

Active Archives ArcFiniti,

V.2 – Oct 7, 2011

Company Proprietary



SGI® InfiniteStorage Hardware Platforms

JBOD

- **IS1000 Series**
Half Depth JBOD
- **IS2000 Series**
Full Depth JBOD

InfiniteStorage RAID Platforms

Entry RAID

- **IS5000**
 - Entry RAID
 - 6 Gb/s SAS
 - SAS and/or SSD drives
 - 192 drives max
- **IS4100**
 - Mid-Range RAID
 - FC and SATA drives
 - 112 drives max

Mid-Range

- **IS4600**
 - Mixed Use RAID
 - FC or IB HBAs
 - Optional 4U 60-drive dense tray
 - 480 drives max
- **IS5500**
 - Next Gen RAID
 - 6 Gb/s SAS
 - SAS and/or SSD drives
 - 380 drives max

Performance

- **IS6120**
 - Performance RAID
 - SSD, SAS, SATA drives intermix
 - 120 drives max
- **IS15000**
 - Extreme bandwidth, density & scalability
 - 600 drives per rack
 - 1200 drives max
- **IS16000**
 - 10GB/s Reads and writes
 - 300k Random HDD read IOPS

Persistent Data Stores

MAID

- **COPAN 400M**
Native MAID
- **COPAN 400T/TX**
VTL

Integrated Archive

ArcFiniti

- Network-accessible Disk-based archive solution.
- Up to 1.44 PB in a single rack.
- Leveraging MAID

Tape Libraries

- **Spectra Logic**
 - T50e
 - T120
 - T200
 - T380
 - T680
 - T950
 - T-Finity

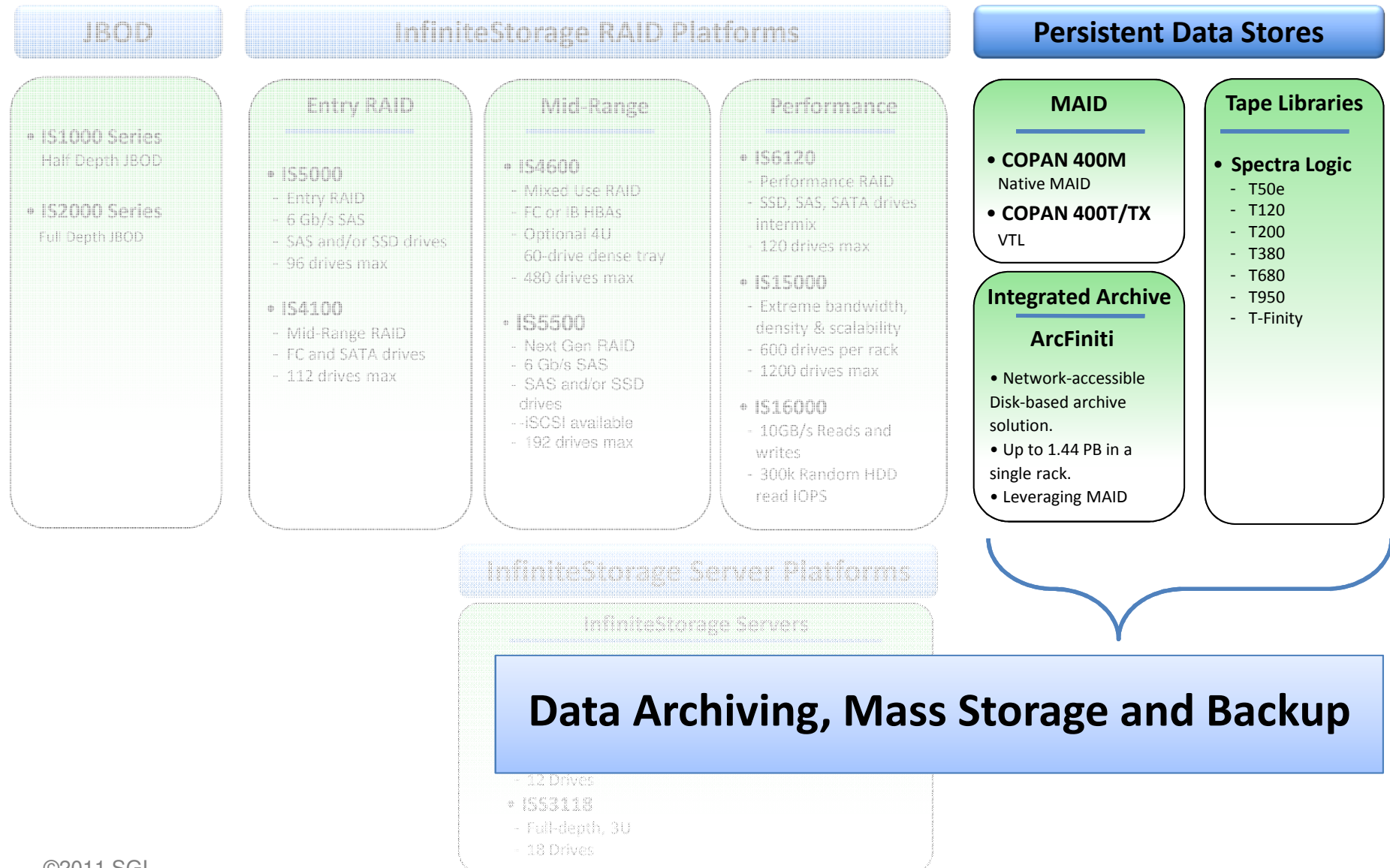
InfiniteStorage Server Platforms

InfiniteStorage Servers

- **ISS3009**
 - Half-depth, 3U
 - 9 Drives
- **ISS3012**
 - Half-depth, 3U
 - 12 Drives
- **ISS3118**
 - Full-depth, 3U
 - 18 Drives
- **ISS3500**
 - 4U – 36 Drives
 - IB, GigE & 10GigE
 - 6GB/s SAS
 - SAS, SATA & SSD
 - ISER, iSCSI, NFS, CIFS



SGI® InfiniteStorage Hardware Platforms



ArcFiniti™

*The Best of SGI InfiniteStorage and COPAN Technology
in a Fully Integrated, File-based Active Archive Solution*



Introducing ArcFiniti - Active archiving made easy

- File-based Archiving Solution
 - Virtualized storage tiers for scalability, lower cost.
 - TCO advantages with industry-leading power efficiency and density featuring MAID technology
 - High-performance file-based access for easy integration into existing infrastructures
 - Data protection software to ensure very long term data integrity

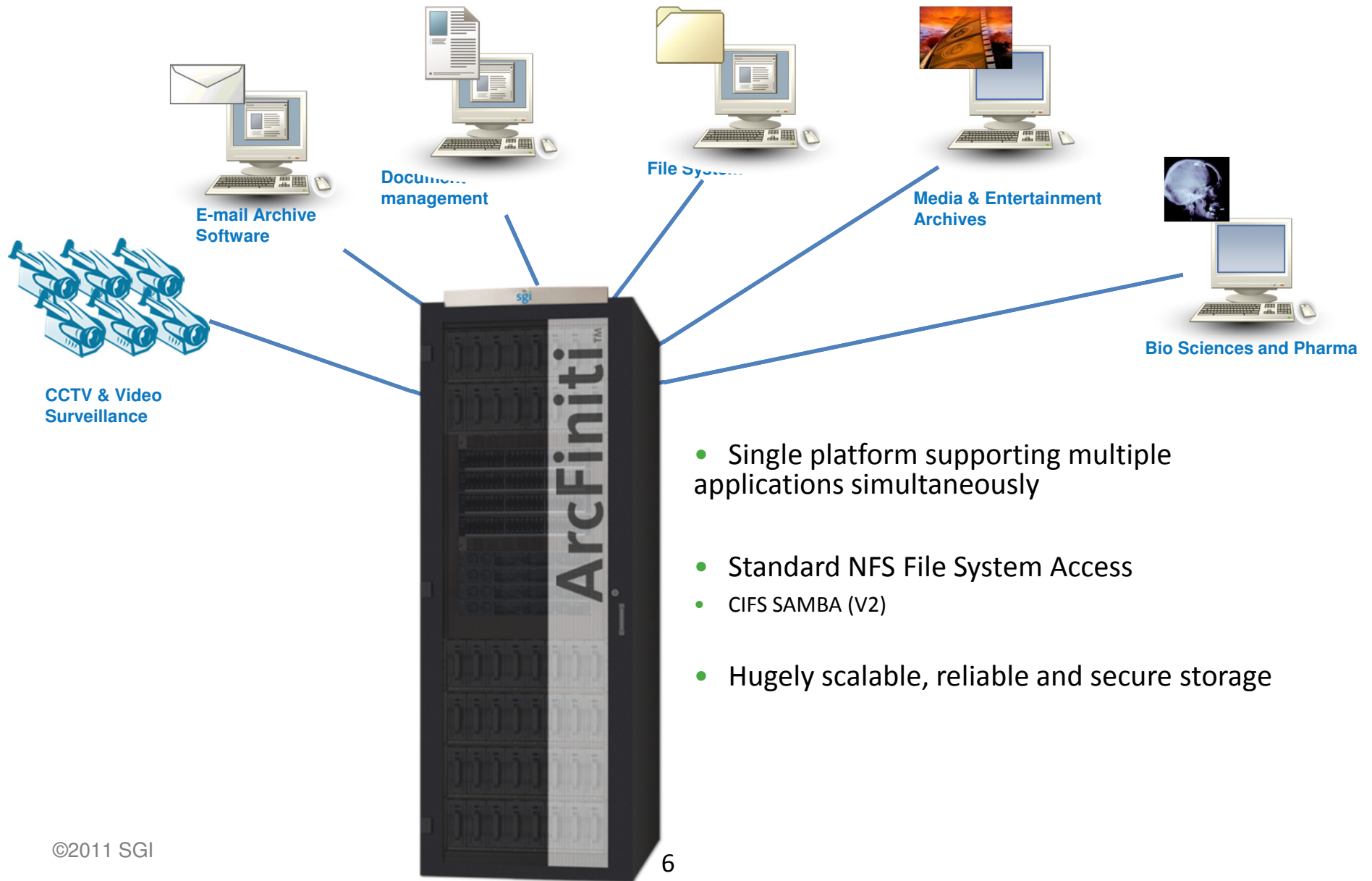
--An easy-to-deploy, integrated archive solution--

Bringing together the best of SGI Storage Tech



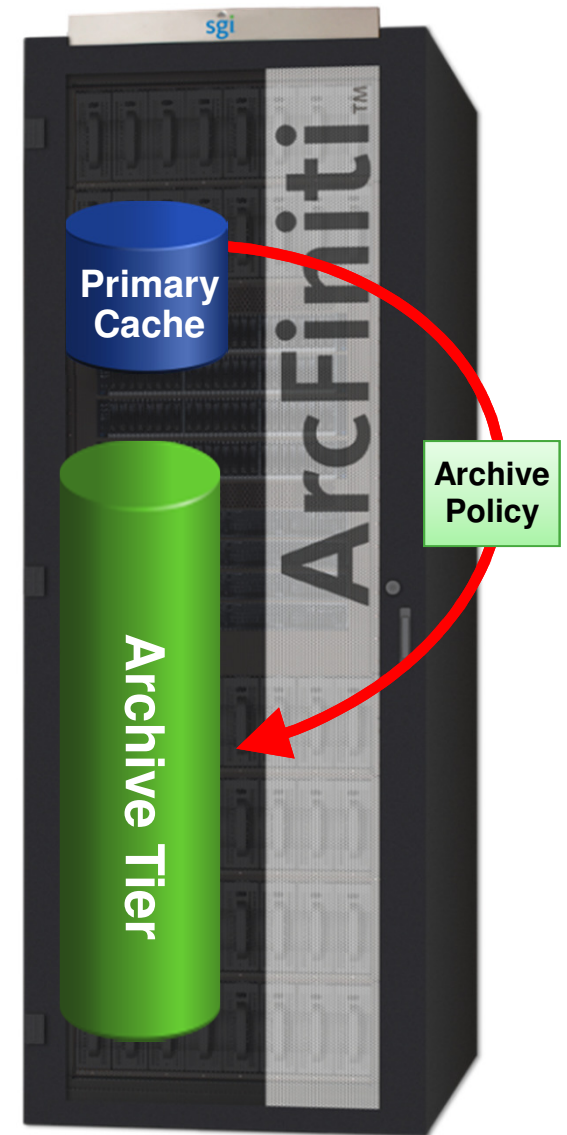
Objective:

Providing a true archive for all persistent file data



ArcFiniti™ -- Virtualized Tiers

- Virtualized tiers give high-performance access and archive security in one integrated solution.
 - High-performance file access to Primary Cache
 - All files in Primary and Archive Tiers are always online and visible to users at all times.
 - Users access whatever files they like just like a normal disk-based array.
 - Automated policy-based migration to the Archive Tier
 - Policies based on customer-defined criteria
 - Preview let's you understand archive priorities
 - Flexible archive policy engine
 - Economic scale by growing Archive storage, versus more expensive main storage



Ultra Scalability – Useable capacity

- Five ArcFiniti Configurations

Model Number	A156	A234	A468	A936	A1404
Max Usable Capacity	178 TB	256 TB	490 TB	970 TB	1.44 PB
Primary Disk Cache	10TB* 22TB - Opt	10TB* 22TB - Opt	10TB* 22TB - Opt	22TB* 34TB - Opt	34TB* 46TB - Opt
Power Managed Archive Tier (Usable)	156 TB	234 TB	468 TB	936 TB	1.4 PB
GigE Ports	2	2	2	4	6
10GigE Ports	2	2	2	4	6

* Standard configuration. Optional 12TB of additional cache capacity available

Protecting data for the long term

- ArcFiniti has built-in data protection technology for long-term assurance
 - Pro-active monitoring of disk health ensures errors are found before disks can fail.
 - Data integrity is continually monitored.
 - Avoid lengthy RAID rebuilds with pro-active data migration and replacement before failure.
 - Archive MAID tier built for 7 year+ lifecycle

ArcFiniti anticipates potential failures and protects data, instead of reacting to them too late.





ArcFiniti provides Green Archive Storage = Less Power & Less Cooling

- Green deep archive storage with high end NAS performance for primary cache
- Reduce power required by up to 90%
- ArcFiniti uses MAID (Massive Array of Idle Disks) for deep archive
 - ArcFiniti means less electricity
 - ArcFiniti means less cooling
 - ArcFiniti means higher reliability
 - ArcFiniti means more TB/s per cabinet.
 - ArcFiniti means LOWER COSTS!

TCO: Impact on Datacenter Floor Space

- Average cost of floor space is \$240 ft² annually
 - ArcFiniti is 10 ft² per cabinet
 - Traditional storage is 6 ft² per cabinet

FEATURE	ArcFiniti	NetApp FAS6200
Raw TB per cabinet	2,088TB	480TB
Raw TB/ft ²	208.8TB	78.3TB
Annual \$/per ft ²	\$2,400 per cabinet	\$1,471 per cabinet
Cost per Raw TB for floor space	\$1.15	\$3.06
Number of cabinets for 2,088TB Raw	1	5
Cost for floor space for 2,088TB Raw	\$2,400	\$7,355

Up to 67% reduction in datacenter costs

TCO: Impact on Power Consumption

Assumes \$.011 per kWh

FEATURE	ArcFiniti	NetApp FAS6200
kW per solution (2PB raw) full operational	6.4 kW	25.32 kW
Standby	3.4 kW	
kW/TB full operational	.0032 kW	.0105 kW
standby	.0017 kW	
Annual cost of power & cooling full operational	\$5.90 per TB	\$20.3 per TB
standby	\$3.14 per TB	
Power & cooling for 2088 TB standby	\$6.5k annually	\$49k annually

Up to 85% savings in power consumption

The TCO Results.... Comparing 2PB Raw

Selecting the appropriate Storage Platform for Active Archive Data

Feature	ArcFiniti A1404	NetApp FAS6200	ArcFiniti Advantage
Components	1 Cabinet	5 Cabinets	6-8x less components
Cost /TB floorspace	\$1.15	\$3.06	67% Space Savings
Power & Cooling (KwH/TB/year)	\$6.5k yearly	\$49k yearly	Up to 85% Power Savings
Reliability	3.8m hrs MTBF	0.6m hrs MTBF	5x Reliability
Serviceability	0.26% AFR 3 drives/1000	4.29% AFR 43 drives/1000	16.5x Serviceability

ArcFiniti:

A Purpose-Built Platform for Persistent File Data



- At Least 500% higher capacity in a single cabinet than nearest competition
- 6x Reliability of standard NAS with MAID
- Data Integrity checking and power management
- Full NFS support (Basic CIFS in V2)
- Automated tier virtualization



- Less hardware to manage
- Less physical footprint in data centers
- Significantly lower power and cooling cost

= Lowest TCO for File Consolidation

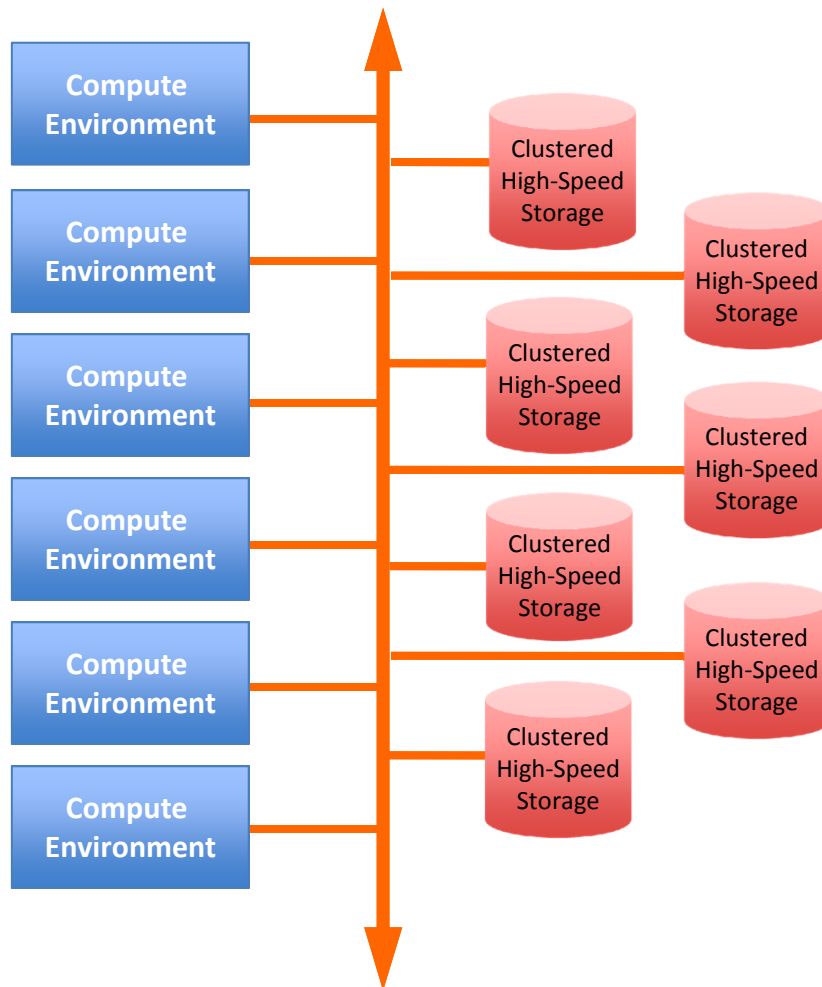
Customer Overview



- Complete Genomics
 - Complete Genomics offers an end-to-end, outsourced solution that enables our customers to offload to us the complex processes of sample preparation, sequencing, computing and data storage and management.
- CG' s Focus:
 - Complete Genomics is dedicated to providing on-demand, affordable, high quality sequence data from thousands of samples.
 - Our service is unlocking a new era in disease research and is transforming the way diseases are studied by providing high-quality complete genome sequence data to all researchers.

Enabling High-Performance Archive

Complete Genomics Problem

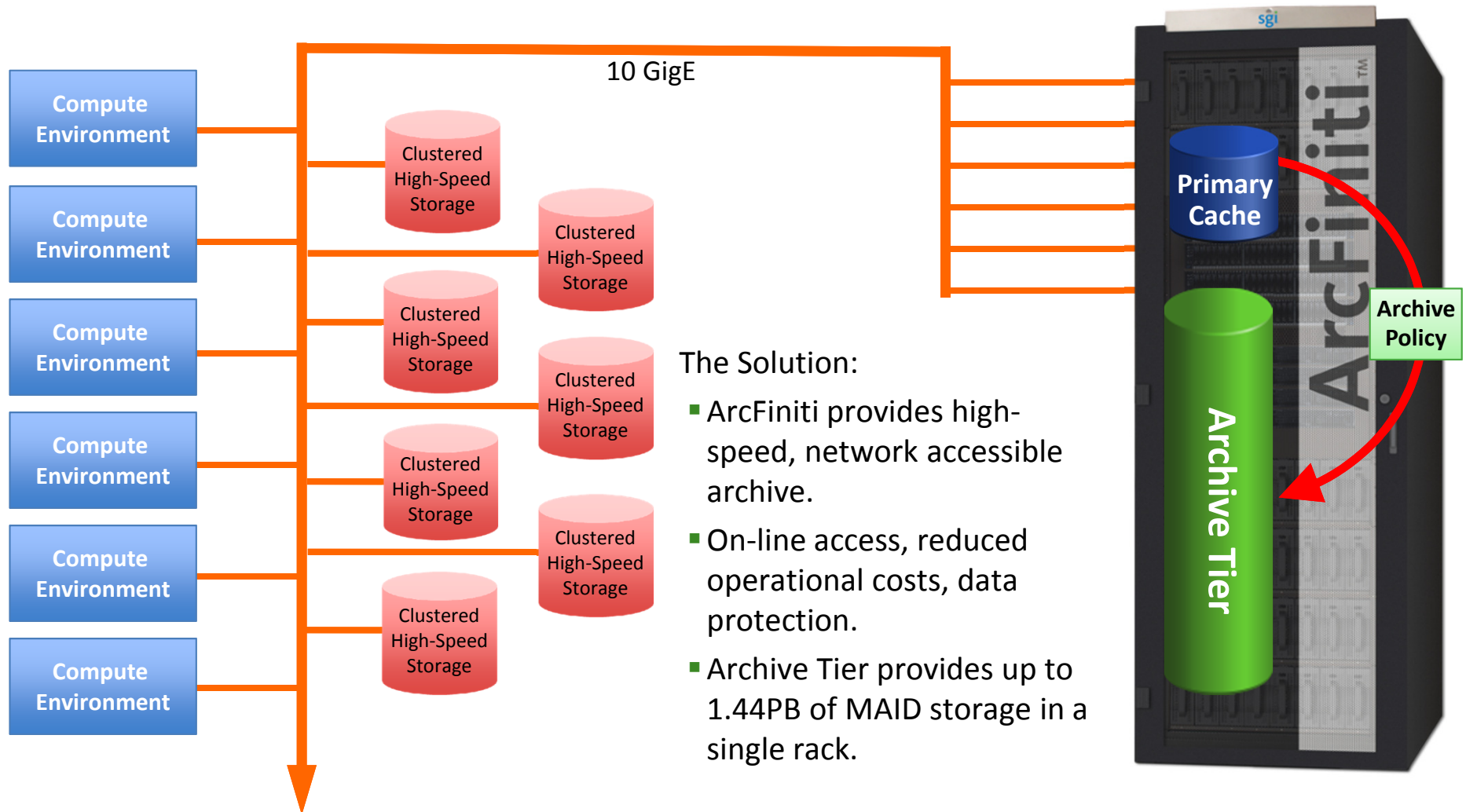


The Problem:

- Increase storage capacity with minimal cost.
- Enable network access to high volume, reliable and high-performance archive

Enabling High-Performance Archive

Complete Genomics Active Archive



The Solution:

- ArcFiniti provides high-speed, network accessible archive.
- On-line access, reduced operational costs, data protection.
- Archive Tier provides up to 1.44PB of MAID storage in a single rack.

