Intel's Innovations with OpenStack

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Agenda

1. Intel and OpenStack

2. Key Intel Contributions to OpenStack and Open Source

3. Intel IT OpenStack update

Intel is committed to OpenStack

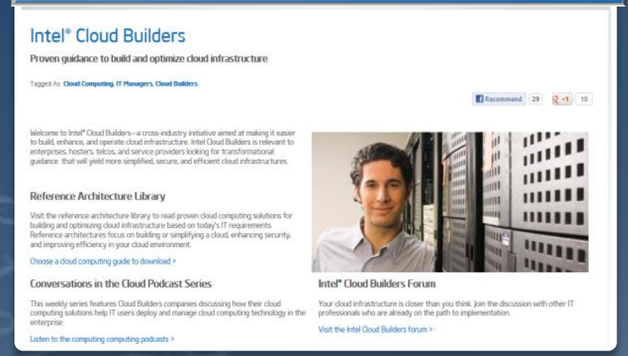
Contributions

- Contributions across OpenStack projects plus tools released to Open Source
- One of top contributors to Grizzly[1]
- Performance optimizations, validation and patches

Intel® IT Open Cloud

- Intel IT Open Cloud with OpenStack
- Deliver Consumable Services
- Enable Automated Management of Cloud

Intel® Cloud Builders Reference Architecture



- Validate Intel IT customization of OpenStack
- Document best practices
- Share best practices with enterprises and services providers

Enable Enterprises & Cloud Service Providers to deploy Open Clouds

[1]Source: OpenStack Grizzly Press Release 4/4/13 (https://www.openstack.org/software/grizzly/press-release)
Top Contributors to Grizzly by Employer: Red Hat, Rackspace, IBM, HP, Nebula, Intel, eNovance, Canonical, VMware, Cloudscaling, DreamHost and SINA.

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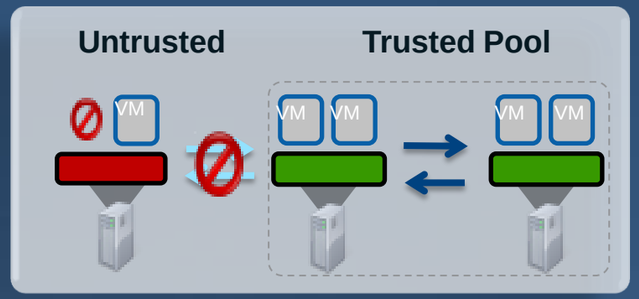
Key Intel Contributions

Contribution	Project	Release	Comments
Trusted Filter	Nova	Folsom	Place VMs in Trusted Compute Pools
Trusted Filter UI	Horizon	Folsom	GUI interface for Trusted Compute Pool management
Filter Scheduler	Cinder	Grizzly	Intelligent scheduler allocates storage based on workload
Multiple Publisher Support	Ceilometer	Havana	Pipeline manager; pipelines of collectors, transformers, publishers
Open Attestation SDK		To Open Source	Remote Attestation service for Trusted Compute Pools
COSBench		To Open Source	Object store benchmarking tool

Trusted Compute Pools

Place workloads & VMs in trusted pools of virtualized servers

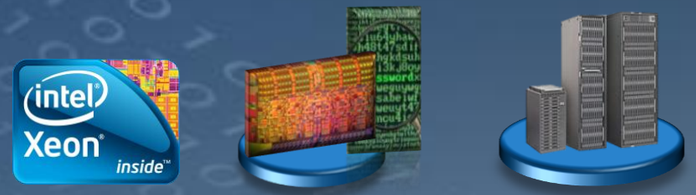


Solution stack requirements

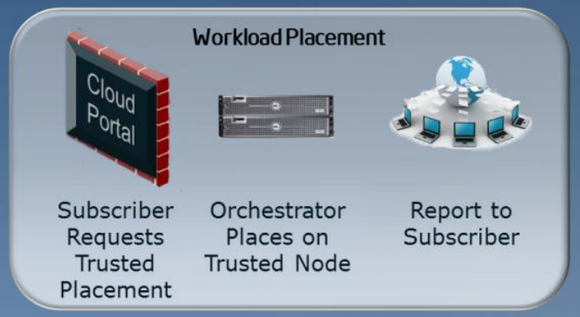
- Policy Engine / Console to Mgr
- CPU that initiates a trusted boot
- TCG Compliant Platform (TPM) standard

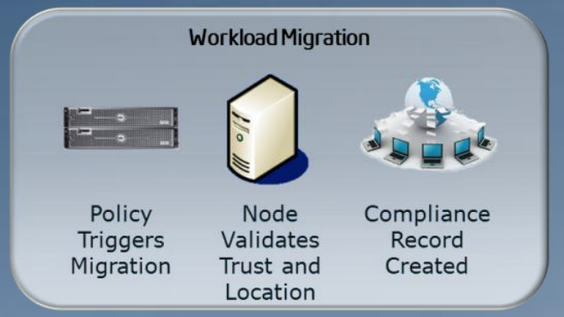
Core technologies

- Intel® Xeon® processor E3, E5 and E7
- Intel Trusted Execution Technology
- Intel VT FlexMigration



Use Cases



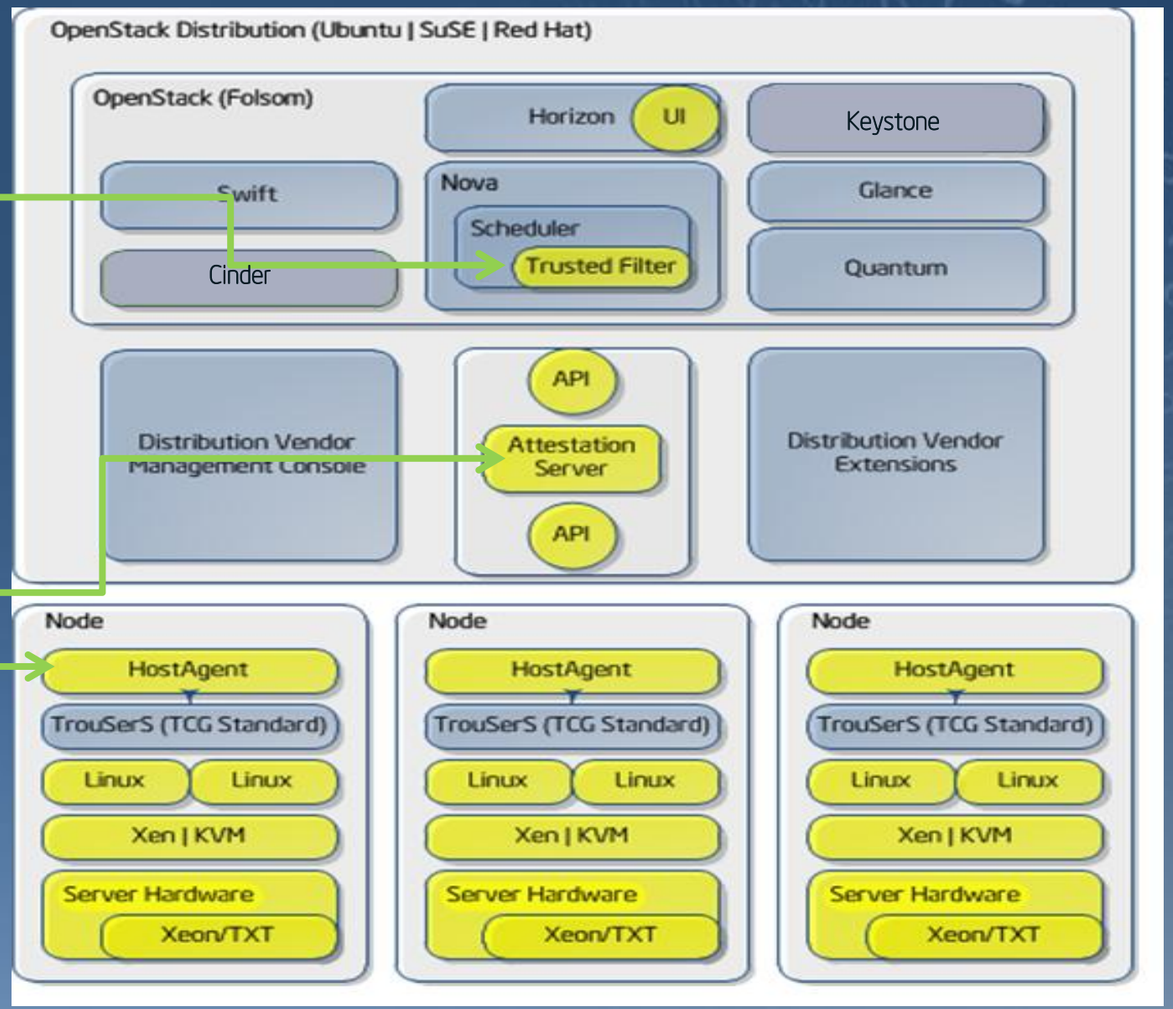


Trusted Compute Pools on OpenStack using Open Attestation with Intel TXT

Intel contributed Trusted Filter to OpenStack in 2012

Intel SSG developed open source Attestation Server in 2012

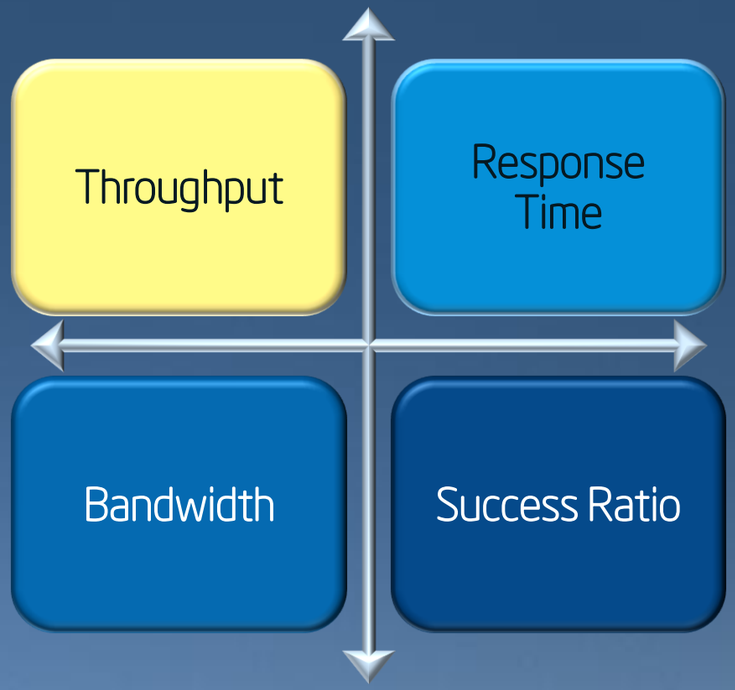
Intel enabled TXT in Xen 3.2 and Linux/KVM kernel in 2.6.33



- Subscriber specifies trust level of VM as Trusted
- Request passes to OpenStack Nova scheduler
- Scheduler invokes web-based remote attestation (Open Attestation) service
- Based on results, scheduler schedules Trusted VM to trusted platform

Introducing COSBench

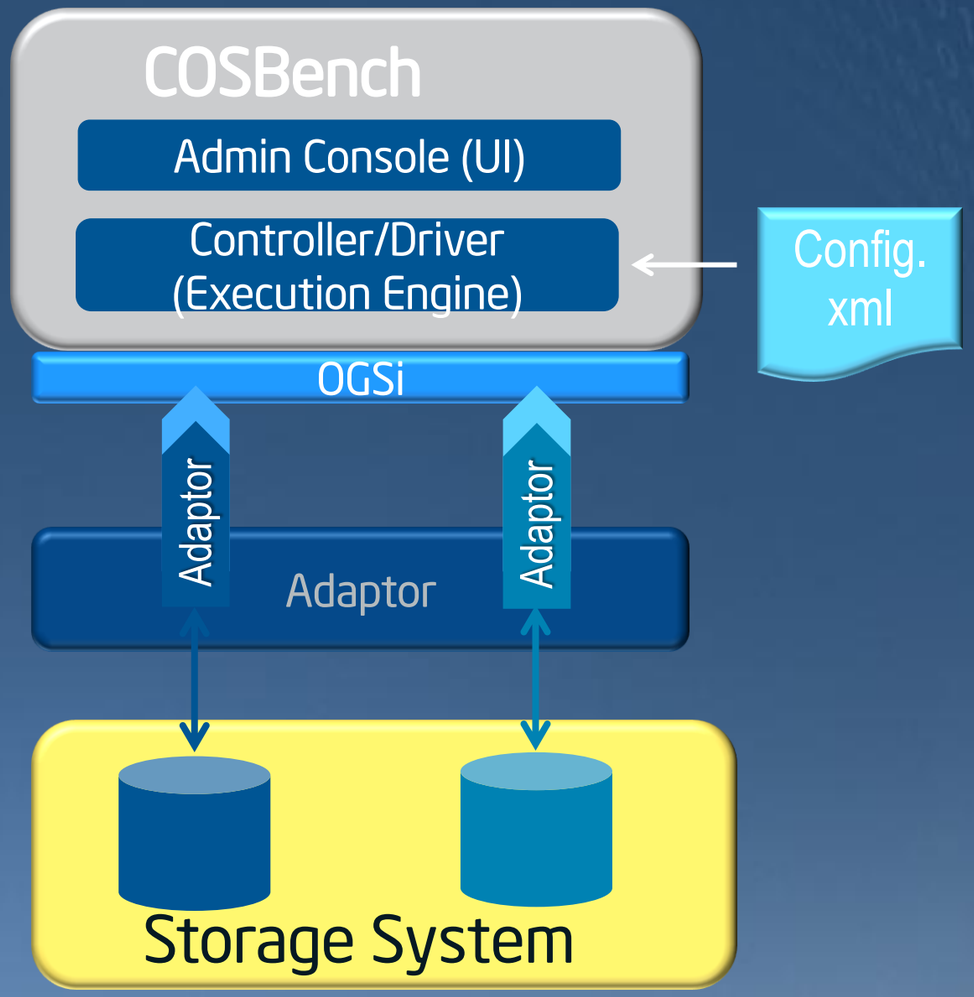
- An Intel-developed benchmarking tool to measure Cloud Object Storage (e.g. OpenStack Swift) performance
- Released to Open Source today



- Compare performance of cloud object stores
- Evaluate internal options for software stacks
- Identify bottlenecks and tune performance

https://github.com/intel-cloud/cosbench

Major Features



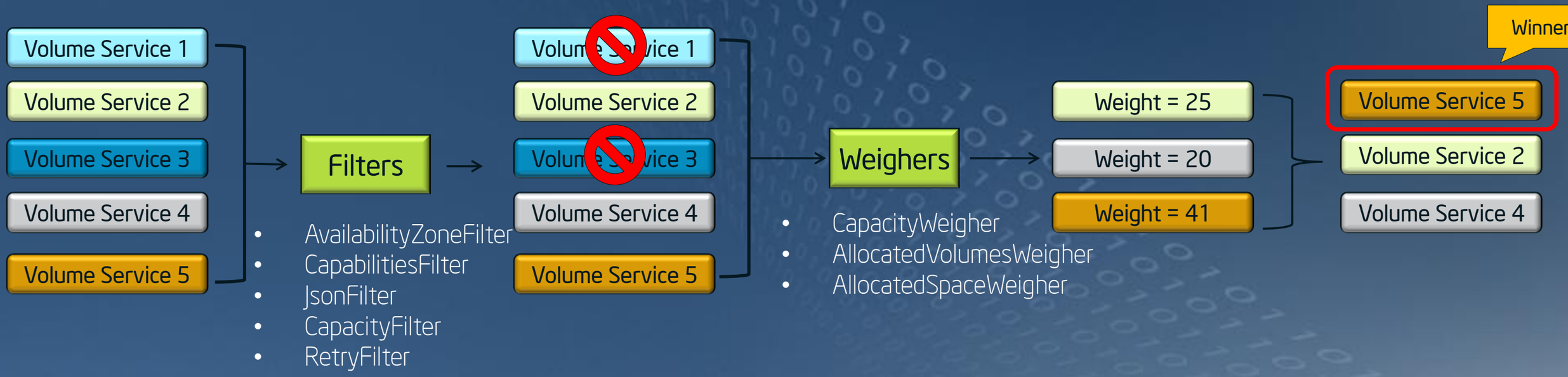
- Developed with Java*, OSGi framework based.
- Supports multiple operating systems.
  - Ubuntu 12.04 LTS*, Red Hat Enterprise Linux 6.1*, Microsoft* Windows* 7[1].
- Distributed load testing framework.
- Pluggable adaptors for different storage systems
  - OpenStack * Swift and Amplidata * Amplistor *v2.3, 2.5 and 3.1 adaptors included
  - Allows development of adaptors for additional storage systems

- Web based UI
- Real-time performance monitoring
- Flexible workload definition.

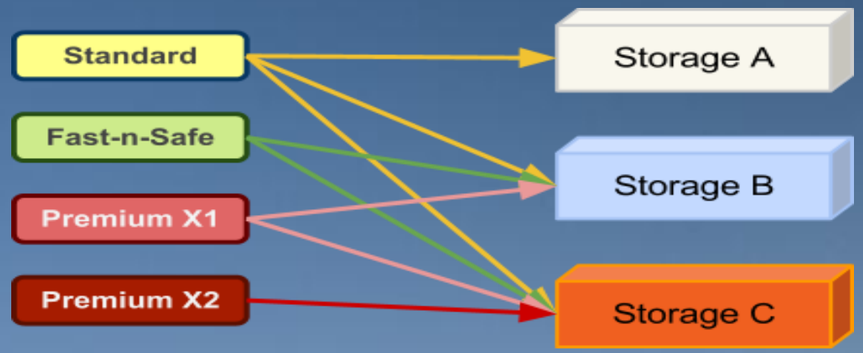
* Other names and brands may be claimed as the property of others.
[1] Windows tested with Mock Storage only.

Filter Scheduler (Cinder)

"A new intelligent scheduler allows cloud end users to allocate storage based on the workload, whether they are looking for performance, efficiency, or cost effectiveness."
OpenStack Grizzly Press Release 4/4/13 (https://www.openstack.org/software/grizzly/press-release)



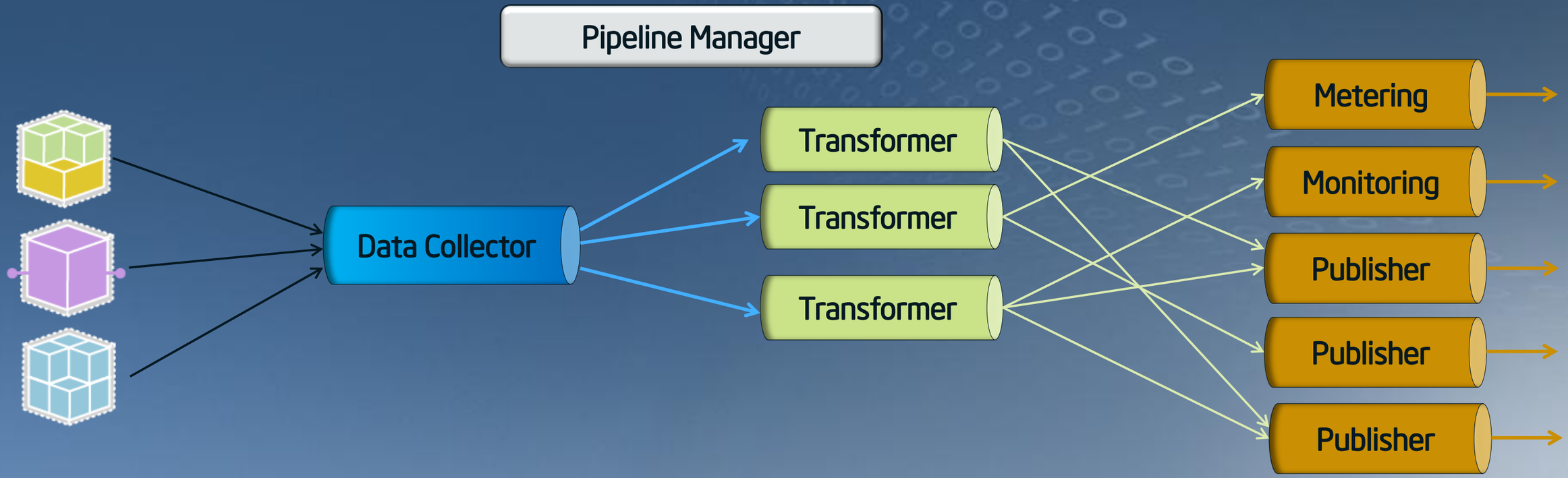
Example Use Case: Differentiated Service with Different Storage Back-ends



- Cloud provider has 3 different storage systems and wishes to provide 4 levels of volume services
- Volume service criteria dictates which storage system can be used
- Filter scheduler allows provider to name storage services and, using capabilities in extra specs, allocate correct volume

Multiple Publisher (Ceilometer)

- Send one single datum to multiple consumers
  - Send/publish collected measurements to different endpoint/utility through different conduits with different format



- System has multiple data collectors; pipeline manager creates multiple pipelines

Multiple Publisher (Ceilometer)

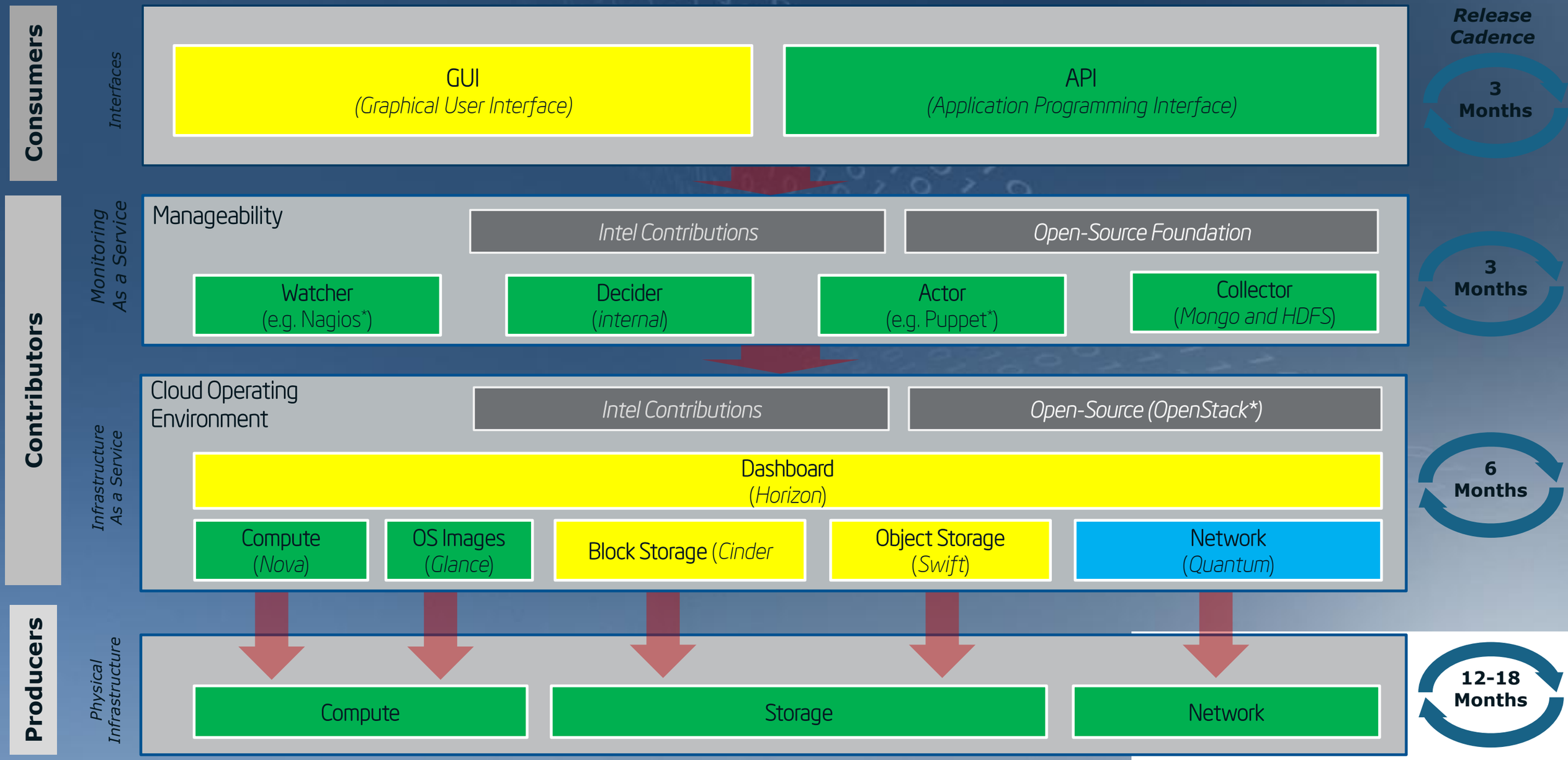
- Multiple publishers transform collected measurements into different formats through different conduits
- Transformers are organized as a pipeline to transform data from counter to meter, metrics etc.
- Five components for multiple publisher support
  - Data collectors: collect measurements from other openstack project.
  - Transformers: transform the data from data collectors or from other transformers.
  - Publishers: publish data to the world through conduit.
  - Pipeline: chaining the data collectors, transformers and publishers together. Multiple pipeline exists in the system.
  - Pipeline Manager: manages the pipelines in the system. The measurement collected from the collector will be dispatched to the pipeline manager.

Future OpenStack Releases

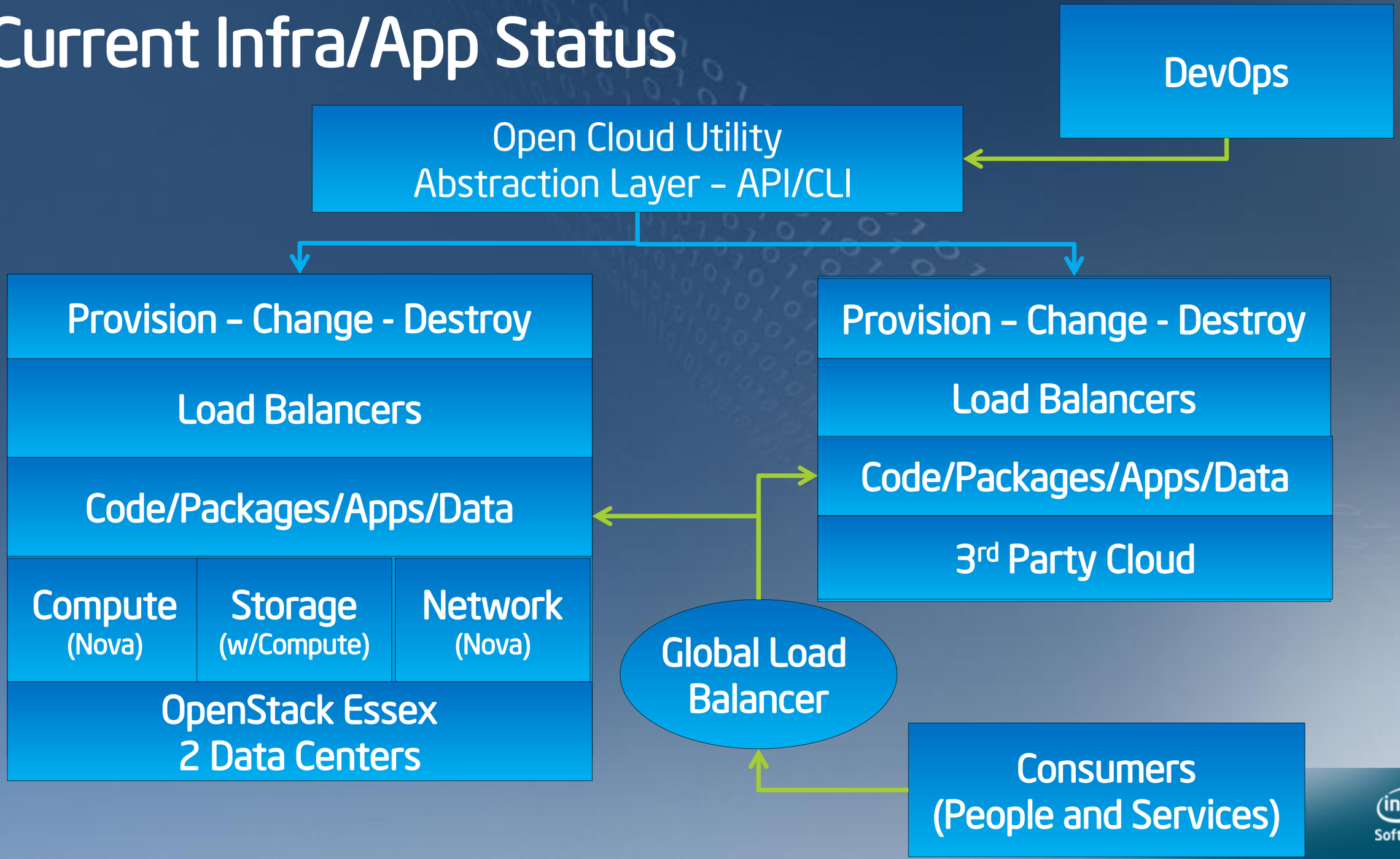
- Looking for continued collaboration with the OpenStack community in the following areas

Proposal	Target Release	Comment
Enhanced Platform Awareness	Havana	Leveraging PCIe devices in cloud infrastructure
Utilization Based Scheduling	Havana	Better scheduling according to the compute resources collected
Host monitoring	Havana	Physically monitoring on CPU, memory, network, disk etc of computes in Ceilometer
Key Manager	Havana	Makes data protection more readily available via server side encryption with key management
Erasure Code	Havana	Replacing tri-replication algorithm in Swift

Intel® IT Open Cloud IaaS Platform Solution Stack

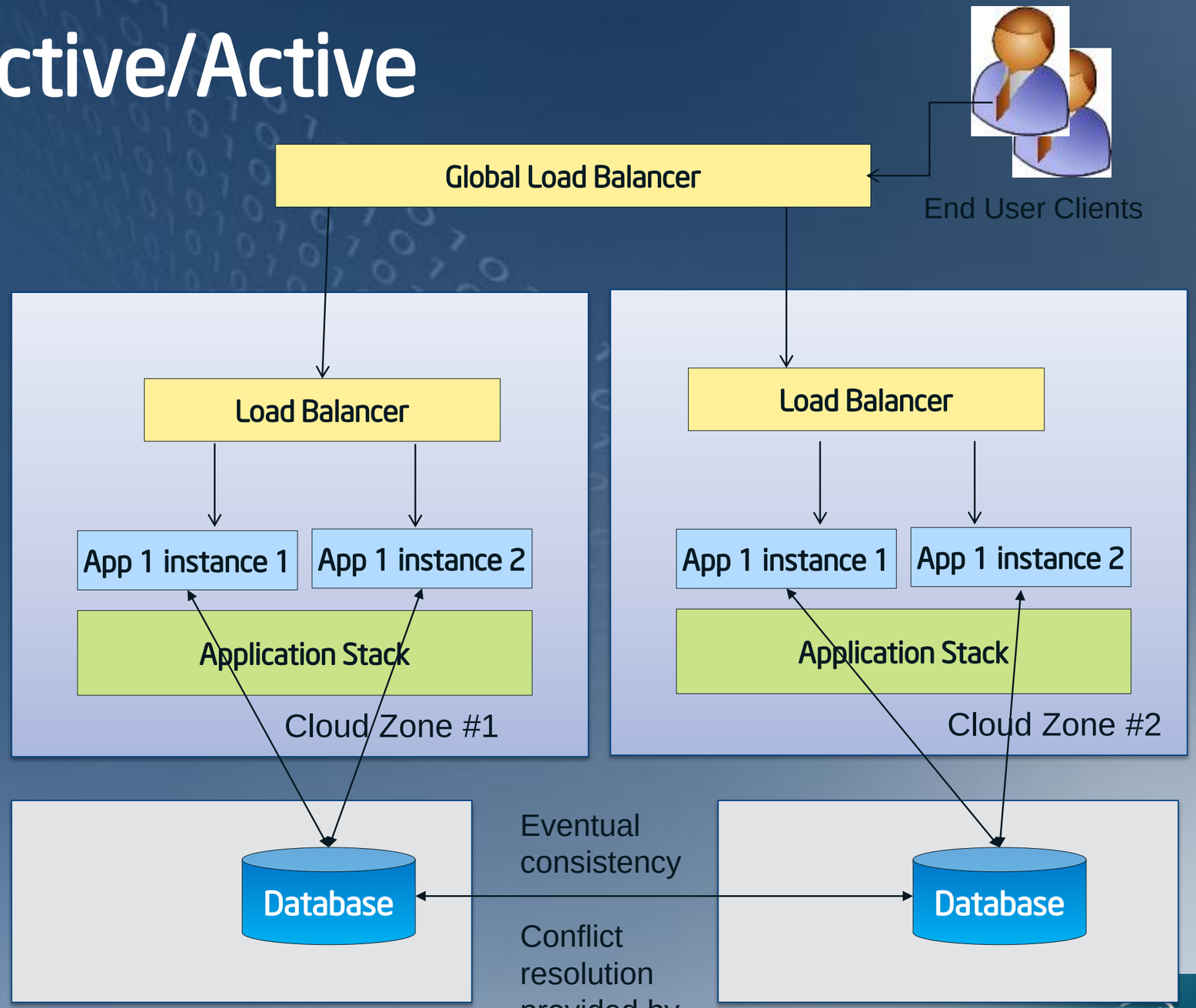


Current Infra/App Status



Design Pattern : Active/Active

- App deploy to N+1 clouds
- Eventual consistency and conflict resolution is built into the developer application
- Database replication is configured
- App URL is added to GLB to actively distribute across app instances
- Users connect to any app instance – runs simultaneously



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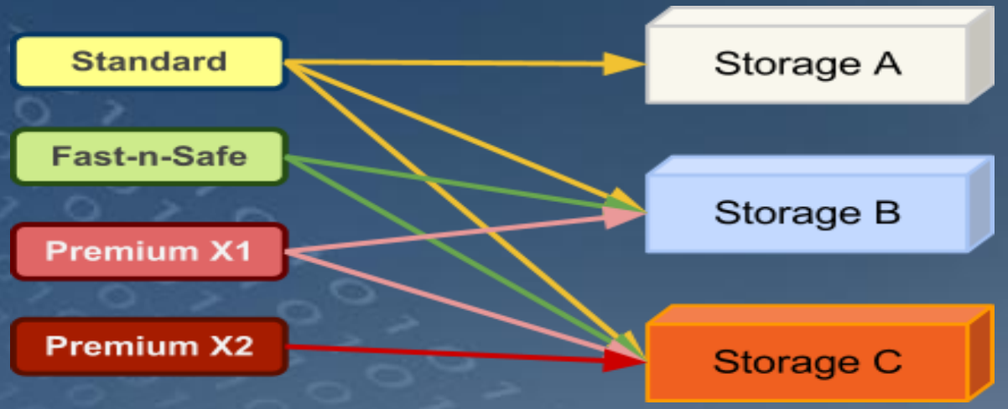
BACK-UP SLIDES

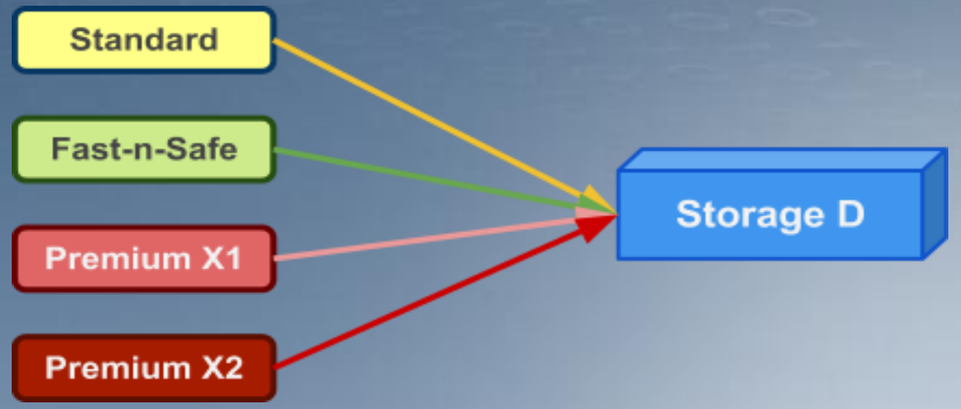
Filter Scheduler (Cinder)

"A new intelligent scheduler allows cloud end users to allocate storage based on the workload, whether they are looking for performance, efficiency, or cost effectiveness."
OpenStack Grizzly Press Release 4/4/13 (https://www.openstack.org/software/grizzly/press-release)

- Use Case A: Differentiated Service with Different Storage Back-ends
  - Example Cinder volumes
    - type 1: name 'standard', with extra specs {'volume_backend_name': 'Storage System A'}
    - type 2: name 'fast-n-safe', with extra specs {'volume_backend_name': 'Storage System B'}
    - type 3: name 'premium-x1', with extra specs {'QoS': 'false', 'fast snapshot': 'true'}
    - type 4: name 'premium-x2', with extra specs {'fast clone": 'true', 'fast snapshot': 'true', 'QoS:level': 'guarantee:200IOPS'}



- Use Case B: Differentiated Service with Single Powerful Storage Back-end
  - Example Cinder volumes
    - type 1: name 'standard', with extra specs {'QoS': 'true', 'QoS:level': 'best_effort:80IOPS', 'Reliability:backup':'no'}
    - type 2: name 'fast-n-safe', with extra specs {'QoS': 'true', 'QoS:level': 'best_effort:150IOPS', 'Reliability:backup':'auto'}
    - type 3: name 'premium-x1', with extra specs {'QoS': 'true', 'QoS:level': 'best_effort:150IOPS', 'Reliability:backup':'auto', 'Feature:Enable': 'fast snapshot'}
    - type 4: name 'premium-x2', with extra specs {'QoS': 'true', 'QoS:level': 'guarantee:200IOPS', 'Reliability:backup':'auto', 'Feature:Enable': 'fast snapshot, fast cloning'}



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Future OpenStack Releases

- Looking for continued collaboration with the OpenStack community in the following areas:

  - Leveraging PCIe devices in cloud infrastructure
  - Making data protection more readily available via server side encryption with key management
  - Replacing tri-replication algorithm in Swift with Erasure Code

Read/Comment on Blueprints
Enhanced Platform Awareness for PCIe: https://blueprints.launchpad.net/nova/+spec/epa-for-pcie-devices
Key Manager: https://wiki.openstack.org/wiki/KeyManager
Erasure Code: https://blueprints.launchpad.net/swift/+spec/swift-ec