Northwestern
INFORMATION TECHNOLOGY

Purchasing Guide for
High Performance Computing (HPC) Central Compute Resources

Effective for FY2017

Purpose

This document summarizes High Performance Computing (HPC) compute resources that faculty engaged in research may purchase through ***Northwestern Information Technology***.

Summary of HPC Compute Resources

Northwestern Information Technology operates Quest through the acquisition of funds from faculty grants, startup packages, and institutional sources. Housed at the University's central data centers, these resources benefit from a secure, reliable, and stable environment and are designed to meet the compute needs of our researchers. The Applications and Allocations Committee, comprised of Northwestern faculty, with staff support from members of Northwestern IT, allocates access to Quest through a quarterly review process. Researchers who want dedicated resources can purchase **full access** to Quest as described in this document.

Benefits to Full Access Quest

A Full Access User is guaranteed launch of jobs on the Quest HPC cluster within 4 hours of scheduling the job and the use of an annual compute-core-hours allocation resulting from their equipment purchases for a period of five years. Full Access Users may divide their compute-core-hours allocation among members of their research group.

- *Professional System Administration*
  Northwestern IT HPC administrators handle security patches, operating system updates, hardware repairs, account management, and system troubleshooting so faculty and graduate students can focus on their research.
- *Cost Effective*
  Full Access Users are *not* charged for basic infrastructure resources and technical staff support. These institutional costs include: core InfiniBand and Ethernet network switches, power distribution units; a secure data center that is monitored 24/7; the data center operations staff, and the technical HPC consulting staff supporting researchers.

- *Application and Code Support*
  Northwestern IT HPC Specialists help users with the installation, porting, and optimization of code on the Quest high performance computing system.

Purchasing Full Access User Allocations on Quest

To purchase Full Access User allocations on Quest, the requesting researcher must be a member of the Northwestern faculty. Documentation must be provided by the requesting faculty member containing a chart string from which the funds will be transferred. If funds are not available when the documentation is submitted, the requesting faculty member must specify when funds will be available.

If sponsored funds are used for purchase of a Full Access User allocation, the faculty member is responsible for assuring the purchase is required to achieve and is consistent with the purpose and aims of the grant. The faculty member will complete any necessary re-budgeting of the sponsored project, if required, to ensure appropriate management of the funds.

Quest Compute Resources

The Quest HPC cluster is designed to run both compute-intensive and data-intensive application codes with the greatest economy.

The types of InfiniBand-connected server clusters that Quest has been designed to support are summarized below:

Equipment Cost and Description

1. **Quest General Compute Node**
   a. Characteristics
      i. Processors: Intel Broadwell, 2 x Intel Xeon Processor E5-2680 v4 14C 2.4GHz (28 cores total)
      ii. Memory: 128 GB per node, Type: DDR4
      iii. Interconnect: InfiniBand FDR/14
      iv. Local Disk: 1TB SATA HDD
      v. Quest Project Storage: 50 GB
   b. Full Access User Cost per Node: $7,812
   c. Purchase of a Full Access General Compute node will provide approximately 245,280 compute-core-hours of Quest HPC computing resource per year, for a duration of five years.
   d. General Compute nodes are best for parallel or other applications that are not suitable for individual workstations.

2. **Quest GPU Node**
   a. Characteristics

i. Processors: Intel Xeon Processor E5-2680 v4 14C 2.4G
ii. GPGPU: two nVidia Tesla K80
iii. Memory: 128GB TruDDR4
iv. Interconnect: InfiniBand FDR
v. Local Disk: 1TB 7.2K 6Gbps SATA 3.5" HDD
vi. Quest Project Storage: 50 GB

b. Full Access User Cost per Node: Estimated at $23,155.07
c. Purchase of a Full Access GPU node will provide approximately 245,280 compute-core-hours of Quest HPC computing resource per year, for a duration of five years.
d. Visualization/GPGPU nodes are designed to facilitate the analysis and visualization of large data sets. Consisting of GPU appliances, such as the nVidia Tesla, these servers are integrated with Quest through high-speed InfiniBand connections to Quest parallel storage systems.

Installation Cycles

Satisfying routine orders for Full Access computing and visualization nodes occurs on a rolling basis, provided that nodes are in stock and chassis capacity is available. Orders for large numbers of nodes may be combined into a larger, incremental purchase and installation cycle. This may require 2-3 months of advance notice due to addition of infrastructure. Equipment refreshes are generally purchased in February and installation is completed by July.

Duration of Full Access Use

Full Access Users are guaranteed full access to Quest compute cores for a period of **five year**s from the date of the installation of the funded hardware purchase.

If you are interested in purchasing resources, please contact:
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The ‘per node’ cost charged to Full Access Users for the purchase of equipment is reviewed annually. Full Access node pricing in this document is good until May 31, 2017.