

Research Computing Resources at the Center for High Performance Computing

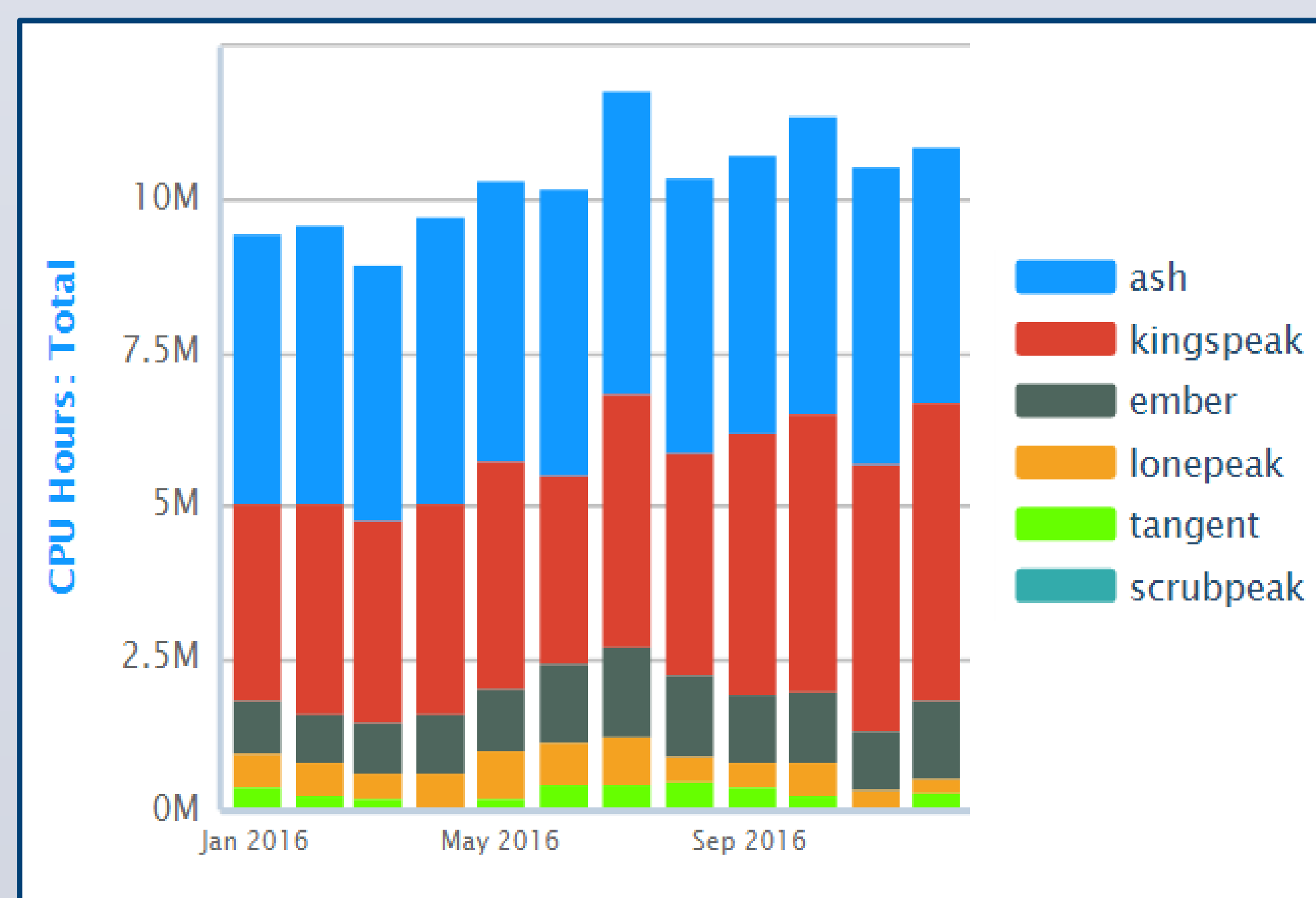
CHPC Mission Statement

Historically, CHPC has deployed and operated large-scale and high performance computational resources, as well as facilitated the use of these resources through advanced user support and training. As research computing needs have broadened and expanded, so has CHPC's purview, user base, and user community. These needs include support for big data, big data movement, data analytics, security, virtual machines, Windows science application servers, protected environments for data mining and analysis of protected health information, and advanced networking. CHPC has assisted in facilitating projects such as 100Gbps Science DMZ segments at both the University of Utah Downtown Data Center (DDC) and the 40-Gbps campus backbone, dynamic cluster and network provisioning, and software defined networks. In addition, CHPC continues to expand the training and support mechanisms needed for the ever-broadening set of computational research occurring at the University of Utah and beyond.

CHPC By the Numbers

- 28 years of operation
- 19 full-time staff
- 10 part-time student staff
- 48 training sessions & presentations given in 2016 with over 575 attendees

2016 Cluster Usage



During the 2016 Calendar Year over 550 users from 175 research groups from the University of Utah and Utah State University ran over 3 million jobs which used over 124 million core hours.

CHPC Resources and Services

CHPC operates compute resources described below for both general usage as well as for use on projects dealing with restricted or sensitive data. For the later, CHPC works closely with the University's Institutional Security Office and the Compliance Office in order to provide a HIPAA compliant Protected Environment (PE).



High Performance Computing Clusters

CHPC operates six general and one PE compute clusters with more than 1,100 nodes and over 20,000 cores. In each environment there are allocated general resources, unallocated, resources, and owner resources. Access to the unallocated resources (tangent and lonepeak) are available at no charge to all users with a CHPC account. For access to the general nodes on the allocated clusters of kingspeak and ember, there is an allocation process, again free of charge, for research groups. Finally, CHPC has a process by which groups can purchase nodes that are added to the clusters at the cost of the hardware. On these owner nodes, the owner group has priority, but if left idle any user can access them in a guest mode, with the guest jobs being preempted by any owner jobs.

Storage

CHPC supports approximately 13 PB in home, group, scratch and archive file spaces, some in the PE space. In the non-protected environment, this includes the free 50GB home directory space, not backed up, provided for each user, as well as access to scratch file systems. CHPC also has larger home directory spaces, up to 1TB per research group, with backup, along with larger group or project spaces available for purchase.

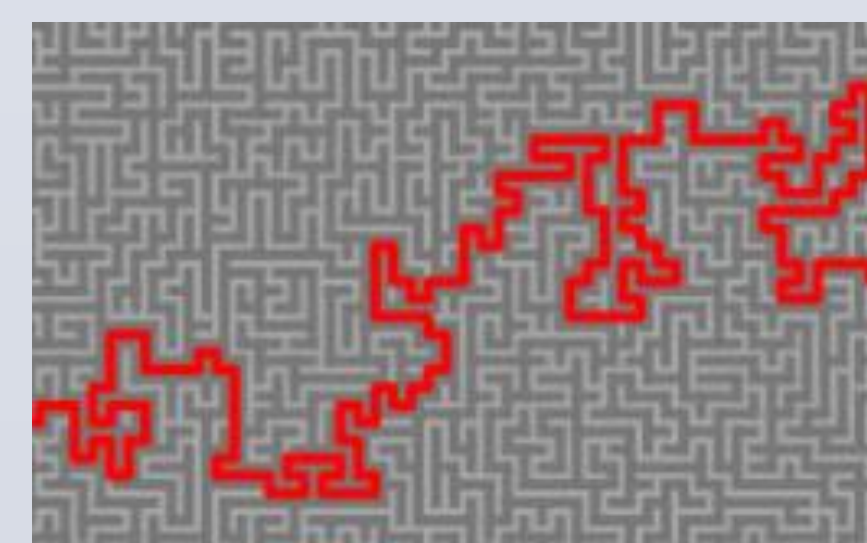


Windows Compute Server

Two windows servers, each with 48 cores and 512GB memory, are available to all users, kachina for general usage and swasey in the PE. These have a variety of statistical applications installed, as well as other applications as needed. In addition, CHPC will provision owner windows compute servers as needed.

Virtual Machines (VMs)

Two Virtual Machine Farms allow for the provisioning of VMs to meet research computing needs that cannot be met by the HPC clusters or Windows Servers. On the VM farm, CHPC provides community web and database servers, as well as git and subversion repositories. While basic VM servers are provisioned free of charge, the cost of VMs which require customization are addressed on a case by case basis.



Data Transfer

CHPC operates a set of Data Transfer Nodes (DTNs) which utilize the Science DMZ to bypass the campus firewall thereby allowing for high speed data transfer. Along with the DTNs, CHPC also provides tools including Globus to facilitate the transfers. In addition, CHPC maintains a guest transfer service, which allows sharing of data with collaborators that do not have CHPC accounts.



Networking

The CHPC Networking team provides the support for the CHPC networks and the Science DMZ, as well as being available for performance troubleshooting and consultation on the data movement needs of the University research community.

User Services

Along with the day to day operation of the resources, CHPC staff are available to provide assistance with the use of the computing resources, including installation of packages and providing training sessions on the use of the resources. In addition, staff are available for consultation to discuss ways CHPC resources can be utilized to advance your group's computational research.

For additional details on the resources and services provided and CHPC policies, please visit www.chpc.utah.edu and/or request a consultation

CHPC Presentations

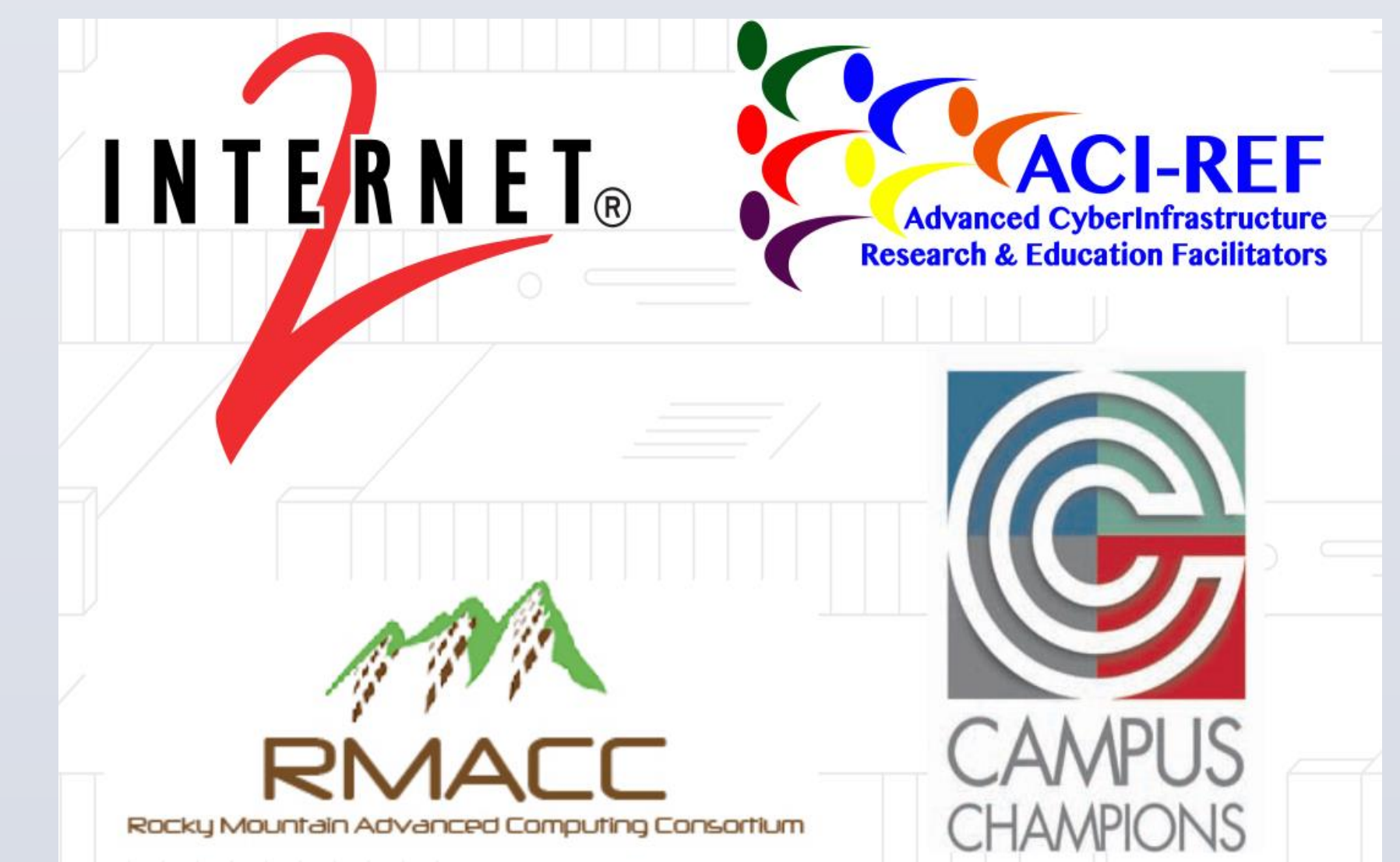
Each semester CHPC offers a number of training sessions and presentations to help users get the most from their use of HPC. These classes include:

- Overview of CHPC Resources
- Use of Modules and Slurm Batch Scheduler
- Hands on Introduction to Linux Series
- Hands on Introduction to Python Series
- The use of R on CHPC Resources
- Parallel Programming Series
- XSEDE HPC Monthly Workshops, including ones on Big Data, OpenACC, MPI and OpenMP
- XSEDE and/or VSCSE Summer Schools

In addition, CHPC has a growing set of Training Videos to help users get started with the use of CHPC resources.

Research Computing on Campuses

CHPC is actively involved with Campus Computing efforts at both the regional and national levels, including participation in:



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