TAMPERE UNIVERSITY OF TECHNOLOGY

OpenStack

Otto Hylli

Introduction (1/2)

- Open source
- Cloud computing platform, IaaS, cloud operating system
- Manage compute, storage and networking resources in a data center
- Build a public or private cloud
- Use with web dashboard, cli tools or REST apis

Introduction (2/2)

- Consists of many projects (services) (compute, networking, storage)
- In deployments components distributed to multiple machines
- Support for different virtualization, network and storage technologies via drivers
- Development overseen by OpenStack foundation, member companies include Intel, HP, AT&T

Outline

- Compute, storage and networking concepts
- OpenStack architecture
- Case: TUT CloudLab
- OpenStack demo: provision a web server
- Conclusions

Compute (nova)

- Manage VMs (create, snapshot, pause, terminate)
- Create VMs from images or snapshots with desired resources (flavor)
- Network access with security groups
- Access to resources managed with tenants (projects), users and roles
- VMs managed with different hypervisors (KVM, qemu, XEN)

Storage

- VMs have ephemeral storage, deleted when VM terminated
- Block storage (Cinder) offers persistent volumes
- Object storage (Swift) replicated, access via REST api
- Shared file system (Manilla)

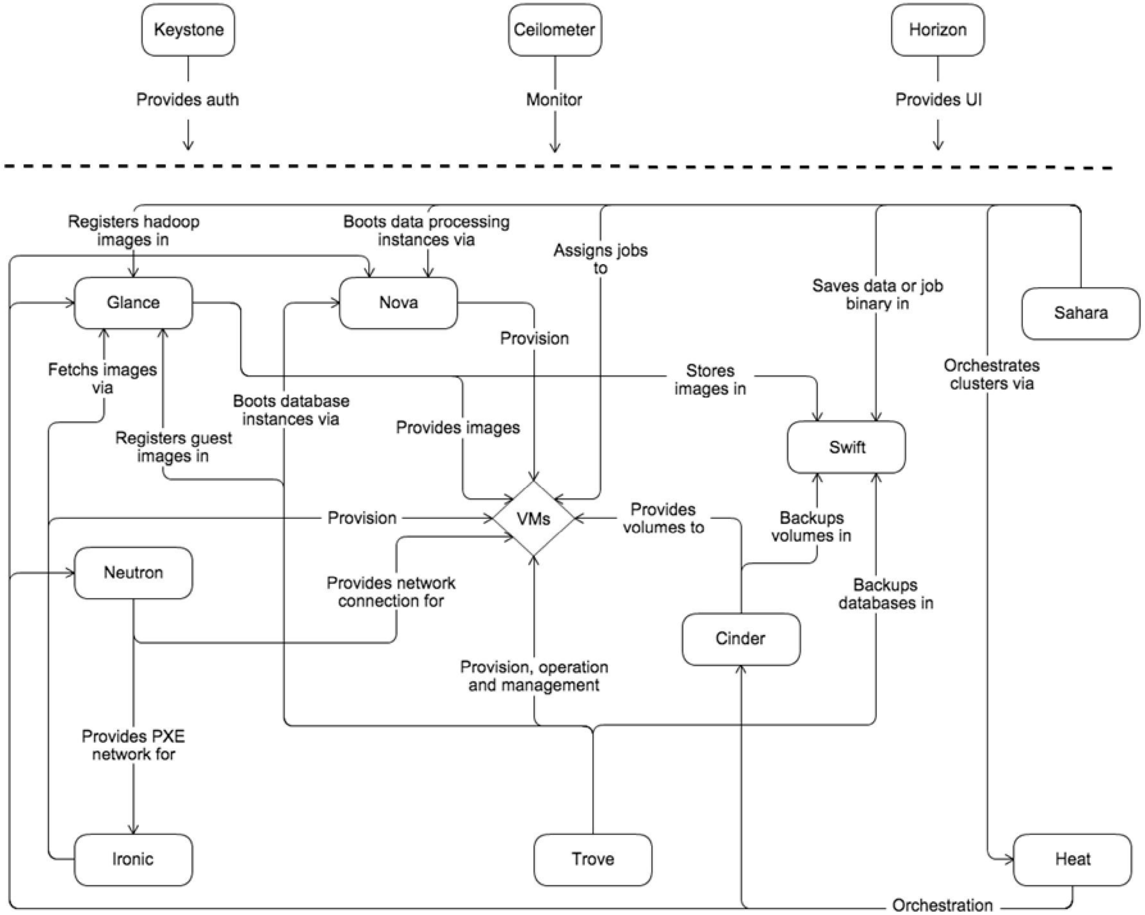
Networking (Neutron) (1/2)

- Manage networks (LANs), subnets (ip Blocks)
- Handles networks with overlapping IPs
- Connect devices to networks via ports

Networking (Neutron) (2/2)

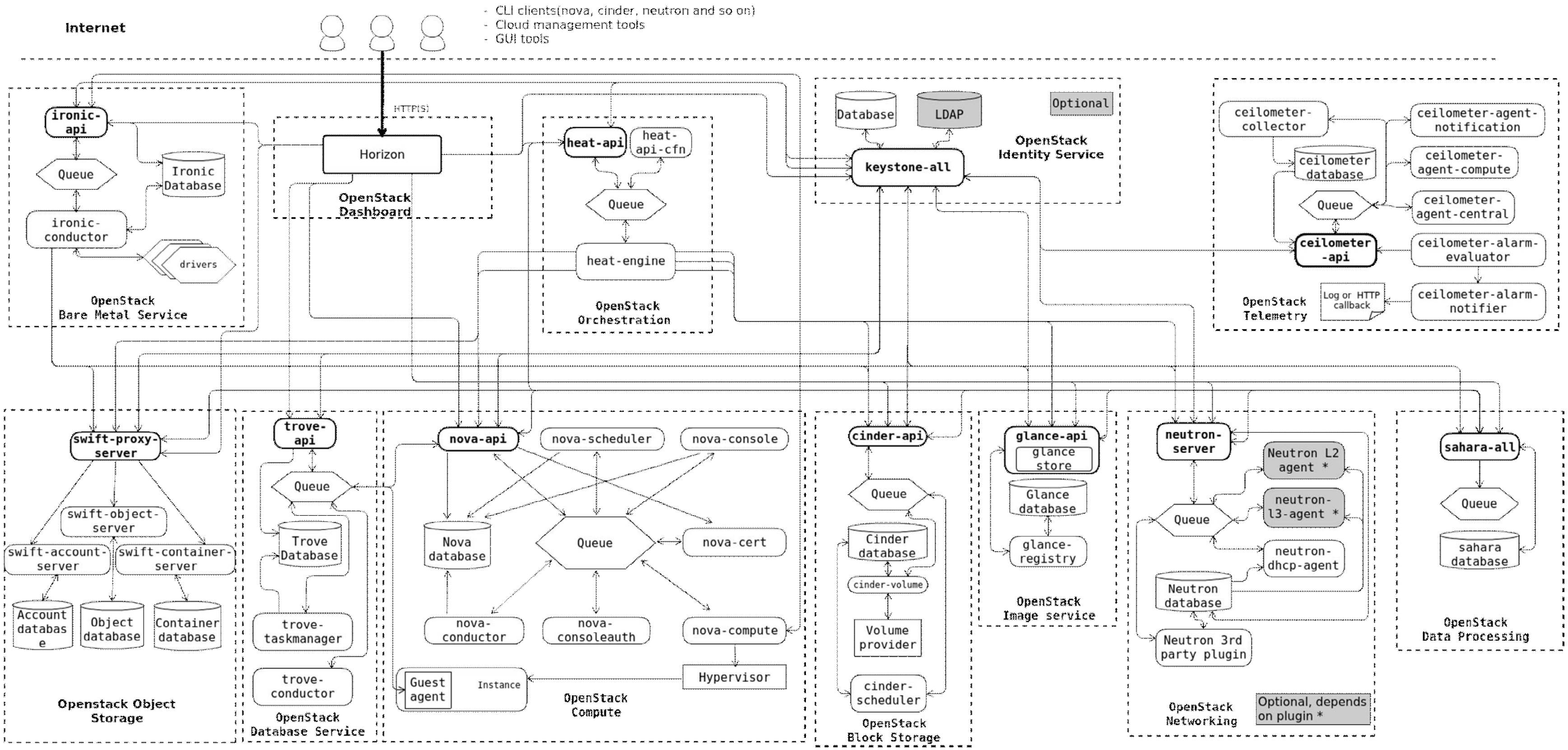
- Plugins and agents for different technologies (Cisco, Open Vswitch, Linux bridging)
- Offers load balancing, edge firewalls, and IPsec VPN.
- Example build multi tiered web applications, migrate existing systems to cloud without changing ip addresses

Conceptual architecture



docs.openstack.org/admin-guide-cloud/common/get_started_conceptual_architecture.html

Logical Architecture



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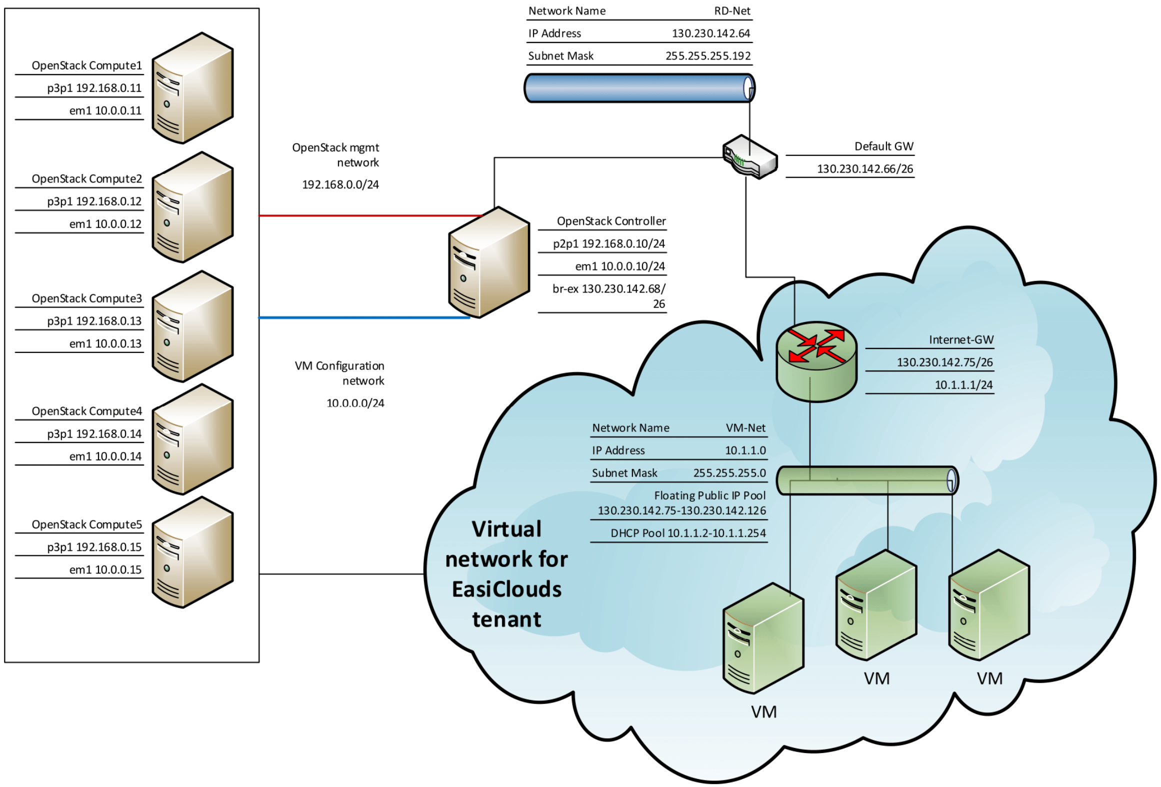
Example: Nova components

- Queue: messaging between components
- SQL DB: save system state
- Nova-api: handle user Api calls
- Nova-scheduler: choose VM host
- Nova-compute: use hypervisor APIs
- Nova-conductor: mediate DB access

TUT CloudLab



Network Name RD-Net
IP Address 130.230.142.64
Subnet Mask 255.255.255.192

Default GW
130.230.142.66/26

OpenStack Compute1
p3p1 192.168.0.11
em1 10.0.0.11

OpenStack Compute2
p3p1 192.168.0.12
em1 10.0.0.12

OpenStack Compute3
p3p1 192.168.0.13
em1 10.0.0.13

OpenStack Compute4
p3p1 192.168.0.14
em1 10.0.0.14

OpenStack Compute5
p3p1 192.168.0.15
em1 10.0.0.15

OpenStack mgmt network
192.168.0.0/24

VM Configuration network
10.0.0.0/24

OpenStack Controller
p2p1 192.168.0.10/24
em1 10.0.0.10/24
br-ex 130.230.142.68/26

Internet-GW
130.230.142.75/26
10.1.1.1/24

Network Name VM-Net
IP Address 10.1.1.0
Subnet Mask 255.255.255.0
Floating Public IP Pool
130.230.142.75-130.230.142.126
DHCP Pool 10.1.1.2-10.1.1.254

Virtual network for EasiClouds tenant

CloudLab: experiences

- Manual installation tedious (2 failed attempts)
- Requires understanding (Linux, networking, OpenStack)
- DevStack (installation scripts) handy way to get hands on experince
- Complicated, hard to debug (reboot node and hope it fixes)
- Usage via dashboard quite easy ifbasic concepts understood

Demo: provision web server

- Objective: provision a VM for hosting a web page
- Use Horizon dashboard
- Choose VM image
- Choose flavor
- Configure SSH key authentication and security groups (ping, SSH, http)

Conclusions

- Complicated system that offers many possibilities
- Not just simple VM management, networks, data processing, orchestration available
- Different deployment possibilities: you can get what you want, you have to know what you want
- Neat when works, frustrating when not