Red Hat Storage
Introduction To GlusterFS

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Today's Speakers

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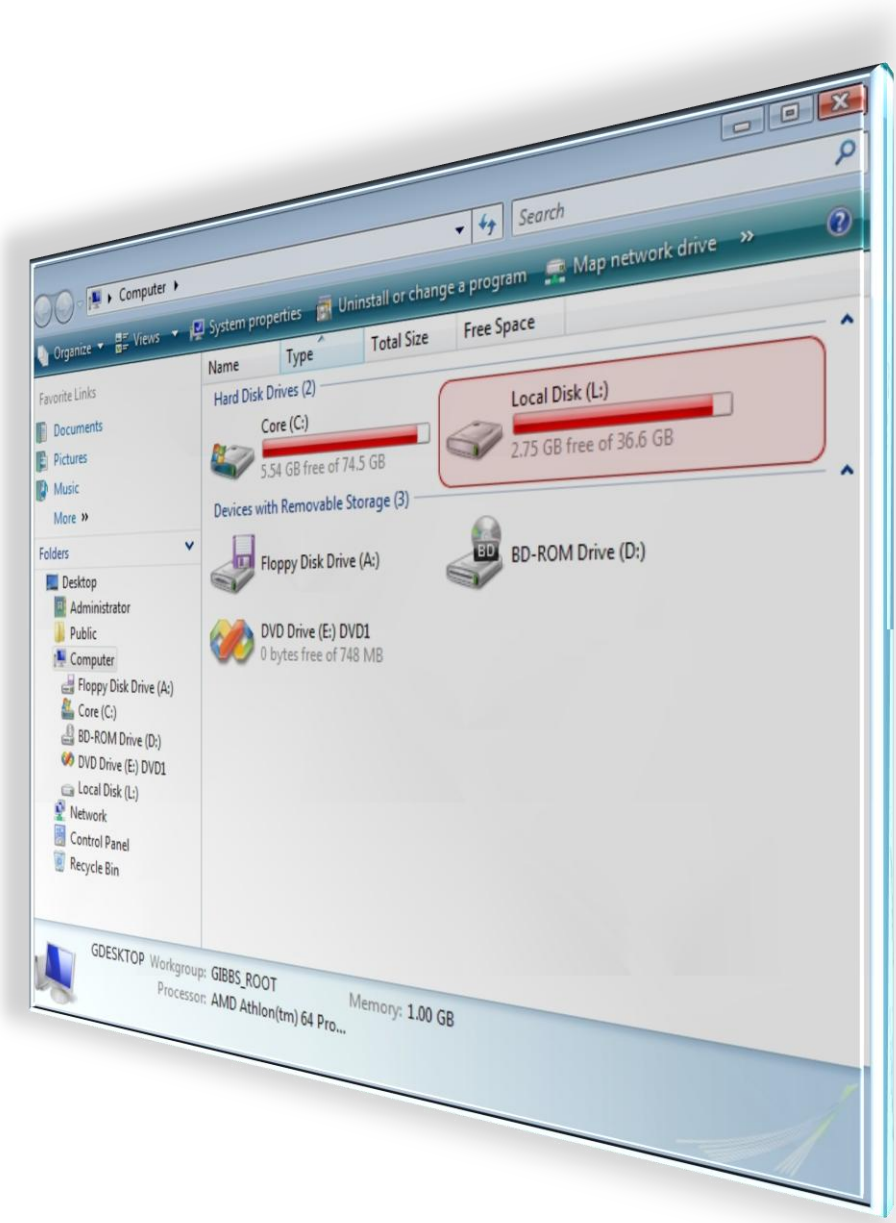
Red Hat Acquires Gluster – What it Means for You

- Proven GlusterFS architecture
- Stability and long term viability
- Integration
- New features and functions
- Global reach
- Scalable, affordable, and flexible storage

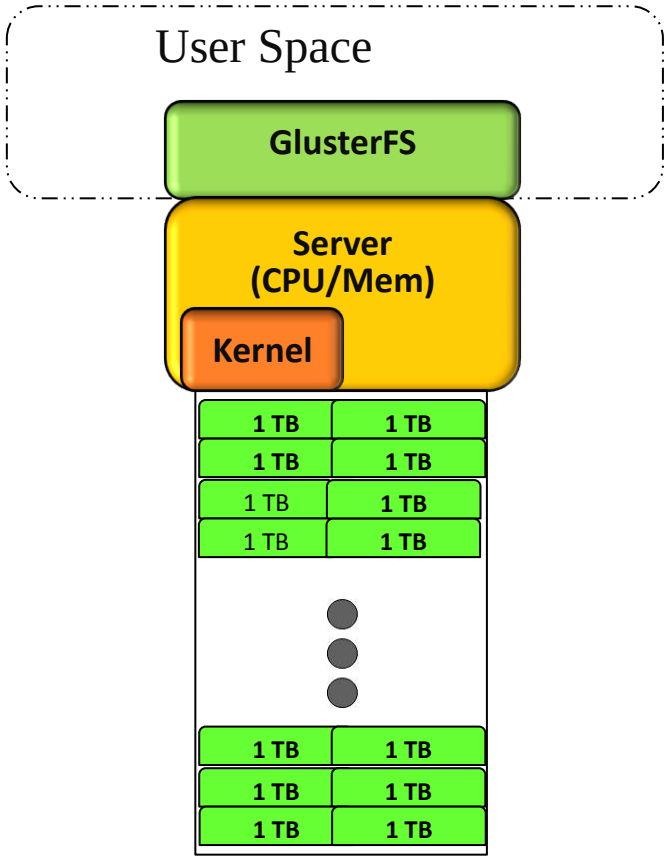
What is the Gluster File System?

- **Scale-out file storage software for**
  - Network Attached Storage (NAS)
  - Object
  - Big Data

- **GlusterFS provides**
  - Scalability to Petabytes & beyond
  - Affordability
    - Use of commodity hardware
  - Flexibility
    - Deploy in ANY environment
  - Linearly scalable performance
  - High availability
  - Unified files and objects
  - File system for Apache Hadoop
  - Superior storage economics



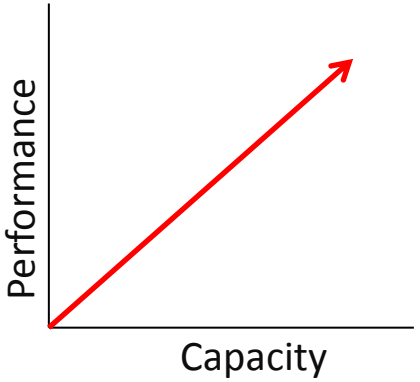
File System in User Space (FUSE)



- **Not tied to kernel**
- **No reassemblies**
- **Independence**
- **Flexibility**

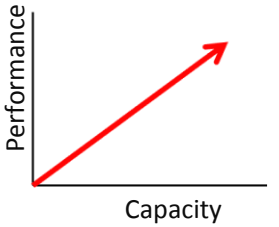
Many Enterprises Rely on GlusterFS

GlusterFS Architecture Design Goals



- Innovation
  - **Eliminate metadata**
  - Dramatically improve performance
  - Unify files and objects
- Elasticity
  - Flexibility adapt to growth/reduction
  - Add, delete volumes & users
  - Without disruption
- Scale linearly
  - Multiple dimensions
  - Performance
  - Capacity
  - Aggregated resources
- Simplicity
  - Ease of management
  - No complex Kernel patches
  - Run in user space

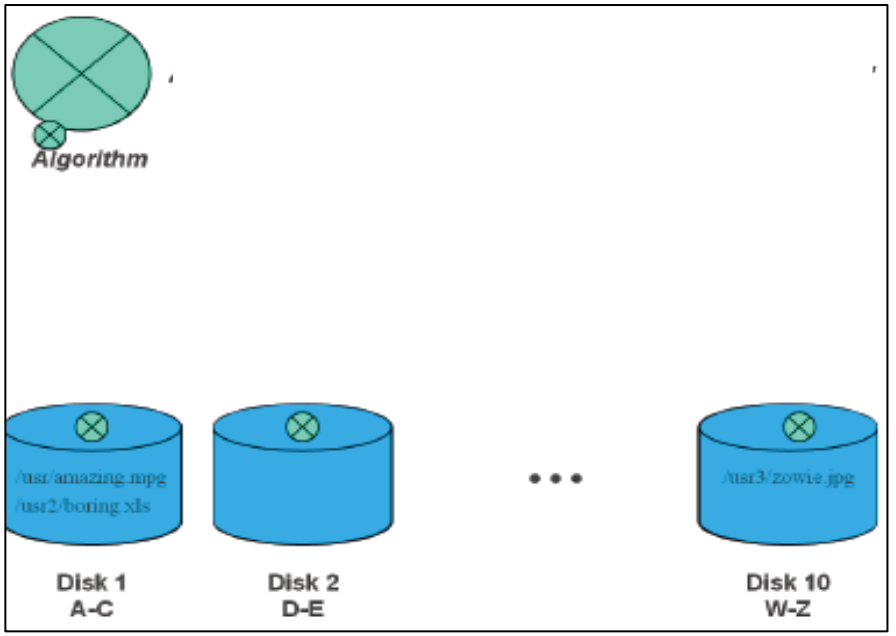
Key Differentiators



- Scalable
  - No metadata server – faster file system
    - Enables linear scaling of performance via elastic hashing
- Affordable
  - Deploy on commodity hardware
- Flexible
  - Software only
  - Deploy on the infrastructure of choice
  - Simultaneous files and objects
  - Apache Hadoop Distributed File System (HDFS) alternative
  - Modular, stackable storage OS architecture
  - Data stored in native file formats

What is GlusterFS Elastic Hashing?

- No metadata server
- An algorithmic approach
  - Unique hash tag for each file stored
  - Tags stored within the file system
  - Rapid file read – low latency



Innovative Elastic Approach

Software Only – Future Proofing Storage

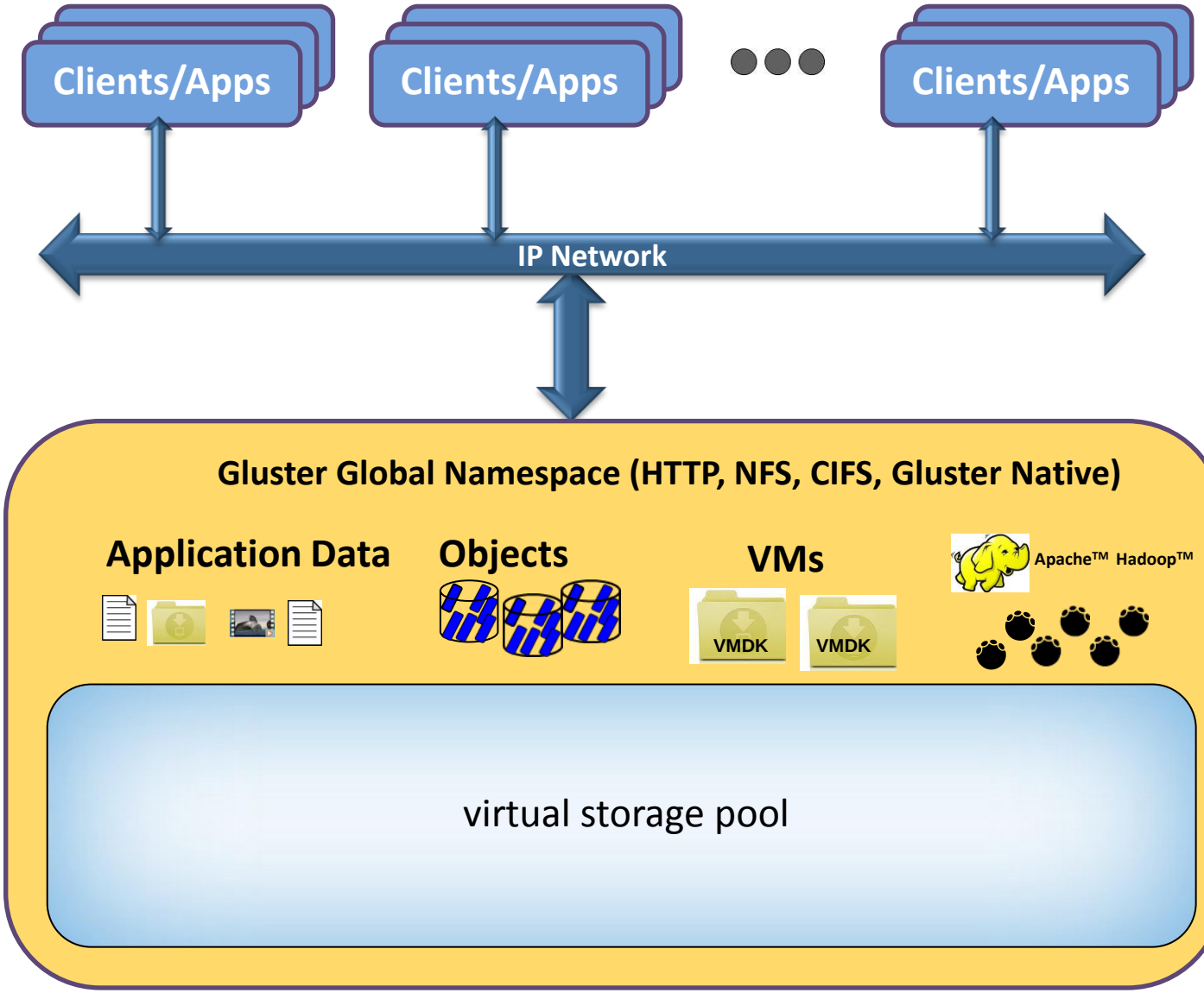
- Superior storage economics & flexibility
  - Data center / private cloud use commodity hardware
  - Public cloud – i.e. AWS, RightSacle, GoGrid, Nimbula – pay for only what you need
- No hardware lock-in
  - You choose hardware vendors - at purchase time or in the future
  - Any Cloud – Public, private, and hybrid
  - Performance, capacity, or availability levels
  - GlusterFS – not proprietary, files are stored in native formats (i.e. EXT4)

A Strong Open Source Foundation

Global Adoption

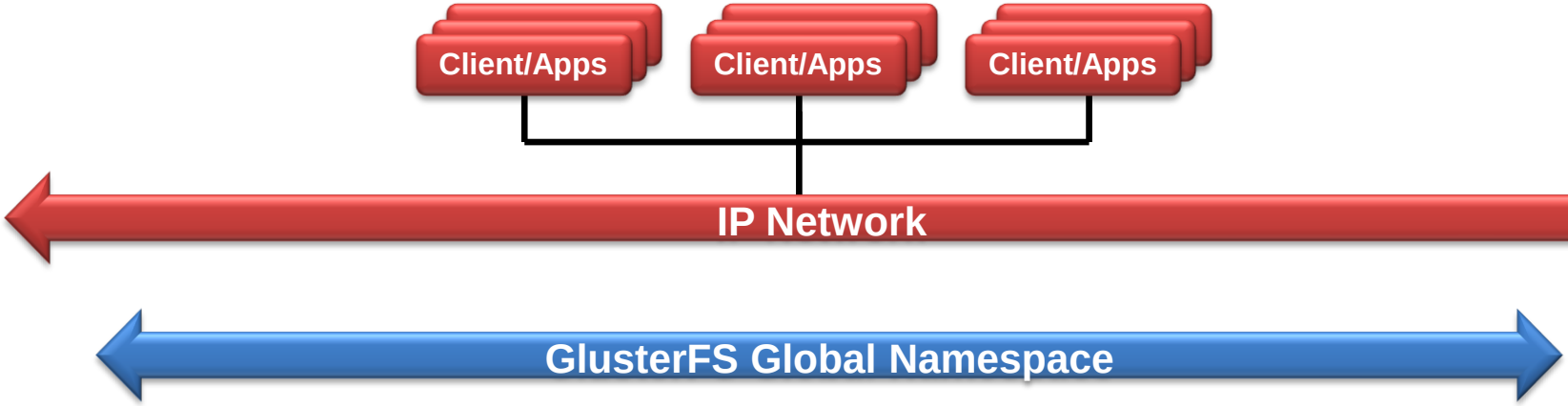
- 200,000+ downloads
  - ~16,000 /month
- 550+ registered deployments
  - 45 countries
- 2,500+ registered users
  - Mailing lists, Forums, etc.
- Active community
  - Diverse testing environments
  - Bugs identification and fixes
  - Code contributions
- Member of broader ecosystem
  - OpenStack
  - Linux Foundation
  - Open Virtualization Alliance

Anatomy of a GlusterFS Deployment

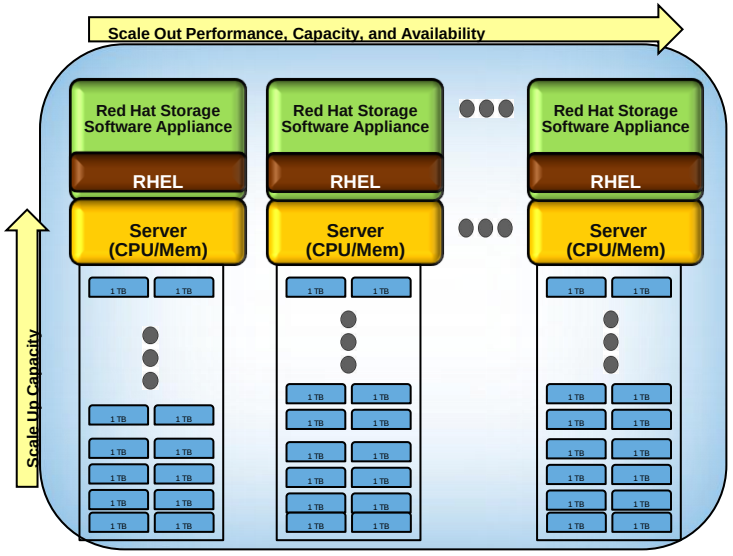


- Standard clients running standard apps
- Over any standard IP network
- Access to data, as files and folders and or objects, in global namespace, using a variety of standard protocols
- Stored in a commoditized, virtualized, scale-out, centrally managed pool of DAS, NAS

Unifying Private and Public Clouds

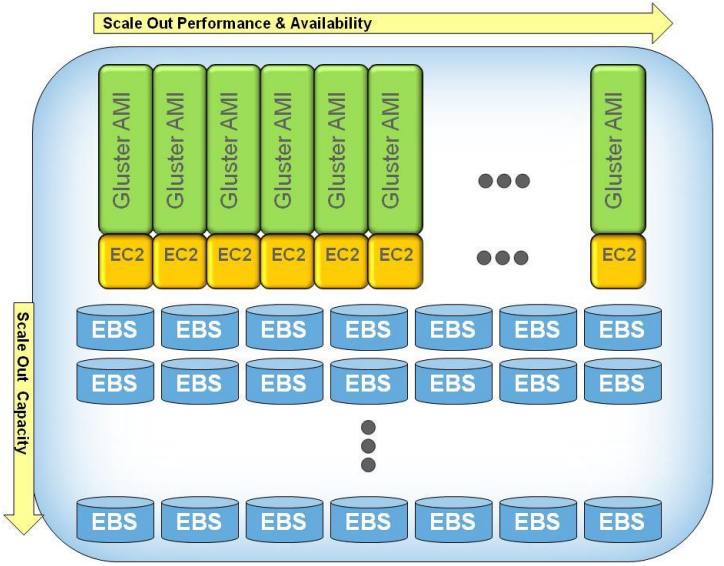


Private Cloud



Replication

Public Cloud



CIC Electronic Signature Solutions

Hybrid Cloud: Electronic Signature Solutions

- Reduced time-to-market for new products
- Meeting all client SLAs
- Accelerating move to the cloud

- Problem
  - Must leverage economics of the cloud
  - Storage performance in the cloud too slow
  - Need to meet demanding client SLA's
- Solution
  - Red Hat Storage Software Appliance
  - Amazon EC2 and Elastic Block Storage (EBS)
  - RightScale Cloud Management
- Benefits
  - Enabled faster development and delivery of new products to clients
  - All SLA's are met with headroom to spare
  - Accelerating move to the cloud
  - Scale-out architecture allows for constantly changing resources to be added and accessed
  - Data is highly available – allowing 24/7 client access to data

Common Solutions Built on GlusterFS

- Media serving (CDN)
- Large scale file storage
- Tier 2 & 3 archive
- File sharing
- High Performance Computing (HPC) storage
- IaaS storage layer
- Disaster recovery
- Backup & restore
- Private cloud

Pandora Internet Radio

Private Cloud: Media Serving

- 1.2 PB of audio served per week
- 13 million files
- Over 50 GB/sec peak traffic

- Problem
  - Explosive user & title growth
  - As many as 12 file formats for each song
  - ‘Hot’ content and long tail
- Solution
  - Three data centers, each with a six-node GlusterFS cluster
  - Replication for high availability
  - 250+ TB total capacity
- Benefits
  - Easily scale capacity
  - Centralized management; one administrator to manage day-to-day operations
  - No changes to application
  - Higher reliability

Brightcove

Private Cloud: Media Serving

- Over 1 PB currently in Gluster
- Separate 4 PB project in the works

- Problem
  - Cloud-based online video platform
  - Explosive customer & title growth
  - Massive video in multiple locations
  - Costs rising, esp. with HD formats
- Solution
  - Complete scale-out based on commodity DAS/JBOD and GlusterFS
  - Replication for high availability
  - 1PB total capacity
- Benefits
  - Easily scale capacity
  - Centralized management; one administrator to manage day-to-day operations
  - Higher reliability
  - Path to multi-site

Partners Healthcare

Private Cloud: Centralized Storage as a Service

- Over 500 TB
- 9 Sun “Thumper” systems in cluster

- Problem
  - Capacity growth from 144TB to 1+PB
  - Multiple distributed users/departments
  - Multi OS access - Windows, Linux and Unix
- Solution
  - GlusterFS Cluster
  - Red Hat Enterprise Linux (RHEL)
  - Native CIFS/ NFS access
- Benefits
  - Capacity on demand / pay as you grow
  - Centralized management
  - Higher reliability
  - OPEX decreased by 10X

Simultaneous File and Object Storage (SFO)

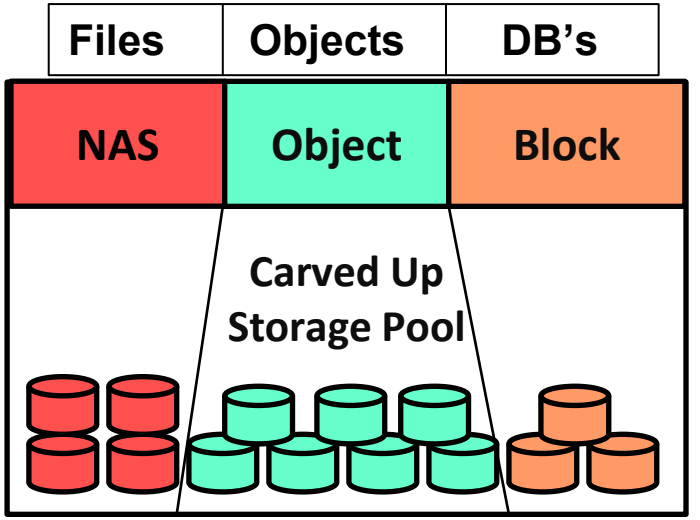
- SFO Defined
  - As part of GlusterFS, it is the first file system that enables you to store and access data as an object and as a file
- Flexible and powerful
  - Simplifies access and management of data.
  - Eases migration of legacy, file-based applications to object storage for use in the cloud
- Public beta available since 2011
  - Broad community testing and participation
  - Selected enterprise customer engagements

A breakthrough from the traditional hardware approach…

Traditional Hardware Approach

"VNX reminds me of my old VHS, DVD and cable box….
….one thing fails and I'm blown out of the water."
Beta Customer , 2011

- Proprietary
- Bolt-together disparate technology
  - Combined hardware raises costs
  - Higher TCO
  - Paying for what you many not need
- Increased risk
  - Common hardware elements can fail
    - Power supplies
    - Fans
    - Cabling…lots of cabling

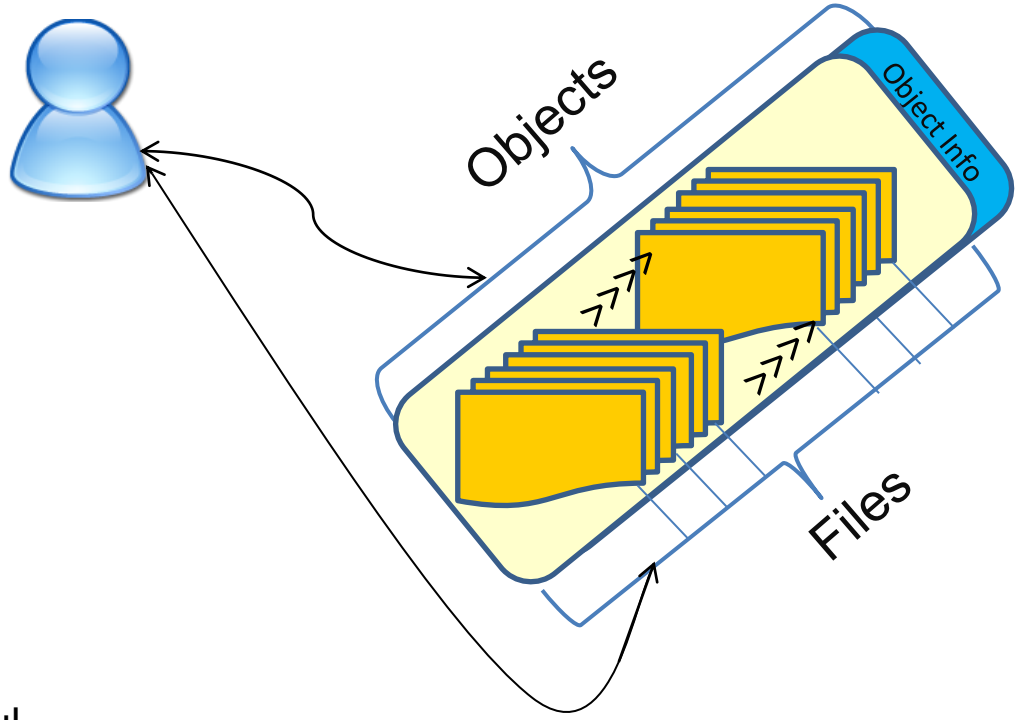


Traditional Monolithic Hardware
Bolt-on Approach
(i.e. EMC VNX)

Software Approach to File and Object Storage

Store discrete video files and move numbers of them as objects and vice versa…

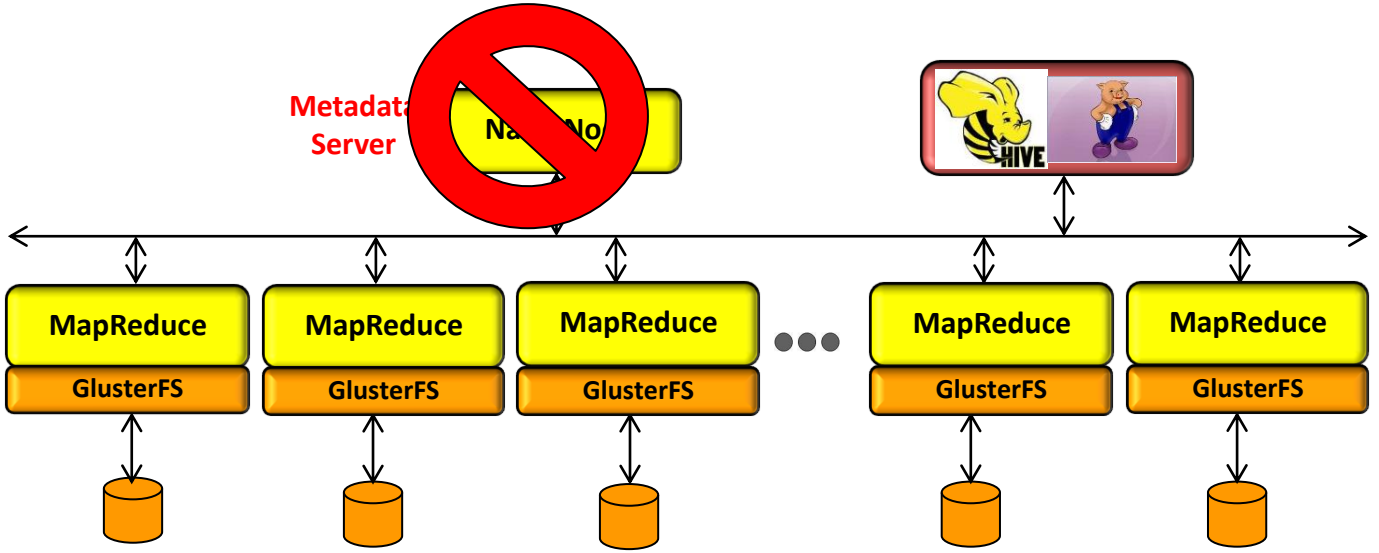
- Window Access
  - Improves Windows performance
  - Uses HTTP, not slower CIFS
  - We will still support SAMBA
- Object Storage
  - API
  - Internet Protocol (IP)
  - ResTFul
  - Get/Put
  - Buckets
  - Objects seen as files
- Standards based
  - Amazon Web Services S3 ReSTFul interface compatible
  - Access data as objects and a NAS interface to access files (NFS, CIFS, GlusterFS)
  - Backup to AWS
  - Public and private clouds



- **Network Attached Storage (NAS)**
  - NFS / CIFS / GlusterFS
  - POSIX compliant
  - Access files within objects

GlusterFS simplifies file and object storage

Introducing GlusterFS Compatibility for Apache Hadoop



- Coexist, or alternative to HDFS
- NameNode metadata server eliminated
- Faster access times – faster file system
- All the features and benefits of GlusterFS

Why It's Different

- No metadata server
  - No performance bottleneck on data lookups - fast file access
- Reduces requirement for replicated files from 3 to 2
  - 33% capacity savings
- Built in replication
  - Synchronous for inter-node replication
  - Asynchronous for geo-replication
- No single point of failure
- No block size restrictions
  - Ideal for small and large files
- POSIX compliant file system
  - Out of the box NFS, CIFS and Gluster native access
- Expanded data access options
  - File and object access to data
  - Access files from your object interface and access data within objects as files
  - File based applications can access data without modification

Major Retailer – Analytics Group

Leverages Hadoop and GlusterFS

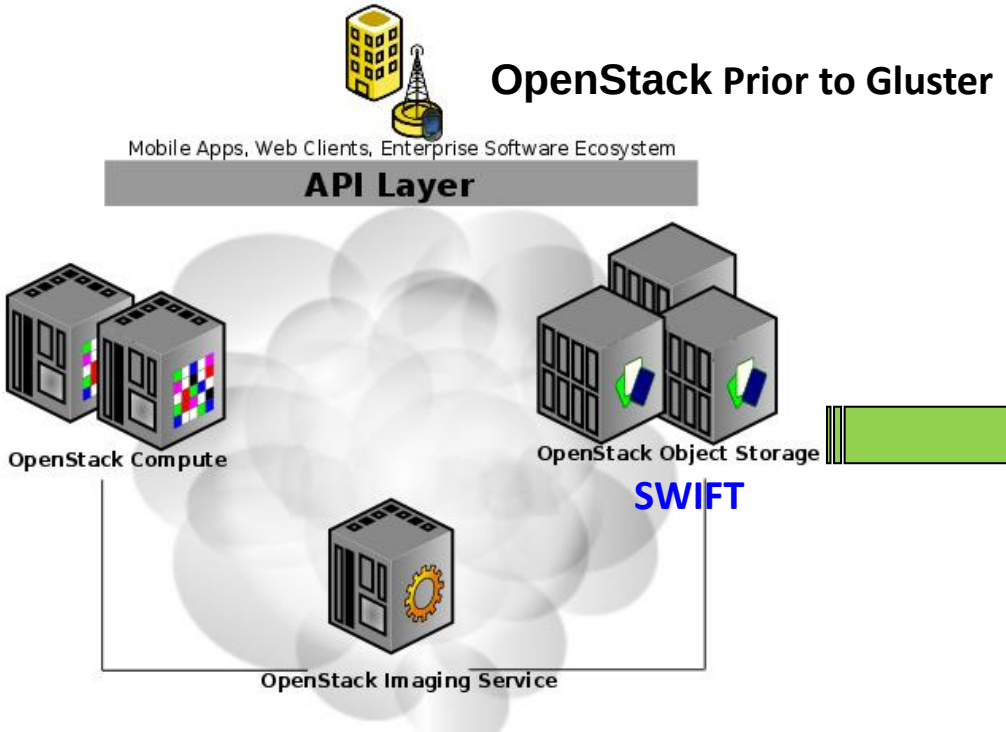
Big Data Analytics

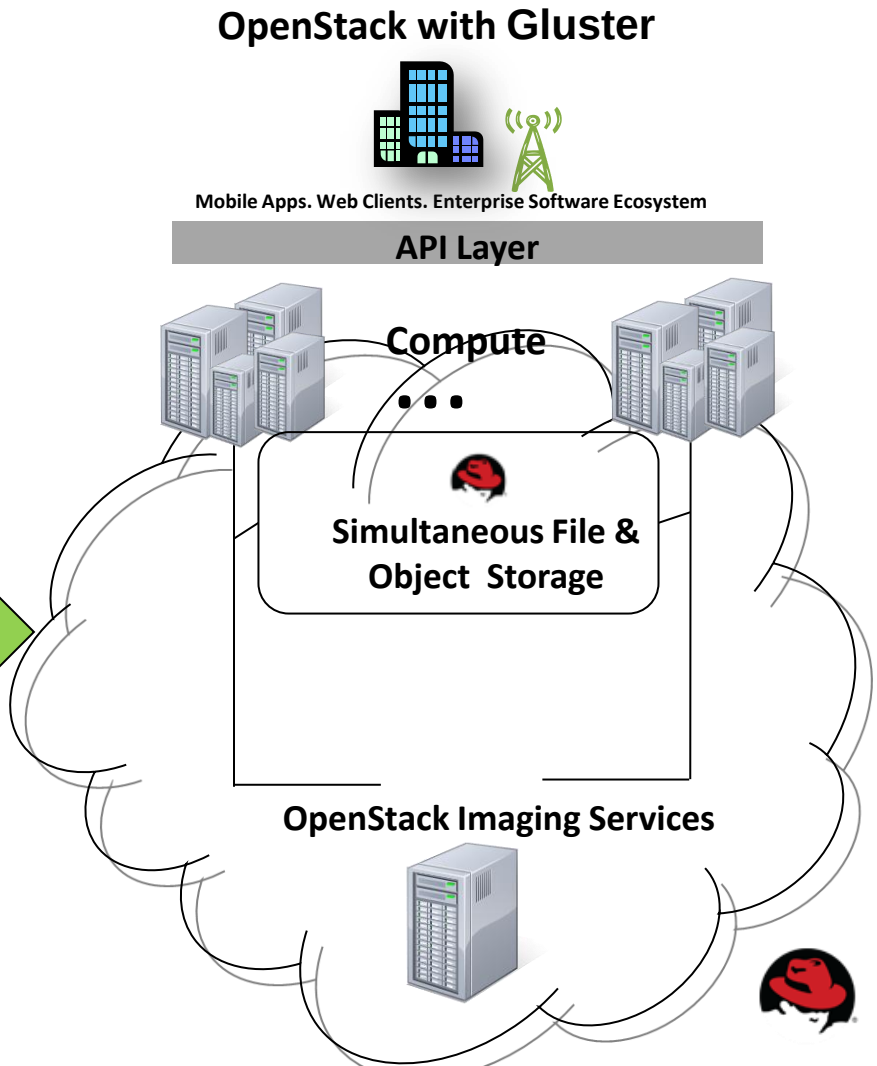
- Higher performance
- Greater availability
- Lower overall costs

- Problem
  - Performance trails off as file quantity soars
  - NameNode server errors degrade availability
  - Must scale beyond current performance limitations
- Solution
  - Red Hat Storage
  - GlusterFS alternative to HDFS
  - Elimination of NameNode server
- Benefits
  - Accelerating overall performance
  - Scale-out architecture allows for constantly changing resources to be added and accessed
  - Files are highly available – allowing 24/7access to data
  - NFS and Object access to files
  - Higher overall capacity utilization
  - Reduced storage spend

The Gluster Connector for OpenStack – July 2011

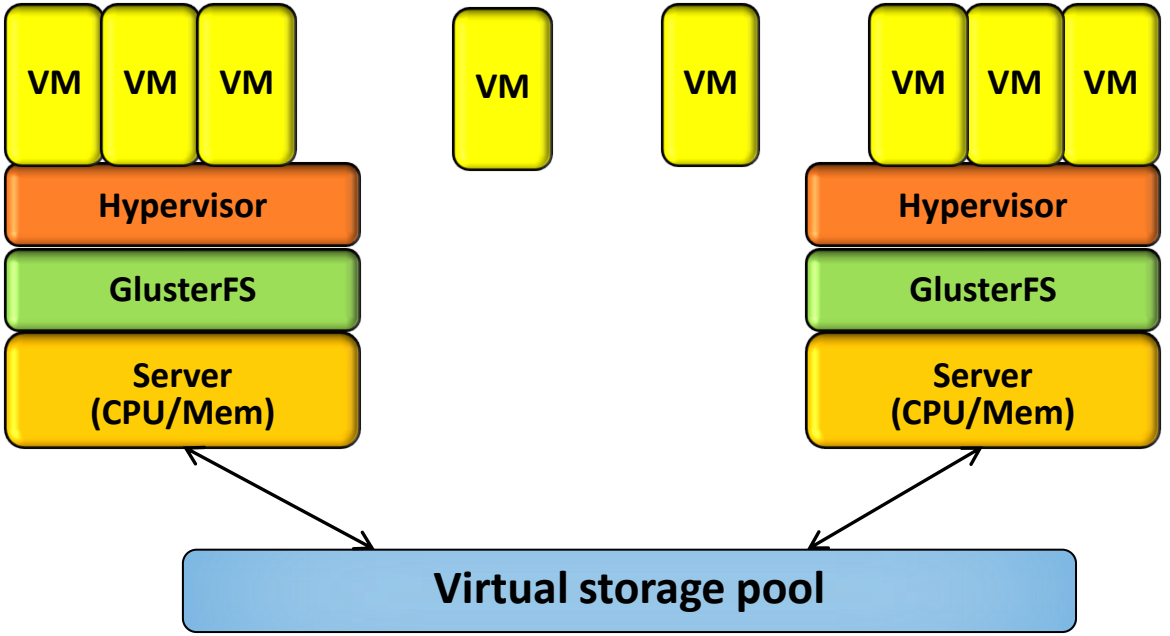
- Enables GlusterFS to be the underlying file system
- Connects GlusterFS to Xen and KVM hypervisor
  - Unified File and Object storage
  - Highly-available, scale-out NAS
  - Alternative to SWIFT





The Gluster Connector for OpenStack - July 2011

- Connector enables GlusterFS to be chosen as the file system
  - Provides:
    - Unified File and Object storage
    - Highly scalable NAS
    - High Availability – synchronous and asynchronous replication
    - Preferred, scalable alternative to SWIFT
    - Virtual motion of virtual machines (a.k.a. vmotion)



Red Hat Storage Deployment Options

On-premise/datacenter

- Red Hat Storage Software Appliance
  - Deploy on bare metal
  - Any hardware on Red Hat Hardware HCL

Public cloud

- Amazon Web Services (AWS)
  - Runs within Amazon Machine Image (AMI)

- GoGrid Cloud
  - Gluster Server Image (GSI) for scale-out NAS on GoGrid cloud

Summary

- GlusterFS is scale-out storage
  - NAS
  - Object
  - Big Data
- Scalable, affordable, and flexible
- Open Source
- Innovative architecture provides a better way to do storage

Questions & Answers

Your turn - ask our experts

- Register to try GlusterFS here: http://www.gluster.com/trybuy/
- Follow us on twitter: @RedHatStorage
- Additional resources here: http://www.gluster.com/products/resources/
- Join the community: http://www.gluster.org/
- Read our blog: http://blog.gluster.com/

Contact us at: info@gluster.com or 1-800-805-5215