Computational Resources

Managed by the Department of Scientific Computing
“Pillars” of DSC Computing Resources

FSU’s Shared HTC
- Condor Scheduler
- Opportunistic
- Serial jobs only
- x86
- x86_64
- PPC
- Clusters
- Desktops
- Mixed Storage
- www.sc.fsu.edu/computing/general-access/batch

Interactive Cluster
- SGE Scheduler
- (will be MOAB)
- Interactive
- Short Serial jobs
- Some support for GPUs to support high-end vis
- Some support for GPUs to support CUDA/OpenCL
- Lustre Storage
- www.sc.fsu.edu/computing/general-access/interactive

FSU’s Shared HPC
- MOAB/Torque
- Parallel environment
- Infiniband for MPI
- 3000+ cores
- 3Leaf Shared memory machine (132 cores, .5 TB mem)
- Smaller Shared memory Machines
- Panasas Storage
- www.hpc.fsu.edu

Scientific Visualization
- 3D stereo VisWall
- 3D stereo workstations
- Vis software
- DSC Panasas Storage
- www.sc.fsu.edu/computing/general-access/visualization
High Throughput Computing (HTC)

What is it?
High Throughput Computing (HTC)

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High Throughput Computing (HTC)

What is it?

• Up to 1000 Total CPUs in the “Flock”
  – 684: X86 64-bit Linux
  – 218: X86 32-bit Linux
  – 128: PPC Linux
  – Aggregate throughput of over 1 TF

• Submit from HPC Login nodes
  – SC users can use submit.sc.fsu.edu

• Two runtime environments supported
  – Vanilla Universe
    • Highly portable
    • No checkpointing
  – Standard Universe (SC users only)
    • Will checkpoint and migrate to like architectures
    • Very robust
    • Must link your code to condor libs (need at least object files)
High Throughput Computing (HTC)

What should I use it for?

• Long or short running serial process jobs
• Big (1000 plus) job arrays are supported
• Will not run parallel jobs (use HPC)
• Will not run interactive jobs (use general purpose clusters)
High Throughput Computing (HTC)

Demonstration

A very simple condor submit file

Executable = foo
Log = foo.log
Queue
High Throughput Computing (HTC)

Demonstration

• Live Demonstration
• For a Screen cast demonstrating the use of condor on DSC systems go to:
  – http://www.sc.fsu.edu/computing/general-access/batch
High Throughput Computing (HTC)

Getting Help

- General Documentation (For DSC) including screen cast
  - [http://www.sc.fsu.edu/computing/general-access/batch](http://www.sc.fsu.edu/computing/general-access/batch)

- Condor project pages
Interactive Cluster

What is it?
Interactive Cluster

What is it?

• Interactive: gp000 to gp003
  – 4 Single-core Quad socket Intel(R) Xeon 2.8 GHz, 1 GB RAM

• Interactive: gp004
  – 1 Dual-core Dual socket AMD Opteron 2.0 GHz, 2 GB RAM

• Batch: gp005-gp020
  – 16 Single-core Dual socket AMD Opterons 2.0 GHz, 1 GB RAM
Interactive Cluster

What should I use it for?

• Matlab
• GNUPlot
• Software compilation with GNU compilers
• Tecplot
• Maple
• COMSOL
• ...
Interactive Cluster

Demonstration

A very simple SGE submit script:

#!/bin/bash
# Execute from the current working directory
#$ -cwd
# join std error and std out
#$ -j y
# commands you want executed
ls -l /etc/
Interactive Cluster

Demonstration
FSU’s Shared HPC

What is it?
FSU’s Shared HPC

What is it?

• Opened in 2007
• Hardware overview
  – Storage:
    • 156 TB of Panasas Storage
    • 120 plus TB of Infiniband connected Storage
  – Cores
    • 3972 plus
• IB cluster is in 3 Parts
  – DDR IB
    • 2176 Quad Core AMD opterons
    • 2 GB per core
  – QDR IB Y1
    • 512 Dual Core AMD opterons
    • 2GB per core
  – QDR IB Y4
    • 1152 12-core AMD opterons
    • 2.6 GB per core
• 3Leaf Virtual Shared Memory Machine
  – 12 nodes
  – Total of 132 cores usable
  – Total of 528 GB memory usable
FSU’s Shared HPC

What is it?

• DSC Ownership Share in HPC
  – 220 Cores
  – 23 TeraBytes of Storage
  – One log in node: scs.hpc.fsu.edu

• Job Policy For DSC
  – Max Jobs = 10
  – Max procs = 128
  – Queue name: “scs_q”

• General queue access policy
  – Max Jobs = 8
  – Max procs = 512
  – Queue name: “genacc_q”

• Backfill queue access policy
  – Max jobs = 100
  – Max procs =512
  – Queue name: “backfill”
FSU’s Shared HPC
What should I use it for?

• Large and small parallel jobs
• Short (e.g., < 4 hours) parallel or serial jobs
• Jobs that require very low communication latency
• Application areas currently served
  – Biology: Evolutionary, population, structural Biology
  – Engineering
  – Physics
  – Meteorology
  – Math
  – Chemistry
  – Economics
  – ...
FSU’s Shared HPC
Demonstration

A very simple MOAB submit script:

#!/bin/bash

#MOAB -l nodes=16  <- request these resources
#MOAB -j oe       <- combine output and error
#MOAB -l walltime=120:00  <- specify runtime
#MOAB -N TRAP-OPENMPI <- name for this job

source /usr/local/profile.d/openmpi-gnu.sh

cd $PBS_O_WORKDIR
mpirun ./trap-openmpi option1 option2
DSC Vislab
What is it?
DSC Vislab
What is it?

• 499 DSL (Seminar Room)
  – 3D (Stereoscopic) Display Wall (8’x18’)
  – MRI: Acquisition of a Stereographic Projection System to Support Multidisciplinary Scientific Visualization
  – Access Grid (multi-institutional A/V conferencing)

• 428 DSL (Public Lab)
  – Stereoscopic prototyping workstation
  – 6 Graphics rendering workstations
  – 9 TB data storage
  – CUDA (NVidia) enabled graphics cards
DSC VisLab

What should I use it for?

"offers a way to see the unseen"
DSC Vislab
What should I use it for?

• Chekhov (OSX)
  – Video editing (Final Cut Studio)
  – Graphic Design (Omnigraffle)
• Borg (Windows)
  – Stereo Visualization/Prototyping
  – Movie Rendering
• Kirk, Spock, Uhura, Bones, Worf (Linux)
  – Data Interrogation (Avizo, ParaView, VisIt, VMD, ...)
  – GPU Computing
DSC Vislab
Getting Help

• General Information

• Stereoscopic Visualization/Movies

• Lab Access
  – For user account see TSG’s User Management page
  – For key card access see Anne Johnson
## Summary of DSC Computing Resources

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<th>Scientific Vis</th>
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<tr>
<td>Total CPUs</td>
<td>Variable as much as 1000</td>
<td>20(interactive)/32(batch)</td>
<td>3000 plus</td>
<td>4 + workstations</td>
</tr>
<tr>
<td>Max CPUs</td>
<td>400</td>
<td>4 jobs</td>
<td>640 (w/ GA)</td>
<td>N/A</td>
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<tr>
<td>Max runtime</td>
<td>No limit</td>
<td>8 hours/process</td>
<td>90 days</td>
<td>N/A</td>
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<td>Parallel</td>
<td>Serial+Threads</td>
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<td>scs.hpc.fsu.edu</td>
<td>N/A</td>
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<td>Example use</td>
<td>Large serial job array</td>
<td>Matlab, Maple, TechPlot</td>
<td>Large parallel job using MPI</td>
<td>Visualization of 3D data, graphic rendering</td>
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Systems Support

The key to everything

- Technical Support Group
- HPC group
- Graduate Assistants
Systems Support in General

Getting Help

• HPC Resources:
  – support@hpc.fsu.edu
• DSC Resources:
  – ops@sc.fsu.edu
• Your contact information
  – username
  – Email
  – telephone
• Full description of problem
  – Where did it happen (hostname)
  – When did it happen
  – What happened
  – Error messages given?
  – Can you repeat the problem?