ColdFront
HPC Resource Allocation Management

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OpenSource HPC resource allocation portal for users, system admins, & center staff
History of ColdFront

- System Administrators wanted:
  - More automation, less manual error
  - One location for access management of all resources
  - Allow PIs to self-service access to resources

- Center Director wanted:
  - To require PIs to update project info annually
  - Consistent reporting of publication & grant info
  - Easy displays of usage for annual reporting
Automate access to your HPC resources

Manage access to all your resources in one place
Resources

- Resources are anything you want to control access to and/or monitor usage of
- Our resources include:
  - clusters, storage, cloud, servers, and software licenses
- Resources can have attributes in the form of limits:
  - storage (GB/TB),
  - software (seats),
  - cloud (subscriptions)
  - these are all customizable
- Resources can have other attributes that may tie to plugins:
  - Is the resource private or public?
  - Which users/groups are allowed access to it
  - Is payment required
  - Warranty expiration dates
<table>
<thead>
<tr>
<th>RESOURCE ATTRIBUTES</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>hve_applicable</td>
<td>Yes</td>
</tr>
<tr>
<td>quantity_label</td>
<td></td>
</tr>
<tr>
<td>quantity_default</td>
<td>1</td>
</tr>
<tr>
<td>xmod_resource</td>
<td>openstack</td>
</tr>
</tbody>
</table>
Allocations

- Determines what resource an account has access to
- Any limits/attributes associated with that access
  - Expiration date
  - CPU/core hours
  - Scheduler account name
  - UNIX group
  - Storage quota
- Users emailed when expiration dates approach
- Resource access can be removed/locked when an allocation expires
ColdFront
HPC Resource Allocation Management System

Allocation Configuration
Projects

- Project = users, allocations for resources, reportable data (publications, grants)
- PIs (group leads) can request allocations for resources, add/remove users on their project & allocations, upload research info, complete annual project review, view group usage
- Role based logins allow for:
  - full project access for PIs
  - additional capabilities for managers assigned by PIs,
  - read-only views for users,
  - HPC center staff have access to tools for:
    - Allocation review, approval, & configuration
    - Annual project review approval
    - Other policy-driven tools
Project Overview

ColdFront
HPC Resource Allocation Management System

Principal Investigator: Dori Sajdak (djm29)

Description: This is used for testing purposes
Field of Science: Other
Project Status: Active
Created: Mar. 18, 2021

Users

Username | Name | Email | Role | Status | Actions
---------|------|-------|------|--------|--------
ccrgst72 | ccrgst72 | djm29@buffalo.edu | User | Active | Edit
djm29 | Dori Sajdak | djm29@buffalo.edu | Manager | Active | Edit

Allocations

Resource Name | Resource Type | Information | Status | End Date | Actions
-------------|---------------|-------------|--------|----------|--------
beta | Cluster Partition | skrg_account_name: testacct | Active | 2022-04-02 | Edit
RPCI | Cluster Partition | skrg_account_name: djm29test | Inactive (Renewed) | 2021-04-06 | Edit
RPCI Scavenger Access | Cluster | skrg_account_name: djm29test | Active | 2022-04-30 | Edit
UB-HPC Academic | Cluster | skrg_account_name: djm29 | Active | 2022-03-30 | Edit

Research Outputs

ColdFront: Resource Allocation Management System
http://coldfront.io
ColdFront is an open source resource allocation management system designed to provide a central portal for administration, reporting, and measuring scientific impact of HPC resources. ColdFront was created to help HPC centers manage access to a diverse set of resources across large groups of users and provide a rich set of extensible meta data for comprehensive reporting. ColdFront is written in Python and released under the GPLv3 license.

Messages from System Administrators

There are no messages from system administrators.
Annual Project Reviews Completed by PIs Can be Viewed by Center Director and System Administrators

Pending Project Reviews

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Date Review Submitted</th>
<th>PI</th>
<th>Grants Last Updated</th>
<th>Publications Last Updated</th>
<th>Reason for not Updating Project</th>
<th>Project Review Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>My Test Project</td>
<td>May. 13, 2021</td>
<td>Dori Sajdak (djm29)</td>
<td>May. 13, 2021</td>
<td>May. 13, 2021</td>
<td></td>
<td>Mark Complete Email</td>
</tr>
</tbody>
</table>

Allocation Requests Can be Viewed by System Administrators

<table>
<thead>
<tr>
<th>#</th>
<th>Date Requested/Last Modified</th>
<th>Project Title</th>
<th>PI</th>
<th>Resource</th>
<th>Project Review Status</th>
<th>Status</th>
<th>Allocation Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>825</td>
<td>Apr. 08, 2021</td>
<td>Interplay Between Genetics and Epigenetic in Poly...</td>
<td>James Jarvis (jamesjar)</td>
<td>ProjectStorage (Storage)</td>
<td>Renewal Requested</td>
<td></td>
<td>Activate Deny</td>
</tr>
<tr>
<td>838</td>
<td>Apr. 30, 2021</td>
<td>Hachmann Group Research</td>
<td>Johannes Hachmann (hachmann)</td>
<td>ProjectStorage (Storage)</td>
<td>Renewal Requested</td>
<td></td>
<td>Activate Deny</td>
</tr>
<tr>
<td>845</td>
<td>Apr. 01, 2021</td>
<td>Wilson Lab</td>
<td>Adam Wilson (adamw)</td>
<td>ProjectStorage (Storage)</td>
<td>Renewal Requested</td>
<td></td>
<td>Activate Deny</td>
</tr>
<tr>
<td>1874</td>
<td>Apr. 01, 2021</td>
<td>Samudrala Computational Biology Research Group</td>
<td>Vaikuntanath Samudrala (rams)</td>
<td>ProjectStorage (Storage)</td>
<td>Renewal Requested</td>
<td></td>
<td>Activate Deny</td>
</tr>
<tr>
<td>2079</td>
<td>May. 13, 2021</td>
<td>My Test Project</td>
<td>Dori Sajdak (djm29)</td>
<td>UB-HPC Academic (Cluster)</td>
<td>Renewal Requested</td>
<td></td>
<td>Activate Deny</td>
</tr>
</tbody>
</table>
Center Directors are able to better demonstrate the center’s impact

- Report on resources & allocations
- Collect publication information
- Collect grant information

Grants

- National Institutes of Health (NIH): $78,599,277 (33)
- National Science Foundation (NSF): $52,283,068 (73)
- Other: $12,161,778 (49)
Extensible plug-in architecture allows for integration of nearly anything!
Integrations

Plug-ins (Django Apps)

- **OnDemand**
- **XDMoD**
- **Slurm**
- **Mokey/Hydra OpenID Connect** (Identity Management)
- **FreeIPA** (LDAP/AD)
- **Other plug-in examples**
- Other 3rd party APIs should be added as a new plug-in (Django app)
- In the works – OpenStack plug-in
ColdFront

https://github.com/ubccr/coldfront

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We’ll be at PEARC21 – full day tutorial with OnDemand & XDMoD plus a ColdFront BOF featuring a panel of current adopters