ASTRONOMY DATA AND COMPUTING SERVICES



An Australian Government Initiative



Astronomy Australia Ltd.



SWINBURNE UNIVERSITY OF TECHNOLOGY



Curtin University



- Vision:
 - astronomy-focused training, support and expertise to maximise scientific return on investments in astronomical data & computing infrastructure
 - 3 service components:
 - 1. Training (face-to-face, webinars, internships)
 - 2. Astronomy software support for the OzSTAR supercomputer
 - 3. National Support
 - Professional software support
 - Astronomy Supercomputing Time Allocation committee (ASTAC)
 - Data management and collaboration platform (gDMCP)

• Two nodes:

- Swinburne University (Melbourne)
- Curtin University (Perth)
- Commenced operations March 2017
- Funded by Astronomy Australia Limited (AAL) through the astronomy National Collaborative Research Infrastructure Strategy (NCRIS) allocation





Training and Material Offered



Face to Face workshops

Over the past 2 years ADACS has delivered more than a dozen face-to-face events, ranging from outreach events, to halfday and multi-day workshops.

Github

Material we teach during these

workshops is generally made

available via our Github page

LMS

...

We have been developing a series of webinars to help the community master a variety of topics related to computing for astronomers. These webinars are a short series of informational videos compiled by theme on the ADACS LMS.



ADACS runs regular internships offering student the possibility to work on software development projects within astronomy Youtube Channel

Our youtube channel (ADACS learning) makes a selection of our LMS webinars available to the public.



A curated list of tutorials,information and cheat sheets from around the web on key skills for astronomy researchers that are not explicitly covered in our webinars.

INSERT YOUR TRAINING HERE

- Next Support Call will permit applications for training
- ~1 day workshops allocated by merit

Merit Allocated Training: Some ideas ...







You could (for example) request ...

- to rerun a workshop we previously held
- have a new (~1 day) bespoke workshop delivered

... or ...

- a new self-paced tutorial
- the creation of a new webinar to accompany a tutorial

... or ...

- training as part of a software support project:
 - proper use of new tools/optimisations, etc. in HPC environments;
 - training in the use of technologies leveraged in the development cycle of the project



Software Support Program

Swinburne Group: Full-Stack HPC



- ~20 professional developers and research software engineers with expertise covering:
 - Scientific computing;
 - High performance computing;
 - Data science & machine learning;
 - Web development;
 - Large-scale scientific databases;
 - · Cloud computing/microservice architectures; and
 - Scientific visualisation.



- ... augmented by a suitable mix of computationally skilled astronomers and product discovery & delivery professionals:
 - ensuring adequate domain & community knowledge;
 - trained User eXperience (UX) expertise; and
 - certified Agile product discovery & delivery



Full-Stack HPC ... what is meant by this?

Diverse projects involving:

- Broad range of skills
- Broad range of domains

Strengths in:

- HPC
- Full-stack web development

... but importantly, projects which *uniquely blend both*





- Merit-based allocation of professional software development
- Program is currently in its 6th semester (2/yr)
- Methodology:
 - 1. Users respond to calls for Expressions of Interest (EoIs); 1 page description of project
 - 2. ADACS developer interviews applicant to coax-out detailed technical specifications
 - 3. Once all interviews are complete, ADACS meets as a team to develop an assessment of required development time and skills required
 - 4. Users complete a detailed application and quote the ADACS assessment for their project
 - 5. An independent time allocation committee (TAC) selects projects to be supported, reconciling requested and available resources



Software Support Program



<u>Semester</u>	Project Title	Project type	
2020B	GPU Acceleration of the DiFX Software Correlator	optimisation	
2020B	Optimizing parallel Bilby (pBilby)	optimisation	
2020B	Software Support for GASKAP Imaging	optimisation	
2020B	A web based portal for COMPAS	web	
2020B	Extending the Data Central Simple Spectra Viewer	web	
2020B	Optimisation of the COMPAS rapid binary population synthesis code	optimisation	
2020A	Global Cosmic Ray Detection	mobile app	·
2020A	Rapidly and Optimally Identifying Gravitational-Wave Optical Counterparts for GOTO	data	Legend
2020A	Fast becomes Faster: A Full OpenCL rewrite of Corrfunc	optimisation	
2020A	Software support for the SMART pulsar survey	web	 Web application
2019B	ProFound	optimisation	
2019B	Final data release of the Australian Dark Energy Survey (OzDES)	web	 Optimisation
2019B	Parallelisation of the SoFiA Source Finding Pipeline	optimisation	• Other
2019B	NBody and VR	optimisation	
2019B	An implementation of the BFDMT in CUDA	optimisation	
2019A	Bilby	web	* All but three
2019A	Spectrum viewer	web	selected projects
2019A	Building on Bilby-UI: bringing continuous gravitational wave science to the web	web	Selected projects
2019A	A Webapp for modeliing the Galalxy	web	have been web or
2019A	DWF portal and database	web	GPU optimisation
2018B	Extended MWA Survey Progress and Monitoring	web	projects
2018B	Bringing LIGO Science to the Masses	web	projects
2018B	Multi-threading ASKAPSoft Synthesis Imaging	optimisation	
2018B	Model dispersion with PRISM	optimisation	
2018B	Corrfunc Blazing Fast Correlation Functions Now on the GPU	optimisation	
2018A	An automated data reduction pipeline for AAO Data Central	data	
2018A	GPU acceleration of gravitational-wave signal models	optimisation	
2018A	Galaxy and black hole co evolution survey using active machine learning	web	
2017B	Speeding-up Reionization with GPUs	optimisation	
2017B	Building and Supporting User Communities with GPU-Accelerated Computing Services	web	

Software Support Program



- Some interesting general issues we have grappled with:
 - 1. Web applications and GPU optimisations are dominating supported projects
 - Turns-out: astronomers have a lot of good web application ideas/needs
 - UX expertise?
 - 2. Who owns/is-responsible for code developed?
 - 3. Ongoing support?
 - Burden grows with time if we offer support
 - On the other hand: don't want to be building tools that fall into states of disrepair
 - 4. Role of TAC
 - What influence should the TAC have on policy?
 - 5. Project management
 - Agile development practices, etc.?
 - Astronomers aren't necessarily used to the language, let alone the methodologies
 - They are generally accustomed to a great deal of control over development work



Finally ...

INSERT YOUR PROJECT HERE

- Internship projects
- ARC Proposals

... and of course, SSP projects (call for Eols now open!)

High Performance Computing



Diversely qualified team of software professionals



Full-Stack HPC



Cloud-based Solutions







http://ADACS.org.au