King Abdullah University of Science and Technology

KAUST

Research Computing
Noor GPU Cluster Introduction

GPU Cluster Capacity

Total Number Of Compute Nodes (Intel Xeon E5-2670)	**28**
Total Number Of Cores	**448**
Total Memory	**1 TB**
Total Compute Capacity (Theoretical Max)	**9.31 TFLOPS**
Local Scratch /tmp	**400 GB**
Shared NFS Scratch	**20 TB**

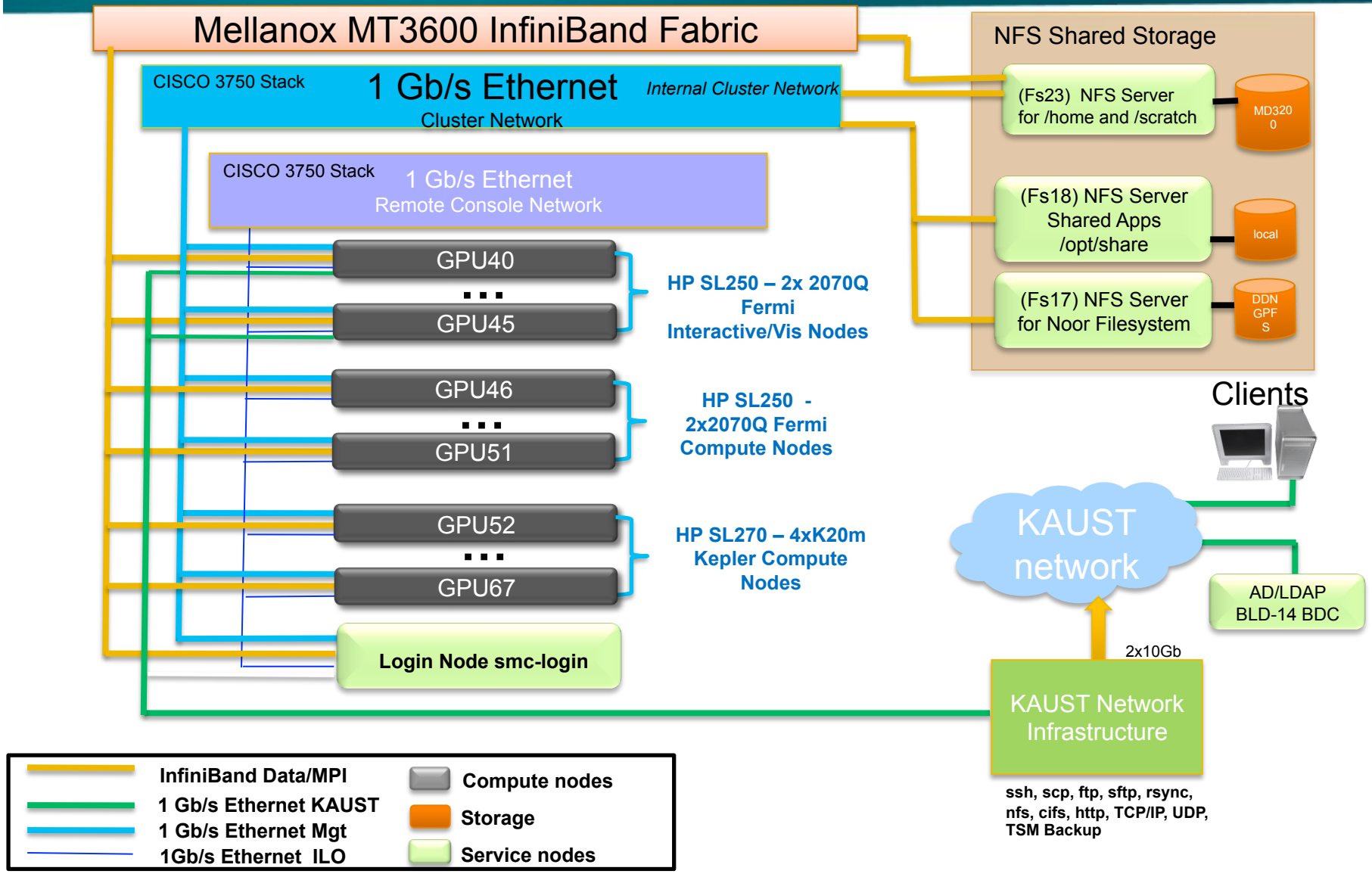
Total Number Of **GPU**	**88**
Fermi M2070-Q / **Kepler K20m**	**24 / 64**
Total Number Cuda Cores	**170496**
Total Memory	**464 GB**
Total Peak single precision floating point performance	**250 TFLOPS**
Total Peak double precision floating point performance	**87.24 TFLOPS**

Cluster Specification & Configuration

- **Hardware**
  - **HP ProLiant SL250s Gen8 (**Intel(R) Xeon(R) CPU E5-2670 0 @ 2.60GHz)
    - 2 Processors, 16 cores, Memory 64GB per node
    - **GPU Fermi Tesla M2070-Q**
      - Processor Speed **1.56GHz,** Memory 6GB, Memory Bandwidth **150 GB/Sec**
      - Peak double precision/single precision floating point performance **515/1030 Gigaflops**
      - Cuda Cores / Node **448**
  - **HP ProLiant SL270s Gen8 (**Intel(R) Xeon(R) CPU E5-2670 0 @ 2.60GHz)
    - 2 Processors, 16 cores, Memory 64GB per node
    - **GPU Kepler K20m**
      - Processor Speed **1.56GHz,** Memory 5GB, Memory Bandwidth **208 GB/Sec**
      - Peak double precision/single precision floating point performance **1.17/3.52 TFLOPS**
      - Cuda Cores / GPU **2496**

- **Software**
  - **OS**
    - RHEL6.3, Kernel 2.6.32-279.el6.x86_64
  - **Drivers**
    - NVRM version: NVIDIA UNIX x86_64 Kernel Module 319.17 (Fermi Nodes)
    - NVRM version: NVIDIA UNIX x86_64 Kernel Module 319.32 (K20 Nodes)
  - **Compilers**
    - Cuda5 Toolkit and SDK, PGI and CAPS OpenACC compilers available on all the nodes NFS shared
    - Use module command to check and load the compilers
  - **Job Scheduler**
    - LSF HPC 7 update 6

Cluster Design Document



User Guide

- **Requires Noor Account to login to Noor GPU Cluster**
- **How submit the Batch job**
  - $ ssh smc-login.kaust.edu.sa (Use KAUST Portal User ID and Password)
    - Transfer requires files under /scratch/<uid>
  - $ cd /scratch/<uid>
    - Load require compilers
  - $ module load compilers-extra
  - $ module load cuda
  - $ module load pgi
  - $ bsub -q gpu -n1 -x -R select[k20] -o out%J -e error.%J ./myjob
    - Use –x option if your job going to use all the GPU so other job cannot start on the same node
- **Simple Job submission script**

```
$vi myjob_script
#/bin/bash –l
#BSUB –q gpu
#BSUB –n 16   # Number of compute cores
#BSUB –R select[k20]   # to select k20 nodes –R select[fermi] for Fermi nodes
#BSUB –e erro.%J
#BSUB –o output.%J
#BSUB –x     #For Exclusive
cd  /scratch/<uid>
module load compilers-extra
module load cuda
module load pgi
./myapps
:wq
$ bsub < myjob_script
```

  - http://rcweb.kaust.edu.sa/KAUST/ResearchComputing/wiki/NoorGuide#ExampleofusingbatchjobscriptsOpenMPI
  - CAUTION! Make sure to submit the job using /scratch/<uid> dir for heavy I/O please use /tmp
- **How to submit Interactive Job**
  - $ ssh –X smc-login.kaust.edu.sa (Make sure Xserver" is running on your desktop (Xming, Cygwin etc.))
  - $ bsub -XF -I -q interactive xterm
    - http://rcweb.kaust.edu.sa/KAUST/ResearchComputing/wiki/NoorGuide#InteractiveLSFJob

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- **Important LSF Command**
  - *bsub* *# submit the job*
  - *bjobs* *# check the job status*
  - *btop* *# Move the job up*
  - *bbot* *# Move the job down*
  - *bstop* *# Suspend the job*
  - *bresume* *# Resume suspended job*
  - *bkill* *# kill the job*
  - *bqueues* *# queues list*

  ** Note all the command applies to only your jobs.

- **How to request Noor Account**
  - **KAUST USERS**
    - **Go to http://researchcomputing.kaust.edu.sa**
    - **IT Request Forms Section**
    - Noor Account Request Form
  - **External USERS (KAUST Collaborators) require**
    - In addition to Noor Account Request form submit Remote access request form
    - Remote Access Request Form

** **Note** KAUST internal Researcher or Faculty must make the Noor and ssh Gateway account request