

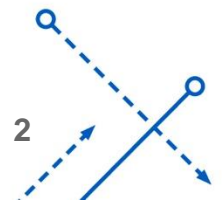
The background of the slide features a complex network of blue lines and arrows. Solid lines intersect at various angles, while dashed lines form loops and paths. Small circles, some solid and some hollow, are placed at various points along these lines, suggesting nodes or data points in a network or computational graph.

# CENTER FOR COMPUTATIONAL RESEARCH: OVERVIEW

Adrian Levesque, MBA

# CCR Overview:

1. CCR's Mission
2. About CCR
3. HPC Research Computing Services
4. Private Cloud Services
5. Moving and Sharing Data
6. Sponsored Research/Grant Support
7. Economic Outreach
8. Account Policies/Getting Access





## CCR's Mission

- Enable research and scholarship among UB faculty
  - High-performance computing and data services, sponsored funding support, faculty recruitment and retention
- Provide hi-tech workforce training
  - Partner with applicable coursework, IAD/ICDS/CDSE programs
- Foster economic development and job creation among area industries
  - Work closely with faculty engaged in industrial collaboration, and the Office of Economic Development



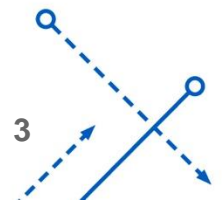
**Researchers**



**Students**



**Business Partners**



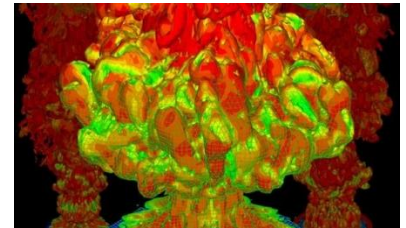
## About CCR:

- CCR provides UB researchers and affiliated partners, including industry, with access to advanced computing resources and services
  - 24 years experience delivering HPC and related services to UB
- UB CCR serves all decanal units at UB
  - ~1300 active users (~350 PI groups)
  - Involved in >470 proposals >90M\$ awarded in external funding since 2017
  - >2000 CCR-related publications since reporting started in 2016.
- Personnel
  - **CCR operations:** Computational Scientists (2), Sys Admins (5), Admin+Vis (2)
  - **Research support** (XDMoD/ACCESS MMS): Computational Scientists (3), Software Engineers (6)
- National Recognition
  - **\$27M 15-year NSF Metrics Service award (3x 5y awards)**
    - XDMoD software used by academic and industrial HPC centers worldwide
    - Measure and optimize system and application performance
  - **Open Source projects (ColdFront, Grendel/Heorot, Mokey, Open XDMoD)**
    - Conference presentations/papers/tutorials and collaborations with other academic HPC centers



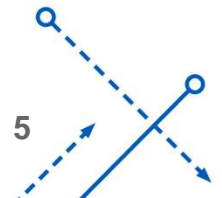
## Research Services: High Performance Computing/Data

- Academic cluster:
  - Approximately 1200 servers (some include GPUs) and 4PB of storage
  - Resources requested via jobs through batch scheduler (SLURM)
  - High-performance networking for parallel applications
  - Accessed remotely via command line SSH or Open OnDemand web portal
- No cost for faculty groups to access CCR compute resources
  - 1TB of free shared group storage (cost recovery for >1TB)
  - 10TB of free shared group scratch storage (60 day limit)
- Faculty/project specific server hosting
  - CCR provides quotation and order assistance, installation, and on-going maintenance for up to 7 years
  - Small cost recovery charged as a one-time fee for rack space, network switches, and cabling
  - Made available for preemptable “scavenger” jobs when otherwise idle



[Academic cluster details](#)

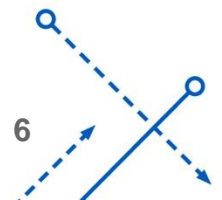
[Faculty cluster details](#)



## Research Services: Private On-Premise Cloud

- Designed, procured, installed, and managed in-house
- Your data stays at UB!
- ***Useful for non-HPC research needs such as websites, databases, long-running services, proof of concept tests***
- Users have full control (and responsibility) for virtual instances
- Built on Openstack cloud software
  - 24 nodes (768 CPU cores & 8.8TB RAM) and growing
  - 1.7PB Ceph storage (object-oriented), NVME ephemeral storage & PMEM (persistent memory) storage
  - Nvidia V100 vGPUs
- Eventually burst to commercial cloud capability
- Unlike HPC resources, cloud does have a cost recovery model, see link below for current rates

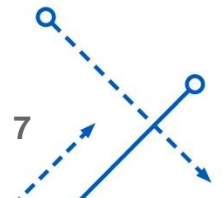
[More LakeEffect cloud details](#)



## Moving and Sharing Data: Globus

- Easily and securely move data from/to your PC to CCR, UB Box, or other institutions with Globus collections ([including NIH](#))
- Globus Personal Connect software available for Linux, MacOS, & Windows
- Browser-based & Command line tools available for scripting regular data transfers
- Set and forget: Will resume failed transfers, distributes large transfers across multiple servers, brokers direct transfers between remote computing centers
- Performs MD5-checksum at completion of transfer to verify data transferred
- Easy way to share data on CCR's storage with external collaborators without a CCR/UB account!
- Currently only available for CCR users but in the works for all of UB

[More Globus Details](#)

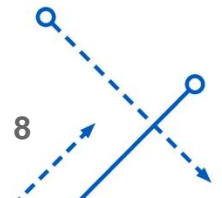


## Sponsored Research/Grant Support

- CCR actively seeks funding opportunities both on its own and in active collaboration with others
- CCR funds almost all of its infrastructure (and more than half of its staff) via sponsored research
- Direct support of HPC activities (development, administration, engineering, etc.)
- Support for collaborative research platforms (web, etc.)
- Software engineering support
- Scientific computing/modeling



[More details](#)





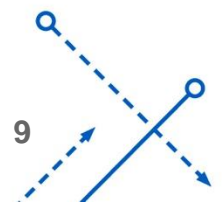


## Economic Outreach

- UB CCR provides local industry partners with access to a 650 TFlop/s (5544 cores) cluster
- Including nodes with Nvidia A100 GPUs and larger memory (1TB) capability
- Since 2013, CCR has assisted over 42 companies
- Can be direct engagement or faculty-led collaborations

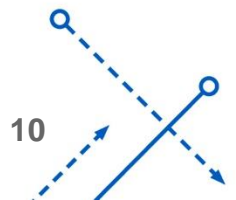


[More Details](#)



## Account Policies & Requirements for Use:

- No cost to use academic (UB-HPC) cluster – queue priority is based on contribution level (more info on [Supporters Boost](#))
- Publications: Acknowledge CCR support in publications ([citation format](#))
- Grants: Include a percent credit to CCR (at least a 5%) on the Sponsored Programs Approval Form (though this can be larger for grants requiring significant CCR resources)
- Communicate with CCR about the nature of your research, publications and any funding that you have using **ColdFront allocations portal**
  - Use ColdFront to manage your project: add/remove users, request allocations to resources, provide research information (publications, grant info, other reportable data)
  - You may add students, postdocs, external collaborators
  - Required to review and update this information annually
  - Allocations usually last one year and if you wish to continuing access the resource you request renewal
- Classes may be able to be supported – contact CCR Help to discuss class size and requirements – all access is managed through ColdFront with allocations good for the current semester



# QUESTIONS?

## RESOURCES:

<https://buffalo.edu/ccr>

Help Desk: <https://ubccr.freshdesk.com>

Documentation: <https://docs.ccr.buffalo.edu>

Email: [ccr-help@buffalo.edu](mailto:ccr-help@buffalo.edu)