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Cross-organizational distributed systems and Clouds

Solution for Exercise 1

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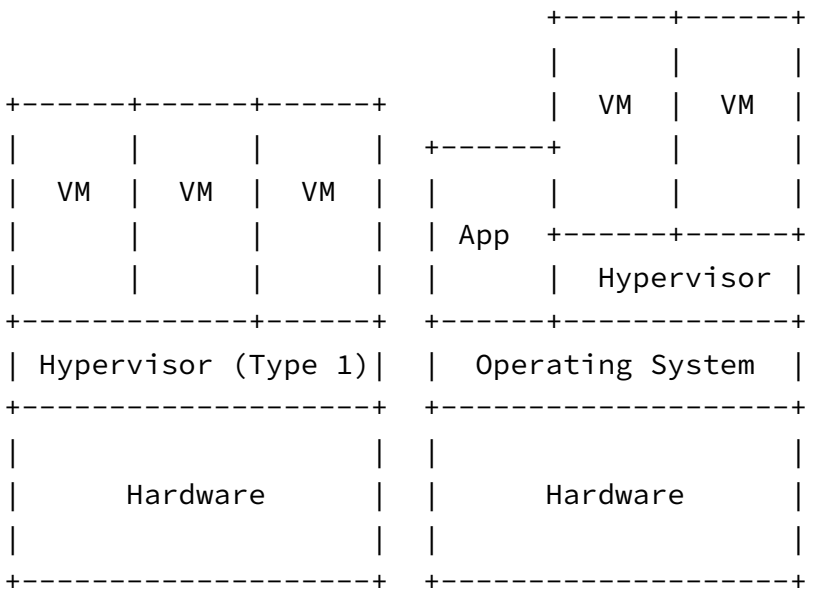
Lesson 1: OpenStack Basics

Question: Hypervisors and Virtual Machines

What are the basic tasks of a hypervisor?

A hypervisor (sometimes "virtual machine monitor" or VMM) manages physical hardware and divides it into usually smaller virtual hardware, used by virtual machines. Type-1 and Type-2 hypervisors differ in their location (Type 1 runs on bare metal, Type 2 runs on top of an operating system). Examples: XEN (Type 1), KVM (Type 2 but since part of operating system close to Type 1), VirtualBox (Type 2).



What are benefits / drawbacks of using virtual machines compared to physical servers?

- Drawback: Virtualisation costs performance and may lead to resource interference when more than one VM is hosted
- Benefit: virtual machine is abstracted from hardware and can be freely moved between hardware

Lesson 2: First Steps with Omistack

Task: Launch your first Instance

Your first instance in Openstack should look like follows:

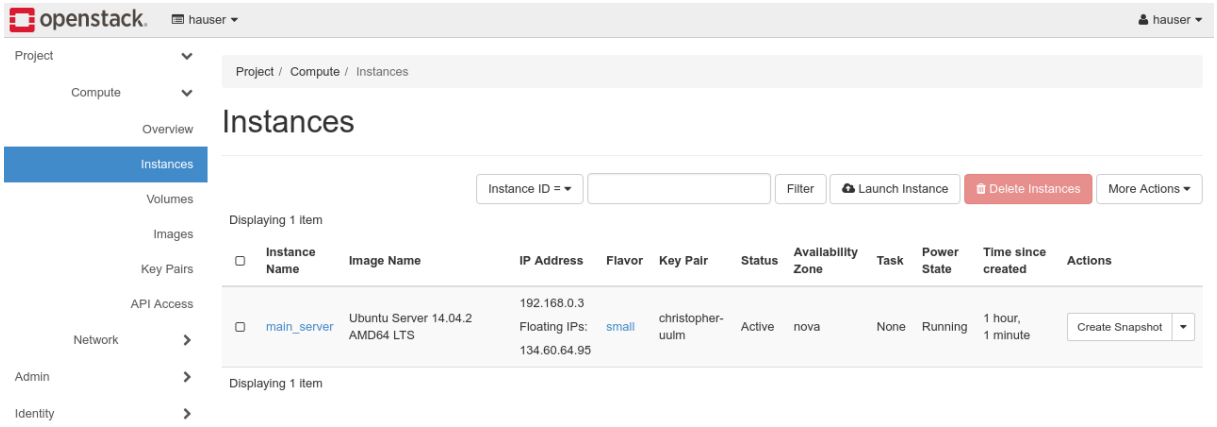
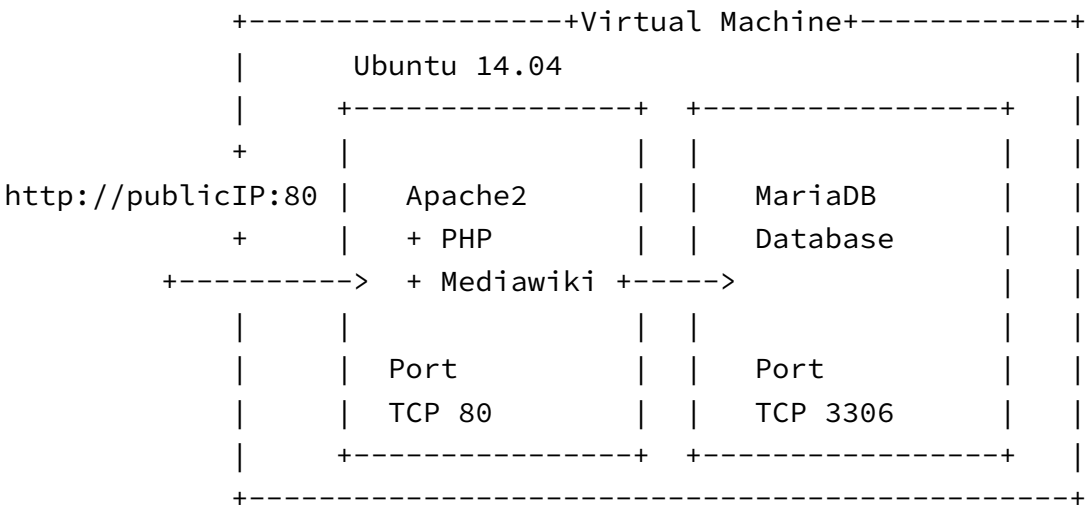


Figure 1: *First instance in Openstack*

Lesson 3: Install Mediawiki Application

The setup looks as follows at the moment: one virtual machine, based on an Ubuntu 14.04 operating system, with an Apache2 web server and a MariaDB database server.



The ready Mediawiki installation looks like follows:

Question: One Instance for Database and Application

Pro:

- connection via 127.0.0.1 is fast
- Traffic does not leave the host
- high bandwidth, low latency

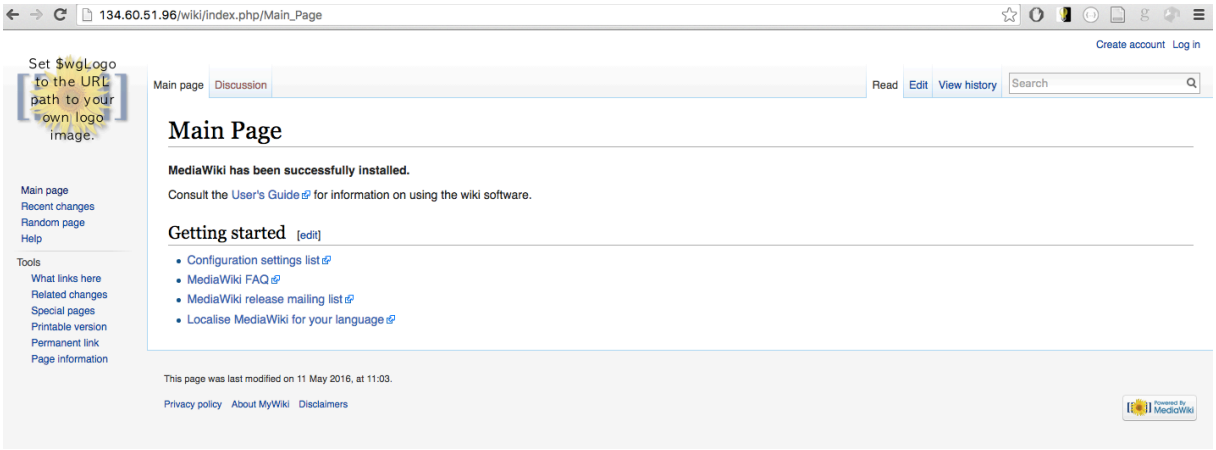


Figure 2: *Mediawiki Installation*

Con:

- Scalability is limited, since database is bound to application
- Apache2 and mariaDB have to run on the same node
- DB and Web server have different resource demand (CPU vs Memory/Disk)

Alternative:

- Move database to separate host
- Connect apache2 via TCP
- Scale horizontally by adding more web servers