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**Creating a coherent and integrated model for
managing subsurface data**

Advances in information management for geoscientists



Introduction

1. Integrating technology to benefit the Geophysicist
2. Laying a foundation for coherent data management
 - What are the issues facing the geophysicist today?
 - How are things changing?
 - What is driving change?
 - What would make life easier?
 - Is this achievable?
 - What role does technology play and how can that be improved?

Background

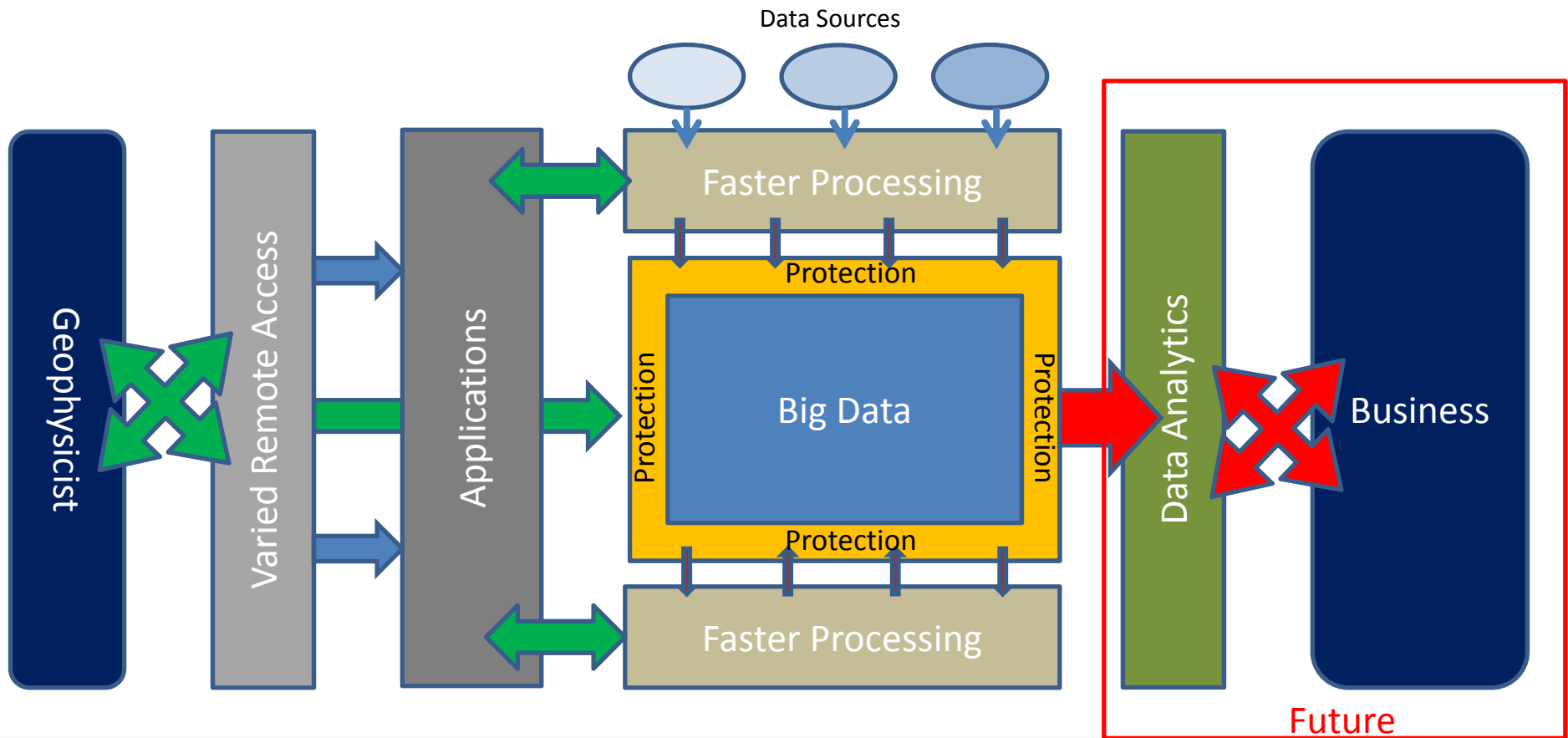
Issues

- Increased E&P activity
- Greater need for accuracy of processing
- Faster turnaround needed
- Wider dispersion of data required
- Growth in data volumes – emergence of Big Data

Drivers

- Oil price
- Competition
- New markets

Dealing with the issues



What's the impact on technology?

You need more of it!

- Ever growing HPC estate
- More frequent infrastructure refreshes
- More complex designs
- Infinite storage expansion
- Need performance, performance, performance

But, is it enough?

Technology for the Geophysicist?

- Performance

- Processors (Intel – Sandy bridge)
- Storage (flash/SSD)
- Networking (40GbE, Infiniband)

Result – process data faster

- Scalability

- Add more “stuff” easier and to greater capacities
- Easier to scale
- Much higher performance, capacity or functionality

Result – grow platforms without forklift replacement & cheaper

Technology for the Geophysicist?

- Consolidation

- Virtualisation (VMware, Citrix, MS)
- Virtualised storage
- Reduce number of different platforms

Result – easier management, lower operational costs

- Footprint Reduction

- Get more into same or smaller space
- Energy savings
- Better packaging

Result – easier to deploy and lower cost

Technology for the Geophysicist?

- Energy Consumption

- Latest technology for CPUs
- Storage advances (Solid State, spin down, etc)
- Improved monitoring tools

Result – lower TCO

- Communications

- Greater bandwidth (more speed, more availability)
- Thin client technology (RGS, VMware View, etc)
- Technology advances (graphics controllers, security)

Result – ability to implement “work anywhere, anytime, anyhow “

Does it make your life easier?

The Problem with technology

- IT vs IM
- Resort to “one size fits all”
- Throw more generic resources at the problem
- Spend more money!
- Lack of corporate strategy
- Poor use of new technology innovations to solve G&G issues
- Lack of flexibility

Eventually you have to adapt your Information processing requirements to fit the technology

The Solution?

Adapt technology to fit your specific requirements

Making Technology work for you

- Need to re-think approach
- Avoid the “best of breed” arguments
- IT and IM have to agree
- Partnership approach between:
 - Integrator
 - Business
 - End user
 - Vendor(s)
- Need to agree objectives, timelines and strategy
- Create an integrated platform for managing subsurface data

Example

- Background
 - Data Processing requirement
 - Very large scale clusters & Large data output – bottleneck in disk i/o
 - Standardised on a high end clustered filesystem storage platform
- Problem
 - Server improvements (new CPUs, more cache, more cores, etc)
 - Networking improvements (10GbE, 40GbE, Infiniband, etc)
 - Storage platform lagging behind
- Solution
 - Increase storage capacity – faster disks over more channels
or
 - Design something new

Partnership - Eurotech, Client and IBM



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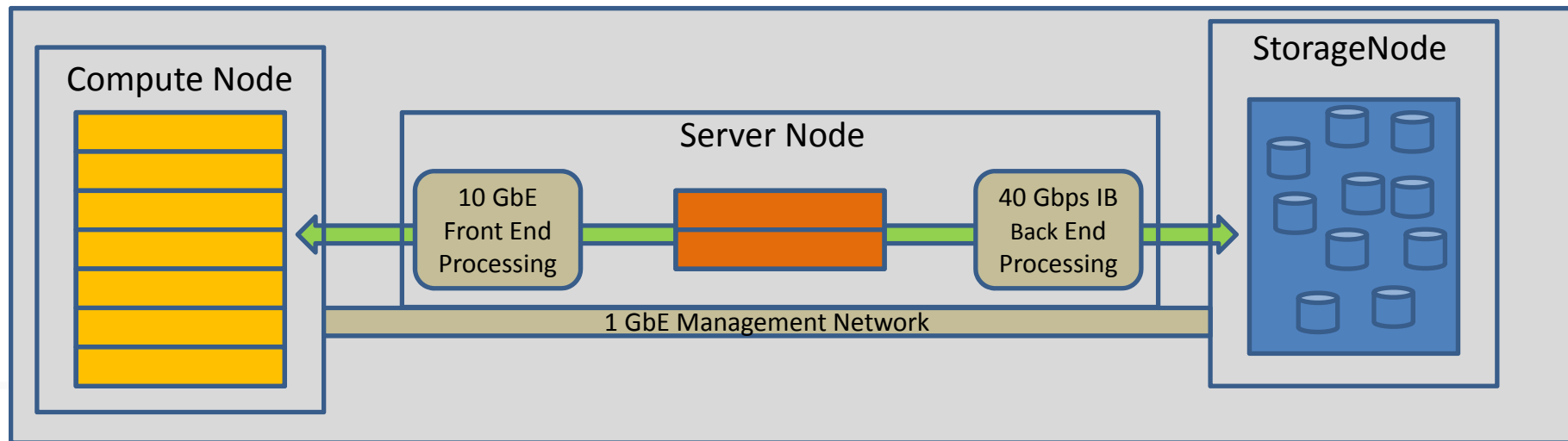
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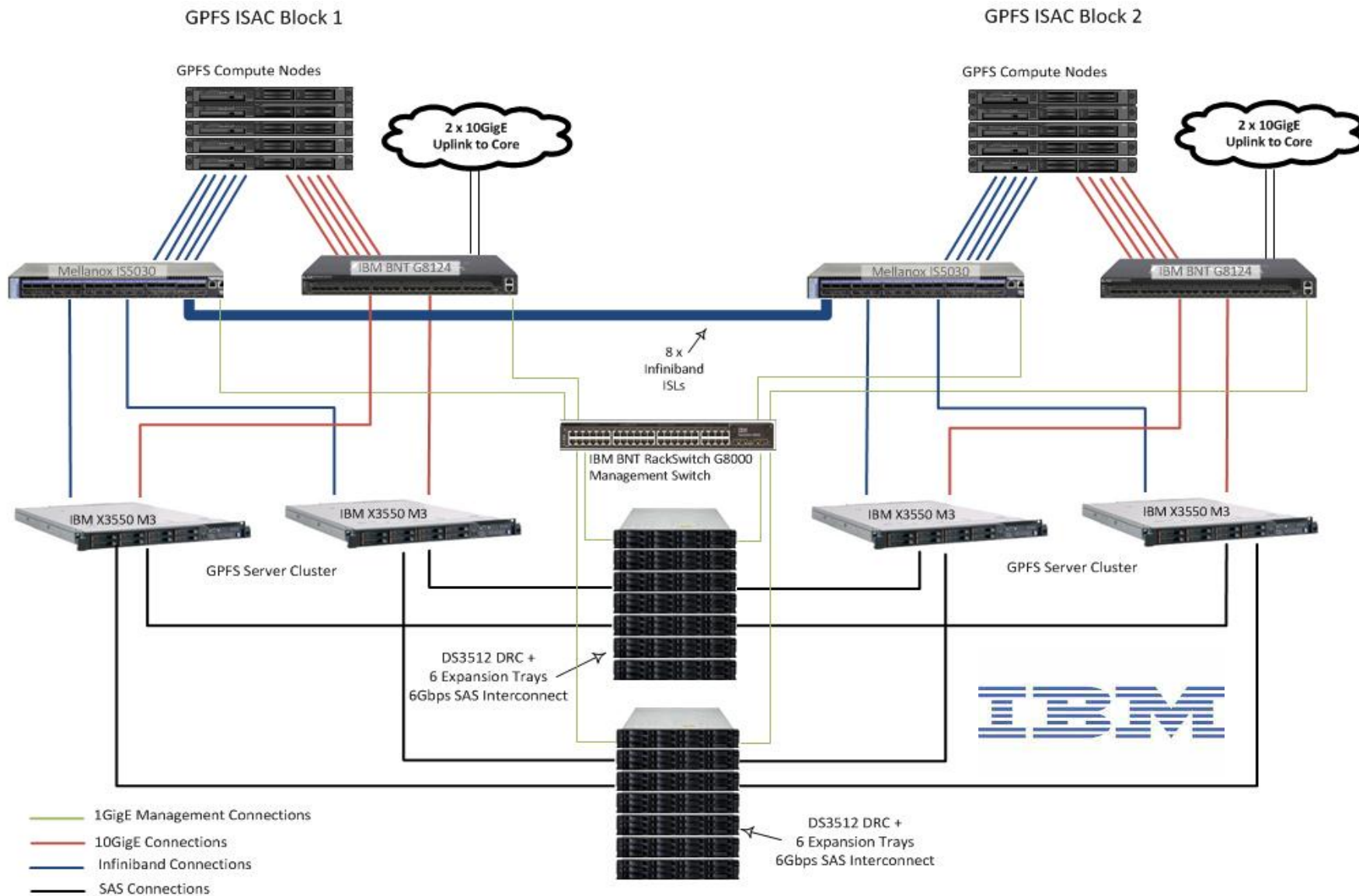
Integrating technology to benefit the Geophysicist

Result: ISAC

(Integrated Storage and Compute)

- Eliminate Silo based architecture
- Implement large scale HPC in a modular way
- Start small, scale as needed to any level
- Add performance at *any* point





Specifics

Compute Node

- Server number as required

Server Node

- Multiple IBM X3550 M3 Servers
- Linux, GPFS, cNFS
- IBM G8000 1GbE Management Switch
- IBM G8124R 10GbE Front End Processing Switches
- Mellanox ISS030 40 Gbps Infiniband Data Throughput Switches



Storage Node

- Multiple IBM DS3512 arrays
- 3TB drives
- Dual RAID active-active



Advantages

- Tailored architecture
 - Meet your exact requirements
 - No compromise
- High Performance
 - 3 x higher than existing config
 - And, only entry level config
- High Throughput
 - At front *and* back ends
- Infinitely scalable
 - Increase compute node, server node, bandwidth speed, storage node, disk drives
- Easy Management
 - Single pane
 - Readily available components
- Cost
 - 40% lower than existing storage

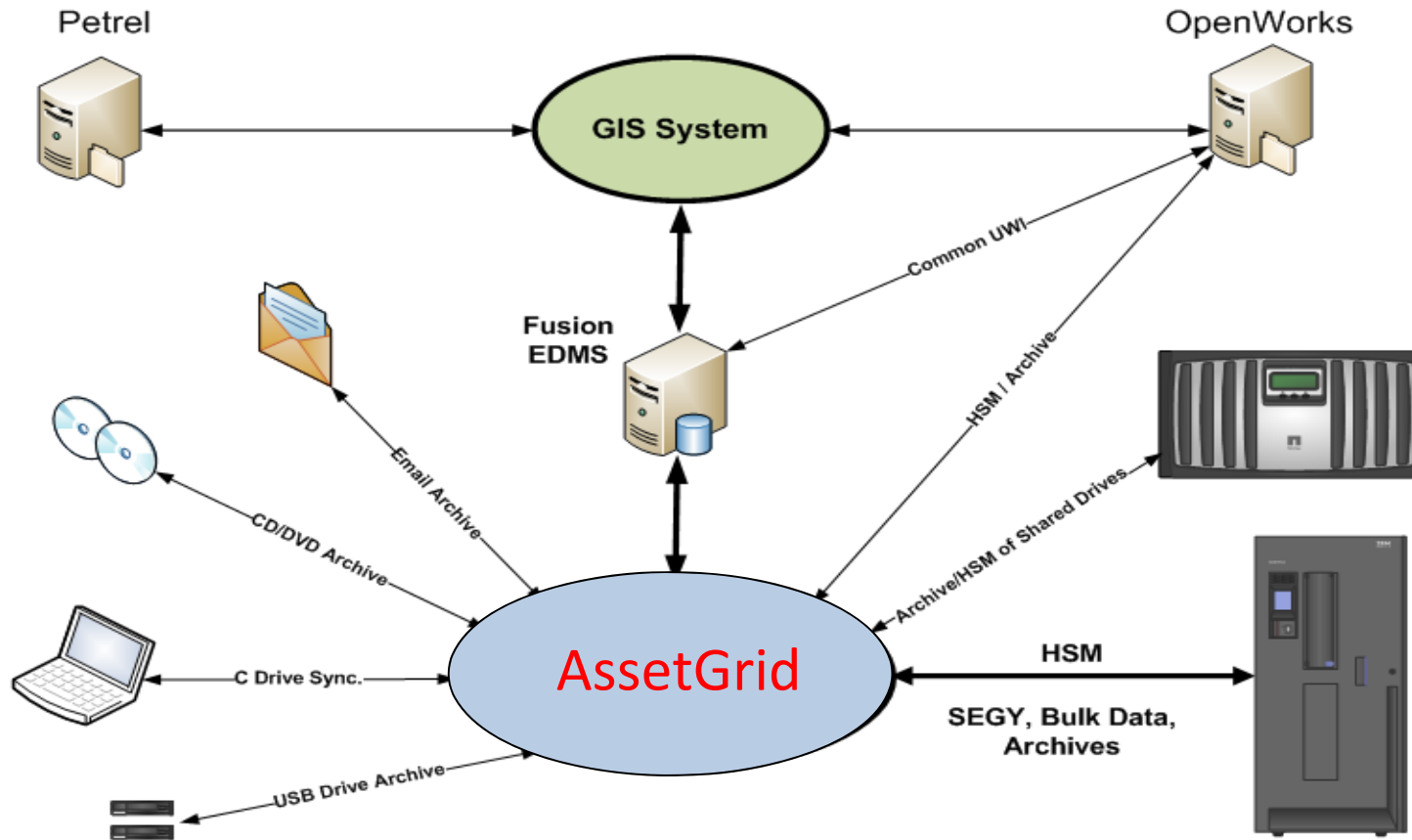
Coherent Data Management?

- Multiple data sources
- Poor or no tracking or management of data
- Often stored at multiple locations
- No security
- Unreliable storage mediums
- Different data types
- No compliance with regulatory controls
- No internal compliancy
- Visibility limited to small number
- No integration with other business areas

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Laying a foundation for coherent data management

Digital Preservation



What you get

- Automatic ingestion of data - Policy driven
- Remove duplicate data
- Automatic movement of data – ILM
- Long term archiving
 - To disk, To Tape, To Cloud
- Global multi-site coverage
- Compliancy
- Secure environment
- Automatic deletion
- Easy retrieval – by file, by project, by identifier

Summary

- *Big Data* really is an issue
- Rapid evolution of technology also an issue

- Don't put up with "best fit" technology
- Explore the market & Work with partners
- Technology can adapt to your requirements

- But, don't forget to implement best practices around it
- Create the first steps for an integrated model