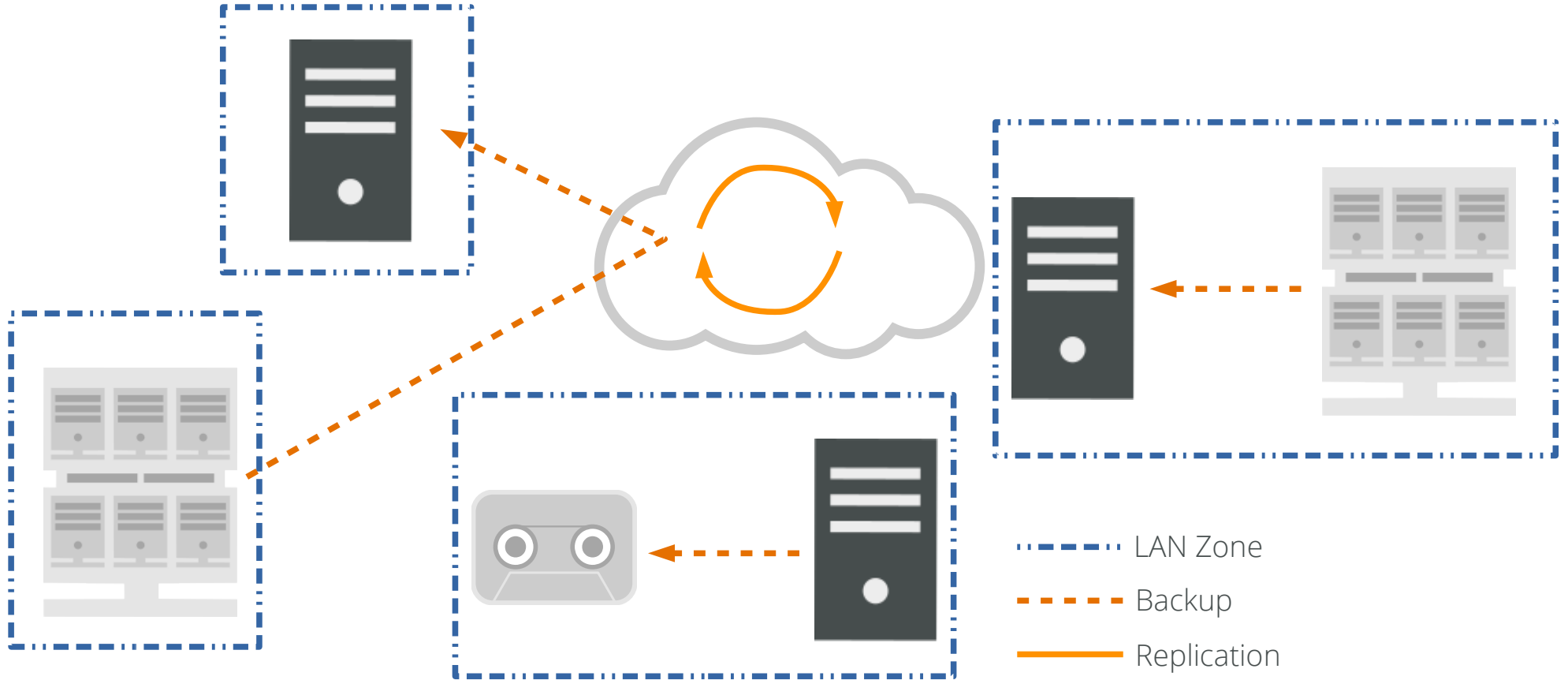
··· LAN Zone

--- Backup

Backup Scenarios with Backup Server



Backup Scenarios with Backup Server



Proxmox Offline Mirror

- Update air-gapped Proxmox systems
- Manage subscription keys for air-gapped systems
- [Official documentation](#)
- [Product announcement](#)

Live Demo

Questions?

Get involved

- Community Support Forum
 - <https://forum.proxmox.com>
- Mailing-Lists
 - <https://lists.proxmox.com/cgi-bin/mailman/listinfo>
- Bug Tracker
 - <https://bugzilla.proxmox.com>
- Source Code
 - <https://git.proxmox.com>

Get involved – Proxmox VE

- Project Page
 - <https://pve.proxmox.com>
- Documentation
 - <https://pve.proxmox.com/pve-docs/>
- Roadmap
 - <https://pve.proxmox.com/wiki/Roadmap>
- Translations
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Get in touch



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

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

Online Shop: <https://shop.proxmox.com/contact.php>

General inquires: office@proxmox.com

THANK YOU FOR YOUR ATTENTION!



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