Ellexus Ltd: The I/O Profiling Company

Dr Rosemary Francis, CEO, Good I/O evangelist

I/O Profiling with Ellexus at Diamond Light Source on an IBM Spectrum Scale cluster

The I/O Profiling Company - Protect. Balance. Optimise.

www.ellexus.com

Ellexus Ltd: The I/O Profiling Company

Products: We make system telemetry tools to help you

- improve application performance,
- protect shared storage, and
- manage application dependencies for migration.

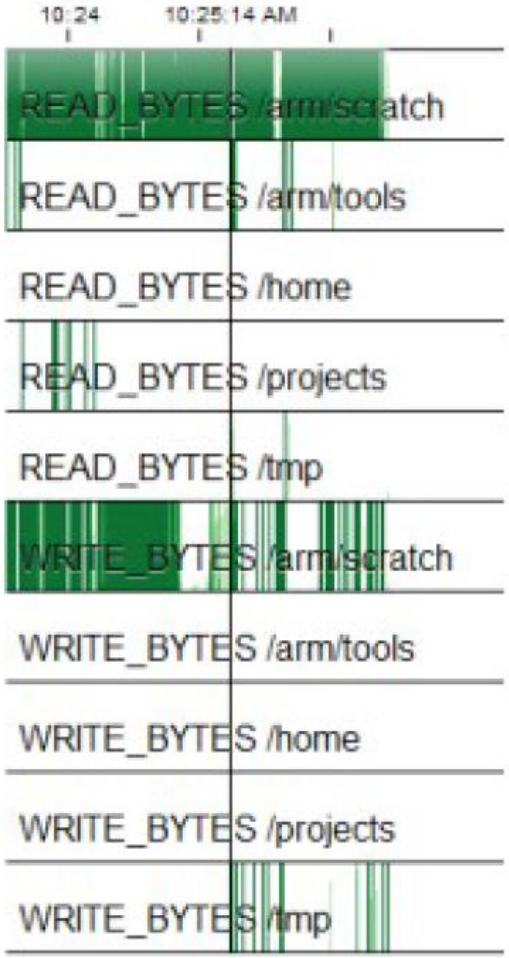
Customers include:

TACC
TEXAS
The University of Texas at Austin
diamond
wellcome sanger institute
DELL EMC
ANSYS
arm
Mentor
A Siemens Business

Solving the noisy neighbour problem

How we worked with Arm to develop our technology

Example of a rogue job from Arm:



This application is overloading shared storage by putting data in the wrong place.

Temporary data is written to shared storage

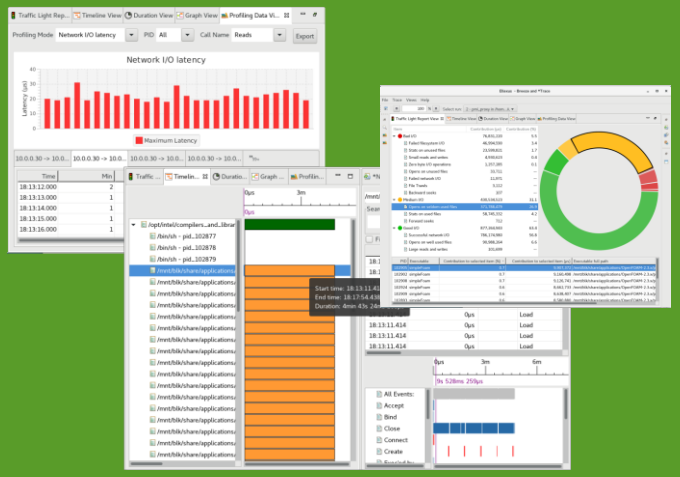
Local storage is unused

Ellexus enterprise products

Take control of the way you access your data

breeze

Detailed I/O profiling
Application discovery



Dependencies
What do I need to include in my container?
How do I migrate this tool chain?

I/O profiling
What resources do I need to run it?

Debug and triage
Why am I not getting the results I expect?
Why can’t I pick up the right licence?

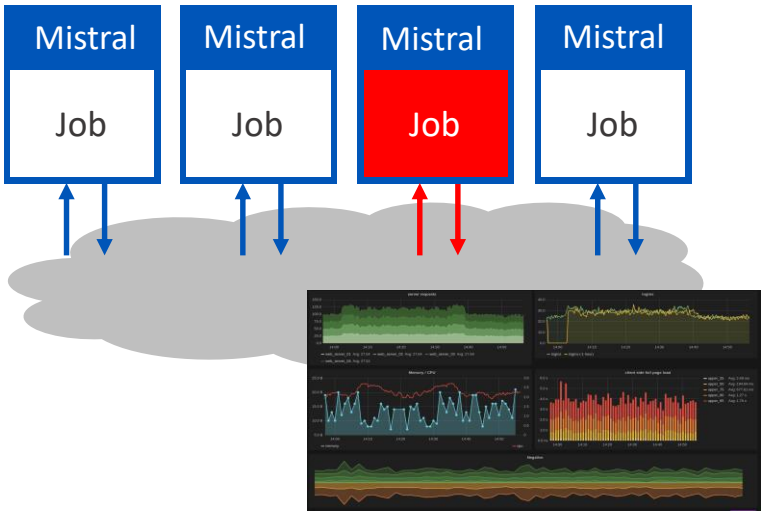
Ellexus enterprise products

Take control of the way you access your data

Live telemetry for on-premises clusters and cloud

Protect storage and find bottlenecks

Cost management and forecasting



mistral

Live system telemetry:
I/O monitoring in production

Data that pays for itself

Returns on day one:

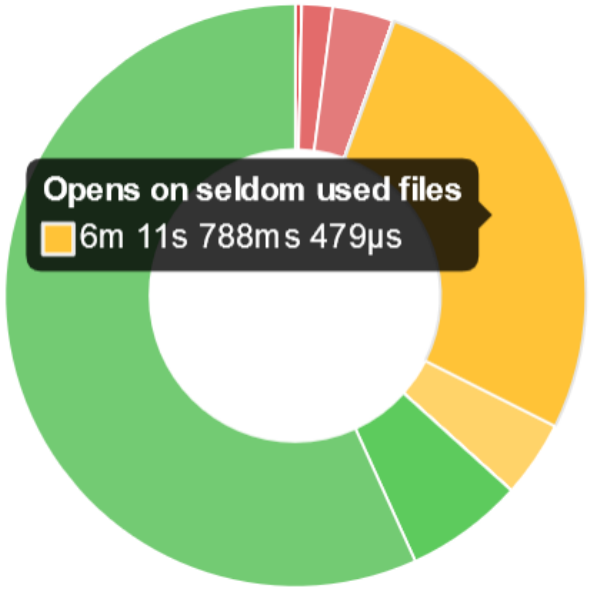
- Dependencies for migration
- I/O profiling and sizing
- Job steering
- Telemetry for operations
- Storage protection

Long-term benefits:

- Forecasting
- Optimisation
- Cost-aware scheduling

Tuning and sizing:

How much time are you wasting doing bad I/O?

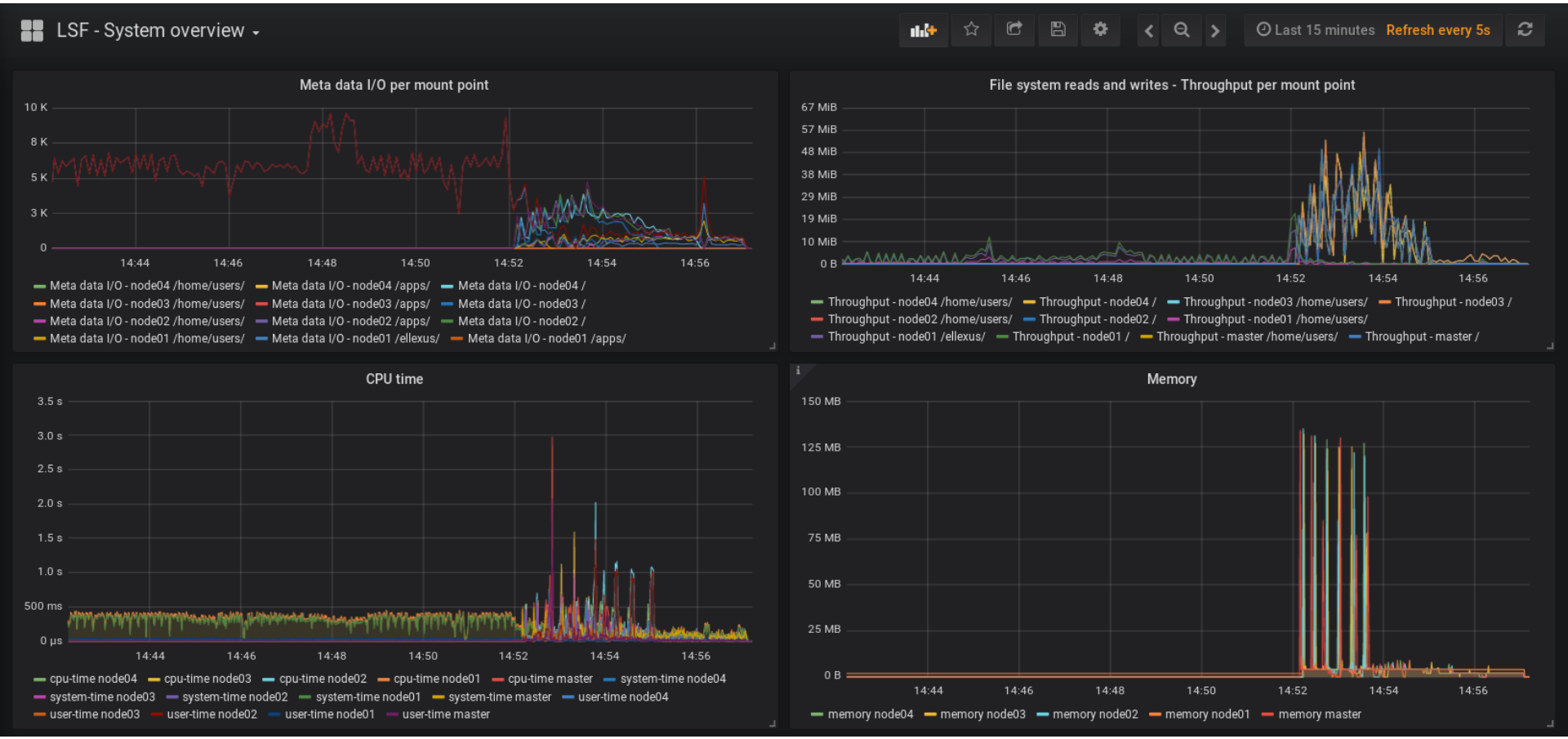


- Small reads and writes
- Opens on unused files
- Stats on unused files
- Failed filesystem I/O
- Backward seeks
- File Trawls
- Zero byte I/O operations
- Failed network I/O
- Opens on seldom used files
- Stats on used files
- Forward seeks
- Large reads and writes
- Opens on well used files
- Successful network I/O

System telemetry:

How much time are you wasting doing bad I/O?

What is normal?



Diamond Light Source

The UK’s national synchrotron (particle accelerator)

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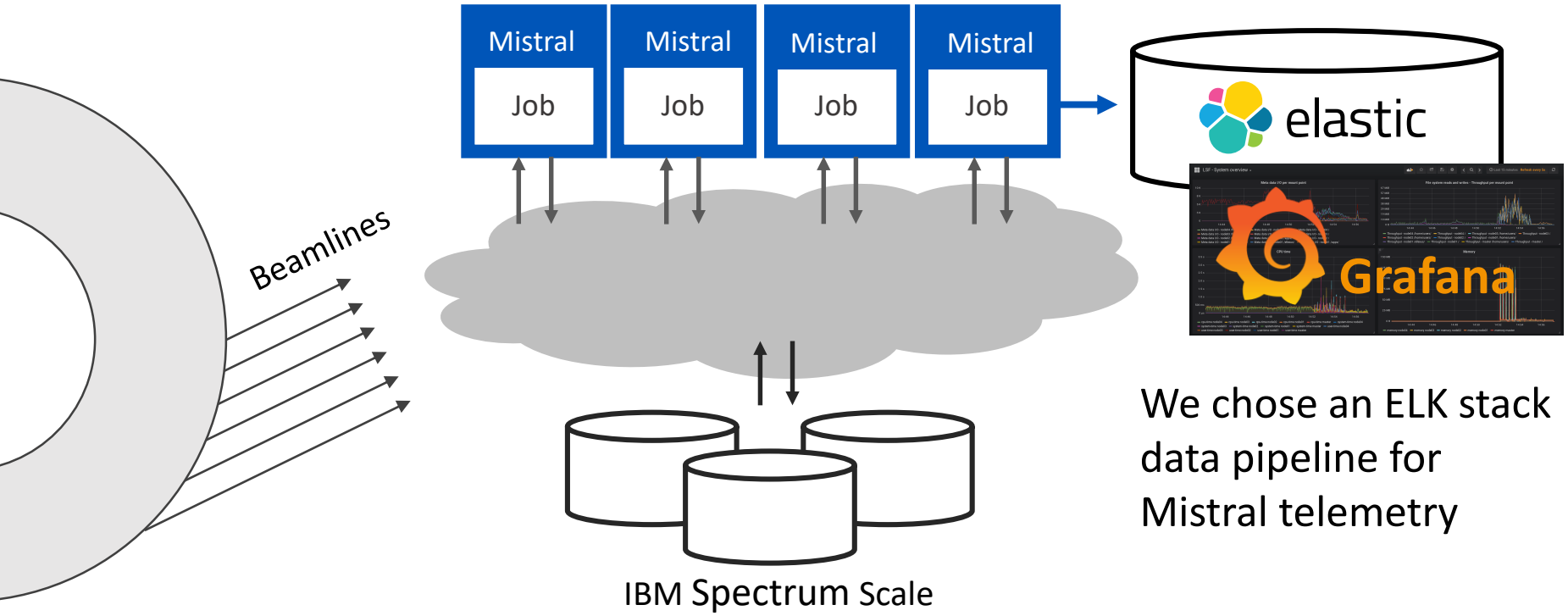
Beam lines

Deploying Mistral at Diamond Light Source

Beamline data must be processed in real time



We chose an ELK stack data pipeline for Mistral telemetry

First win: eliminating bad meta-data

- Applications were profiled with Mistral
- Some were Stat()ing files many times
- The files did not exist or did not change

Second win: optimizing application deployment

Long pythonpaths cause file system trawls when loading modules.

Removing unused paths improved file system performance and application run time.

Production win: finding noisy neighbours

A single-core job was able to saturate the network of a group of nodes

Mistral located the node and jobID of the offending program

Fast, agile and (hybrid) cloud ready

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Performance, portability and planning

~~Fast, agile and (hybrid) cloud ready~~

Performance, portability and planning

Performance: Understand I/O patterns and requirements

Portability: Understanding application dependencies

Planning: System telemetry

⇨ Capacity planning and charge back

⇨ Make better decisions about how to deploy applications

Thanks for listening

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