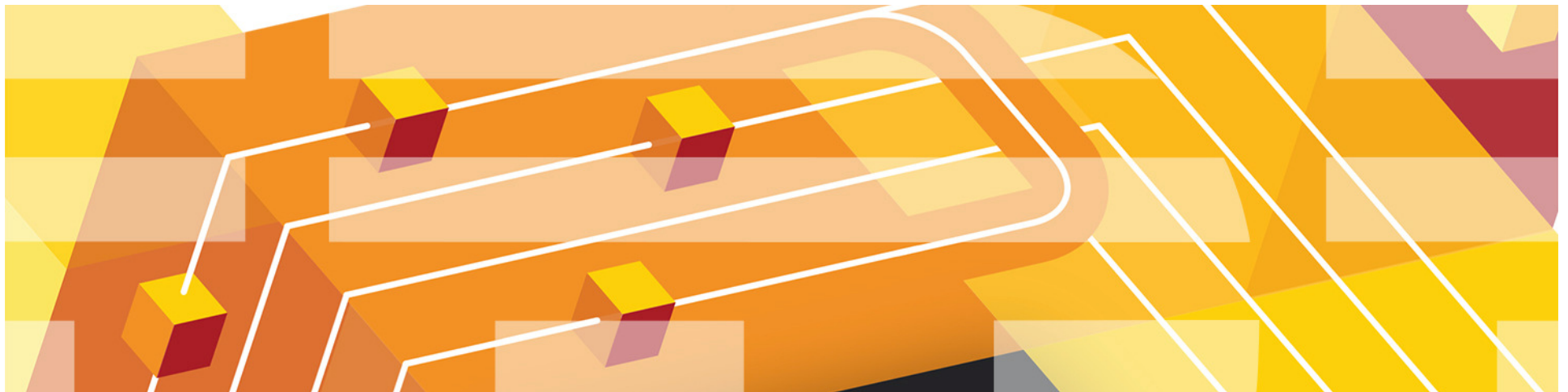
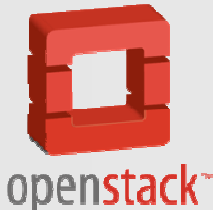


Openstack - was bringt uns das

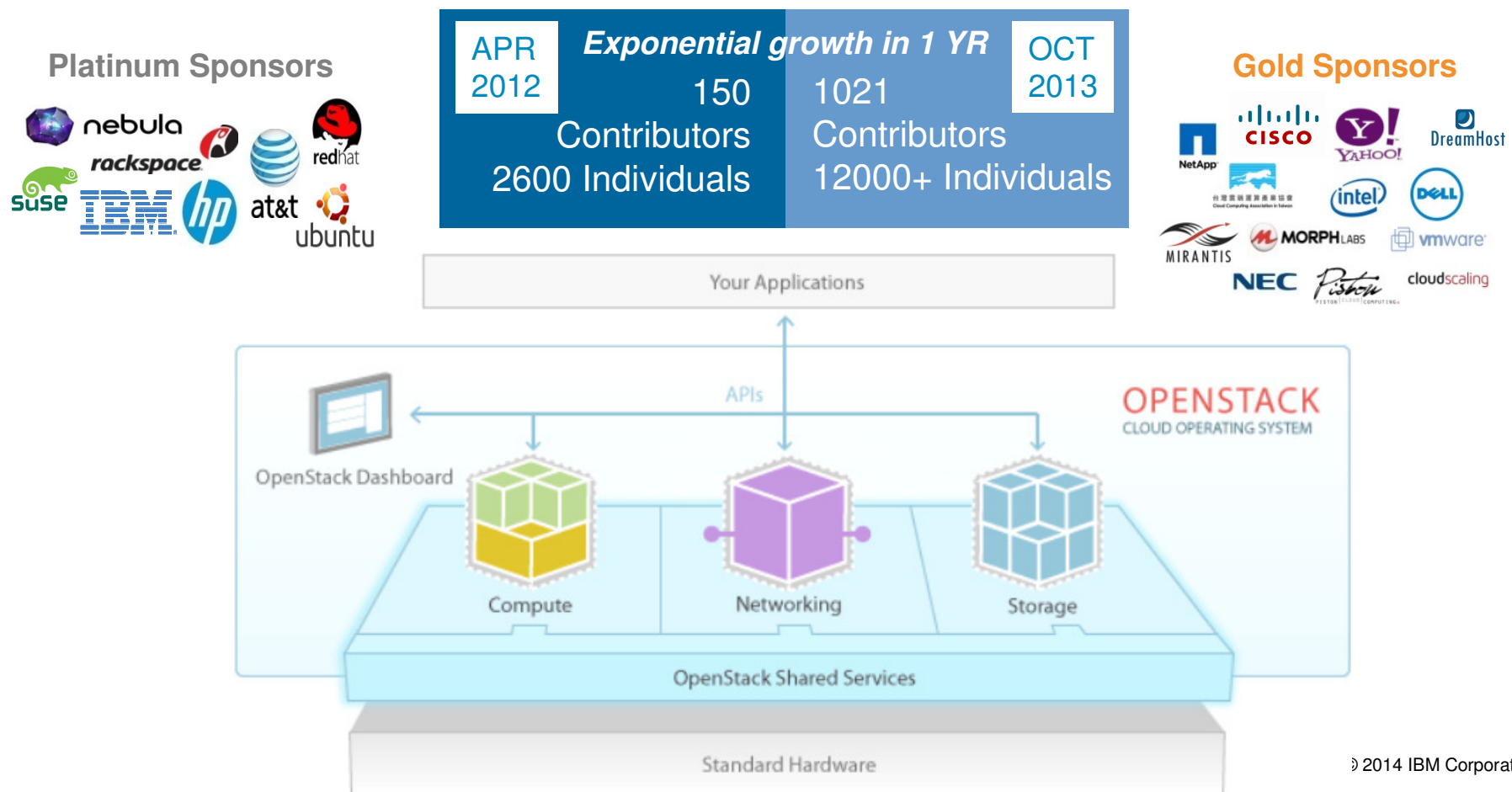


Wilhelm Mild
IT Architect
IBM Labor Böblingen

The OpenStack Foundation – Exponential Ecosystem Growth

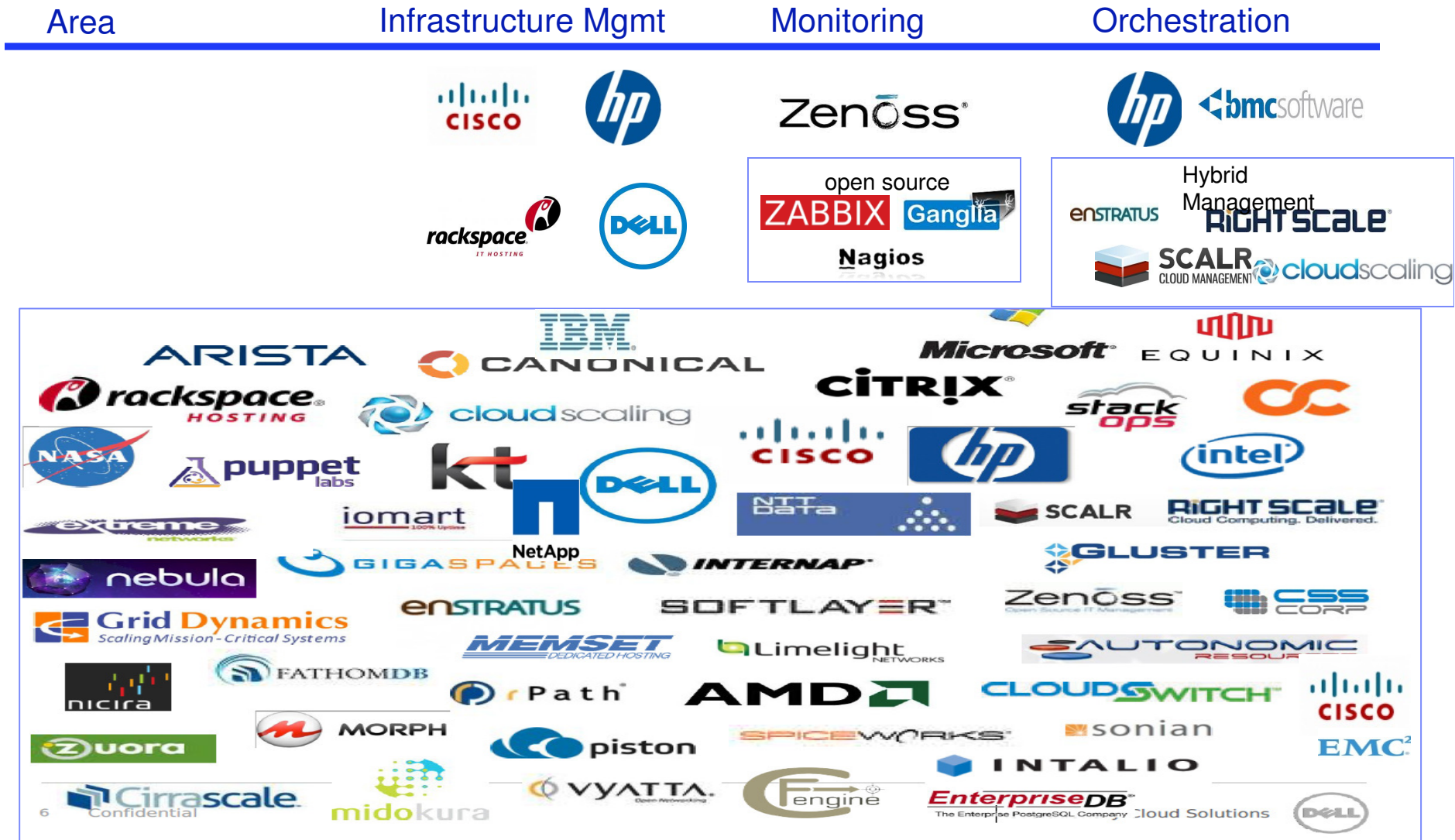


OpenStack is a global collaboration of developers & cloud computing technologists working to produce an **ubiquitous Infrastructure as a Service (IaaS) open source** cloud computing platform for public & private clouds.

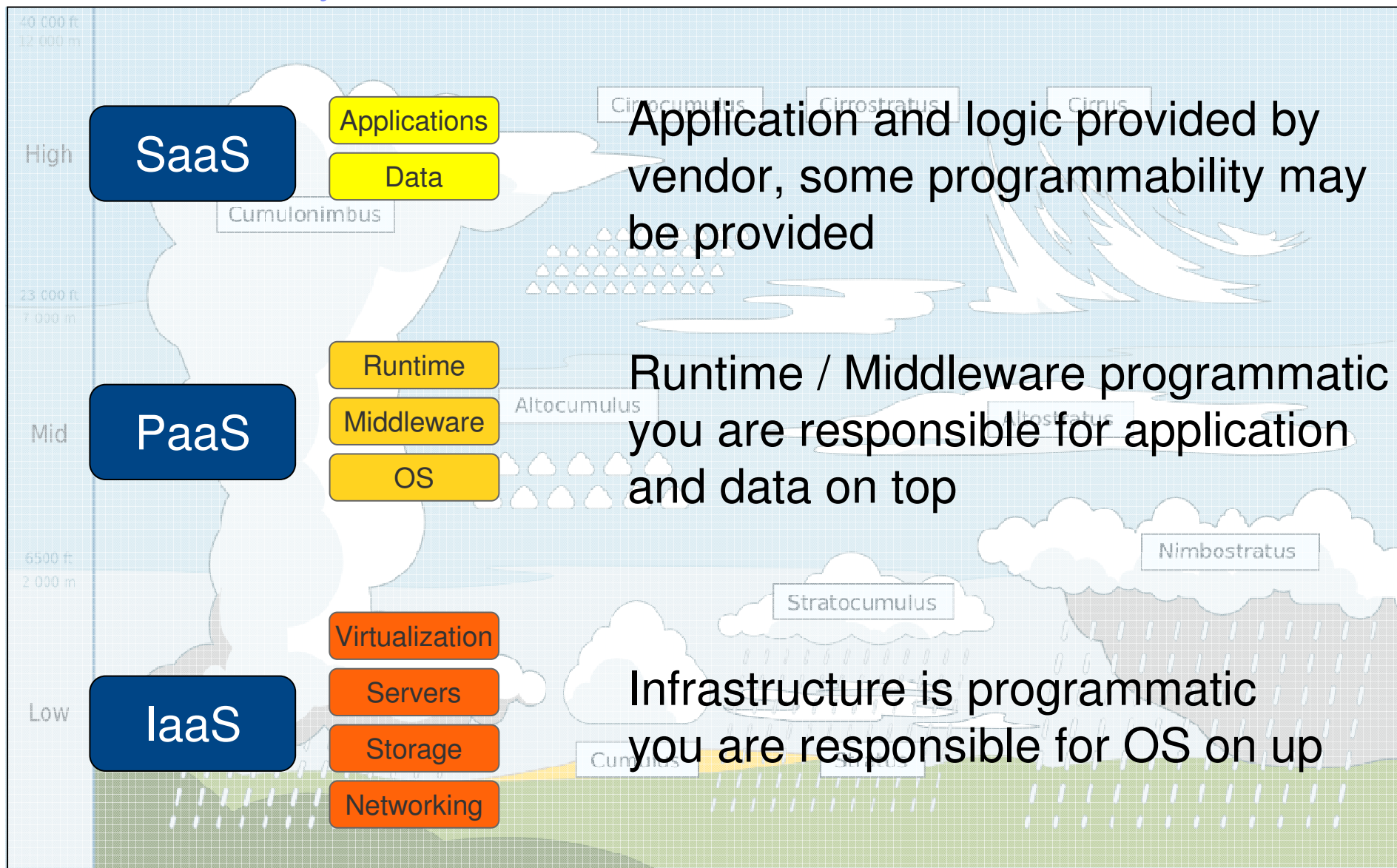


OpenStack Ecosystem at a glance.

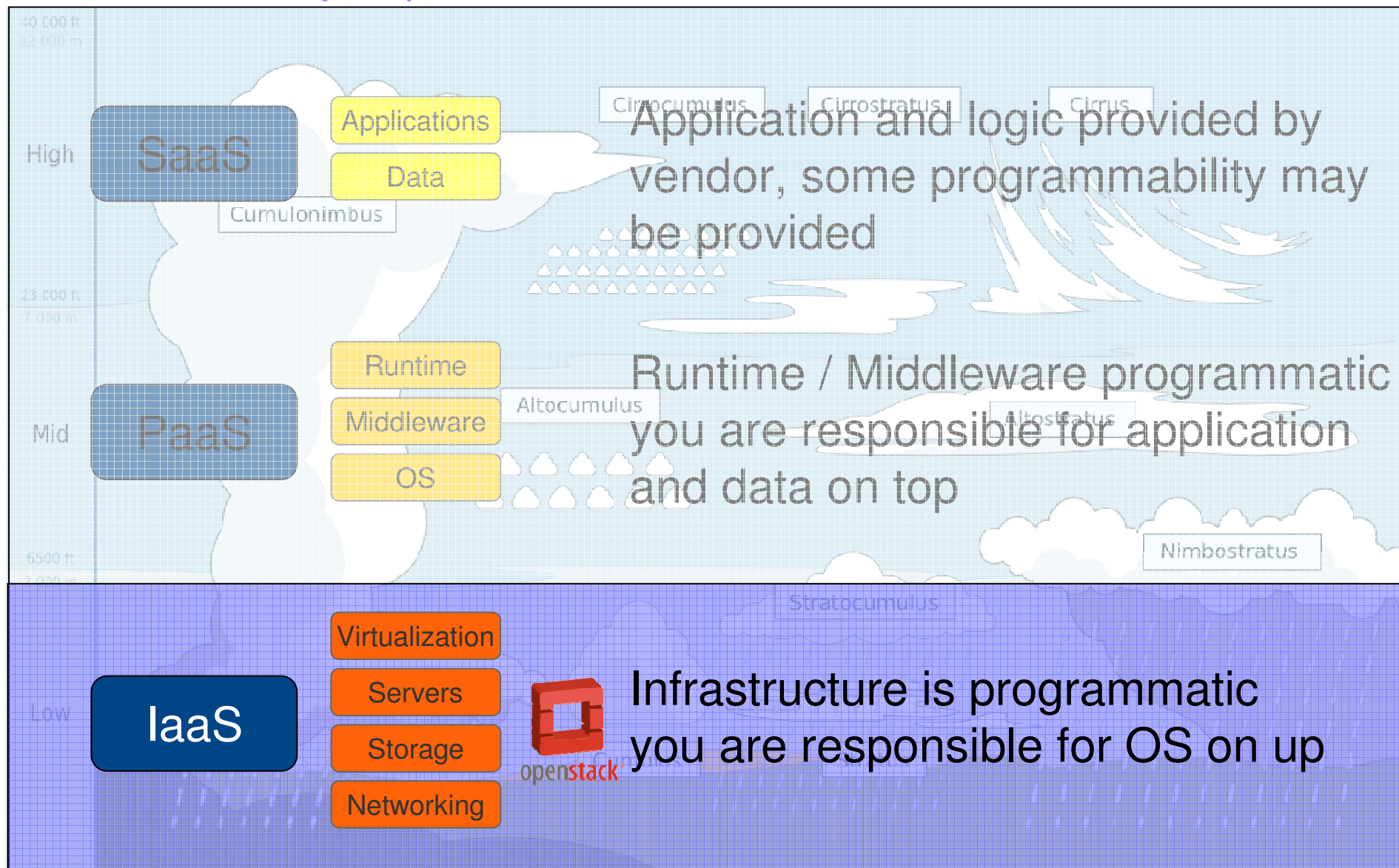
Infrastructure and Automation (Orchestration) have more investments, most hardware companies shifting strategically to Openstack. Hybrid management and Orchestration is emerging as a strong use case.



Cloud Taxonomy



Cloud Taxonomy - OpenStack



OpenStack Project Objectives

Mission:

Create an ubiquitous open source cloud computing platform that is simple to implement and massively scalable

Open - All code is Apache 2 licensed

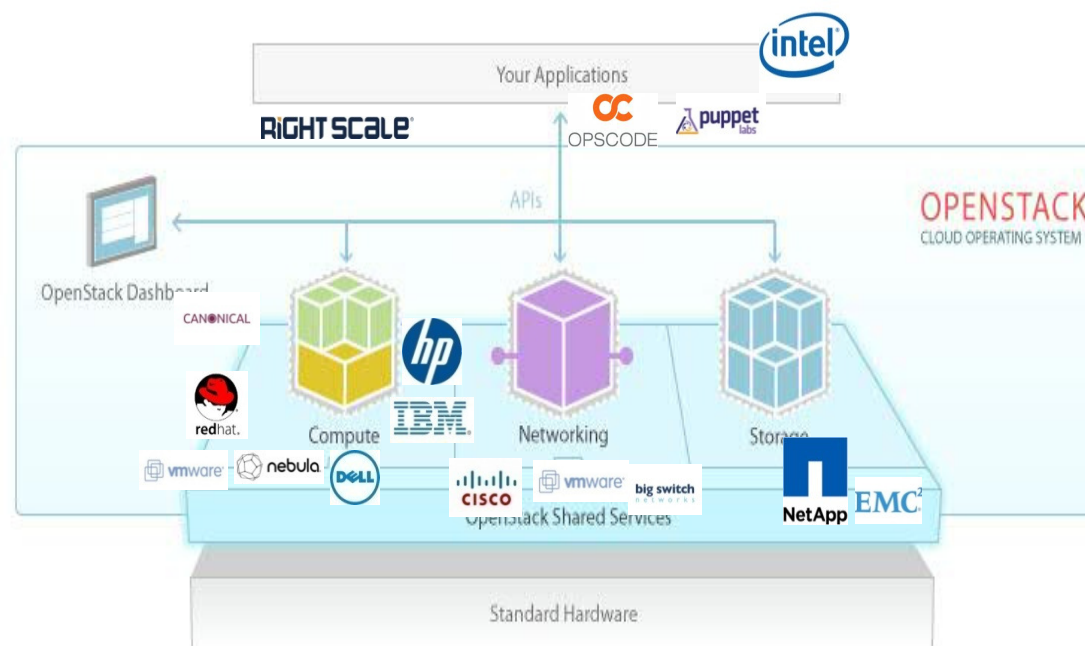
Simple - Architecture is Modular

Scalable – Massive scale Design Goals:

- 1 Million Physical machines, 60 Million VMs
- Billions of Objects stored

A vibrant ecosystem around the main pillars of compute, network and storage. Most major vendors already on board, lots of new smaller companies gaining traction.

OpenStack: The Open Source Cloud Operating System



OpenStack Projects Cover Many Aspects of IaaS Solutions



Nova

OpenStack Compute

Provision and manage large networks of virtual machines



Swift

Object Storage

Scalable, redundant http-based put/get object store



Cinder

Block Storage

Block storage service, create/clone/manage volumes



Quantum

Network

Network-connectivity-as-a-service, provision and manage L2 networks



Keystone

Identity

Unified authentication system, integrates with existing systems



Glance

Imaging Service

Image registration and (optional) storage



Horizon

Dashboard

End-user self-service portal and administrative interface



Ceilometer

Monitoring / Metering

Extendable statistics and metering service



Heat

Orchestration

Combines resources into a running cloud stack

Telecom/Media



at&t



Retail



Financial Services

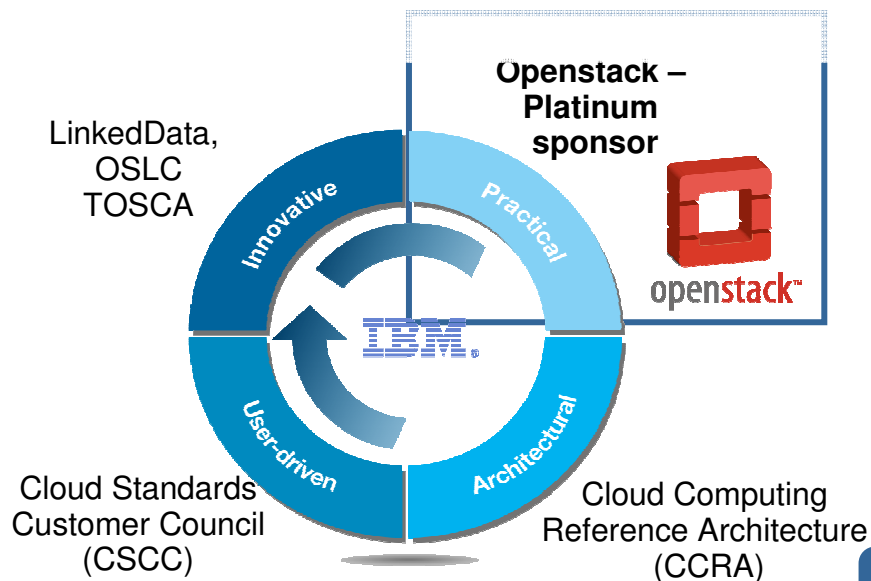
Bloomberg

Public Sector *



* OpenStack becoming table stakes for solutions in US Public Sector

Openstack – Industry Accepted IaaS Cloud Computing Model



IBM joins the new OpenStack Foundation as Platinum Sponsor

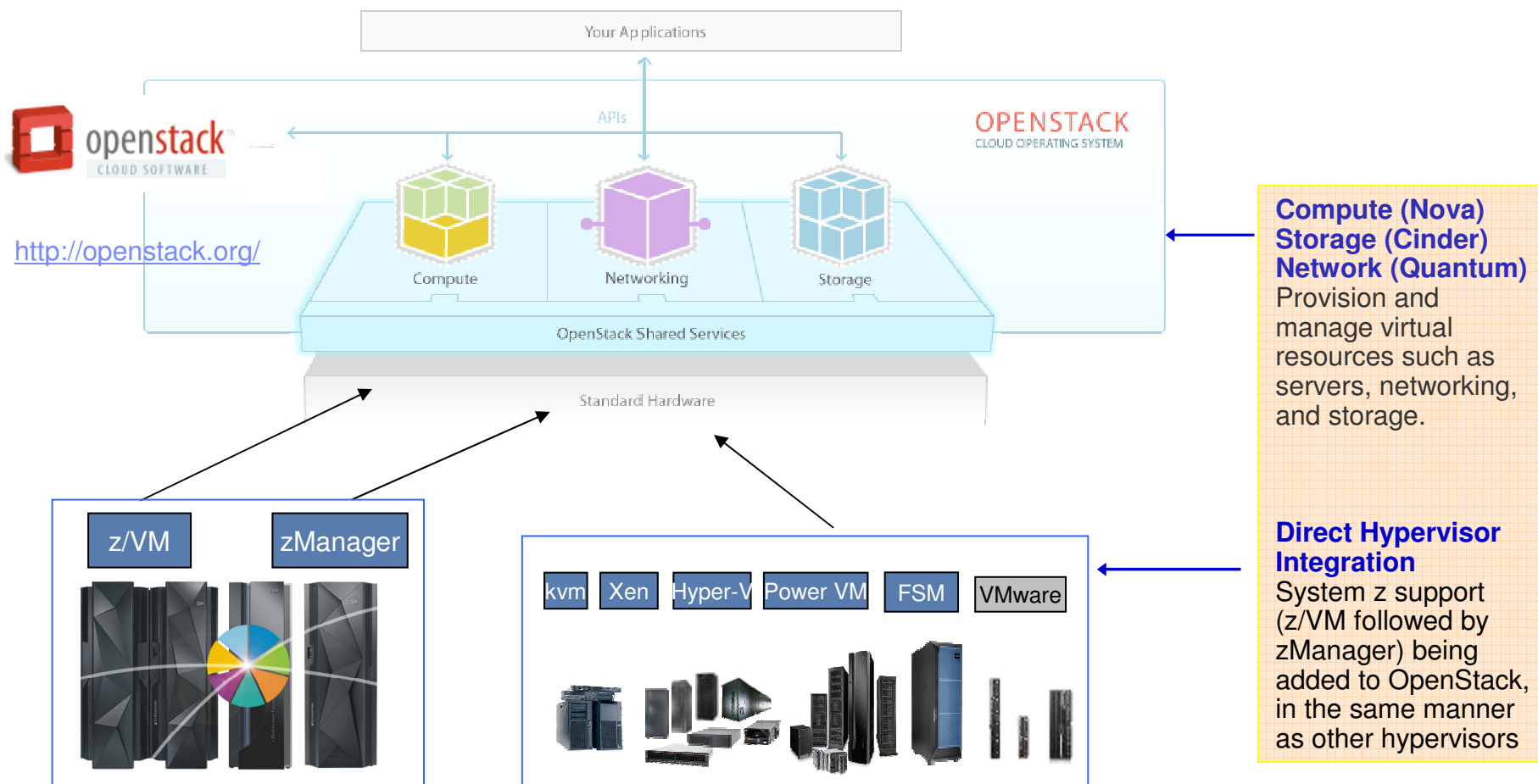
Objectives

- OpenStack is an Infrastructure as a Service (IaaS) cloud computing project that is free open source software released under the terms of the Apache License.
- Managed by the OpenStack Foundation, a non-profit corporate entity established in September 2012
- More than 150 companies have joined the project among which are AMD, Intel, Canonical, SUSE Linux, Red Hat, Cisco, Dell, HP, IBM, NEC, VMware and Yahoo
- It is portable software, but is mostly developed and used on the Linux operating system.

<http://en.wikipedia.org/wiki/OpenStack>

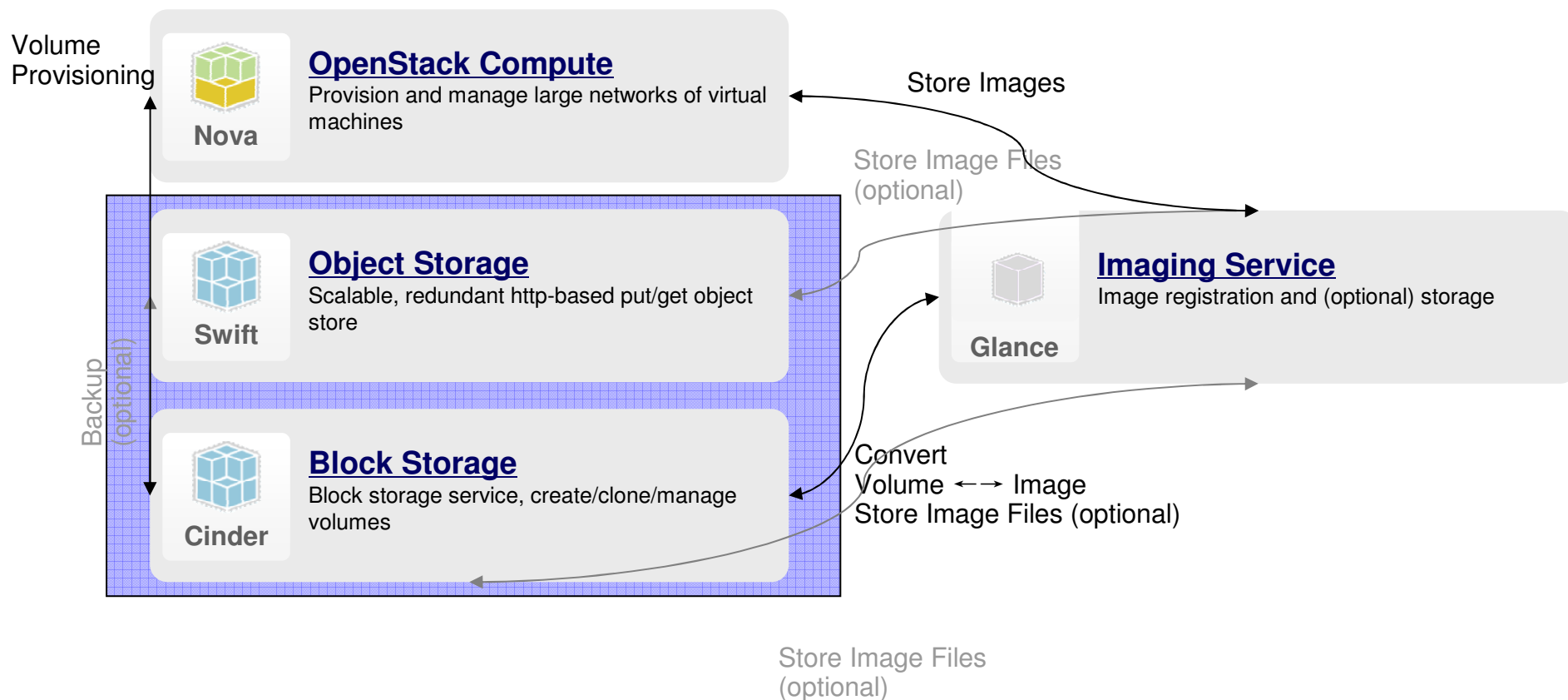
System z - Participation in OpenStack

Self-Service	Cloud Management Application (including SmartCloud technologies)	Multi-Tenant
Services Catalog		Billing and Charge-back



OpenStack Storage-related Components

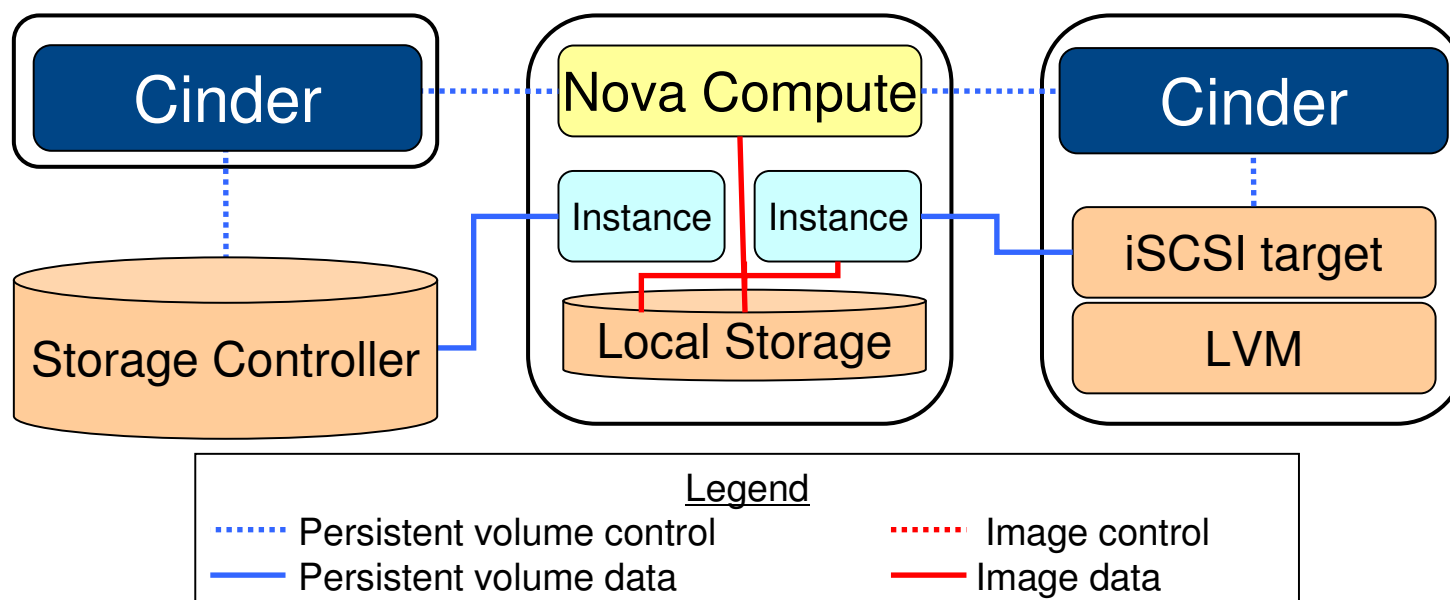
OpenStack Terminology:
 Images: Virtual machine (VM) templates
 Instances: VMs created from Images
 Volumes: Block storage for Instances





Cinder – Block Storage Architecture

- Enables persistent data store for VMs
 - Nova instance disks are ephemeral, deleted when the instance is deleted
 - Cinder volume lifecycle is independent of VM
- Supports creating, attaching, detaching, deleting etc. volumes
 - Volumes are primarily, but not limited to Block storage in the back-end
 - (also NAS, File Systems)
- Supports space-efficient snapshots, cloning (full copy) and backup (early support)



Why using IBM Storage for OpenStack (1/2)?

■ XIV

- **Very easy to install**
 - XIV itself as well as OpenStack driver
- XIV dense packaging well suited for storage-intense cloud
- All storage is deployed automatically with complete automation
 - Direct attached to VM node
- Supports iSCSI + FC attachment



<http://www.youtube.com/watch?v=RgAYTUNrWe0>

■ SVC/Storwize

- **Only Storage solution that supports fully transparent live storage migration in OpenStack Havana**
 - No interaction with the host required
- All advanced Storwize features are supported and exposed to the Cinder ecosystem
 - Real-time compression, EasyTier
- Supports iSCSI + FC attachment

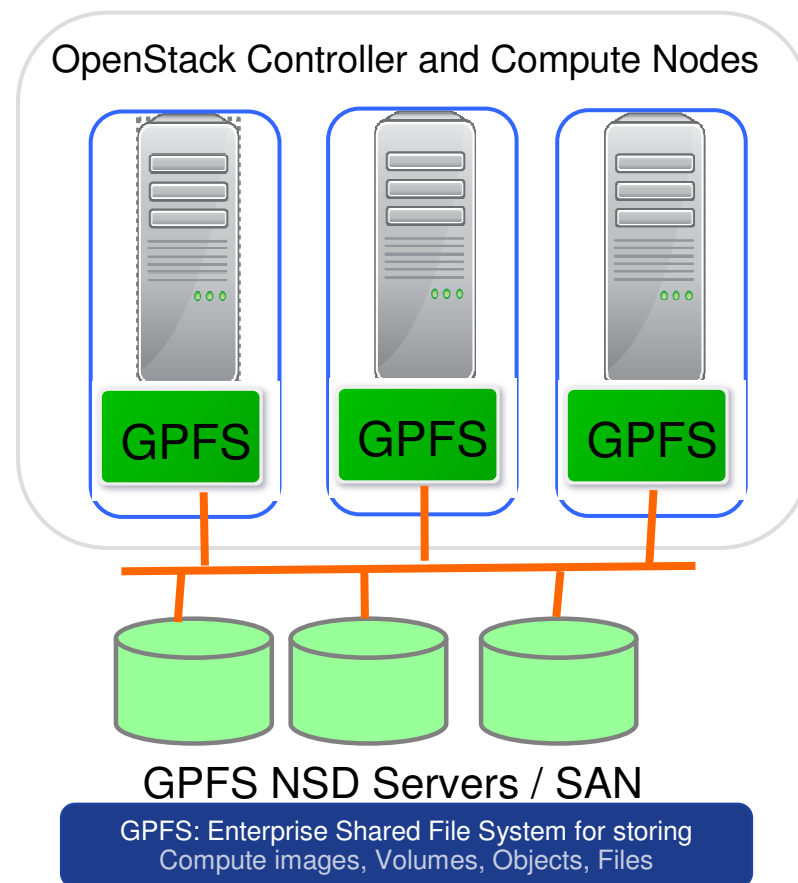


<http://www.youtube.com/watch?v=cwt1n6s83mQ>
<http://www.youtube.com/watch?v=JWMm6-zwrMw>

Why using IBM Storage for OpenStack (2/2)?

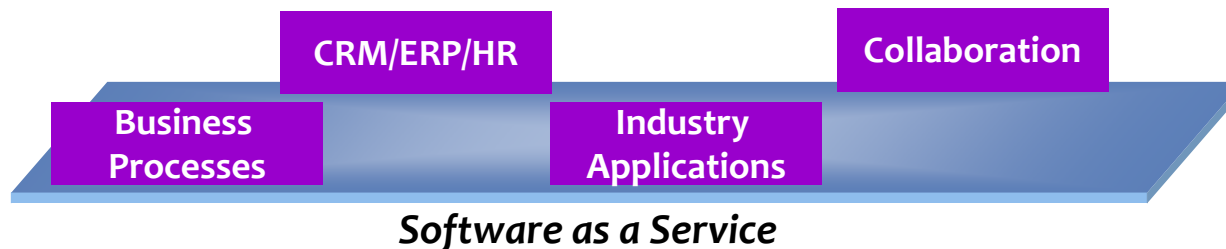
■ GPFS

- **Single scale-out dataplane for the entire datacenter**
- Volumes & Snapshots are files in the unified namespace
- Localizes & optimizes all volume operations
 - Snapshots & Clones are mapped to space-efficient and high-performant GPFS clone operations
- Supports per-Volume replication levels
- Glance integration
 - VM instantiation is copy-on-write (COW)
 - Volume ← → Image conversion is COW
- File system features
 - Volume auto-formatting and -labeling
- Transparent migration support
 - Between GPFS pools or GPFS-nodes
- Supports all enterprise GPFS features
 - FPO, de-clustered parity (GNR), policy-based ILM/HSM, Tape support

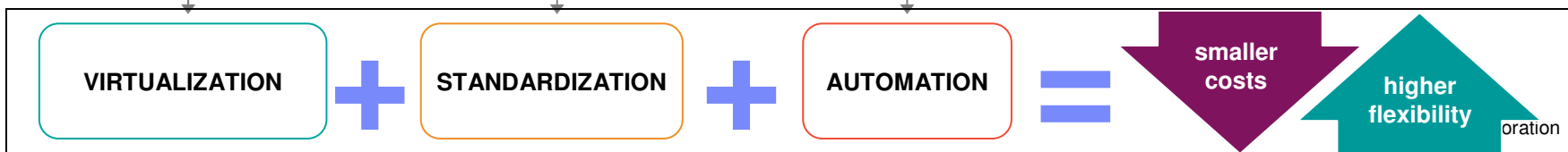
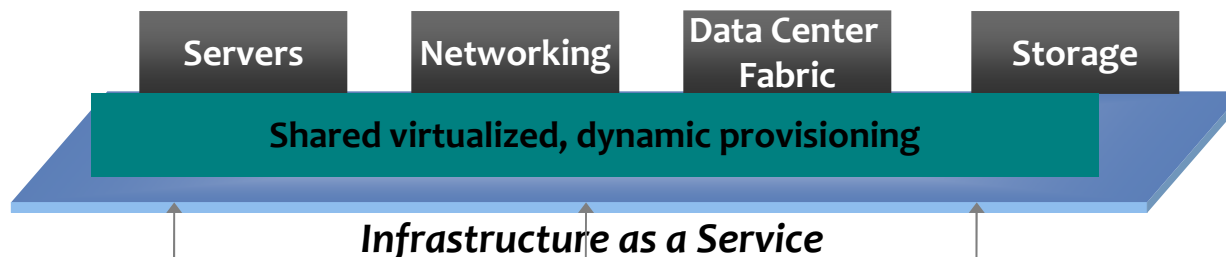
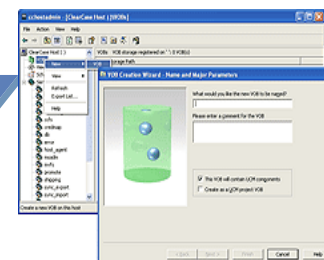
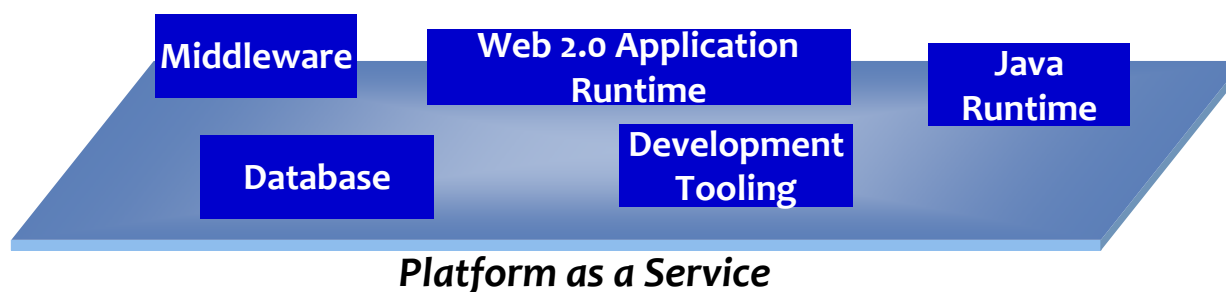
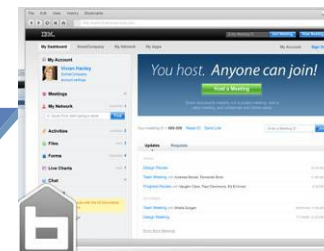


<http://www.youtube.com/watch?v=q-O-VPs0K8w>

Cloud computing service Layers



User



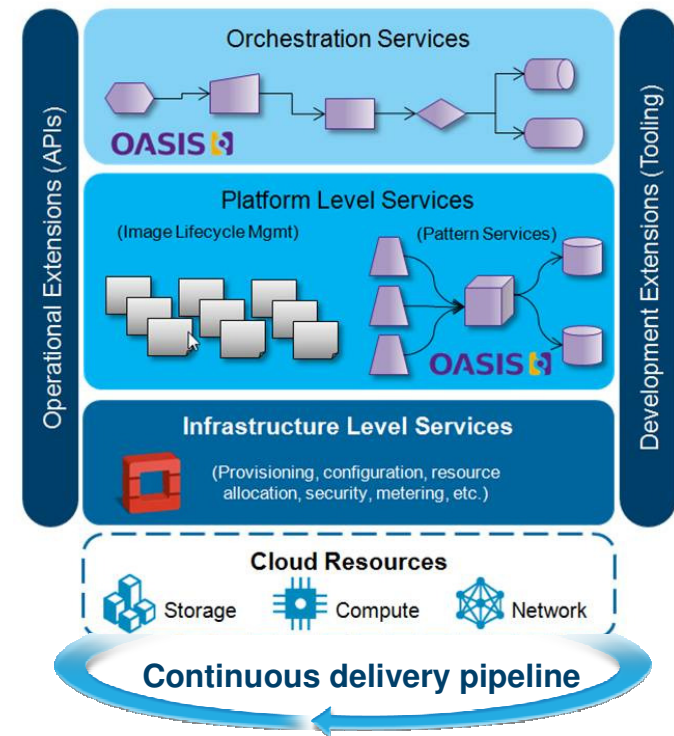
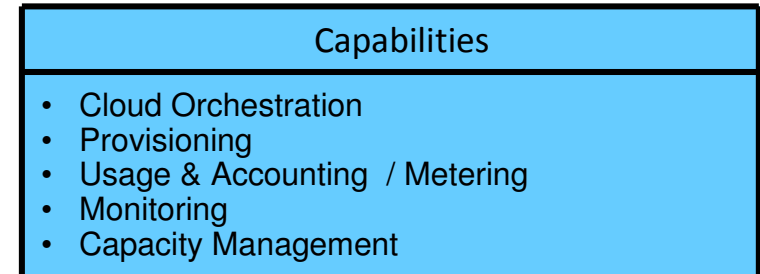
IBM SmartCloud Orchestrator



Reduce IT costs and accelerate delivery of business applications with an open and extensible orchestration platform that fully automates the delivery of IT services in a cloud environment

Solution benefits

- Accelerate deployment of cloud services using reusable **workload patterns** and **IT process automation**
 - Self-service portal allows for selection of cloud services from a predefined menu of offerings
 - Intuitive **graphical orchestrator** helps compose and customize workflows quickly and easily
- Deliver interoperable open cloud services with support for **open standards**
 - Governance Services (**OSLC** support)
 - Eases coordination of complex tasks and workflows, leveraging existing skills, processes and tools
 - Platform Services (**TOSCA** Support)
 - Simplifies deployment and lifecycle management of middleware and application patterns
 - Infrastructure Services (**OpenStack** Support)
 - Provides support for highly flexible, scalable infrastructure on heterogeneous resources
- Extensibility
 - Pre-built images, patterns, process / configuration automation through the **Cloud Marketplace**
 - Take advantage of patterns built for IBM's PureApplication System
- Measure the cost of cloud services, keep track of cloud service health, perform capacity management of the cloud resources



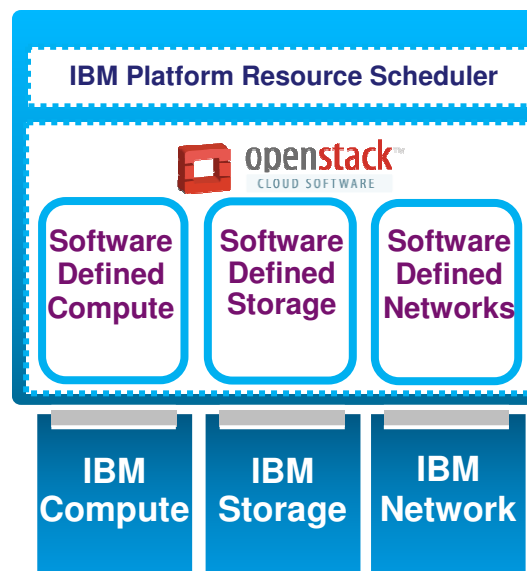
Software Defined Systems - spans across all domains for maximum agility & efficiency

Software Defined Compute

- Hypervisor choice
- Leadership performance and scalability
- Rich virtualization feature set

Software Defined Storage

- Advanced tiering, migration, and compression services
- Leadership storage virtualization
- Elastic storage software for massive scalability



Software Defined Networks

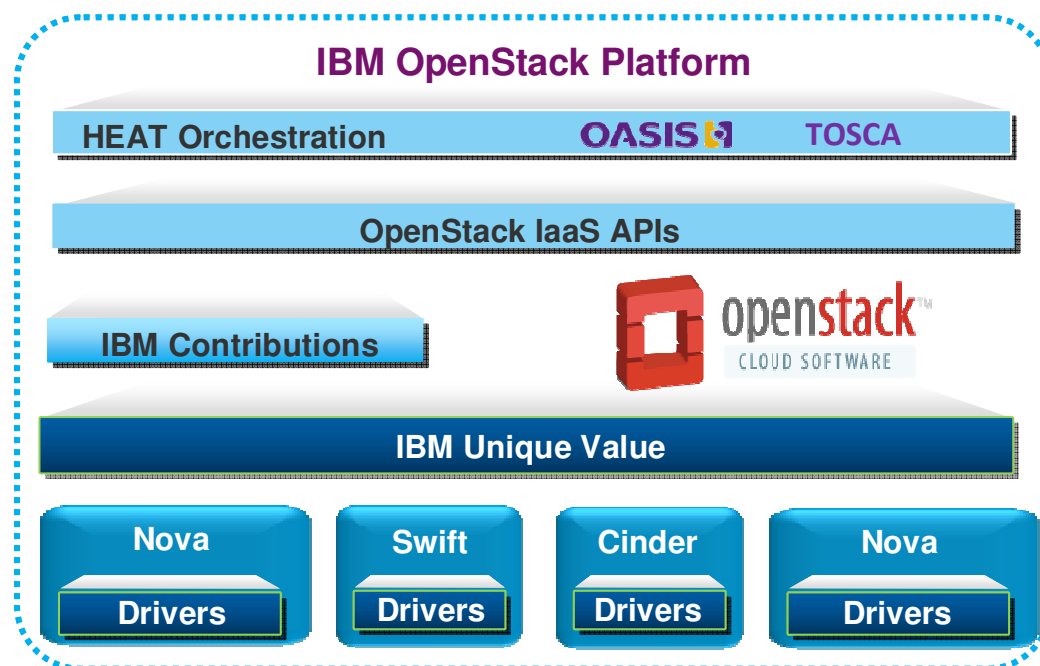
- Multi-platform network virtualization
- OpenFlow and OpenDaylight enabled
- Unify control across virtual switches and fabrics

Resource Smart Software

- Policy based scheduling
- Intelligent placement and migration of workloads
- Balance workload demand with infrastructure supply

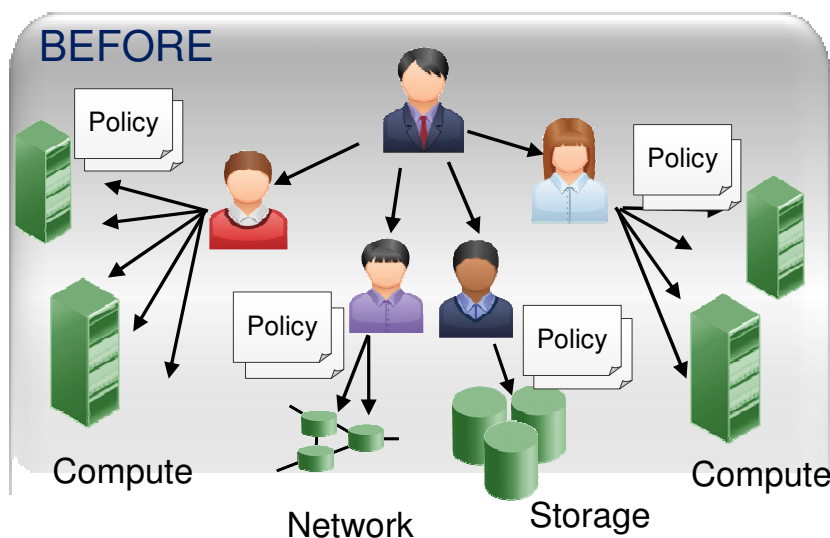
IBM is enabling clients to take advantage of a broad ecosystem built on open standards

- Enables choice through open standards at the component, management and application layers
- OpenStack applications and TOSCA patterns can program and exploit software defined infrastructure through standard APIs
- Infrastructure management is performed through OpenStack
- Provides access to a broad range of capabilities
 - Choice of IBM and industry hypervisors, platforms and storage
 - A wide range of network fabrics and network services through OpenStack
 - 209 companies participating in OpenStack community

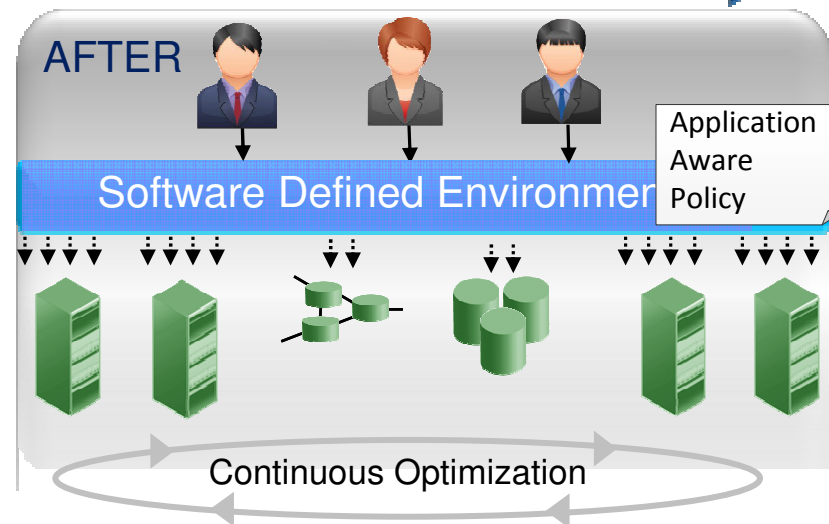


Simplified: Software Defined Environment in action

SDE fully integrates IT infrastructure across resource domains to maximize utilization, ensure compliance and decrease administration costs



- IT silos and costly specialization
- Slow and manual
- Reactive administration

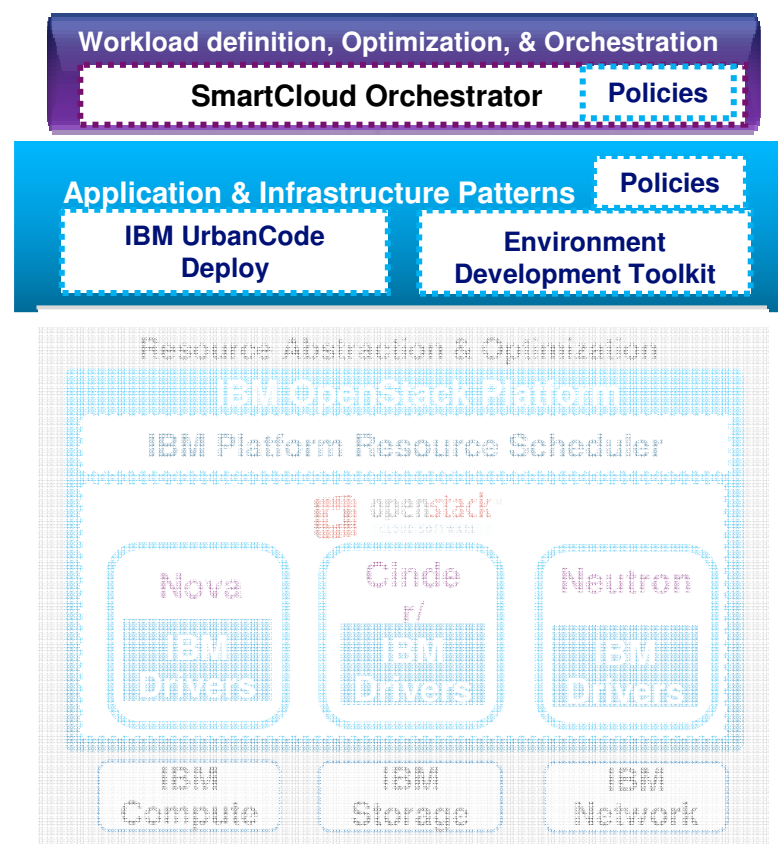


- Fully integrated management
- Rapid, repeatable and automated
- Proactive administration

Getting started with Software Defined Environments: Workload Lifecycle Management

Making it easy to dynamically provision new application environments

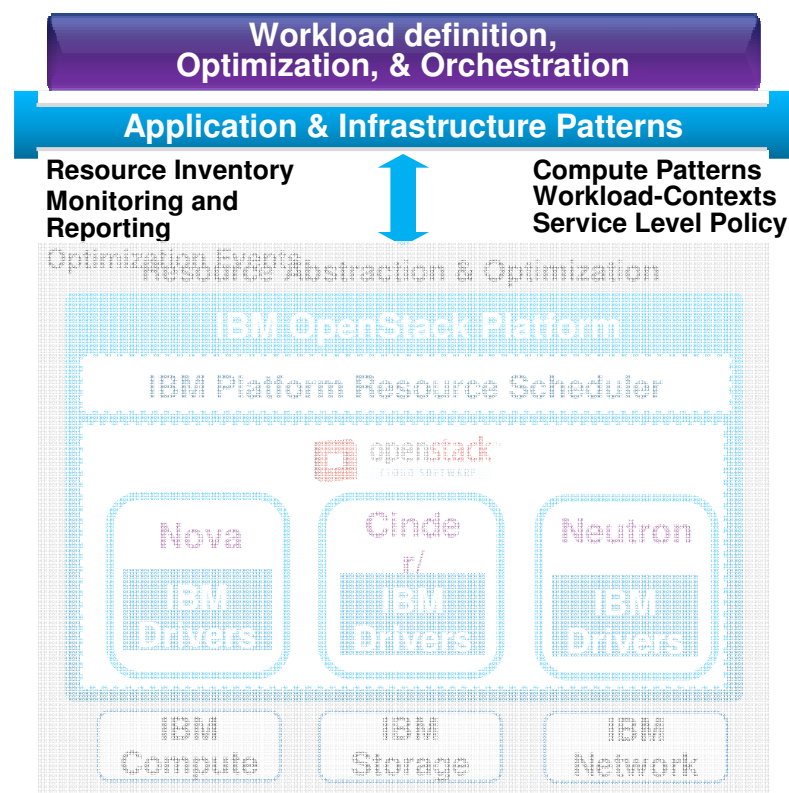
- **Today – flexible but static**
 - Static cloud resources tied to application processes
 - Infrastructure SLAs manually defined and baked into patterns
 - Infrastructure patterns not workload aware and not easily managed over the lifecycle of a workload
- **Tomorrow – lean and agile**
 - Capture full-stack environment configurations in code
 - Version and incrementally manage environment changes throughout the application lifecycle
 - Simplified patterns driven by workload policies to automatically adjust underlying infrastructure to achieve SLAs
 - Manage configurations in one place for the full workload stack



Getting started with Software Defined Environments: SmartCloud Orchestrator

Enabling workloads to be managed across the lifecycle

- **Service Orchestration**
 - Manage the IT service lifecycle for applications
 - Graphical orchestrator helps compose and customize services
 - Pre-built integrations with common services
- **Workload orchestration**
 - TOSCA pattern based workload aware placement, optimization and operation
 - A rich set of ready to use automation packages
 - Image lifecycle management
- **Resource orchestration**
 - Control compute, storage and network across the enterprise and Cloud





System z (z/VM) architecture for cloud with OpenStack using xCAT

(xCAT – eXtreme Cloud Administration Toolkit)

xCAT MN:

Management Node
(single instance)
Central management server running on Linux as normal guest
Can run on Linux on z or other platform

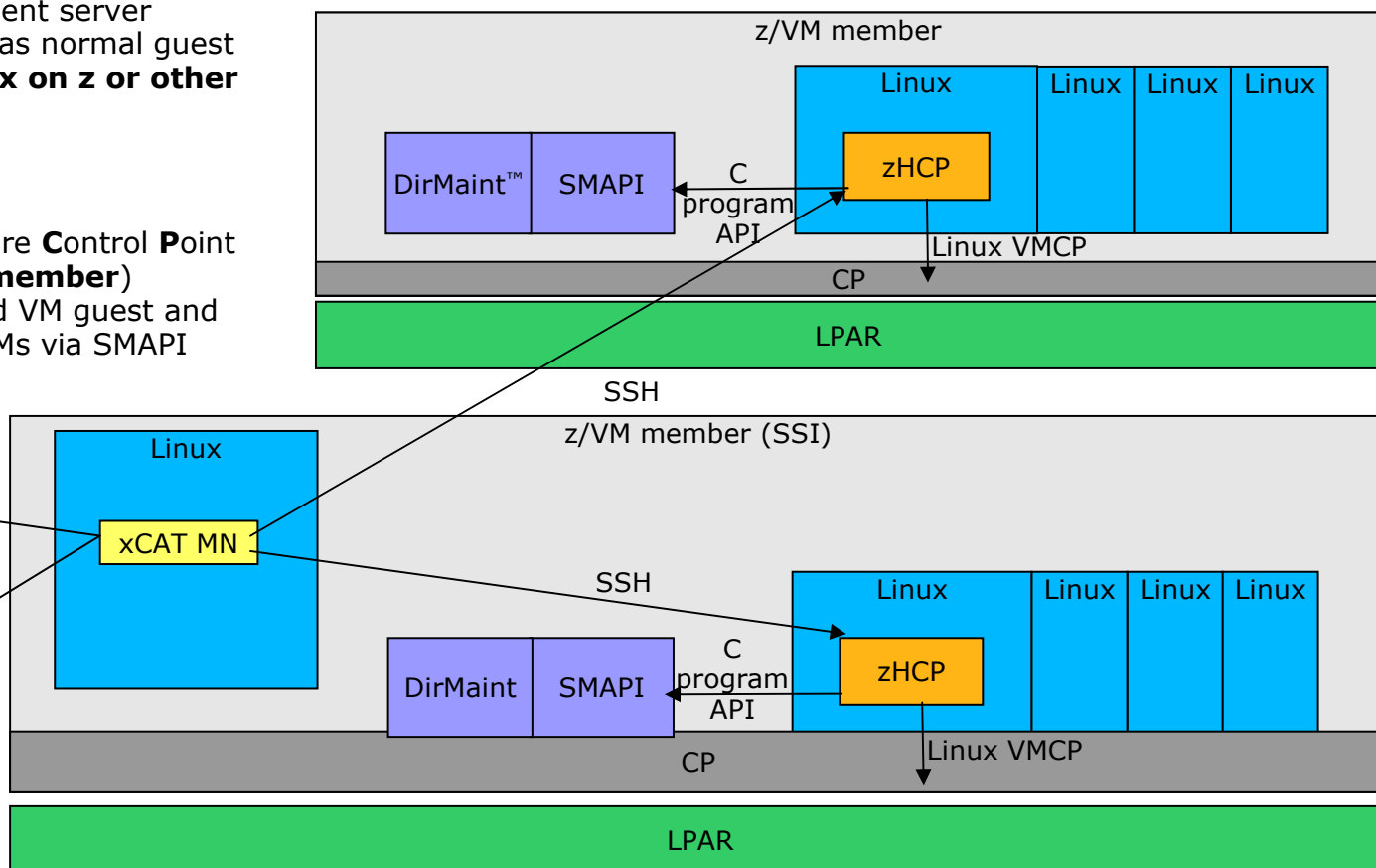
zHCP:

System z Hardware Control Point
(**one per z/VM member**)
Runs as privileged VM guest and manages other VMs via SMAPI and CP

Web GUI



CLI



Summary – IBM Storage is Driving Innovation with OpenStack

IBM is a leading contributor to OpenStack in general and to Cinder in particular

Storage products that are OpenStack-ready:

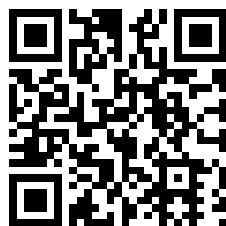
- IBM XIV
- IBM Storwize family
- IBM DS8000
- IBM Tivoli Storage Manager
- IBM General Parallel File System

Industry-leading features accessible through OpenStack



“Managing IBM Storwize V7000 Storage with OpenStack”

<http://www.youtube.com/watch?v=JWMm6-zwrMw>



“IBM Storage leadership and value for OpenStack”

<http://www.youtube.com/watch?v=vuITbfn3PZM>



“OpenStack volume migration and IBM Storwize systems”










<http://www.youtube.com/watch?v=cwt1n6s83mQ>



“Roark Hilomen - IBM Edge 2013”

<http://www.youtube.com/watch?v=E7xFGNtpUK0>

Who's using OpenStack?

 <p>Explore</p> <p>Cloudup Cloud & Managed Services Provider</p>	 <p>Explore</p> <p>PayPal eCommerce & Online Payments</p>	 <p>Explore</p> <p>Cisco WebEx Collaboration & SaaS</p>
 <p>Explore</p> <p>eNovance Cloud & Managed Services Provider</p>	 <p>Explore</p> <p>Intel Hardware</p>	 <p>Explore</p> <p>NeCTAR Research</p>
 <p>Explore</p> <p>Argonne National Laboratory, US Department of Energy Government & Research</p>	 <p>Explore</p> <p>San Diego Supercomputer Center Academic & Research</p>	 <p>Explore</p> <p>MercadoLibre, Inc. e-Commerce</p>

PayPal Uses OpenStack



- **Processed more than \$26,000 in mobile payments every minute in 2012**
- **OpenStack runs thousands of VMs to support their self-service developer model**
- **Internal team manages deployment and operations, using OpenStack Compute, Storage & Shared Services**

“We needed agility without sacrificing availability. By leveraging the collective innovation of the OpenStack community, we can develop and grow our private cloud much quicker without having to reinvent anything.”

Saran Mandair, senior director of PayPal infrastructure engineering

CERN Uses OpenStack



- **Large Hardron Collider tracks 4 million collisions/sec, out of which it selects 200 complex images to store/sec**
- **Building out a 50,000 core OpenStack farm to handle**

“We record 40 Mbytes per second each 6 months, adding to the currently store of around 140 PB today”

Randall Sonie, research scientist,
University of Victoria

Questions?



Wilhelm Mild
IBM Executive IT Architect



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& Development GmbH
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