Introduction to Proxmox Virtual Environment and Proxmox Clustering

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What is Proxmox?

- Proxmox VE (Virtual Environment) is an open-source server virtualization management platform
- It combines KVM (Kernel-based Virtual Machine) and LXC (Linux Containers) technologies
- Provides a user-friendly web-based interface for streamlined management

Basic system Requirements

- Hardware Requirements
  - CPU: 64-bit processor with virtualization support (Intel VT/AMD-V)
  - RAM: Minimum 2 GB, recommended 8 GB or more
  - Storage: Sufficient disk space for VMs and containers
- Software Requirements
  - Supports Debian-based Linux distributions
  - Compatible with various storage and network configurations

Proxmox VE Features

- Open-source with enterprise-grade capabilities
- High availability (HA) clustering
- Integrated backup and restore
- Web-based management interface

Installation

- Download the Proxmox VE ISO from the official website
- Create a bootable USB drive or burn the ISO to a CD
- Boot from the USB drive/CD and follow the installation prompts
- Perform initial configuration through the web-based interface

Proxmox VE Architecture

- Components
  - Proxmox VE Kernel: Custom Linux kernel optimized for virtualization
  - Proxmox VE Cluster: Group of nodes working together for high availability
  - Proxmox VE Storage: Supports various storage types like local, network, and shared.

Creating and Managing VMs

- Creating a VM: Step-by-step process using the web interface
- VM Management: Start, stop, pause, and configure VMs
- VM Migration: Live and offline migration between nodes.

Containers in Proxmox

- LXC Containers
  - Creating Containers: Using templates to quickly deploy environments
  - Managing Containers: Resource allocation, backup, and restore

Networking in Proxmox

- ➔ Bridged Networking: Direct access to the host's network
- ➔ VLANs: Virtual LANs for network segmentation
- ➔ Bonding: Combining multiple network interfaces for redundancy

Storage Solutions

- ➔ Local Storage: Directly attached storage
- ➔ Network Storage: NFS, iSCSI, and Ceph
- ➔ Shared Storage: Used in clusters for VM and container migration

High Availability (HA)

- ➔ Setting up HA Cluster: Adding nodes and configuring resources
- ➔ Managing HA Resources: Ensuring critical services remain available

Proxmox Clustering

- Clustering of the two or more proxmox nodes
- Benefits of clustering such as high availability, load balancing, and scalability
- VM Migrations (Live and offline migrations)

Backup and Restore

- Types of Backups: Full, incremental, and differential
- Scheduling Backups: Automated backup schedules
- Restoring from Backup: Recovery procedures for VMs and containers

Proxmox Usage Monitoring

- CPU Usage
- Memory Usage
- Network Traffic

Security Features

- ➔ User Management: Creating and managing user accounts and permissions
- ➔ Firewall Configuration: Setting up and managing firewall rules
- ➔ Two-Factor Authentication: Enhancing security with 2FA.

Proxmox VE in Action

- ➔ Real-World deployments: Deployment scenarios in various research institutes
- ➔ Success Stories: Benefits realized by using Proxmox VE

Thank you