CRAMS

Cloud Resource Allocation Management System

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Overview

- **CRAMS** enables **researchers/users** to request cloud resources across
  - Research Data Storage
  - High Performance Computing Platform (MASSIVE, MonArch and CVL)
  - Research Computing Cloud and Virtual Desktop Infrastructure.

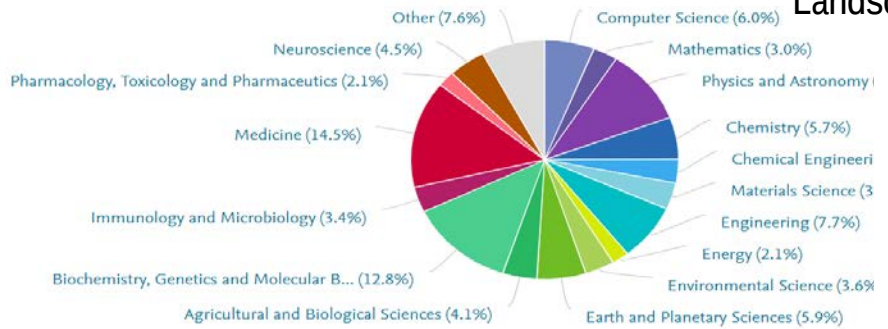
- **CRAMS** manages :
  - Allocation and Instantiation of Cloud Resources
  - Report Resource Utilisation via Dashboard
  - Contacts and Project Membership
  - User Accounts (HPC)
  - Administrative and Management Reports

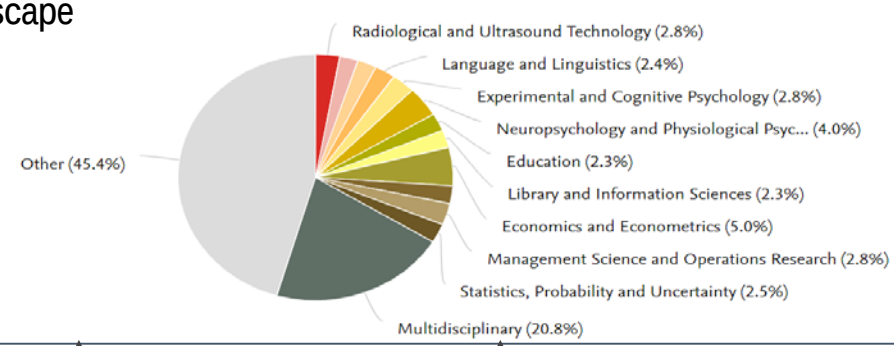
- **CRAMS** forming a rich metadata registry over the time.

- **CRAMS** in it’s transformation driven agenda, is becoming a key cloud resource management tool in Monash eResearch ecosystem

Current Monash eResearch Landscape

Disciplines





Monash eResearch Projects

MASSIVE · MonARCH · RaCMon · VicNode · CVL · MyTARDIS · MIVP (Transforming visualisation practice)

Data Tools, Techniques, Infrastructure

Design and Prototyping · Visualisation · Data Science · Modelling · GPUs · VR/AR · ASICs · Software Defined Everything · **Disruptive Technology** · IoT and Sensors · Artificial Intelligence · Deep Learning · Simulation · Cloud API · MapReduce

Data

FAIR · Collaboration · Governance · Self Service · Data Management · Transparency · Virtual Laboratories · Open Science · **Accessibility**

Infrastructure and Capacity · Data Storage · Instrument Data Workflows · Research Networks · Cloud Computing · High Performance Computing

Contributors and Partners

Gov and NCRIS: NCRIS National Research Infrastructure for Australia · Microscopy Australia · ardc · CSIRO · Bioplatforms Australia · ANSTO · PAWSEY supercomputing centre · aarnet · AuScope · National Imaging Facility · NCI Australia · VicNode · ANFF

AI and Compute: NVIDIA

Hardware: Mellanox Technologies · DELL EMC

Middleware: openstack · redhat · The Linux Foundation · cumulus · ceph

Cloud: Azure · amazon web services · Google Cloud Platform · rackspace

CRAMS “ Flavours”

Data dashboard - CRAMS offering for Research data storage allocation management and reporting. Replaced both the manual and paper-based user request form and the VicNode Reporting System for Monash.

HPC dashboard - CRAMS offering for high performance computing (MASSIVE, MonArch and CVL) allocation management and reporting. Will be replacing google application form and karaage based allocation management mechanism.

Cloud dashboard - CRAMS offering for compute cloud (Nectar) resource usage reporting.

Our journey : Scrum based continuous delivery within SAFe Agile framework

Restful API enables “CRAMS Clients” / “tenants” to implement their own version of user interface suit to specific needs.

CRAMS is AAF enabled

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Data-dashboard

- **Research data storage @ Monash**
  - Shared infrastructure obscures individual project allocation usage across multiple domains
  - Users repeatedly “du” their storage causing unnecessary load on infrastructure
  - Single portal for each contact to get their project specific usage across all storage types daily
  - One stop allocation requests and provisioning recorded as storage transactions history

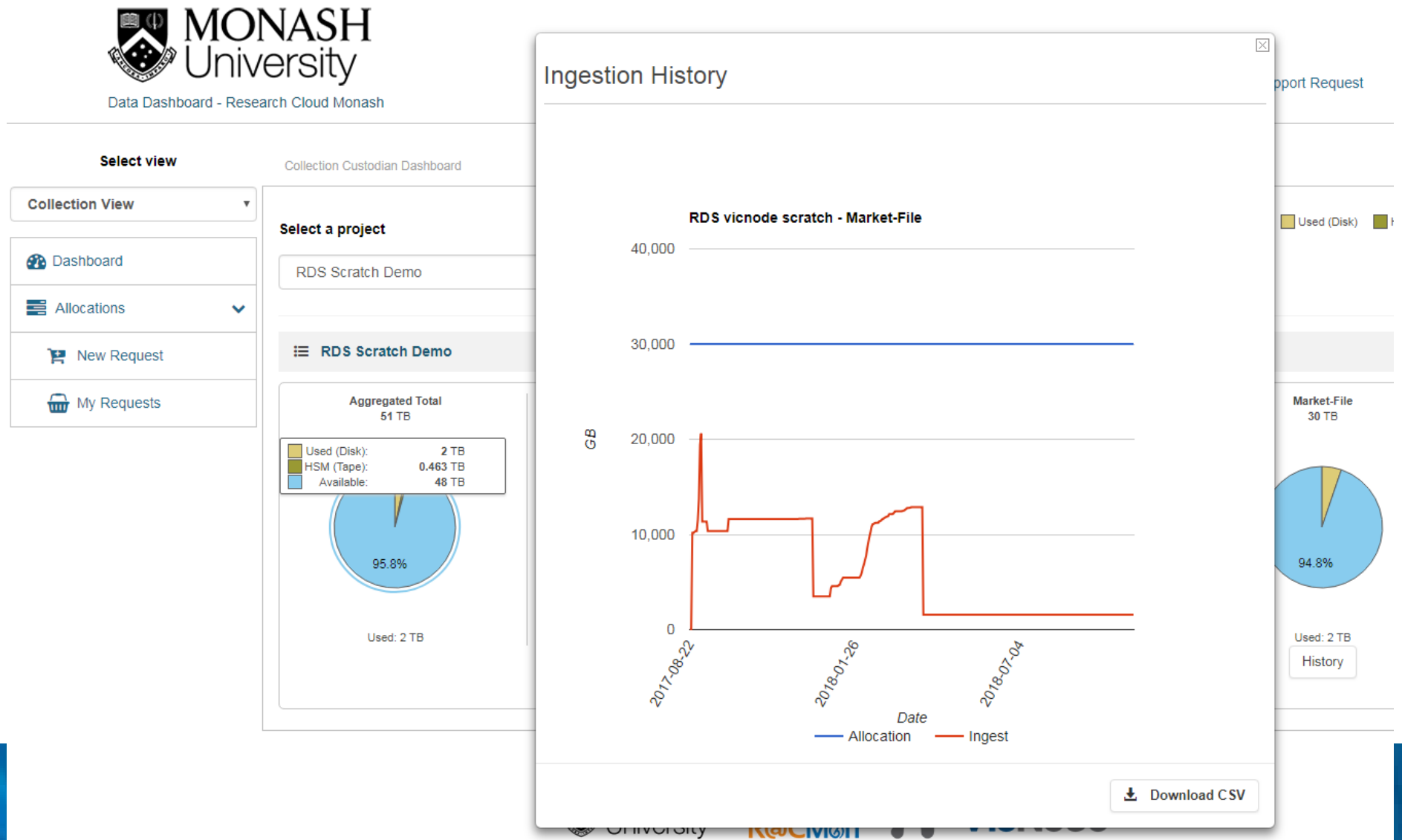
- **Scale of operation as at 16/10/2018**
  - **608 projects** registered, **764 storage allocations**
  - **9.3PB data holdings**, **11.6PB storage allocated**,
  - 5 storage product types, daily usage update
  - **373 user contacts**, **136 active users**,

Data-dashboard

- **Research impact /benefit to research community**
  - Allocation request form process stimulates discussion about appropriate usage
  - Meaningful project description and FOR code classification
  - Data lifetime, access protocol, data sensitivity, cost reporting to faculty
  - Archive storage formats that are content appropriate and recalled from tape quickly

- **Complements other research activities**
  - Supports Store.Monash, MyTardis, MASSIVE
  - Supports instrument operators

Data Dashboard - Collection View for contacts



- Collection View menu
  - Defaults to first project dashboard charts
  - Pie charts reveal near-line storage usage
  - History button reveals basic history graph
  - History download as CSV for user specific analysis
- Allocations menu
  - New Requests starts a new project form dialog
  - My Requests allows for amendment, extension or change of project custodian or contacts

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Data dashboard -Demo

Live Demo

HPC Dashboard

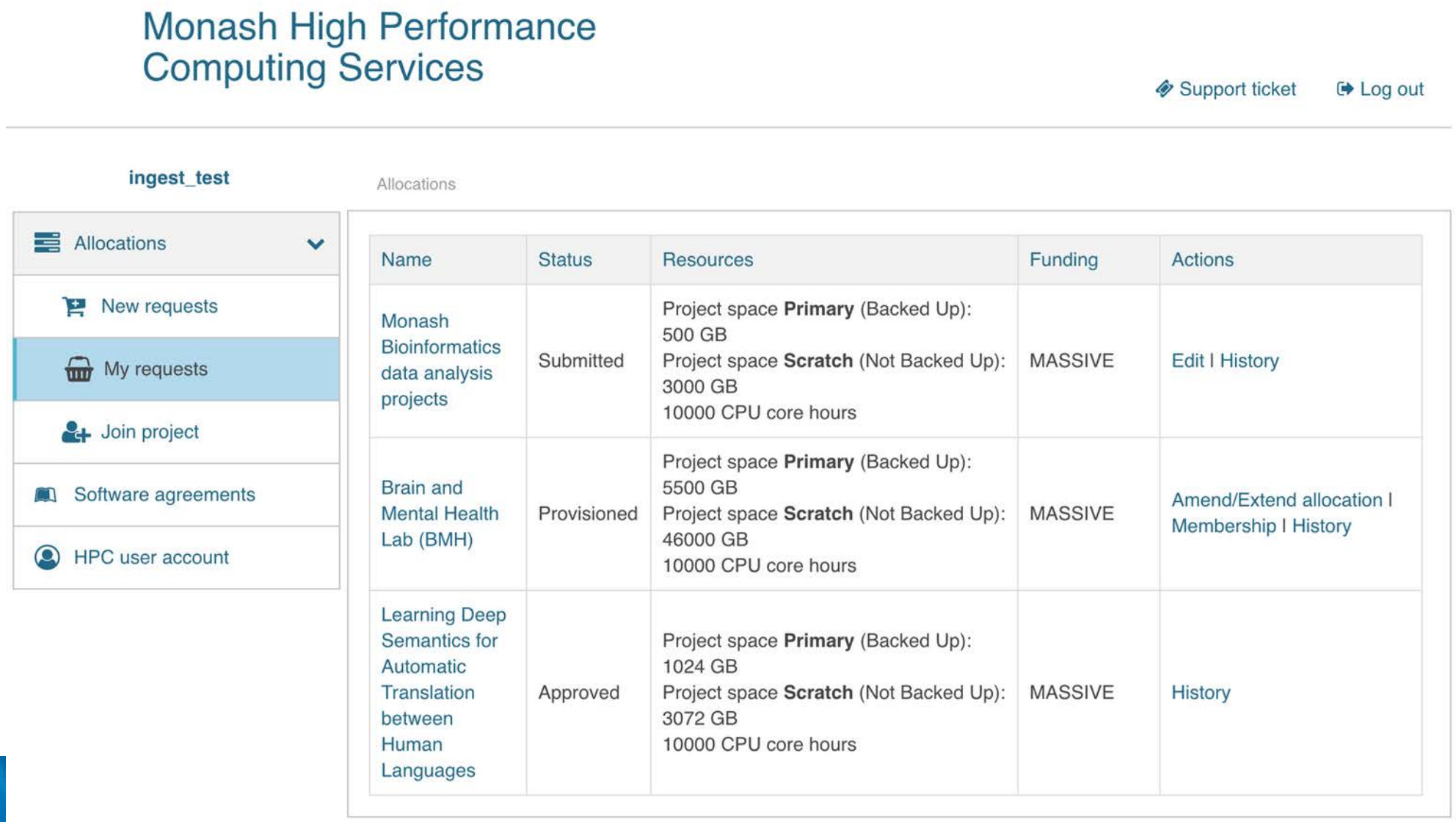
Some High Performance Computing numbers...

580 Projects **1200 Users** **4,120 CPUs (M3)** **3 PB Lustre file system (M3)**

HPC dashboard:

- CRAMS offering for high performance computing (MASSIVE, MonARCH and CVL) allocation management and reporting.
- Enables:
  - Users to request new allocations/extensions to existing allocations
  - Users to manage project membership and metadata
  - Partners and administrators to manage the project lifecycle

HPC Dashboard - User View



- Request status unlocks user actions
  - Submitted
  - Approved
  - Provisioned
- Users can also request access to licensed software
- Password reset and username selection handled in the HPC user account module

HPC Dashboard

Live Demo

Cloud Dashboard

Some Cloud Computing Numbers...

200+ Projects	**5800 Instances**	**11,000 VCPUs**
45,000 GB RAM	**500+ Users**	

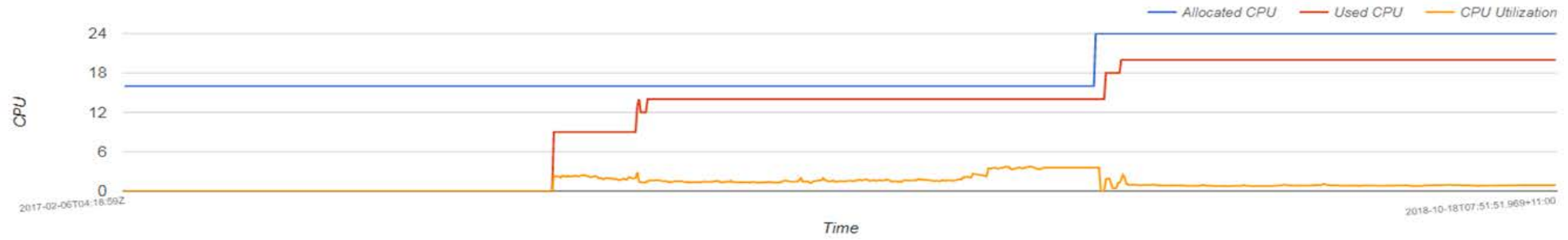
Cloud Dashboard :

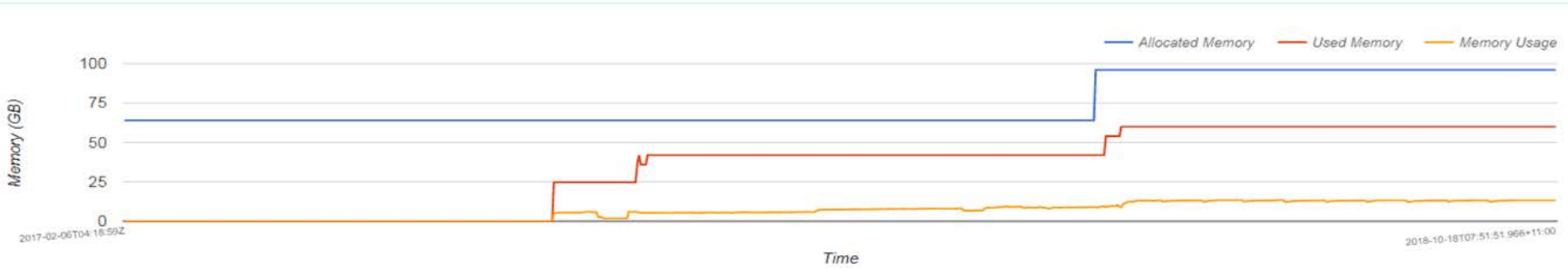
- CRAMS offering for compute cloud (Nectar) resource usage reporting.
- Enables users to monitor their project resource allocations vs usage.
- Admin and management reports | Unified view for capacity management.

Cloud Dashboard- Resource Allocations Vs Usage

Crams_HPC

Flavor	Number of Instances	Cost (AUD)
m2.medium	11	7,757.71
m2.tiny	1	265.84





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What’s Next

- Production deployment of HPC Dashboard and Cloud Dashboard.
- Consolidated “eResearch Dashboard “
- Capture more and more metadata.
- Integrations with key research related systems.
- CRAMS for virtual desktop infrastructure allocations
- Automated provisioning
- More user /management reporting

It’s a Collaborative Effort @ Monash eResearch

In Our **Agile** Journey .....People played different roles and it’s fun..!!!

“Builders” / Research Dev Ops

Simon Yu, Senior Software Specialist
Rafi Feroze, Senior Analyst Programmer
Melvin Luong, Application Developer

“Product Owners”

David Lam, Senior Project Manager
Stephen Dart, Research Storage Manager
Kerri Wait, HPC Consultant

Project Lead/ Scrum Master

Samitha Amarapathy, Senior Project Manager

Vision Makers/ “CRAMS Custodians”

Dr Steve Quenette, Deputy Director
Dr Wojtek Goscinski, Associate Director

Quality Assurance

George Vidalis, Senior Business Analyst
Nouran Khattab, Test Analyst

And Research Data Storage, HPC and Cloud Team.....

Thank You