



Deployment of Private Cloud

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Introduction

- What is Cloud Computing?
 - Cloud computing is the delivery of computing services over the internet.
- Types of Cloud Deployment
 - Not all clouds are the same and not one type of cloud computing is right for everyone.
There are three different ways to deploy cloud services:
 - Public Cloud
 - Private Cloud
 - Hybrid Cloud
- Types of Cloud Services
 - Infrastructure as a service (IaaS)
 - Platform as a service (PaaS)
 - Serverless computing
 - Software as a service (SaaS)

IaaS

- Instant computing infrastructure, provisioned and managed over the internet
- Helps to avoid the expense and complexity of buying and managing physical servers and other data-center infrastructure.
- Eliminates capital expense and reduces ongoing cost
- Improves business continuity and disaster recovery
- Respond quicker to shifting business conditions
- Increase stability, reliability, and supportability

OpenNebula Introduction

- OpenNebula is an open-source platform
- It delivers simple yet feature-rich solution to build and manage different cloud deployment methods
- It provides unified management of IT infrastructure and applications
- OpenNebula combines virtualization and container technologies with multi-tenancy, automatic provision and elasticity to offer on-demand applications and services.

Architecture of OpenNebula

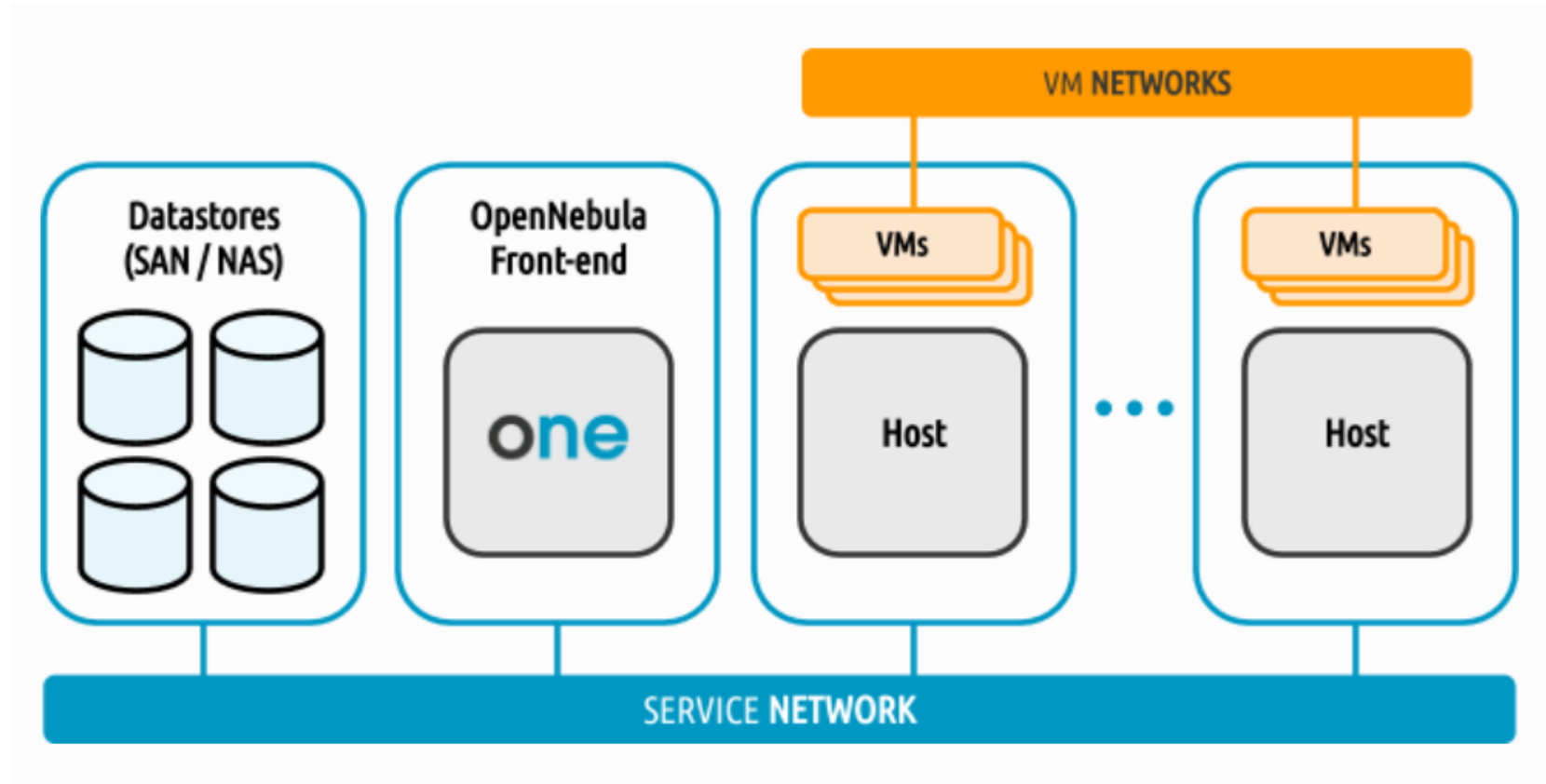


Figure 1: OpenNebula Architecture
Source: opennebula Documentation

Front-end Installation

Pre-requisites:

- 4 GB RAM
- 20 GB
- OS: Red Hat Enterprise Linux-7, 8; CentOS-7.8; Ubuntu Server 16.04 (LTS), 18.04 (LTS), 20.04 (LTS), 20.10, Debian 9,10.
- Root user or sudo user access

Sunstone:

- Web browsers and versions: Chrome 61.0 - 67.0, Firefox 59.0 - 61.0, IE11.0

Database:

- MariaDB or MySQL: All Linux OS mentioned in Front-end
- PostgreSQL 9.5+: All Linux OS mentioned in Front-end except RHEL/CentOS 7
- SQLite: Default DB, no configuration is needed

Demo

Hypervisor

- What is it ?
- How does it do it?
- Can it manage it?
- What is advantage of it?
- There are two types of hypervisors,
 - **Bare Metal or Native:** They run directly on the host hardware to manage its resources.
 - **Hosted Hypervisors:** They are like applications that run on conventional Operating System.
 - What are examples of each category?

Node Installation

- What is node?
- Trial run using miniOne.
- Prerequisite:
 - 4 GB RAM
 - 20 GB
 - free space on diskx86-64 Intel or AMD processor with virt. capabilities
 - default installation of the operating system with the latest updates
 - privileged user access (root)
 - openssh-server package installed
 - Physical Host or virtual Machine(LXD)
- Node Installation
 - KVM
 - LXD
 - Firecracker

Node installation [cntd..]

General steps:

- Getting Resources from OpenNebula (Community or enterprise)
- Installing Compatible hypervisor
- Password less SSH configuration between Front end and Host(s)
- Network configuration (Bridge)
- Adding Host to Front End
- Verification of Installation.

Verification

- One of the key feature of OpenNebula is Market Place.
- Marketplace has preconfigured virtual instances and can be downloaded depending on Hypervisor.
- Objective is to download a configured virtual instance from marketplace , store it and deploy on the host where hypervisor should match up.
- If we can access our VM, our cloud is ready for further improvements.

Verification - Demo

The screenshot shows the OpenNebula Sunstone dashboard interface. The browser window title is "OpenNebula Sunstone" and the address bar shows "localhost/#dashboard-tab". The dashboard is titled "Dashboard" and includes a sidebar with navigation options: Dashboard, Instances (VMs, Services, Virtual Routers), Templates (VMs, Services, Virtual Routers, VM Groups), Storage, Network, Infrastructure, System, and Settings. A "Not officially supported" warning is visible at the bottom of the sidebar. The main content area displays several summary cards:

- Virtual Machines:** 0 TOTAL, 0 PENDING, 0 FAILED.
- System:** 2 USERS, 2 GROUPS.
- Images:** 1 IMAGES, 200 MB USED.
- Virtual Networks:** 1 VNETS, 0 USED IPs.
- Hosts:** 3 MONITORED, 0 DISABLED, 0 FAILED. Includes progress bars for "Allocated CPU" (0 / 1500) and "Allocated Memory" (OKB / 44.5GB).

At the bottom of the dashboard, it indicates "Group#6".

Advantages of using OpenNebula

- OpenNebula has many advanced features
 - Multi-VM Applications and Auto-scaling
 - Hybrid Cloud Bursting
 - Public Cloud
 - Distributed Edge Provisioning
- Price comparison
- One interface to manage everything

OpenNebula Vs OpenStack

- Price
 - Management Costs
 - Subscription Costs
- Upgrades
- Licensing
- Multi-Hypervisor Support
- VM and Containers
- Multisite, Hybrid, Edge

Use Case

- Telefonica (Telecommunications) is using OpenNebula for its Cloud Support.
- With 5G roll out, it would need Edge resources for its IoT devices for real time processing.

Conclusion

- Developing cloud from scratch can be tiresome
- Level of complexity depends on the knowledge about underlying OS and complex terminology
- Most important point in building OpenNebula cloud is prerequisites and Infrastructure.
- It sure takes lot of computing power and memory.
- Knowing your hypervisor compatibility is heart of OpenNebula.
- miniOne makes it a breeze to install node but it is for trail runs not suggestable for production environment.

Thank you