LCC and Research computing infrastructure

The center operates a $6 million central and distributed supercomputing facility containing nearly 16,000 processor cores and 120 high-performance graphics processing units with a combined peak performance of 1.5 petaflops. LCC and on-prem research cloud hardware includes about 550 compute nodes with memory ranging from 64GB up to 3TB per node. Each of the compute nodes have between 16 to 48 compute cores. All these compute nodes are networked with an FDR/EDR Infiniband and 100Gbps Ethernet interconnect fabric. The high-performance GPFS parallel file systems attached to this central cluster contains 3 PB of usable disk storage for home, project and scratch directories. The cluster includes a dedicated backup node running IBM’s Tivoli Storage Manager (TSM) and Hierarchical Storage Manager (HSM) with a 10Gb link to UK’s central backup system providing access to the university’s near-line tape storage system. The facility has dedicated high speed 40Gb data transfer nodes for researchers needing to transfer data to and from external resources and offsite.

The center also provides programmable cloud infrastructure-as-a-service, managed cloud-native platforms and applications, consulting, and research and development efforts into new cloud computing technologies such as OpenStack deployments, distributed systems and interactive computing environments such as Jupyter notebooks. These computing environments fosters reproducible, shareable computing through containers and virtualization. These services are provided on 50 compute nodes, each powered by Intel processors (1600 cores) with 3TB RAM per node and supported by a 2PB usable object store storage system.

Other high-performance computing resources are available to researchers through the Center for Computational Science as well. The National Science Foundation’s Extreme Science and Engineering Discovery Environment (XSEDE), the world’s largest distributed infrastructure for open scientific research, is a single virtual system that scientists can use to share computing resources, data, and expertise through a premier collection of integrated digital resources and services. Through the National Science Foundation’s Campus Champions program, UK researchers have on-campus consulting resources to submit allocation requests to XSEDE and to access powerful national supercomputing facilities for modeling, simulation, and advanced data and visualization analysis. In addition to allowing researchers to run their own custom code, most well-known major scientific codes are available through XSEDE resources. These resources are available at no cost to users.

LCC

The current UK HPC Lipscomb Compute Cluster (LCC) is a traditional batch-processing cluster, with high-speed interconnects and a shared file system. The LCC cluster along with the research infrastructure provides over 12000 processor cores, 37 TB of distributed RAM, 2.6 PB of high-speed parallel disk storage, 4 PB of Ceph storage supporting over 800 active UK, regional, and national researchers representing over 55 academic departments. The LCC provides over 100 million core-hours of processing annually. This LCC resource, hosted on the UK campus, is open to regional researchers and available to national research collaborators. Active research areas include physics, astronomy, biochemistry, pharmacy, medicine, mechanical engineering, and many others.
2020 CCS Research Infrastructure
By Our 4th Summit

100 Gbps EDR InfiniBand Network

1.5+ Pflops
Compute

12 PB
Raw Storage

NFS/GPFS GateWay

GPFS
1.6PB
COT OpenStack

GPFS
1.3PB

860TB
Object Store

860TB
Object Store

20 TFLOPS

64 TFLOPS
3TB RAM/Node

Object Store
1.8PB

OpenHPC LCC

GPU ML/AI Cluster

740 TFLOPS

750 TFLOPS

1.8PB

Center for Computational Sciences