CRAMS
Cloud Resource Allocation Management System

Samitha Amarapathy
Stephen Dart
Kerri Wait

Monash eResearch Centre
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 its transformation driven agenda, is becoming a key cloud resource management tool in Monash eResearch ecosystem
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
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
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

**Monash High Performance Computing Services**

- **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

---

<table>
<thead>
<tr>
<th>Name</th>
<th>Status</th>
<th>Resources</th>
<th>Funding</th>
<th>Actions</th>
</tr>
</thead>
</table>
| Monash Bioinformatics data analysis projects | Submitted | Project space **Primary** (Backed Up): 500 GB  
 Project space **Scratch** (Not Backed Up): 3000 GB  
 10000 CPU core hours | MASSIVE | Edit | History                     |
| Brain and Mental Health Lab (BMH)   | Provisioned | Project space **Primary** (Backed Up): 5500 GB  
 Project space **Scratch** (Not Backed Up): 46000 GB  
 10000 CPU core hours | MASSIVE | Amend/Extend allocation | Membership | History                     |
| Learning Deep Semantics for Automatic Translation between Human Languages | Approved  | Project space **Primary** (Backed Up): 1024 GB  
 Project space **Scratch** (Not Backed Up): 3072 GB  
 10000 CPU core hours | MASSIVE | History                     |
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

<table>
<thead>
<tr>
<th>Flavor</th>
<th>Number of Instances</th>
<th>Cost (AUD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>m2.medium</td>
<td>11</td>
<td>7,757.71</td>
</tr>
<tr>
<td>m3.liny</td>
<td>1</td>
<td>366.84</td>
</tr>
</tbody>
</table>

Graphs showing CPU and Memory usage over time.
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