

# Research at light speed

Make your computing super with Intersect Australia's shared high performance cluster, virtual and cloud computing environments.

## Time. Sliced.

Time.intersect.org.au puts you in control of the best computing for your needs from a range of compute zones. Time offers you access to the right environment for your analysis: from increasing the capacity of your existing pipeline, to transforming your research using massively parallel processing.

Carve out your own slice of Time, assisted by experts who live and breathe big computing.

## Your Time

Time is a set of composite long-term technology investments, leveraging Australian Government research infrastructure funding, created through commercial partnerships, and backed by member institutions since 2008. Intersect Time zones help hundreds of researchers, running thousands of analyses and allocating millions of CPU hours each year. Answer questions across all fields of research in Time.

## Units of Time

**NCI:** Access the nation's fastest supercomputer, Raijin, through Intersect's partner-share of NCI.

**Orange:** Leverage Intersect's NSW peak HPC facility, reinvented every three years in response to evolving research demands.

**NeCTAR:** Deploy your own compute environment with your software on the NeCTAR Research Cloud.

**Amazon EC2:** Harness the largest compute cloud on the planet with Intersect expertise.

# Time Zones

Joining the Intersect research community brings access to state of the art big computing resources locally, nationally and internationally. Researchers can choose between local cloud computing, State-based cluster computing, Australian national supercomputing, and Amazon's international compute cloud.



Intersect's **Orange**  
[orange.Intersect.org.au](http://orange.Intersect.org.au)

Intersect's 'Orange' was commissioned in March 2013. The system features 103 cluster nodes with 1,660 cores powered by the Intel® Xeon® E5-2600 processor series. It includes 200TB local scratch disk space and 101TB of usable shared storage (56TB disk space in a Panasas® PAS-12 global parallel file system and 45TB disk storage in a SGI NAS Storage Server). Orange delivers 30+ TFlops peak performance. The interconnects are QDR Infiniband.



**NeCTAR Research Cloud**  
[rc.NeCTAR.org.au](http://rc.NeCTAR.org.au)

Over 4,500 local and 32,000 distributed computing cores running x86 OpenStack hypervisors tuned to the needs of research. Create multiple virtual machines with up to 16 virtual CPUs. Features Linux operating system flavours including: Centos, Ubuntu, Fedora and Scientific Linux. Researchers can directly access eight national network nodes for additional scale or data proximity.



**NCI Raijin**  
[raijin.NCI.org.au](http://raijin.NCI.org.au)

Intersect is a partner and shares high performance computing facilities at the National Computational Infrastructure, based at the Australian National University. NCI's peak system 'Raijin' is a Fujitsu PRIMERGY cluster based on Intel Sandy Bridge 8-core processors (2.6 GHz) comprising: 57,472 cores in the compute nodes, approximately 160 TBytes of main memory, and approximately 10 PBytes of usable fast file system.



**Amazon EC2**  
[ec2.Amazon.com](http://ec2.Amazon.com)

Intersect and Amazon Web Services collaborate on projects to improve big computing access for the research community. Amazon Elastic Compute Cloud offers resizable compute capacity in the cloud for maximum scale and global reach. User-pays commercial computing models include on-demand, reserved and spot market capacity options. Researchers can choose Amazon, CentOS or Debian Linux plus Microsoft Windows Server 2012 operating systems. EC2 is available in Australia and internationally and is unparalleled in automatically dealing with big computing workload spikes.

## Light speed

Time is connected by optical fibre to Australia's Academic and Research Network (AARNet.edu.au) the not-for-profit company that operates the National Research and Education Network (NREN). This means Time travel is optimally fast to critical eResearch infrastructure such as high performance computing clusters [orange.Intersect.org.au](http://orange.Intersect.org.au) and [raijin.NCI.org.au](http://raijin.NCI.org.au), other [AeRO.edu.au](http://AeRO.edu.au) organisations, medical research and clinical facilities, and every Australian university campus. AARNet operates dedicated international fibre and interconnects as a peer of Internet2 in the USA, TEIN in Asia and GÉANT in Europe. Because AARNet also connects directly to commercial organisations and telecommunications companies, rapid transit is also possible between Time, Space and Google, Amazon, Microsoft, Telstra, Optus and more.

## Space-Time Continuum

[Space.intersect.org.au](http://Space.intersect.org.au) is a petabyte scale, high performance, colocated and cost-effective digital storage cloud. By coupling Space with Time you can substantially reduce data movement across the Internet and maximize your Space-Time eResearch performance experience.

Learn more at [space.intersect.org.au/continuum](http://space.intersect.org.au/continuum).



**aarnet**  
Australia's Academic  
and Research Network

## Help.intersect.org.au

To make research life easier we offer a simple one-stop self-serve experience. By visiting [Help.intersect.org.au](http://Help.intersect.org.au), emailing [Help@intersect.org.au](mailto:Help@intersect.org.au) or calling +61 2 8079 2525 you can let us know about a problem, ask for help, or find information. Get started by signing in with your own credentials through the Australian Access Federation (at participating organisations).



**AUSTRALIAN  
ACCESS FEDERATION**

# Time Travel

There's no such thing as an 'average' researcher when it comes to intensity, appetite, flavour and volume of big computing, so no one Time zone fits all. A physicist may need a large cluster of independent nodes with high I/O, a computational linguist may need a large shared memory space, and an astronomer may need massively parallel compute array. Collaboration tools may be the mainstream driver for a social scientist, while an archaeologist needs geocoding. Intersect people are flexible and ready to help solve individual, team, and organisational compute challenges.

In most Time zones demand exceeds supply because subsidised merit schemes apply. Larger proposals for significant quantities of Time are requested through an annual merit-based formal process. However, new Time travellers are actively sought, especially researchers from smaller institutions, non-traditional HPC disciplines, and research students. Intersect routinely and frequently accepts small-scale experimental proposals at any time.

Intersect runs a merit based Resource Allocation Round every calendar year where researchers from member institutions apply for large allocations for both Orange and Raijin. These applications are reviewed for comparative research merit by the independent Resource Allocation Committee as well as Intersect HPC experts. However you can apply for small amounts of compute at any time. Learn how to book your Time at at [intersect.org.au/time/merit](https://intersect.org.au/time/merit)



**Orange**



**Raijin**



**NeCTAR RC**



**EC2**

	Orange	Raijin	NeCTAR RC	EC2
Massively parallel applications	✓	✓	—	—
Massive amount of data and compute power	✓	✓	—	—
High speed file input/output	✓	✓	—	—
Access to specific licensed software	✓	✓	✓	✓
Transferring big data to/from big compute	✓	✓	✓	✓
Run web servers	—	—	✓	✓
Requiring specific operating systems	—	—	✓	✓
Online interactive use	—	—	✓	✓
Big data parallelism using Hadoop	—	—	✓	✓
Non-time-boxed massive scale with many virtual machines	—	—	—	✓

"It's immensely helpful to work with Intersect, as a provider of high performance computing. When we go to use the computers we don't need to worry about systems administration issues, we don't need to worry about network administration issues, we don't need to worry about user administration issues, we don't need to worry about how information is going to be backed up and stored from the those computers. That's all taken care of in the package of support that Intersect provides. So it essentially means that my researchers can concentrate on doing their research."

Prof Marc Wilkins, Director, Ramaciotti Centre for Genomics

## Making Time

Creating your Time depends on many factors including

- Application software constraints.
- Processing speed required per processing workload
- Node scale required for each workload.
- Memory demands per workload and the degree to which it must be shared between nodes.
- The degree to which your workload is specialised versus commoditised and proprietary versus open.

Don't panic - please get in touch and we'll work through it with you.

## Compatibility

### **orange.Intersect.org.au** **raijin.NCI.org.au**

NCI underpins HPC for all scientific disciplines from A (Astrophysics) to Z (Zoology). Raijin and Orange compatibility is listed in the complete catalogue of all software installed in most Australian HPC centres at: [nf.NCI.org.au/facilities/software](http://nf.NCI.org.au/facilities/software)

## Researcher Requirements

There are a few simple prerequisites to get into Time.

### **orange.Intersect.org.au and rajin.NCI.org.au**

- Command line secure shell, for example OpenSSH or Putty

### **rc.NeCTAR.org.au and ec2.Amazon.com**

- HTML5 Browser
- API protocol: https
- VM access and authentication at researcher discretion.
- Authentication: AAF account for rc.NeCTAR; Amazon account for EC2

### **Nominal Performance (Orange, NCI and NeCTAR, EC2)**

- Interconnect speeds: AARNET: 10Gb/s, Science DMZ: 10Gb/s, Institutions: 1Gb/s, 10Gb/s and 40Gbps, EC2: 10Gb/s

## Saving Time

Jump start your productivity with open community libraries and SDKs.

### **Orange and Raijin**

- An extensive range of compilers, languages, free and commercial software packages to run your code is available, including Siesta (Chem/Phys), ANSYS (Eng), Abyss (Genetics), SOAPDenovo (Genetics), NAMM (Phys) and Gaussian\* (Chem)  
\*NCI only

### **Nectar and EC2**

- A generic VM and operating system where the researcher can install any tools at their discretion

### **rc.NeCTAR.org.au**

rc.nectar.org.au is powered by OpenStack.org, a cloud orchestration system that controls large pools of compute, storage, and networking resources throughout multiple Australian data centres, all managed through a dashboard that gives administrators control while empowering consumers with web self-serve resource provisioning. Pre-baked virtual machine images are catalogued at:

[support.rc.NeCTAR.org.au/docs/images](http://support.rc.NeCTAR.org.au/docs/images)

### **ec2.Amazon.com**

EC2's cloud orchestration system allows customers to select instance types that best fit their compute requirements. Customers can launch instances with a variety of operating systems and manage access using web interfaces. Nearly any application can be installed. Instances can be scaled vertically (i.e. upgrade to a larger CPU instance) or horizontally (i.e. add instances) as needed. Find EC2 instance types at: [aws.Amazon.com/ec2/instance-types/](http://aws.Amazon.com/ec2/instance-types/)

## Back to the Future

In the beginning Time was created by researchers for researchers to attract collaborative funding opportunities through LIEF and other Australian government schemes. Today it is brought to you by Intersect and its partners: the University of Sydney, the University of New South Wales, Macquarie University, the University of Technology, Sydney, the University of Newcastle, Southern Cross University, the University of New England, the University of Wollongong, the University of Western Sydney, Charles Sturt University the University of Canberra and the Australian Catholic University.

### Learn more

This information and more is available online.



**Time**  
[.intersect.org.au](http://.intersect.org.au)

### Time Camp

Scheduled training and seminars run on member university campuses. Get in touch with your local eResearch analyst or visit: [intersect.org.au/training](http://intersect.org.au/training)

### Get Started

Want to ask questions about Time or have us contact you? Reach out by emailing

✉ [time@intersect.org.au](mailto:time@intersect.org.au)



Intersect is a pivotal part of NSW research infrastructure, and the state's research. We provide robust, innovative, and collaborative technology to support the world-class research at our member institutions. Intersect delivers storage and analysis platforms, custom engineering, expert consultation and training programs to thousands of researchers every year.

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