# OpenStack Awareness Session

**Affan A. Syed**

**Director Engineering,**

PLUMgrid Inc.

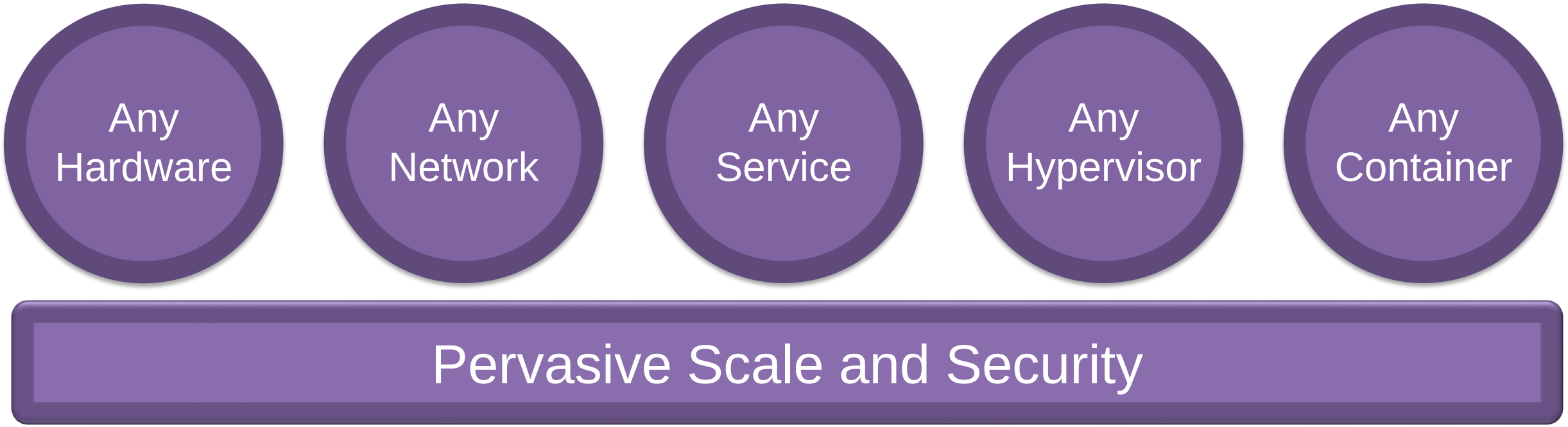


Pakistan Telecommunication Authority, Oct 20th, 2015

# PLUMgrid's Mission



***Deliver comprehensive virtual networking solutions that scale, secure, and simplify the modern cloud data center***



# PLUMgrid Global Alliance Partners

## OpenStack Distro

openstack
redhat
MIRANTIS
Piston CLOUD COMPUTING
CANONICAL
ORACLE
suse

## Technical Alliance

ARISTA
Mellanox TECHNOLOGIES
cumulus
f5
Check Point SOFTWARE TECHNOLOGIES LTD.
A10 Networks
paloalto NETWORKS
ixia

## Channel Partners

AWNIX
inbox
NEC
NECネッツエスアイ
macnica networks
DASHER TECHNOLOGIES
datavision
Future-Proofed Networking Solutions
REDAPT
CANCOM
HPM NETWORKS

# Talk outline

# Outline

- A view of the Cloud, from the clouds
- What is OpenStack? Why care?
- OpenStack: a 10,000 feet view
- Workshops and their content

<Break>

- Demo session by Dr. Adnan Iqbal (Namal University)

# Cloud(ed) thinking!

debunking the myth of “Cloud”

# How the Cloud Business Model started

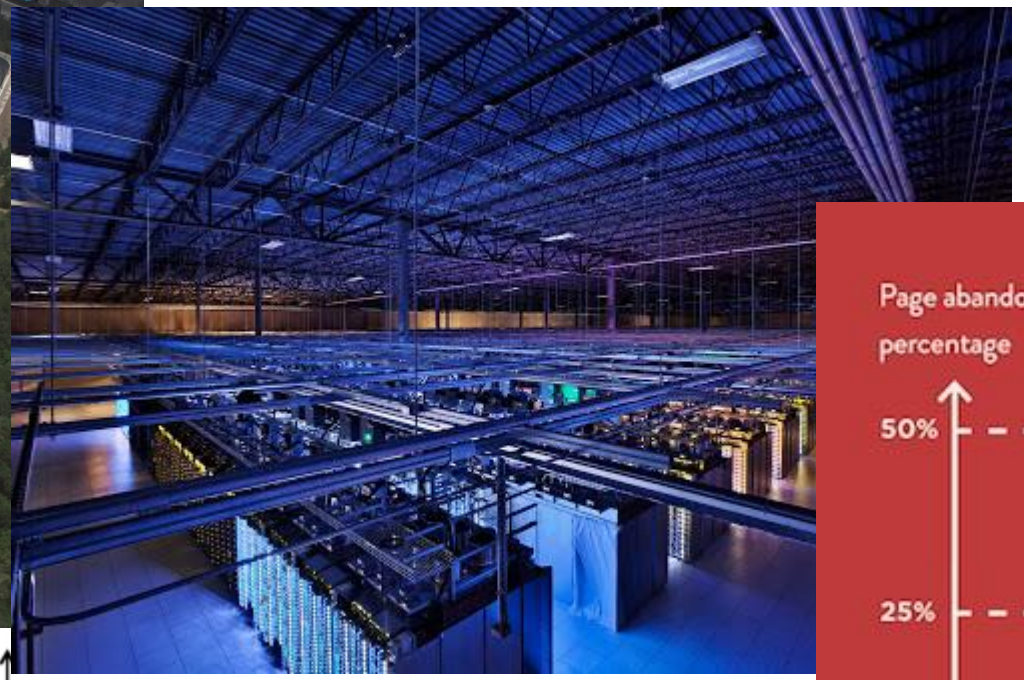
Excess capacity/Under utilized servers

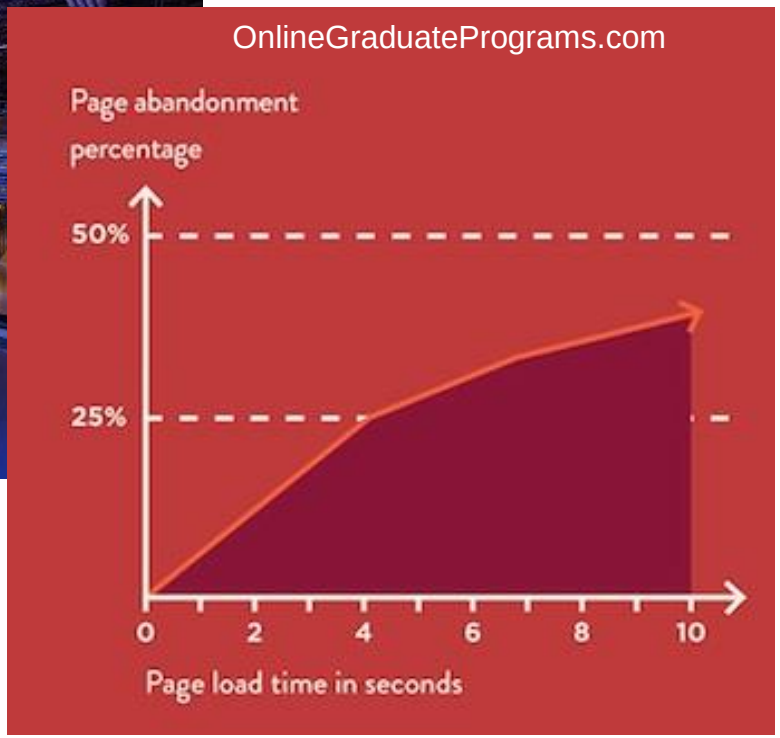
Machine & Network virtualization

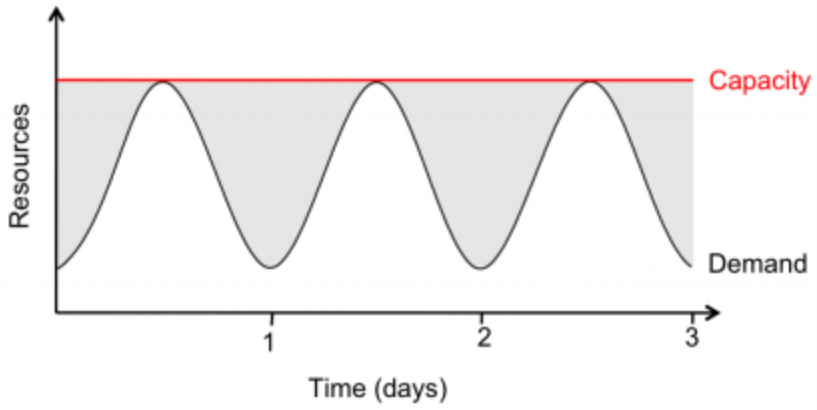
Monetization opportunity through renting

# Excess capacity

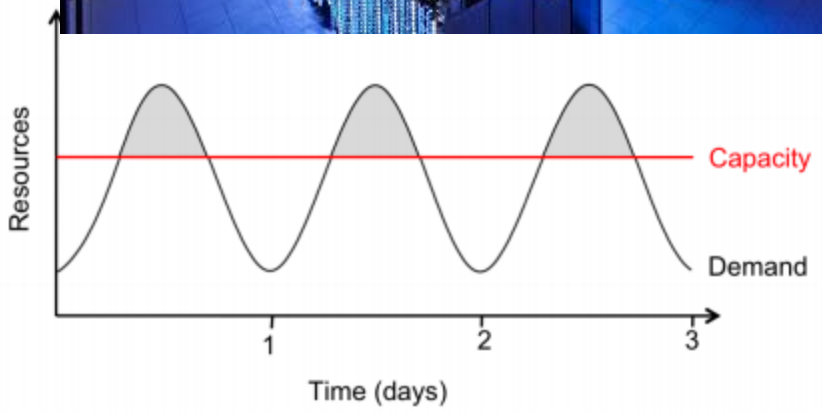
https://googleblog.blogspot.com/2012/10/googles-data-centers-inside-look.html





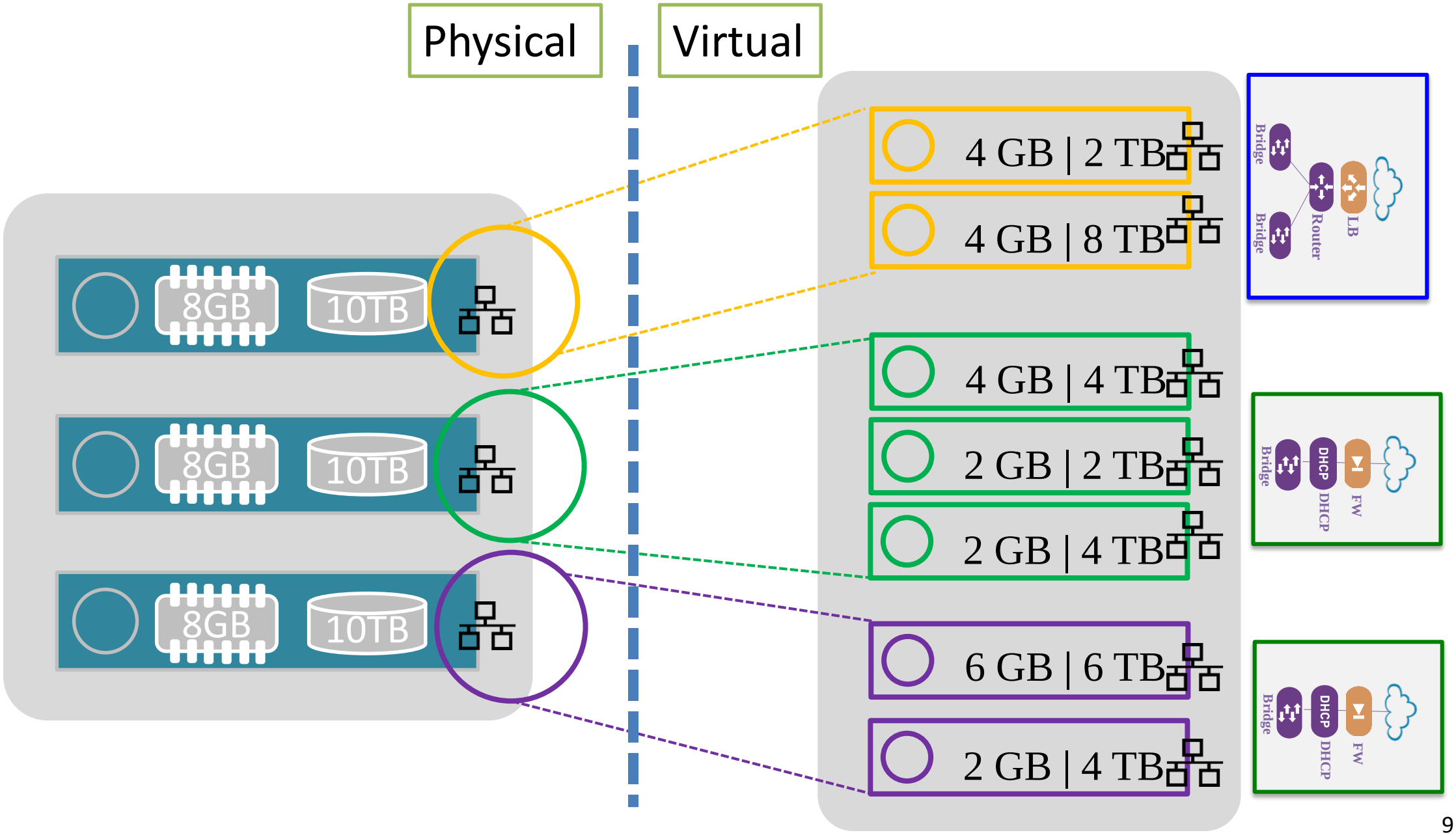

(a) Provisioning for peak load



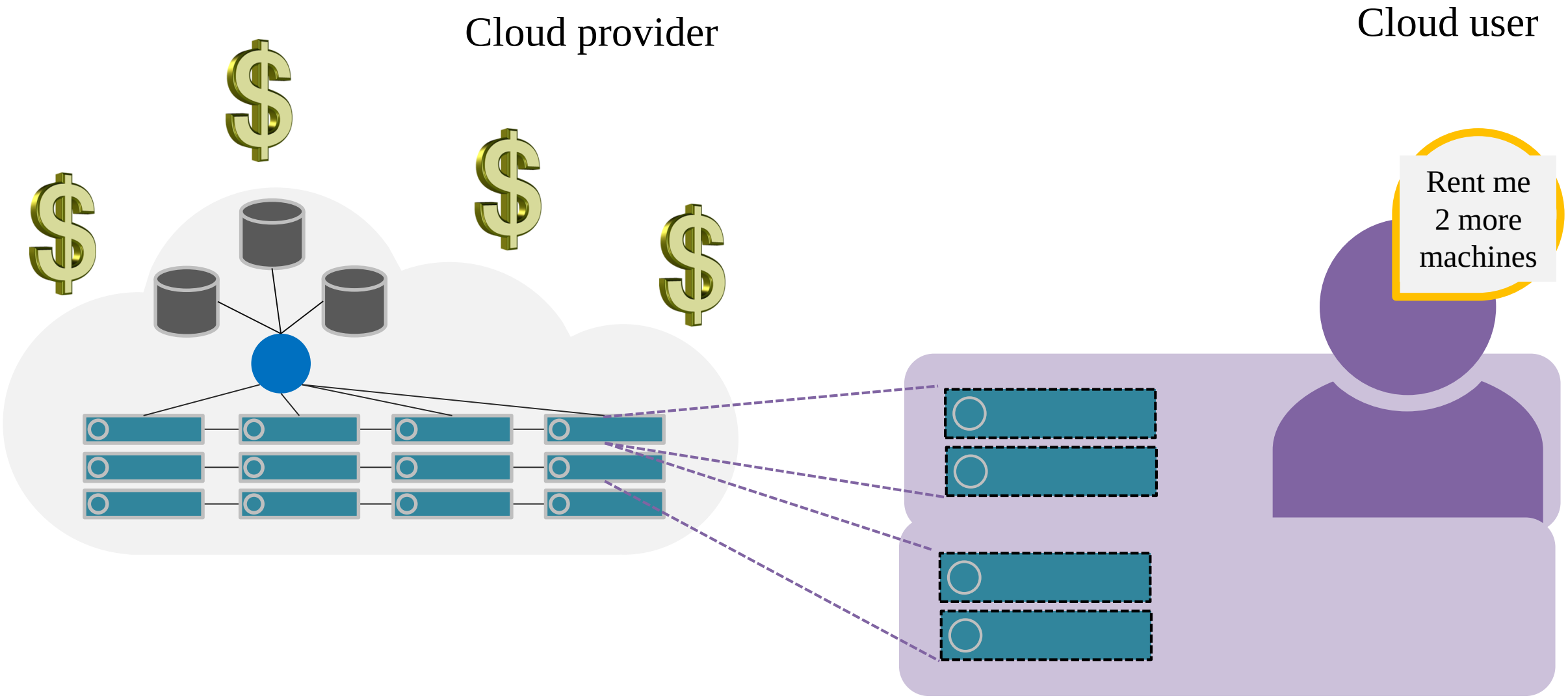

(b) Underprovisioning 1

Src: "above the clouds …", UC Berkeley tech report

# Machine and network virtualization



# Money through rental model

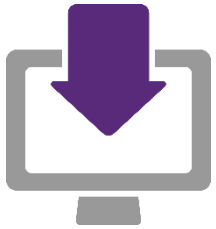



Allow services to “**scale out**” on demand

# Types of a cloud

Infrastructure-as-a-Service 

Platform-as-a-Service 

Software-as-a-Service 

(lots of other XaaS)

# Enterprises and Private clouds

Build compute powers without vendor lock-in

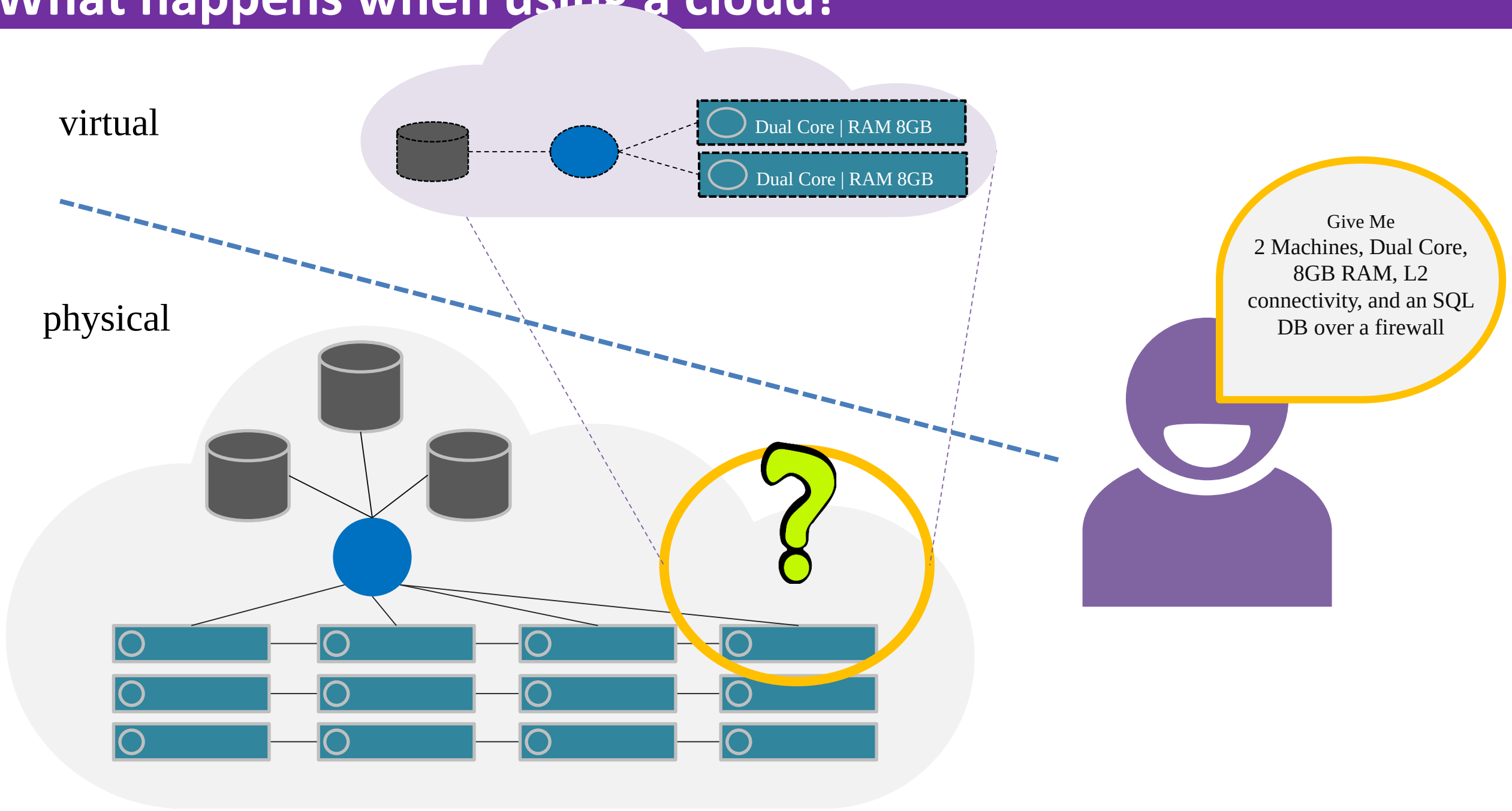
Provide and build services, at lower cost

*Facebook has 20,000 server per admin*

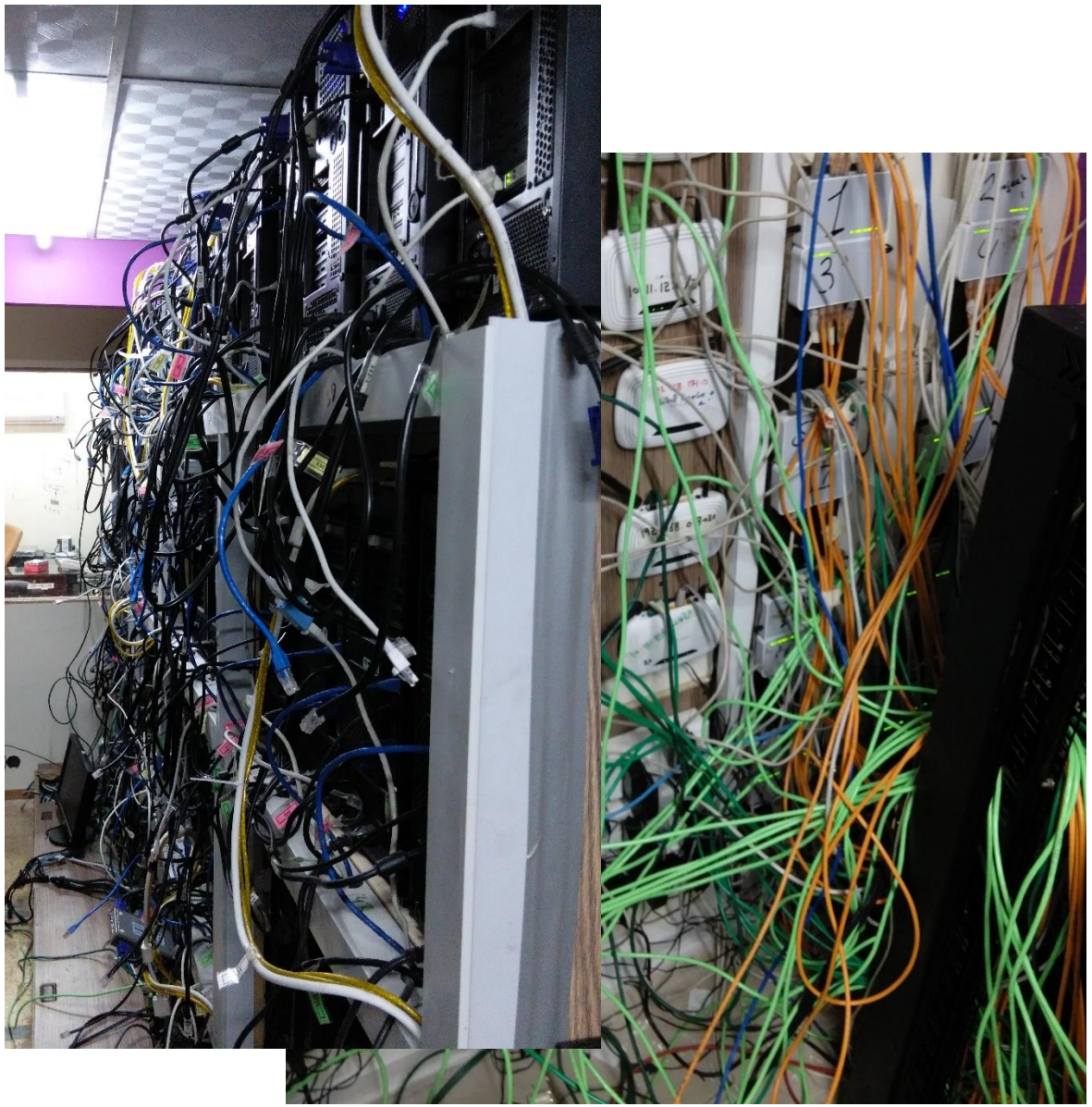
Scale out easily by adding servers

*go to public clouds when needed (Cloud bursting)*

# What happens when using a cloud!



# Managing and (re)provisioning a DCN is difficult



Credit: Google

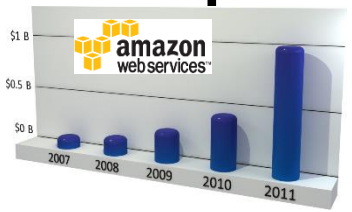
# OpenStack: Motivation and history

… and why OpenStack matters!

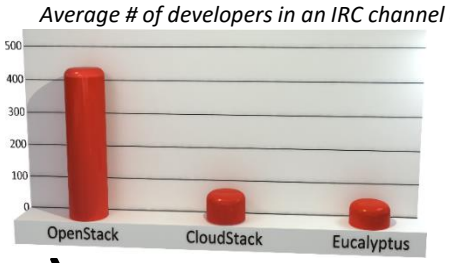
# OpenStack Future (from its past!)

In 2012 Boris Renski (CMO) Mirantis made three arguments for money in OpenStack

Cloud is BIG $$$




Cloud will be open (Google, facebook, Rackspace back OpenStack)

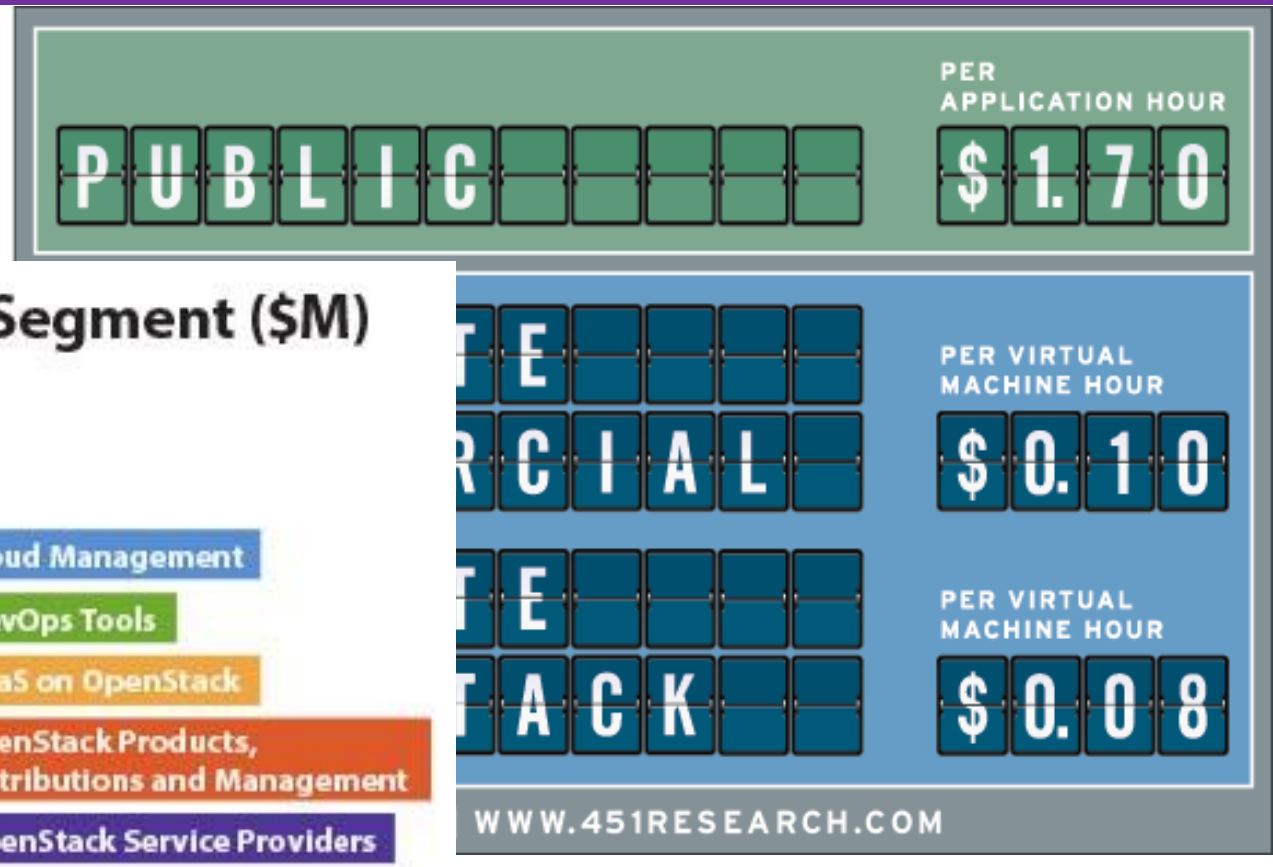



OpenStack won the OpenCloud war (2012)

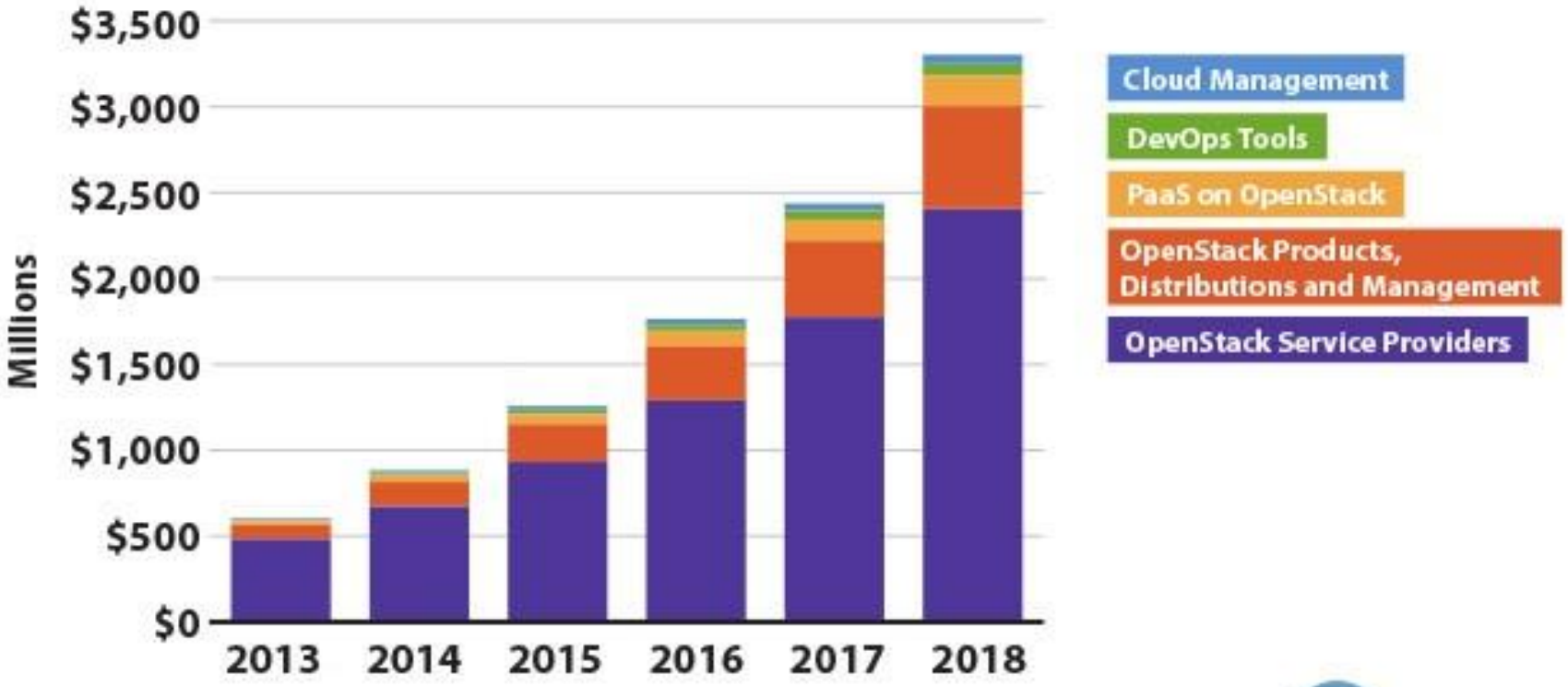
Mirantis raised **$100 million** as pure-play OpenStack in Aug 2015

# Monetary Motivations

## Cloud Price Index




### Worldwide OpenStack Vendor Revenue by Segment ($M) 2013-2018



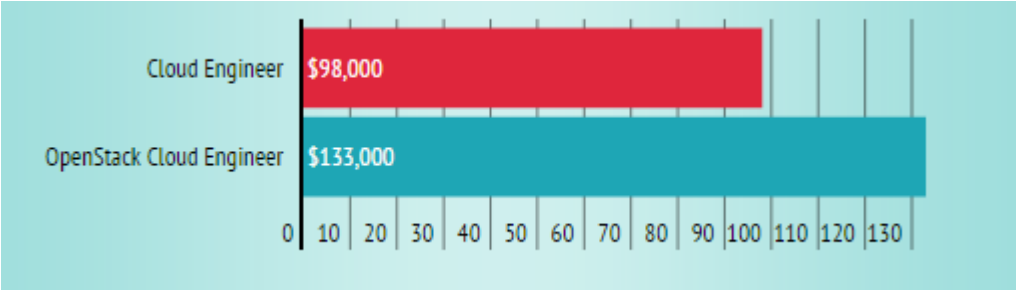

Source: 451 Research's Market Monitor & Forecast, OpenStack September 2014

451 Research

# Job opportunity


OpenStack engineers make 36% more than other cloud engineers.

*Src: http://www.datacenterdynamics.com/*




*"OpenStack continues to gain mindshare among enterprise CIOs …….. We continue to see* ***OpenStack becoming the de facto open source option*** *for deploying private clouds. However, this will accelerate* ***only after*** *more* ***OpenStack-trained developers enter the workforce*****…..**" *[The 451Research Take (https://451research.com/openstack)]*

# OpenStack: A Brief History

**NASA Launches Nebula**

One of the first cloud computing platforms built for Federal Government Private Cloud

**March 2010:** Rackspace Open Sources Cloud Files software, aka Swift

**May 2010:** NASA open sources compute software, aka “Nova”

**June 2010:** OpenStack is formed

**July 2010:** The inaugural Design Summit

**April 2012:** OpenStack Foundation


nebula.nasa.gov

# OpenStack® Foundation

Independent body to protect, empower and promote OpenStack software

Board of Directors (Platinum, Gold sponsors)


Legal Affairs Committee

User Committee

Technical Committee

Project Technical Leads (PTL)

# Platinum, Gold and Corporate members

# Fastest Growing Global Open Source Community


"OpenStack appears to be a **more advanced** or **more modern open source** project than some of its predecessors because it's a **highly coordinated** effort."

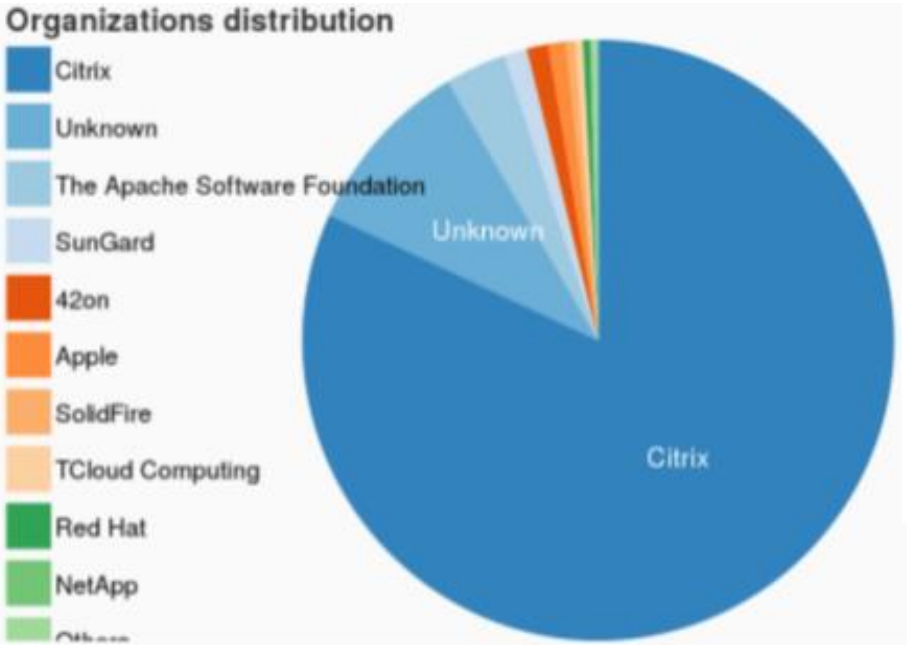
**– Charlie Babcock**
Information Week

Sources: openstack.org and http://activity.openstack.org/dash/browser May 15, 2015

openstack
CLOUD SOFTWARE

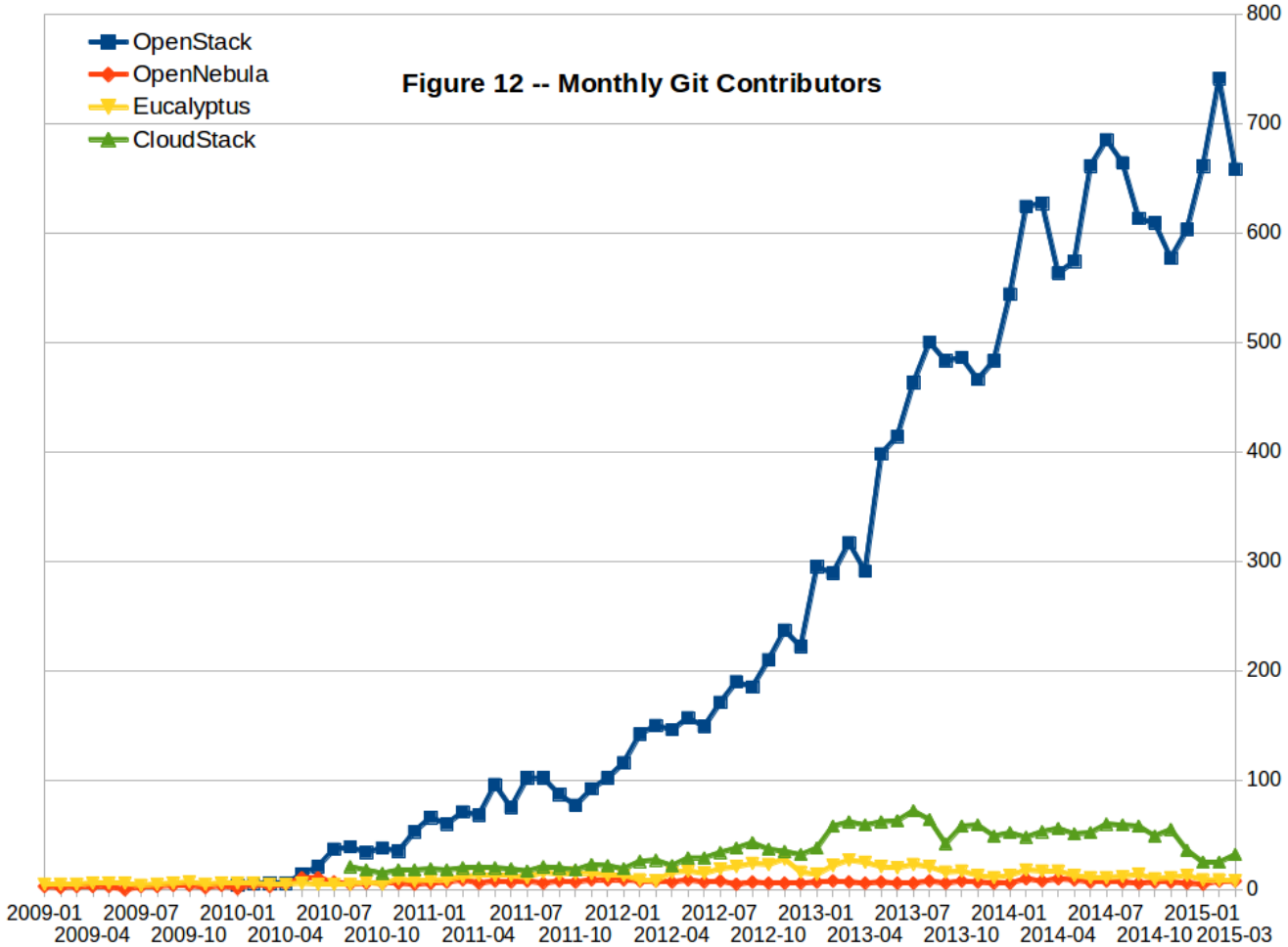
# Competitors….. Not there!

## *CloudStack*





Src: Bitergia




Src: http://www.qyjohn.net/?p=3801

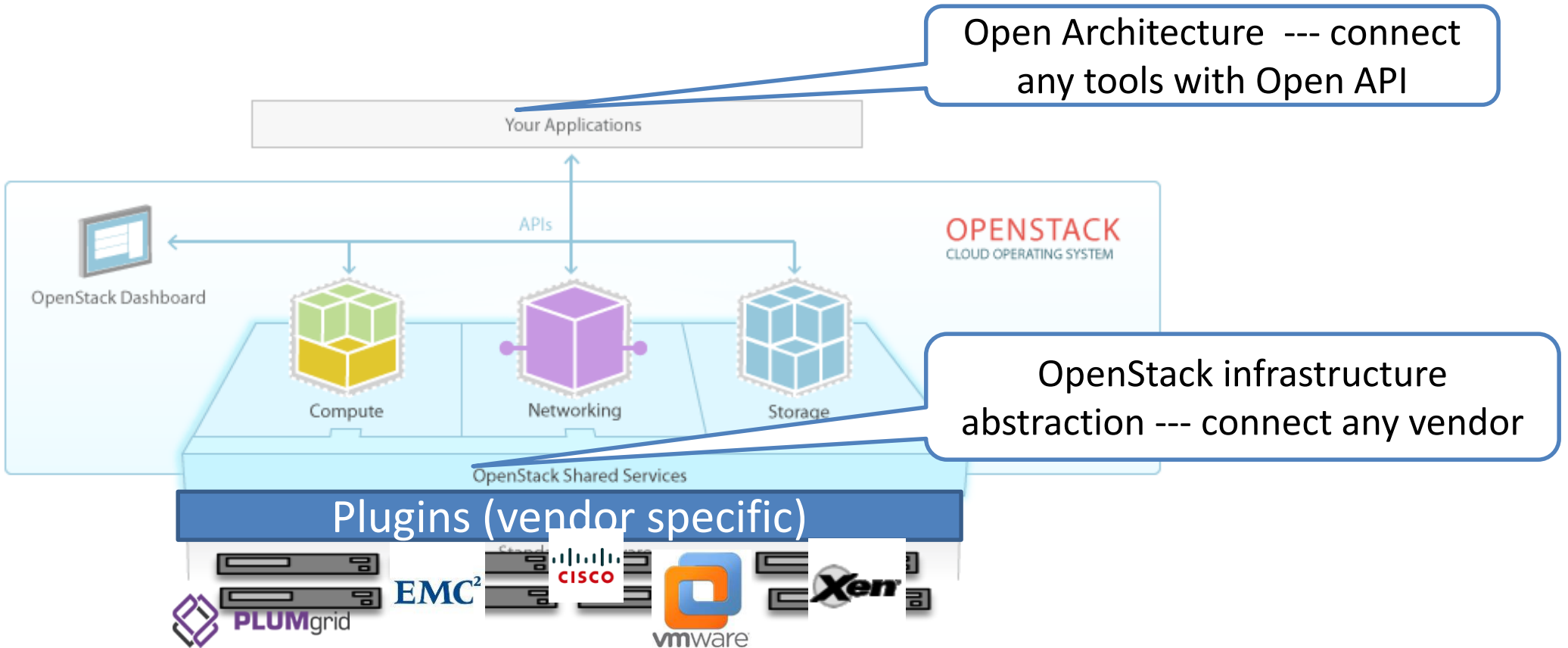
**Cloud tou buss …… Openstack!**

# OpenStack: Managing *your* Cloud!

# OpenStack

Interrelated Projects to control pools of *compute*, *storage*, and *networking resources*

Managed through API & dashboard that give administrators control and empower users to provision their own resources



# Features/Benefit (high level)

**Open source** (Apache license) software

*accelerated innovation, community benefits*

**Plug-in architecture**

*no vendor lock-in (hypervisors, storage soln, SDN soln)*

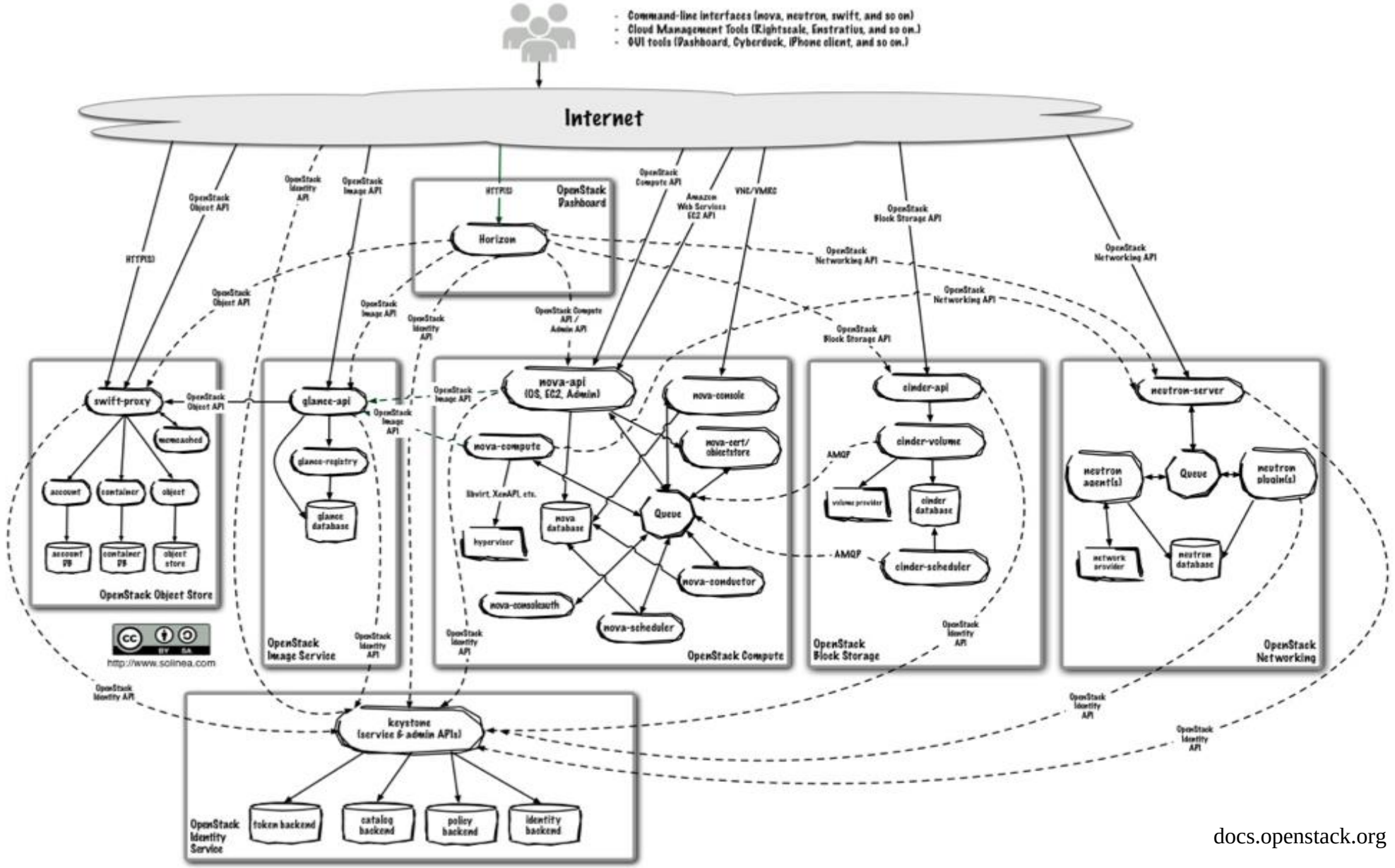
**On demand** control of large pools of compute, network, storage

*Enable IT automation*

**Multi-tenancy** support with quotas and isolation

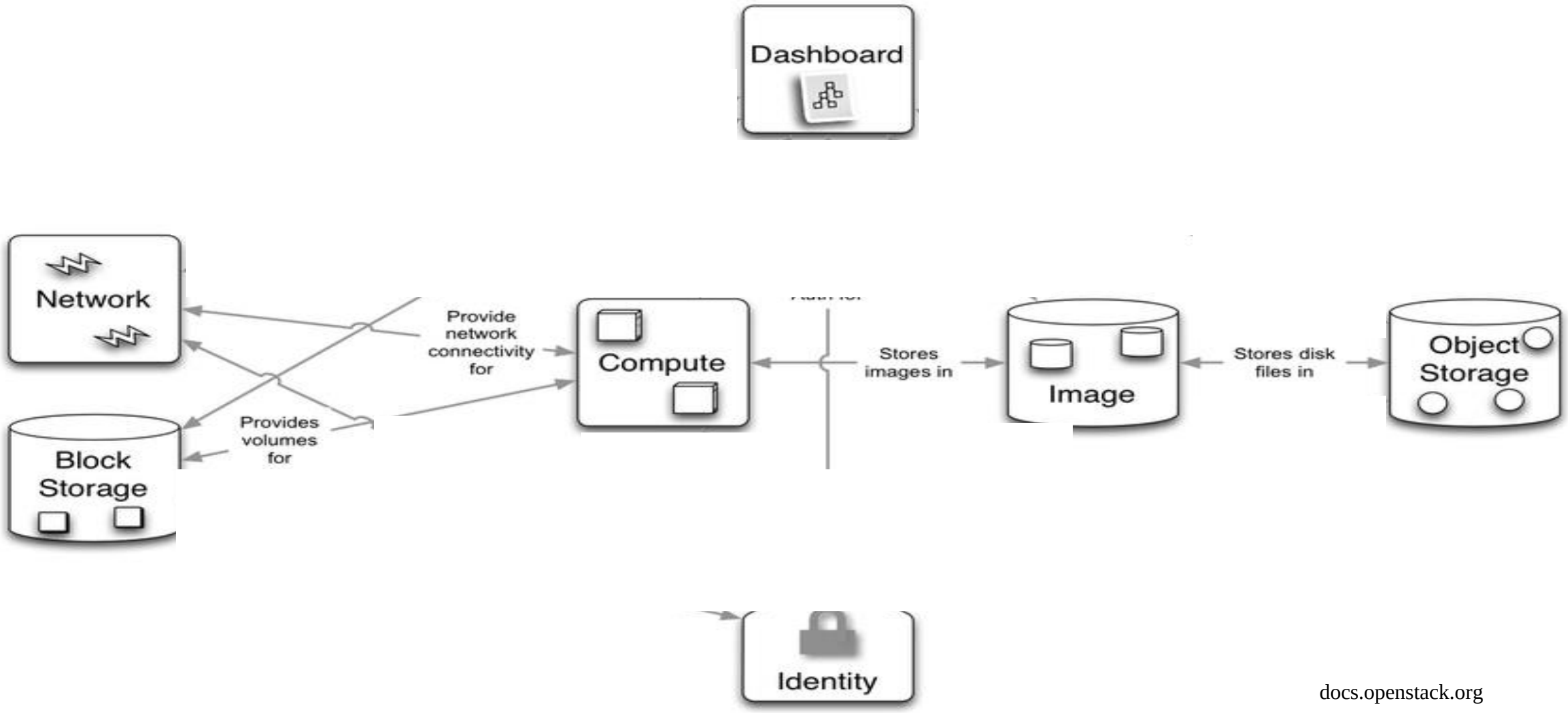
*ability to control, monitor and monetize resources*

# OpenStack Core Services – the Spider web!




docs.openstack.org

# OpenStack Core Services – Relation ship diagram (2012)

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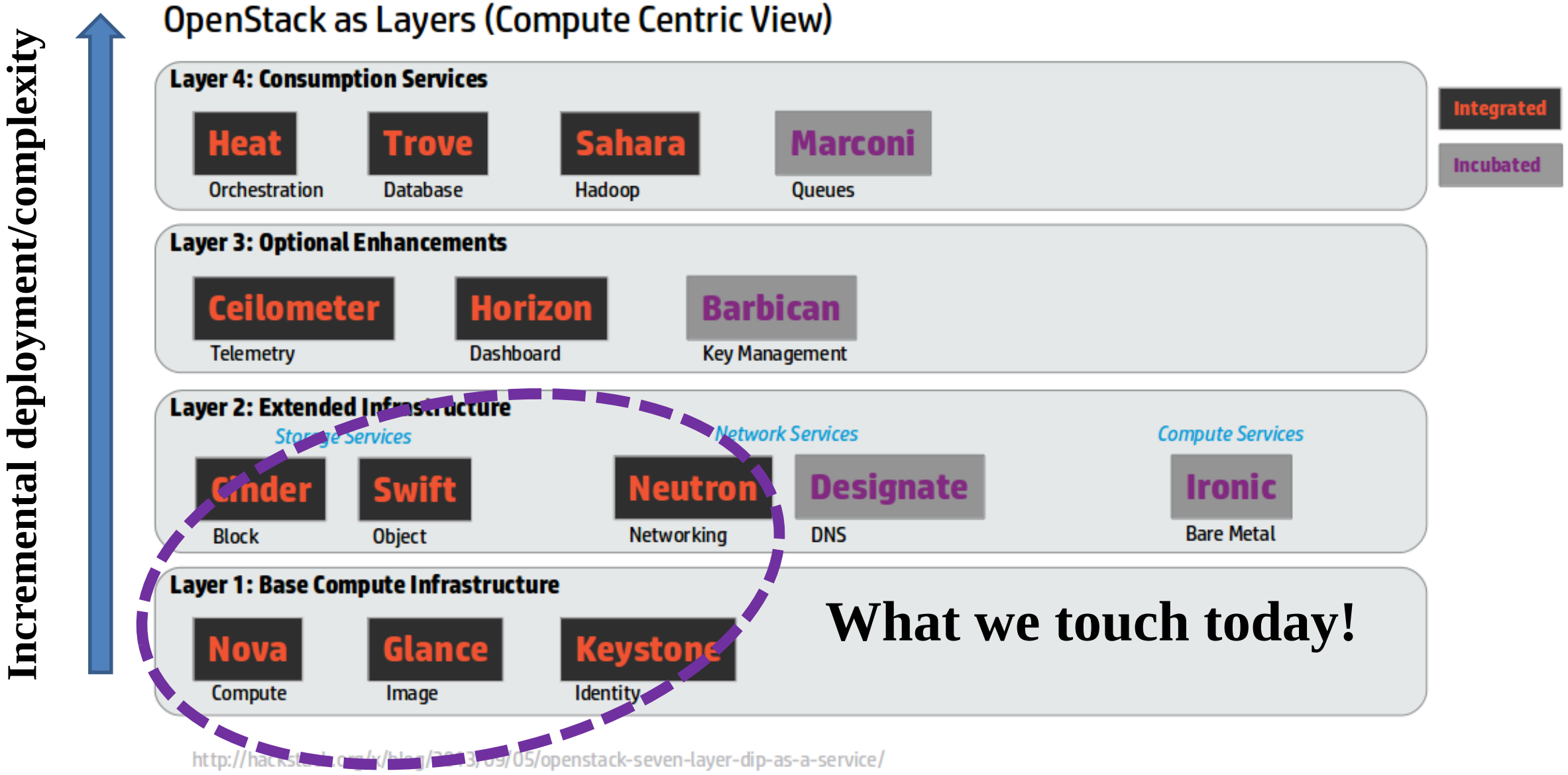
# OpenStack as Layers (2014)



# Nova: Managing *Compute*

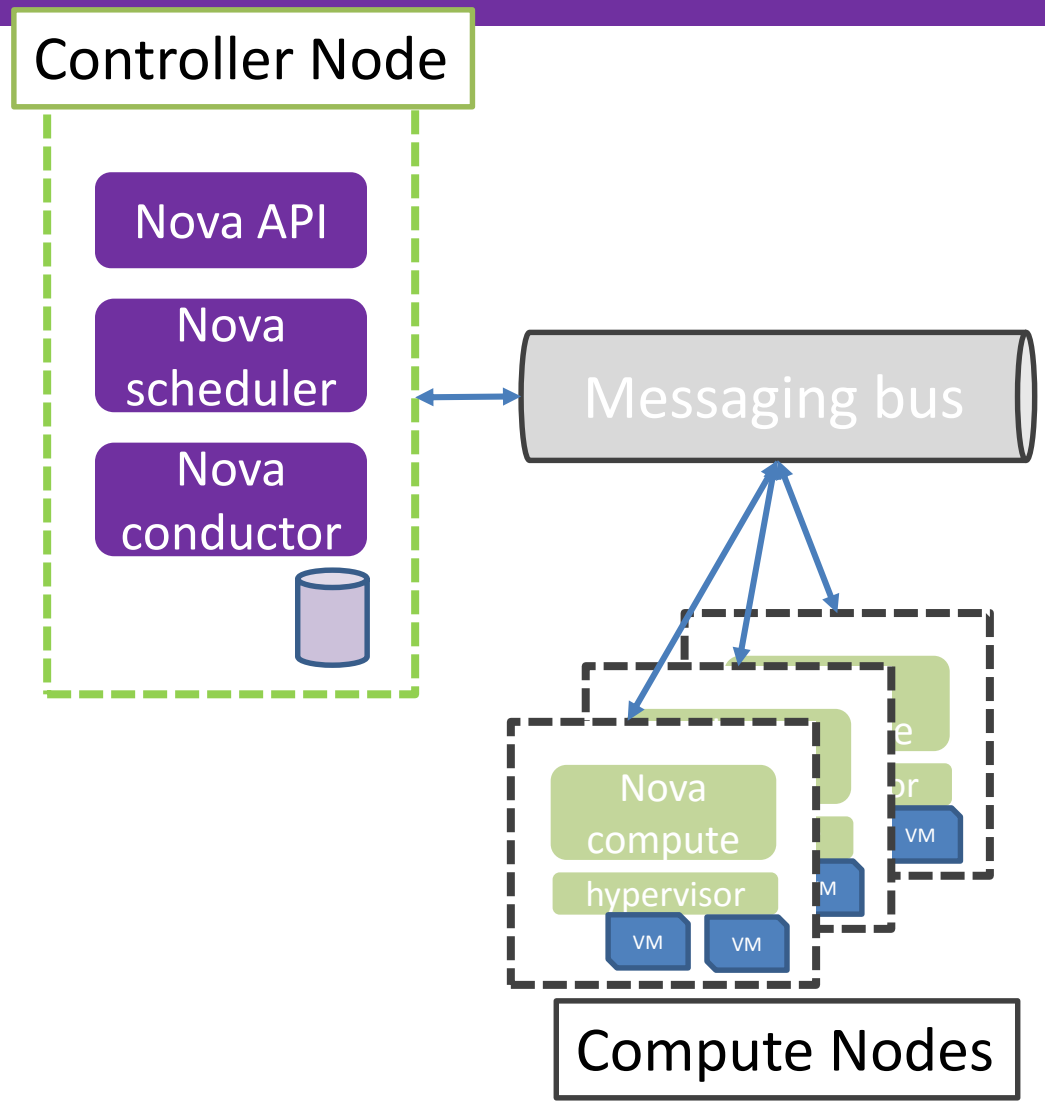
Provides a REST interface to:

*Spawn, bootstrap, delete VMs*

Built using a messaging arch

Supports multiple hypervisor technologies

Supports multi-tenancy



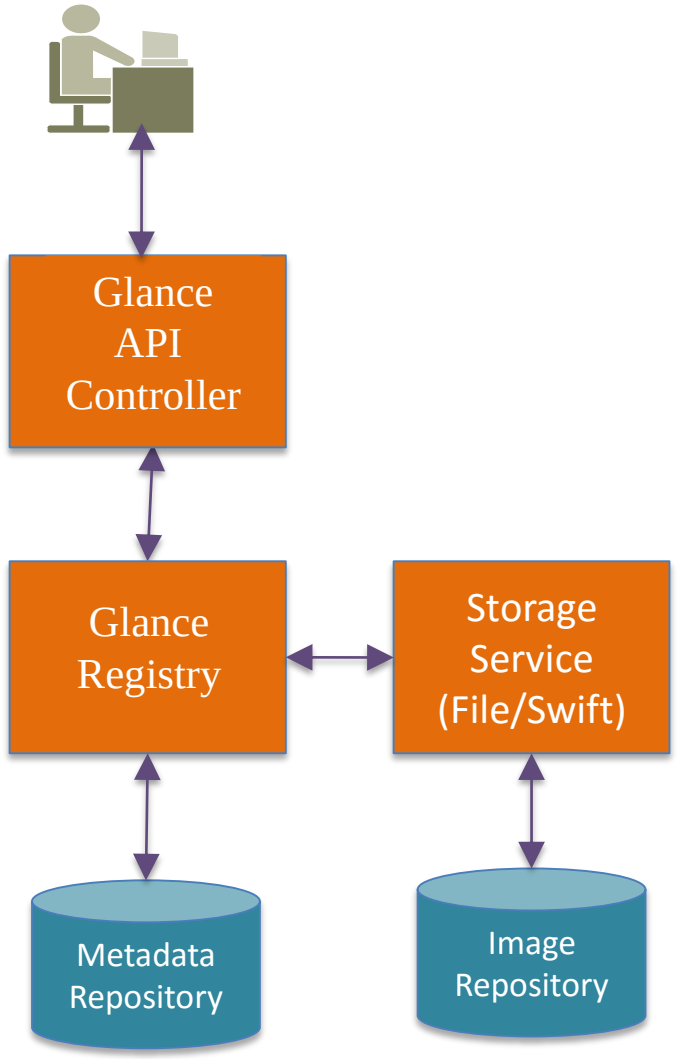
# Glance: Managing *images*

Interface to manage images

*Storage provided by drivers*

Database to manage images

*DB abstraction to match any driver*



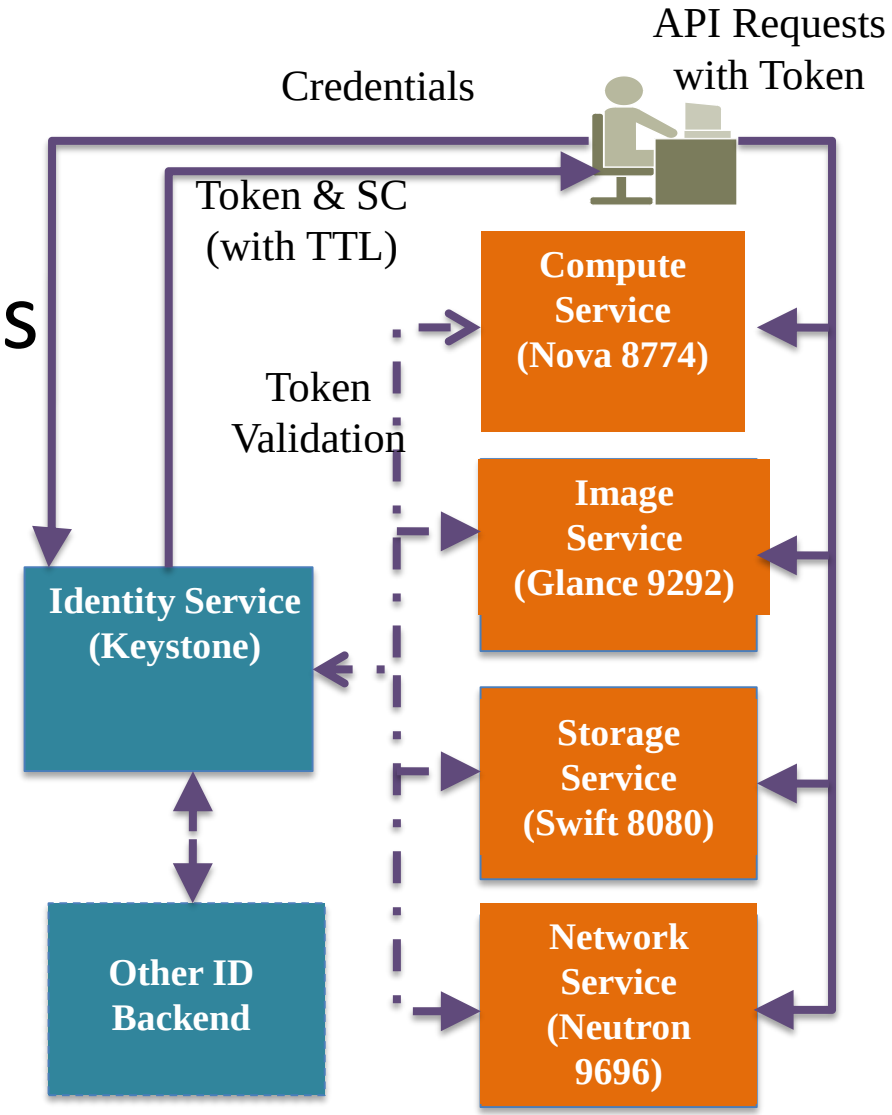
# Keystone: Managing *identity*

Tracking users and their permissions

Providing a catalog of available services (with URLs)

New services first register with keystone

Provides tokens for usage of any service, using the RBAC model



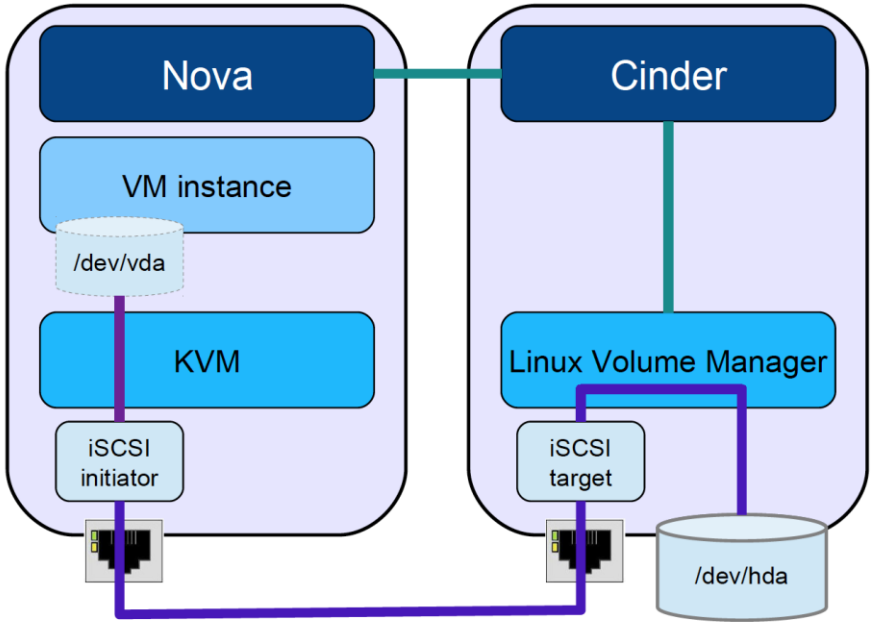
# Cinder: Managing *block storage*

*Persistent* block storage for VM instances
- lives through reboots and crashes

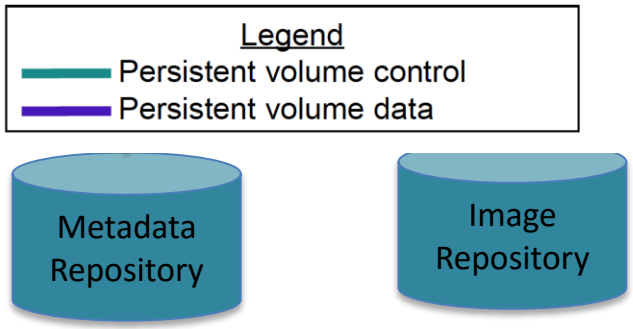
Can be used to create bootable volumes
- No need for ephemeral storage!

Multiple volumes (disks) for a single VM

Can backup volumes, (perhaps) in swift!




http://www.slideshare.net/avishaytraeger/cinder-havana




A frontend to create and manage virtual disks and their VM association

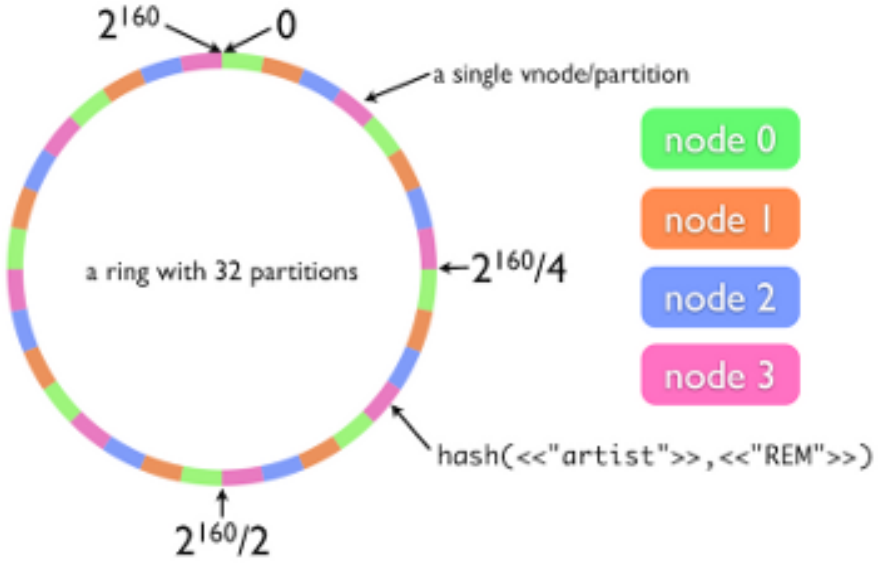
# Swift: Managing *object* storage

Object = files, persistent and HA

Flat name-space

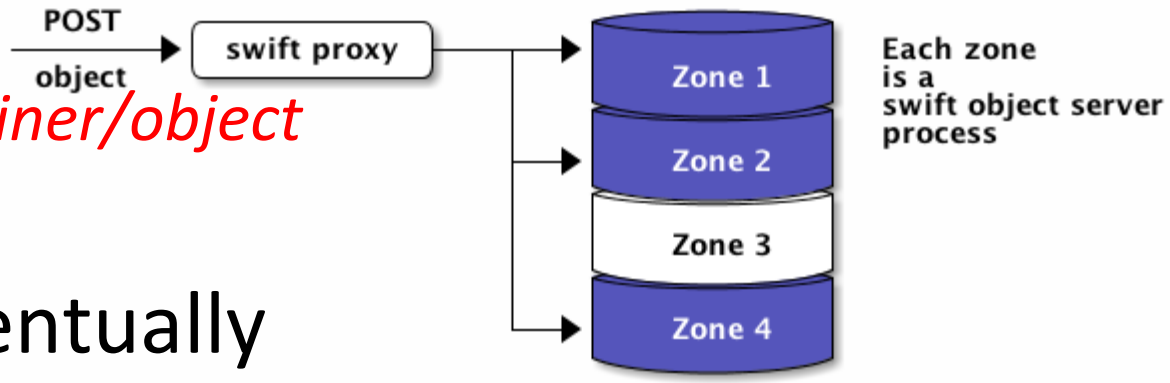
Unstructured blobs, replicated in a ring across different zones

*Default to three replicas*




Objects accessible with a URL

*swift.example.com/v1/account/container/object*




Massively scalable, but with eventually consistent behavior

https://julien.danjou.info/blog/2012/openstack-swift-consistency-analysis

# Storate services: Comparison

| On-instance / ephemeral | Block storage (cinder) | Object Storage (swift) |
|---|---|---|
| Runs operating systems and provides scratch space | Used for adding additional persistent storage to a virtual machine (VM) | Used for storing virtual machine images and data |
| Persists until VM is terminated | Persists until deleted | Persists until deleted |
| Access associated with a VM | Access associated with a VM | Available from anywhere |
| Implemented as a filesystem underlying OpenStack Compute | Mounted via OpenStack Block Storage controlled protocol (for example, iSCSI) | REST API |
| Administrator configures size setting, based on flavors | Sizings based on need | Easily scalable for future growth |
| Example: 10 GB first disk, 30 GB/core second disk | Example: 1 TB "extra hard drive" | Example: 10s of TBs of data set storage |

docs.openstack.org

# Neutron: Managing *networks*

API to create virtual networks

*Software defined!*

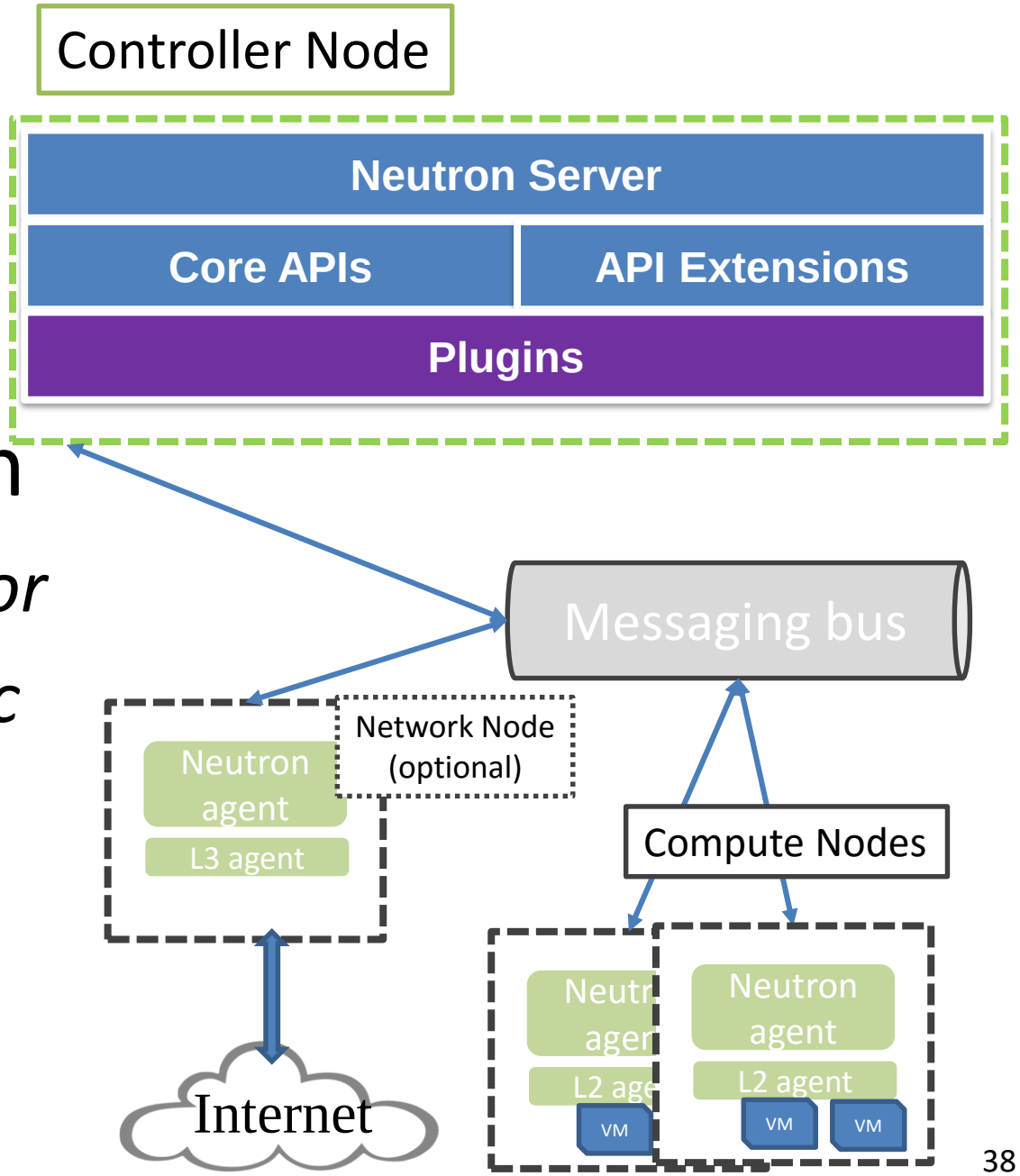
Modular and multi-tenant arch

*API=service, implementation=vendor*

*Plugins make it technology agnostic*

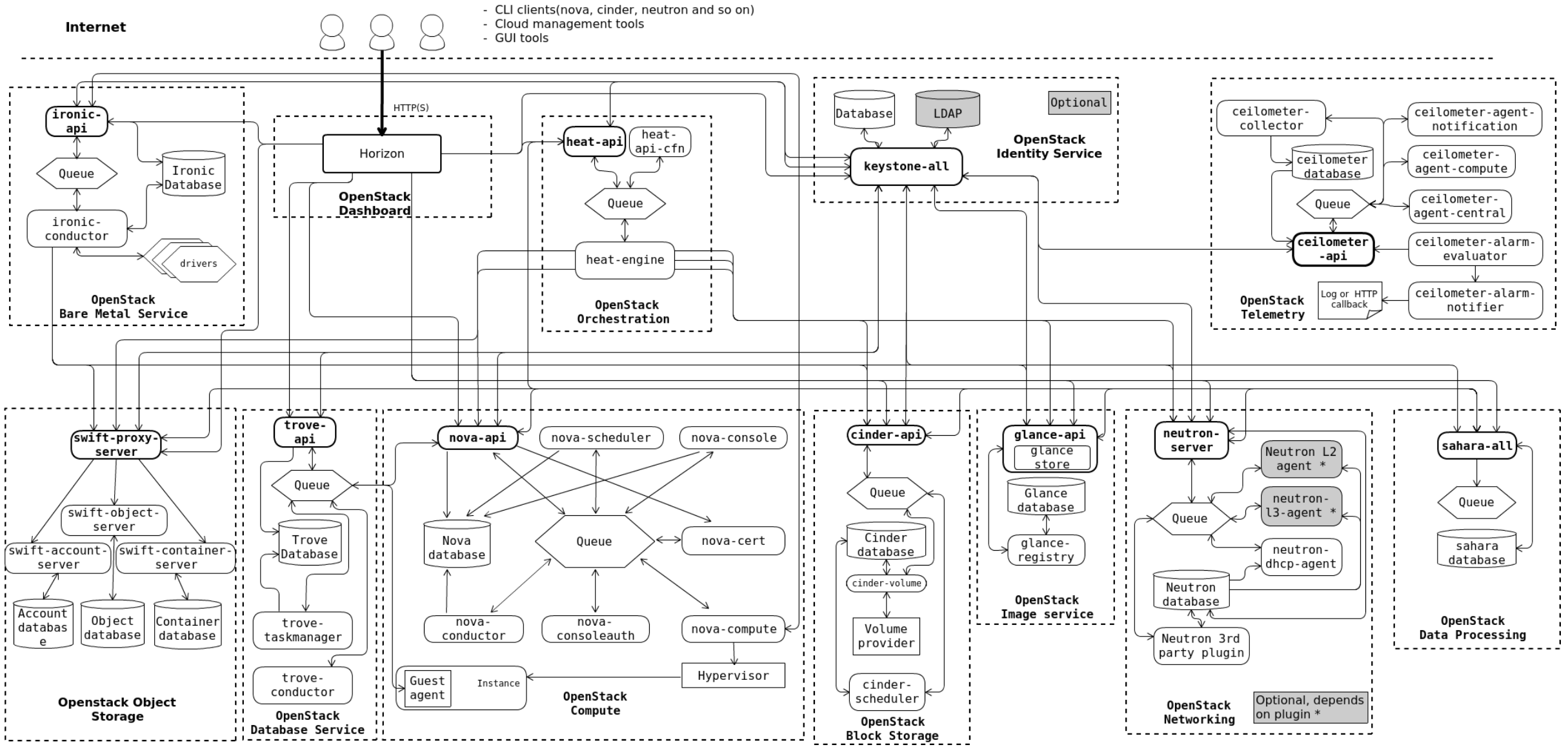
IPAM, load balancer, VPN …

*Services provided by Network node*



# Evolved Core view (2015)

Understanding this requires lots of time and training



# Workshops and their vision

# Workshops on each aspect

Cloud and DCN

Openstack Overview: Layer 1 and 2

Details Layer 1: Nova, Glance, Keystone

Details Layer 2: Neutron, Cinder, Swift

Details: Orchestration of a cloud

Details: Monitoring and Billing

Detail: High Availability

**Lots of hands on work, content to be developed iteratively**
**Funding expected from Industry and ICTRDF**

# DevStack: the default installer

PLUMgrid

# Questions?

***https://twitter.com/openstack_isb***

***http://pta.gov.pk/trg/pta_openstack_2015.php***

***http://docs.openstack.org/developer/devstack/***