# OpenStack

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Clusters, Grids, Clouds course @ ITMO
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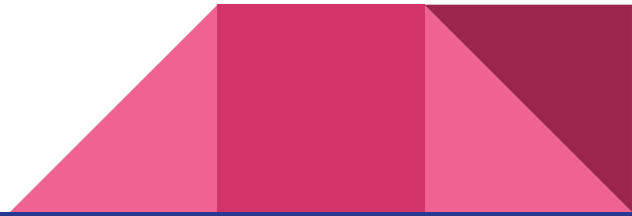
# Agenda

- Cloud Computing
- Scaling
- Virtualization
- History of Openstack
- What is Openstack
- Architecture
- Compute, Networking, Storage, Dashboard, Telemetry, Authorization,
- Demo time!



# Virtualization

Virtualization is creation of virtual

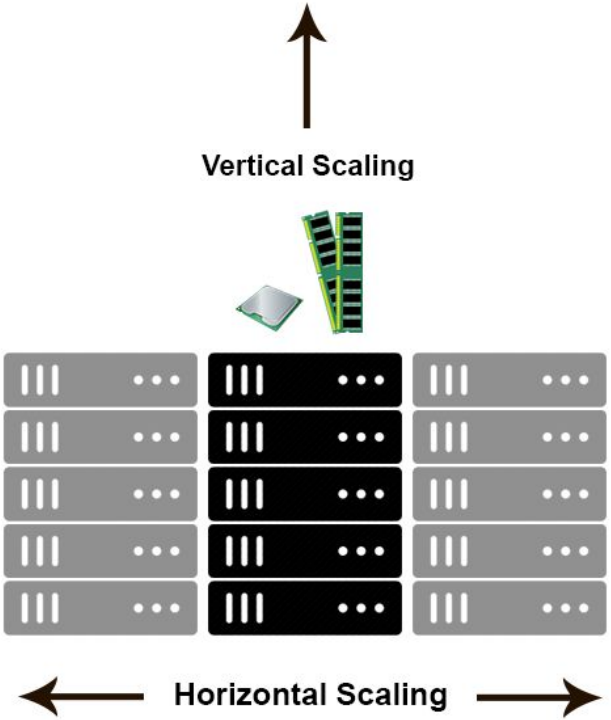
--rather than actual-- version of

Something, such as OS, Storage,

Network Resource.

*Citrix, VMWare*

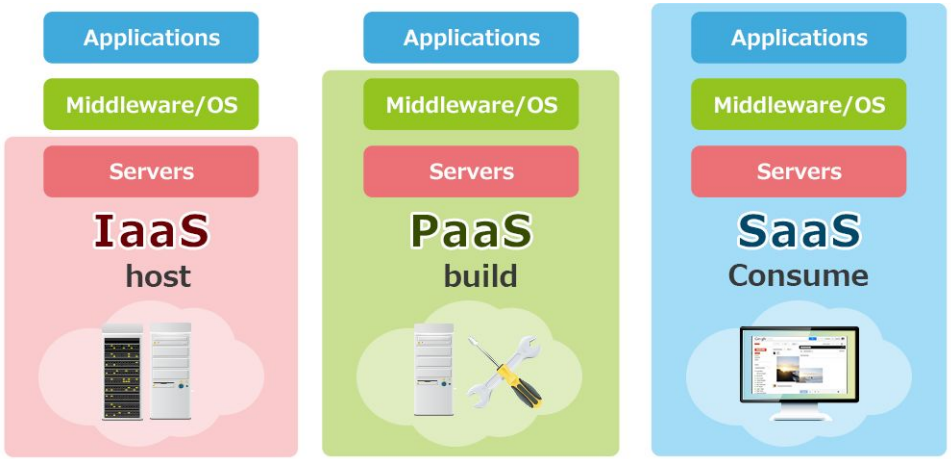
# Horizontal Scaling vs Vertical Scaling



# Cloud Computing

- Resources are shared
- On demand access

Everything should become a service



# Cloud Computing

Main Rules

- Massive Scale
- Agility
- Abstraction
- Automation
- Infinite capacity
- Converged API
- Metering
- Pay as you go

# History of Openstack

Begun in 2010 as a joint project of Rackspace hosting and NASA to build Cloud based OS.

Merged Swift (Object Storage) of Rackspace  with Nebula (Compute platform) of NASA.

FOSS under Apache license.

Actively driven by strong open source community with more than 500 companies that contribute to the project: IBM, RedHat, HP, Cisco, Intel, Google, Oracle, Dell, EMC, VMWare, ….

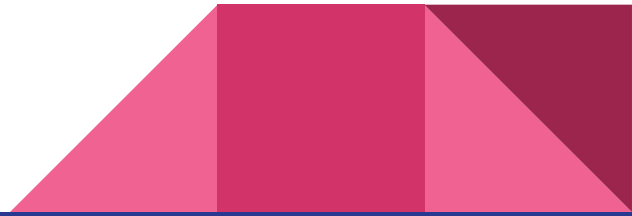
More than $10million in funding.

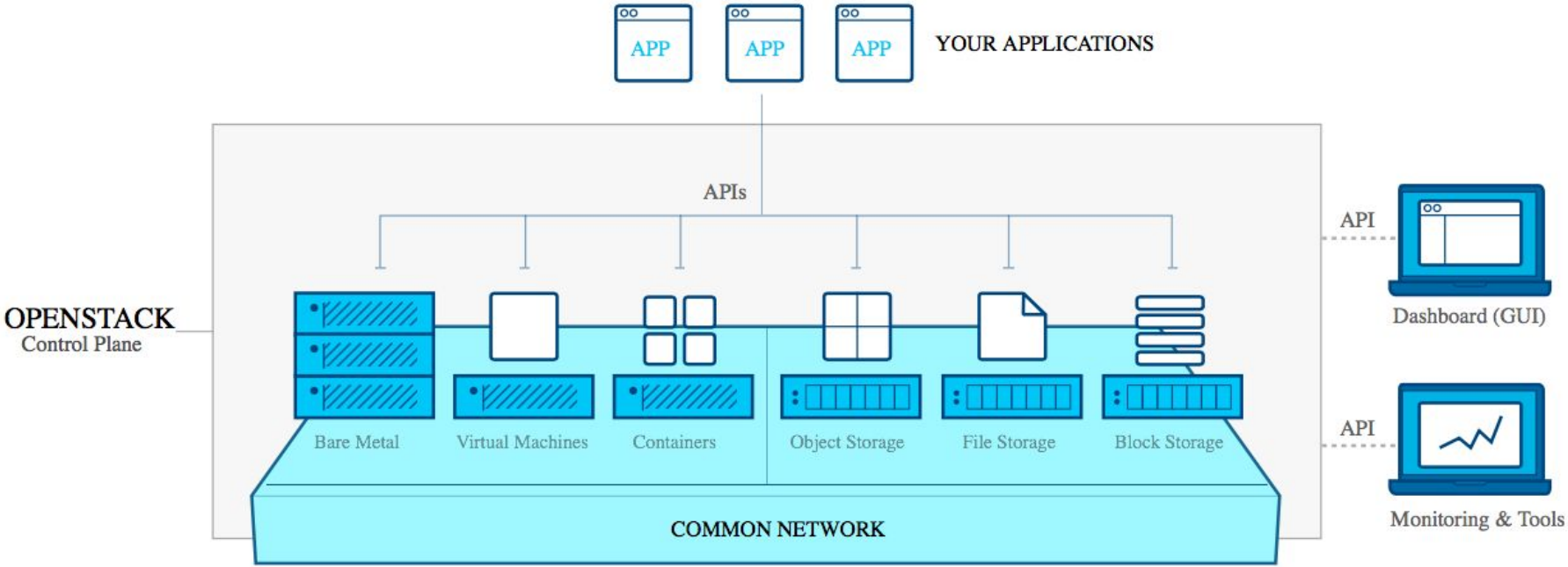
# What is Openstack?

Openstack is a cloud Operating system that controls large pools of compute, storage, networking resources throughout a datacenter.

Everything is managed by a dashboard (Horizon) and can be managed through Rest API calls.

All services authenticate through a common source.




APP
APP
APP
YOUR APPLICATIONS
APIs
OPENSTACK
Control Plane
Bare Metal
Virtual Machines
Containers
Object Storage
File Storage
Block Storage
COMMON NETWORK
API
Dashboard (GUI)
API
Monitoring & Tools

# Compute (Nova)

The core: Providing Virtual machines on demand.

It schedules virtual machines to run on a set of nodes by defining drivers that interact with underlying virtualization mechanisms.

Interacts with identity service to authenticate instance.

# Networking (Neutron)

A system for managing networks and IP addresses.

- VLANs
- DHCP
- Floating IP, Load Balancing
- SDN
- OpenFlow
- IDS, VPN, Firewall

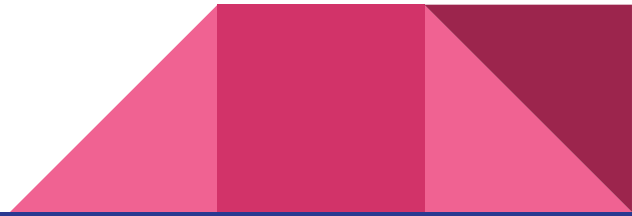
# Storage (Cinder-Swift)

**Cinder**

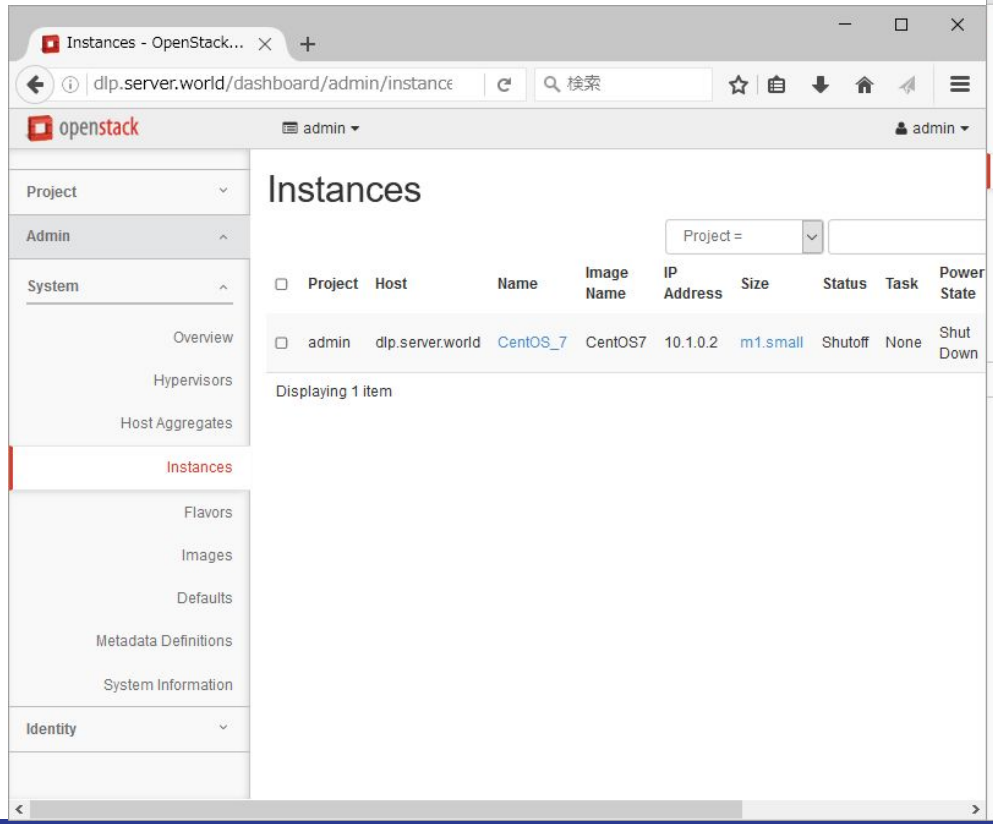
- Block level storage for compute instances.
- The block storage system manages the creation, attaching and detaching of the block devices to servers.

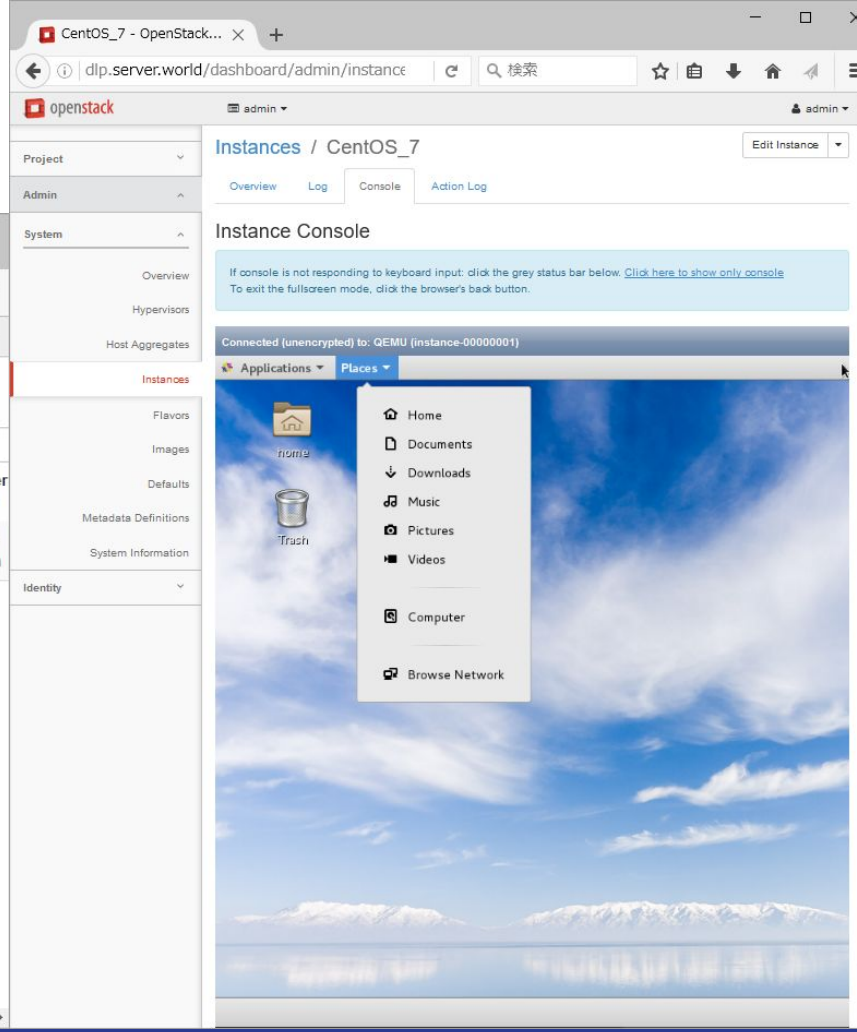
**Swift**

- Scalable redundant storage system: Object Storage.
- Replication, Scale Horizontally, API



# Dashboard (Horizon)



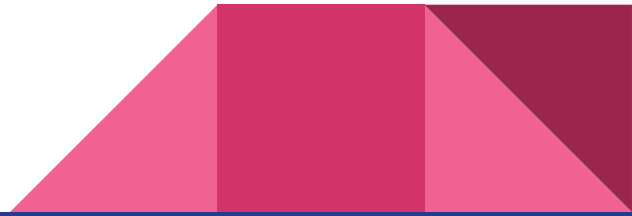



# Telemetry (Ceilometer)

Single point of Contact for Billing system.

Traceable, auditable.

Data collection is independent of the overall system.



# KeyStone-Magnum

## Identity Management (KeyStone)

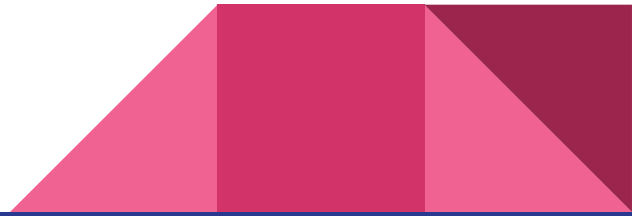
Authentication and authorization.

user/pass, token based

Account management

## Container Orchestration (Magnum)

Magnum uses Heat to orchestrate an OS image which contains Docker and Kubernetes and manages it.



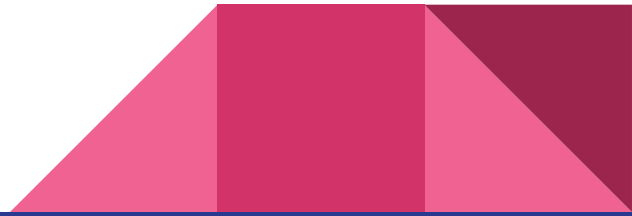
# Why it is good

Community

Vendor support

Mature

But it is not a suitable solution for every organization!



# Thank you for your attention

Demo time.

https://openstack.homeatcloud.cz/

**References:**
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