User-level Tutorial on Using OpenNebula

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Outline

1 – Introduction
2 – OpenNebula Architecture
3 – Hands on: Private Cloud
4 – Final Considerations
1 - Introduction

→ **OpenNebula (ONE)** is an open-source cloud computing toolkit.

→ This Virtual Infrastructure Manager orchestrates **network, storage** and **machine** virtualization.
1 - Introduction

➔ **Private Cloud:** Private Infrastructure and Usage
➔ **Public Cloud:** Public Infrastructure and Usage
➔ **Hybrid Cloud:** Public/Private Infrastructure and Public Usage

![Diagram showing cloud infrastructures and interfaces]

EC2-Query | REST-OCCI | ONE CLI | XML-RPC Query

OpenNebula.org

The Open Source Toolkit for Cloud Computing

Private Infrastructure

Public Infrastructure

Amazon Web Services

ElasticHosts

Flexible servers in the cloud
1 - Introduction

Tutorial cloud case: Private cloud
2 - ONE Architecture (Components)

- Real Network
- Virtual Network

ONE Front-end

ONE-Node
ONE-Node
ONE-Node
ONE-Node
ONE-Node
ONE-Node

Private Infrastructure

Virtual Machine
Virtual Machine
Virtual Network (VN) in ONE is a MAC/IP addresses space to be used by VMs, through leasing.

VNs are controlled through the `onevnet` tool.

**VN Template example:**

```plaintext
NAME = "Public"  
TYPE = FIXED  
BRIDGE = vbr1  
LEASES = [IP=130.10.0.1, MAC=50:20:20:20:20:20]  
LEASES = [IP=130.10.0.2, MAC=50:20:20:20:20:21]  
LEASES = [IP=130.10.0.3, MAC=50:20:20:20:20:22]  
LEASES = [IP=130.10.0.4, MAC=50:20:20:20:20:23]
```
2 - ONE Architecture (Use case)

Private Infrastructure

host-1
host-2
host-3
host-4
host-5
host-6
host-7

Real Network

ONE Front-end

Virtual Network

Private Infrastructure
2 - ONE Architecture (Use case)
2 - ONE Architecture (Use case)

Real Network

ONE Front-end

Virtual Network

vm-1

Private Infrastructure

host-1

host-2

host-3

host-4

host-5

host-6

host-7
2 - ONE Architecture (Use case)
2 - ONE Architecture (Use case)

Private Infrastructure

host-7
host-6
host-5
host-4
host-3
host-2
host-1

vm-3
vm-2
vm-1

ONE Front-end

Real Network

Virtual Network

Private Infrastructure
2 - ONE Architecture (Use case)

Real Network

Virtual Network

Private Infrastructure

ONE Front-end

host-1
host-2
host-3
host-4
host-5
host-6
host-7

vm-1
vm-2
vm-3
vm-4

Real Network

Virtual Network
3 - Hands on: Private Cloud

→ Tutorial goals:

• Use Command-Line Interface in ONE Front-end.

• Use OpenNebula v1.4

• Verify Cloud status and usage

• Create your Virtual Machine

• Use this Virtual Machine

• Delete your Virtual Machine
3 - Hands on: Private Cloud

User

ssh -p 65000 guest-<id>@XX.XX.XX.XX
Password: tclouds
$ ls

template

$ cat template

NAME = vm-1-guest-1
MEMORY = 512

OS = [ kernel = /usr/lib/xen-default/boot/hvmloader ]
DISK = [
    source = oneadmin@s4:~oneadmin/images/default/tclouds.img,
    target = xvda,
    readonly = no ]
NIC = [ NETWORK = "Public"]
RAW = [ TYPE = "xen",
    DATA = "builder = 'hvm'
    shadow_memory = 8
    device_model = '/usr/lib/xen-default/bin/qemu-dm'
    boot = "c""]
REQUIREMENTS = "HOSTNAME = "s4""
3 - Hands on: Private Cloud

```
guest-<id>@s1:~$

- Create your Virtual Machine:
  $ onevm create template

$ onevm list
Note: A Virtual Machine is properly running just when its status (STAT field) is “runn”.

$ onevm show <vm-id>
Note: Get the IP address of your Virtual Machine to connect in.
3 - Hands on: Private Cloud

```
| s3 | s4 | s6 | s7 | s8 | s9 | s10 |
```

- **ONE Front-end**
- **Real Network**
- **Virtual Network**

- Private Infrastructure
  - vm-1-guest-1
  - vm-1-guest-5
3 - Hands on: Private Cloud

- **ONE-Nodes management:**
  
  - `$ onehost list`
  - `$ onehost show <host-id>`

- **Virtual Networks management:**
  
  - `$ onevnet list`
  - `$ onevnet show <vnet-id>`

- **Virtual Machines management:**
  
  - `$ onevm list`
  - `$ onevm show <vm-id>`
$ ssh guest@<vm-IP>
Password: tclouds

$ ssh root@<vm-IP>
Password: tclouds

$ exit
3 - Hands on: Private Cloud

guest-<id>@s1:~$

- **Delete your VM:**
  $ onevm delete <vm-id>
4 – Final Considerations

→ Other Interesting Features:

• Shared or Remote Image Repository

• Image Management with oneimage tool (v2.0+)

• LDAP authentication in the Cloud and VMs

• User quota for CPU and memory usage (v2.0+)