OSG Site Survey

OSG
OSG Docdb
2007
DRAFT
Version 4.0

Document Name	**OSG Site Survey**
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Purpose
A survey was conducted to obtain correct and up to date information. In addition to reporting metrics to funding agencies, OSG must know the computing capacity it has access to. Usage of the resources is managed through policy with local and remote usage supported. Capacity information is important also in order to understand the efficiency of utilization and to allocate resources. Resource configuration information is useful for allocation planning and job submission.

1 Summary

Data collected by the survey has given us a first look at the actual capability and resources of OSG. While the data is imperfect, it provides insight to the potential of OSG sites. We also have a better understanding of the configuration of site resources.

This document will describe the content selection, how it was conducted, our results and the limitations of the survey. There will be brief discussion of current plans for improving and automating the collection of site resource information.

2 Survey Content:

The GLUE Schema is the current method of characterizing sites. It defines attributes which provide a useful description of the site. Some redundant information was included as a cross-check for accuracy or to verify current OSG data.

A first pass at the questions was circulated to OSG management and the survey takers. The following key attributes were selected for the survey.

GlueSiteName
GlueSiteSysAdminContact
GlueSiteUserSupportContact
GlueSiteLocation
GlueCEUniqueID
GlueSubClusterUniqueID
GlueHostProcessorVendor
GlueHostProcessorModel
GlueHostProcessorVersion
CluHostProcessorClockSpeed
GlueSubClusterPhysicalCPUs
GlueSubClusterLogicalCPUs
GlueHostOperatingSystemName
GlueHostOperatingSystemRelease
GlueHostOperatingSystemVersion
SEUniqueID

Some non-Glue attributes of interest were also included.

Site Administrator telephone number and email.
Site User Support contact telephone number and email.
SE Available Storage
SE OSG Restrictions
CE OSG Restrictions

3 Implementation:

It was decided to first send email to the list of site administrators registered with the GOC. For sites that did not respond or sent incomplete information a telephone call was made to the site administrator.

The survey form included detailed descriptions/definitions of the information expected for each item.

It quickly became apparent that a more consistent way of gathering processor and OS information was needed. The survey was amended to include the following commands to be run on worker nodes of each subcluster (as defined in the GLUE Schema);

uname –r (the kernel version)
cat /etc/redhat-release (standardized way of getting OS name)
cat /proc/cpuinfo (complete processor type information)

In almost every case, further explanation of the definition of subclusters was required to obtain the correct data.

The responses were collected into a database for organization and analysis.

The SPEC CPU2000 benchmark suite was selected as a standardized way of evaluating site resources. The SPEC site has a good database of results covering a wide range of processors. The newer SPEC CPU2006 did not have good coverage of the processors used in OSG sites.
http://www.spec.org/

An informal survey of Physicists using multiprocessor farms indicated that both the Integer and Floating Point performance of processors was important. The SPECint2000 and SPECcfp2000 results from the CPU2000 suite were evaluated. Definitions of the SPECint2000 and SPECcfp2000 are in Appendix A.

A database benchmark table was created to correlate the data provided by cat /proc/cpuinfo with the benchmark data. An on-line CPU table was used to cross-reference cpuinfo results and the benchmark results available at the SPEC site.
http://balusc.xs4all.nl/srv/wel.html

4 Results

The GOC database was used as the source of resource sites. .Accuracy of GOC database was generally good. The administrator and user support contact info was inaccurate in many cases. This was primarily due to outdated information. There were several sites no longer in service which were not marked as inactive.

For sites with incorrect administrator information, GOC helpdesk tickets were generated. A resolution was supplied for all requests. The responses were slow and the status messages confusing. In many cases the GOC had to request the information through a resource site helpdesk which contributed to the delay and confusing emails.

For 122 sites in the GOC database, there was the following respsone:

Inactive sites…….	5
No contact……	3
Contacted but incomplete information……..	64
Completed surveys……	51
Shared cluster sites……	7

Subtracting the inactive sites and sites where no contact could be made, 94% of sites. Not all supplied the information requested by the time the survey closed (Three weeks). Sites which supplied complete information were 48% of active sites. 3% of sites were not contacted due to missing or incorrect contact information. Of the sites reporting complete information, seven shared clusters with another site. This was taken into account by not including the second site in totals to ensure subclusters were only counted once. Appendix B has detailed information about site response.

On average, four emails and one phone call were required to complete a survey.

There was a wide range of reasons for incomplete surveys. The responses ranged from “I’m not going to do it!” to “How do I find the information?” The later could be addressed and most of the completed surveys were of this type. The most common response for incomplete sites was “I don’t’ have time for this level of detail.” In general, site administrators were resistant to manually providing details about their sites.

Subcluster details were the most difficult item to obtain. There were many interpretations of a subcluster. The definition used for this survey was:

“A subcluster is a group of homogeneous processors. This is very specific. Each group is composed of a particular processor type and model. Thus a group of 100 AMD opteron 1.4 GHz processors would be a different subcluster than a group of 100 AMD opteron 3 GHz processors or a group of 100 Intel P4 2 GHz processors.”

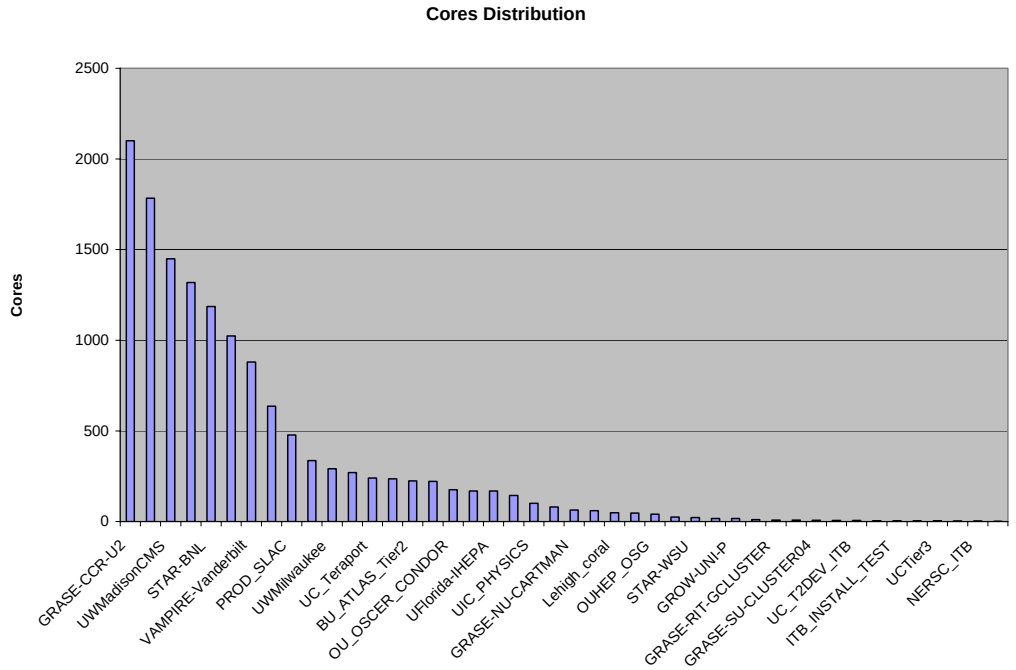
Initially responding sites reported processor and OS information in a slightly different ways. The adoption of standard commands solved this problem, but site administrators were reluctant to take the time needed to run them on each subcluster.

The SPEC2000 benchmarks are run on many different types of hardware. The processor type is only one component in a complex chipset that composes a particular motherboard implementation. A processor may be used in many different motherboards. Each implementation may have different performance due to the specific hardware used.

Within a group of motherboards with the same processor, the performance difference is small compared to differences between processors. It was decided to take all the benchmarks for a particular processor and average the benchmark results. The number of benchmark results per processor ranged from 0 to 15. Most processors had at least two results and many 4-5. For the processors with no benchmark results a very similar processor was chosen.

Appendix C contains a table of processor types and quantities.

Of the OSG sites surveyed, there were very small (1 core) and very large (2100 cores) sites. Some sites have many small subclusters and others have one large subcluster. The averages are 2.9 subclusters/site and 108 cores/subcluster. Of the reporting sites, 48% had 100 or more cores. 11% had 1000 or more cores.

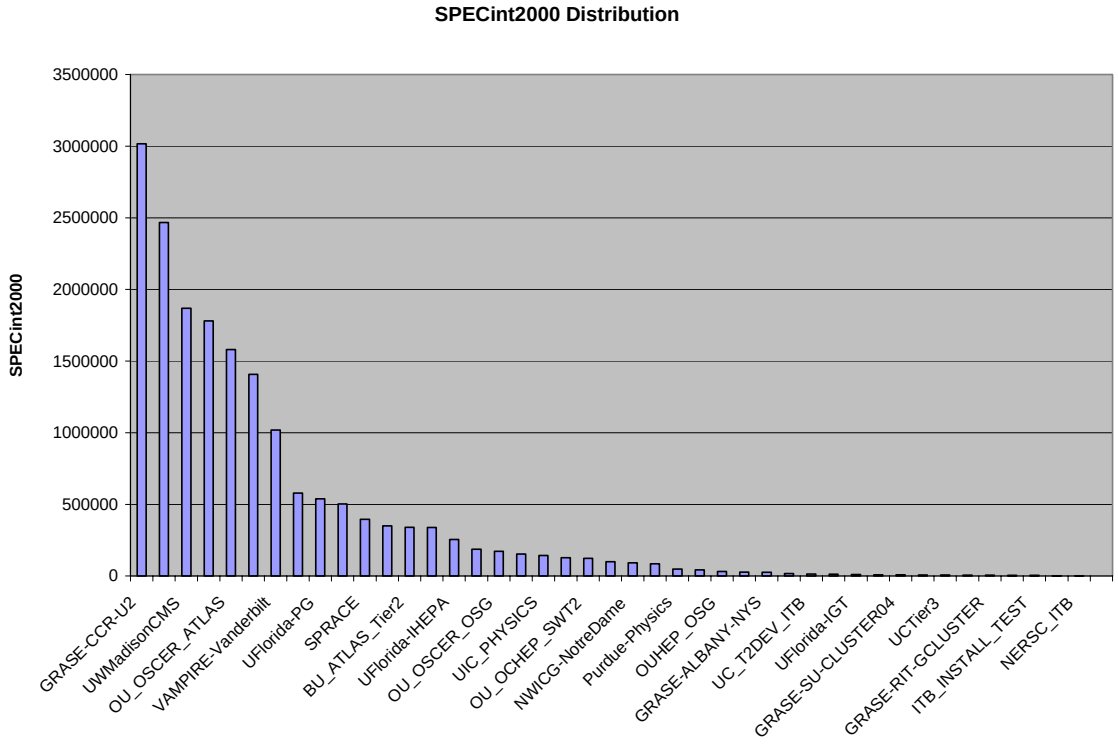


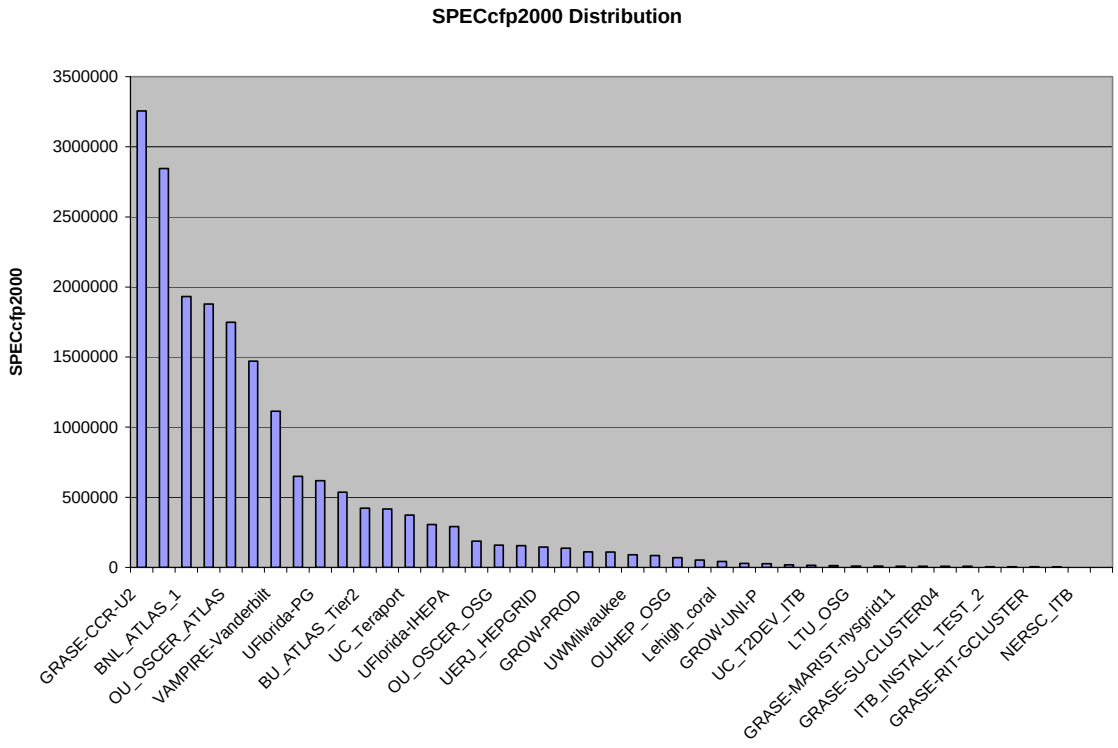
A common measure of performance is Floating Point Operations/sec (FLOPS). A rough approximation can be obtained by taking 2 x Clock x the number of cores. This formula produces a figure of ~67 Peak TeraFLOPS for the sites reporting. A conservative rule of thumb estimate of sustained FLOPS is 50% of Peak FLOPS or ~33 sustained TeraFLOPS for the reporting sites. These are very generalized numbers and many other factors will affect actual performance.

A more meaningful measure for analysis and reconstruction farms is obtained using the SPECint2000 and SPECcfp2000 results. The OSG sites which responded to the survey total 17,909,106 for SPECint2000 and 19,347,066 for SPECcfp2000.

The best performing site was GRASE-CCR-U2 with a SPECint2000 of 3,017,700 and a SPECcfp2000 of 3,257,100. The smallest numbers were reported by IUB-VTB with a SPECint2000 of 466 and SPECcfp2000 of 386. The IUB-VTB site is a single Pentium III, 500 MHz and GRASE-CCR-U2 is 2100 3 GHz Xeons. OSG software accommodates a wide range of processors and site sizes.

Of reporting sites the average for SPECint2000 was 407,025/site and SPECcfp2000 of 439,706/site. The subcluster averages are SPECint2000 of 138,830/subcluster and a SPECcfp2000 of 149,977/subcluster.





Performance data per site with details of subclusters can be found in Appendix D.

19 sites reported storage facilities. Total capacity reported was 1,090 Terabytes. The average was 57 Terabytes/site. The largest site was USCMS-FNAL-WC1-CE at 850 Terabytes and the smallest was GRASE-NU-CARTMAN with 1 Gigabyte. Appendix E contains a table of storage sites.

48% of sites in completed surveys reported no restrictions on OSG jobs. Of these, the largest site in the survey (GRASE-CCR-U2) has no restrictions. The restrictions imposed by the rest of the sites are some form of limitation on the number of jobs or a time limit. Appendix F lists the sites and their reported restrictions.

5 Appendix A – Discussion of Spec measurements

The CINT2000 and CFP2000 suites can be used to measure and calculate the following metrics:. A higher score means "better performance" on the given workload.

CINT2000 (for integer compute intensive performance comparisons):

* SPECint2000: The geometric mean of twelve normalized ratios (one for each integer benchmark) when compiled with aggressive optimization for each benchmark.
* SPECint_base2000: The geometric mean of twelve normalized ratios when compiled with conservative optimization for each benchmark.
* SPECint_rate2000: The geometric mean of twelve normalized throughput ratios when compiled with aggressive optimization for each benchmark.
* SPECint_rate_base2000: The geometric mean of twelve normalized throughput ratios when compiled with conservative optimization for each benchmark.

CFP2000 (for floating point compute intensive performance comparisons:

* SPECfp2000: The geometric mean of fourteen normalized ratios (one for each floating point benchmark) when compiled with aggressive optimization for each benchmark.
* SPECfp_base2000: The geometric mean of fourteen normalized ratios when compiled with conservative optimization for each benchmark.
* SPECfp_rate2000: The geometric mean of fourteen normalized throughput ratios when compiled with aggressive optimization for each benchmark.
* SPECfp_rate_base2000: The geometric mean of fourteen normalized throughput ratios when compiled with conservative optimization for each benchmark.

The ratio for each of the benchmarks is calculated using a SPEC- determined reference time and the run time of the benchmark.

CINT2000 (Integer Component of SPEC CPU2000):		
Benchmark	Language	Category
164.gzip	C	Compression
175.vpr	C	FPGA Circuit Placement and Routing
176.gcc	C	C Programming Language Compiler
181.mcf	C	Combinatorial Optimization
186.crafty	C	Game Playing: Chess
197.parser	C	Word Processing
252.eon	C++	Computer Visualization
253.perlbmk	C	PERL Programming Language
254.gap	C	Group Theory, Interpreter
255.vortex	C	Object-oriented Database
256.bzip2	C	Compression
300.twolf	C	Place and Route Simulator

CFP2000 (Floating Point Component of SPEC CPU2000):		
Benchmark	Language	Category
168.wupwise	Fortran 77	Physics / Quantum Chromodynamics
171.swim	Fortran 77	Shallow Water Modeling
172.mgrid	Fortran 77	Multi-grid Solver: 3D Potential Field
173.applu	Fortran 77	Parabolic / Elliptic Partial Differential Equations
177.mesa	C	3-D Graphics Library
178.galgel	Fortran 90	Computational Fluid Dynamics
179.art	C	Image Recognition / Neural Networks
183.equake	C	Seismic Wave Propagation Simulation
187.facerec	Fortran 90	Image Processing: Face Recognition
188.ammp	C	Computational Chemistry
189.lucas	Fortran 90	Number Theory / Primality Testing
191.fma3d	Fortran 90	Finite-element Crash Simulation
200.sixtrack	Fortran 77	High Energy Nuclear Physics Accelerator Design
301.apsi	Fortran 77	Meteorology: Pollutant Distribution

6 Appendix B - Sites Surveyed

Sites included in the Survey:

BNL_ATLAS_1
BNL_ATLAS_2
BNL_ITB_Test1
BU_ATLAS_Tier2
Clemson
GRASE-ALBANY-NYS
GRASE-CCR-U2
GRASE-MARIST-nysgrid11
GRASE-NU-CARTMAN
GRASE-RIT-GCLUSTER
GRASE-SU-CLUSTER04
GROW-PROD
GROW-UNI-P
ITB_INSTALL_TEST
ITB_INSTALL_TEST_2
ITB_INSTALL_TEST_3
IUB-VTB
Lehigh_coral
LTU_CCT
LTU_OSG
MIT_CMS
Nebraska
NERSC-ITB
NWICG-NotreDame
OSG_INSTALL_TEST_2
OU_OCHEP_SWT2
OU_OSCER_ATLAS
OU_OSCER_CONDOR
OU_OSCER_OSG
OUHEP_ITB
OUHEP_OSG
PROD_SLAC
Purdue-Physics
SPRACE
SPRACE-SE
STAR-BNL
STAR-WSU
UC_T2DEV_ITB
UC_Teraport
UFlorida-IGT
UFlorida-IHEPA
UFlorida-PG
UIC_PHYSICS
UREJ_HEPGRID
USCMS-FNAL-WC1-CE
UWMadisonCMS
UWMadisonCMS-SE
UWMilwaukee
VAMPIRE-Vanderbilt

Sites which were contacted but provided incomplete information:

Alliance
ASGC_OSG
CIT_CMS_T2
CIT_CMS_T2:srm_v1
CIT_ITB_1
CIT_ITB_2
CMS-BURT-ITB
FIU-PG
GRASE-BINGHAMTON
GRASE-CORNELL-CTCNYSGRID
GRASE-GENESEO-OSG
GRASE-HWI-IDUN
GRASE-NYU-BENCH
GRASE-SB-SBNYSGRID
GRASE-UR-NEBULA
GROW-ITB
HAMPTONU
IPAS_OSG
IUB_ITB
IUPUI-ITB
LIGO-CIT-ITB
LIGO-CIT-VTB
MIT_CMS:srm_v1
MWT2_IU
MWT2_UC
NERSC-PDSF
NERSC-STAR
NERSC-STAR-DRM
NERSC-VM-VTB0
OSG_ITB_PSU
OSG_LIGO_PSU
Purdue-ITB
Purdue-Lear
Purdue-RCAC
Rice
SMU_PHY
STAR-Bham
STAR-SAO_PAULO
T2_Nebraska_Storage
TACC
TTU-ANTAEUS
TTU-TESTWULF
UARK_ACE
UC_ATLAS_MWT2
UC_ITB_TEST1
UCSandiegoOSG-Prod-SE
UCSanDiegoPG
UF-HPC
UFlorida-EO
UFlorida-PG:srm_v1
UIOWA-OSG-ITB
UIOWA-OSG-PROD
UMATLAS
UNM_HPC
USATLAS_dCache_at_BNL
USCMS-FNAL-WC1-SE
USCMS-FNAL-WC1-SE-ITB
UTA-DPCC
UVA-HEP
UVA-sunfire
FERMIGRID_DCACHE_SE
FNAL_FERMIGRID
FNAL_FERMIGRID_TEST
FNAL_GPFARM
FNAL_GPFARM_TEST

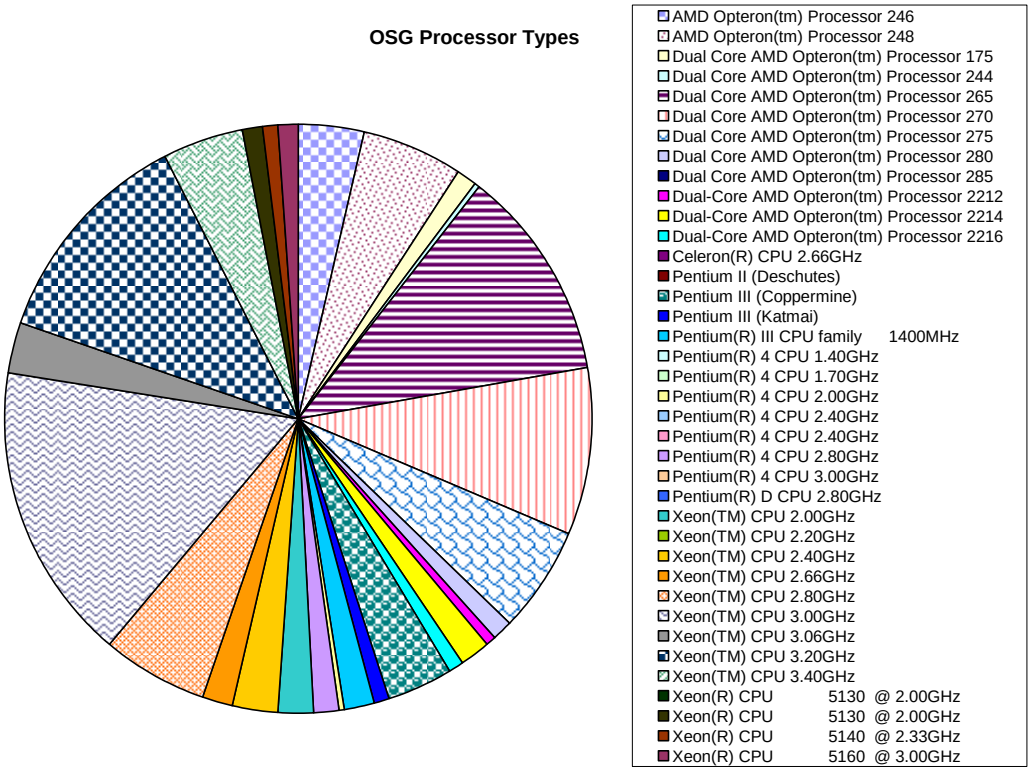
Sites which could not be contacted:

FSU-HEP
DARTMOUTH
isuhep

Inactive sites in GOC database:

bandera
IU_ATLAS_Tier2
IU_iuatlas
SDSS_TAM
UC_T2DEV_SE

7 Appendix C - Unique Processor Types and Quantity



Model Name: Pentium(R) 4 CPU 1.40GHz Vendor Intel
Family-Model- 15-1-2 **Clock Speed** 1.4 **GHz**
Number of Cores 15

Model Name: Pentium(R) 4 CPU 2.00GHz Vendor Intel
Family-Model- 15-1-2 **Clock Speed** 2 **GHz**
Number of Cores 1

Model Name: Pentium(R) 4 CPU 1.70GHz Vendor Intel
Family-Model- 15-1-3 **Clock Speed** 1.7 **GHz**
Number of Cores 1

Model Name: Pentium(R) 4 CPU 2.00GHz Vendor Intel
Family-Model- 15-2-4 **Clock Speed** 2 **GHz**
Number of Cores 43

Model Name: Xeon(TM) CPU 2.20GHz Vendor Intel
Family-Model- 15-2-4 **Clock Speed** 2.2 **GHz**
Number of Cores 2

Model Name: Xeon(TM) CPU 2.66GHz Vendor Intel
Family-Model- 15-2-5 **Clock Speed** 2.66 **GHz**
Number of Cores 76

Model Name: Xeon(TM) CPU 2.80GHz Vendor Intel
Family-Model- 15-2-5 **Clock Speed** 2.8 **GHz**
Number of Cores 4

Model Name: Xeon(TM) CPU 2.00GHz Vendor Intel
Family-Model- 15-2-7 **Clock Speed** 2 **GHz**
Number of Cores 240

Model Name: Pentium(R) 4 CPU 2.40GHz Vendor Intel
Family-Model- 15-2-7 **Clock Speed** 2.4 **GHz**
Number of Cores 347

Model Name: Xeon(TM) CPU 2.66GHz Vendor Intel
Family-Model- 15-2-7 **Clock Speed** 2.66 **GHz**
Number of Cores 168

Model Name: Xeon(TM) CPU 2.80GHz Vendor Intel

Family-Model- 15-2-7 **Clock Speed** 2.8 **GHz**
Number of Cores 7

Model Name: Xeon(TM) CPU 2.40GHz Vendor Intel
Family-Model- 15-2-9 **Clock Speed** 2.4 **GHz**
Number of Cores 12

Model Name: Xeon(TM) CPU 2.66GHz Vendor Intel
Family-Model- 15-2-9 **Clock Speed** 2.66 **GHz**
Number of Cores 4

Model Name: Xeon(TM) CPU 2.80GHz Vendor Intel
Family-Model- 15-2-9 **Clock Speed** 2.8 **GHz**
Number of Cores 939

Model Name: Xeon(TM) CPU 3.06GHz Vendor Intel
Family-Model- 15-2-9 **Clock Speed** 3.06 **GHz**
Number of Cores 412

Model Name: Dual Core AMD Opteron(tm) Processor 265 Vendor AMD
Family-Model- 15-33-1 **Clock Speed** 1.8 **GHz**
Number of Cores 92

Model Name: Dual Core AMD Opteron(tm) Processor 270 Vendor AMD
Family-Model- 15-33-1 **Clock Speed** 2 **GHz**
Number of Cores 116

Model Name: Dual-Core AMD Opteron(tm) Processor 2214 Vendor AMD
Family-Model- 15-33-1 **Clock Speed** 2.2 **GHz**
Number of Cores 232

Model Name: Dual Core AMD Opteron(tm) Processor 265 Vendor AMD
Family-Model- 15-33-2 **Clock Speed** 1.8 **GHz**
Number of Cores 1542

Model Name: Dual Core AMD Opteron(tm) Processor 270 Vendor AMD
Family-Model- 15-33-2 **Clock Speed** 1.9 **GHz**
Number of Cores 196

Model Name: Dual Core AMD Opteron(tm) Processor 270 Vendor AMD
Family-Model- 15-33-2 **Clock Speed** 2 **GHz**
Number of Cores 960

Model Name: Dual Core AMD Opteron(tm) Processor 275 Vendor AMD
Family-Model- 15-33-2 **Clock Speed** 2.2 **GHz**
Number of Cores 540

Model Name: Dual Core AMD Opteron(tm) Processor 280 Vendor AMD
Family-Model- 15-33-2 **Clock Speed** 2.4 **GHz**
Number of Cores 168

Model Name: Dual Core AMD Opteron(tm) Processor 285 Vendor AMD
Family-Model- 15-33-2 **Clock Speed** 2.6 **GHz**
Number of Cores 4

Model Name: Pentium(R) 4 CPU 2.80GHz Vendor Intel
Family-Model- 15-3-4 **Clock Speed** 2.8 **GHz**
Number of Cores 2

Model Name: Dual Core AMD Opteron(tm) Processor 175 Vendor AMD
Family-Model- 15-35-2 **Clock Speed** 2.2 **GHz**
Number of Cores 144

Model Name: Xeon(TM) CPU 2.80GHz Vendor Intel
Family-Model- 15-4-1 **Clock Speed** 2.8 **GHz**
Number of Cores 4

Model Name: Pentium(R) 4 CPU 3.00GHz Vendor Intel
Family-Model- 15-4-1 **Clock Speed** 3 **GHz**
Number of Cores 72

Model Name: Xeon(TM) CPU 3.20GHz Vendor Intel
Family-Model- 15-4-1 **Clock Speed** 3.2 **GHz**
Number of Cores 505

Model Name: Xeon(TM) CPU 3.40GHz Vendor Intel
Family-Model- 15-4-1 **Clock Speed** 3.4 **GHz**
Number of Cores 586

Model Name: AMD Athlon(tm) 64 Processor 3700+ Vendor AMD
Family-Model- 15-4-10 **Clock Speed** 2.4 **GHz**
Number of Cores 16

Model Name: Xeon(TM) CPU 3.00GHz Vendor Intel
Family-Model- 15-4-10 **Clock Speed** 3 **GHz**
Number of Cores 2200

Model Name: Xeon(TM) CPU 3.40GHz Vendor Intel
Family-Model- 15-4-10 **Clock Speed** 3.4 **GHz**
Number of Cores 16

Model Name: Xeon(TM) CPU 3.00GHz Vendor Intel
Family-Model- 15-4-3 **Clock Speed** 3 **GHz**
Number of Cores 8

Model Name: Xeon(TM) CPU 3.20GHz Vendor Intel
Family-Model- 15-4-3 **Clock Speed** 3.2 **GHz**
Number of Cores 1183

Model Name: Pentium(R) D CPU 2.80GHz Vendor Intel
Family-Model- 15-4-4 **Clock Speed** 2.8 **GHz**
Number of Cores 2

Model Name: Pentium(R) 4 CPU 2.40GHz Vendor Intel
Family-Model- 15-4-9 **Clock Speed** 2.4 **GHz**
Number of Cores 5

Model Name: Celeron(R) CPU 2.66GHz Vendor Intel
Family-Model- 15-4-9 **Clock Speed** 2.6 **GHz**
Number of Cores 1

Model Name: AMD Opteron(tm) Processor 244 Vendor AMD
Family-Model- 15-5-1 **Clock Speed** 1.8 **GHz**
Number of Cores 26

Model Name: AMD Opteron(tm) Processor 246 Vendor AMD
Family-Model- 15-5-10 **Clock Speed** 2 **GHz**
Number of Cores 482

Model Name: AMD Opteron(tm) Processor 248 Vendor AMD
Family-Model- 15-5-10 **Clock Speed** 2.2 **GHz**
Number of Cores 548

Model Name: AMD Opteron(tm) Processor 242 Vendor AMD
Family-Model- 15-5-8 **Clock Speed** 1.60 **GHz**
Number of Cores 1

Model Name: Dual Core AMD Opteron(tm) Processor 244 Vendor AMD
Family-Model- 15-5-8 **Clock Speed** 1.8 **GHz**
Number of Cores 44

Model Name: AMD Opteron(tm) Processor 248 Vendor AMD
Family-Model- 15-5-8 **Clock Speed** 2.2 **GHz**
Number of Cores 240

Model Name: Dual-Core AMD Opteron(tm) Processor 2212 Vendor AMD
Family-Model- 15-65-2 **Clock Speed** 2 **GHz**
Number of Cores 60

Model Name: Dual-Core AMD Opteron(tm) Processor 2214 Vendor AMD
Family-Model- 15-65-2 **Clock Speed** 2.2 **GHz**
Number of Cores 16

Model Name: Dual-Core AMD Opteron(tm) Processor 2216 Vendor AMD
Family-Model- 15-65-2 **Clock Speed** 2.4 **GHz**
Number of Cores 102

Model Name: Pentium(R) III CPU family 1400MHz Vendor Intel
Family-Model- 6-11-1 **Clock Speed** 1.4 **GHz**
Number of Cores 238

Model Name: Xeon(R) CPU 5130 @ 2.00GHz Vendor Intel
Family-Model- 6-15-6 **Clock Speed** 2 **GHz**
Number of Cores 128

Model Name: Xeon(R) CPU 5140 @ 2.33GHz Vendor Intel
Family-Model- 6-15-6 **Clock Speed** 2.33 **GHz**
Number of Cores 128

Model Name: Xeon(R) CPU 5160 @ 3.00GHz Vendor Intel
Family-Model- 6-15-6 **Clock Speed** 3 **GHz**
Number of Cores 6

Model Name: Pentium II (Deschutes) Vendor Intel
Family-Model- 6-5-0 **Clock Speed** .333 **GHz**
Number of Cores 2

Model Name: AMD Athlon(tm) MP 1600+ Vendor AMD
Family-Model- 6-6-2 **Clock Speed** 1.4 **GHz**
Number of Cores 8

Model Name: AMD Athlon(tm) MP 1800+ Vendor AMD
Family-Model- 6-6-2 **Clock Speed** 1.5 **GHz**
Number of Cores 290

Model Name: Pentium III (Katmai) Vendor Intel
Family-Model- 6-7-2 **Clock Speed** .45 **GHz**
Number of Cores 80

Model Name: Pentium III (Katmai) Vendor Intel
Family-Model- 6-7-3 **Clock Speed** .4 **GHz**
Number of Cores 1

Model Name: Pentium III (Katmai) Vendor intel
Family-Model- 6-7-3 **Clock Speed** .5 **GHz**
Number of Cores 2

Model Name: AMD Athlon(tm) MP 2000+ Vendor AMD
Family-Model- 6-8-0 **Clock Speed** 1.6 **GHz**
Number of Cores 128

Model Name: Pentium III (Coppermine) Vendor Intel
Family-Model- 6-8-10 **Clock Speed** 1 **GHz**
Number of Cores 112

Model Name: Model 8, P3 Coppermine Vendor Intel
Family-Model- 6-8-2 **Clock Speed** 1 **GHz**
Number of Cores 291

Model Name: Pentium III (Coppermine) Vendor Intel
Family-Model- 6-8-3 **Clock Speed** .85 **GHz**
Number of Cores 82

Model Name: Pentium III (Coppermine) Vendor Intel
Family-Model- 6-8-3 **Clock Speed** .866 **GHz**
Number of Cores 1

Model Name: Pentium III (Coppermine) Vendor Intel
Family-Model- 6-8-6 **Clock Speed** 1 **GHz**
Number of Cores 40

8 Appendix D - OSG Performance Results

Model	Version	GHz	Cores	xSPECint2000	SPECcfp2000
SITE: BNL_ATLAS_1					
Dual Core AMD Opteron(tm) Processor 265	15-33-2	1.8	640	822,400	987,520
Xeon(TM) CPU 3.06GHz	15-2-9	3.06	92	107,548	101,384
Xeon(TM) CPU 3.40GHz	15-4-1	3.4	586	850,872	842,668
Summary: (3 Subclusters)		**Totals**	1,318	1,780,820	1,931,572
SITE: BU_ATLAS_Tier2					
Dual-Core AMD Opteron(tm) Processor 2214	15-33-1	2.2	224	340,032	421,568
Summary: (1 SubCluster)		**Totals**	224	340,032	421,568
SITE: Clemson					
Dual Core AMD Opteron(tm) Processor 275	15-33-2	2.2	4	6,084	6,920
Summary: (1 SubCluster)		**Totals**	4	6,084	6,920
SITE: GRASE-ALBANY-NYS					
Xeon(TM) CPU 3.40GHz	15-4-10	3.4	16	25,904	27,904
Summary: (1 SubCluster)		**Totals**	16	25,904	27,904
SITE: GRASE-CCR-U2					
Xeon(TM) CPU 3.00GHz	15-4-10	3	2,100	3,017,700	3,257,100
Summary: (1 SubCluster)		**Totals**	2,100	3,017,700	3,257,100
SITE: GRASE-MARIST-nysgrid11					
Pentium(R) 4 CPU 2.00GHz	15-2-4	2	10	7,740	7,750
Summary: (1 SubCluster)		**Totals**	10	7,740	7,750
SITE: GRASE-NU-CARTMAN					
Xeon(TM) CPU 3.20GHz	15-4-3	3.2	64	98,752	109,248
Summary: (1 SubCluster)		**Totals**	64	98,752	109,248
SITE: GRASE-RIT-GCLUSTER					
Pentium(R) III CPU family 1400MHz	6-11-1	1.4	8	5,312	3,648
Summary: (1 SubCluster)		**Totals**	8	5,312	3,648
SITE: GRASE-SU-CLUSTER04					
Xeon(TM) CPU 2.80GHz	15-2-7	2.8	7	7,861	7,105
Summary: (1 SubCluster)		**Totals**	7	7,861	7,105
SITE: GROW-PROD					
Dual-Core AMD Opteron(tm) Processor 2212	15-65-2	2	60	85,680	109,620
Summary: (1 SubCluster)		**Totals**	60	85,680	109,620
SITE: GROW-UNI-P					
AMD Athlon(tm) 64 Processor 3700+	15-4-10	2.4	16	27,344	25,856
Summary: (1 SubCluster)		**Totals**	16	27,344	25,856

Model	Version	GHz	Cores	xSPECint2000	SPECcfp2000
SITE: ITB_INSTALL_TEST					
Xeon(TM) CPU 2.80GHz	15-2-5	2.8	4	4,492	4,060
Summary: (1 SubCluster)		**Totals**	4	4,492	4,060
SITE: ITB_INSTALL_TEST_2					
Xeon(TM) CPU 3.06GHz	15-2-9	3.06	4	4,676	4,408
Summary: (1 SubCluster)		**Totals**	4	4,676	4,408
SITE: IUB-VTB					
Pentium III (Katmai)	6-7-3	.5	2	466	386
Summary: (1 SubCluster)		**Totals**	2	466	386
SITE: Lehigh_coral					
Pentium II (Deschutes)	6-5-0	.333	2	0	0
Pentium III (Katmai)	6-7-3	.4	1	213	178
Pentium III (Coppermine)	6-8-6	1	8	3,496	2,456
Pentium(R) 4 CPU 2.00GHz	15-2-4	2	7	5,418	5,425
Xeon(TM) CPU 2.40GHz	15-2-9	2.4	12	11,052	10,500
Pentium(R) 4 CPU 2.40GHz	15-2-7	2.4	8	7,496	7,448
Celeron(R) CPU 2.66GHz	15-4-9	2.6	1	0	0
Pentium(R) D CPU 2.80GHz	15-4-4	2.8	2	2,844	3,364
Xeon(TM) CPU 3.00GHz	15-4-3	3	8	11,496	12,408
Summary: (9 Subclusters)		**Totals**	49	42,015	41,779
SITE: LTU_CCT					
Xeon(R) CPU 5140 @ 2.33GHz	6-15-6	2.33	4	9,756	9,716
Xeon(TM) CPU 3.06GHz	15-2-9	3.06	2	2,338	2,204
Summary: (2 Subclusters)		**Totals**	6	12,094	11,920
SITE: LTU_OSG					
Pentium(R) 4 CPU 2.00GHz	15-1-2	2	1	663	715
AMD Opteron(tm) Processor 246	15-5-10	2	2	2,614	2,856
Xeon(TM) CPU 2.20GHz	15-2-4	2.2	2	1,614	1,598
Pentium(R) 4 CPU 2.40GHz	15-2-7	2.4	1	937	931
Xeon(TM) CPU 2.80GHz	15-2-9	2.8	2	2,246	2,030
Summary: (5 Subclusters)		**Totals**	8	8,074	8,130
SITE: MIT_CMS					
Pentium III (Katmai)	6-7-2	.45	80	17,040	14,240
Pentium III (Coppermine)	6-8-3	.85	82	30,094	21,976
Pentium III (Coppermine)	6-8-10	1	100	43,700	30,700
AMD Athlon(tm) MP 1600+	6-6-2	1.4	8	4,664	4,296
AMD Athlon(tm) MP 1800+	6-6-2	1.5	4	2,564	2,332
AMD Athlon(tm) MP 2000+	6-8-0	1.6	128	88,704	79,232
Dual Core AMD Opteron(tm) Processor 265	15-33-1	1.8	92	118,220	141,956
AMD Opteron(tm) Processor 244	15-5-1	1.8	26	29,276	33,982
Dual Core AMD Opteron(tm) Processor 270	15-33-1	2	116	168,432	207,060
Summary: (9 Subclusters)		**Totals**	636	502,694	535,774

Model	Version	GHz	Cores	xSPECint2000	SPECcfp2000
SITE: Nebraska					
Dual Core AMD Opteron(tm) Processor 275	15-33-2	2.2	120	182,520	207,600
Dual-Core AMD Opteron(tm) Processor 2216	15-65-2	2.4	102	167,790	208,080
Summary: (2 Subclusters)		**Totals**	222	350,310	415,680
SITE: NERSC_ITB					
Pentium III (Coppermine)	6-8-10	1	2	874	614
Summary: (1 SubCluster)		**Totals**	2	874	614
SITE: NWICG-NotreDame					
Dual Core AMD Opteron(tm) Processor 175	15-35-2	2.2	144	92,448	84,528
Summary: (1 SubCluster)		**Totals**	144	92,448	84,528
SITE: OSG_INSTALL_TEST					
Xeon(TM) CPU 3.20GHz	15-4-1	3.2	1	1,395	1,420
Summary: (1 SubCluster)		**Totals**	1	1,395	1,420
SITE: OU_OCHEP_SWT2					
Xeon(TM) CPU 3.20GHz	15-4-3	3.2	80	123,440	136,560
Summary: (1 SubCluster)		**Totals**	80	123,440	136,560
SITE: OU_OSCER_ATLAS					
Xeon(TM) CPU 3.20GHz	15-4-3	3.2	1,024	1,580,032	1,747,968
Summary: (1 SubCluster)		**Totals**	1,024	1,580,032	1,747,968
SITE: OU_OSCER_CONDOR					
Pentium(R) 4 CPU 2.80GHz	15-2-9	2.8	175	187,250	187,425
Summary: (1 SubCluster)		**Totals**	175	187,250	187,425
SITE: OU_OSCER_OSG					
AMD Athlon(tm) MP 1800+	6-6-2	1.5	270	173,070	157,410
Summary: (1 SubCluster)		**Totals**	270	173,070	157,410
SITE: OUHEP_OSG					
Pentium III (Coppermine)	6-8-3	.866	1	403	297
Pentium III (Coppermine)	6-8-6	1	6	2,622	1,842
Pentium(R) 4 CPU 1.40GHz	15-1-2	1.4	15	7,680	8,250
AMD Athlon(tm) MP 1800+	6-6-2	1.5	2	1,282	1,166
Pentium(R) 4 CPU 1.70GHz	15-1-3	1.7	1	594	649
Pentium(R) 4 CPU 2.40GHz	15-4-9	2.4	5	4,655	41,875
Pentium(R) 4 CPU 2.80GHz	15-3-4	2.8	2	2,534	2,754
Pentium(R) 4 CPU 3.00GHz	15-4-1	3	6	8,244	9,174
Pentium(R) 4 CPU 3.00GHz	15-4-1	3	2	2,748	3,058
Summary: (9 Subclusters)		**Totals**	40	30,762	69,065

Model	Version	GHz	Cores	xSPECint2000	SPECcfp2000
SITE: PROD_SLAC					
Pentium(R) III CPU family 1400MHz	6-11-1	1.4	82	54,448	37,392
Dual Core AMD Opteron(tm) Processor 244	15-5-8	1.8	44	49,544	57,508
Dual Core AMD Opteron(tm) Processor 270	15-33-2	1.9	196	284,592	349,860
Dual Core AMD Opteron(tm) Processor 275	15-33-2	2.2	80	121,680	138,400
Xeon(TM) CPU 2.66GHz	15-2-5	2.66	76	69,236	65,360
Summary: (5 Subclusters)		**Totals**	478	579,500	648,520
SITE: Purdue-Physics					
AMD Athlon(tm) MP 1800+	6-6-2	1.5	2	1,282	1,166
AMD Athlon(tm) MP 1800+	6-6-2	1.5	2	1,282	1,166
AMD Athlon(tm) MP 1800+	6-6-2	1.5	2	1,282	1,166
AMD Athlon(tm) MP 1800+	6-6-2	1.5	2	1,282	1,166
AMD Athlon(tm) MP 1800+	6-6-2	1.5	2	1,282	1,166
AMD Athlon(tm) MP 1800+	6-6-2	1.5	2	1,282	1,166
AMD Athlon(tm) MP 1800+	6-6-2	1.5	2	1,282	1,166
AMD Opteron(tm) Processor 242	15-5-8	1.60	1	1,053	1,120
Xeon(TM) CPU 2.00GHz	15-2-4	2	4	3,092	3,028
Xeon(TM) CPU 2.00GHz	15-2-4	2	4	3,092	3,028
Xeon(TM) CPU 2.00GHz	15-2-4	2	4	3,092	3,028
Dual-Core AMD Opteron(tm) Processor 2214	15-65-2	2.2	4	6,072	7,528
Dual-Core AMD Opteron(tm) Processor 2214	15-65-2	2.2	4	6,072	7,528
Dual-Core AMD Opteron(tm) Processor 2214	15-65-2	2.2	4	6,072	7,528
Dual-Core AMD Opteron(tm) Processor 2214	15-65-2	2.2	4	6,072	7,528
Xeon(TM) CPU 2.80GHz	15-4-1	2.8	4	4,492	4,060
Summary: (16 Subclusters)		**Totals**	47	48,083	52,538
SITE: SPRACE					
Xeon(R) CPU 5130 @ 2.00GHz	6-15-6	2	128	269,440	177,408
Xeon(TM) CPU 2.40GHz	15-2-7	2.4	44	40,524	38,500
Xeon(TM) CPU 3.00GHz	15-4-1	3	64	85,632	89,792
Summary: (3 Subclusters)		**Totals**	236	395,596	305,700
SITE: STAR-BNL					
Pentium III (Coppermine)	6-8-10	1	10	4,370	3,070
Pentium(R) III CPU family 1400MHz	6-11-1	1.4	148	98,272	67,488
Dual Core AMD Opteron(tm) Processor 265	15-33-2	1.8	392	503,720	604,856
Xeon(TM) CPU 2.40GHz	15-2-7	2.4	120	110,520	105,000
Xeon(TM) CPU 3.06GHz	15-2-9	3.06	130	151,970	143,260
Xeon(TM) CPU 3.20GHz	15-4-1	3.2	386	538,470	548,120
Summary: (6 Subclusters)		**Totals**	1,186	1,407,322	1,471,794

Model	Version	GHz	Cores	xSPECint2000	SPECcfp2000
SITE: STAR-WSU					
Pentium III (Coppermine)	6-8-6	1	2	874	614
Xeon(TM) CPU 2.00GHz	15-2-4	2	2	1,546	1,514
Xeon(TM) CPU 2.00GHz	15-2-4	2	12	9,276	9,084
Xeon(TM) CPU 2.66GHz	15-2-9	2.66	4	3,644	3,440
Xeon(TM) CPU 2.80GHz	15-2-9	2.8	2	2,246	2,030
Summary: (5 Subclusters)		**Totals**	22	17,586	16,682
SITE: UC_T2DEV_ITB					
Xeon(R) CPU 5160 @ 3.00GHz	6-15-6	3	6	14,520	14,112
Summary: (1 SubCluster)		**Totals**	6	14,520	14,112
SITE: UC_Teraport					
AMD Opteron(tm) Processor 248	15-5-8	2.2	240	338,880	371,760
Summary: (1 SubCluster)		**Totals**	240	338,880	371,760
SITE: UCTier3					
Dual Core AMD Opteron(tm) Processor 285	15-33-2	2.6	4	7,148	8,096
Summary: (1 SubCluster)		**Totals**	4	7,148	8,096
SITE: UERJ_HEPGRID					
Xeon(TM) CPU 2.66GHz	15-2-7	2.66	168	153,048	144,480
Summary: (1 SubCluster)		**Totals**	168	153,048	144,480
SITE: UFlorida-IGT					
Pentium III (Coppermine)	6-8-6	1	24	10,488	7,368
Summary: (1 SubCluster)		**Totals**	24	10,488	7,368
SITE: UFlorida-IHEPA					
Dual Core AMD Opteron(tm) Processor 275	15-33-2	2.2	168	255,528	290,640
Summary: (1 SubCluster)		**Totals**	168	255,528	290,640
SITE: UFlorida-PG					
Dual Core AMD Opteron(tm) Processor 275	15-33-2	2.2	168	255,528	290,640
Dual Core AMD Opteron(tm) Processor 280	15-33-2	2.4	168	282,744	327,600
Summary: (2 Subclusters)		**Totals**	336	538,272	618,240
SITE: UIC_PHYSICS					
Xeon(TM) CPU 3.00GHz	15-4-10	3	100	143,700	155,100
Summary: (1 SubCluster)		**Totals**	100	143,700	155,100
SITE: USCMS-FNAL-WC1-CE					
Dual Core AMD Opteron(tm) Processor 270	15-33-2	2	960	1,393,920	1,713,600
AMD Opteron(tm) Processor 248	15-5-10	2.2	548	773,776	848,852
Xeon(TM) CPU 2.40GHz	15-2-7	2.4	92	84,732	80,500
Xeon(TM) CPU 3.06GHz	15-2-9	3.06	184	215,096	202,768
Summary: (4 Subclusters)		**Totals**	1,784	2,467,524	2,845,720

Model	Version	GHz	Cores	xSPECint2000	SPECcfp2000
SITE: UWMadisonCMS					
Dual Core AMD Opteron(tm) Processor 265	15-33-2	1.8	90	115,650	138,870
Dual Core AMD Opteron(tm) Processor 265	15-33-2	1.8	88	113,080	135,784
Dual Core AMD Opteron(tm) Processor 265	15-33-2	1.8	72	92,520	111,096
Dual Core AMD Opteron(tm) Processor 265	15-33-2	1.8	100	128,500	154,300
Xeon(R) CPU 5140 @ 2.33GHz	6-15-6	2.33	124	302,436	301,196
Xeon(TM) CPU 2.40GHz	15-2-7	2.4	82	75,522	71,750
Xeon(TM) CPU 2.80GHz	15-2-9	2.8	116	130,268	117,740
Xeon(TM) CPU 2.80GHz	15-2-9	2.8	644	723,212	653,660
Xeon(TM) CPU 3.20GHz	15-4-3	3.2	15	23,145	25,605
Xeon(TM) CPU 3.20GHz	15-4-1	3.2	118	164,610	167,560
Summary: (10 Subclusters)		**Totals**	1,449	1,868,943	1,877,561
SITE: UWMilwaukee					
Model 8, P3 Coppermine	6-8-2	1	291	127,167	89,337
Summary: (1 SubCluster)		**Totals**	291	127,167	89,337
SITE: VAMPIRE-Vanderbilt					
Dual Core AMD Opteron(tm) Processor 265	15-33-2	1.8	160	205,600	246,880
Xeon(TM) CPU 2.00GHz	15-2-7	2	240	185,520	181,680
AMD Opteron(tm) Processor 246	15-5-10	2	480	627,360	685,440
Summary: (3 Subclusters)		**Totals**	880	1,018,480	1,114,000
		Grand Total	13,913	17,909,106	19,347,066

9 Appendix E - Storage Elements

SITE		SE Capacity
BNL_ATLAS_1		5,500 Gigabytes
BU_ATLAS_Tier2		8,000 Gigabytes
GRASE-ALBANY-NYS		1,800 Gigabytes
GRASE-CCR-U2		1,800 Gigabytes
GRASE-NU-CARTMAN		1 Gigabyte
GROW-PROD		2,500 Gigabytes
IUB-VTB		34 Gigabytes
LTU_CCT		104 Gigabytes
LTU_OSG		277 Gigabytes
MIT_CMS		40,000 Gigabytes
Nebraska		80,000 Gigabytes
NERSC_ITB		10 Gigabytes
SPRACE-SE		6,000 Gigabytes
UC_T2DEV_ITB		140 Gigabytes
UERJ_HEPGRID		32,000 Gigabytes
UFlorida-PG		62,160 Gigabytes
USCMS-FNAL-WC1-CE		850,000 Gigabytes
UWMadisonCMS-SE		200 Gigabytes
UWMilwaukee		350 Gigabytes
	Grand Total	1,090,876 Gigabytes

10 Appendix F - Compute Element Restrictions by Site

SITE	OSG restrictions
BNL_ATLAS_1	BNL assigns jobs, according to the users' credential, to different queues. OSG priority is low, most of the time. OSG jobs will be evicted/suspended by other higher local user/usatlas jobs.
BU_ATLAS_Tier2	There is a maximum number of slots per user name, adjusted as needed. The osg user has a current maximum of 30 slots.
CIT_CMS_T2	24 hour subjective wall clock time limit
Clemson	none
GRASE-ALBANY-NYS	none
GRASE-CCR-U2	none
GRASE-GENESEO-OSG	none
GRASE-MARIST-nysgrid11	none
GRASE-NU-CARTMAN	none
GRASE-NYU-BENCH	none
GRASE-RIT-GCLUSTER	none
GRASE-SU-CLUSTER04	none
GROW-PROD	OSG jobs max_queuable = 300 max_user_queuable = 180 max_cput = 128 H max_walltime = 256H
GROW-UNI-P	Scripts submitted to test the resource status may be terminated without notice, including any script that involves "sleep", etc. See site usage policy.
IPAS_OSG	
ITB_INSTALL_TEST	none
ITB_INSTALL_TEST_2	none
ITB_INSTALL_TEST3	none
IUB-VTB	none
Lehigh_coral	none
LTU_CCT	opportunistic
LTU_OSG	opportunistic
MIT_CMS	We have job prioritization policy.
Nebraska	CMS gets priority on the machine with CMSprod getting 80% of the priority queue and analysis getting 20% utilizing PBS fair share. We due enforce a 24 hours queue time limit for all jobs.
NERSC_ITB	OSG integration testing only
NERSC-VM-VTB0	OSG validation testing only
NWICG-NotreDame	user priority: Local user > NWICG user > OSG user
OSG_INSTALL_TEST	none
OU_OCHEP_SWT2	Fair share with ATLAS and Dzero jobs high priority
OU_OSCER_ATLAS	Fair share with ATLAS and Dzero jobs high priority
OU_OSCER_CONDOR	Fair share with ATLAS and Dzero jobs high priority
OU_OSCER_OSG	Fair share with ATLAS and Dzero jobs high priority
OUHEP_ITB	Fair share with ATLAS and Dzero jobs high priority
OUHEP_OSG	Fair share with ATLAS and Dzero jobs high priority
PROD_SLAC	none
Purdue-Physics	10% of total cluster cpu resources
SMU_PHY	none at this time

SITE	CE OSG restrictions
SPRACE	none
STAR-BNL	OSG jobs have a "middle" priority here, higher than some jobs, but lower than others, and are started accordingly in order when there are no higher priority jobs waiting. OSG/grid jobs can have as many slots as are available at any time.
STAR-WSU	Only mis and star Vos
UC_T2DEV_ITB	none, but not for production use
UC_Teraport	128 jobs for OSG Vos
UCTier3	for VTB/ITB testing only and not for production use
UERJ_HEPGRID	none
UFlorida-IGT	none
UFlorida-IHEPA	none
UFlorida-PG	cms mainly + osg opportunistically, none, none
UIC_PHYSICS	INTERNAL USE ONLY UNTIL FURTHER NOTICE
USCMS-FNAL-WC1-CE	cms production has condor priority 5; normal CMS users have priority 100; all other VOs have priority 1000.
UWMadisonCMS	There is no general limit on number of OSG jobs. However, policies exist to dedicate portions of the available resources to specific OSG VOs.
UWMilwaukee	Local users have priority
VAMPIRE-Vanderbilt	Default is 15 minutes wall clock time, can specify up to 30 days via RSL. OSG jobs limited by scheduler to a small fair share of the total CPUs, by a complex algorithm.