Proxmox VE – Advanced Administration and High Availability

Course code: PROXMOX2

A follow-up course for those who already have a basic command of Proxmox VE and want to build and run a resilient cluster. Over three days, you will focus hands-on on cluster architecture, shared storage including Ceph (HCI), high availability, backups with Proxmox Backup Server, and management automation. Each topic is accompanied by practical exercises.

Who is the course for

- Administrators and IT specialists with experience in basic Proxmox VE administration
- IT architects and DevOps engineers planning a cluster deployment or a transition to hyper-converged infrastructure (HCI)
- System administrators responsible for HA operations, backup and disaster recovery

What we teach you

- Understand cluster architecture and its key components (pmxcfs, Corosync)
- Deploy and manage Ceph for scalable storage
- Properly configure High Availability (HA) and prepare for outages and disaster recovery
- Work with Proxmox Backup Server
- Automate administration using the REST API and command line

Required skills

Knowledge of basic Proxmox VE administration (e.g., completion of the PROXMOX1 course) and a solid understanding of Linux administration and TCP/IP networks.

Course outline

Cluster Architecture, pmxcfs, Corosync and Networking

- Cluster design: network, storage and hardware requirements; typical cluster topologies and best practices
- Importance of time synchronization (chrony/NTP) and DNS in a cluster
- Proxmox Cluster File System (pmxcfs) – principles of a RAM-based distributed configuration filesystem
- Corosync: quorum, cluster membership and vote tracking; tuning and monitoring (latency, outages)
- Cluster networking and redundancy (bonding, LACP), VLANs
- Software-defined networking (SDN): zones, vnets and bridges

Storage, Ceph (HCI) and Replication

- Shared storage backends: NFS, iSCSI, ZFS over iSCSI, Ceph; storage redundancy and failover
- Hyper-converged infrastructure (HCI): architecture and benefits
- Ceph cluster deployment and management: RBD for VM disks, CephFS for shared filesystem
- Ceph cluster maintenance and best practices
- Asynchronous disk replication between nodes: planning, granularity and recovery scenarios
- Proxmox Backup Server: installation, deduplication, encryption, offsite replication and recovery

High Availability, Automation and Operations

- HA groups for VMs and LXC containers: preferred nodes, failover, dependencies and anti-affinity
- 2-node cluster configuration and QDevice (third vote); split-brain prevention
- Failure scenarios and hands-on exercises: node, network and storage failures; manual vs. automatic recovery
- Advanced user management: AD/LDAP integration, roles and permissions across the cluster
- Automation: REST API (authentication, endpoints), CLI (pvesh, qm, pct) and introduction to Ansible
- Troubleshooting and monitoring: performance, network and replication diagnostics; logs and best practices

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