ColdFront

Open Source Resource Allocation System

HUST—SC18 Dallas, TX

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University at Buffalo
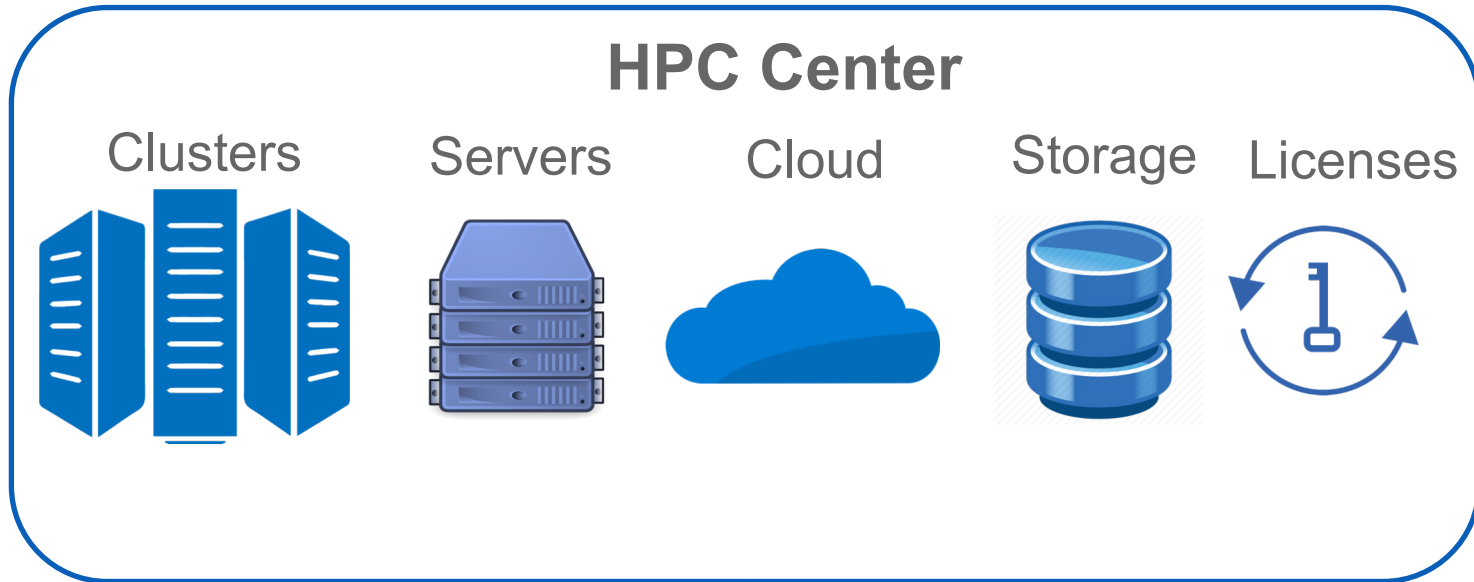Center for Computational Research

Workshop Agenda

- What is ColdFront?

- Benefits of Using ColdFront

- ColdFront Design: Project

- ColdFront Design: Plugins

- ColdFront Vision

- ColdFront Task Overview
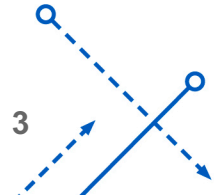
- Installation/configuration

- Extra Plugins

- Recap

What is ColdFront?

HPC Center

Clusters   Servers   Cloud   Storage   Licenses
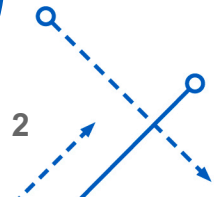
Principal Investigators   System Administrators   Center Directors

Benefits for PIs

- Request allocation to center resources

- Add/remove user access to allocations

- Monitor resource utilization

- Receive automated email notifications
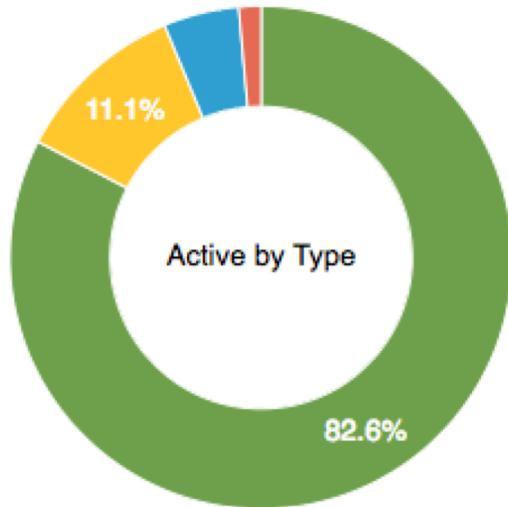
- Elevate selected users to privileged status

Benefits for System Administrators

- Approve/deny resource allocation requests

- Manage resources

- Automate access control to the resources

- Integrate with multiple authentications backends

Benefits for Center Directors

Overview of resource demand

Active by Type

82.6%

11.1%

- Cluster: 290
- Storage: 39
- Cloud: 17
- Server: 5

Resource Name (Type) ⇅	Active Subscription Count ⇅
UB-HPC **(Cluster)**	223
MAE **(Cluster)**	33
ProjectStorage **(Storage)**	29
Lake Effect Cloud **(Cloud)**	17
Industry **(Cluster)**	15
Chemistry **(Cluster)**	13
BudgetStorage **(Storage)**	7
Physics **(Cluster)**	6
(Software License)	5
ProjectSpaceAccessOnly **(Storage)**	3
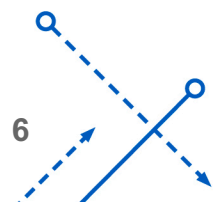
# Benefits for Center Directors Cont'd

Measure center impact

Grants
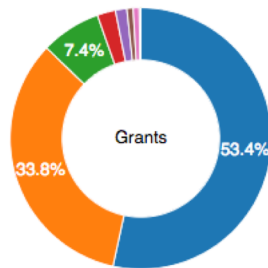
- National Institutes of Health (NIH): $71,155,320 (26) National Science Foundation (NSF): $44,947,131 (58)
- Other: $9,871,388 (38) New York State Department of Health (DOH): $3,020,564 (1)
- Department of Energy (DOE): $1,882,675 (4) Empire State Development (ESD): $1,020,000 (2)
- Empire State Development's Division of Science, Technology and Innovation (NYSTAR): $1,000,000 (1)
- National Aeronautics and Space Administration (NASA): $236,984 (1) New York State (NYS): $26,353 (3)

Grants Total: $133,160,415
Grants Total PI Only: $73,543,762
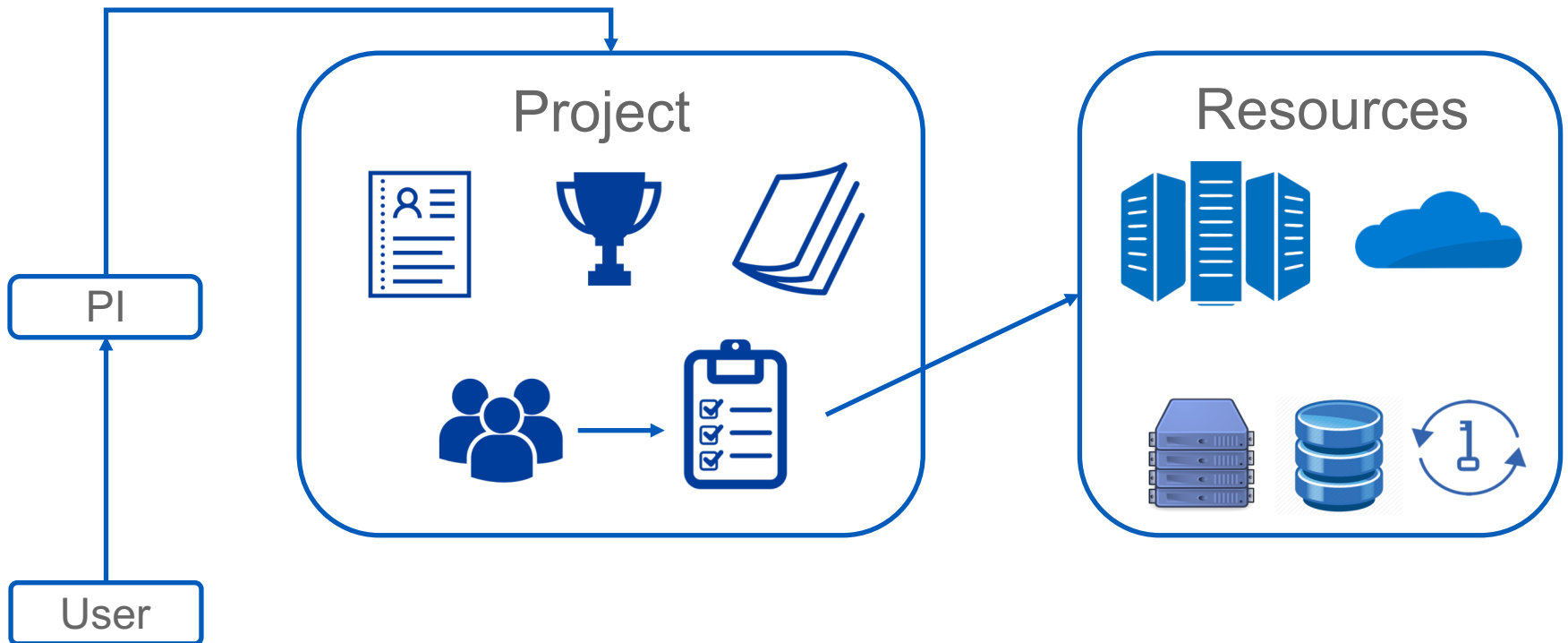**Grants Total CoPI Only:** $59,509,950
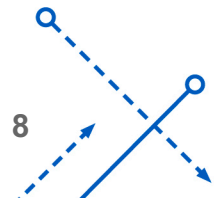**Grants Total Senior Personnel Only:** $106,703
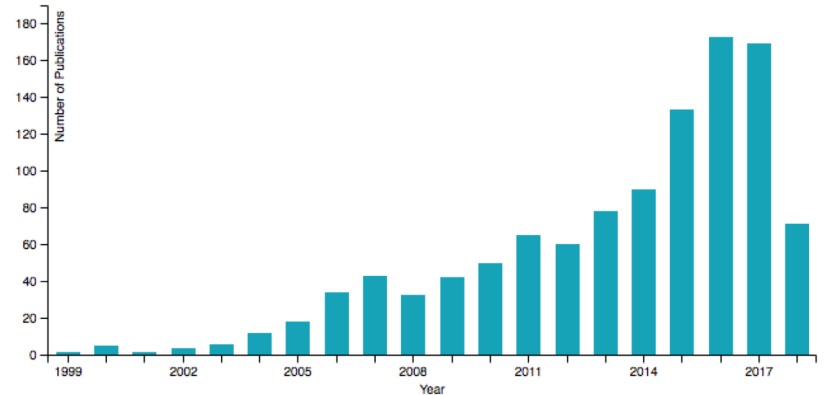
Total Publications: 1065

ColdFront Design: Projects

* In ColdFront allocation to a resource is called **subscription**

ColdFront Design: Plugins

- Plugins use data captured by ColdFront to communicate with external systems
  - Capture all user associations/relations in projects
  - Associate values to resources and subscriptions

- Example:
  - Slurm

ColdFront Vision

- ColdFront is part of an ecosystem:
  - XDMoD
  - ColdFront
  - Open OnDemand

- Involve open source community in developing plugins that will extend functionality of ColdFront
  - Other resource managers (Torque)

ColdFront Task Overview

- As a system administrator add a new GPU resource
- As a PI request subscription to the new GPU resource
- As a PI add user another to the subscription
- As a system administrator review and activate the subscription
- As a system administrator generate slurm flat file with the new slurm account associations – Example of plugin

Requirements

- Written in Python3.6 – using the Django web frameworks
- Redis (not needed for workshop)
- Memcached (not needed for workshop)

- Requirements for workshop
 - Python3.6 (assumes python3.6 venv)

Installation/Configuration

git clone https://github.com/ubccr/coldfront.git
pip install -e .

cp coldfront/config/local_settings.py.sample
coldfront/config/local_settings.py
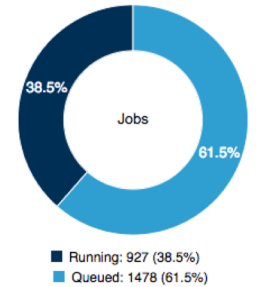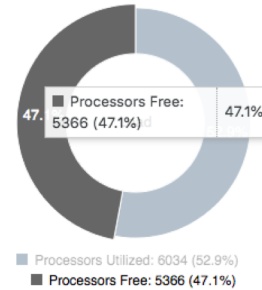cp coldfront/config/local_strings.py.sample
coldfront/config/local_strings.py

coldfront initial_setup
coldfront load_test_data
coldfront runsslserver 127.0.0.1:8000
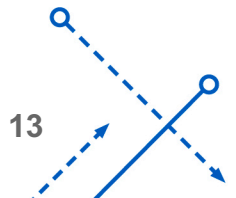
Available Plugins

- Slurm integration
- XDMoD integration
- FreeIPA or RHEL Identity Manager integration
- Isilon iquota reporting
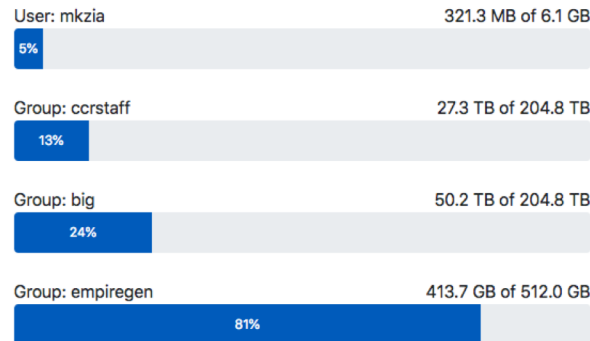- System Reporting
- Billing (planned)

UB-HPC Cluster Status

Processors Free: 5366 (47.1%) 47.1%

Jobs 38.5% 61.5%

Processors Utilized: 6034 (52.9%)
Processors Free: 5366 (47.1%)
Running: 927 (38.5%)
Queued: 1478 (61.5%)

More status info   Last Updated: Wed Nov 7 12:15:02 EST 2018

Isilon Storage Quotas

User: mkzia   321.3 MB of 6.1 GB   5%

Group: ccrstaff   27.3 TB of 204.8 TB   13%

Group: big   50.2 TB of 204.8 TB   24%

Group: empiregen   413.7 GB of 512.0 GB   81%

Refresh Quota

Recap

- ColdFront – Open source resource allocation system

- It communicates with external systems using plugins that act on the information captured in the ColdFront

- Looking for community involvement to develop more plugins to extend ColdFront functionality

Contact Us!

- ColdFront is available at: https://coldfront.io

- Booth # **3144** at Supercomputing 2018

- Center for Computational Research:

  https://www.buffalo.edu/ccr.html

- Andrew Bruno, CCR System Administrator & Developer - aebruno2@buffalo.edu

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