

Provider's intro

Alastair Basden

Alastair Basden
DiRAC / Durham University



DiRAC
High Performance
Computing Facility

The COSMA logo, featuring a stylized white star with a horizontal line passing through it, set against a dark background. Below the star, the word "COSMA" is written in a bold, white, sans-serif font.

COSMA

IRIS compute providers

- RAL cloud
- Cambridge: CSD3/Arcus
- Imperial
- GridPP
- Somerville
- DiRAC
- Durham/COSMA (new)

Recent(ish) developments

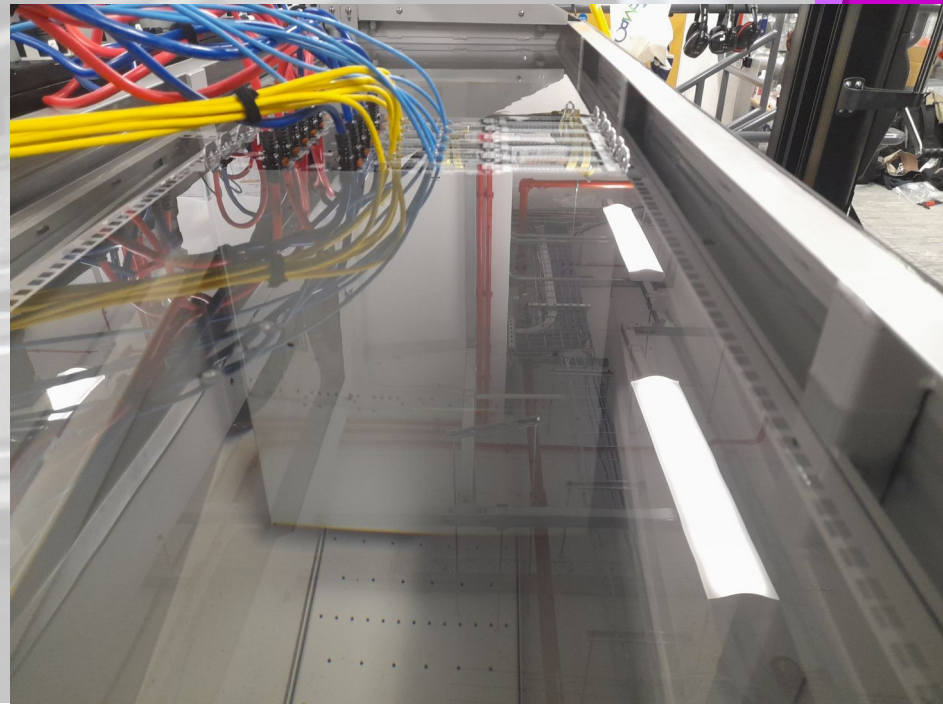
- The past decade has seen:
 - Some shift from HPC to private cloud
 - And back again in some cases
- User approach in computing is changing
 - A fear of technical compute
 - “Is there an app for that?”
- New user communities
 - Increasing demand for capacity

And more recently...

- Fast increases in costs
 - 50% increases within a month
 - And still going up
- Very short quotation validity periods
 - All because of AI

Compute at Durham

- Traditional HPC: COSMA - DiRAC
 - HPC Hardware Lab (CPU, GPU, Networks, storage, composability, etc)
 - Disk and tape storage
 - Reinstalled in 2024 on an OpenStack backend
 - Due to end-of-life of CentOS7
 - With help from StackHPC
- New IRIS Azimuth cloud
 - Up and running, ready for test users
 - More hardware being added
 - In our immersion tank (ICHS)
 - Feel free to arrange a visit if interested



THE NATIONAL GRID IS GETTING GREENER

THIS MEANS LESS CO₂

BUT HEATING IS STILL A PROBLEM

THE ICHS PROJECT AT DURHAM UNI

- A FEASIBILITY STUDY: INTER-SEASONAL HEAT STORAGE

THE DURHAM CAMPUS SITS ABOVE TWO LEVELS OF ABANDONED COAL MINES

THIS COULD BE VERY BORING!

HA HA!

DATA CENTRES PRODUCE LARGE AMOUNTS OF HEAT ALL YEAR ROUND!

WHICH ARE NOW FLOODED

AND LINKED BY MINESHAFTS

WE CAN PUMP THIS HEAT DEEP INTO FLOODED MINE WORKINGS

AND EXTRACT COOLER WATER FROM UPPER LEVELS

THE SYSTEM FORMS A CLOSED CIRCUIT - THE WATER THAT IS EXTRACTED IS REINJECTED

MEANWHILE IN THE WINTER THE STORED HEAT CAN BE EXTRACTED TO HEAT BUILDINGS

AND THE COLD WATER REINJECTED INTO THE MINES

THE BUSTY SEAM EST 1858

THE HUTTON SEAM EST 1816

a large underground heat battery

making heating more efficient

ROOM AND PILLAR FLOODED VOIDS

Exit

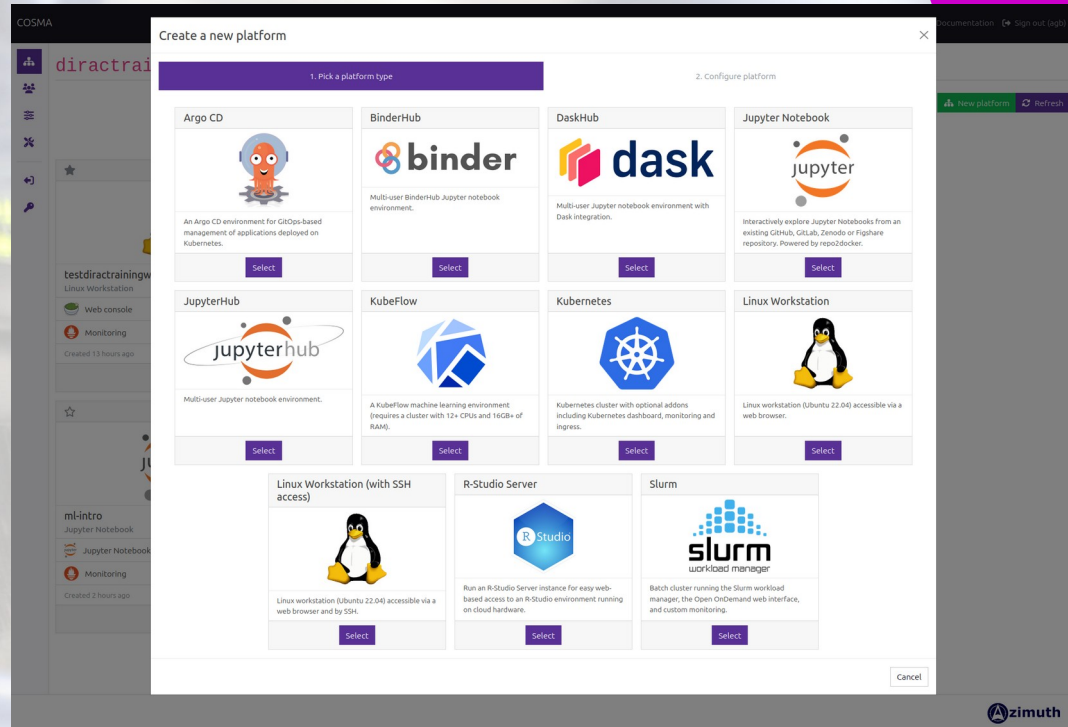
THEY DELVED TOO DEEP!

BALFOUR

PUTTING OUR UNDERGROUND ASSETS TO GOOD USE

Azimuth

- Should be a familiar interface for some
 - Giving root access to virtual servers and slurm clusters
 - And Kubernetes clusters for Jupyter etc



Knowing what you get...

- Is important

(Galaxy Classification CNN) across the systems:

Metric	Google Colab CPU (AMD EPYC 7B12)	IRIS Cloud CPU (AMD EPYC-Rome)	Google Colab GPU (Tesla T4)
Time per Epoch	~33 seconds	~6.5 seconds	~1.2 seconds
Step Time	~136ms / step	~32ms / step	~6ms / step
Total Training Time	27 min 30 sec	5 min 30 sec	59 seconds
	(1,649s)	(327s) 5x Faster	(59s) 28x Faster

Panel questions (to think about)

- What do you need from IRIS (apart from funding)
- In the next 2-3 years, what should IRIS prioritise?
- What do you use for forward planning? (roadmaps, usage, growth curves, etc)
 - Where are you currently planning blind?
- What user problems does federation solve today? (SSO, portability, data, accounting?)
 - Are users calling out for federation?
- Which policies could have a federated baseline? (data, encryption, quotas, acceptable use, incident response)
 - Which should remain autonomous?
- Have you registered for HPC Days?




Alastair Basden
DiRAC / Durham University



COSMA

Alastair Basden
DiRAC / Durham University





Alastair Basden
DiRAC / Durham University



Alastair Basden
DiRAC / Durham University



Alastair Basden
DiRAC / Durham University







Alastair Basden
DiRAC / Durham University





Alastair Basden
DiRAC / Durham University