

ADACS

ASTRONOMY DATA AND COMPUTING SERVICES

NCRIS

National Research
Infrastructure for Australia

An Australian Government Initiative



Astronomy
Australia
Ltd.

SWIN
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SWINBURNE
UNIVERSITY OF
TECHNOLOGY




Curtin University



PAWSEY
supercomputing centre

- Recommendation from Computing Infrastructure Planning Group
- Vision:
 - Astronomy-focused training, support and expertise to maximize scientific return on investments in astronomical data and computing infrastructure
- Three service components:
 - Training
 - Data & eResearch
 - Computing Access & Support
- Two nodes:
 - Swinburne University of Technology (Melbourne)
 - Curtin University and Pawsey Supercomputing Centre (Perth)
- Commenced operations March 2017
- Funded through the astronomy NCRIS allocation to AAL

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- Vision:
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- Three service components:
 - Training
 - Data & eResearch
 - Computing Access & Support
 - Training Activities
 - ASVO
 - National Support
 - Access to Infrastructure
- Two nodes:
 - Swinburne University of Technology (Melbourne) + SDSRI
 - Curtin University and Pawsey Supercomputing Centre (Perth) + CIC
 - AAO Data Central, CASDA ...
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ADACS Training Activities



- Sustainable training platform
- Caters for different skill levels
- Focus on required and transferrable skills

→ Face-to-Face | Webinars | Internships

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- ANITA Astroinformatics (Hobart, 2017)
- Introduction to Machine Learning (Canberra, ASA 2017)
- OzGrav ECR HPC Training (Melbourne, 2017)
- HPC for Astronomers (Melbourne 2017)
- Observational workshop (Perth 2017)
- NVIDIA/Slurm workshops (Melbourne 2018)
- ACAMAR Astroinformatics (Shanghai 2018)
- SciCoder workshops (Various, 2018)
- ML for ANITA, OzGrav, Astro-3D (Feb/March 2019)

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- A Beginners Introduction to Computing Clusters
- Introduction to Astropy
- Scientific Data Visualisation with Python
- Introduction to SQL
- Introduction to HDF5
- Introduction to MPI
- Introduction to Slurm
- Introduction to Version Control with Git
- IVOA Table Access Protocol
- Introduction to Python (coming soon)

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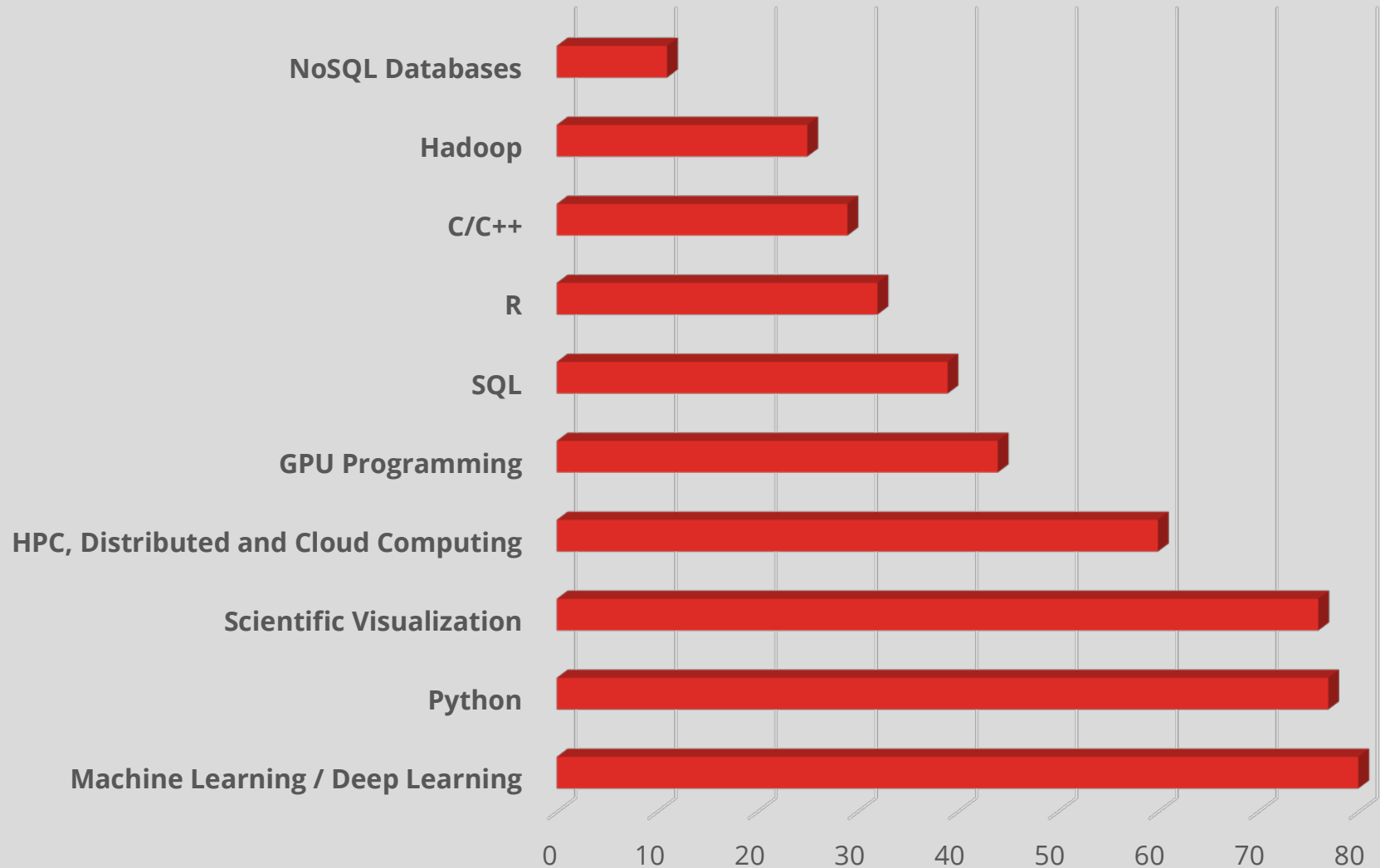
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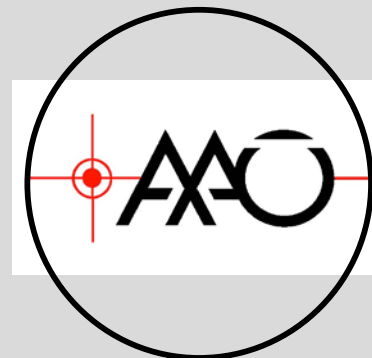
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ADACS Training Activities



ADACS Community Survey Results 2017

- ASVO coordination (AAO Data Central)
- Contribute to MWA 1.0 Development
- Contribute to TAO 5.0 Development
- Support ingestion of data-sets into CASDA
- Ongoing operation and user support (TAO)



- Professional Software and Scientific Computing Services
- Support for Astronomy Supercomputing Time Allocation Committee (ASTAC)
 - Online application/review system developed and deployed
- Facility-related HPC and Data Management support
- Feasibility of astronomy HPC on Cloud Services
- Data Portals – Publishing, Hosting and Collaboration

Merit-based allocation of Professional Software Services

- Developers embedded within projects
- Independent Time Assignment Committee (TAC)
- Program in 3rd Semester of operation

Expertise covering:

- System analysis and design
- Scientific computing
- HPC workflow optimization
- Large-scale scientific databases
- Data science methodologies
- Web development/portals
- Cloud computing
- Scientific visualisation

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Application process [Apr/May and Oct/Nov]:

- Researcher responds to EoI call with one-page overview
- ADACS developer interviews applicant to coax out technical requirements
- Technical team meets to assess required development time/skills
- Researcher completes detailed application incorporating technical feedback
- TAC ranks and selects projects to be supported reconciling requirements and available resources (weeks/skills)

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“Building and Supporting User Communities with GPU-Accelerated Computing”, Bekiaris, **CSIRO**

“Speeding-up Reionisation with GPUs”, Mutch, **Melbourne** (9 weeks)

“An Automated Data Reduction Pipeline for AAO Data Central”, O’Toole, **AAO** (12 weeks)

“Galaxy and Black Hole Co-evolution Survey using Machine Learning”, Banfield, **ANU** (15 weeks)

“GPU Acceleration of Gravitational Wave Signal Models”, Smith, **Monash** (13 weeks)

“Extended MWA Survey Progress and Monitoring”, Hurley-Walker, **Curtin** (11 weeks)

“Corrfunc – Blazing Fast Correlation Functions on GPUs”, Sinha, **Swinburne** (7 weeks)

“Bringing LIGO Science to the Masses”, Lasky, **Monash** (11 weeks)

“Multi-threading ASKAPSoft Synthesis Imaging”, Mitchell, **CSIRO** (24 weeks)

“Model Dispersion with PRISM”, van der Velden, **Swinburne** (11 weeks)

- 389 weeks requested, 126 weeks allocated



- Hosting and Tools for Small to Mid-Size Datasets
- DOI support (ANDS)
- Publications of the Astronomical Society of Australia (**PASA**) – Data Store
 - 9 PASA datasets, 6 other publications
- Hosting of Data Mirrors

ADACS Access to Infrastructure



OzSTAR

Supercomputing

- 4140 Intel SkyLake cores
- 230 NVIDIA P100 GPUs
- 5.1PiB lustre filesystem
- 100 Gbps OmniPath network

- 1.25 Petaflop/s (DP) performance

- Usage: 35% OzGrav, 20% other astronomy (minimum targets)
 ➔ 20MSU (CPU), 1.1MSU (GPU)



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Astronomy Usage	%
Swinburne	19
UWA	16
Monash	14.4
UQ	9.1
Melbourne	7.3
Macquarie	2.1
UNSW	0.8
ANU	0.5
Sydney, Curtin, WSU, CSU	0.4
Astronomy (total)	70
OzGrav (total)	29



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Publications - gSTAR	
FY13/14	47
FY14/15	75
FY15/16	99
FY16/17	80
FY17/18	90

Astronomy accounts	243
Male/Female	62/38
Staff/Student	45/55
SUT/other	45/55

- Data Intensive Astronomy workshops (biennial)
- Outreach events (Cloudy Skies, Hackathon)
- ADACS Special Sessions @ ASA2018
- Keck Real-time Controller for next generation adaptive opt
 - Assist with GPU software engineering (2 FTE-yrs)
- 320 ADACS “users” in 2017/18
- In-kind: Andrew Rohl, Jenni Harrison, Darren Croton, Chris Fluke, Paul Hancock, Karl Glazebrook, Jarrod Hurley

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