Cornell University
Center for Advanced Computing

Hardware Overview

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TeraGrid

- Series of interconnected HPC resources with a high speed interconnect and shared login/consulting services.

High Performance Systems

Name	Institution	System	*Peak TFlops*	Memory TBytes	Status	Load	Running Jobs	Queued Jobs	Other Jobs
Kraken	NICS	Cray XT5	608.00	129.00	Up		24	5	3
Ranger	TACC	Sun Constellation	579.40	123.00	Up		297	406	100
Abe	NCSA	Dell Intel 64 Linux Cluster	89.47	9.38	Up*		194	170	136
Lonestar	TACC	Dell PowerEdge Linux Cluster	62.16	11.60	Up		40	90	1
Steele	Purdue	Dell Intel 64 Linux Cluster	60.00	12.40	Up		813	189	25
Queen Bee	LONI	Dell Intel 64 Linux Cluster	50.70	5.31	Up		119	5	1
Lincoln	NCSA	Dell/Intel PowerEdge 1950	47.50	3.00	Up		1	0	0
Big Red	IU	IBM e1350	30.60	6.00	Up*		611	903	43
BigBen	PSC	Cray XT3	21.50	4.04	Up		13	56	48
TeraGrid Cluster	NCSA	IBM Itanium2 Cluster	10.23	4.47	Up		45	4	0
Cobalt	NCSA	SGI Altix	6.55	3.00	Up		63	473	40
Frost	NCAR	IBM BlueGene/L	5.73	0.51	Up		8	0	10
Pople	PSC	SGI Altix 4700	5.00	1.54	Up		38	0	16
TeraGrid Cluster	SDSC	IBM Itanium2 Cluster	3.10	1.02	Up*		42	6	0
TeraGrid Cluster	UC/ANL	IBM Itanium2 Cluster	0.61	0.24	Up		1	0	0
NSTG	ORNL	IBM IA-32 Cluster	0.34	0.07	Up		1	0	0
		Total:	**1580.89**	**314.58**			**2310**	**2307**	**423**

TeraGrid

- Teragrid resources also include storage and visualization systems.

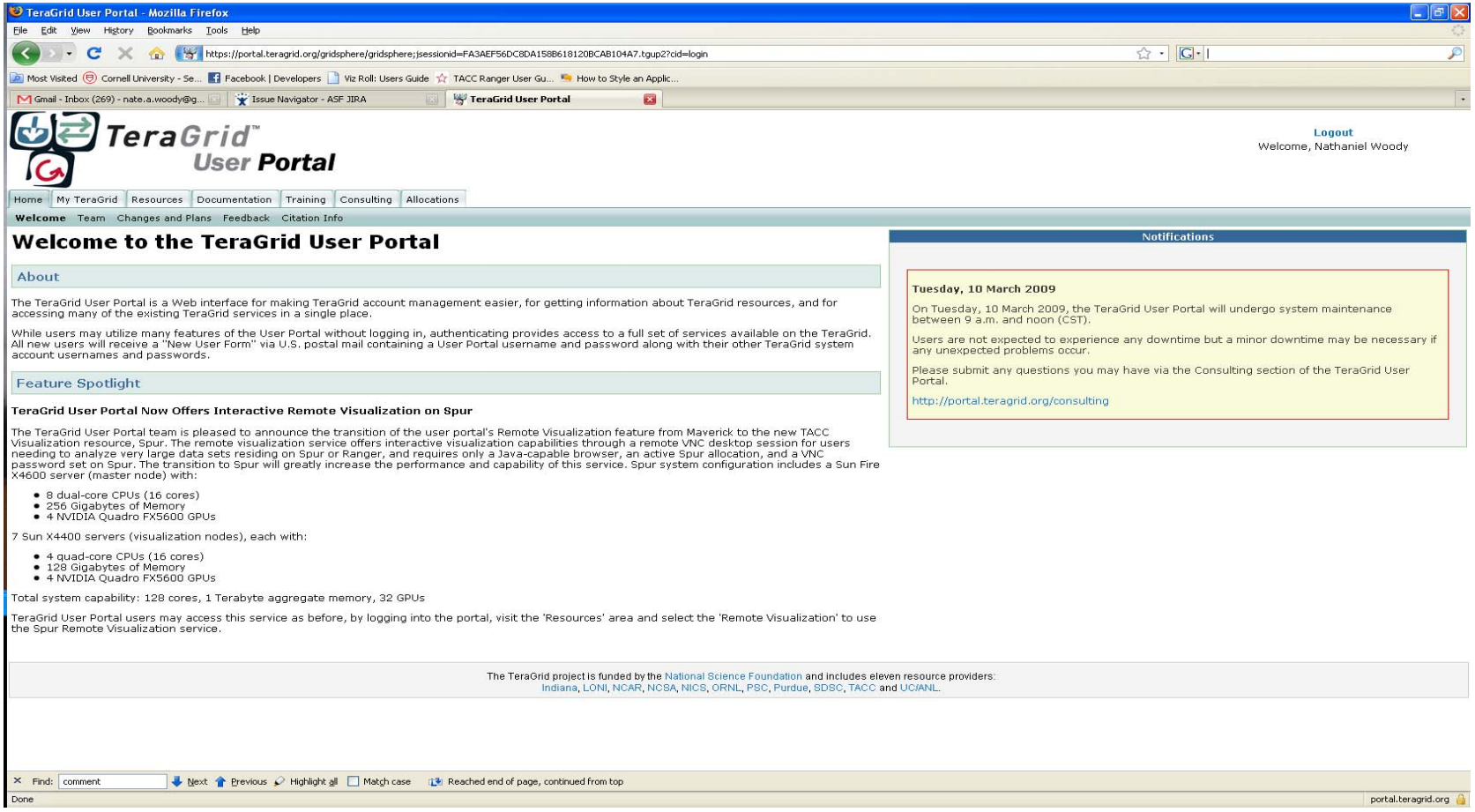
Storage Systems

Name	Institution	System	Online Storage TB	*Offline Storage TB*
IU Archival Storage	IU	HPSS	N/A	28000
SDSC Tape Storage	SDSC	HPSS	N/A	25000
Ranch	TACC	Sun StorageTek Mass Storage Facility	35	5000
MSS	NCAR	Mass Storage System	N/A	2000
Data Capacitor	IU	Lustre	535	N/A
Ranger Storage	TACC	Lustre	1700	N/A
SDSC GPFS-WAN	SDSC	Global Parallel File System-Wide Area Network	700	N/A
			Total: 2970	**60000**

Advanced Visualization Systems

Name	Institution	System	CPUs	Peak TFlops	Memory TBytes	Graphics Hardware
Spur	TACC	Sun Visualization Cluster	128	1.13	1.00	4 NVIDIA Quadro Plex model 4, 6 NVIDIA Quadro Plex S4. Total: 32 NVIDIA FX 5600 GPUs
TeraDRE	Purdue	Condor Pool	14000	60.00	28.00	Nvidia GeForce 6600 GT
TeraGrid Cluster	UC/ANL	Intel Xeon Cluster	192	0.61	0.38	nVIDIA GeFORCE 6600GT AGP graphics cards
			Total: 14320	**61.74**	**29.38**	

Teragrid Portal



Ranger

- Ranger – Sun Constellation Linux cluster, in production since February of 2008

Pictures from www.tacc.utexas.edu

Ranger

- 3,936 AMD Opteron (Barcelona) Nodes
  - Four socket, quad-core (62,976 cores, 2.3 GHz)
- 579 TFlops Peak Performance
- 125 TB Memory (2GB/core)
  - 32 GB/ Node
- 1.7 PB Storage (Lustre Parallel File System)
  - Broken into several different file systems
  - An tape storage device provides 10PB offline storage
- InfiniBand Interconnect (2x 3456-port switches)
  - 1GB point to point connection

Ranger Data

- No local disk storage (booted from 8 GB compact flash)
- User data is stored on 1.7 PB (total) Lustre file systems, provided by 72 Sun x4500 I/O servers and 4 Metadata servers.
- 3 mounted filesystems, all available via Lustre filesystem over IB connection. Each system has different policies and quotas.

Alias	Total Size	Quota (per User)	Retention Policy
$HOME	~100 TB	6 GB	Backed up nightly; Not purged
$WORK	~200 TB	350 GB	Not backed up; Not purged
$SCRATCH	~800 TB	400 TB	Not backed up; Purged every 10 days

Ranger Software Configuration

- Rocks-based (4.1) Linux
  - 2.6.18.8 Linux kernel
- Compilers
  - Intel 9.1 and 10.1, PGI 7, SunStudio 12, gcc 4.2 &4.3
- Numeric libraries
  - ACML, MKL, FFTW, scalapack, gotoblas,gsl, numpy
- MPI
  - Mvapich1 and 2
- Debugging/etc tools
  - mpiP, DDT, Tau, Papi

Spur

- Spur is the new visualization resource attached to Ranger
- 8 Compute nodes
  - 128 GB RAM
    - 1 Node has 256 GB
  - 4 NVIDIA FX5600's
    - 6 of the nodes via a QuadroPlex 2100
    - 1 via 2 QuadroPlex 1000s
    - 1.5GB GDD3/GPU
    - 77GB/s Memory Bandwidth.
- Spur shares the IB connection with Ranger and has all file systems mounted.
- Ranger data can be visualized without having to move simulation results off of Ranger.