

RED HAT
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OpenStack Nirvana: Big Data & Elastic Infrastructure Together at Last

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Red Hat Summit Boston
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Keith Basil

- personal

Virginia hare scrambler, plays chess..

- professional



Cloudscaling, Time Warner Cable,
FederalCloud.com, Cisco and
a couple of startups

- blended

skype/twitter/github/irc, life: noslzzp



Agenda

- ◉ So.. What Are We Talking About Here?
- ◉ OpenStack, Sahara & IroniC
- ◉ Who?
- ◉ Implementation and Performance
 - ◉ Network
 - ◉ VMs vs. Bare Metal
- ◉ Getting to the End State
- ◉ Questions
- ◉ Resources

So.. What Are We Talking About Here?



Data, Data, Data..

- ◉ We are generating a large amount of data...***very fast.***
 - ◉ Social media footprints
 - ◉ Financial transactions
 - ◉ System instrumentation (logs, metrics, etc)
 - ◉ IoT and sensor data
- ◉ Across **many industries..**
 - ◉ Financial Services, Health Care, Human Sciences
 - ◉ Telecommunications, Travel, Energy, Retail

Data, Data, Data: Why Elasticity Is Needed

- **Our Data is too large**
 - We are past the point of single computers being able to efficiently handle our data
- **Service Requests are too large**
 - Client devices are more plentiful than ever
- **Or, BOTH..**

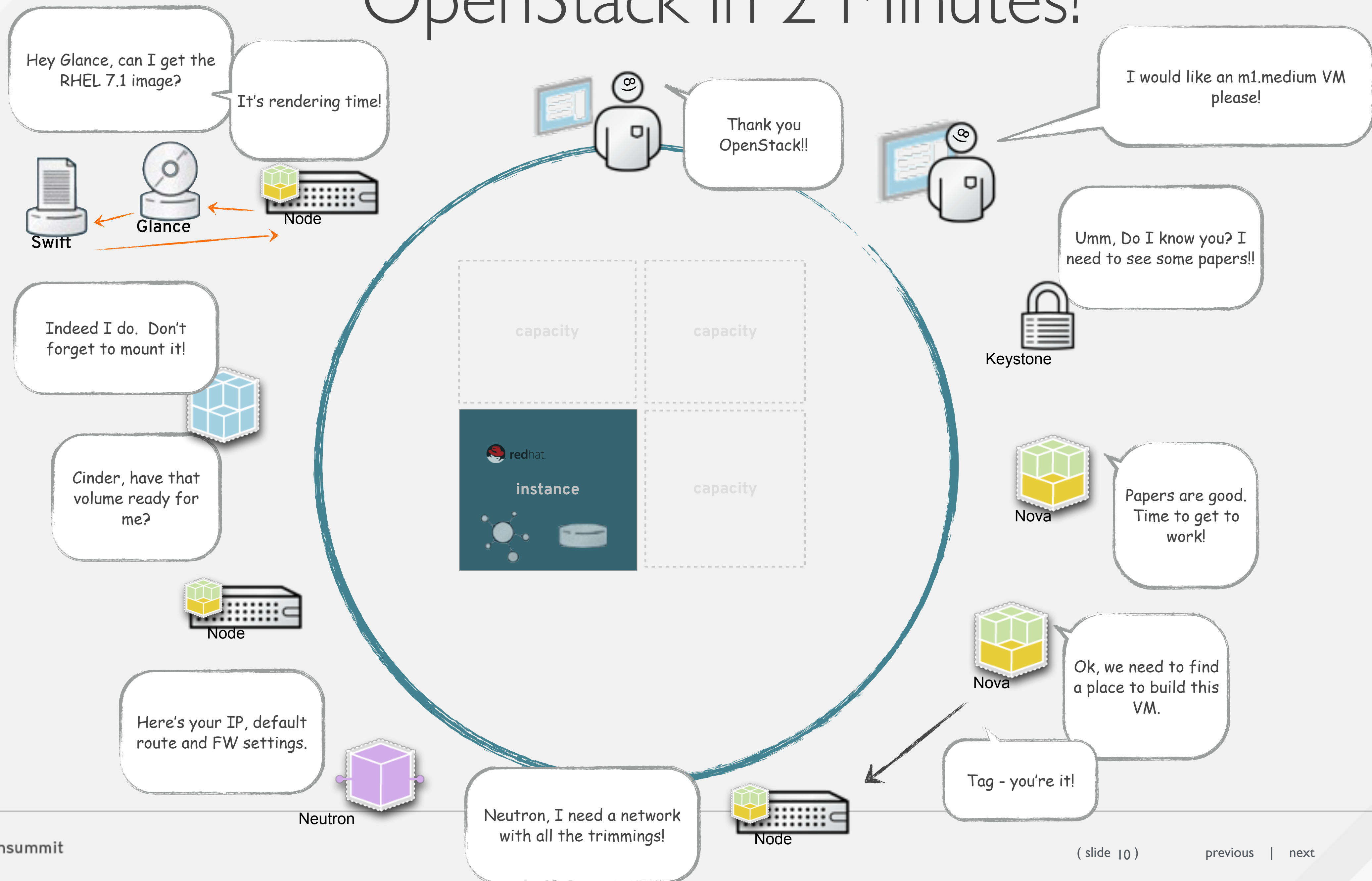
We need
more ~~cowbell~~
cloud!



OpenStack, Sahara & Ironic



OpenStack in 2 Minutes!



Hadoop's MapReduce as a Unix Command Line

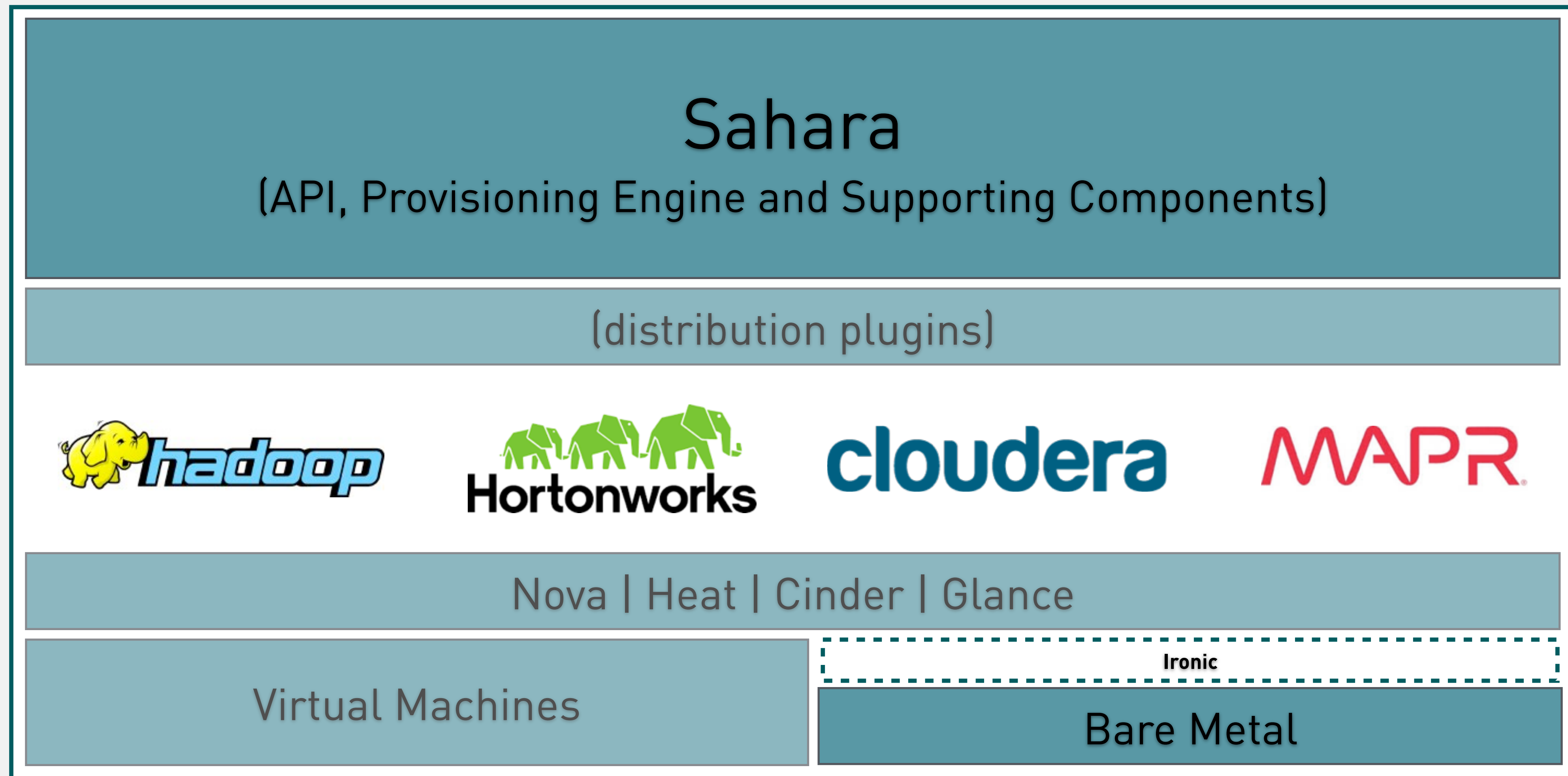
```
cat /my/log | grep '\.html' | sort | uniq -c > /my/outfile
```

Map

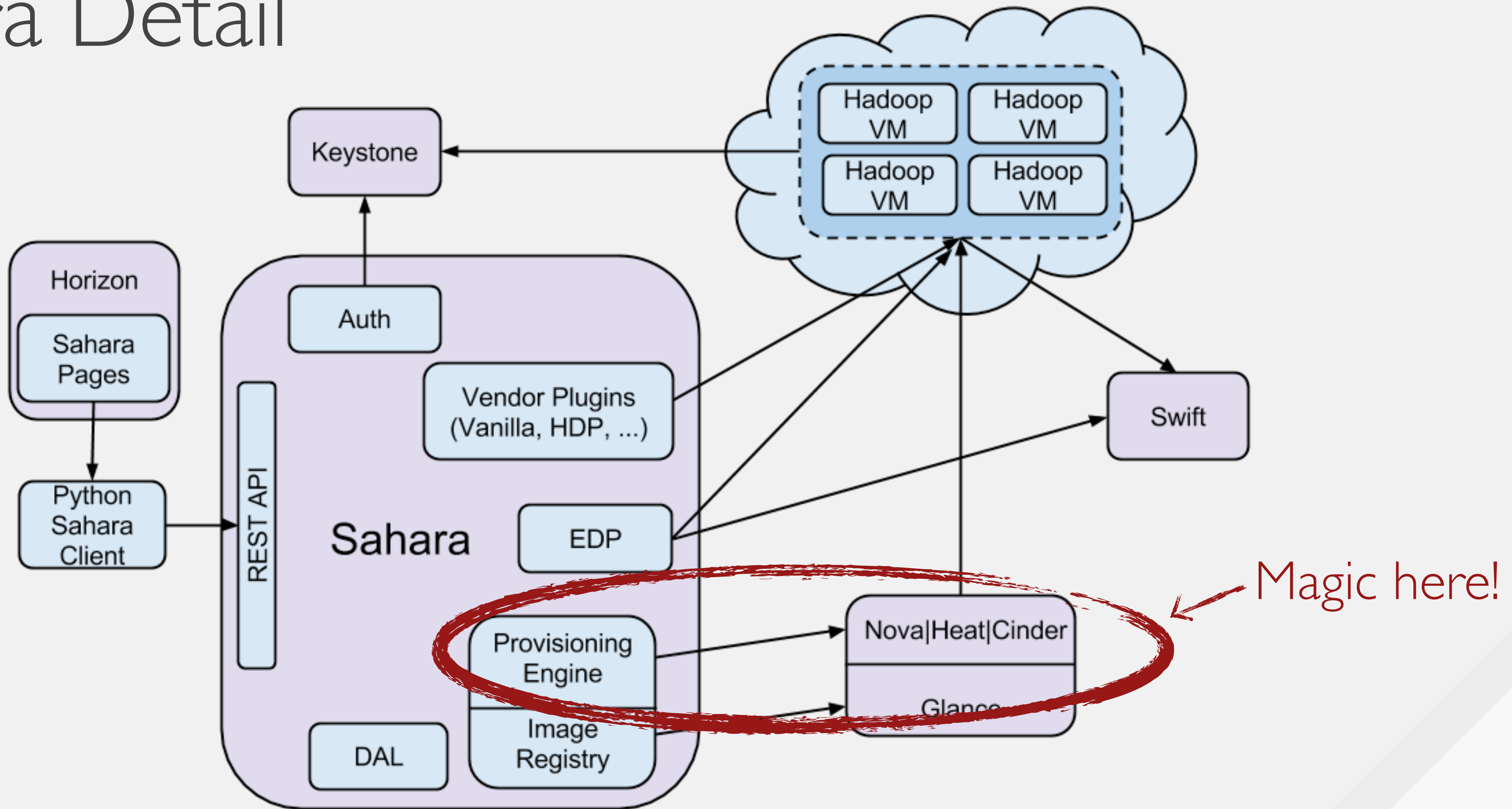
Sort & Shuffle

Reduce

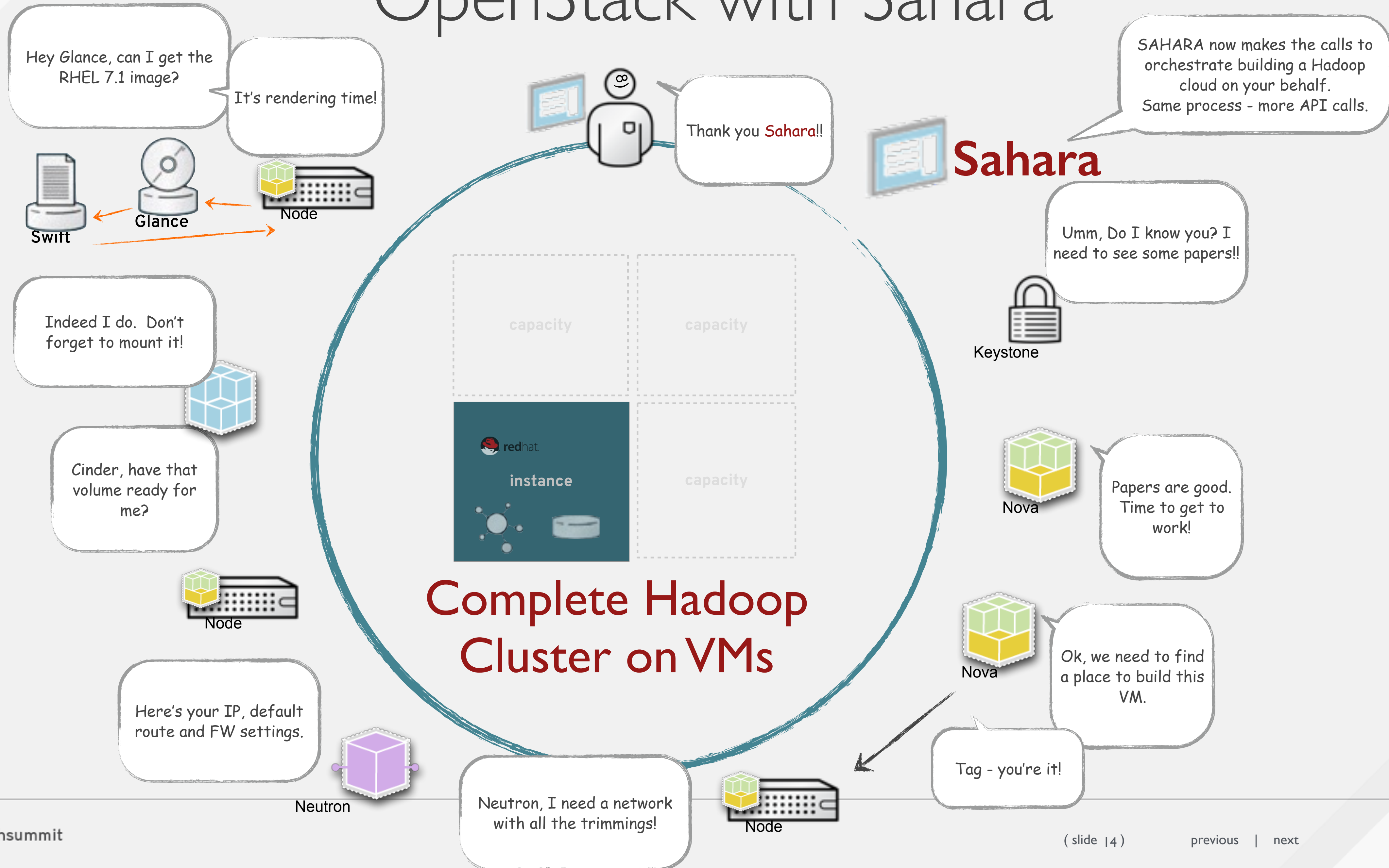
OpenStack Sahara: Logical Architecture



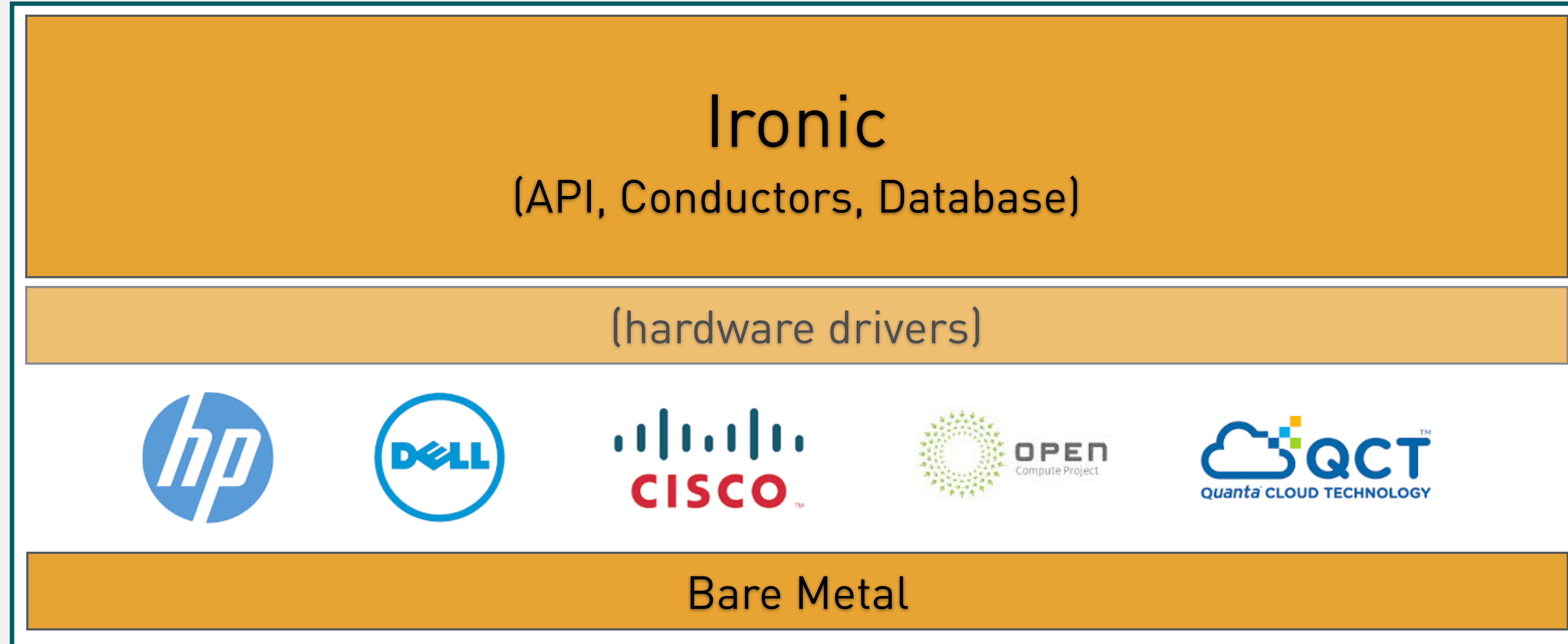
Sahara Detail



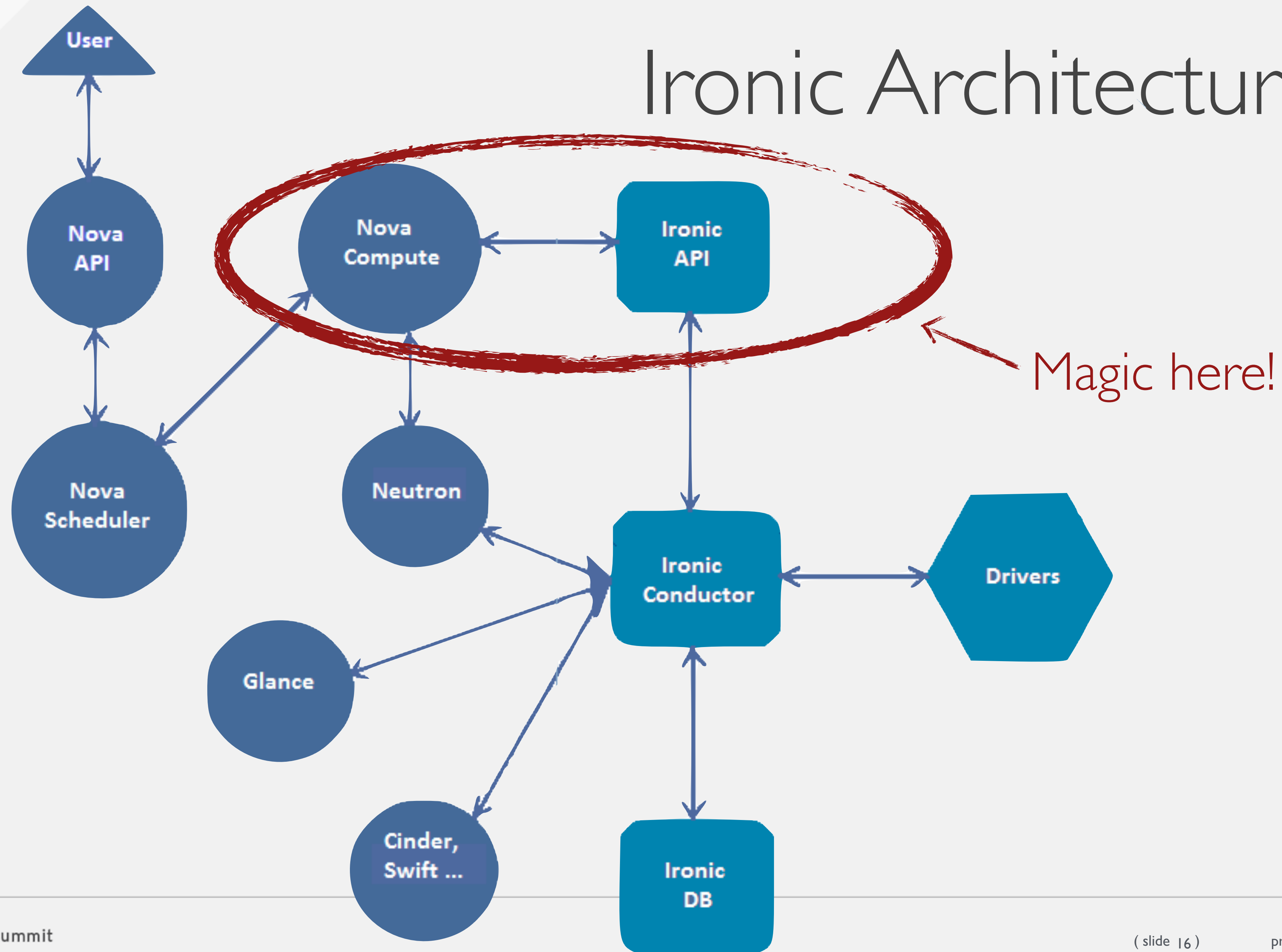
OpenStack with Sahara



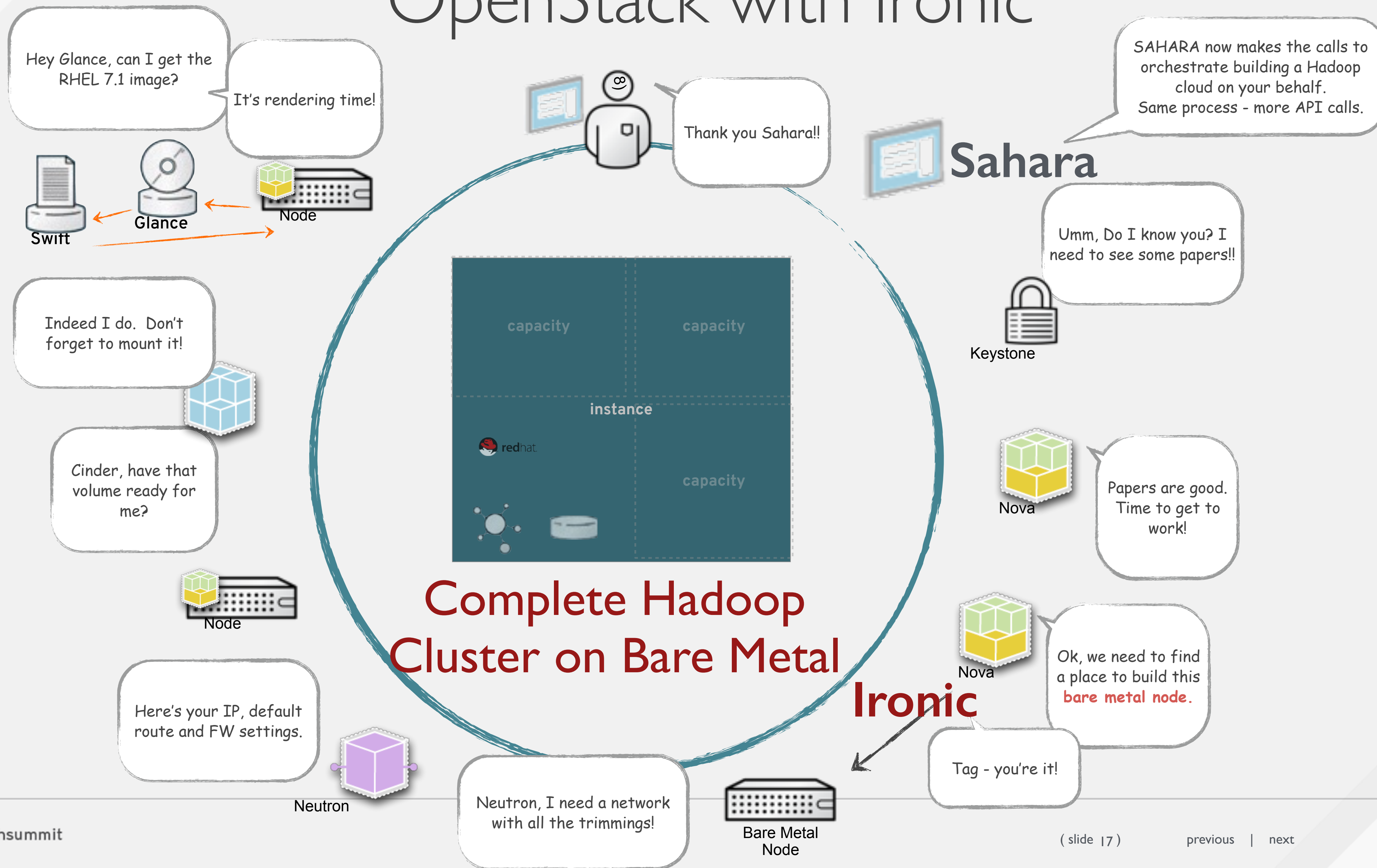
Ironi Logical Architecture



Ironiic Architecture Detail



OpenStack with Ironi



Elastic Infrastructure .. meets

(OpenStack)



.. Elastic Infrastructure (Hadoop)

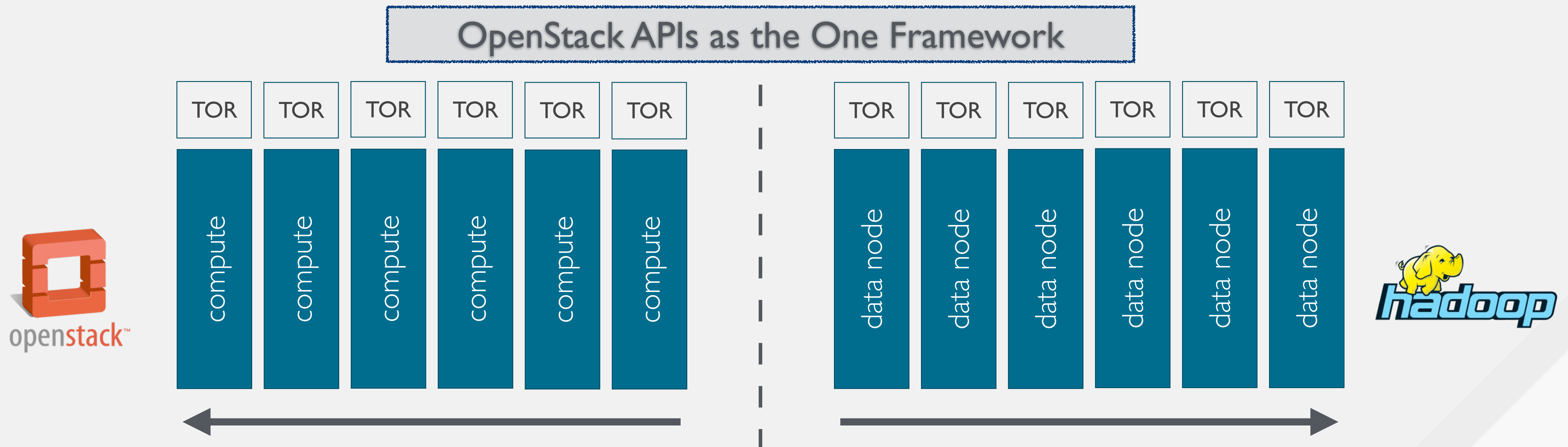
Herefords and Angus!



No pets here - all cattle!

The Holy Grail of Elasticity

- One set of APIs to drive both IaaS and Big Data
- Both love east-west network optimization
- Both expect failure

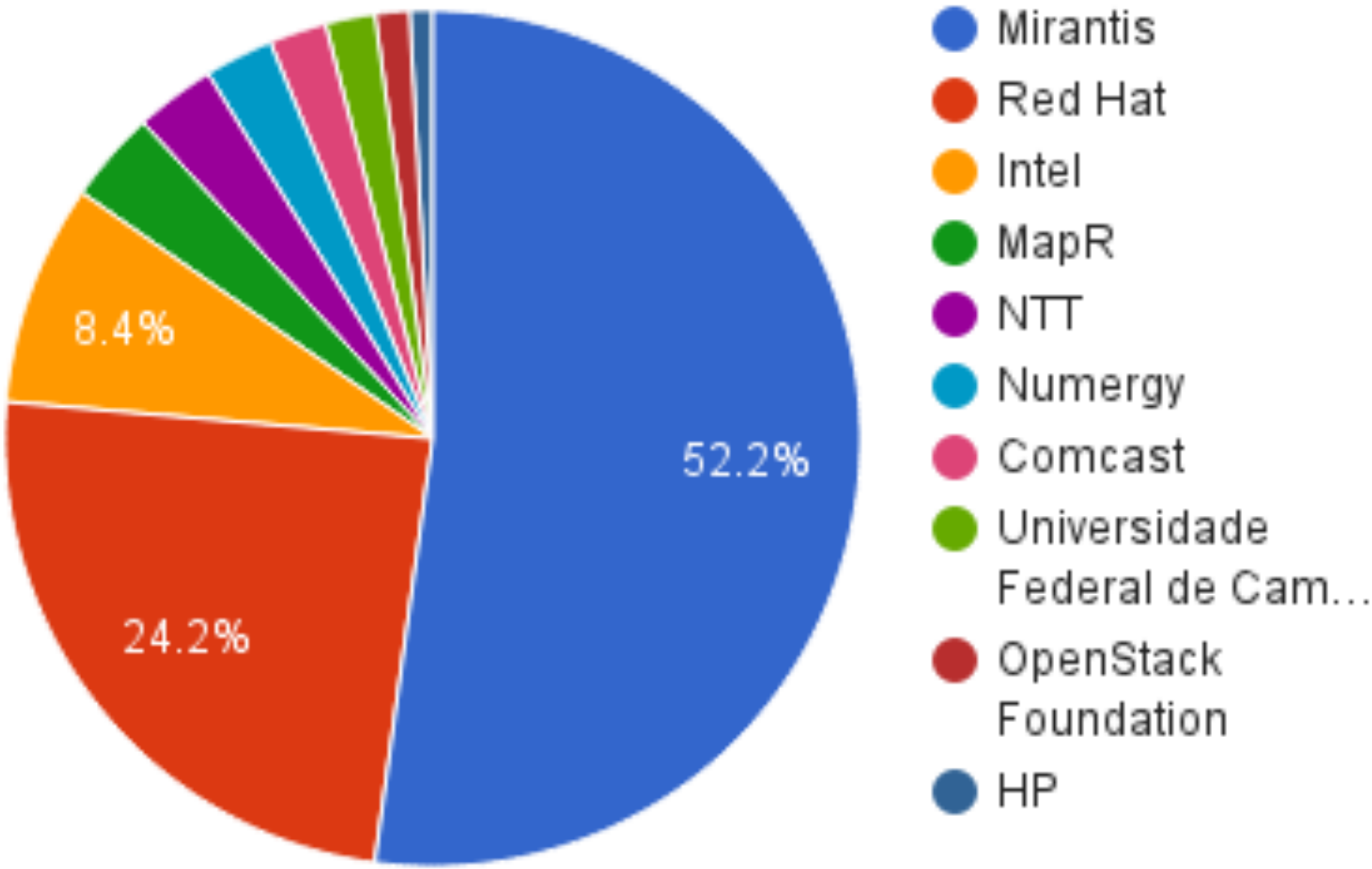


Who?

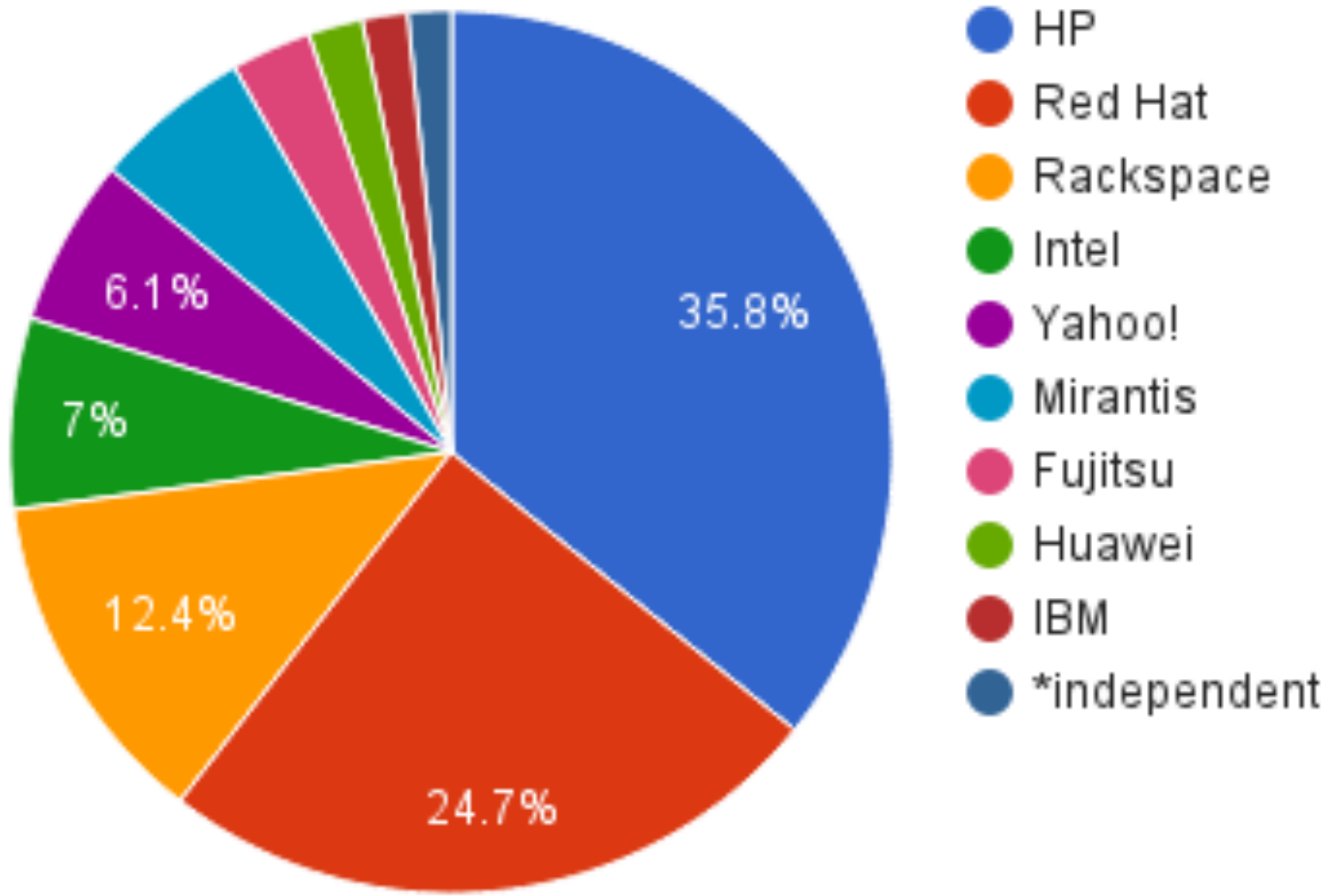


Red Hat, HP, Mirantis and Rackspace

Sahara Kilo Contributions



IroniC Kilo Contributions

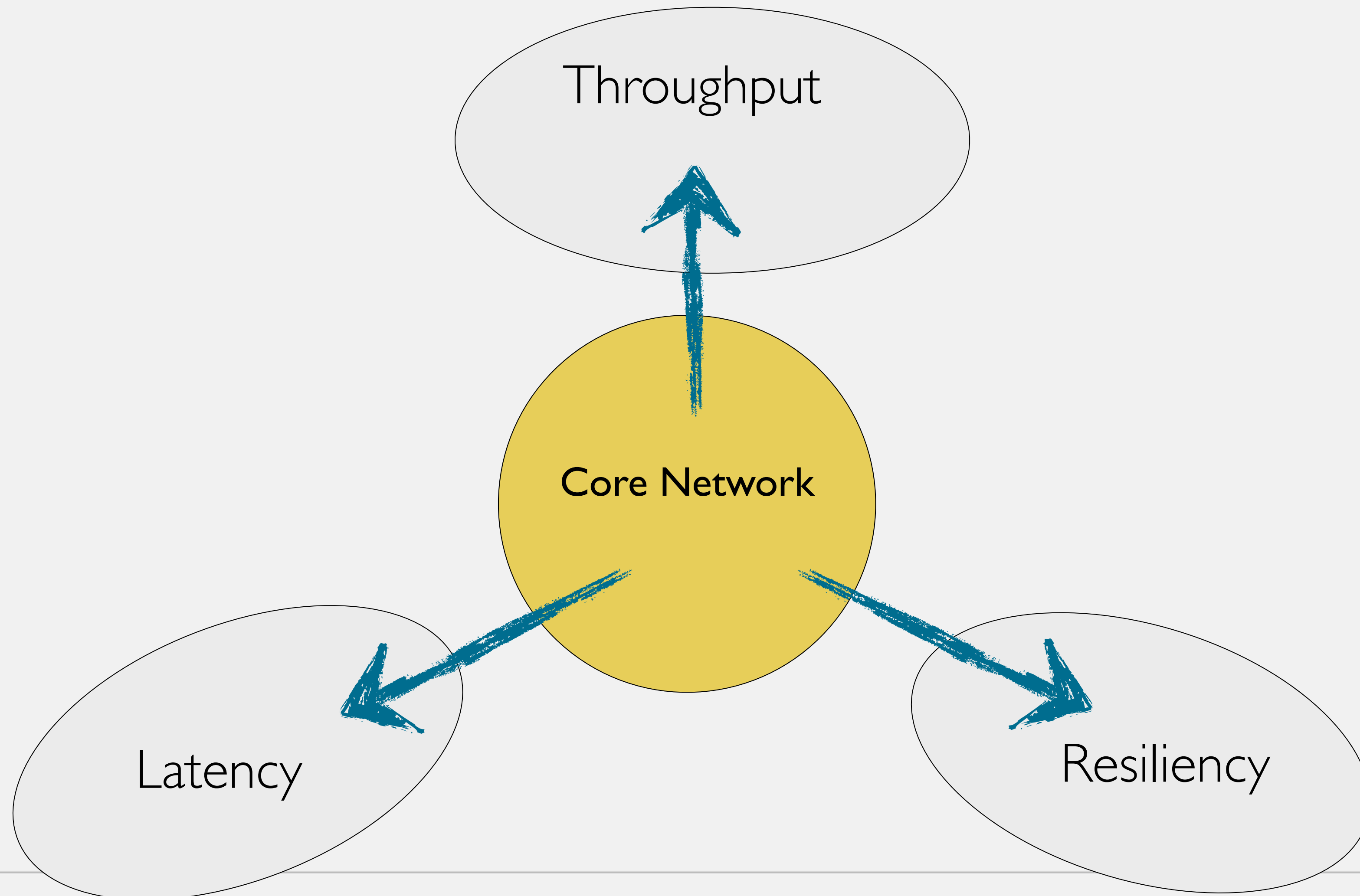


Implementation and Performance

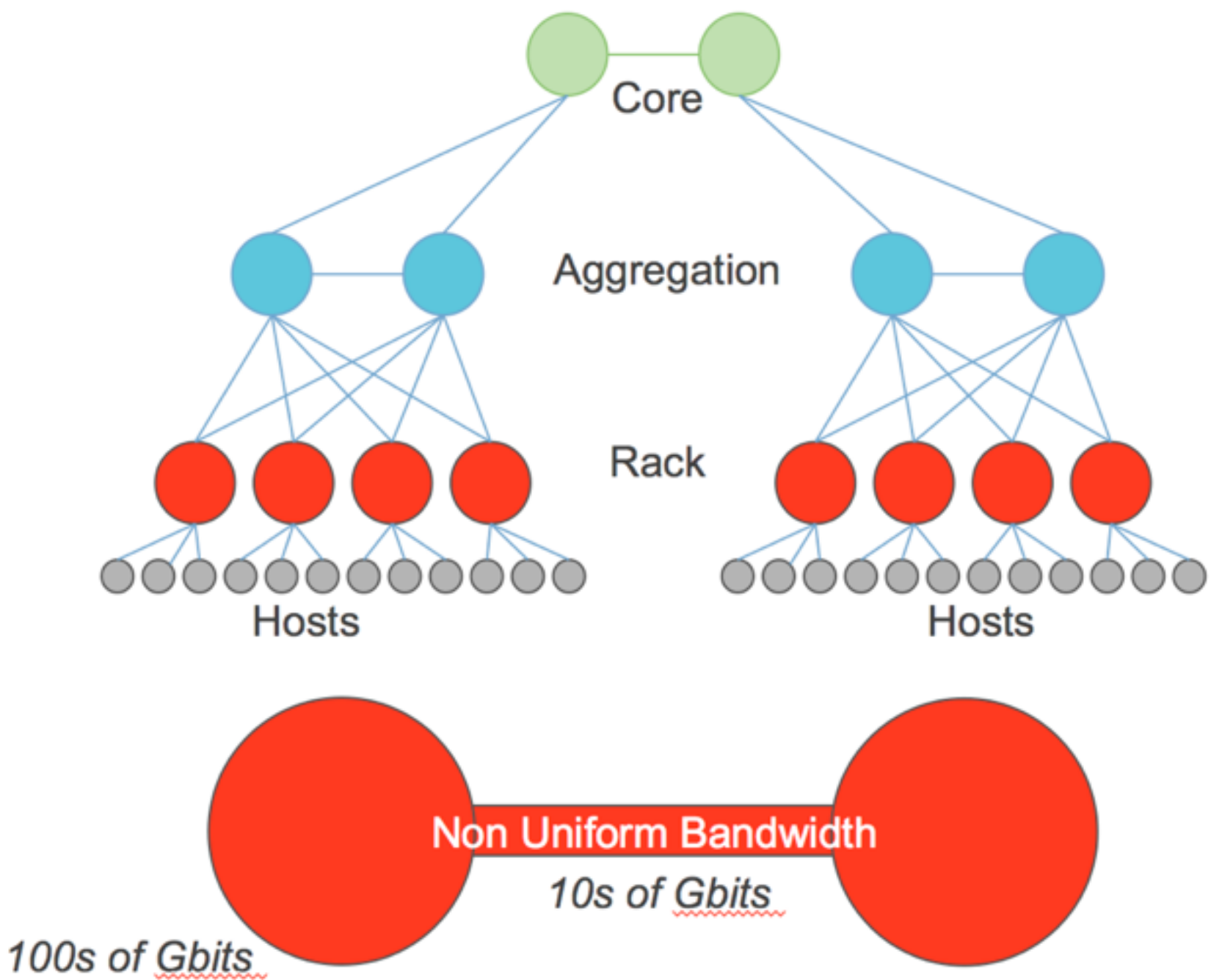


Networking for Elastic Clouds

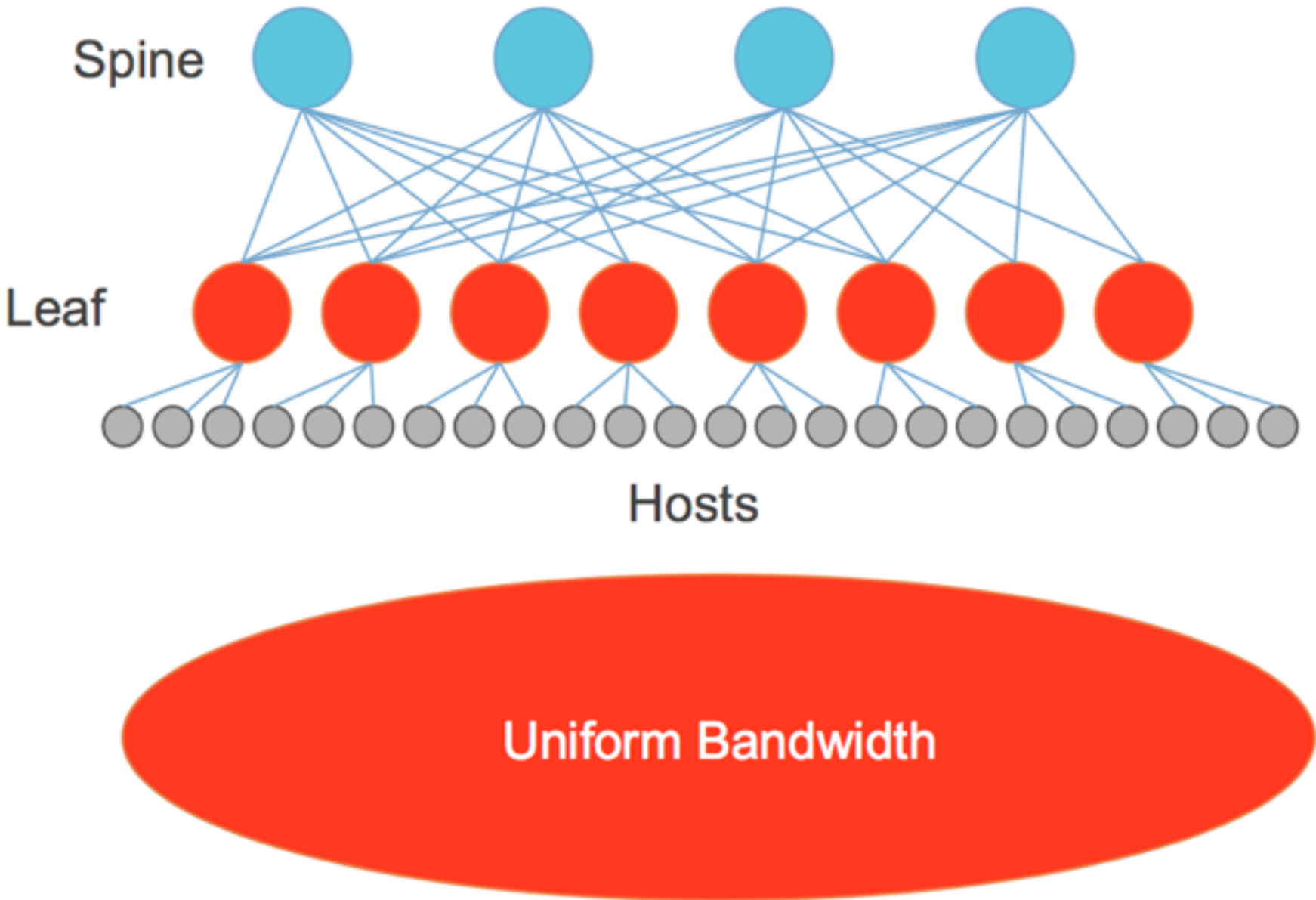
Solving for the Network



Enterprise vs Cloud Fabric

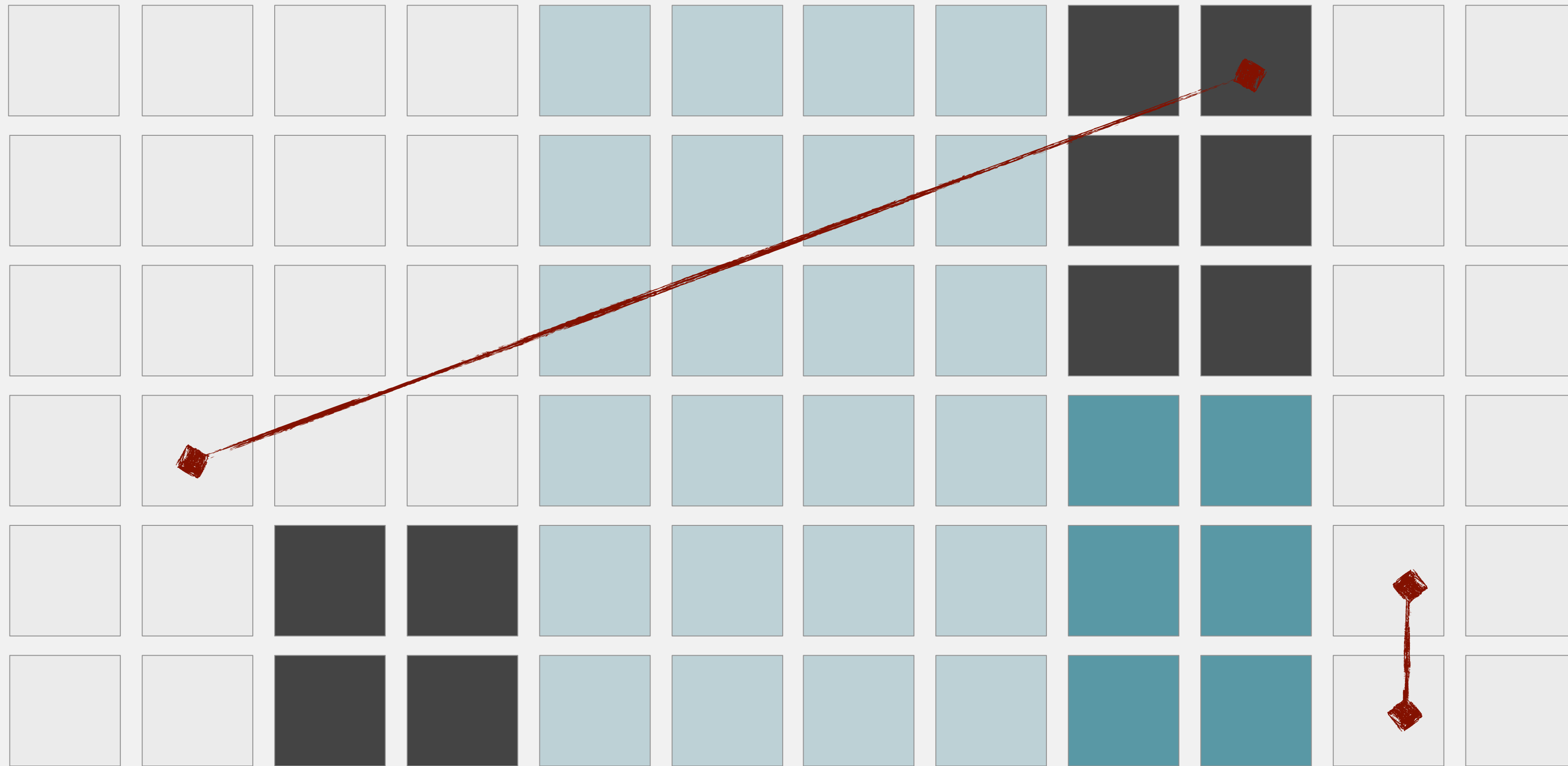


Traditional Enterprise Topology



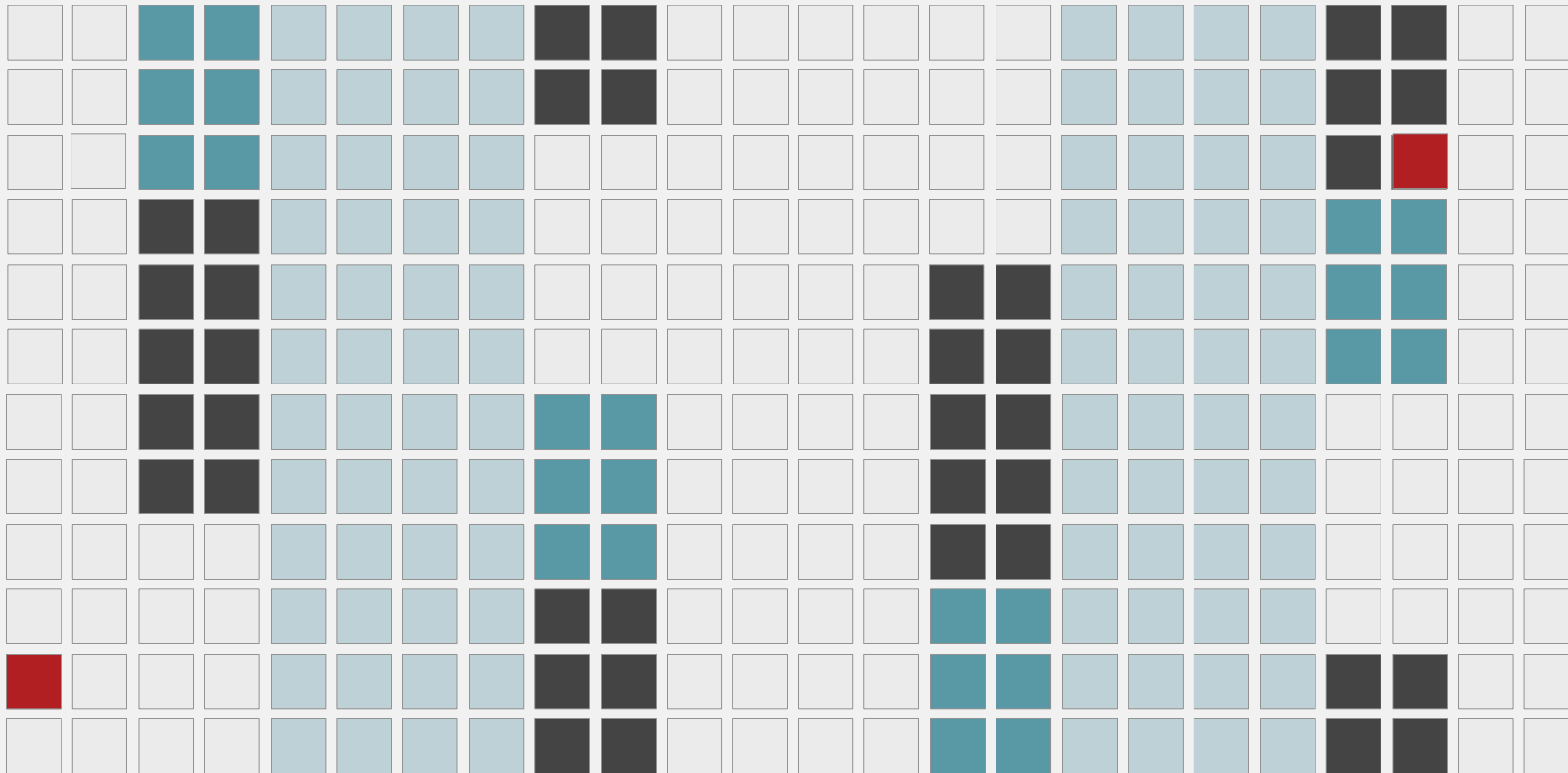
Modern Cloud Friendly Topology

Network Elasticity is Required..



Elastic Cloud Resource Map

Because your cloud will grow..



Each unit here could be a server or rack of servers

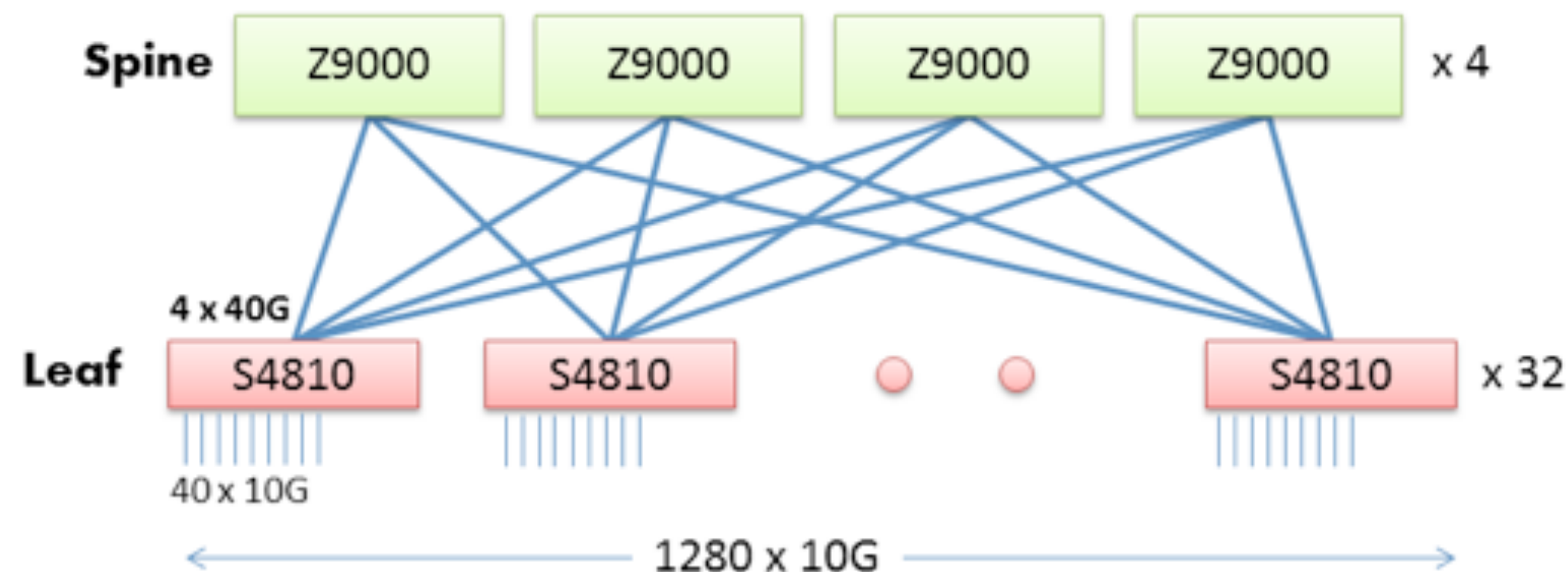
Core Fabric Requirements

- ◉ OpenStack and Hadoop friendly networking features:
 - ◉ Availability and Resiliency
(multi-path, per-flow routing)
 - ◉ Resource Node (compute/storage) Data Throughput
 - ◉ Low Network Latency
 - ◉ Congestion Management

Spine and Leaf Topology

- Ask your friendly network vendor for guidance
 - Cisco, PlumGrid, Mellanox, Brocade, Juniper, Force 10, etc.

40G Leaf/Spine

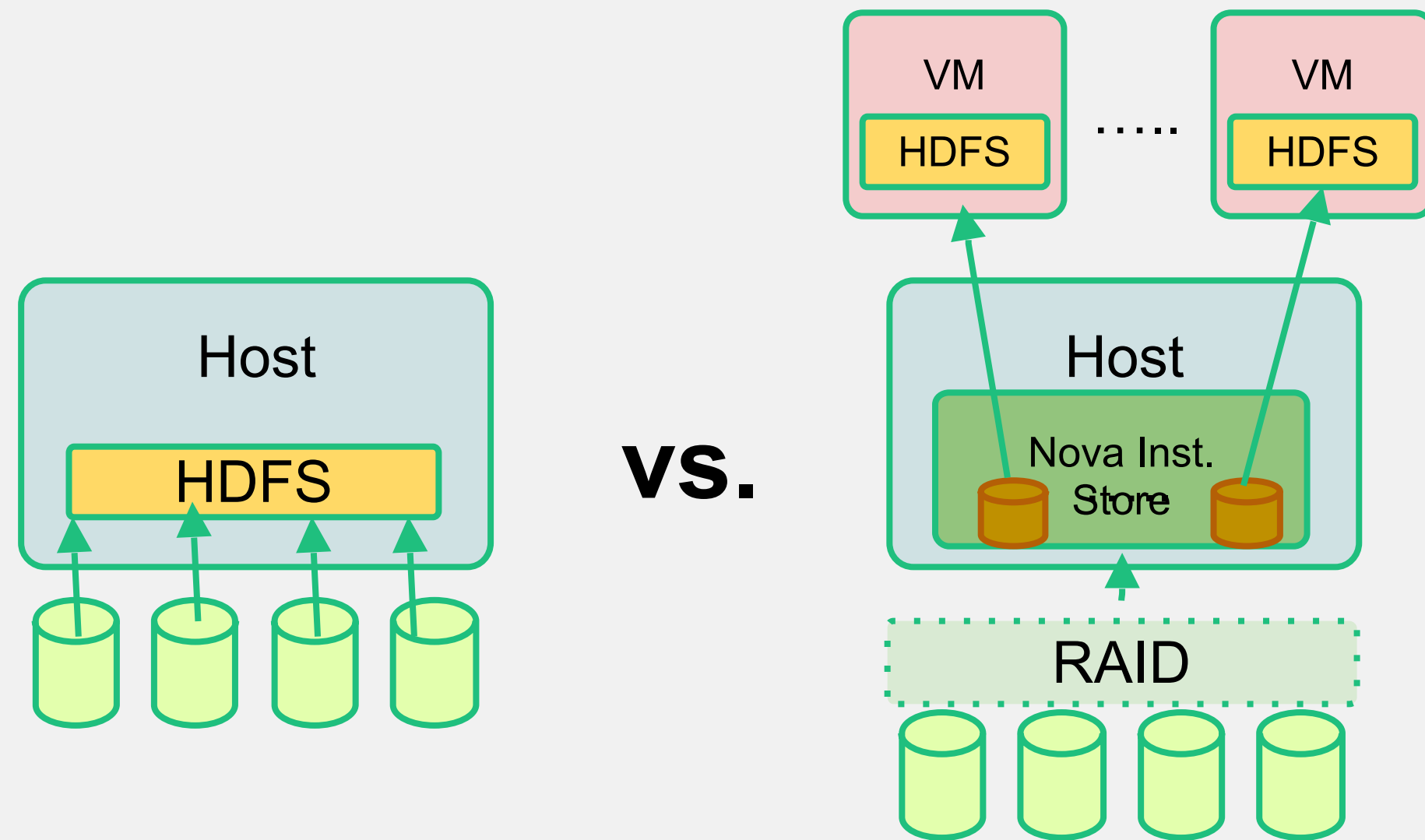


<http://bradhedlund.com/2012/01/25/construct-a-leaf-spine-design-with-40g-or-10g-an-observation-in-scaling-the-fabric/>

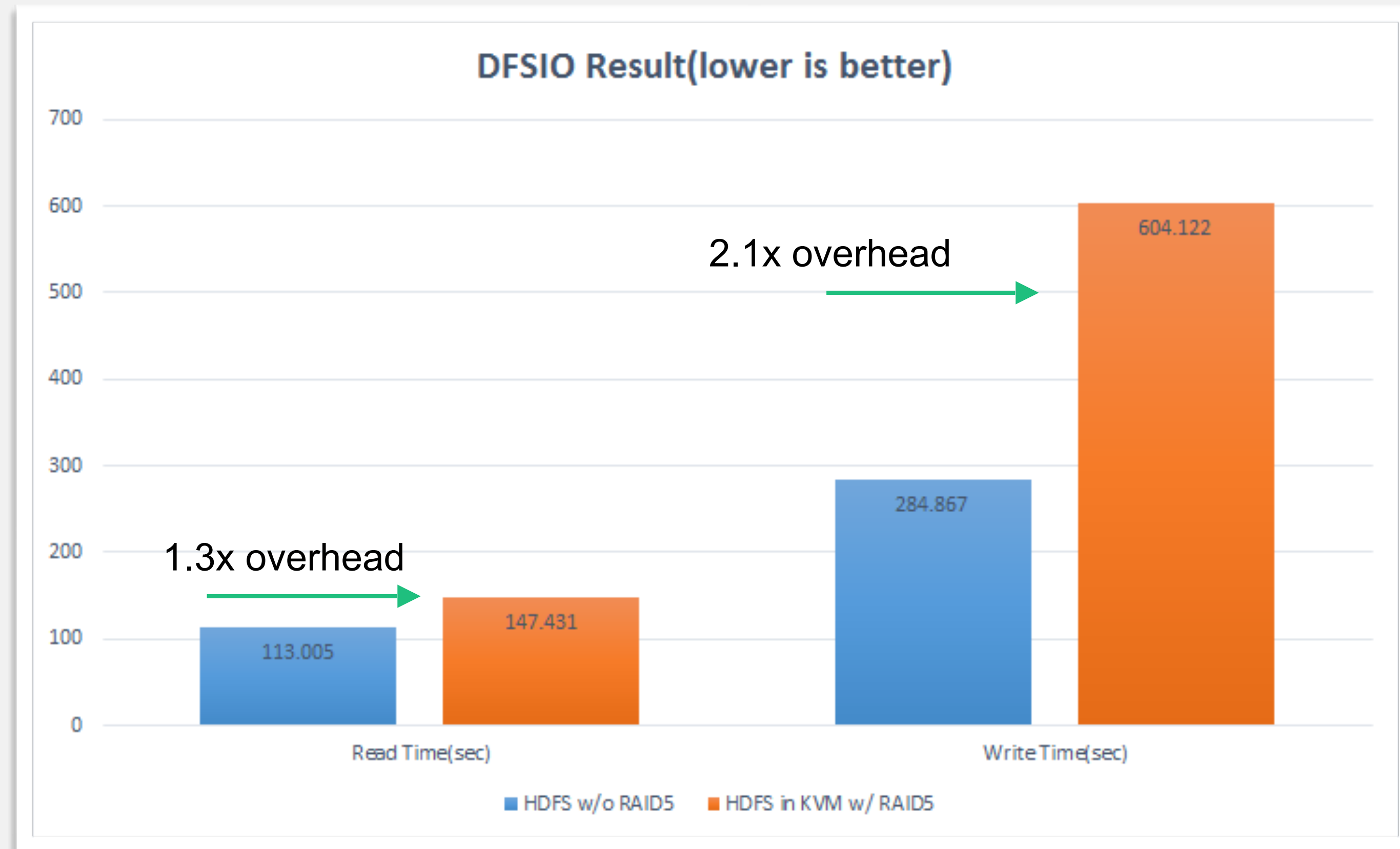
BRAD HEDLUND .com

Virtual vs. Bare Metal Performance

Virt vs. BM: Ephemeral Disk Performance



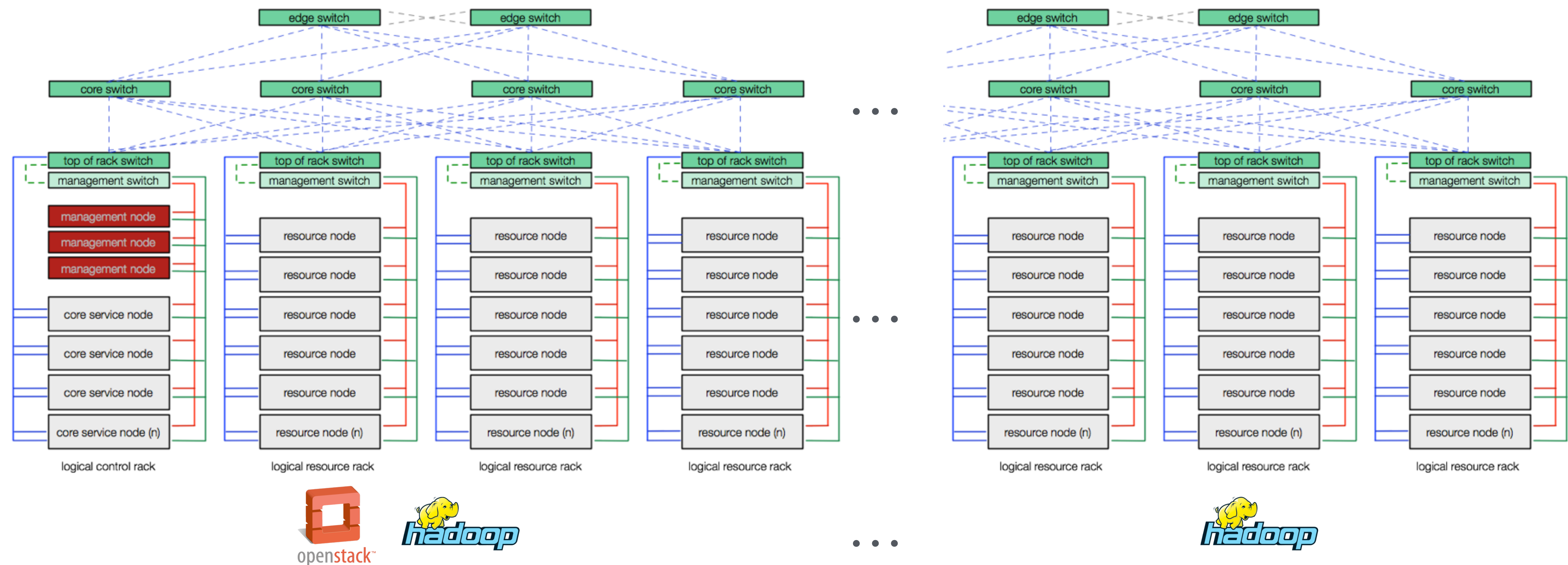
- 1.3x read overhead, 2.1x overhead
- disk access pattern change: 10%
- virtualization overhead: 90%
 - 60% due to I/O overhead
 - 30% due to memory efficiency in virtualization



Heavy tuning is required.

Getting to the End State

OpenStack and Non-Ephemeral Hadoop



Traditional OpenStack IaaS plus Hadoop on **virtual machines** deployed by Sahara

More permanent, performant Hadoop clusters also deployed by Sahara but on **bare metal**

Future Work and Considerations

In General

- ◉ Best practices and reference architectures created
- ◉ Bare metal to tenant security architecture
- ◉ Heavy validation of the bare metal deployment use case
- ◉ Early benchmarking shows a huge virtual vs bare-metal performance gap.
- ◉ Strong customer demand for a unified solution!
- ◉ Sahara in Kilo is ready!

Future Work and Considerations

IroniC

- IroniC topology awareness should be a thing by RHEL OSP 8.
- Increased hardware **Ready State** coverage
- IroniC is a supported component in RHEL OSP 7
- Top of Rack switch configurations via Neutron?

RHEL OpenStack Platform director - the new deployment and management tool for RHEL OSP

- Sahara deployment by RHEL OSP director will be a 7.x feature
- RHEL OSP director should have a tenant facing IroniC story

Questions?

Resources

- *Isn't it Ironic? The Bare Metal Cloud*

<https://www.openstack.org/summit/vancouver-2015/summit-videos/presentation/isn-and-039t-it-ironic-the-bare-metal-cloud>

- *Benchmarking Sahara-based Big Data as a Service solutions*

<https://www.openstack.org/summit/vancouver-2015/summit-videos/presentation/benchmarking-sahara-based-big-data-as-a-service-solutions>

- *Bare Metal Hadoop and OpenStack: Together at Last!*

<https://www.openstack.org/summit/vancouver-2015/summit-videos/presentation/bare-metal-hadoop-and-openstack-together-at-last>

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