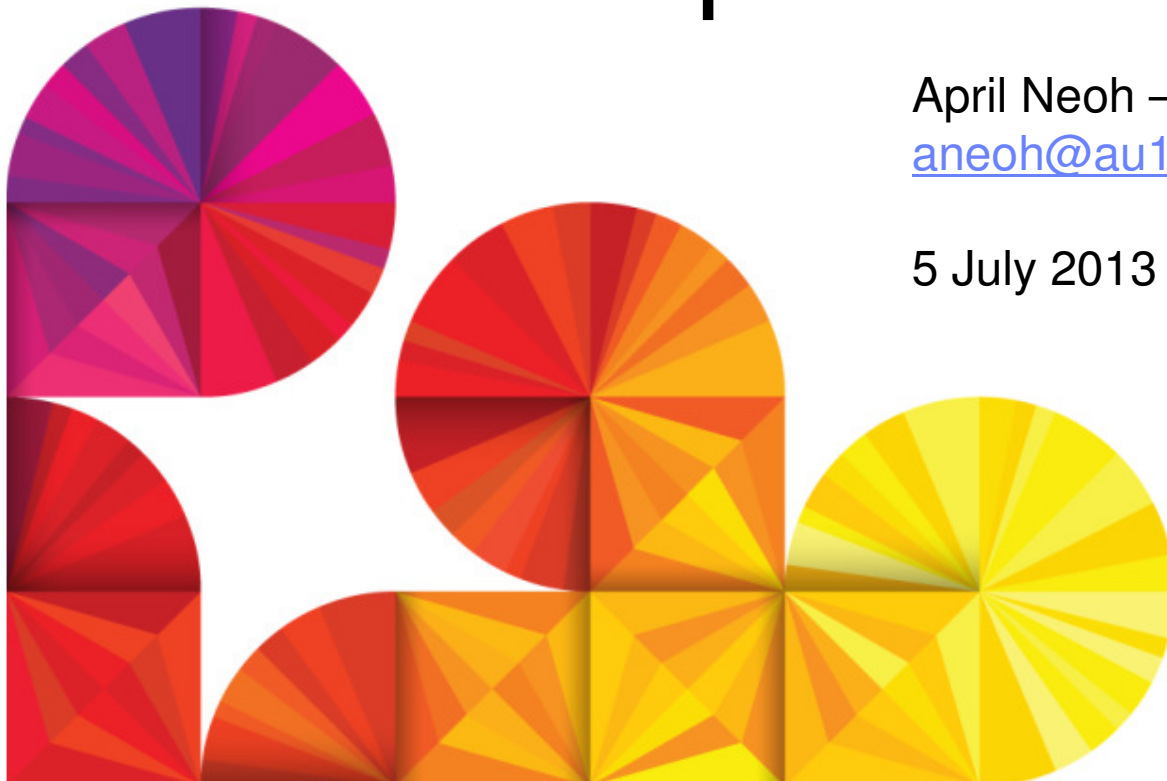


Eliminating the NFS Hotspot Bottleneck

April Neoh – IBM Technical Computing ANZ
aneoh@au1.ibm.com

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Agenda

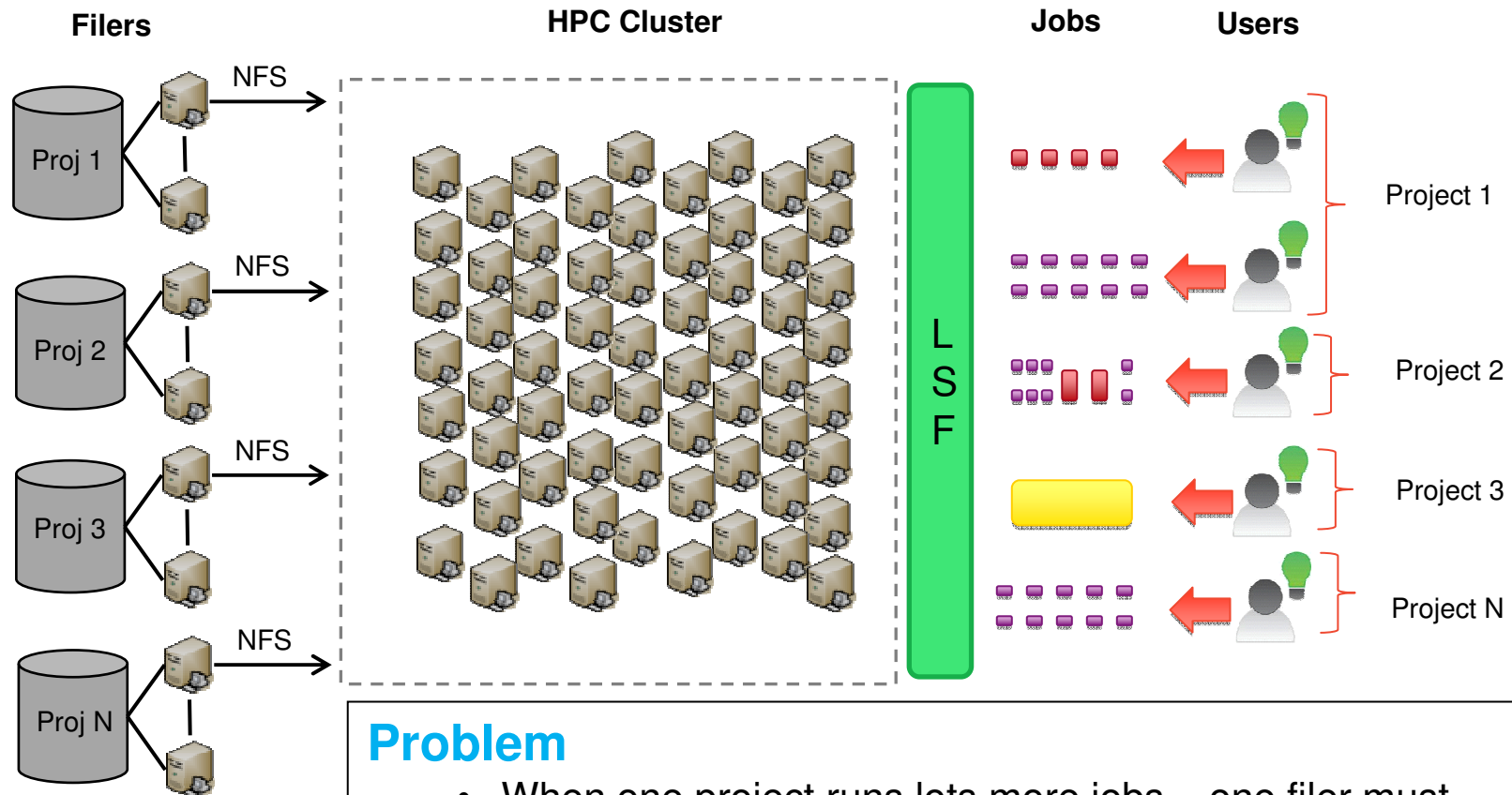
- What is the Filer Bottleneck Problem?
- IBM General Parallel File System (GPFS)
 - Product overview
 - Solution architecture
 - How it works
 - Benchmarks
- Benefits and summary
- Q & A



Eliminating the NFS Hotspot Bottleneck The Filer Bottleneck Problem



The Traditional NFS environment today

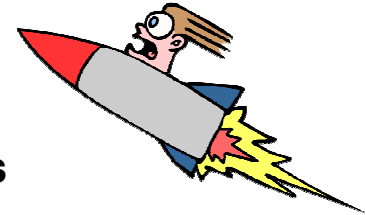


Problem

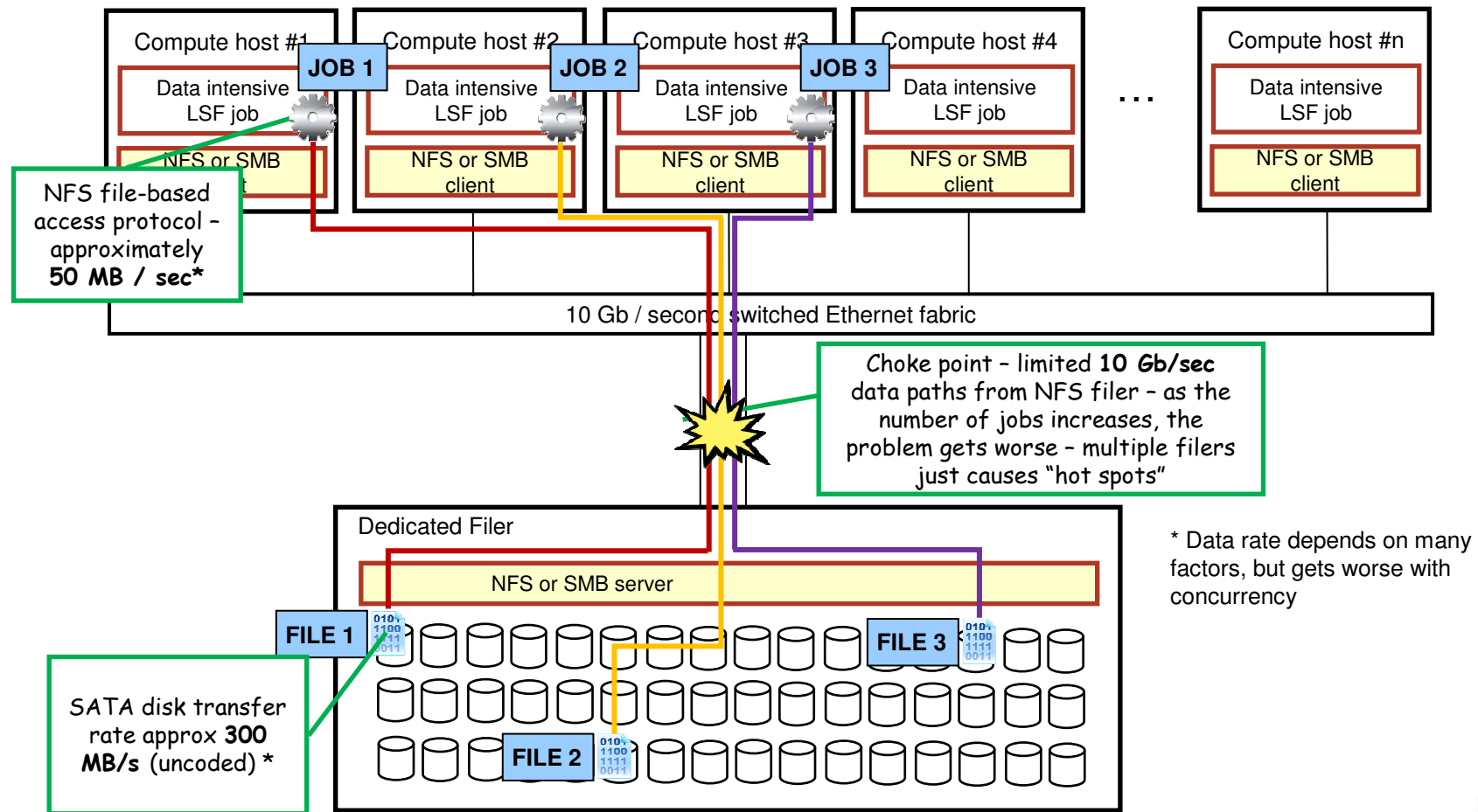
- When one project runs lots more jobs – one filer must push much more data than the others – but bandwidth is limited
- Scaling can only be achieved by adding more filers



NAS choke point



NAS storage (NFS/SMB) has performance bottlenecks

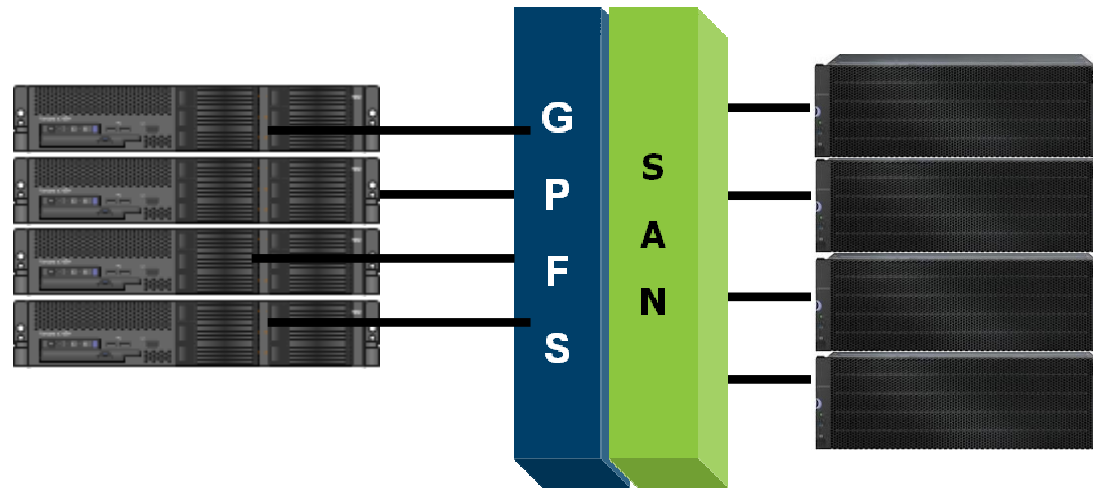


Eliminating the NFS Hotspot Bottleneck

GPFS Caching Solution



IBM General Parallel File System (GPFS)?

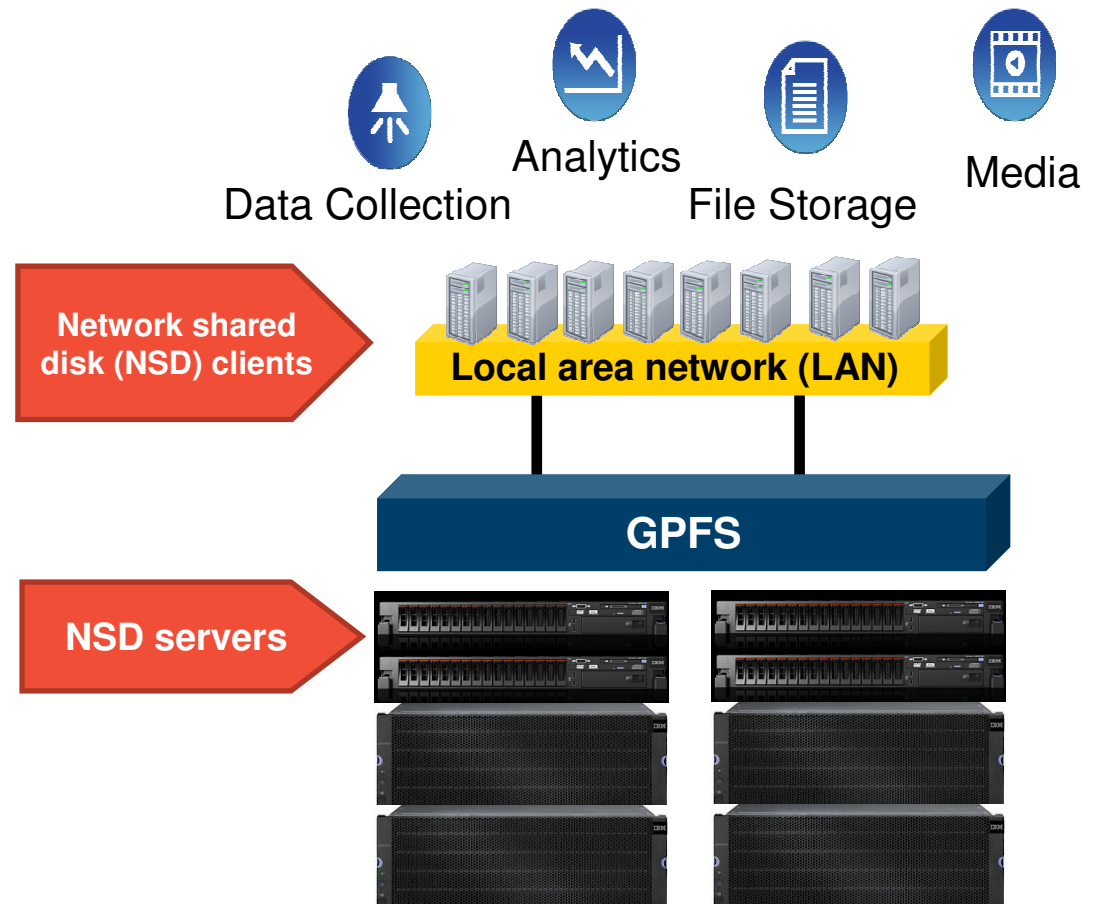


- Cluster file system, all nodes access all data
- Seamless capacity and performance scaling
- All features are included

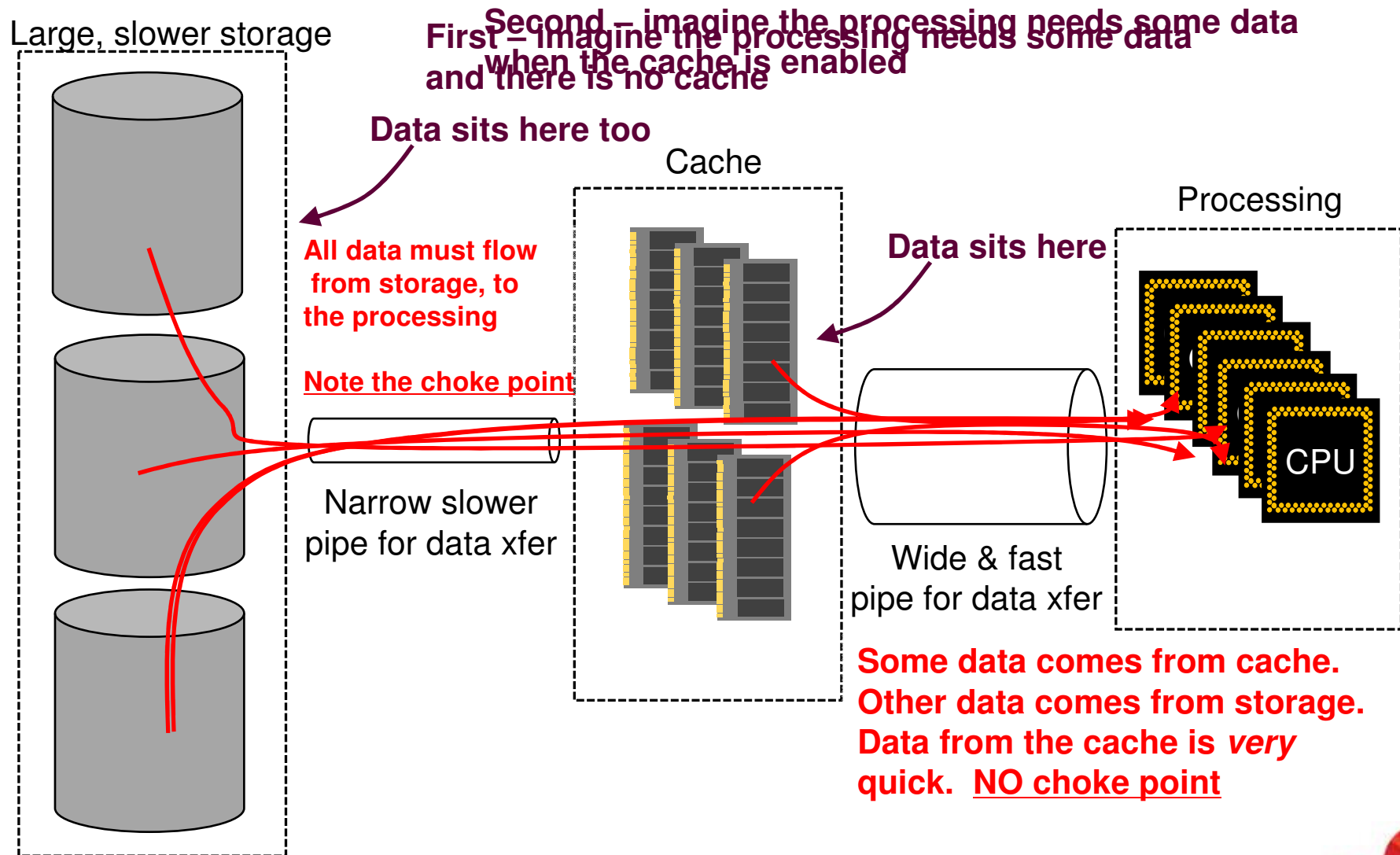


Network-based block input and output (I/O)

- Reduce costs for data administration
- Enable virtually seamless multi-site operations
- Provide flexibility of file system access
- Establish highly scalable and reliable data storage
- Future protection by supporting mixed technologies
- Streamline data access
- Centralize storage management
- Improve data availability



What is a cache ?



Solution concept

Description

- A GPFS – AFM installation to cache active projects
- Hardware & software solution
- Investment protection with permanent data remains on filers

Value

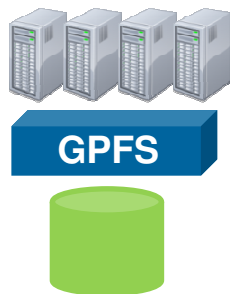
- Utilization & efficiency of resources (hardware & licenses) remain high
- Assure high priority, busy projects do not suffer a performance loss
- Scaling the bandwidth or the storage is simple, easy & incremental
- **Accelerate time to market**

Target Market

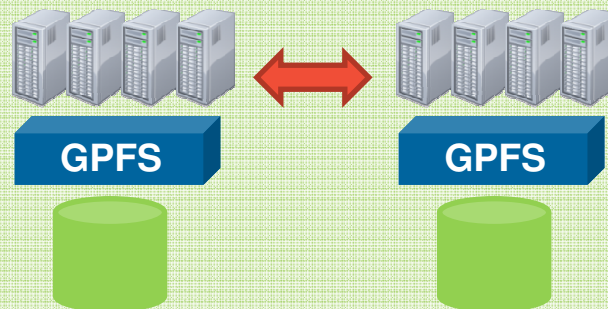
- EDA and other environments where NFS filers are common



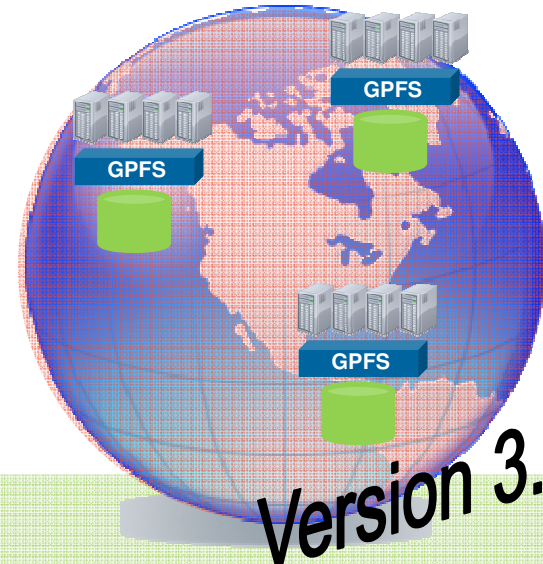
What is GPFS “AFM” (Active File Management)?



GPFS introduced concurrent file system access from multiple nodes.



Multi-cluster expands the global namespace by connecting multiple sites



AFM takes global namespace truly global by automatically managing asynchronous replication of data

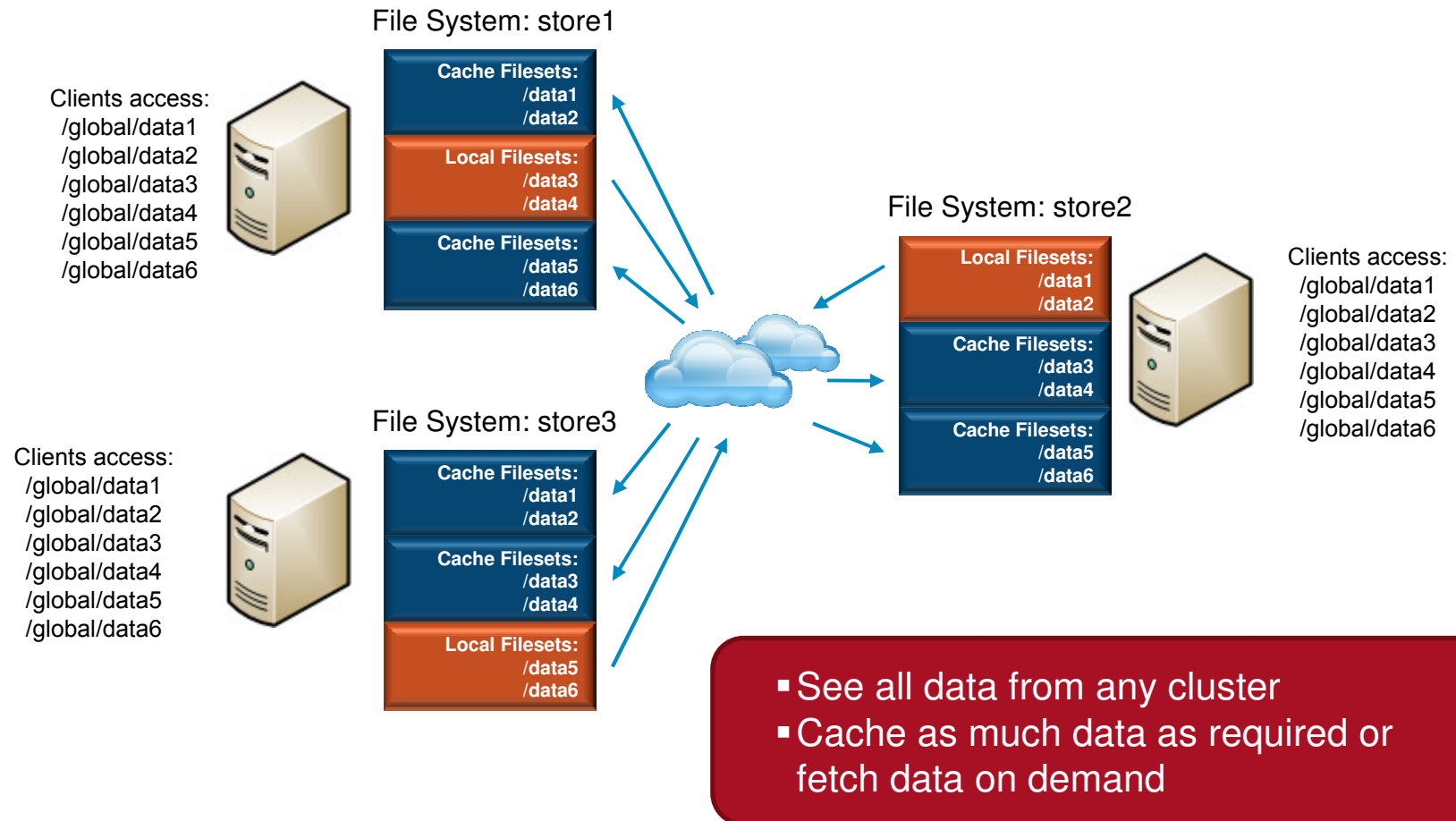
1993

2005

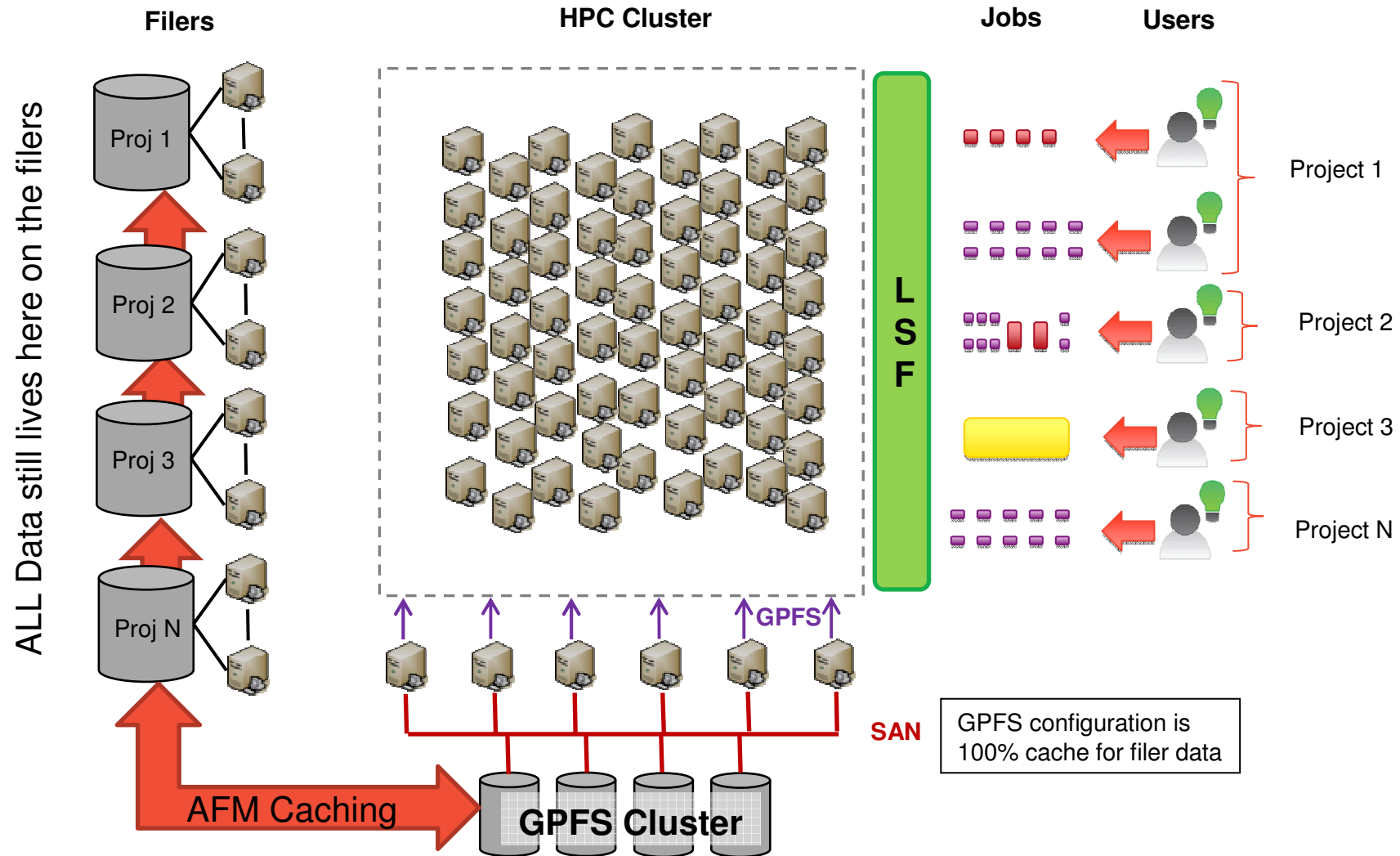
2011



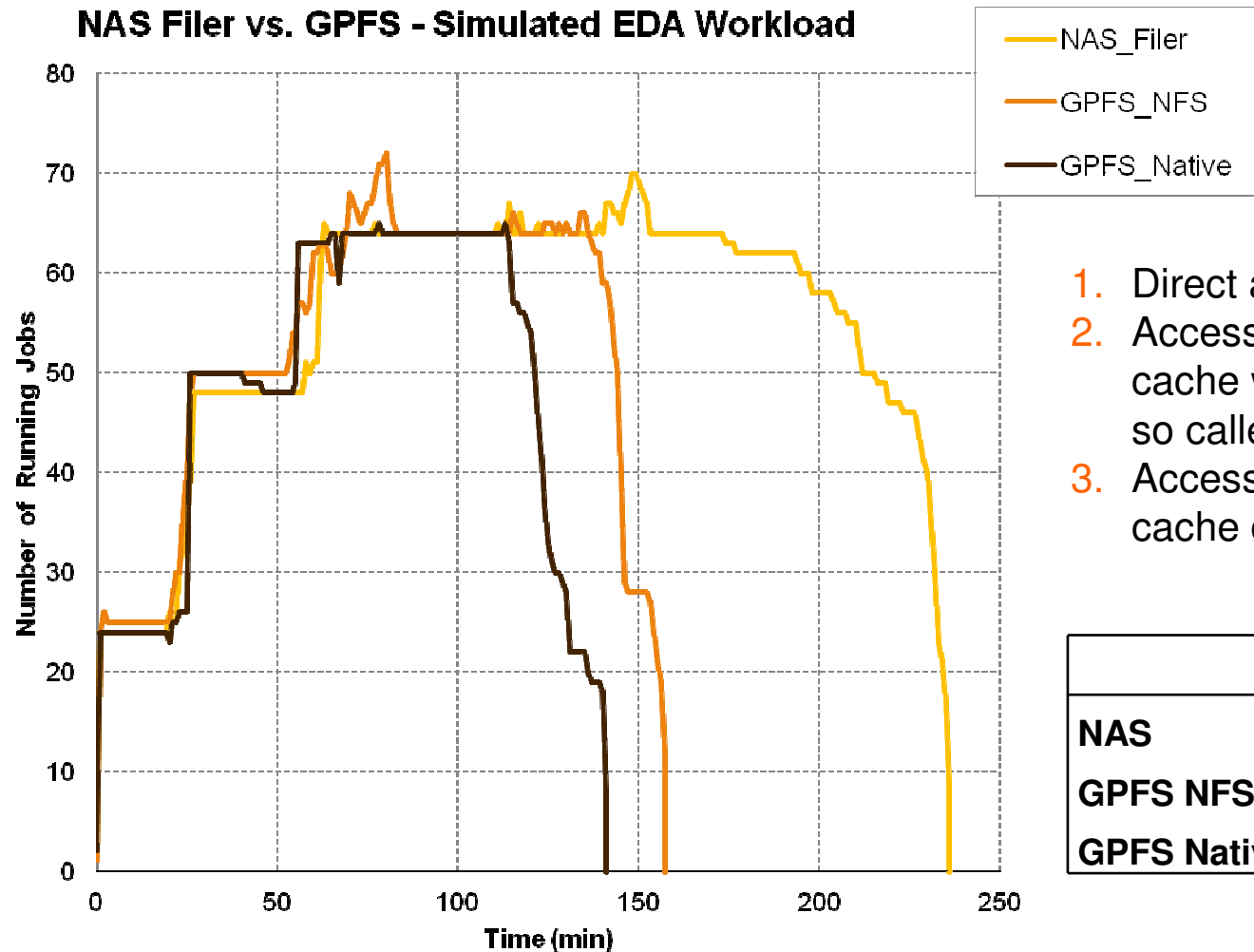
Global namespace + AFM cache



Solution architecture



Benchmark results



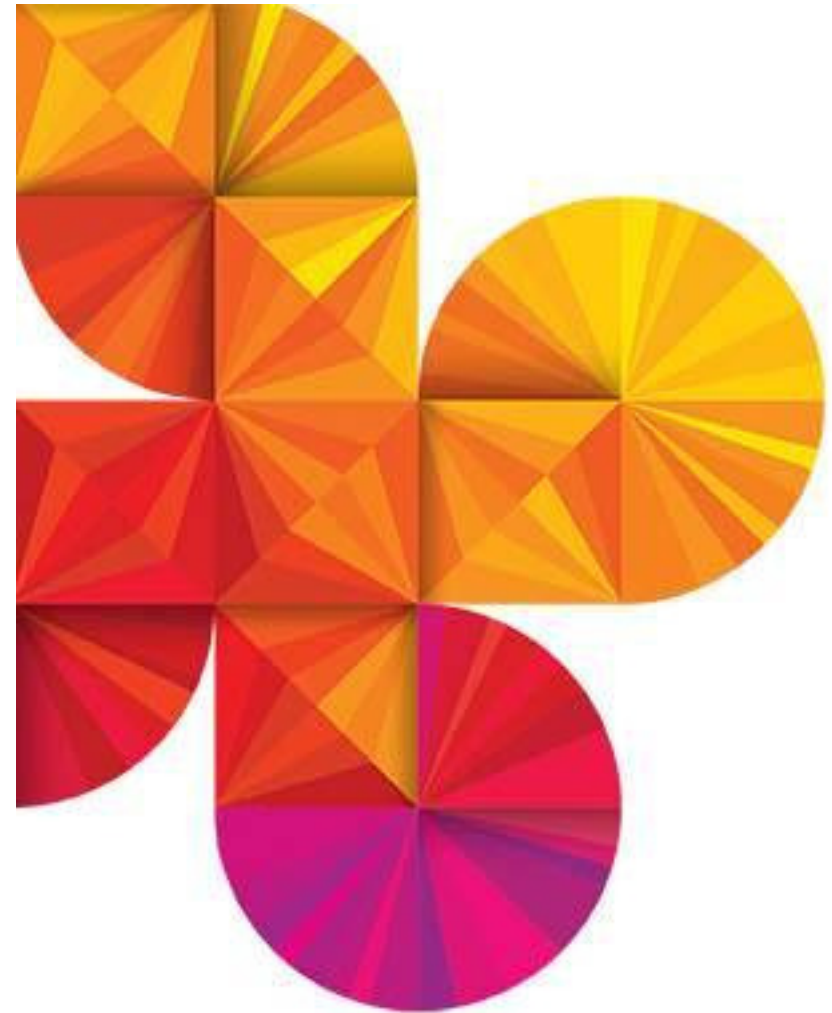
1. Direct access through NAS filer
2. Access through GPFS-AFM cache which exported as NFS, so called GPFS-AFM filer.
3. Access through GPFS-AFM cache directly as GPFS client.

	Run Time	Speedup
NAS	236	0%
GPFS NFS	157	33%
GPFS Native	141	40%



Eliminating the NFS Hotspot Bottleneck

Solution Value and Benefits



Solution value & benefits

■ Performance

- A single project can get the full bandwidth of the GPFS AFM cluster
- Any data access through the GPFS cache will be cached on the GPFS disk system and cached by the AFM algorithm
- Hot project data will then be served by the large number of NSD servers and not touch the filer at all
- Filers no longer are impacted by hot projects

■ Scaling

- Scaling is incremental, easy, and quick
 - Requires a simple addition of AFM NSD Server or backend cache disk
- Scaling of the overall footprint requires additional disk in the filers

■ Reliability

- Evolutionary approach – not revolutionary
- All permanent data stays on the filers
- Existing projects can use NFS mounts from filers as they always have – no data risk



Is this solution a good fit for your environment?

Are filer hot spots a known issue in your environment today?

Have you done anything to alleviate them? If so, what? Was it effective?

Do filers ever get unstable because of overuse by your HPC?

Do you ever have to buy additional filers because of bandwidth rather than capacity?



Solution Packaging

“Roll Your Own”

- Build you own GPFS Cluster with:
 - x86 Servers
 - GPFS Software
 - Storage

Pre-Integrated GPFS Cluster

- GPFS Storage Server (GSS)

Appliance Style

- IBM SONAS
- IBM Storwize v7000U



Eliminating the NFS Hotspot Bottleneck Questions?

