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neuGRID

A GRID-BASED e-INFRASTRUCTURE FOR DATA ARCHIVING/ COMMUNICATION AND COMPUTATIONALLY INTENSIVE APPLICATIONS IN THE MEDICAL SCIENCES

Combination of Collaborative Project and Coordination and Support Action

Objective INFRA-2007-1.2.2 - Deployment of e-Infrastructures for scientific communities

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Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

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Glossary

Term	Definition
AMGA	Metadata Catalog Service of gLite UI
GCC	Grid Coordination Center. Core (common to all sites) services of the grid infrastructure
DCC	Data Coordination Center. Core (common to all sites) services of the database infrastructure
DACS	Data Archiving and Computational Site. neuGRID site offering and managering a set of physical resources
DCS	Data Collection Site. End-user sites acquiring data and connecting to a given DACS
Gridification	The engineering process of porting an existing application to the grid, so that it can be executed via the grid enactment environment
Pipeline	A pipeline is a set of data processing elements connected in series, so that the output of one element is the input of the next one (extracted from Wikipedia.org)
CE	Computing ElementDisk Pool Manager
DPM	Disk Pool Manager
LFC:	LCG File Catalog
SE	Storage Element
CA	Certificate Authority
sBDII	Site level Berkeley Data Base Information Index
tBDII	Top Level Berkeley Data Base Information Index
VOMS	Virtual Organization Membership Service
UI	gLite User Interface
WN	Worker Node
WMS	Workload Management System

This document describes the of the deployment of the neuGRID infrastructure. The document covers all aspects, including the definition, profiling and hardware specification, the selection of the technologies that will be used as infrastructure, the deployment logistics preparation and the tests that will be performed over the hardware (see work package 11 – WP11 – for more information) to ensure that the site deployed will fit into the neuGRID infrastructure.

This second version of the document covers the tasks T8.4 "Phase 2 – 2nd DACS Establishment" and T8.5 "Phase 3– 3rd DACS Establishment"; this document also includes the information delivered in the D8.1 "Ground Truth & Phase1, Deployment Test & Validation Report". In other words, the document summarizes the work developed by WP8 until the month 24 of the project.

This document is meant to be updated throughout the duration of the WP8 activity. The content of the deliverable has two well distinguished parts.

The aim of the first part of the deliverable is to define all the requirements needed in order to successfully deploy neuGRID sites in the institutions (hospitals and research centers). This includes a specific hardware portfolio of specifications and the preparation of the logistics. It also includes the justification of the selected technologies by means of an analysis of the gLite technology that will be used as GRID middleware and its implications in a large project such as neuGRID.

The second part of the deliverable is the summary of the deployments performed during the reporting period. This summary includes a detailed description of the sites, including physical and logical descriptions of the services deployed. It also includes the results of the hardware tests (provided by WP11) that have been run using the deployed hardware.

1.1. Purpose of the Document

This document aims to illustrate the main objectives of the first 24 months of the project; these objectives are detailed in the following list (extracted from the DoW):

- *To define the hardware specifications for the different sites and levels of the infrastructure.*
- *To design a series of basic hardware and software tests for validating hardware and proper connectivity performance.*
- *To deploy the infrastructure at the different institutions of the project. This includes the grid middleware and project prototype, as well as the establishment of appropriate and efficient logistic support.*

1.2. Document Positioning and Intended Audience

The deliverable D8.2 – "**Phase2 & 3, Updated Deployment Test & Validation Report**" aims to serve as a reference guide for the deployment of the sites that will be part of the neuGRID infrastructure.

By the definition of the recommended hardware portfolio, the specification of all the technologies involved in the relying infrastructure and the technological constraints, WP8 wants to help new sites to select appropriate hardware in order to successfully deploy a neuGRID Site.

2. Hardware Portfolio

This section will explain the spreadsheet that WP8 has developed (See Annex 1 – Hardware Portfolio) in order to help partners (hospitals and institutions) select the most suitable configuration for each one.

The spreadsheet presents the developed configurations in 3 different versions: Basic, Advanced and Premium. These configurations range from basic hardware specifications to the most advanced and powerful configurations.

In the spreadsheet, the following parameters for each configuration are summarized:

- Price
- Number of CPU
- Raw Disk Space
- Memory
- Power Consumption
- Heat Dissipation

WP8 has developed 2 sets of configurations. The first set is directed towards hospitals, with the main configurations having been calculated to fit within the 30.000 € available budget for this kind of institution. The second set has been designed to fit within the 10.000 € budget available to the technical partners.

First, the hospital configurations will be described, with a presentation of 5 different hardware configurations that attempt to cover all of the needs and restrictions of the IT centers at the hospitals that will be hosting the neuGRID infrastructure. In these cases the best option is to choose the Advanced configuration. Following is a description of the hardware configurations detailed in the portfolio:

- Blade Servers + Dell PowerEdge 2950: The main advantages of this configuration are moderate physical space, power consumption and heat dissipation. By using 2 DPM, running in 2 Dell PowerEdge 2950 will allow the infrastructure to manage some redundancy.
- Blade Servers + Dell PowerEdge 2900: As in the previous configuration, the use of blade servers provides moderate physical space, power consumption and heat dissipation. In this case, the use of only 1 Dell PowerEdge 2900 removes the redundancy but increases raw Disk Space.
- Blade Servers + M300 iSCSI: This is the most powerful configuration, maintaining moderate physical space, power consumption and heat dissipation. The use of an iSCSI device allows the upgrade of the DPM, should this be necessary in the future. On the other hand, this solution is the least cost effective.
- Dell PowerEdge 2950 + Dell PowerEdge 1950: This is a good solution if only taking the Power (CPU and storage) to Cost ratio into account. The main problems of this configuration are the space used, the power consumption and the heat dissipation. By using 2 DPM running in 2 Dell PowerEdge 2950, the infrastructure is able to manage some redundancy.
- Dell PowerEdge 2900 + Dell PowerEdge 1950: This is a good solution when looking at the Power (CPU and storage) to Cost ratio. The main problems of this configuration are the space used, the power consumption and the heat dissipation. In this case, the use of only 1 Dell PowerEdge 2900 removes the redundancy but increases raw Disk Space.

Secondly, the configuration for technical partners will be shown:

- Dell PowerEdge 2950 + Dell PowerEdge 1950: This is the best solution for technological partners, offering flexibility and a good ratio between price and raw disk space. In this case, the best option is to choose the premium option. This option offers the best ratio between cost and power and also fitting within the 10.000 € budget.

In the "Annex 2 – neuGRID Hardware Template Tests", we can find a set of tests that all of the servers must pass in order to ensure correct operation.

3. Technologies

One of the main challenges that WP8 has faced, and continues to face, is the shifting of needs from a development environment to a real production environment. Working within the constraints that this places on the architecture of system deployment, the solution must provide a high level of security, stability, and cost effectiveness. These requirements have therefore motivated the WP8 partners to look into solutions that enable, in a realistic way, the deployment of a neuGRID site in complex environments.

An additional important technological challenge that WP8 has been facing is the use of the gLite grid technology. gLite is a grid middleware software stack from the European project "Enabling the Grid for e-sciEnces (EGEE)."

As stated on the EGEE official website "gLite provides a bleeding-edge, best-of-breed framework for building grid applications tapping into the power of distributed computing and storage resources across the Internet." gLite was conceived as a large-scale project for providing grid capabilities to sites using a large number of computers. The architecture of gLite is complex and includes services including security, user interfaces, computing and storage elements, information systems and data and workload management.

For the sake of exemplifying gLite's usage and scalability, it is currently used in production in the WLCG/EGEE infrastructure[1]. This infrastructure operates a grid distributed over more than 200 sites around the world, with more than 30,000 CPUs and 20 PB of data storage. These numbers can give the reader a better idea of the capabilities and sheer complexity of gLite.

While a single gLite service can be deployed in a single operating system, a site containing multiple grid services cannot be deployed in a single operating system due to its complex architecture. On the other hand, the use of one physical machine for each one of the grid services would clearly not be acceptable in the context of neuGRID.

Thus, this raised a deployment issue which had to be solved in order to provide a reasonable and successful platform deployment that could cope with the neuGRID environment. To address this situation, WP8 has been using virtualization technologies to run several instances of an operating system in one physical computer. This allowed a drastic reduction in the hardware requirements while not impacting the resulting quality of the services.

This is not the only reason to use virtualization technologies in the environments; the use of virtualization has more advantages than the example of running more than one guest OS in one host OS. These advantages are:

Independence of the hardware: The images of the guest OS can run in any compatible server. This feature of virtualization ensures the correct operation of the services deployed, without affecting the relying hardware.

[1] http://glite.web.cern.ch/glite/

Cost-effective hardware solution: It is a good solution for obtaining increased server productivity, running services that are not CPU-intensive consumers. In the case of neuGRID, this fits perfectly within the philosophy of the gLite Services.

Fast deployment of preconfigured images: Since the hardware layer at guest OS level is the same for all the servers, the building of preconfigured OS images is simplified.

In the remainder of this chapter, the virtualization paradigm and associated technologies are presented, and an evaluation is carried out to highlight the design decision(s) made in WP8.

3.1. Virtualization Technologies Introduction

Virtualization is performed on a given hardware platform using a so-called "host" software (a control program), which creates a simulated computer environment (a virtual machine) for its "guest" software. The "guest" software, which is often itself a complete operating system, runs just as though it were installed on a stand-alone hardware platform. Typically, many such virtual machines are simulated on a given physical machine. For the "guest" system to operate properly, the simulation must be robust enough and must support all the guest system's external interfaces, which (depending on the type of virtualization) may include hardware drivers.

The type of virtualization that WP8 has been and will be used is the so-called paravirtualization[2]. This is a virtualization technique that presents a software interface to virtual machines that is similar (but not identical) to that of the underlying hardware [BAR03]. This requires operating systems to be explicitly ported to run on top of the Virtual Machine Monitor (VMM), which the owner of exclusive rights in a proprietary operating system may decline to allow for strategic reasons, but which may enable the VMM itself to be simpler or virtual machines that run on it to obtain performances closer to non-virtualized hardware.

3.2. Virtualization Software Overview

This section contains a (non-exhaustive) overview of the current virtualization techniques and corresponding implementations. In accordance with existing legacy IT assets (e.g. gLite grid middleware) and other constraints that WP8 had to respect (e.g. budget limitation for hardware purchases), several criteria have been formulated for selecting an appropriate virtualization technology. These criteria are the following:

Support virtualization of Scientific Linux CERN 3 and Scientific Linux CERN 4, this constraint is imposed[3] by the gLite grid middleware, perform reasonably well when running a virtualized Operating Systems, common requirement, allow the use of SMP Kernels, all server computers use multi-processors architectures nowadays, run on i686 and x86_64 Architectures with the ability of mixing 32 and 64 bits Kernels for host Oss. 64 bits and the various possible mixed modes have to be supported for allowing future use of 64 bits-based software to be distributed under a GPL License.

[2] http://www.vmware.com/pdf/virtualization_considerations.pdf

[3] gLite is heavily reliant on the host OS. The packages for installing gLite 3.1 version are only certified to work on Scientific Linux 4.0; this is also the only operating system that is certified to properly run gLite.

3.2.1. Xen

Xen[4] is free software VMM for IA-32, x86-64, IA-64 and PowerPC architectures. It is software which runs in a host operating system and which allows several guest operating systems to be installed and used on top of, and at the same the time as, the host on the same computer. Xen originated as a research project at the University of Cambridge, led by Ian Pratt, senior lecturer at Cambridge and founder of XenSource, Inc. This company now supports the development of the open source project and also sells enterprise versions of the software. The first public release of Xen was made available in 2003.

3.2.2. Kernel based Virtual Machine

Kernel-based Virtual Machine (KVM)[5] is a Linux kernel infrastructure for supporting virtualization. KVM currently supports full virtualization using Intel VT or AMD-V. Limited support for paravirtualization is also available for Linux guests and Windows in the form of a paravirtual network driver, a balloon driver to affect the operation of the guest virtual memory manager, and CPU optimization for Linux guests. KVM is currently implemented as a loadable kernel module although future versions will likely use a system call interface and be integrated directly into the kernel. Architecture ports are currently being developed for s390, PowerPC, and IA64. The first version of KVM was included in the Linux kernel version 2.6.20.

By itself, KVM does not perform any emulation. Instead, a user-space program uses the /dev/kvm interface to set up the guest VM's address space, feeds it simulated I/O and maps its video display back onto the host. Currently, the only known program that does this is a modified version of QEMU[9]. KVM's components are available under various GNU licenses.

3.2.3. OpenVZ

OpenVZ[6] is an operating system-level virtualization technology based on the Linux kernel and operating system. OpenVZ allows a physical server to run multiple isolated operating system instances, known as Virtual Private Servers (VPS) or Virtual Environments (VE).

Compared to virtual machines such as VMware and paravirtualization technologies like Xen, OpenVZ is limited as it requires both the host and guest OS to be Linux-based (although Linux distributions can be different in different VEs). However, OpenVZ claims a performance advantage; according to its website, there is only a 1-3% performance penalty for OpenVZ as compared to using a standalone server.

OpenVZ is a basis of Virtuozzo[7], a proprietary software product provided by SWsoft[8], Inc. OpenVZ is licensed under the GPL version 2.

[4] http://www.xensource.com

[5] kvm.qumranet.com

[6] http://openvz.org/

[7] http://www.swsoft.com/en/products/virtuozzo

[8] http://www.swsoft.com

3.2.4. QEMU

QEMU[9] is a fast processor emulator, allowing full virtualization of a PC system. It is free software and was written by Fabrice Bellard. QEMU is a hypervisor and is similar to projects such as Bochs, VMware Workstation and PearPC, but lacks several features, including increased speed on x86 architectures, although achievable through an optional accelerator KQEMU[10], and support for multiple architectures (work in-progress at the time of writing). By using dynamic translation it performs reasonably well, and turns out to be easy to port to new host CPUs.

3.2.5. Linux-VServer

Linux-VServer[11] is a virtual private server implementation which achieves virtualization by adding operating system-level virtualization capabilities to the Linux kernel. Linux-VServer is a jail mechanism which can be used to securely partition resources on a computer system (such as the file system, CPU time, network addresses and memory) in such a way that processes cannot mount a denial-of-service attack on anything outside of their partition. Each partition is called a security context, and the virtualized system within it is the virtual private server. A chroot-like utility for entering security contexts is provided. The contexts themselves are robust enough to boot many unmodified Linux distributions, including Debian and Fedora Core.

Virtual private servers are commonly used in web hosting services, where they are useful for segregating customer accounts, pooling resources and containing any potential security breaches. Conceptually Linux-VServer is similar to the Solaris Containers (including Solaris Zones isolation technology), or FreeBSD Jail, or OpenVZ.

Linux-VServer is developed and distributed as open source software, licensed under the terms of the GNU General Public License (GPL).

3.2.6. VMware

VMware[12] is a wholly-owned subsidiary of the EMC Corporation which supplies proprietary virtualization software for x86-compatible computers, including VMware Workstation and the freeware VMware Server and VMware Player products. VMware software runs on Microsoft Windows, Linux, and Mac OS X.

There are several flavors of VMware, depending on the needs of the client. VMware is offering a large variety of products, including free and non-free products licensed under a commercial license. VMware is not licensing its products under an open source license.

[9] http://fabrice.bellard.free.fr/qemu

[10] http://fabrice.bellard.free.fr/qemu/kqemu-tech.html

[11] http://linux-vserver.org/

[12] http://www.vmware.com/

Free products:

VMware Player: VMware makes VMware Player available, free of charge, to run guest virtual machines produced by other VMware products. VMware Player itself is not able to create new virtual machines.

VMware Server: VMware Server can create, edit, and play virtual machines. It uses a client-server model, allowing remote access to virtual machines, at the cost of some graphical performance. VMware Inc. makes VMware Server freely available in the hope that users will eventually upgrade to the VMware ESX Server.

Non-Free products:

VMware Workstation: VMware Workstation software consists of a virtual-machine suite for x86 and x86-64 computers. This software suite allows users to set up multiple x86 and x86-64 virtual computers and to use one or more of these virtual machines simultaneously with the hosting operating system. Each virtual machine instance can execute its own guest operating system. In simple terms, VMware Workstation allows one physical machine to run two or more operating systems simultaneously.

VMware ESX: This is the most professional solution. VMware ESX implements what is referred to as the "VMkernel", which is a bundle of hypervisor codes along with the device driver modules used to support a given set of hardware.

VMware ESX Server uses a Linux kernel that loads additional code. It is referred by VMware, as the "VMkernel". The VMware FAQ states 'ESX Server also incorporates a service console based on a Linux 2.4 kernel that is used to boot the ESX Server virtualization layer'. The Linux kernel runs before any other software on an ESX host, witness the console of a booting ESX machine. After the Linux kernel has loaded, there is a script that loads the VMkernel. VMware states that VMkernel is not derived from Linux. The Linux kernel continues running but under VMkernel, providing functions including the proc file system used by the ESX and an environment to run support applications.

3.3. Conclusions

These virtualization techniques and technologies have been evaluated and, when possible, tested. In the following table, their most interesting characteristics are reflected, together with the features that were retained for making further decisions regarding upon which solution to base the neuGRID deployment. As formerly stated, the following properties have been partially extracted from the virtualization technologies state-of-the-art literature.

Properties	Xen	KVM	QEMU	OpenVZ	VServer	VMWare
Full VT	Yes	Yes	Yes	No	No	Yes
Paravirtualization	Yes	Yes	No	No	No	Yes
OS Level VT	No	No	No	Yes	Yes	No
License	GPL	GPL	GPL BSD Core: LGPL	GPL	GPL	Proprietary
Architecture	i686 x86-64 IA64 PPC	i686 x86-64	i686 ARM	i686 x86-64 PPC	i686 ARM	i686 x86-64
Performance	PV: Fast FV: Medium	PV: Fast FV: Medium	FV: Slow Best if kQEMU enabled	Fast	Fast	PV: Medium FV: Medium
SMP Ghuests	Yes	Development	Development	Yes	Yes	Yes
CPU Hot Plug	Yes	No	No	Yes	Yes	Yes
Mem Hot Plug	Yes	No	No	Yes	Yes	Yes
Standalone Host	Yes	No	No	No	No	No
Standalone Hypervisor	No	No	No	No	No	Only with ESX Server

From this table, it can be noted that some of the virtualization techniques do not fulfill the main WP8 criteria, exposed in the Point 2.2. For instance, QEMU and Vserver cannot run, at the time of writing, x86_64 hosts, and VMware is distributed under a commercial license, which turns out to be quite expensive and inappropriate given the needs of our project.

WP8 has been in direct contact with the gLite development team at CERN in order to obtain additional expert advice regarding virtualization solutions and their potential current use in other projects. From this feedback, the formerly introduced evaluation and the experience of the partners using gLite, WP8 therefore decided to adopt Xen.

Xen has been extensively tested and appears to work properly with the gLite grid middleware. It allows the running of a large variety of Linux Kernels, such as i686, i686 PAE and x86_64 as host and guest kernels.

Nevertheless, WP8 is still investigating other technologies such as OpenVZ, in the spirit of comparing performance and stability aspects, for a potential future migration in case significant improvement in quality of services can be obtained.

4. Data Coordination Centre

In the DoW we can find the DCC defined as: "*DCC takes care of coordinating and maintaining the different DACS centres from level 1. TheDCC's primary functions early in the neuGRID development phase are the development, deployment and maintenance of the user-facing services, including the development of the neuGRID access portal. Towards the later phases of the project these functions will shift towards oversight and more operational responsibilities, where the DCC will coordinate operations such as standardization of acquisition protocols; development of quality control procedures; monitoring of data consistency; ontological mapping of existing databases; use, performance and validation of image analysis algorithms; use of statistical analyses procedures, etc. Many of these functions will be implemented by consensus-building among the partners as well as the user communities. The DCC will also participate in the grid as a level 1 node, providing storage space and CPU resources to the grid*"

This site was deployed during month 8 of the project, in parallel to the GCC. The current activity in the DCC is a series of developments concerning the LORIS database software, which is being integrated in the grid and in the neuGRID services.

5. Grid Coordination Centre

In the DoW we can find the GCC defined as: *"GCC is in charge of hosting, maintaining up and running the grid middleware information system services 24/7. These services are the cornerstones of the grid. They provide the inner mechanics of the distributed infrastructure. The GCC will be installed as part of the Ground-Truth phase of the neuGRID Infrastructure deployment, and once available will host its newly created virtual organization"*.

The GCC was successfully deployed at month 8 at Archamps, France within the servers provided by maat Gknowledge.

The GCC will host the entire infrastructure to run the gLite GRID middleware. This includes gLite core services, a site performing CE and SE, and the necessary infrastructure to provide servers and users with the digital certificates, which will allow operating against the neuGRID infrastructure.

- gLite Core services, including: VOMS, WMS/LB, LFC. tBDII and AMGA
- Site level services, including: UI, CE, SE and sBDII
- neuGRID UI
- CA

5.1. Services

To run a new gLite middleware infrastructure it is necessary to install some gLite services. The basic infrastructure that will allow neuGRID to provide grid services is the following:

- VOMS: Virtual Organization Membership System. This service will manage the users, the resources and the possible interactions between them.
- LFC: LCG File Catalogue, this service will store a global index of files to allow the grid users to find these files stored in the grid.
- tBDII: Top Level Berkeley Database Information Index, this service will read the configuration of the different grid sites, and will present it with an LDAP interface.

- AMGA: It is a metadata catalog for gLite.
- WMS/LB: gLite Workload Management System

These services have been installed in one DELL PowerEdge 2950; virtualization techniques have been used in this hardware in order to install 4 distinct services in one server. This technique is commonly used when deploying gLite. As explained in Section 2, gLite has significant constraints regarding the mixing of different services in one OS.

The complete gLite infrastructure security model relies on digital certificates. This means that to operate with the grid, each user and server will need a digital certificate ensuring that the actor is who he or she is supposed to be. With this purpose in mind, the neuGRID project has deployed a local Certification Authority, which will be able to issue certificates to operate with neuGRID infrastructure.

OpenCA software has been installed in a virtual machine. OpenCA provides a complete suite of Certification Authority services. This suite enables the management of the certificate life cycle of the users and servers.

An SE and a DPM were also deployed as a CE and WN.

The Computing Element is composed by 3 DELL Power Edge 1950 servers, with the specifications outlined in next section. These servers will be part of a gLite Computing Element, by running Worker Node software in each one. The main function of these servers is to execute the jobs that are submitted to the GRID infrastructure.

The Storage Element was deployed in a DELL PowerEdge 2950.

5.2. Services Configuration

5.2.1. Hardware Distribution

The following table shows the dom0 servers list, in addition to the management IP that will be performed over a Dell Remote Administration Card, and its Service TAG (Serial Number of the Server).

Server Name	Dom0 IP	Management IP	Service TAG
dell-1950-1	80.245.17.57	80.245.17.40	CKWZM3J
dell-1950-2	80.245.17.48	80.245.17.41	BKWZM3J
dell-1950-3	80.245.17.61	80.245.17.42	8KWZM3J
dell-2950-1	80.245.17.50	80.245.17.38	6310N3J
dell-2950-2	80.245.17.44	80.245.17.43	9310N3J

5.2.2. gLite Services Distribution

The following table presents a summary of the gLite middleware services deployed at GCC, including the reference to the physical machine that is hosting the guest virtual machine, which is running the gLite middleware service identified in the last column of the table.

Server Name	External IP	FQDN	gLite
dell-2950-2	80.245.17.45	ng-maat-server2.maat-g.com	WOMS
dell-2950-2	80.245.17.49	ng-maat-server4.maat-g.com	Lfc tBDII
dell-2950-2	80.245.17.51	ng-maat-server5.maat-g.com	amga
dell-2950-2	80.245.17.52	ng-maat-server6.maat-g.com	gLiteUI
dell-2950-1	80.245.17.47	ng-maat-server3.maat-g.com	DPM sBDII
dell-2950-1	80.245.17.58	ng-maat-devel1.maat-g.com	AMGA gLiteUI
dell-2950-1	80.245.17.59	ng-maat-server7.maat-g.com	Myproxy
dell-2950-1	80.245.17.61	ng-maat-server8.maat-g.com	CE
dell-2950-1	80.245.17.62	ng-maat-server9.maat-g.com	WMS LB
dell-1950-1	80.245.17.63	ng-maat-server10.maat-g.com	WN
dell-1950-2	80.245.17.64	ng-maat-server11.maat-g.com	WN
dell-1950-3	80.245.17.65	ng-maat-server12.maat-g.com	WN

5.2.3. Support Services Distribution

In the following table we can see all the data related to the openCA and a support web for deployments and developments that was also deployed in the GCC.

Server Name	External IP	FQDN	Services
dell-2950-2	80.245.17.46	ng-maat-server1.maat-g.com	WEB
dell-2950-2	80.245.17.46	openca.ng-maat-server1.maat-g.com	OPENCA

5.3. Infrastructure

This site will be installed over 5 servers: 2 DELL PowerEdge 2950, and 3 DELL PowerEdge 1950 in the first stage of the deployment; gLite Core Services have been deployed over one of the DELL PowerEdge2950. In the second stage, a Site including a Storage Element has been deployed in the second DELL PowerEdge 2950 and finally, a Computing Element over the 3 remaining DELL PowerEdge 1950 servers remains to be deployed.

Detailed hardware tests for each server can be found in "*Annex 3 – GCC Hardware Tests*" in which we can see that all the servers pass the hardware test suit detailed in the Annex 2.

5.3.1. Servers Configuration

DELL PowerEdge 2950

In the following table we can see the final hardware configuration for the server DELL PowerEdge 2950, corresponding to the advanced configuration of the portfolio of solutions. This server offers a good cost to raw space ratio.

In order to fit the services, 2 of these servers have been acquired. In the first, the Core Services have been deployed, the other one will host SE and the DPM. The second one will host all core services.

	PE2950
1	PE2950 III QUAD-CORE XEON E5410 2.33GHZ/
1	RISER WITH PCI EXPRESS SUPPORT (2X PCIE
1	PE2950 SPANISH RACK POWER CORD
1	PE2950 BEZEL ASSEMBLY
1	8GB 667MHZ FBD (2X4GB DUAL RANK DIMMS)
1	PE2950 III ADDITIONAL QUAD-CORE XEON E54
2	80GB SERIAL ATA2 7.2K 3.5" HD HOT PLUG
4	750GB SERIAL ATAU 7.2K 3.5" ADDITIONAL H
1	PE2950 III - CHASSIS 3.5HDD X6 BACKPLANE
1	PERC 6/I, INTEGRATED CONTROLLER CARD X6
1	8X IDE DVD-ROM DRIVE
1	CD/DVD CABLE
1	PE2950 III - REDUNDANT PSU NO POWER CORD
1	POWER CORD, PDU (RACK)
2	BROADCOM NETXTREME 5721 SINGLE PORT GIGA
1	BROADCOM TCP/IP OFFLOAD ENGINE FUNCTIONA
1	DRAC 5 CARD
1	PE2950 OPEN MANAGE CD + DRIVERS
1	CFI EMEA SERVICE ORDER READY POWEREDGE P
1	PE2950 RAPID/VERSA RACK RAILS
1	PE2950 III - C6, MSSR0/R0, ADD IN PERC 5/
1	POWEREDGE ORDER - SPAIN
1	BASE WARRANTY
1	1YR BASIC WARRANTY - NEXT BUSINESS DAY -
1	3YR BASIC WARRANTY - NEXT BUSINESS DAY

The total power of the DPM is described in the following list:

- 8 cores running at 2.33GHz
- 8 Gigabytes of RAM
- 2 Terabytes of local space in RAID5

DELL PowerEdge 1950

In the following table we can see the final hardware configuration for the server DELL PowerEdge 1950, which corresponds to the advanced configuration of the portfolio of solutions. This server offers a good ratio between effective cost, number of cores and RAM capacity. The full solution consists of 13 servers with these characteristics that are part of the cluster that will run the computing element.

	PE1950
1	PE1950 III QUAD-CORE XEON E5410 2.33GHZ/
1	PE1950 PCIE RISER (2 SLOTS)
1	SPANISH - DOCUMENTATION AND RACK POWER C
1	PE1950 BEZEL ASSEMBLY
1	8GB 667MHZ FBD (2X4GB DUAL RANK DIMMS)
1	PE1950 III - ADDITIONAL QUAD-CORE XEON E
2	73GB SAS (15, 000RPM) 3.5 INCH HARD DRIVE
1	PE1950 III 3.5" HDD SUPPORT CHASSIS
1	PERC 6I INTEGRATED CONTROLLER

1	8X IDE DVD-ROM DRIVE
1	PE1950 III REDUNDANT POWER SUPPLY - NO P
1	POWER CORD, PDU (RACK)
1	BROADCOM TCP/IP OFFLOAD ENGINE FUNCTIONA
1	DRAC 5 CARD
1	NO OPERATING SYSTEM
1	PE1950 OPENMANAGE KIT AND FI DRIVER
1	YOU HAVE CHOSEN NOT TO TAKE THE DELL POW
1	CFI EMEA SERVICE ORDER READY POWEREDGE P
1	SLIDING COMBINATION RAPID/VERSA RAIL WIT
1	PE1950 III - C3, MSSR1, ADD IN PERC 5I/6I
1	POWEREDGE ORDER - SPAIN
1	BASE WARRANTY
1	1YR BASIC WARRANTY - NEXT BUSINESS DAY -
1	3YR BASIC WARRANTY - NEXT BUSINESS DAY

In the following table we can see the partition table common to the 3 servers that comprise the Computing Element. Each one will run one host OS and one guest OS. All of them will run WN gLite software.

dev	**lvm**	**Size**
/dev/sda	boot	100 Mbytes
/dev/sdb	swap	2 GBytes
/dev/sdc	root	10 Gbytes
	wn	66 GBytes
	wn_swp	2 GBytes

The total power of the Computing Element is described in the following list:

- 24 cores running at 2.33GHz
- 24 Gigabytes of RAM
- 198 Gigabytes of local space in RAID1

6. DACS1 - IRCCS Fatebenefratelli (FBF, Brescia - Italy)

IRCSS will contribute to the neuGRID infrastructure with a site composed by a computational node and a data node. These nodes are part of the PROD infrastructure defined in the DoW.

6.1. Services

The site at DACS1 will provide an SE and a DPM, and a CE and WN to the grid infrastructure. This infrastructure will allow users to store and access files, and to execute jobs. This fits with the specifications of the DoW.

Due to the gLite grid middleware architecture, it is necessary to set up a service sBDII that will present the site to the core services of the neuGRID infrastructure.

This site will provide 4,5 TBytes of usable space in 3 different data stores, but the most impressive numbers come from the CE, running 12 WN of 8 cores each one. This infrastructure provides a total of 96 cores running at 2,3GHz and 96 GBytes of RAM.

6.1.1. Services Configuration

In this section we will describe the distribution of the gLite services deployed in the FBF servers. In the followings tables we can see the deployed services in the set of servers. Those can be categorized in two major families: the gLite grid-site related services (UI, DPM, CE, WN) and the neuGRID Gateway. Service TAG and the IP distribution can be also viewed in the following tables.

Each server will have 3 IP addresses, the first IP address is attached to the dom0 (host OS), the second IP address is attached to the dom1 (guest OS), and finally the third IP address is attached to the remote administration card.

Server Name	Dom0 IP	Management IP	Service TAG
ng-fbf-dell-1	192.168.1.227	192.168.1.200	GPL2W3J
ng-fbf-dell-2	192.168.1.228	192.168.1.201	JFL3W3J
ng-fbf-dell-3	192.168.1.229	192.168.1.202	BFL3W3J
ng-fbf-dell-4	192.168.1.230	192.168.1.203	CFL3W3J
ng-fbf-dell-5	192.168.1.231	192.168.1.204	DFL3W3J
ng-fbf-dell-6	192.168.1.232	192.168.1.205	GFL3W3J
ng-fbf-dell-7	192.168.1.233	192.168.1.206	HFL3W3J
ng-fbf-dell-8	192.168.1.234	192.168.1.207	1GL3W3J
ng-fbf-dell-9	192.168.1.235	192.168.1.208	9FL3W3J
ng-fbf-dell-10	192.168.1.236	192.168.1.209	2GL3W3J
ng-fbf-dell-11	192.168.1.237	192.168.1.210	4GL3W3J
ng-fbf-dell-12	192.168.1.238	192.168.1.211	5GL3W3J
ng-fbf-dell-13	192.168.1.239	192.168.1.212	6GL3W3J

Server Name	External IP	FQDN	Internal IP	gLite
ng-fbf-dell-1			192.168.1.214	SE DPM
ng-fbf-dell-2			192.168.1.215	gLiteUI CE sBDII
ng-fbf-dell-3			192.168.1.216	WN
ng-fbf-dell-4			192.168.1.217	WN
ng-fbf-dell-5			192.168.1.218	WN
ng-fbf-dell-6			192.168.1.219	WN
ng-fbf-dell-7			192.168.1.220	WN
ng-fbf-dell-8			192.168.1.221	WN
ng-fbf-dell-9			192.168.1.222	WN
ng-fbf-dell-10			192.168.1.223	WN
ng-fbf-dell-11			192.168.1.224	WN
ng-fbf-dell-12			192.168.1.225	WN
ng-fbf-dell-13			192.168.1.225	WN

6.2. Infrastructure

This site will be installed over 13 servers: 1 DELL PowerEdge 2900, and 12 DELL PowerEdge 1950 in the first stage of the deployment.

Detailed hardware tests for each server can be found in "Annex 4 – DACS1 Hardware Tests" in which we can see that all the servers pass the hardware test suit detailed in the Annex 2.

6.2.1. Servers Configuration

As previously explained, for the neuGRID deployment, all of the servers have been virtualized with XEN Software; the host Operating System is Scientific Linux 5.2. It runs a XEN Kernel in the top, allowing the server to run paravirtualized Virtual Machines. This technique has some advantages when compared to deploying the OS running gLite services directly in the hardware. These advantages are:

- Fast deployment of preconfigured images in the Guest OS.
- Simple maintenance and upgrades of the Guest OS.
- Simple backup of the whole system.
- Allows the running of more than one Guest OS in one physical server.

DELL PowerEdge 2900

In the next table, we can see the final hardware configuration for the server DELL PowerEdge 2900, corresponding to the advanced configuration of the portfolio of solutions. This server offers a good ratio between cost and raw space.

PE2900	
1	PE2900 III - QUAD-CORE XEON E5410 2.33GHz
1	PE2900 III SERVER RACK CHASSIS
1	RACK BEZEL ASSEMBLY
1	8GB 667MHZ FBD (4X2GB DUAL RANK DIMMS)
1	PE2900 III - ADDITIONAL QUAD-CORE XEON E
1	3.5 INCH 1.44MB FLOPPY DRIVE
8	750GB SERIAL ATAU 7.2K 3.5" HD HOT PLUG
1	PERC 6/I INTERNAL RAID CONTROLLER CARD
2	80GB SATA 7.2K 3.5INCH FRONT BAY HDD
1	16X SATA DVD
1	REDUNDANT POWER SUPPLY (2 HOT PLUG PSU)
1	POWER CORD, PDU (RACK)
1	BROADCOM TCP/IP OFFLOAD ENGINE FUNCTIONA
1	TCP/IP OFFLOAD ENGINE 2P
1	DRAC5 CONTROLLER
1	NO OPERATING SYSTEM
1	OPENMANAGE SERVER SOFTWARE, WITH CD & DO
1	PE2900 UNIVERSAL SLIDING VERSA/RAPID RAC
1	PE2900 III - C11 RAID5/1 PERC5I/6I 3-8HD
1	BASE WARRANTY
1	1YR BASIC WARRANTY - NEXT BUSINESS DAY -
1	3YR BASIC WARRANTY - NEXT BUSINESS DAY

The following table shows the partition table of the DELL PowerEdge 2900, including host OS and the partitions to be installed in the guest OS. This server will run the DPM with 3 data stores, 2 of 1.43 GBytes, and one of 1.2 GBytes, with a total usable space of 4 TBytes as data stored in the GRID. As explained before, the physical support of this space relies on a RAID5 and a spare disk in order to ensure maximum data security and stability.

Dev	lvm	Size
/dev/sda	boot	100 Mbytes
	lvswap	8 GBytes
	lvroot	10 Gbytes
	dpm	24 GBytes
	dpm_swp	2 GBytes
/dev/sdb	dpm_data	1.43 TBytes
/dev/sdc	dpm_data_2	1.43 TBytes
/dev/sdd	dpm_data_3	1.2 TBytes

The total power of the Storage Element is described in the following list:

- 8 cores running at 2.33GHz
- 8 Gigabytes of RAM
- 4500 Gigabytes of shared disk space in RAID5 with 1 spare disk to increase data integrity and security.
- 80 Gigabytes of local space in RAID1

DELL PowerEdge 1950

In the following table, we can see the final hardware configuration for the server DELL PowerEdge 1950, corresponding to the advanced configuration of the portfolio of solutions. This server offers a good ratio between effective cost, number of cores and RAM capacity. In the full solution there are 12 servers with these characteristics that are part of the cluster that will run the computing element.

PE1950	
1	PE1950 III QUAD-CORE XEON E5410 2.33GHZ/
1	PE1950 PCIE RISER (2 SLOTS)
1	PE1950 BEZEL ASSEMBLY
1	8GB 667MHZ FBD (4X2GB DUAL RANK DIMMS)
1	PE1950 III - ADDITIONAL QUAD-CORE XEON E
2	73GB SAS 15K 3.5" HD HOT PLUG
1	SAS 6/IR INTEGRATED CONTROLLER FOR C1
1	PE1950 III 3.5" HDD SUPPORT CHASSIS
1	8X IDE DVD-ROM DRIVE
1	PE1950 III REDUNDANT POWER SUPPLY
1	POWER CORD, PDU (RACK)
1	TCP/IP OFFLOAD ENGINE 2P
1	DRAC 5 CARD
1	NO OPERATING SYSTEM
1	PE1950 OPENMANAGE KIT AND FI DRIVER
1	SLIDING COMBINATION RAPID/VERSA RAIL WIT
1	PE1950 III - C1, MOTHERBOARD SATA/SAS RAID1
1	POWEREDGE ORDER - SPAIN
1	BASE WARRANTY
1	1YR BASIC WARRANTY - NEXT BUSINESS DAY -
1	3YR BASIC WARRANTY - NEXT BUSINESS DAY

In the following table we can see the partition table common to the 12 servers that comprise the Computing Element; each one will run one host OS and one guest OS. One of them will run CE and other gLite site services; the other 11 will run WN gLite software.

dev	lvm	Size
/dev/sda	boot	100 Mbytes
/dev/sdb	swap	2 GBytes
/dev/sdc	root	10 Gbytes
	wn	66 GBytes
	wn_swp	2 GBytes

The total power of the Computing Element is described in the following list:

- 96 cores running at 2.33GHz
- 96 Gigabytes of RAM
- 876 Gigabytes of local space in RAID1

7. DACS2 – Karolinska Institutet (KI, Stockholm - Sweden)

Karolinska Institutet will contribute to the neuGRID infrastructure with a site composed by a computational node and a data node. These nodes are part of the PROD infrastructure defined in the DoW.

7.1. Services

The site at DACS2 will provide an SE and a DPM, and a CE and WN to the grid infrastructure. This infrastructure will allow users to store and access files, and to execute jobs. This fits with the specifications of the DoW.

Due to the gLite grid middleware architecture, it is necessary to set up a service sBDII that will present the site to the core services of the neuGRID infrastructure.

This site will provide 2,6 TBytes of usable space in 2 different data stores, but the most impressive numbers come from the CE, running 13 WN of 8 cores each one. This infrastructure provides a total of 96 cores running at 2,0GHz and 96 GBytes of RAM.

7.1.1. Services Configuration

In this section we will describe the distribution of the gLite services deployed in the KI servers. In the followings tables we can see the deployed services in the set of servers. Those can be categorized in two major families: the gLite grid-site related services (UI, DPM, CE, WN) and the neuGRID Gateway. Service TAG and the IP distribution can be also viewed in the following tables.

Each server will have 3 IP addresses, the first IP address is attached to the dom0 (host OS), the second IP address is attached to the dom1 (guest OS), and finally the third IP address is attached to the remote administration card.

Following it is presented a table describing the physical servers, including information about the server name, the dom0 IP address (host), the management IP (DRAC card) and finally the serial number of the server (Service TAG). This table will show us the ground infrastructure in which the grid services will be deployed.

Server Name	Dom0 IP	Management IP	Service TAG
ng-ki-node1	192.168.0.10	192.168.0.120	1CWB84J
ng-ki-node2	192.168.0.11	192.168.0.121	9CWB84J
ng-ki-node3	192.168.0.12	192.168.0.122	JBWB84J
ng-ki-node4	192.168.0.13	192.168.0.123	5CWB84J
ng-ki-node5	192.168.0.14	192.168.0.124	2CWB84J
ng-ki-node6	192.168.0.15	192.168.0.125	3CWB84J
ng-ki-node7	192.168.0.16	192.168.0.126	GBWB84J
ng-ki-node8	192.168.0.17	192.168.0.127	HBWB84J
ng-ki-node9	192.168.0.18	192.168.0.128	7CWB84J
ng-ki-node10	192.168.1.236	192.168.0.129	8CWB84J
ng-ki-node11	192.168.1.237	192.168.0.130	6CWB84J
ng-ki-node12	192.168.1.238	192.168.0.131	FBWB84J

ng-ki-node13	192.168.1.239	192.168.0.132	4CWB84J
ng-ki-dom0	130.237.143.72	130.237.143.71	9SZF84J
NA	NA	130.237.143.70	CXPB84J

In the next two tables it is represented the services hosted by each physical server, the reference comes form the previous table.

Following, in the next table, are described the 13 WN, these servers are in the hidden side of the network and builds the cluster of WN that will be accessible for the CE.

Server Name	External IP	Domain Name	Internal IP	gLite Service
ng-ki-node1	NA	ng-ki-wn-server1.neugrid	192.168.0.220	WN
ng-ki-node2	NA	ng-ki-wn-server2.neugrid	192.168.0.221	WN
ng-ki-node3	NA	ng-ki-wn-server3.neugrid	192.168.0.222	WN
ng-ki-node4	NA	ng-ki-wn-server4.neugrid	192.168.0.223	WN
ng-ki-node5	NA	ng-ki-wn-server5.neugrid	192.168.0.224	WN
ng-ki-node6	NA	ng-ki-wn-server6.neugrid	192.168.0.225	WN
ng-ki-node7	NA	ng-ki-wn-server7.neugrid	192.168.0.226	WN
ng-ki-node8	NA	ng-ki-wn-server8.neugrid	192.168.0.227	WN
ng-ki-node9	NA	ng-ki-wn-server9.neugrid	192.168.0.228	WN
ng-ki-node10	NA	ng-ki-wn-server10.neugrid	192.168.0.229	WN
ng-ki-node11	NA	ng-ki-wn-server11.neugrid	192.168.0.230	WN
ng-ki-node12	NA	ng-ki-wn-server12.neugrid	192.168.0.231	WN
ng-ki-node13	NA	ng-ki-wn-server13.neugrid	192.168.0.232	WN

Finally in this section it is presented the services exposed in the external side of the network, these services had been deployed in two virtual machines, in one physical server, and are interconnected to the hidden part of the network.

ServerName	External IP	Server Name	Internal IP	gLite Service
ng-ki-dom0	130.237.143.73	ng-ki-server4	NA	DPM
ng-ki-dom0	130.237.143.74	ng-ki-server5	192.168.0.5	CE sBDII TORQUE

7.2. Infrastructure

This site will be installed over 14 servers: 1 DELL PowerEdge 2950, and 13 DELL M600, containing the M600 Servers there is a M1000 Blade Enclosure, which provides M600 servers with power, connectivity, and remote management.

M10000 Blade Enclosure is a piece of advanced hardware which simplifies physical deployments, reduces power consumption and reduces the total cost of a cluster – in the case of neuGRID – bigger than 10 servers. Other benefits are the unification of the power management, redundancy, cabling, connectivity, monitoring, and remote operation of the cluster. Finally this option also

offers a reduction of the space needed in the IT Center and the best factor between CPU power and Watts consumed.

Detailed hardware tests for each server can be found in "Annex 5 – DACS2 Hardware Tests" in which we can see that all the servers pass the hardware test suit detailed in the Annex 2.

7.2.1. Servers Configuration

As previously explained, for the neuGRID deployment, all of the servers have been virtualized with XEN Software; the host Operating System is Scientific Linux 5.2. It runs a XEN Kernel in the top, allowing the server to run paravirtualized Virtual Machines. This technique has some advantages when compared to deploying the OS running gLite services directly in the hardware. These advantages are:

- Fast deployment of preconfigured images in the Guest OS.
- Simple maintenance and upgrades of the Guest OS.
- Simple backup of the whole system.
- Allows the running of more than one Guest OS in one physical server.

DELL PowerEdge 2950

In the next table, we can see the final hardware configuration for the server DELL PowerEdge 2950, corresponding to the advanced configuration of the portfolio of solutions. This server offers a good ratio between cost, raw space and power consumption.

PE2950	
1	PE 2950 III Quad Core Xeon E5430 (2.66GHz, 2x6MB, 1333MHz FSB)
1	PE2900 III SERVER RACK CHASSIS
1	RACK BEZEL ASSEMBLY
1	8GB (4x2GB Dual Rank DIMMs) 667MHz FBD
1	PE2950 III Additional Quad-Core Xeon E5430 (2.66GHz, 2x6MB, 1333MHz FSB)
1	3.5 INCH 1.44MB FLOPPY DRIVE
6	750GB SERIAL ATAU 7.2K 3.5" HD HOT PLUG
1	PERC 6/I INTERNAL RAID CONTROLLER CARD
2	80GB SATA 7.2K 3.5INCH FRONT BAY HDD
1	16X SATA DVD
1	REDUNDANT POWER SUPPLY (2 HOT PLUG PSU)
1	POWER CORD, PDU (RACK)
1	BROADCOM TCP/IP OFFLOAD ENGINE FUNCTIONA
1	TCP/IP OFFLOAD ENGINE 2P
1	DRAC5 CONTROLLER
1	NO OPERATING SYSTEM

1	OPENMANAGE SERVER SOFTWARE, WITH CD & DO
1	PE2950 UNIVERSAL SLIDING VERSA/RAPID RAC
1	PE2950 III - C11 RAID5/1 PERC5I/6I 3-8HD
1	BASE WARRANTY
1	1YR BASIC WARRANTY - NEXT BUSINESS DAY -
1	3YR BASIC WARRANTY - NEXT BUSINESS DAY

The following table shows the partition table of the DELL PowerEdge 2950, including host OS and the partitions to be installed in the guest OS. This server will run the CE, sBDII, TORQUE in one Virtual Machine. In another Virtual Machine will run DPM with 2 data stores, of 1.3 GBytes, with a total usable space of 2,6 TBytes as data stored in the GRID. As explained before, the physical support of this space relies on a RAID5 in order to ensure maximum data security and stability.

Dev	lvm	Size
/dev/sda	boot	100 Mbytes
	lvswap	8 GBytes
	lvroot	10 Gbytes
	dpm	24 GBytes
	dpm_swp	2 GBytes
/dev/sdb	dpm_data	1.3 TBytes
/dev/sdc	dpm_data_2	1.3 TBytes
	sbdii	20 GBytes
	sdbi_sw	2 GBytes

The total power of the Storage Element is described in the following list:

- 8 cores running at 2.33GHz
- 8 Gigabytes of RAM
- 2600 Gigabytes of shared disk space in RAID5.
- 80 Gigabytes of local space in RAID1
- 1000 Gigabytes of non shared disk space containing OS Images.

DELL PowerEdge M600

In the following table, we can see the final hardware configuration for the servers DELL PowerEdge M600, corresponding to the advanced configuration of the portfolio of solutions. This server offers a good ratio between effective cost, number of cores, RAM capacity and Power Consumption. In the full solution there are 13 servers with these characteristics that are part of the cluster that will run the computing element.

PE M600	
1	PE M600 Quad Core Xeon E5405 (2.0GHz, 2x6MB, 1333MHz FSB)

1	M600 PCIE RISER (2 SLOTS)
1	M600 BEZEL ASSEMBLY
1	8GB (4x2GB Dual Rank DIMMs) 667MHz FBD
1	M600 Additional Quad-Core Xeon E5405 (2.0GHz, 2x6MB, 1333MHz FSB)
2	73GB SAS 15k 2.5" HD Hot Plug
1	SAS 6/IR INTEGRATED CONTROLLER FOR C1
1	TCP/IP OFFLOAD ENGINE 2P
1	NO OPERATING SYSTEM
1	M600 III - C1, MOTHERBOARD SATA/SAS RAID1
1	BASE WARRANTY
1	1YR BASIC WARRANTY - NEXT BUSINESS DAY -
1	3YR BASIC WARRANTY - NEXT BUSINESS DAY
1	M600 III - C1, MOTHERBOARD SATA/SAS RAID1

In the following table we can see the partition table common to the 13 servers that comprise the Computing Element; each one will run one host OS and one guest OS. All the 13 Servers will run WN gLite software.

dev	**lvm**	**Size**
/dev/sda	boot	100 Mbytes
/dev/sdb	swap	2 GBytes
/dev/sdc	root	10 Gbytes
	wn	66 GBytes
	wn_swp	2 GBytes

The total power of the Computing Element is described in the following list:

- 96 cores running at 2.33GHz
- 96 Gigabytes of RAM
- 876 Gigabytes of local space in RAID1

8. DACS3 – VUmc (VUmc, Amsterdam - The Netherlands)

It was agreed that the deployment and management of the cluster machine at VUmc will be entirely done by the VUmc staff. There were three main arguments for this decision:

1. VUmc has the necessary expertise and experience in GRID and cluster computing;
2. The network management team of VUmc ICT is fully responsible for all computing systems within its IP domain and therefore wanted complete control of all port traffic and protocols;
3. The neuGRID consortium wanted to test the possibility to engage heterogeneous GRID nodes. The VUmc DACs offers an excellent opportunity to test this.

The fact of the strict restrictions with the security in the infrastructures, installations and network at VUmc, bring this delegation in order to speed up the deployment process.

At the VUmc site, the infrastructure deployed differs a bit from the standard installations guided by WP8 in the other institutions (KI and FBF). This installation had been done using the ClusterVisionOS[13] instead of the XEN images provided by WP8. The use of ClusterVisionOS software comes from a decision of the IT team at VUmc. The choice for ClusterVisionOS was based on VUmc's experience with this system, running the DACS3 cluster. ClusterVisionOS provides a set of facilities to administrate, deploy and maintain Clusters in a GRID environment. The main restriction of ClusterVisionOS is that it is not compatible with Red Hat 4 like distributions. This issue had been solved by VUmc staff by using last gLite version (3.3) that is compatible with Red Hat 5 like distributions.

Following the constraints described in the first paragraph, the entire process of buying the servers, installation, configuration and software deployment had been done by the IT VUmc staff being in touch with WP8.

The physical deployment of the VUmc site had been successfully finished, as well as the installation of the gLite 3.3 middleware software. For now the cluster is only accessible from within the VUmc network, as well as from a restricted number of external sites (from the DACS3 cluster at VU University computer science; and from the GINA cluster at SARA). In the upcoming weeks the cluster will be connected to the neuGRDI infrastructure. In the next deliverable update, VUmc will be providing detailed testing and infrastructure information as it had been done with the FBF and KI sites.

[13] http://www.clustervision.com/ClusterVisionOS4_WEB_v4.pdf

9. Conclusions

The present document has introduced the solution, designed during the first 24 months of the project, for deploying a complex set of software in heterogeneous information systems, which satisfies the security, budget and physical concrete constraints imposed by the neuGRID project. The document also elaborated on the achievements of the work package contrasted with the initially foreseen work plan.

The first step WP8 accomplished as part of this work, was to analyze the neuGRID platform (mainly the Gateway and gLite grid middleware) requirements in order to deliver an appropriate infrastructure.

Indeed, technologies such as gLite are quite new and resource demanding due to their scope and nature. The challenge WP8 therefore faced, was to build a solution that is capable of running such technologies, while maintaining a reasonable overall quality of services. To do so, it investigated various aspects related to hardware, software and associated costs. As a result, a deep analysis of the current virtualization techniques and technologies was carried out with the aim of drastically reducing the requirements and making it accessible while conforming to all possible institutions' needs and pertinent IT configurations.

As a significant output of the work package, a complete portfolio of Hardware has been drafted, which can be used as a reference for the partners to acquire the complete solution of hardware that will better fit in IT centres.

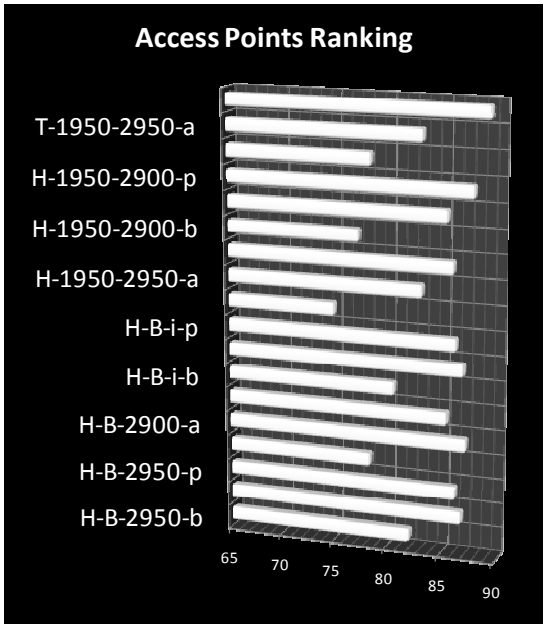
WP8 successfully exercised and exemplified its approach through the deployment of GCC and finally deploying the Level1 DACS. The deployment of DACS1, DACS2 and DACS3 was a big challenge in terms of logistics and deployment. We should keep in mind that the DACS1 (12 WN and 1 DPM), DACS2 (13 WN and 1 DPM) involves 27 servers that had been bought, delivered, tested, configured and finally, successfully deployed.

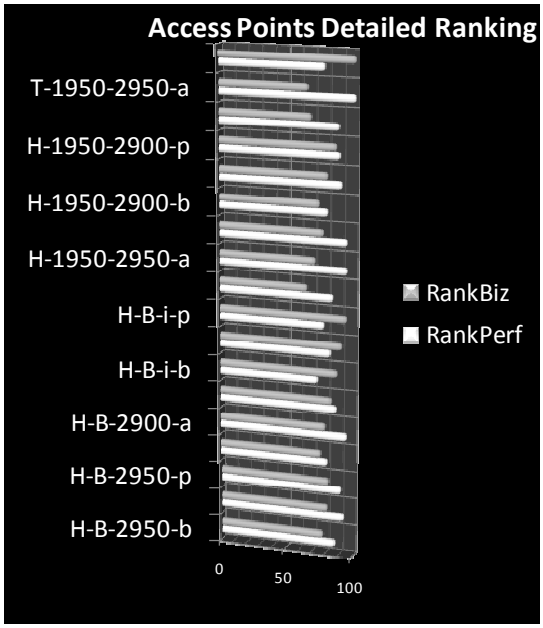
Finally DACS1 and DACS2 are currently fully operative inside the neuGRID production infrastructure; while DACS3 is installed and configured, it is under the process of integration with the neuGRID production infrastructure. This milestone is programmed to be reached early during the next reporting period.

10. Annex 1 – Hardware Portfolio

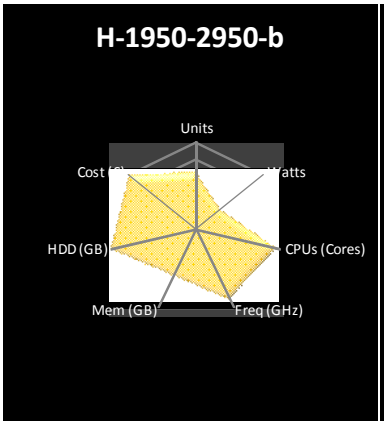
Model	Price	Space	Watts
PowerEdge M1000e Blade			
PowerEdge M1000e Blade Enclosure	5435	10U	3524
PE M600 Quad-Core Xeon E5405 2.0GHz/2x6MB 1333FSB	1600		220
PowerConnect M6220 switch 20 Port Non-Redundant (FI)	1185		
UPGRADE TO 8 GB	135		
UPGRADE TO E5410 PROCESSOR (2.3GHz)	40		
UPGRADE TO E5430 PROCESSOR (2.6 GHz)	198		
M1000e Basic	1600		
M1000e Advanced E5410 8GBytes	1775		
M1000e Premium E5430 8GBytes	1933		
PE2950 III Quad-Core Xeon E5405 2.0GHz/2x6MB 1333FSB	2230	2U	750
UPGRADE TO 8 GB	70		
UPGRADE TO E5410 PROCESSOR (2.3GHz)	40		
UPGRADE TO E5430 PROCESSOR (2.6 GHz)	200		
PE2950 Basic	2230		
PE2950 Advanced E5410 8GBytes	2340		
PE2950 Premium E5430 8GBytes	2500		
PE2900 III - Quad-Core Xeon E5405 2.0GHz/2x6MB 1333FSB	2415	5U	930
UPGRADE TO 8 GB	70		
UPGRADE TO E5410 PROCESSOR (2.3GHz)	40		
UPGRADE TO E5430 PROCESSOR (2.6 GHz)	200		
UPGRADE TO 6TBytes of space	1320		
PE2900 Basic	3735		
PE2900 Advanced E5410 8GBytes	3845		
PE2900 Premium E5430 8GBytes	4005		
PE1950 III Quad-Core Xeon E5405 2.0GHz/2x6MB 1333FSB	1805	1U	670
UPGRADE TO 8 GB	98		
UPGRADE TO E5410 PROCESSOR (2.3GHz)	40		
UPGRADE TO E5430 PROCESSOR (2.6 GHz)	200		
PE1950 Basic	1805		
PE1950 Advanced E5410 8GBytes	1943		
PE1950 Premium E5430 8GBytes	2103		
MD3000i external iSCSI RAID			476
5,2 TBytes of space	4514,2	2U	
6,7 TBytes of space	4844,5	2U	
6,7 TBytes of space 2CPU	5969,5	2U	
CONNECTIVITY			
PowerConnect 5424, Managed, 24 Port Gigabit, 4 SFP slots	579	1U	
PowerConnect 5448, Managed, 48 Port Gigabit, 4 SFP slots	869	1U	

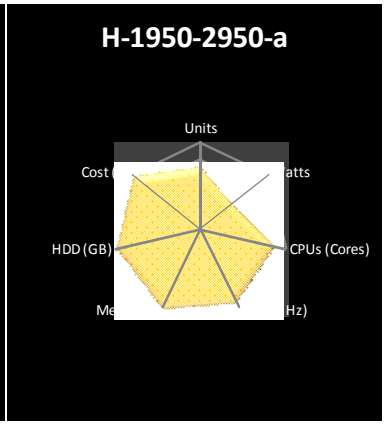
Access Point	Sub Category	ID	Units	Watts	CPUs (Cores)	Freq (GHz)	Mem (GB)	HDD (GB)	Cost (€)
HOSP Blade + 2950	Basic	H-B-2950-b	16	8104	128	256	56	7036	34665
HOSP Blade + 2950	Advanced	H-B-2950-a	16	7664	112	257,6	96	6888	33785
HOSP Blade + 2950	Premium	H-B-2950-p	16	7444	104	276,64	88	6814	34068
HOSP Blade + 2900	Basic	H-B-2900-b	17	7754	128	256	60	5110	35540
HOSP Blade + 2900	Advanced	H-B-2900-a	17	7314	112	257,6	104	6962	34725
HOSP Blade + 2900	Premium	H-B-2900-p	17	6874	96	255,36	88	6814	33073
HOSP Blade + iSCSI	Basic	H-B-i-b	14	7080	112	224	56	5036	34719,2
HOSP Blade + iSCSI	Advanced	H-B-i-a	14	6640	96	220,8	96	5888	33949,5
HOSP Blade + iSCSI	Premium	H-B-i-p	14	6200	80	212,8	80	6740	33104,5
HOSP 1950 + 2950	Basic	H-1950-2950-b	19	10210	120	240	60	6962	29083
HOSP 1950 + 2950	Advanced	H-1950-2950-a	18	9540	112	257,6	104	6888	29154
HOSP 1950 + 2950	Premium	H-1950-2950-p	17	8870	104	275,68	104	6814	29291
HOSP 1950 + 2900	Basic	H-1950-2900-b	17	9640	112	224	56	6962	28358
HOSP 1950 + 2900	Advanced	H-1950-2900-a	16	8970	104	239,2	100	6888	28319
HOSP 1950 + 2900	Premium	H-1950-2900-p	15	8300	96	254,88	96	6814	28296
TECH 2950 + 1950	Basic	T-1950-2950-b	7	2840	32	64	16	6148	8649
TECH 2950 + 1950	Advanced	T-1950-2950-a	7	2840	32	73,6	24	6148	9145
TECH 2950 + 1950	Premium	T-1950-2950-p	5	2090	24	63,36	24	3148	7285

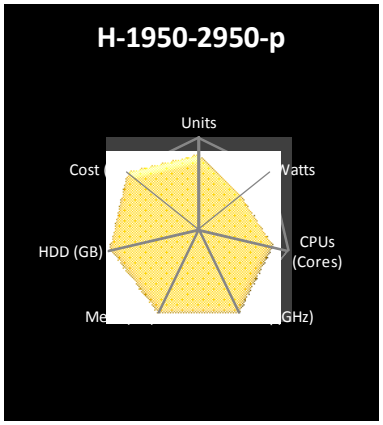


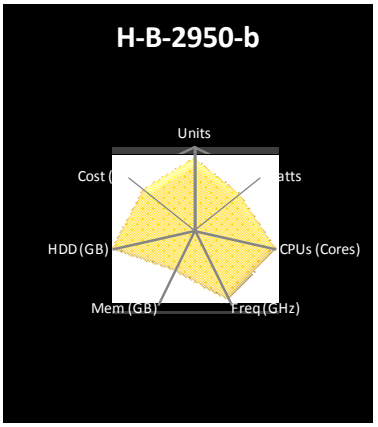


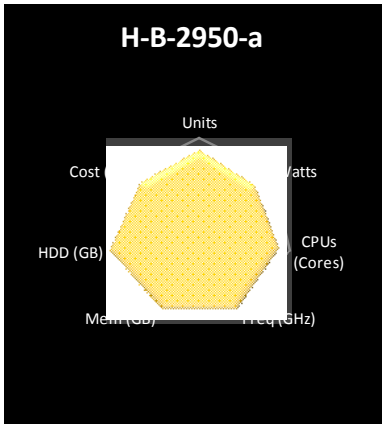
Access Point	Sub Category	ID	Units	Watts	CPUs (Cores)	Freq (GHz)	Mem (GB)	HDD (GB)	Cost (€)	RankPerf	RankBiz	Average
HOSP Blade + 2950	Basic	H-B-2950-b	85,7142857	69,2903226	100	92,5390399	53,8461538	100	77,4915182	86,59629844	77,49870884	82,04750364
HOSP Blade + 2950	Advanced	H-B-2950-a	85,7142857	76,3870968	87,5	93,1174089	92,3076923	97,8965321	80,6014984	92,70540833	80,90096031	86,80318432
HOSP Blade + 2950	Premium	H-B-2950-p	85,7142857	79,9354839	81,25	100	84,6153846	96,8447982	79,6013571	90,6775457	81,75037556	86,21396063
HOSP Blade + 2900	Basic	H-B-2900-b	78,5714286	74,9354839	100	92,5390399	57,6923077	72,6264923	74,3992084	80,71445998	75,96870694	78,34158346
HOSP Blade + 2900	Advanced	H-B-2900-a	78,5714286	82,0322581	87,5	93,1174089	100	98,9482661	77,2794741	94,89141874	79,29438692	87,09290283
HOSP Blade + 2900	Premium	H-B-2900-p	78,5714286	89,1290323	75	92,3076923	84,6153846	96,8447982	83,1177552	87,19196878	83,606072	85,39902039
HOSP Blade + iSCSI	Basic	H-B-i-b	100	85,8064516	87,5	80,9716599	53,8461538	71,5747584	77,2999717	73,47314304	87,70214111	80,58764208
HOSP Blade + iSCSI	Advanced	H-B-i-a	100	92,9032258	75	79,8149219	92,3076923	83,6839113	80,0201442	82,70163139	90,97445667	86,83804403
HOSP Blade + iSCSI	Premium	H-B-i-p	100	100	62,5	76,9230769	76,9230769	95,7930642	83,006432	78,03480452	94,33547733	86,18514093
HOSP 1950 + 2950	Basic	H-1950-2950-b	64,2857143	35,3225806	93,75	86,7553499	57,6923077	98,9482661	97,2186882	84,28648092	65,60899436	74,94773764
HOSP 1950 + 2950	Advanced	H-1950-2950-a	71,4285714	46,1290323	87,5	93,1174089	100	97,8965321	96,9677693	94,62848526	71,50845766	83,06847146
HOSP 1950 + 2950	Premium	H-1950-2950-p	78,5714286	56,9354839	81,25	99,6529786	100	96,8447982	96,4836019	94,4369442	77,33017145	85,88355783
HOSP 1950 + 2900	Basic	H-1950-2900-b	78,5714286	44,516129	87,5	80,9716599	53,8461538	98,9482661	99,7808878	80,31651996	74,28948179	77,30300087
HOSP 1950 + 2900	Advanced	H-1950-2900-a	85,7142857	55,3225806	81,25	86,4661654	96,1538462	97,8965321	99,9187164	90,44163592	80,3185276	85,38008176
HOSP 1950 + 2900	Premium	H-1950-2900-p	92,8571429	66,1290323	75	92,1341816	92,3076923	96,8447982	100	89,07166802	86,32872504	87,70019653
TECH 2950 + 1950	Basic	T-1950-2950-b	60	64,1148325	100	86,9565217	66,6666667	100	81,2765957	88,4057971	68,46380943	78,43480326
TECH 2950 + 1950	Advanced	T-1950-2950-a	60	64,1148325	100	100	100	100	74,4680851	100	66,19430588	83,09715294
TECH 2950 + 1950	Premium	T-1950-2950-p	100	100	75	86,0869565	100	51,2036435	100	78,07265	100	89,036325

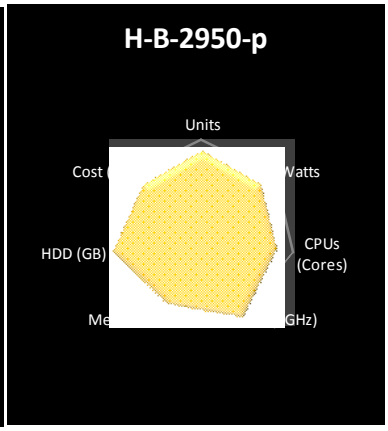


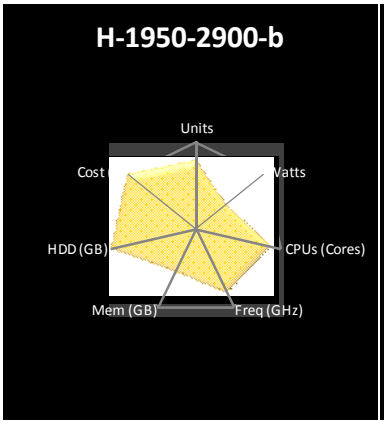


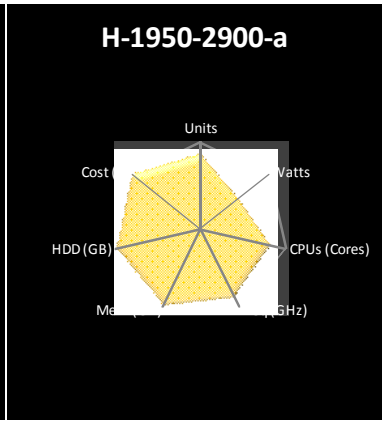


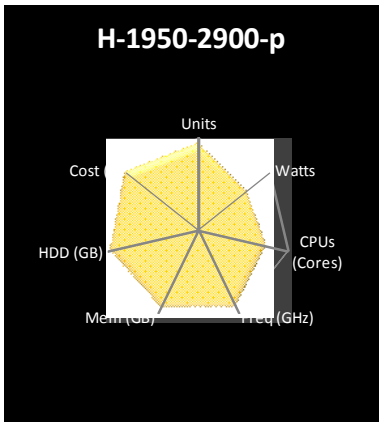


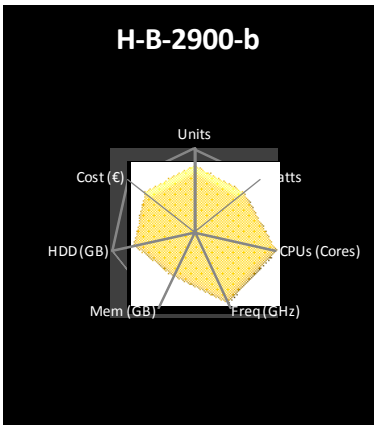


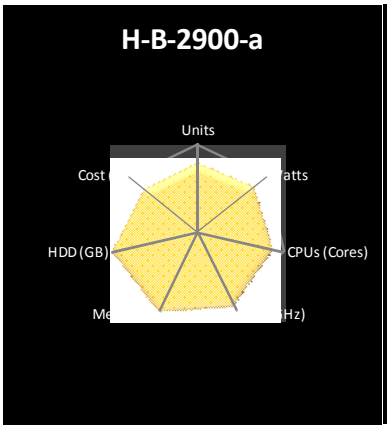


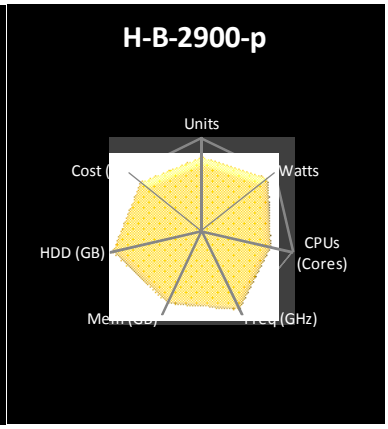


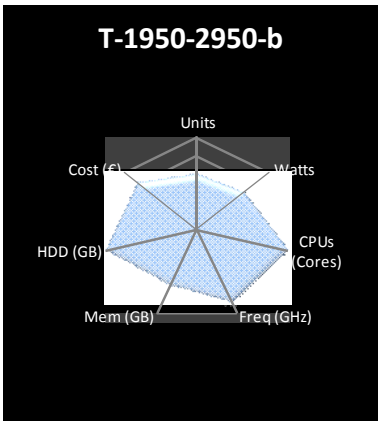


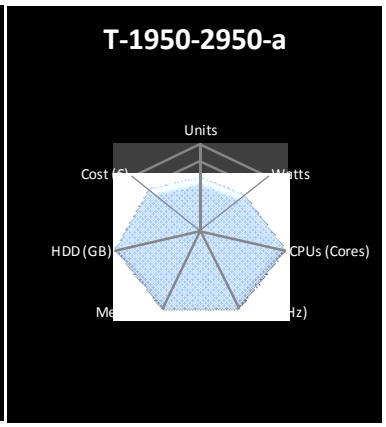


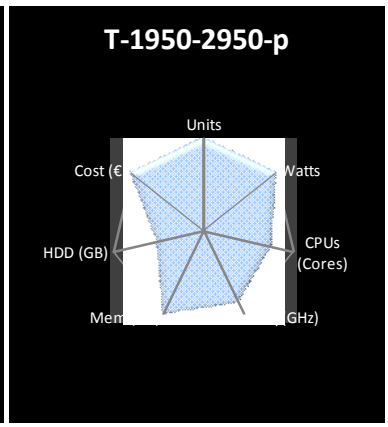

H-B-2900-b
Units
Cost (€)
Watts
HDD (GB)
CPUs (Cores)
Mem (GB)
Freq (GHz)

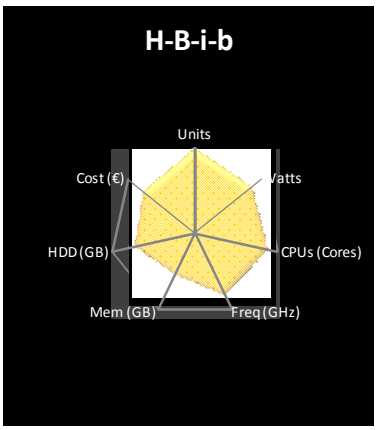

H-B-2900-a
Units
HDD (GB)
CPUs (Cores)

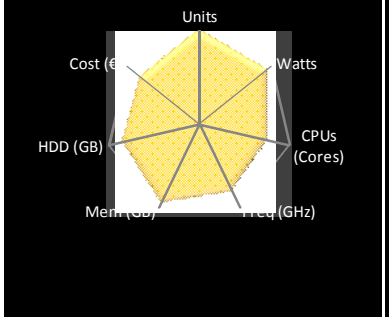

H-B-2900-p
Units
Watts
HDD (GB)
CPUs
(Cores)

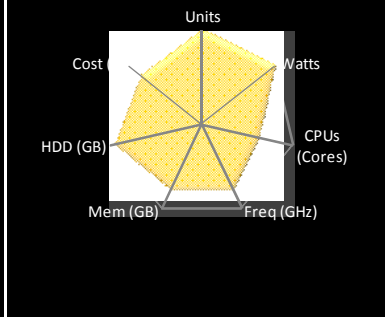

T-1950-2950-b
Units
Watts
HDD (GB)
CPUs
(Cores)
Mem (GB)
Freq (GHz)

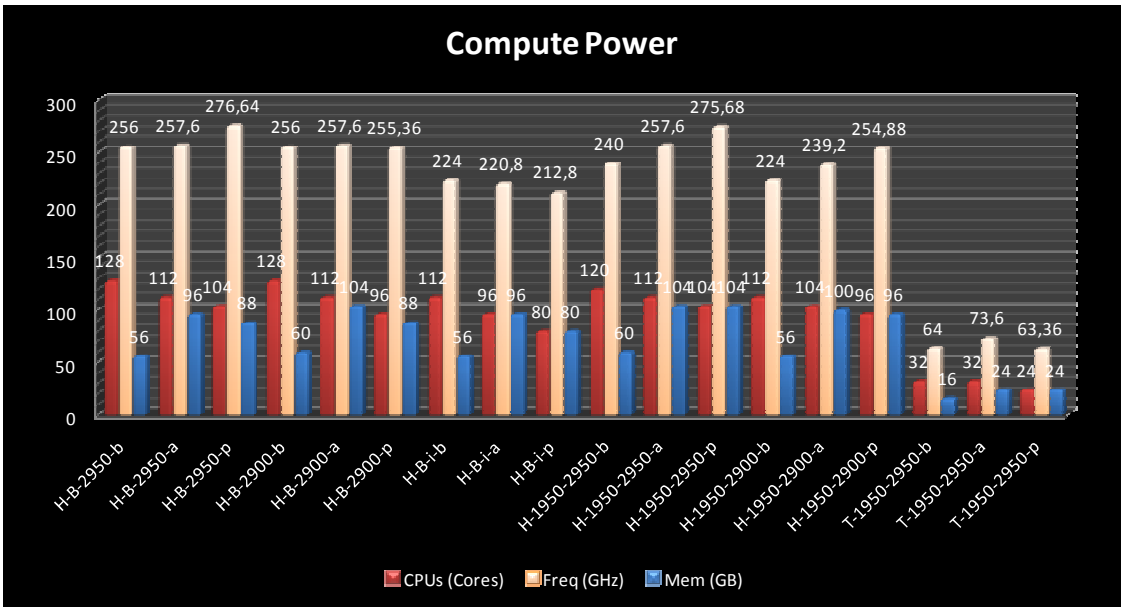

T-1950-2950-a
Units
HDD (GB)
CPUs (Cores)

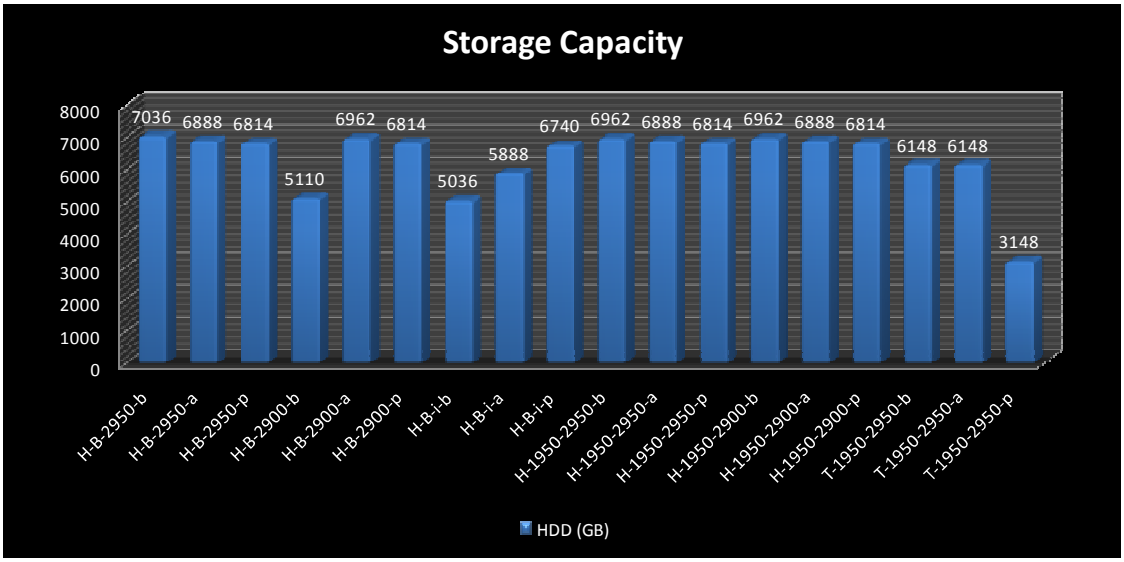

T-1950-2950-p
Units
Watts
HDD (GB)
CPUs
(Cores)


H-B-i-b
Units
Cost (€)
HDD (GB)
CPUs (Cores)
Mem (GB)
Freq (GHz)


H-B-i-a
Units
Watts
HDD (GB)
CPUs
(Cores)


H-B-i-p
Units
Watts
HDD (GB)
CPUs
(Cores)
Mem (GB)
Freq (GHz)


Compute Power
300
250
200
150
100
50
0
256 257,6 276,64 256 257,6 255,36 224 220,8 212,8 240 257,6 275,68 224 239,2 254,88
128 56 112 96 104 88 128 60 112 104 96 88 112 56 96 96 80 80 120 60 112 104 104 104 112 56 104 100 96 96 32 16 32 24 24 24
H-B-2950-b
H-B-2950-a
H-B-2950-p
H-B-2900-b
H-B-2900-a
H-B-2900-p
H-B-i-b
H-B-i-a
H-B-i-p
H-1950-2950-b
H-1950-2950-a
H-1950-2950-p
H-1950-2900-b
H-1950-2900-a
H-1950-2900-p
T-1950-2950-b
T-1950-2950-a
T-1950-2950-p
CPUs (Cores)
Freq (GHz)
Mem (GB)


Storage Capacity
8000
7000
6000
5000
4000
3000
2000
1000
0
7036 6888 6814 5110 6962 6814 5036 5888 6740 6962 6888 6814 6962 6888 6814 6148 6148 3148
H-B-2950-b
H-B-2950-a
H-B-2950-p
H-B-2900-b
H-B-2900-a
H-B-2900-p
H-B-i-b
H-B-i-a
H-B-i-p
H-1950-2950-b
H-1950-2950-a
H-1950-2950-p
H-1950-2900-b
H-1950-2900-a
H-1950-2900-p
T-1950-2950-b
T-1950-2950-a
T-1950-2950-p
HDD (GB)


Cost & Requirements
100000
10000
1000
100
10
1
34665 33785 34068 35540 34725 33073 34719,2 33949,5 33104,5 29083 29154 29291 28358 28319 28296
8104 7664 7444 7754 7314 6874 7080 6640 6200 10210 9540 8870 9640 8970 8300 8649 9145 7285
16 16 16 17 17 17 14 14 14 19 18 17 17 16 15 7 7 5 2840 2840 2090
H-B-2950-b
H-B-2950-a
H-B-2950-p
H-B-2900-b
H-B-2900-a
H-B-2900-p
H-B-i-b
H-B-i-a
H-B-i-p
H-1950-2950-b
H-1950-2950-a
H-1950-2950-p
H-1950-2900-b
H-1950-2900-a
H-1950-2900-p
T-1950-2950-b
T-1950-2950-a
T-1950-2950-p
Units
Watts
Cost (€)

HOSP Blade + 2950 Series

	Unit Price	Cuantity	Price	CPU	MEM	DISK	CPU*Freq	Watts
Blade Enclosure	5435	1	5435	0	0	0	0	3524
Connectivity	1185	2	2370	0	0	0	0	0
Blade Basic	1600	14	22400	112	56	1036	224	3080
Power Edge 2950 Basic	2230	2	4460	16	0	6000	32	1500
Total			34665	128	56	7036	256	8104
Rack Units		16		Number of Cores	GB	GB	Ratio	Watts

	Unit Price	Cuantity	Price	CPU	MEM	DISK	CPU*Freq	Watts
Blade Enclosure	5435	1	5435	0	0	0	0	3524
Connectivity	1185	2	2370	0	0	0	0	0
Blade Advanced	1775	12	21300	96	96	888	220,8	2640
Power Edge 2950 Advanced	2340	2	4680	16	0	6000	36,8	1500
Total			33785	112	96	6888	257,6	7664
Rack Units		16		Number of Cores	GB	GB	Ratio	Watts

	Unit Price	Cuantity	Price	CPU	MEM	DISK	CPU*Freq	Watts
Blade Enclosure	5435	1	5435	0	0	0	0	3524
Connectivity	1185	2	2370	0	0	0	0	0
Blade Premium	1933	11	21263	88	88	814	234,08	2420
Power Edge 2950 Premium	2500	2	5000	16	0	6000	42,56	1500
Total			34068	104	88	6814	276,64	7444
Rack Units		16		Number of Cores	GB	GB	Ratio	Watts

+ Moderated space requirement
+ Moderated power consumption
+ 11 WN units

- 2 DPM 3 TBytes each,
- DPM can not be upgraded

Note: Best Configuration: Advanced

HOSP Blade + 2900 Series

	Unit Price	Cuantity	Price	CPU	MEM	DISK	CPU*Freq	Watts
Blade Enclosure	5435	1	5435	0	0	0	0	3524
Connectivity	1185	2	2370	0	0	0	0	0
Blade Basic	1600	15	24000	120	60	1110	240	3300
Power Edge 2900 Basic	3735	1	3735	8	0	4000	16	930
Total			35540	128	60	5110	256	7754
Rack Units		17		Number of Cores	GB	GB	Ratio	Watts

	Unit Price	Cuantity	Price	CPU	MEM	DISK	CPU*Freq	Watts
Blade Enclosure	5435	1	5435	0	0	0	0	3524
Connectivity	1185	2	2370	0	0	0	0	0
Blade Advanced	1775	13	23075	104	104	962	239,2	2860
Power Edge 2900 Advanced	3845	1	3845	8	0	6000	18,4	930
Total			34725	112	104	6962	257,6	7314
Rack Units		17		Number of Cores	GB	GB	Ratio	Watts

	Unit Price	Cuantity	Price	CPU	MEM	DISK	CPU*Freq	Watts
Blade Enclosure	5435	1	5435	0	0	0	0	3524
Connectivity	1185	2	2370	0	0	0	0	0
Blade Premium	1933	11	21263	88	88	814	234,08	2420
Power Edge 2900 Premium	4005	1	4005	8	0	6000	21,28	930
Total			33073	96	88	6814	255,36	6874
Rack Units		17		Number of Cores	GB	GB	Ratio	Watts

+ Moderated space requirement
+ Moderated power consumption
+ 1 DPM unit of 6 TBytes,
+ DPM can be upgraded
+ 11 WN

Note: Best Configuration: Advanced

HOSP Blade + iSCSI Series

	Unit Price	Cuantity	Price	CPU	MEM	DISK	CPU*Freq	Watts
Blade Enclosure	5435	1	5435	0	0	0	0	3524
Connectivity	1185	2	2370	0	0	0	0	0
Blade Basic	1600	14	22400	112	56	1036	224	3080
iSCSI Basic	4514,2	1	4514,2	0	0	4000	0	476
Total			34719,2	112	56	5036	224	7080
Rack Units		14		Number of Cores	GB	GB	Ratio	Watts

	Unit Price	Cuantity	Price	CPU	MEM	DISK	CPU*Freq	Watts
Blade Enclosure	5435	1	5435	0	0	0	0	3524
Connectivity	1185	2	2370	0	0	0	0	0
Blade Advanced	1775	12	21300	96	96	888	220,8	2640
iSCSI Advanced	4844,5	1	4844,5	0	0	5000	0	476
Total			33949,5	96	96	5888	220,8	6640
Rack Units		14		Number of Cores	GB	GB	Ratio	Watts

	Unit Price	Cuantity	Price	CPU	MEM	DISK	CPU*Freq	Watts
Blade Enclosure	5435	1	5435	0	0	0	0	3524
Connectivity	1185	2	2370	0	0	0	0	0
Blade Premium	1933	10	19330	80	80	740	212,8	2200
iSCSI Premium	5969,5	1	5969,5	0	0	6000	0	476
Total			33104,5	80	80	6740	212,8	6200
Rack Units		14		Number of Cores	GB	GB	Ratio	Watts

+ Moderated space requirement
+ Moderated power consumption
+ 1 or 2 DPM units for 6 TBytes total,
+ DPM (Data Stored with EMC) can be upgraded UP TO 9 TBytes

- 7 WN units

Note: This option is the most flexible, all servers are inside the Blade Enclosure.

HOSP 1950 + 2950 Series

	Unit Price	Cuantity	Price	CPU	MEM	DISK	CPU*Freq	Watts
Power Edge 2950 Basic	2230	2	4460	16	8	6000	32	1500
Connectivity	579	2	1158	0	0	0	0	0
Power Edge 1950 Basic	1805	13	23465	104	52	962	208	8710
Total			29083	120	60	6962	240	10210
Rack Units		19		Number of Cores	GB	GB	Ratio	Watts
	Unit Price	Cuantity	Price	CPU	MEM	DISK	CPU*Freq	Watts
Power Edge 2950 Advanced	2340	2	4680	16	8	6000	36,8	1500
Connectivity	579	2	1158	0	0	0	0	0
Power Edge 1950 Advanced	1943	12	23316	96	96	888	220,8	8040
Total			29154	112	104	6888	257,6	9540
Rack Units		18		Number of Cores	GB	GB	Ratio	Watts
	Unit Price	Cuantity	Price	CPU	MEM	DISK	CPU*Freq	Watts
Power Edge 2950 Premium	2500	2	5000	16	16	6000	41,6	1500
Connectivity	579	2	1158	0	0	0	0	0
Power Edge 1950 Premium	2103	11	23133	88	88	814	234,08	7370
Total			29291	104	104	6814	275,68	8870
Rack Units		17		Number of Cores	GB	GB	Ratio	Watts

+ Moderated space requirement
+ 10 WN units

- High power consumption
- 2 DPM units of 3 TBytes each, DPM can not be upgraded

Note: Best Configuration: Advanced

HOSP 1950 + 2900 Series

	Unit Price	Cuantity	Price	CPU	MEM	DISK	CPU*Freq	Watts
Power Edge 2900 Basic	3735	1	3735	8	4	6000	16	930
Connectivity	579	2	1158	0	0	0	0	0
Power Edge 1950 Basic	1805	13	23465	104	52	962	208	8710
Total			28358	112	56	6962	224	9640
Rack Units		17		Number of Cores	GB	GB	Ratio	Watts
	Unit Price	Cuantity	Price	CPU	MEM	DISK	CPU*Freq	Watts
Power Edge 2900 Advanced	3845	1	3845	8	4	6000	18,4	930
Connectivity	579	2	1158	0	0	0	0	0
Power Edge 1950 Advanced	1943	12	23316	96	96	888	220,8	8040
Total			28319	104	100	6888	239,2	8970
Rack Units		16		Number of Cores	GB	GB	Ratio	Watts
	Unit Price	Cuantity	Price	CPU	MEM	DISK	CPU*Freq	Watts
Power Edge 2900 Premium	4005	1	4005	8	8	6000	20,8	930
Connectivity	579	2	1158	0	0	0	0	0
Power Edge 1950 Premium	2103	11	23133	88	88	814	234,08	7370
Total			28296	96	96	6814	254,88	8300
Rack Units		15		Number of Cores	GB	GB	Ratio	Watts

+ Moderated space requirement
+ 1 DPM unit of 6 TBytes,
+ DPM can be upgraded
+ 11 WN

- High power consumption

TECH 1950 + 2950 Series

	Unit Price	Cuantity	Price	CPU	MEM	DISK	CPU*Freq	Watts
Power Edge 2950 Basic	2230	2	4460	16	8	6000	32	1500
Connectivity	579	1	579	0	0	0	0	0
Power Edge 1950 Basic	1805	2	3610	16	8	148	32	1340
Total			8649	32	16	6148	64	2840
Rack Units		7		Number of Cores	GB	GB	Ratio	Watts
	Unit Price	Cuantity	Price	CPU	MEM	DISK	CPU*Freq	Watts
Power Edge 2950 Advanced	2340	2	4680	16	8	6000	36,8	1500
Connectivity	579	1	579	0	0	0	0	0
Power Edge 1950 Advanced	1943	2	3886	16	16	148	36,8	1340
Total			9145	32	24	6148	73,6	2840
Rack Units		7		Number of Cores	GB	GB	Ratio	Watts
	Unit Price	Cuantity	Price	CPU	MEM	DISK	CPU*Freq	Watts
Power Edge 2950 Premium	2500	1	2500	8	8	3000	20,8	750
Connectivity	579	1	579	0	0	0	0	0
Power Edge 1950 Premium	2103	2	4206	16	16	148	42,56	1340
Total			7285	24	24	3148	63,36	2090
Rack Units		5		Number of Cores	GB	GB	Ratio	Watts

- Disk Space can not be upgraded, the space is 3 TBytes

Note:
.This option offers flexibility and a good ratio between power, price and space
. Best Option: Premium

11. Annex 2 – neuGRID Hardware Tests Template

neuGRID Hardware Tests

This section describes a group of test suites. Basically, these suites concerns hardware tests. Their goal is to show that it has an expected behavior. Otherwise, any problems or unexpected behavior must be remarked.

Performed hardware tests include visual inspections and system tests. Moreover, this document shows basic tests for the hardware specifications, general requirements for system and data disk, the available documentation and requests a brief summary about server status.

Following is an explanation of all of these tests, elaborating on their motivation and validation procedure.

Visual Tests

This section describes an exhaustive visual inspection of all provided material. The purpose is to detect physical failures or absence of components. In addition, a visual test of the server's configuration is also demanded. The status of these tests must be PASSED or NOT PASSED.

A check of the delivery to ensure the conveyance of all requested material (such as keys, configuration sheet, power cords and documentation) is provided with the server. No reported problems are marked as PASSED. Otherwise, a brief remark should be done.

Server
Passed / NOT Passed

A visual inspection of the server (inside and outside), with a particular emphasis on cabling. No reported problems are marked as PASSED. Otherwise, a brief remark should be done.

Server
Passed / NOT Passed

A check of the configuration of the server to ensure all components are properly installed, recognized and configured. No reported problems are marked as PASSED. Otherwise, a brief remark should be done.

Server
Passed / Not Passed

System Tests

The purpose of these tests is to detect hardware failures. A bad device or wrong configuration can cause an assortment of different problems on a computer. Therefore, some guidelines are given in order to detect hardware failures. Moreover, the hardware performance should be measured to ensure the correct functioning of the hardware.

A basic check of the entire system, including data disks, to ensure correct cabling and connectivity.

Server
Passed / Not Passed

Memory Test: A good choice for testing computer memory is Memtest86+. This is software designed to stress test an x86-compatible computer's random access memory (RAM). It tries to verify that the RAM will accept and correctly retain arbitrary patterns of data written to it. In particular, Memtest86+ writes a series of test patterns to every memory address, reads back the data written, and compares it for errors. With many chipsets, Memtest86+ allows the counting of failures even in error-correcting ECC DRAM. No reported problems are marked as PASSED. Otherwise, a brief remark should be done.

Server
Passed / Not Passed

Installation of the Scientific Linux 5.2 32 Bits Linux distribution: Hardware must be recognized by kernel, and a basic configuration must be carried out. Take special care in RAID and network cards detection. No reported problems are marked as PASSED. Otherwise, a brief remark should be done.

Server
Passed / Not Passed

Hard Drive Performance: Hard drive performance tests were applied to the RAID disk volumes of Server using BONNIE[14]. BONNIE is a benchmark suite that is aimed at performing a number of simple tests of hard drive and file system performance.

[14] http://www.coker.com.au/bonnie++/

Tests to be applied are:

Sequential Output (Write Test):

Block: The file is created using write. The CPU overhead should be just the OS file space allocation.

Rewrite: Each block of the file is read with read, dirtied, and rewritten with write, requiring an lseek. Since no space allocation is done, and the I/O is well-localized, this should test the effectiveness of the filesystem cache and the speed of data transfer.

Sequential Input (Read Test):

Block: The file is read using read. This should be a pure test of sequential input performance

Random Seeks

This test runs three SeekProcCount processes in parallel, doing a total of 8000 lseeks to locations in the file specified by a random function. In each case, the block is read with read. In 10% of cases, it is dirtied and written back with write.

Network Performance Tests: The measurement and recording of a network's state of operation over a period of time must be performed. These tests should detect bottlenecks, congestion networks and/or other problems related to networks.

A useful network analyser is Gensink. This consists of a pair of utilities that measure the performance of a TCP connection between two hosts. Gensink is a simple tcp benchmark program. This has been used for testing network performances. This software generates random network traffic, not related to the hard drive, in order to generate the maximum possible data in the network card. No reported problems are marked as PASSED. Otherwise, a brief remark should be done. The average speed should be indicated in the report.

Hardware Specifications

This section provides basic information about hardware. This summarizes the hardware specifications and ensures that all material is valid for use. This section completes hardware and visual tests sections.

Chassis, Power Supply, Cooling and Serial Number.

	Worker Node Server
Chassis	Passed / Not Passed
Power Supply	Passed / Not Passed
Cooling	Passed / Not Passed
Serial Number	XXXXXXXX

Server shall be housed in a rack mountable 19” chassis at 100cm deep and 12U high. The chassis must be provided with sliding rails for 19” racks and have easily accessible power on/off and reset buttons and a power LED.

Server
Passed / Not Passed

The server chassis shall provide locking solution that locks the chassis cover closed to protect internal components and guarantee the air flux for correct cooling.

Server
Passed / Not Passed

Dual redundant power supplies are required. Server must be able to restart properly even if one power supply module is not working.

Server
Passed / Not Passed

The required number of flame-retardant (rated IEC 332-1) and halogen-free (PVC is excluded) appropriate power cord must be supplied.

Server
Passed / Not Passed

Server must have a unique serial number on the rear of the chassis that is clearly visible when the chassis is installed in a rack. If additional information is provided with the serial number, this information must be written in English.

Server
XXXXXXXXX

Two Dual Core 2 or One Quad Core Intel Xeon processors are required.

Server

Server shall be equipped with a SVGA video, keyboard and mouse ports. Servers shall be supplied without keyboard, mouse and video screen.

Server
Passed / Not Passed

Connection for SVGA video, keyboard and mouse present in front and rear of server. Keyboard and mouse must be USB type.

The server must be able to boot Linux without keyboard, screen or mouse attached.

Server
Passed / Not Passed

Servers must have at least 4 GBytes of RAM. The supplier is responsible for providing modules that are compatible with the motherboard and for testing them with the diagnostic diskette of the motherboard manufacturer. Proof of such a test must be provided for each machine.

Server
Passed / Not Passed

Server must have 2 copper Gigabit Ethernet interface for data access.

Server
Passed / Not Passed

Remote administration card: The server must be shipped with a remote administration card, the mandatory properties are:

To be capable of interaction at BIOS level with the hardware.

Server
Passed / Not Passed

To be configurable through a TCP/IP network, and provide software client with remote administration of the server.

Server
Passed / Not Passed

General Requirements for System and Data Disks

All hard disks shall have a rotational speed of at least 7200 RPM.

Server
Passed / Not Passed

All disks must be installed in hot swap disk trays. It must be possible to extract these disk trays while the server chassis remains in its place in the 19" rack in which it is installed.

Server
Passed / Not Passed

System Disks: Two dedicated system disks of at least 20 GB each are required for the installation of the Linux Operating system. These system disks must be configured as a mirrored set using hardware mirroring.

Worker Node Server
Passed

Documentation

The server must be delivered with a set of manuals in English comprising:

Documentation	Server
The chassis and power supply manual	Passed / Not Passed
The Raid hardware manual.	Passed / Not Passed
The gigabit card manual.	Passed / Not Passed
The motherboard manual.	Passed / Not Passed
The disk's led manual	Passed / Not Passed
The complete warranty including and all the terms and conditions.	Passed / Not Passed

Status

This section provides a brief summary of server state. This shows all detected problems and/or any remark about components server.

12. Annex 3 – GCC Hardware Tests

neuGRID Central Services – Worker Node 1

Hardware Tests

This section describes the hardware and visual tests that should be performed to validate the neuGRID Central Services servers. These servers were purchased by maat Gknowledge, for facilitating the deployment logistic and effort.

Visual Tests

A check of the delivery to ensure that all requested material (such as keys, configuration sheet, power cords and documentation) has been provided with the server.

Worker Node Server
Passed.

All documentation is OK and two power cords are included for each server.

A visual inspection of the server (inside and outside), with a particular emphasis on cabling.

Worker Node Server
Passed

Both servers are in perfect state outside and inside, making special remarks in the professional assembly. The internal cabling and elements to ensure correct airflow between components are properly installed. CPU's and RAM are inside an airflow circuit in order to ensure correct cooling.

A check of the configuration of the server to ensure all components are properly installed recognized and configured.

Worker Node Server
Passed

BIOS recognizes RAM installed properly and RAID card recognizes hard drives properly in both servers.

System Tests

A basic check of all system, including data disks to ensure correct cabling and connectivity.

Worker Node Server

Passed

Memory testing using Memtest86+ v2.0.1. This test will be performed using the bootable iso image available at http://www.memtest86.org.

Worker Node Server
Passed

Memory tests have been applied during 14 hours and no errors were found. Full test has been executed several times during these 14 hours.

Worker Node Server
Passed

Installation of the Scientific Linux 5.1 32 Bits Linux distribution.

Worker Node Server
Passed

Operating system has been installed without any problems, hardware is well recognized by Kernel, and works perfectly, including RAID card and Ethernet cards.

Hard drive performance tests were applied to the RAID disk volumes of the neuGRID Central Services Server using BONNIE[15]. BONNIE is a benchmark suite that is aimed at performing a number of simple tests of hard drive and file system performance.

Tests to be applied are:

Sequential Output (Write Test):

Block: The file is created using write. The CPU overhead should be just the OS file space allocation.

Rewrite: Each block of the file is read with read, dirtied, and rewritten with write, requiring an lseek. Since no space allocation is done, and the I/O is well-localized, this should test the effectiveness of the filesystem cache and the speed of data transfer.

Sequential Input (Read Test):

Block: The file is read using read. This should be a pure test of sequential input performance

Random Seeks

[15] http://www.coker.com.au/bonnie++/

This test runs three SeekProcCount processes in parallel, doing a total of 8000 lseeks to locations in the file specified by a random function. In each case, the block is read with read. In 10% of cases, it is dirtied and written back with write.

Results obtained for Worker Node unit

		Sequential Output				Sequential Input		Random	
	Size:Chunk Size	Block		Rewrite		Block		Seeks	
		K/sec	% CPU	K/sec	% CPU	K/sec	% CPU	/ sec	% CPU
dell-1950-1	16G	92787	21	49576	10	135870	15	519.2	0
dell-1950-1	16G	91955	22	51032	10	122783	6	556.2	1

These results indicate that the RAID volume, formatted under ext3, can write at 90 Mega Bytes per second, rewrite 49 Mega Bytes per second, read 126,3 Mega Bytes per second and perform an average of 510 – 570 random seeks per second.

Network Performance Tests: GENSINK has been used for testing network performances. GENSINK generates random network traffic, not related to the hard drive, in order to generate the maximum possible data in the network card.

The Annex: "Results of neuGRID Central Services – Worker Node 1 test" shows the network performance results obtained on this server. Network cards perform at an average speed of 117'750 KiloBytes/sec (919.922 Megabits/sec). Despite of this, performances remain very high.

Hardware Specifications

Chassis, Power Supply, Cooling and Serial Number.

	Worker Node Server
Chassis	Passed
Power Supply	Passed
Cooling	Passed
Serial Number	CKWZM3J

neuGRID Central Services Server shall be housed in a rack mountable 19" chassis at 100cm deep and 12U high. The chassis must be provided with sliding rails for 19" racks and have easily accessible power on/off and reset buttons and a power LED.

Worker Node Server
Passed

The server chassis shall provide locking solution that locks the chassis cover closed to protect internal components and guarantee the air flux for a correct cooling.

Worker Node Server
Passed

Dual redundant power supplies are required. The neuGRID Central Services Server must be able to restart properly even if one power supply module is not working.

Worker Node Server
Passed

The server has two redundant power supplies. Servers work properly with only one of them. The unit should be delivered with UPS that assures continuous operation in case of power cut (15 minutes) and proper system shutdown in an event of longer power cut.

Worker Node Server
Passed

UPS Service is provided by the IT Center.

The required number of flame-retardant (rated IEC 332-1) and halogen-free (PVC is excluded) appropriate power cord must be supplied.

Worker Node Server
Passed

neuGRID Central Services Server must have a unique serial number on the rear of the chassis that is clearly visible when the chassis is installed in a rack. If additional information is provided with the serial number, this information must be written in English.

Worker Node Server
CKWZM3J

One Dual Core 2 or One Quad Core Intel Xeon processors are required.

Worker Node Server
Two Quad Core Intel(R) Xeon(R) CPU E5410 2.33GHz

Server shall be equipped with a SVGA video, keyboard and mouse ports. Servers shall be supplied without keyboard, mouse and video screen.

Worker Node Server
Passed

Connection for SVGA video, keyboard and mouse present in front and rear of server. Keyboard and mouse must be USB type.

The server must be able to boot Linux without keyboard, screen or mouse attached.

Worker Node Server
Passed

Servers must have at least 4 GBytes of RAM. The supplier is responsible for providing modules that are compatible with the motherboard and for testing them with the diagnostic diskette of the motherboard manufacturer. Proof of such a test must be provided for each machine.

Worker Node Server
Passed

The server has 8 GBytes of RAM.

Network interface: neuGRID Central Services Server must have 4 copper Gigabit Ethernet interface for data access.

Worker Node Server
Passed

The server has 2 Gigabit Ethernet cards

Remote administration card: The server must be shipped with a remote administration card, the mandatory properties are:

To be capable to interact at BIOS level with the hardware.

Worker Node Server
Passed

Server has DRAC5 (Dell Remote Access Card) installed. Provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allow to start, stop and restart the server remotely.

To be configurable through a TCP/IP network, and provide software client to remote administration of the server.

Worker Node Server
Passed

Server has a DRAC5 (Dell Remote Access Card) installed. This card provides the necessary tools and functionality to monitor, troubleshoots, and repair server. Allow to start, stop and restart the server remotely and mounting remote iso images of floppy disks and cd.

General Requirements for System and Data Disks

All hard disks shall have a rotational speed of at least 7200 RPM.

Worker Node Server
Passed

Worker Node Server:

2 HDD of 73GB sata 7200 RPM (system RAID1)

All disks must be installed in hot swap disk trays. It must be possible to extract these disk trays while the server chassis remains in its place in the 19" rack in which it is installed.

Worker Node Server
Passed

All disks are hot swapable. Hot extraction of one of the disk has been tested without stopping the server. The server has been working without a disk for a short time, then the disk has been reintroduced and the raid successfully restored without human intervention.

System Disks: Two dedicated system disks of at least 20 GB each are required for installation of the Linux Operating system. These system disks must be configured as a mirrored set using hardware mirroring.

Worker Node Server
Passed

This server was delivered with two hard drives of 73 GB each one mounted under hardware RAID1.

Documentation

The server must be delivered with a set of manuals in English comprising:

Documentation	Worker Node Server
The chassis and power supply manual	Passed
The Raid hardware manual.	Passed
The gigabit card manual.	Passed
The motherboard manual.	Passed
The disk's led manual	Passed
The complete guaranty including and all the terms and conditions.	Passed

Status

Remote Management

The DRAC card for remote access and management of the server works perfectly well. It can however be noted that sometimes DRACs do not close connections properly and therefore require a physical reset. This problem can apparently be solved by upgrading the DRAC firmware.

neuGRID Central Services – Worker Node 2

Hardware Tests

This section describes the hardware and visual tests that should be performed to validate the neuGRID Central Services servers. These servers were purchased by maat Gknowledge, for facilitating the deployment logistic and effort.

Visual Tests

- A check of the delivery to ensure that all requested material (such as keys, configuration sheet, power cords and documentation) has been provided with the server.

Worker Node Server
Passed.

All documentation is OK and two power cords are included for each server.

- A visual inspection of the server (inside and outside), with a particular emphasis on cabling.

Worker Node Server
Passed

Both servers are in perfect state outside and inside, making special remarks in the professional assembly. The internal cabling and elements to ensure correct airflow between components are properly installed. CPU's and RAM are inside an airflow circuit in order to ensure the correct cooling.

- A check of the configuration of the server to ensure all components are properly installed, recognized and configured.

Worker Node Server
Passed

BIOS recognizes RAM installed properly and RAID card recognizes hard drives properly in both servers.

System Tests

- A basic check of the entire system, including data disks, to ensure correct cabling and connectivity.

Worker Node Server
Passed

- Memory testing using Memtest86+ v2.0.1. This test will be performed using the bootable iso image available at http://www.memtest86.org.

Worker Node Server
Passed

Memory tests have been applied during 14 hours and no errors were found. Full test has been executed several times during these 14 hours.

Worker Node Server
Passed

- Installation of the Scientific Linux 5.1 32 Bits Linux distribution.

Worker Node Server
Passed

Operating system has been installed without any problems, hardware is well recognized by Kernel, and works perfectly, including RAID card and Ethernet cards.

- Hard drive performance tests were applied to the RAID disk volumes of the neuGRID Central Services Server using BONNIE[16]. BONNIE is a benchmark suite that is aimed at performing a number of simple tests of hard drive and file system performance.

  Tests to be applied are:

  - Sequential Output (Write Test):
    - Block: The file is created using write. The CPU overhead should be just the OS file space allocation.
    - Rewrite: Each block of the file is read with read, dirtied, and rewritten with write, requiring an lseek. Since no space allocation is done, and the I/O is well-localized, this should test the effectiveness of the filesystem cache and the speed of data transfer.
  - Sequential Input (Read Test):
    - Block: The file is read using read. This should be a pure test of sequential input performance

[16] http://www.coker.com.au/bonnie++/

- Random Seeks
  - This test runs three SeekProcCount processes in parallel, doing a total of 8000 lseeks to locations in the file specified by a random function. In each case, the block is read with read. In 10% of cases, it is dirtied and written back with write.

Results obtained for Worker Node unit

		Sequential Output				Sequential Input		Random	
	Size:Chunk Size	Block		Rewrite		Block		Seeks	
		K/sec	% CPU	K/sec	% CPU	K/sec	% CPU	/ sec	% CPU
dell-1950-2	16G	90329	20	49747	10	133356	15	463.1	0
dell-1950-2	16G	90402	22	49999	10	125353	15	510.0	0

These results indicate that the RAID volume, formatted under ext3, can write at 89 Mega Bytes per second, rewrite 48,6 Mega Bytes per second, read 126,3 Mega Bytes per second and perform an average of 450 – 530 random seeks per second.

- Network Performance Tests: GENSINK has been used for testing network performances. GENSINK generates random network traffic, not related to the hard drive, in order to generate the maximum possible data in the network card.

The Annex: "Results of neuGRID Central Services – Worker Node 2 test" shows the network performance results obtained on this server. Network cards perform at an average speed of 117'750 KiloBytes/sec (919.922 Megabits/sec). The theoretical maximum speed is not reached as we use the drivers provided with the Xen Kernel. Despite of this, performances remain very high.

Hardware Specifications

- Chassis, Power Supply, Cooling and Serial Number.

	Worker Node Server
Chasis	Passed
Power Supply	Passed
Cooling	Passed
Serial Number	BKWZM3J

- neuGRID Central Services Server shall be housed in a rack mountable 19” chassis at 100cm deep and 12U high. The chassis must be provided with sliding rails for 19” racks and have easily accessible power on/off and reset buttons and a power LED.

Worker Node Server
Passed

- The server chassis shall provide locking solution that locks the chassis cover closed to protect internal components and guarantee the air flux for a correct cooling.

Worker Node Server
Passed

- Dual redundant power supplies are required. The neuGRID Central Services Server must be able to restart properly even if one power supply module is not working.

Worker Node Server
Passed

- The server has two redundant power supplies. Servers work properly with only one of them. The unit should be delivered with UPS that assures continuous operation in case of power cut (15 minutes) and proper system shutdown in an event of longer power cut.

Worker Node Server
Passed

UPS Service is provided by the IT Center.

- The required number of flame-retardant (rated IEC 332-1) and halogen-free (PVC is excluded) appropriate power cord must be supplied.

Worker Node Server
Passed

- neuGRID Central Services Server must have a unique serial number on the rear of the chassis that is clearly visible when the chassis is installed in a rack. If additional information is provided with the serial number, this information must be written in English.

Worker Node Server
BKWZM3J

- One Dual Core 2 or One Quad Core Intel Xeon processors are required.

Worker Node Server
Two Quad Core Intel(R) Xeon(R) CPU E5410 2.33GHz

- Server shall be equipped with a SVGA video, keyboard and mouse ports. Servers shall be supplied without keyboard, mouse and video screen.

Worker Node Server
Passed

Connection for SVGA video, keyboard and mouse present in front and rear of server. Keyboard and mouse must be USB type.

- The server must be able to boot Linux without keyboard, screen or mouse attached.

Worker Node Server
Passed

- Servers must have at least 4 GBytes of RAM. The supplier is responsible for providing modules that are compatible with the motherboard and for testing them with the diagnostic diskette of the motherboard manufacturer. Proof of such a test must be provided for each machine.

Worker Node Server
Passed

The server has 8 GBytes of RAM.

- Network interface: neuGRID Central Services Worker Node Server must have 2 copper Gigabit Ethernet interface for data access.

Worker Node Server
Passed

The server has 2 Gigabit Ethernet cards

- Remote administration card: The server must be shipped with a remote administration card, the mandatory properties are:

  - To be capable of interaction at BIOS level with the hardware.

Worker Node Server
Passed

Server has DRAC5 (Dell Remote Access Card) installed. Provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allow to start, stop and restart the server remotely.

  - To be configurable through a TCP/IP network, and provide software client to remote administration of the server.

Worker Node Server
Passed

Server has a DRAC5 (Dell Remote Access Card) installed. This card provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allows to start, stop and restart the server remotely and mounting remote iso images of floppy disks and cd.

General Requirements for System and Data Disks

- All hard disks shall have a rotational speed of at least 7200 RPM.

Worker Node Server
Passed

Worker Node Server:

2 HDD of 73GB sata 7200 RPM (system RAID1)

- All disks must be installed in hot swap disk trays. It must be possible to extract these disk trays while the server chassis remains in its place in the 19" rack in which it is installed

Worker Node Server
Passed

All disks are hot swapable. Hot extraction of one of the disks has been tested without stopping the server. The server has been working without a disk for a short time, then the disk has been reintroduced and the raid successfully restored without human intervention.

- System Disks: Two dedicated system disks of at least 20 GB each are required for installation of the Linux Operating system. These system disks must be configured as a mirrored set using hardware mirroring.

Worker Node Server
Passed

This server was delivered with two hard drives of 73 GB each one mounted under hardware RAID1.

Documentation

- The server must be delivered with a set of manuals in English comprising:

Documentation	Worker Node Server
The chassis and power supply manual	Passed
The Raid hardware manual.	Passed
The gigabit card manual.	Passed
The motherboard manual.	Passed
The disk's led manual	Passed
The complete guaranty including and all the terms and conditions.	Passed

Status

Remote Management

The DRAC card for remote access and management of the server works perfectly well. It can, however, be noted that sometimes DRACs do not close connections properly and therefore require a physical reset. This problem can apparently be solved by upgrading the DRAC firmware.

neuGRID Central Services – Worker Node 2

Hardware Tests

This section describes the hardware and visual tests that should be performed to validate the neuGRID Central Services servers. These servers were purchased by maat Gknowledge, for facilitating the deployment logistic and effort.

Visual Tests

- A check of the delivery to ensure that all requested material (such as keys, configuration sheet, power cords and documentation) has been provided with the server.

Worker Node Server
Passed.

All documentation is OK and two power cords are included for each server.

- A visual inspection of the server (inside and outside), with a particular emphasis on cabling.

Worker Node Server
Passed

Both servers are in perfect state outside and inside, making special remarks in the professional assembly. The internal cabling and elements to ensure correct airflow between components are properly installed. CPU's and RAM are inside an airflow circuit in order to ensure correct cooling.

- A check of the configuration of the server to ensure all components are properly installed, recognized and configured.

Worker Node Server
Passed

BIOS recognizes RAM installed properly and RAID card recognizes hard drives properly in both servers.

System Tests

- A basic check of the entire system, including data disks, to ensure correct cabling and connectivity.

Worker Node Server
Passed

- Memory testing using Memtest86+ v2.0.1. This test will be performed using the bootable iso image available at http://www.memtest86.org.

Worker Node Server
Passed

Memory tests have been applied during 14 hours and no errors were found. Full test has been executed several times during these 14 hours.

Worker Node Server
Passed

- Installation of the Scientific Linux 5.1 32 Bits Linux distribution.

Worker Node Server
Passed

Operating system has been installed without any problems, hardware is well recognized by Kernel, and works perfectly, including RAID card and Ethernet cards.

- Hard drive performance tests were applied to the RAID disk volumes of the neuGRID Central Services Server using BONNIE[17]. BONNIE is a benchmark suite that is aimed at performing a number of simple tests of hard drive and file system performance.

  Tests to be applied are:

  - Sequential Output (Write Test):
    - Block: The file is created using write. The CPU overhead should be just the OS file space allocation.
    - Rewrite: Each block of the file is read with read, dirtied, and rewritten with write, requiring an lseek. Since no space allocation is done, and the I/O is well-localized, this should test the effectiveness of the filesystem cache and the speed of data transfer.
  - Sequential Input (Read Test):

[17] http://www.coker.com.au/bonnie++/

- Block: The file is read using read. This should be a pure test of sequential input performance

o Random Seeks

- This test runs three SeekProcCount processes in parallel, doing a total of 8000 lseeks to locations in the file specified by a random function. In each case, the block is read with read. In 10% of cases, it is dirtied and written back with write.

Results obtained for Worker Node unit

		Sequential Output				Sequential Input		Random	
	Size:Chunk Size	Block		Rewrite		Block		Seeks	
		K/sec	% CPU	K/sec	% CPU	K/sec	% CPU	/ sec	% CPU
dell-1950-2	16G	90329	20	49747	10	133356	15	463.1	0
dell-1950-2	16G	90402	22	49999	10	125353	15	510.0	0

These results indicate that the RAID volume, formatted under ext3, can write at 89 Mega Bytes per second, rewrite 48,6 Mega Bytes per second, read 126,3 Mega Bytes per second and perform an average of 450 – 530 random seeks per second.

- Network Performance Tests: GENSINK has been used for testing network performances. GENSINK generates random network traffic, not related to the hard drive, in order to generate the maximum possible data in the network card.

The Annex: "Results of neuGRID Central Services – Worker Node 2 test" shows the network performance results obtained on this server. Network cards perform at an average speed of 117'750 KiloBytes/sec (919.922 Megabits/sec). The theoretical maximum speed is not reached as we use the drivers provided with the Xen Kernel. Despite of this, performances remain very high.

Hardware Specifications

- Chassis, Power Supply, Cooling and Serial Number.

	Worker Node Server
Chasis	Passed
Power Supply	Passed
Cooling	Passed

Serial Number	BKWZM3J

- neuGRID Central Services Server shall be housed in a rack mountable 19” chassis at 100cm deep and 12U high. The chassis must be provided with sliding rails for 19” racks and have easily accessible power on/off and reset buttons and a power LED.

Worker Node Server
Passed

- The server chassis shall provide a locking solution that locks the chassis cover closed to protect internal components and guarantee the air flux for correct cooling.

Worker Node Server
Passed

- Dual redundant power supplies are required. The neuGRID Central Services Server must be able to restart properly even if one power supply module is not working.

Worker Node Server
Passed

- The server has two redundant power supplies. Servers work properly with only one of them. The unit should be delivered with UPS that assures continuous operation in case of power cut (15 minutes) and proper system shutdown in an event of longer power cut.

Worker Node Server
Passed

UPS Service is provided by the IT Center.

- The required number of flame-retardant (rated IEC 332-1) and halogen-free (PVC is excluded) appropriate power cord must be supplied.

Worker Node Server
Passed

- neuGRID Central Services Server must have a unique serial number on the rear of the chassis that is clearly visible when the chassis is installed in a rack. If additional information is provided with the serial number, this information must be written in English.

Worker Node Server
BKWZM3J

- One Dual Core 2 or One Quad Core Intel Xeon processors are required.

Worker Node Server
Two Quad Core Intel(R) Xeon(R) CPU E5410 2.33GHz

- Server shall be equipped with a SVGA video, keyboard and mouse ports. Servers shall be supplied without keyboard, mouse and video screen.

Worker Node Server
Passed

Connection for SVGA video, keyboard and mouse present in front and rear of server. Keyboard and mouse must be USB type.

- The server must be able to boot Linux without keyboard, screen or mouse attached.

Worker Node Server
Passed

- Servers must have at least 4 GBytes of RAM. The supplier is responsible for providing modules that are compatible with the motherboard and for testing them with the diagnostic diskette of the motherboard manufacturer. Proof of such a test must be provided for each machine.

Worker Node Server
Passed

The server has 8 GBytes of RAM.

- Network interface: neuGRID Central Services Worker Node Server must have 2 copper Gigabit Ethernet interface for data access.

Worker Node Server
Passed

The server has 2 Gigabit Ethernet cards

- Remote administration card: The server must be shipped with a remote administration card, the mandatory properties are:

  - To be capable to interact at BIOS level with the hardware.

Worker Node Server
Passed

    Server has DRAC5 (Dell Remote Access Card) installed. Provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allows to start, stop and restart the server remotely.

  - To be configurable through a TCP/IP network, and provide software client with remote administration of the server.

Worker Node Server
Passed

    Server has a DRAC5 (Dell Remote Access Card) installed. This card provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allows to start, stop and restart the server remotely and mounting remote iso images of floppy disks and cd.

General Requirements for System and Data Disks

- All hard disks shall have a rotational speed of at least 7200 RPM.

Worker Node Server
Passed

Worker Node Server:

2 HDD of 73GB sata 7200 RPM (system RAID1)

- All disks must be installed in hot swap disk trays. It must be possible to extract these disk trays while the server chassis remains in its place in the 19" rack in which it is installed

Worker Node Server
Passed

All disks are hot swapable. Hot extraction of one of the disk has been tested without stopping the server. The server has been working without a disk for a short time, then the disk has been reintroduced and the raid successfully restored without human intervention.

- System Disks: Two dedicated system disks of at least 20 GB each are required for installation of the Linux Operating system. These system disks must be configured as a mirrored set using hardware mirroring

Worker Node Server
Passed

This server was delivered with two hard drives of 73 GB each one mounted under hardware RAID1.

Documentation

- The server must be delivered with a set of manuals in English comprising:

Documentation	Worker Node Server
The chassis and power supply manual	Passed
The Raid hardware manual.	Passed
The gigabit card manual.	Passed
The motherboard manual.	Passed
The disk's led manual	Passed
The complete guaranty including and all the terms and conditions.	Passed

Status

Remote Management

The DRAC card for remote access and management of the server works perfectly well. It can, however, be noted that sometimes DRACs do not close connections properly and therefore require a physical reset. This problem can apparently be solved by upgrading the DRAC firmware.

neuGRID Central Services – Core Server 1

Hardware Tests

This section describes the hardware and visual tests that should be performed to validate the neuGRID Central Services servers. These servers were purchased by maat Gknowledge, for facilitating the deployment logistic and effort.

Visual Tests

- A check of the delivery to ensure that all requested material (such as keys, configuration sheet, power cords and documentation) has been provided with the server.

Core Server
Passed.

All documentation is OK and two power cords are included for each server.

- A visual inspection of the server (inside and outside), with a particular emphasis on cabling.

Core Server
Passed

Both servers are in perfect state outside and inside, making special remarks in the professional assembly. The internal cabling and elements to ensure correct airflow between components are properly installed. CPU's and RAM are inside an airflow circuit in order to ensure correct cooling.

- A check of the configuration of the server to ensure all components are properly installed, recognized and configured.

Core Server
Passed

BIOS recognizes RAM installed properly and RAID card recognizes hard drives properly to in both servers.

System Tests

- A basic check of the entire system, including data disks, to ensure correct cabling and connectivity.

Core Server
Passed

- Memory testing using Memtest86+ v2.0.1. This test will be performed using the bootable iso image available at http://www.memtest86.org.

Core Server
Passed

Memory tests have been applied during 14 hours and no errors were found. Full test has been executed several times during these 14 hours.

Core Server
Passed

- Installation of the Scientific Linux 5.1 32 Bits Linux distribution.

Core Server
Passed

Operating system has been installed without any problems, hardware is well recognized by Kernel, and works perfectly, including RAID card and Ethernet cards.

- Hard drive performance tests were applied to the RAID disk volumes of the neuGRID Central Services Server using BONNIE[18]. BONNIE is a benchmark suite that is aimed at performing a number of simple tests of hard drive and file system performance.

  Tests to be applied are:

  - Sequential Output (Write Test):
    - Block: The file is created using write. The CPU overhead should be just the OS file space allocation.
    - Rewrite: Each block of the file is read with read, dirtied, and rewritten with write, requiring an lseek. Since no space allocation is done, and the I/O is well-localized, this should test the effectiveness of the filesystem cache and the speed of data transfer.
  - Sequential Input (Read Test):

[18] http://www.coker.com.au/bonnie++/

- Block: The file is read using read. This should be a pure test of sequential input performance

o Random Seeks

- This test runs three SeekProcCount processes in parallel, doing a total of 8000 lseeks to locations in the file specified by a random function. In each case, the block is read with read. In 10% of cases, it is dirtied and written back with write.

Results obtained for Core Server unit

		Sequential Output				Sequential Input		Random	
	Size:Chunk Size	Block		Rewrite		Block		Seeks	
		K/sec	% CPU	K/sec	% CPU	K/sec	% CPU	/ sec	% CPU
dell-2950-32	16G	44871	10	23094	5	55390	7	197.0	0
dell-2950-32	16G	45593	10	22842	5	55052	6	173.2	0

These results indicate that the RAID volume, formatted under ext3, can write at 44 Mega Bytes per second, rewrite 22,4 Mega Bytes per second, read 53,7 Mega Bytes per second and perform an average of 170 – 210 random seeks per second.

- Network Performance Tests: GENSINK has been used for testing network performances. GENSINK generates random network traffic, not related to the hard drive in order to generate the maximum possible data in the network card.

The Annex: "neuGRID Central Services - Core Server 1" shows the network performance results obtained on this server. Network cards perform at an average speed of 117'750 KiloBytes/sec (919.922 Megabits/sec). The theoretical maximum speed is not reached as we use the drivers provided with the Xen Kernel. Despite of this, performances remain very high.

Hardware Specifications

- Chassis, Power Supply, Cooling and Serial Number.

	Core Server
Chasis	Passed
Power Supply	Passed
Cooling	Passed
Serial Number	6310N3J

- neuGRID Central Services Server shall be housed in a rack mountable 19" chassis at 100cm deep and 12U high. The chassis must be provided with sliding rails for 19" racks and have easily accessible power on/off and reset buttons and a power LED.

Core Server
Passed

- The server chassis shall provide a locking solution that locks the chassis cover closed to protect internal components and guarantee the air flux for correct cooling.

Core Server
Passed

- Dual redundant power supplies are required. The neuGRID Central Services Server must be able to restart properly even if one power supply module is not working.

Core Server
Passed

- The server has two redundant power supplies. Servers work properly with only one of them. The unit should be delivered with UPS that assures continuous operation in case of power cut (15 minutes) and proper system shutdown in an event of longer power cut.

Core Server
Passed

UPS Service is provided by the IT Center.

- The required number of flame-retardant (rated IEC 332-1) and halogen-free (PVC is excluded) appropriate power cord must be supplied.

Core Server
Passed

- neuGRID Central Services Server must have a unique serial number on the rear of the chassis that is clearly visible when the chassis is installed in a rack. If additional information is provided with the serial number, this information must be written in English.

Core Server
6310N3J

- One Dual Core 2 or One Quad Core Intel Xeon processors are required.

Core Server
Two Quad Core Intel(R) Xeon(R) CPU E5410 2.33GHz

- Server shall be equipped with a SVGA video, keyboard and mouse ports. Servers shall be supplied without keyboard, mouse and video screen.

Core Server
Passed

Connection for SVGA video, keyboard and mouse present in front and rear of server. Keyboard and mouse must be USB type.

- The server must be able to boot Linux without keyboard, screen or mouse attached.

Core Server	Data Server
Passed	Passed

- Servers must have at least 4 GBytes of RAM. The supplier is responsible for providing modules that are compatible with the motherboard and for testing them with the diagnostic diskette of the motherboard manufacturer. Proof of such a test must be provided for each machine.

Core Server
Passed

Server has 8GBytes of RAM.

- Network interface: neuGRID Central Services Server must have 4 copper Gigabit Ethernet interface for data access.

Core Server
Passed

Each server has 4 Gigabit Ethernet cards

- Remote administration card: The server must be shipped with a remote administration card, the mandatory properties are:

  - To be capable to interact at BIOS level with the hardware.

Core Server
Passed

Server has DRAC5 (Dell Remote Access Card) installed. Provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allows to start, stop and restart the server remotely.

  - To be configurable through a TCP/IP network, and provide software client with remote administration of the server.

Core Server
Passed

Server has a DRAC5 (Dell Remote Access Card) installed. This card provides the necessary tools and functionality to monitor, troubleshoots, and repair server. Allow to start, stop and restart the server remotely and mounting remote iso images of floppy disks and cd.

General Requirements for System and Data Disks

- All hard disks shall have a rotational speed of at least 7200 RPM.

Core Server
Passed

Core Server:

2 HDD of 80GB sata 7200 RPM (system RAID1)

4 HDD of 750GB sata 7200 RPM (data RAID5)

- All disks must be installed in hot swap disk trays. It must be possible to extract these disk trays while the server chassis remains in its place in the 19" rack in which it is installed

Core Server
Passed

All disks are hot swapable. Hot extraction of one of the disk has been tested without stopping the server. The server has been working without a disk for a short time, then the disk has been reintroduced and the raid successfully restored without human intervention.

- System Disks: Two dedicated system disks of at least 20 GB each are required for installation of the Linux Operating system. These system disks must be configured as a mirrored set using hardware mirroring

Core Server
Passed

The server was delivered with two hard drives of 80 GB each one mounted under hardware RAID1.

- Disks: The neuGRID Central Services Server shall have a minimum of 1, 5TB of "usable disk space"[19] on data disks.

Core Server
Passed

Core Server: Server has 4 hard drives of 750 GB mounted under RAID5. This means that the final usable space is 2'25 TB; this is more than required.

[19] "usable disk space" shall mean the amount of user data that can be stored using an ext2/ext3 Linux file system created (using the default parameters of mkfs under CentOS 5.1 32 Bits) on a hardware RAID volume offering redundancy (e.g. RAID1, RAID4, RAID5 or RAID10).

Documentation

- The server must be delivered with a set of manuals in English comprising:

Documentation	Core Server Server
The chassis and power supply manual	Passed
The Raid hardware manual.	Passed
The gigabit card manual.	Passed
The motherboard manual.	Passed
The disk's led manual	Passed
The complete guaranty including and all the terms and conditions.	Passed

Status

Remote Management

The DRAC card for remote access and management of the server works perfectly well. It can however be noted that sometimes DRACs do not close connections properly and therefore require a physical reset. This problem can apparently be solved by upgrading the DRAC firmware.

neuGRID Central Services – Core Server 2

Hardware Tests

This section describes the hardware and visual tests that should be performed to validate the neuGRID Central Services servers. These servers were purchased by maat Gknowledge, for facilitating the deployment logistic and effort.

Visual Tests

- A check of the delivery to ensure that all requested material (such as keys, configuration sheet, power cords and documentation) has been provided with the server.

Core Server
Passed.

All documentation is OK and two power cords are included for each server.

- A visual inspection of the server (inside and outside), with a particular emphasis on cabling.

Core Server
Passed

The server is in perfect state outside and inside. Making special remarks in the professional assembly. The internal cabling and elements to ensure correct airflow between components are properly installed. CPU's and RAM are inside an airflow circuit in order to ensure correct cooling.

- A check of the configuration of the server to ensure all components are properly installed, recognized and configured.

Core Server
Passed

BIOS recognizes RAM installed properly and RAID card recognizes hard drives properly in both servers.

System Tests

- A basic check of all system, including data disks to ensure correct cabling and connectivity.

Core Server
Passed

- Memory testing using Memtest86+ v2.0.1. This test will be performed using the bootable iso image available at http://www.memtest86.org.

Core Server
Passed

Memory tests have been applied during 14 hours and no errors were found. Full test has been executed several times during these 14 hours.

Core Server
Passed

- Installation of the Scientific Linux 5.1 64 Bits Linux distribution.

Core Server
Passed

Operating system has been installed without any problems, hardware is well recognized by Kernel, and works perfectly, including RAID card and Ethernet cards.

- Hard drive performance tests were applied to the RAID disk volumes of the neuGRID Central Services Server using BONNIE[20]. BONNIE is a benchmark suite that is aimed at performing a number of simple tests of hard drive and file system performance.

  Tests to be applied are:

  - Sequential Output (Write Test):
    - Block: The file is created using write. The CPU overhead should be just the OS file space allocation.
    - Rewrite: Each block of the file is read with read, dirtied, and rewritten with write, requiring an lseek. Since no space allocation is done, and the I/O is

[20] http://www.coker.com.au/bonnie++/

well-localized, this should test the effectiveness of the filesystem cache and the speed of data transfer.

- Sequential Input (Read Test):
  - Block: The file is read using read. This should be a pure test of sequential input performance
- Random Seeks
  - This test runs three SeekProcCount processes in parallel, doing a total of 8000 lseeks to locations in the file specified by a random function. In each case, the block is read with read. In 10% of cases, it is dirtied and written back with write.

Results obtained for Core Server unit

		Sequential Output				Sequential Input		Random	
	Size:Chunk Size	Block		Rewrite		Block		Seeks	
		K/sec	% CPU	K/sec	% CPU	K/sec	% CPU	/ sec	% CPU
dell-2950-64	16G	44131	10	20863	3	50777	3	196.5	0
dell-2950-64	16G	43894	10	20605	3	50226	3	196.9	0

These results indicate that the RAID volume, formatted under ext3, can write at 43 Mega Bytes per second, rewrite 20 Mega Bytes per second, read 49,3 Mega Bytes per second and perform an average of 170 – 210 random seeks per second.

- Network Performance Tests: GENSINK has been used for testing network performances. GENSINK generates random network traffic, not related to the hard drive in order to generate the maximum possible data in the network card.

In the Annex: "neuGRID Central Services - Core Server 2" shows the network performance results obtained on this server. Network cards perform at an average speed of 117'750 KiloBytes/sec (919.922 Megabits/sec). The theoretical maximum speed is not reached as we use the drivers provided with the Xen Kernel. Despite of this, performances remain very high.

Hardware Specifications

- Chassis, Power Supply, Cooling and Serial Number.

	Core Server
Chasis	Passed
Power Supply	Passed
Cooling	Passed
Serial Number	9310N3J

- neuGRID Central Services Server shall be housed in a rack mountable 19" chassis at 100cm deep and 12U high. The chassis must be provided with sliding rails for 19" racks and have easily accessible power on/off and reset buttons and a power LED.

Core Server
Passed

- The server chassis shall provide a locking solution that locks the chassis cover closed to protect internal components and guarantee the air flux for a correct cooling.

Core Server
Passed

- Dual redundant power supplies are required. The neuGRID Central Services Server must be able to restart properly even if one power supply module is not working.

Core Server
Passed

- The server has two redundant power supplies. Server works properly with only one of them. The unit should be delivered with UPS that assures continuous operation in case of power cut (15 minutes) and proper system shutdown in an event of longer power cut.

Core Server
Passed

UPS Service is provided by the IT Center.

- The required number of flame-retardant (rated IEC 332-1) and halogen-free (PVC is excluded) appropriate power cord must be supplied.

Core Server
Passed

- neuGRID Central Services Server must have a unique serial number on the rear of the chassis that is clearly visible when the chassis is installed in a rack. If additional information is provided with the serial number, this information must be written in English.

Core Server
9310N3J

- One Dual Core 2 or One Quad Core Intel Xeon processors are required.

Core Server
Two Quad Core Intel(R) Xeon(R) CPU E5410 2.33GHz

- Server shall be equipped with a SVGA video, keyboard and mouse ports. Servers shall be supplied without keyboard, mouse and video screen.

Core Server
Passed

Connection for SVGA video, keyboard and mouse present in front and rear of server. Keyboard and mouse must be USB type.

- The server must be able to boot Linux without keyboard, screen or mouse attached.

Core Server
Passed

- Servers must have at least 4 GBytes of RAM. The supplier is responsible for providing modules that are compatible with the motherboard and for testing them with the diagnostic diskette of the motherboard manufacturer. Proof of such a test must be provided for each machine.

Core Server
Passed

Server has 8GBytes of RAM..

- Network interface: neuGRID Central Services Server must have 4 copper Gigabit Ethernet interface for data access.

Core Server
Passed

The server has 4 Gigabit Ethernet cards

- Remote administration card: The server must be shipped with a remote administration card, the mandatory properties are:

  - To be capable to interact at BIOS level with the hardware.

Core Server
Passed

    Server has DRAC5 (Dell Remote Access Card) installed. Provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allow to start, stop and restart the server remotely.

  - To be configurable through a TCP/IP network, and provide software client with remote administration of the server.

Core Server
Passed

    Server has a DRAC5 (Dell Remote Access Card) installed. This card provides the necessary tools and functionality to monitor, troubleshoots, and repair server. Allow to start, stop and restart the server remotely and mounting remote iso images of floppy disks and cd.

General Requirements for System and Data Disks

- All hard disks shall have a rotational speed of at least 7200 RPM.

Core Server
Passed

Core Server:

2 HDD of 80GB sataII 7200 RPM (system RAID1)

4 HDD of 750GB sataII 7200 RPM (data RAID5)

- All disks must be installed in hot swap disk trays. It must be possible to extract these disk trays while the server chassis remains in its place in the 19" rack in which it is installed

Core Server
Passed

All disks are hot swapable. Hot extraction of one of the disk has been tested without stopping the server. The server has been working without a disk for a short time, then the disk has been reintroduced and the raid successfully restored without human intervention.

- System Disks: Two dedicated system disks of at least 20 GB each are required for installation of the Linux Operating system. These system disks must be configured as a mirrored set using hardware mirroring

Core Server
Passed

The server was delivered with two hard drives of 80 GB each one mounted under hardware RAID1.

- Disks: The neuGRID Central Services Server shall have a minimum of 1,5TB of "usable disk space"[21] on data disks.

Core Server
Passed

Core Server: Server has 4 hard drives of 750 GB mounted under RAID5. This means that the final usable space is 2'25 TB this is more than required.

[21]"usable disk space" shall mean the amount of user data that can be stored using an ext2/ext3 Linux file system created (using the default parameters of mkfs under CentOS 5.1 64 Bits) on a hardware RAID volume offering redundancy (e.g. RAID1, RAID4, RAID5 or RAID10).

Documentation

- The server must be delivered with a set of manuals in English comprising:

Documentation	Core Server Server
The chassis and power supply manual	Passed
The Raid hardware manual.	Passed
The gigabit card manual.	Passed
The motherboard manual.	Passed
The disk's led manual	Passed
The complete guaranty including and all the terms and conditions.	Passed

Status

Remote Management

The DRAC card for remote access and management of the server works perfectly well. It can however be noted that sometimes DRACs do not close connections properly and therefore require a physical reset. This problem can apparently be solved by upgrading the DRAC firmware.

13. Annex 4 – DACS1 Hardware Tests

DACS1 – ng-fbf-dell-1

Hardware Tests

This section describes the hardware and visual tests that should be performed to validate the DACS1 servers. These servers were purchased by maat Gknowledge, for facilitating the deployment logistic and effort.

Visual Tests

A check of the delivery to ensure that all requested material (such as keys, configuration sheet, power cords and documentation) has been provided with the server.

ng-fbf-dell-1
Passed.

All documentation is OK and two power cords are included for each server.

A visual inspection of the server (inside and outside), with a particular emphasis on cabling.

ng-fbf-dell-1
Passed

Both servers are in perfect state outside and inside, making special remarks in the professional assembly. The internal cabling and elements to ensure correct airflow between components are properly installed. CPU's and RAM are inside an airflow circuit in order to ensure correct cooling.

A check of the configuration of the server to ensure all components are properly installed, recognized and configured.

ng-fbf-dell-1
Passed

BIOS recognizes RAM installed properly and RAID card recognizes hard drives properly in both servers.

System Tests

A basic check of the entire system, including data disks, to ensure correct cabling and connectivity.

ng-fbf-dell-1
Passed

Memory testing using Memtest86+ v2.0.1. This test will be performed using the bootable iso image available at http://www.memtest86.org.

ng-fbf-dell-1
Passed

Memory tests have been applied during 14 hours and no errors were found. Full test has been executed several times during these 14 hours.

ng-fbf-dell-1
Passed

Installation of the Scientific Linux 5.1 32 Bits Linux distribution.

ng-fbf-dell-1
Passed

Operating system has been installed without any problems, hardware is well recognized by Kernel, and works perfectly, including RAID card and Ethernet cards.

Hard drive performance tests were applied to the RAID disk volumes of the DACS1 Server using BONNIE[22]. BONNIE is a benchmark suite that is aimed at performing a number of simple tests of hard drive and file system performance.

Tests to be applied are:

Sequential Output (Write Test):

Block: The file is created using write. The CPU overhead should be just the OS file space allocation.

Rewrite: Each block of the file is read with read, dirtied, and rewritten with write, requiring an lseek. Since no space allocation is done, and the I/O is well-localized, this should test the effectiveness of the filesystem cache and the speed of data transfer.

Sequential Input (Read Test):

Block: The file is read using read. This should be a pure test of sequential input performance

Random Seeks

[22] http://www.coker.com.au/bonnie++/

This test runs three SeekProcCount processes in parallel, doing a total of 8000 lseeks to locations in the file specified by a random function. In each case, the block is read with read. In 10% of cases, it is dirtied and written back with write.

Results obtained for ng-fbf-dell-1 unit

		Sequential Output				Sequential Input		Random	
	Size:Chunk Size	Block		Rewrite		Block		Seeks	
		K/sec	% CPU	K/sec	% CPU	K/sec	% CPU	/ sec	% CPU
dell-1950-1	16G	92787	21	49576	10	135870	15	519.2	0
dell-1950-1	16G	91955	22	51032	10	122783	6	556.2	1

These results indicate that the RAID volume, formatted under ext3, can write at 90 Mega Bytes per second, rewrite 49 Mega Bytes per second, read 126,3 Mega Bytes per second and perform an average of 510 – 570 random seeks per second.

Network Performance Tests: GENSINK has been used for testing network performances. GENSINK generates random network traffic, not related to the hard drive in order to generate the maximum possible data in the network card.

Network cards perform at an average speed of 117'750 KiloBytes/sec (919.922 Megabits/sec). Despite of this, performances remain very high.

Hardware Specifications

Chassis, Power Supply, Cooling and Serial Number.

	ng-fbf-dell-1
Chassis	Passed
Power Supply	Passed
Cooling	Passed
Serial Number	GPL2W3J

DACS1 Server shall be housed in a rack mountable 19" chassis at 100cm deep and 12U high. The chassis must be provided with sliding rails for 19" racks and have easily accessible power on/off and reset buttons and a power LED.

ng-fbf-dell-1
Passed

The server chassis shall provide locking solution that locks the chassis cover closed to protect internal components and guarantee the air flux for a correct cooling.

ng-fbf-dell-1
Passed

Dual redundant power supplies are required. The DACS1 Server must be able to restart properly even if one power supply module is not working.

ng-fbf-dell-1
Passed

The server has two redundant power supplies. Servers work properly with only one of them. The unit should be delivered with UPS that assures continuous operation in case of power cut (15 minutes) and proper system shutdown in an event of longer power cut.

ng-fbf-dell-1
Passed

UPS Service is provided by the IT Center.

The required number of flame-retardant (rated IEC 332-1) and halogen-free (PVC is excluded) appropriate power cord must be supplied.

ng-fbf-dell-1
Passed

DACS1 Server must have a unique serial number on the rear of the chassis that is clearly visible when the chassis is installed in a rack. If additional information is provided with the serial number, this information must be written in English.

ng-fbf-dell-1
GPL2W3J

One Dual Core 2 or One Quad Core Intel Xeon processors are required.

ng-fbf-dell-1
Two Quad Core Intel(R) Xeon(R) CPU E5410 2.33GHz

Server shall be equipped with a SVGA video, keyboard and mouse ports. Servers shall be supplied without keyboard, mouse and video screen.

ng-fbf-dell-1
Passed

Connection for SVGA video, keyboard and mouse present in front and rear of server. Keyboard and mouse must be USB type.

The server must be able to boot Linux without keyboard, screen or mouse attached.

ng-fbf-dell-1
Passed

Servers must have at least 4 GBytes of RAM. The supplier is responsible for providing modules that are compatible with the motherboard and for testing them with the diagnostic diskette of the motherboard manufacturer. Proof of such a test must be provided for each machine.

ng-fbf-dell-1

Passed

The server has 8 GBytes of RAM.

Network interface: DACS1 Server must have 2 copper Gigabit Ethernet interface for data access.

ng-fbf-dell-1
Passed

The server has 2 Gigabit Ethernet cards

Remote administration card: The server must be shipped with a remote administration card, the mandatory properties are:

To be capable to interact at BIOS level with the hardware.

ng-fbf-dell-1
Passed

Server has DRAC5 (Dell Remote Access Card) installed. Provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allow to start, stop and restart the server remotely.

To be configurable through a TCP/IP network, and provide software client to remote administration of the server.

ng-fbf-dell-1
Passed

Server has a DRAC5 (Dell Remote Access Card) installed. This card provides the necessary tools and functionality to monitor, troubleshoots, and repair server. Allow to start, stop and restart the server remotely and mounting remote iso images of floppy disks and cd.

General Requirements for System and Data Disks

All hard disks shall have a rotational speed of at least 7200 RPM.

ng-fbf-dell-1
Passed

ng-fbf-dell-1:

2 HDD of 73GB sata 7200 RPM (system RAID1)

All disks must be installed in hot swap disk trays. It must be possible to extract these disk trays while the server chassis remains in its place in the 19" rack in which it is installed

ng-fbf-dell-1
Passed

All disks are hot swapable. Hot extraction of one of the disk has been tested without stopping the server. The server has been working without a disk for a short time, then the disk has been reintroduced and the raid successfully restored without human intervention.

System Disks: Two dedicated system disks of at least 20 GB each are required for installation of the Linux Operating system. These system disks must be configured as a mirrored set using hardware mirroring

ng-fbf-dell-1
Passed

This server was delivered with two hard drives of 73 GB each one mounted under hardware RAID1.

Documentation

The server must be delivered with a set of manuals in English comprising:

Documentation		ng-fbf-dell-1 Server
The chassis and power supply manual	Passed	
The Raid hardware manual.	Passed	
The gigabit card manual.	Passed	
The motherboard manual.	Passed	
The disk's led manual	Passed	
The complete guaranty including and all the terms and conditions.	Passed	

Status

Remote Management

The DRAC card for remote access and management of the server works perfectly well. It can however be noted that sometimes DRACs do not close connections properly and therefore require a physical reset. This problem can apparently be solved by upgrading the DRAC firmware.

DACS1 – ng-fbf-dell-2

Hardware Tests

This section describes the hardware and visual tests that should be performed to validate the DACS1 servers. These servers were purchased by maat Gknowledge, for facilitating the deployment logistic and effort.

Visual Tests

A check of the delivery to ensure that all requested material (such as keys, configuration sheet, power cords and documentation) has been provided with the server.

ng-fbf-dell-2
Passed.

All documentation is OK and two power cords are included for each server.

A visual inspection of the server (inside and outside), with a particular emphasis on cabling.

ng-fbf-dell-2
Passed

Both servers are in perfect state outside and inside, making special remarks in the professional assembly. The internal cabling and elements to ensure correct airflow between components are properly installed. CPU's and RAM are inside an airflow circuit in order to ensure correct cooling.

A check of the configuration of the server to ensure all components are properly installed, recognized and configured.

ng-fbf-dell-2
Passed

BIOS recognizes RAM installed properly and RAID card recognizes hard drives properly to in both servers.

System Tests

A basic check of the entire system, including data disks to ensure correct cabling and connectivity.

ng-fbf-dell-2
Passed

Memory testing using Memtest86+ v2.0.1. This test will be performed using the bootable iso image available at http://www.memtest86.org.

ng-fbf-dell-2
Passed

Memory tests have been applied during 14 hours and no errors were found. Full test has been executed several times during these 14 hours.

ng-fbf-dell-2
Passed

Installation of the Scientific Linux 5.1 32 Bits Linux distribution.

ng-fbf-dell-2
Passed

Operating system has been installed without any problems, hardware is well recognized by Kernel, and works perfectly, including RAID card and Ethernet cards.

Hard drive performance tests were applied to the RAID disk volumes of the DACS1 Server using BONNIE[23]. BONNIE is a benchmark suite that is aimed at performing a number of simple tests of hard drive and file system performance.

Tests to be applied are:

Sequential Output (Write Test):

Block: The file is created using write. The CPU overhead should be just the OS file space allocation.

Rewrite: Each block of the file is read with read, dirtied, and rewritten with write, requiring an lseek. Since no space allocation is done, and the I/O is well-localized, this should test the effectiveness of the filesystem cache and the speed of data transfer.

Sequential Input (Read Test):

Block: The file is read using read. This should be a pure test of sequential input performance

Random Seeks

[23] http://www.coker.com.au/bonnie++/

This test runs three SeekProcCount processes in parallel, doing a total of 8000 lseeks to locations in the file specified by a random function. In each case, the block is read with read. In 10% of cases, it is dirtied and written back with write.

Results obtained for ng-fbf-dell-2 unit

		Sequential Output				Sequential Input		Random	
	Size:Chunk Size	Block		Rewrite		Block		Seeks	
		K/sec	% CPU	K/sec	% CPU	K/sec	% CPU	/ sec	% CPU
dell-1950-2	16G	92654	20	48312	9	135870	14	509.3	0
dell-1950-2	16G	90413	21	49859	10	122783	5	546.9	1

These results indicate that the RAID volume, formatted under ext3, can write at 89 Mega Bytes per second, rewrite 48 Mega Bytes per second, read 121,2 Mega Bytes per second and perform an average of 507 – 568 random seeks per second.

Network Performance Tests: GENSINK has been used for testing network performances. GENSINK generates random network traffic, not related to the hard drive in order to generate the maximum possible data in the network card.

Network cards perform at an average speed of 118'398 KiloBytes/sec (924.984 Megabits/sec). Despite of this, performances remain very high.

Hardware Specifications

Chassis, Power Supply, Cooling and Serial Number.

	ng-fbf-dell-2
Chassis	Passed
Power Supply	Passed
Cooling	Passed
Serial Number	JFL3W3J

DACS1 Server shall be housed in a rack mountable 19" chassis at 100cm deep and 12U high. The chassis must be provided with sliding rails for 19" racks and have easily accessible power on/off and reset buttons and a power LED.

ng-fbf-dell-2
Passed

The server chassis shall provide locking solution that locks the chassis cover closed to protect internal components and guarantee the air flux for a correct cooling.

ng-fbf-dell-2
Passed

Dual redundant power supplies are required. The DACS1 Server must be able to restart properly even if one power supply module is not working.

ng-fbf-dell-2
Passed

The server has two redundant power supplies. Servers work properly with only one of them. The unit should be delivered with UPS that assures continuous operation in case of power cut (15 minutes) and proper system shutdown in an event of longer power cut.

ng-fbf-dell-2
Passed

UPS Service is provided by the IT Center.

The required number of flame-retardant (rated IEC 332-1) and halogen-free (PVC is excluded) appropriate power cord must be supplied.

ng-fbf-dell-2
Passed

DACS1 Server must have a unique serial number on the rear of the chassis that is clearly visible when the chassis is installed in a rack. If additional information is provided with the serial number, this information must be written in English.

ng-fbf-dell-2
JFL3W3J

One Dual Core 2 or One Quad Core Intel Xeon processors are required.

ng-fbf-dell-2
Two Quad Core Intel(R) Xeon(R) CPU E5410 2.33GHz

Server shall be equipped with a SVGA video, keyboard and mouse ports. Servers shall be supplied without keyboard, mouse and video screen.

ng-fbf-dell-2
Passed

Connection for SVGA video, keyboard and mouse present in front and rear of server. Keyboard and mouse must be USB type.

The server must be able to boot Linux without keyboard, screen or mouse attached.

ng-fbf-dell-2
Passed

Servers must have at least 4 GBytes of RAM. The supplier is responsible for providing modules that are compatible with the motherboard and for testing them with the diagnostic diskette of the motherboard manufacturer. Proof of such a test must be provided for each machine.

ng-fbf-dell-2
Passed

The server has 8 GBytes of RAM.

Network interface: DACS1 Server must have 2 copper Gigabit Ethernet interface for data access.

ng-fbf-dell-2
Passed

The server has 2 Gigabit Ethernet cards

Remote administration card: The server must be shipped with a remote administration card, the mandatory properties are:

To be capable to interact at BIOS level with the hardware.

ng-fbf-dell-2
Passed

Server has DRAC5 (Dell Remote Access Card) installed. Provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allow to start, stop and restart the server remotely.

To be configurable through a TCP/IP network, and provide software client with remote administration of the server.

ng-fbf-dell-2
Passed

Server has a DRAC5 (Dell Remote Access Card) installed. This card provides the necessary tools and functionality to monitor, troubleshoots, and repair server. Allow to start, stop and restart the server remotely and mounting remote iso images of floppy disks and cd.

General Requirements for System and Data Disks

All hard disks shall have a rotational speed of at least 7200 RPM.

ng-fbf-dell-2
Passed

ng-fbf-dell-2:

2 HDD of 73GB sata 7200 RPM (system RAID1)

All disks must be installed in hot swap disk trays. It must be possible to extract these disk trays while the server chassis remains in its place in the 19” rack in which it is installed

ng-fbf-dell-2
Passed

All disks are hot swapable. Hot extraction of one of the disk has been tested without stopping the server. The server has been working without a disk for a short time, then the disk has been reintroduced and the raid successfully restored without human intervention.

System Disks: Two dedicated system disks of at least 20 GB each are required for installation of the Linux Operating system. These system disks must be configured as a mirrored set using hardware mirroring

ng-fbf-dell-2
Passed

This server was delivered with two hard drives of 73 GB each one mounted under hardware RAID1.

Documentation

The server must be delivered with a set of manuals in English comprising:

Documentation		ng-fbf-dell-2 Server
The chassis and power supply manual	Passed	
The Raid hardware manual.	Passed	
The gigabit card manual.	Passed	
The motherboard manual.	Passed	
The disk's led manual	Passed	
The complete guaranty including and all the terms and conditions.	Passed	

Status

Remote Management

The DRAC card for remote access and management of the server works perfectly well. It can however be noted that sometimes DRACs do not close connections properly and therefore require a physical reset. This problem can apparently be solved by upgrading the DRAC firmware.

DACS1 – ng-fbf-dell-3

Hardware Tests

This section describes the hardware and visual tests that should be performed to validate the DACS1 servers. These servers were purchased by maat Gknowledge, for facilitating the deployment logistic and effort.

Visual Tests

A check of the delivery to ensure that all requested material (such as keys, configuration sheet, power cords and documentation) has been provided with the server.

ng-fbf-dell-3
Passed.

All documentation is OK and two power cords are included for each server.

A visual inspection of the server (inside and outside), with a particular emphasis on cabling.

ng-fbf-dell-3
Passed

Both servers are in perfect state outside and inside, making special remarks in the professional assembly. The internal cabling and elements to ensure correct airflow between components are properly installed. CPU's and RAM are inside an airflow circuit in order to ensure correct cooling.

A check of the configuration of the server to ensure all components are properly installed, recognized and configured.

ng-fbf-dell-3
Passed

BIOS recognizes RAM installed properly and RAID card recognizes hard drives properly in both servers.

System Tests

A basic check of the entire system, including data disks, to ensure correct cabling and connectivity.

ng-fbf-dell-3
Passed

Memory testing using Memtest86+ v2.0.1. This test will be performed using the bootable iso image available at http://www.memtest86.org.

ng-fbf-dell-3
Passed

Memory tests have been applied during 14 hours and no errors were found. Full test has been executed several times during these 14 hours.

ng-fbf-dell-3
Passed

Installation of the Scientific Linux 5.1 32 Bits Linux distribution.

ng-fbf-dell-3
Passed

Operating system has been installed without any problems, hardware is well recognized by Kernel, and works perfectly, including RAID card and Ethernet cards.

Hard drive performance tests were applied to the RAID disk volumes of the DACS1 Server using BONNIE[24]. BONNIE is a benchmark suite that is aimed at performing a number of simple tests of hard drive and file system performance.

Tests to be applied are:

Sequential Output (Write Test):

Block: The file is created using write. The CPU overhead should be just the OS file space allocation.

Rewrite: Each block of the file is read with read, dirtied, and rewritten with write, requiring an lseek. Since no space allocation is done, and the I/O is well-localized, this should test the effectiveness of the filesystem cache and the speed of data transfer.

[24] http://www.coker.com.au/bonnie++/

Sequential Input (Read Test):

Block: The file is read using read. This should be a pure test of sequential input performance

Random Seeks

This test runs three SeekProcCount processes in parallel, doing a total of 8000 lseeks to locations in the file specified by a random function. In each case, the block is read with read. In 10% of cases, it is dirtied and written back with write.

Results obtained for ng-fbf-dell-3 unit

		Sequential Output				Sequential Input		Random	
	Size:Chunk Size	Block		Rewrite		Block		Seeks	
		K/sec	% CPU	K/sec	% CPU	K/sec	% CPU	/ sec	% CPU
dell-1950-3	16G	93122	22	51278	11	139925	17	521.9	1
dell-1950-3	16G	92109	23	52291	12	126291	8	567.1	1

These results indicate that the RAID volume, formatted under ext3, can write at 92 Mega Bytes per second, rewrite 48 Mega Bytes per second, read 129,1 Mega Bytes per second and perform an average of 513 – 572 random seeks per second.

Network Performance Tests: GENSINK has been used for testing network performances. GENSINK generates random network traffic, not related to the hard drive in order to generate the maximum possible data in the network card.

Network cards perform at an average speed of 115’412 KiloBytes/sec (901.656 Megabits/sec). Despite of this, performances remain very high.

Hardware Specifications

Chassis, Power Supply, Cooling and Serial Number.

	ng-fbf-dell-3
Chassis	Passed
Power Supply	Passed
Cooling	Passed
Serial Number	BFL3W3J

DACS1 Server shall be housed in a rack mountable 19” chassis at 100cm deep and 12U high. The chassis must be provided with sliding rails for 19” racks and have easily accessible power on/off and reset buttons and a power LED.

ng-fbf-dell-3
Passed

The server chassis shall provide locking solution that locks the chassis cover closed to protect internal components and guarantee the air flux for a correct cooling.

ng-fbf-dell-3
Passed

Dual redundant power supplies are required. The DACS1 Server must be able to restart properly even if one power supply module is not working.

ng-fbf-dell-3
Passed

The server has two redundant power supplies. Servers work properly with only one of them. The unit should be delivered with UPS that assures continuous operation in case of power cut (15 minutes) and proper system shutdown in an event of longer power cut.

ng-fbf-dell-3
Passed

UPS Service is provided by the IT Center.

The required number of flame-retardant (rated IEC 332-1) and halogen-free (PVC is excluded) appropriate power cord must be supplied.

ng-fbf-dell-3
Passed

DACS1 Server must have a unique serial number on the rear of the chassis that is clearly visible when the chassis is installed in a rack. If additional information is provided with the serial number, this information must be written in English.

ng-fbf-dell-3
BFL3W3J

One Dual Core 2 or One Quad Core Intel Xeon processors are required.

ng-fbf-dell-3
Two Quad Core Intel(R) Xeon(R) CPU E5410 2.33GHz

Server shall be equipped with a SVGA video, keyboard and mouse ports. Servers shall be supplied without keyboard, mouse and video screen.

ng-fbf-dell-3
Passed

Connection for SVGA video, keyboard and mouse present in front and rear of server. Keyboard and mouse must be USB type.

The server must be able to boot Linux without keyboard, screen or mouse attached.

ng-fbf-dell-3
Passed

Servers must have at least 4 GBytes of RAM. The supplier is responsible for providing modules that are compatible with the motherboard and for testing them with the diagnostic diskette of the motherboard manufacturer. Proof of such a test must be provided for each machine.

ng-fbf-dell-3
Passed

The server has 8 GBytes of RAM.

Network interface: DACS1 Server must have 2 copper Gigabit Ethernet interface for data access.

ng-fbf-dell-3
Passed

The server has 2 Gigabit Ethernet cards

Remote administration card: The server must be shipped with a remote administration card, the mandatory properties are:

To be capable to interact at BIOS level with the hardware.

ng-fbf-dell-3
Passed

Server has DRAC5 (Dell Remote Access Card) installed. Provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allow to start, stop and restart the server remotely.

To be configurable through a TCP/IP network, and provide software client to remote administration of the server.

ng-fbf-dell-3
Passed

Server has a DRAC5 (Dell Remote Access Card) installed. This card provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allows to start, stop and restart the server remotely and mounting remote iso images of floppy disks and cd.

General Requirements for System and Data Disks

All hard disks shall have a rotational speed of at least 7200 RPM.

ng-fbf-dell-3
Passed

ng-fbf-dell-3:

2 HDD of 73GB sata 7200 RPM (system RAID1)

All disks must be installed in hot swap disk trays. It must be possible to extract these disk trays while the server chassis remains in its place in the 19” rack in which it is installed

ng-fbf-dell-3
Passed

All disks are hot swapable. Hot extraction of one of the disk has been tested without stopping the server. The server has been working without a disk for a short time, then the disk has been reintroduced and the raid successfully restored without human intervention.

System Disks: Two dedicated system disks of at least 20 GB each are required for installation of the Linux Operating system. These system disks must be configured as a mirrored set using hardware mirroring

ng-fbf-dell-3
Passed

This server was delivered with two hard drives of 73 GB each one mounted under hardware RAID1.

Documentation

The server must be delivered with a set of manuals in English comprising:

Documentation		ng-fbf-dell-3 Server
The chassis and power supply manual	Passed	
The Raid hardware manual.	Passed	
The gigabit card manual.	Passed	
The motherboard manual.	Passed	
The disk's led manual	Passed	
The complete guaranty including and all the terms and conditions.	Passed	

Status

Remote Management

The DRAC card for remote access and management of the server works perfectly well. It can however be noted that sometimes DRACs do not close connections properly and therefore require a physical reset. This problem can apparently be solved by upgrading the DRAC firmware.

DACS1 – ng-fbf-dell-4

Hardware Tests

This section describes the hardware and visual tests that should be performed to validate the DACS1 servers. These servers were purchased by maat Gknowledge, for facilitating the deployment logistic and effort.

Visual Tests

A check of the delivery to ensure that all requested material (such as keys, configuration sheet, power cords and documentation) has been provided with the server.

ng-fbf-dell-4
Passed.

All documentation is OK and two power cords are included for each server.

A visual inspection of the server (inside and outside), with a particular emphasis on cabling.

ng-fbf-dell-4
Passed

Both servers are in perfect state outside and inside, making special remarks in the professional assembly. The internal cabling and elements to ensure the correct airflow between components are properly installed. CPU's and RAM are inside an airflow circuit in order to ensure the correct cooling.

A check of the configuration of the server to ensure all components are properly installed, recognized and configured.

ng-fbf-dell-4
Passed

BIOS recognizes RAM installed properly and RAID card recognizes hard drives properly to in both servers.

System Tests

A basic check of the entire system, including data disks, to ensure correct cabling and connectivity.

ng-fbf-dell-4
Passed

Memory testing using Memtest86+ v2.0.1. This test will be performed using the bootable iso image available at http://www.memtest86.org.

ng-fbf-dell-4
Passed

Memory tests have been applied during 14 hours and no errors were found. Full test has been executed several times during these 14 hours.

ng-fbf-dell-4
Passed

Installation of the Scientific Linux 5.1 32 Bits Linux distribution.

ng-fbf-dell-4
Passed

Operating system has been installed without any problems, hardware is well recognized by Kernel, and works perfectly, including RAID card and Ethernet cards.

Hard drive performance tests were applied to the RAID disk volumes of the DACS1 Server using BONNIE[25]. BONNIE is a benchmark suite that is aimed at performing a number of simple tests of hard drive and file system performance.

Tests to be applied are:

Sequential Output (Write Test):

Block: The file is created using write. The CPU overhead should be just the OS file space allocation.

Rewrite: Each block of the file is read with read, dirtied, and rewritten with write, requiring an lseek. Since no space allocation is done, and the I/O is well-localized, this should test the effectiveness of the filesystem cache and the speed of data transfer.

[25] http://www.coker.com.au/bonnie++/

Sequential Input (Read Test):

Block: The file is read using read. This should be a pure test of sequential input performance

Random Seeks

This test runs three SeekProcCount processes in parallel, doing a total of 8000 lseeks to locations in the file specified by a random function. In each case, the block is read with read. In 10% of cases, it is dirtied and written back with write.

Results obtained for ng-fbf-dell-4 unit

		Sequential Output				Sequential Input		Random	
	Size:Chunk Size	Block		Rewrite		Block		Seeks	
		K/sec	% CPU	K/sec	% CPU	K/sec	% CPU	/ sec	% CPU
dell-1950-4	16G	90184	19	48339	8	129401	18	521.7	2
dell-1950-4	16G	91059	21	50954	10	119370	9	569.1	3

These results indicate that the RAID volume, formatted under ext3, can write at 87 Mega Bytes per second, rewrite 46 Mega Bytes per second, read 123,9 Mega Bytes per second and perform an average of 509 – 562 random seeks per second.

Network Performance Tests: GENSINK has been used for testing network performances. GENSINK generates random network traffic, not related to the hard drive in order to generate the maximum possible data in the network card.

Network cards perform at an average speed of 125’130 KiloBytes/sec (977.578 Megabits/sec). Despite of this, performances remain very high.

Hardware Specifications

Chassis, Power Supply, Cooling and Serial Number.

	ng-fbf-dell-4
Chassis	Passed
Power Supply	Passed
Cooling	Passed
Serial Number	CFL3W3J

DACS1 Server shall be housed in a rack mountable 19” chassis at 100cm deep and 12U high. The chassis must be provided with sliding rails for 19” racks and have easily accessible power on/off and reset buttons and a power LED.

ng-fbf-dell-4
Passed

The server chassis shall provide locking solution that locks the chassis cover closed to protect internal components and guarantee the air flux for a correct cooling.

ng-fbf-dell-4
Passed

Dual redundant power supplies are required. The DACS1 Server must be able to restart properly even if one power supply module is not working.

ng-fbf-dell-4
Passed

The server has two redundant power supplies. Servers work properly with only one of them. The unit should be delivered with UPS that assures continuous operation in case of power cut (15 minutes) and proper system shutdown in an event of longer power cut.

ng-fbf-dell-4
Passed

UPS Service is provided by the IT Center.

The required number of flame-retardant (rated IEC 332-1) and halogen-free (PVC is excluded) appropriate power cord must be supplied.

ng-fbf-dell-4
Passed

DACS1 Server must have a unique serial number on the rear of the chassis that is clearly visible when the chassis is installed in a rack. If additional information is provided with the serial number, this information must be written in English.

ng-fbf-dell-4
CFL3W3J

One Dual Core 2 or One Quad Core Intel Xeon processors are required.

ng-fbf-dell-4
Two Quad Core Intel(R) Xeon(R) CPU E5410 2.33GHz

Server shall be equipped with a SVGA video, keyboard and mouse ports. Servers shall be supplied without keyboard, mouse and video screen.

ng-fbf-dell-4
Passed

Connection for SVGA video, keyboard and mouse present in front and rear of server. Keyboard and mouse must be USB type.

The server must be able to boot Linux without keyboard, screen or mouse attached.

ng-fbf-dell-4
Passed

Servers must have at least 4 GBytes of RAM. The supplier is responsible for providing modules that are compatible with the motherboard and for testing them with the diagnostic diskette of the motherboard manufacturer. Proof of such a test must be provided for each machine.

ng-fbf-dell-4
Passed

The server has 8 GBytes of RAM.

Network interface: DACS1 Server must have 2 copper Gigabit Ethernet interface for data access.

ng-fbf-dell-4
Passed

The server has 2 Gigabit Ethernet cards

Remote administration card: The server must be shipped with a remote administration card, the mandatory properties are:

To be capable of interaction at BIOS level with the hardware.

ng-fbf-dell-4
Passed

Server has DRAC5 (Dell Remote Access Card) installed. Provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allow to start, stop and restart the server remotely.

To be configurable through a TCP/IP network, and provide software client to remote administration of the server.

ng-fbf-dell-4
Passed

Server has a DRAC5 (Dell Remote Access Card) installed. This card provides the necessary tools and functionality to monitor, troubleshoots, and repair server. Allow to start, stop and restart the server remotely and mounting remote iso images of floppy disks and cd.

General Requirements for System and Data Disks

All hard disks shall have a rotational speed of at least 7200 RPM.

ng-fbf-dell-4
Passed

ng-fbf-dell-4:

2 HDD of 73GB sata 7200 RPM (system RAID1)

All disks must be installed in hot swap disk trays. It must be possible to extract these disk trays while the server chassis remains in its place in the 19” rack in which it is installed

ng-fbf-dell-4
Passed

All disks are hot swapable. Hot extraction of one of the disk has been tested without stopping the server. The server has been working without a disk for a short time, then the disk has been reintroduced and the raid successfully restored without human intervention.

System Disks: Two dedicated system disks of at least 20 GB each are required for installation of the Linux Operating system. These system disks must be configured as a mirrored set using hardware mirroring

ng-fbf-dell-4
Passed

This server was delivered with two hard drives of 73 GB each one mounted under hardware RAID1.

Documentation

The server must be delivered with a set of manuals in English comprising:

Documentation		ng-fbf-dell-4 Server
The chassis and power supply manual	Passed	
The Raid hardware manual.	Passed	
The gigabit card manual.	Passed	
The motherboard manual.	Passed	
The disk's led manual	Passed	
The complete guaranty including and all the terms and conditions.	Passed	

Status

Remote Management

The DRAC card for remote access and management of the server works perfectly well. It can however be noted that sometimes DRACs do not close connections properly and therefore require a physical reset. This problem can apparently be solved by upgrading the DRAC firmware.

DACS1 – ng-fbf-dell-5

Hardware Tests

This section describes the hardware and visual tests that should be performed to validate the DACS1 servers. These servers were purchased by maat Gknowledge, for facilitating the deployment logistic and effort.

Visual Tests

A check of the delivery to ensure that all the requested material (such as keys, configuration sheet, power cords and documentation) is provided with the server.

ng-fbf-dell-5
Passed.

All documentation is OK and two power cords are included for each server.

A visual inspection of the server (inside and outside), with a particular emphasis on cabling.

ng-fbf-dell-5
Passed

Both servers are in perfect state outside and inside, making special remarks in the professional assembly. The internal cabling and elements to ensure the correct airflow between components are properly installed. CPU's and RAM are inside an airflow circuit in order to ensure the correct cooling.

A check of the configuration of the server to ensure all components are properly installed recognized and configured.

ng-fbf-dell-5
Passed

BIOS recognizes RAM installed properly and RAID card recognizes hard drives properly in both servers.

System Tests

A basic check of the entire system, including data disks, to ensure correct cabling and connectivity.

ng-fbf-dell-5
Passed

Memory testing using Memtest86+ v2.0.1. This test will be performed using the bootable iso image available at http://www.memtest86.org.

ng-fbf-dell-5
Passed

Memory tests have been applied during 14 hours and no errors were found. Full test has been executed several times during these 14 hours.

ng-fbf-dell-5
Passed

Installation of the Scientific Linux 5.1 32 Bits Linux distribution.

ng-fbf-dell-5
Passed

Operating system has been installed without any problems, hardware is well recognized by Kernel, and works perfectly, including RAID card and Ethernet cards.

Hard drive performance tests were applied to the RAID disk volumes of the DACS1 Server using BONNIE[26]. BONNIE is a benchmark suite that is aimed at performing a number of simple tests of hard drive and file system performance.

Tests to be applied are:

Sequential Output (Write Test):

Block: The file is created using write. The CPU overhead should be just the OS file space allocation.

Rewrite: Each block of the file is read with read, dirtied, and rewritten with write, requiring an lseek. Since no space allocation is done, and the I/O is well-localized, this should test the effectiveness of the filesystem cache and the speed of data transfer.

Sequential Input (Read Test):

Block: The file is read using read. This should be a pure test of sequential input performance

Random Seeks

[26] http://www.coker.com.au/bonnie++/

This test runs three SeekProcCount processes in parallel, doing a total of 8000 lseeks to locations in the file specified by a random function. In each case, the block is read with read. In 10% of cases, it is dirtied and written back with write.

Results obtained for ng-fbf-dell-5 unit

		Sequential Output				Sequential Input		Random	
	Size:Chunk Size	Block		Rewrite		Block		Seeks	
		K/sec	% CPU	K/sec	% CPU	K/sec	% CPU	/ sec	% CPU
dell-1950-5	16G	94130	25	50408	11	138910	17	520.5	2
dell-1950-5	16G	92613	21	52108	12	123301	9	559.0	3

These results indicate that the RAID volume, formatted under ext3, can write at 91 Mega Bytes per second, rewrite 48 Mega Bytes per second, read 129,2 Mega Bytes per second and perform an average of 521 – 576 random seeks per second.

Network Performance Tests: GENSINK has been used for testing network performances. GENSINK generates random network traffic, not related to the hard drive in order to generate the maximum possible data in the network card.

Network cards perform at an average speed of 109’123 KiloBytes/sec (852.523 Megabits/sec). Despite of this, performances remain very high.

Hardware Specifications

Chassis, Power Supply, Cooling and Serial Number.

	ng-fbf-dell-5
Chassis	Passed
Power Supply	Passed
Cooling	Passed
Serial Number	DFL3W3J

DACS1 Server shall be housed in a rack mountable 19” chassis at 100cm deep and 12U high. The chassis must be provided with sliding rails for 19” racks and have easily accessible power on/off and reset buttons and a power LED.

ng-fbf-dell-5
Passed

The server chassis shall provide a locking solution that locks the chassis cover closed to protect internal components and guarantee the air flux for correct cooling.

ng-fbf-dell-5
Passed

Dual redundant power supplies are required. The DACS1 Server must be able to restart properly even if one power supply module is not working.

ng-fbf-dell-5
Passed

The server has two redundant power supplies. Servers work properly with only one of them. The unit should be delivered with UPS that assures continuous operation in case of power cut (15 minutes) and proper system shutdown in an event of longer power cut.

ng-fbf-dell-5
Passed

UPS Service is provided by the IT Center.

The required number of flame-retardant (rated IEC 332-1) and halogen-free (PVC is excluded) appropriate power cord must be supplied.

ng-fbf-dell-5
Passed

DACS1 Server must have a unique serial number on the rear of the chassis that is clearly visible when the chassis is installed in a rack. If additional information is provided with the serial number, this information must be written in English.

ng-fbf-dell-5
DFL3W3J

One Dual Core 2 or One Quad Core Intel Xeon processors are required.

ng-fbf-dell-5
Two Quad Core Intel(R) Xeon(R) CPU E5410 2.33GHz

Server shall be equipped with a SVGA video, keyboard and mouse ports. Servers shall be supplied without keyboard, mouse and video screen.

ng-fbf-dell-5
Passed

Connection for SVGA video, keyboard and mouse present in front and rear of server. Keyboard and mouse must be USB type.

The server must be able to boot Linux without keyboard, screen or mouse attached.

ng-fbf-dell-5
Passed

Servers must have at least 4 GBytes of RAM. The supplier is responsible for providing modules that are compatible with the motherboard and for testing them with the diagnostic diskette of the motherboard manufacturer. Proof of such a test must be provided for each machine.

ng-fbf-dell-5
Passed

The server has 8 GBytes of RAM.

Network interface: DACS1 Server must have 2 copper Gigabit Ethernet interface for data access.

ng-fbf-dell-5
Passed

The server has 2 Gigabit Ethernet cards

Remote administration card: The server must be shipped with a remote administration card, the mandatory properties are:

To be capable of interaction at BIOS level with the hardware.

ng-fbf-dell-5
Passed

Server has DRAC5 (Dell Remote Access Card) installed. Provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allow to start, stop and restart the server remotely.

To be configurable through a TCP/IP network, and provide software client with remote administration of the server.

ng-fbf-dell-5
Passed

Server has a DRAC5 (Dell Remote Access Card) installed. This card provides the necessary tools and functionality to monitor, troubleshoots, and repair server. Allow to start, stop and restart the server remotely and mounting remote iso images of floppy disks and cd.

General Requirements for System and Data Disks

All hard disks shall have a rotational speed of at least 7200 RPM.

ng-fbf-dell-5
Passed

ng-fbf-dell-5:

2 HDD of 73GB sata 7200 RPM (system RAID1)

All disks must be installed in hot swap disk trays. It must be possible to extract these disk trays while the server chassis remains in its place in the 19" rack in which it is installed

ng-fbf-dell-5
Passed

All disks are hot swapable. Hot extraction of one of the disk has been tested without stopping the server. The server has been working without a disk for a short time, then the disk has been reintroduced and the raid successfully restored without human intervention.

System Disks: Two dedicated system disks of at least 20 GB each are required for installation of the Linux Operating system. These system disks must be configured as a mirrored set using hardware mirroring

ng-fbf-dell-5
Passed

This server was delivered with two hard drives of 73 GB each one mounted under hardware RAID1.

Documentation

The server must be delivered with a set of manuals in English comprising:

Documentation		ng-fbf-dell-5 Server
The chassis and power supply manual	Passed	
The Raid hardware manual.	Passed	
The gigabit card manual.	Passed	
The motherboard manual.	Passed	
The disk's led manual	Passed	
The complete guaranty including and all the terms and conditions.	Passed	

Status

Remote Management

The DRAC card for remote access and management of the server works perfectly well. It can, however, be noted that sometimes DRACs do not close connections properly and therefore require a physical reset. This problem can apparently be solved by upgrading the DRAC firmware.

DACS1 – ng-fbf-dell-6

Hardware Tests

This section describes the hardware and visual tests that should be performed to validate the DACS1 servers. These servers were purchased by maat Gknowledge, for facilitating the deployment logistic and effort.

Visual Tests

A check of the delivery to ensure that all requested material (such as keys, configuration sheet, power cords and documentation) has been provided with the server.

ng-fbf-dell-6
Passed.

All documentation is OK and two power cords are included for each server.

A visual inspection of the server (inside and outside), with a particular emphasis on cabling.

ng-fbf-dell-6
Passed

Both servers are in perfect state outside and inside, making special remarks in the professional assembly. The internal cabling and elements to ensure correct airflow between components are properly installed. CPU's and RAM are inside an airflow circuit in order to ensure correct cooling.

A check of the configuration of the server to ensure all components are properly installed, recognized and configured.

ng-fbf-dell-6
Passed

BIOS recognizes RAM installed properly and RAID card recognizes hard drives properly to in both servers.

System Tests

A basic check of the entire system, including data disks, to ensure correct cabling and connectivity.

ng-fbf-dell-6
Passed

Memory testing using Memtest86+ v2.0.1. This test will be performed using the bootable iso image available at http://www.memtest86.org.

ng-fbf-dell-6
Passed

Memory tests have been applied during 14 hours and no errors were found. Full test has been executed several times during these 14 hours.

ng-fbf-dell-6
Passed

Installation of the Scientific Linux 5.1 32 Bits Linux distribution.

ng-fbf-dell-6
Passed

Operating system has been installed without any problems, hardware is well recognized by Kernel, and works perfectly, including RAID card and Ethernet cards.

Hard drive performance tests were applied to the RAID disk volumes of the DACS1 Server using BONNIE[27]. BONNIE is a benchmark suite that is aimed at performing a number of simple tests of hard drive and file system performance.

Tests to be applied are:

Sequential Output (Write Test):

Block: The file is created using write. The CPU overhead should be just the OS file space allocation.

Rewrite: Each block of the file is read with read, dirtied, and rewritten with write, requiring an lseek. Since no space allocation is done, and the I/O is well-localized, this should test the effectiveness of the filesystem cache and the speed of data transfer.

[27] http://www.coker.com.au/bonnie++/

Sequential Input (Read Test):

Block: The file is read using read. This should be a pure test of sequential input performance

Random Seeks

This test runs three SeekProcCount processes in parallel, doing a total of 8000 lseeks to locations in the file specified by a random function. In each case, the block is read with read. In 10% of cases, it is dirtied and written back with write.

Results obtained for ng-fbf-dell-6 unit

		Sequential Output				Sequential Input		Random	
	Size:Chunk Size	Block		Rewrite		Block		Seeks	
		K/sec	% CPU	K/sec	% CPU	K/sec	% CPU	/ sec	% CPU
dell-1950-6	16G	91189	18	44801	8	129820	11	517.1	0
dell-1950-6	16G	89304	21	49080	10	119905	5	550.1	0

These results indicate that the RAID volume, formatted under ext3, can write at 87 Mega Bytes per second, rewrite 44 Mega Bytes per second, read 115,2 Mega Bytes per second and perform an average of 499 – 559 random seeks per second.

Network Performance Tests: GENSINK has been used for testing network performances. GENSINK generates random network traffic, not related to the hard drive in order to generate the maximum possible data in the network card.

Network cards perform at an average speed of 122’344 KiloBytes/sec (955.812 Megabits/sec). Despite of this, performances remain very high.

Hardware Specifications

Chassis, Power Supply, Cooling and Serial Number.

	ng-fbf-dell-6
Chassis	Passed
Power Supply	Passed
Cooling	Passed
Serial Number	GFL3W3J

DACS1 Server shall be housed in a rack mountable 19” chassis at 100cm deep and 12U high. The chassis must be provided with sliding rails for 19” racks and have easily accessible power on/off and reset buttons and a power LED.

ng-fbf-dell-6
Passed

The server chassis shall provide locking solution that locks the chassis cover closed to protect internal components and guarantee the air flux for a correct cooling.

ng-fbf-dell-6
Passed

Dual redundant power supplies are required. The DACS1 Server must be able to restart properly even if one power supply module is not working.

ng-fbf-dell-6
Passed

The server has two redundant power supplies. Servers work properly with only one of them. The unit should be delivered with UPS that assures continuous operation in case of power cut (15 minutes) and proper system shutdown in an event of longer power cut.

ng-fbf-dell-6
Passed

UPS Service is provided by the IT Center.

The required number of flame-retardant (rated IEC 332-1) and halogen-free (PVC is excluded) appropriate power cord must be supplied.

ng-fbf-dell-6
Passed

DACS1 Server must have a unique serial number on the rear of the chassis that is clearly visible when the chassis is installed in a rack. If additional information is provided with the serial number, this information must be written in English.

ng-fbf-dell-6
GFL3W3J

One Dual Core 2 or One Quad Core Intel Xeon processors are required.

ng-fbf-dell-6
Two Quad Core Intel(R) Xeon(R) CPU E5410 2.33GHz

Server shall be equipped with a SVGA video, keyboard and mouse ports. Servers shall be supplied without keyboard, mouse and video screen.

ng-fbf-dell-6
Passed

Connection for SVGA video, keyboard and mouse present in front and rear of server. Keyboard and mouse must be USB type.

The server must be able to boot Linux without keyboard, screen or mouse attached.

ng-fbf-dell-6
Passed

Servers must have at least 4 GBytes of RAM. The supplier is responsible for providing modules that are compatible with the motherboard and for testing them with the diagnostic diskette of the motherboard manufacturer. Proof of such a test must be provided for each machine.

ng-fbf-dell-6
Passed

The server has 8 GBytes of RAM.

Network interface: DACS1 Server must have 2 copper Gigabit Ethernet interface for data access.

ng-fbf-dell-6
Passed

The server has 2 Gigabit Ethernet cards

Remote administration card: The server must be shipped with a remote administration card, the mandatory properties are:

To be capable of interaction at BIOS level with the hardware.

ng-fbf-dell-6
Passed

Server has DRAC5 (Dell Remote Access Card) installed. Provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allow to start, stop and restart the server remotely.

To be configurable through a TCP/IP network, and provide software client to remote administration of the server.

ng-fbf-dell-6
Passed

Server has a DRAC5 (Dell Remote Access Card) installed. This card provides the necessary tools and functionality to monitor, troubleshoots, and repair server. Allow to start, stop and restart the server remotely and mounting remote iso images of floppy disks and cd.

General Requirements for System and Data Disks

All hard disks shall have a rotational speed of at least 7200 RPM.

ng-fbf-dell-6
Passed

ng-fbf-dell-6:

2 HDD of 73GB sata 7200 RPM (system RAID1)

All disks must be installed in hot swap disk trays. It must be possible to extract these disk trays while the server chassis remains in its place in the 19” rack in which it is installed

ng-fbf-dell-6
Passed

All disks are hot swapable. Hot extraction of one of the disk has been tested without stopping the server. The server has been working without a disk for a short time, then the disk has been reintroduced and the raid successfully restored without human intervention.

System Disks: Two dedicated system disks of at least 20 GB each are required for installation of the Linux Operating system. These system disks must be configured as a mirrored set using hardware mirroring

ng-fbf-dell-6
Passed

This server was delivered with two hard drives of 73 GB each one mounted under hardware RAID1.

Documentation

The server must be delivered with a set of manuals in English comprising:

Documentation		ng-fbf-dell-6 Server
The chassis and power supply manual	Passed	
The Raid hardware manual.	Passed	
The gigabit card manual.	Passed	
The motherboard manual.	Passed	
The disk's led manual	Passed	
The complete guaranty including and all the terms and conditions.	Passed	

Status

Remote Management

The DRAC card for remote access and management of the server works perfectly well. It can however be noted that sometimes DRACs do not close connections properly and therefore require a physical reset. This problem can apparently be solved by upgrading the DRAC firmware.

DACS1 – ng-fbf-dell-7

Hardware Tests

This section describes the hardware and visual tests that should be performed to validate the DACS1 servers. These servers were purchased by maat Gknowledge, for facilitating the deployment logistic and effort.

Visual Tests

A check of the delivery to ensure that all requested material (such as keys, configuration sheet, power cords and documentation) has been provided with the server.

ng-fbf-dell-7
Passed.

All documentation is OK and two power cords are included for each server.

A visual inspection of the server (inside and outside), with a particular emphasis on cabling.

ng-fbf-dell-7
Passed

Both servers are in perfect state outside and inside, making special remarks in the professional assembly. The internal cabling and elements to ensure the correct airflow between components are properly installed. CPU's and RAM are inside an airflow circuit in order to ensure the correct cooling.

A check of the configuration of the server to ensure all components are properly installed, recognized and configured.

ng-fbf-dell-7
Passed

BIOS recognizes RAM installed properly and RAID card recognizes hard drives properly in both servers.

System Tests

A basic check of the entire system, including data disks, to ensure correct cabling and connectivity.

ng-fbf-dell-7
Passed

Memory testing using Memtest86+ v2.0.1. This test will be performed using the bootable iso image available at http://www.memtest86.org.

ng-fbf-dell-7
Passed

Memory tests have been applied during 14 hours and no errors were found. Full test has been executed several times during these 14 hours.

ng-fbf-dell-7
Passed

Installation of the Scientific Linux 5.1 32 Bits Linux distribution.

ng-fbf-dell-7
Passed

Operating system has been installed without any problems, hardware is well recognized by Kernel, and works perfectly, including RAID card and Ethernet cards.

Hard drive performance tests were applied to the RAID disk volumes of the DACS1 Server using BONNIE[28]. BONNIE is a benchmark suite that is aimed at performing a number of simple tests of hard drive and file system performance.

Tests to be applied are:

Sequential Output (Write Test):

Block: The file is created using write. The CPU overhead should be just the OS file space allocation.

Rewrite: Each block of the file is read with read, dirtied, and rewritten with write, requiring an lseek. Since no space allocation is done, and the I/O is well-localized, this should test the effectiveness of the filesystem cache and the speed of data transfer.

Sequential Input (Read Test):

Block: The file is read using read. This should be a pure test of sequential input performance

Random Seeks

[28] http://www.coker.com.au/bonnie++/

This test runs three SeekProcCount processes in parallel, doing a total of 8000 lseeks to locations in the file specified by a random function. In each case, the block is read with read. In 10% of cases, it is dirtied and written back with write.

Results obtained for ng-fbf-dell-7 unit

		Sequential Output				Sequential Input		Random	
	Size:Chunk Size	Block		Rewrite		Block		Seeks	
		K/sec	% CPU	K/sec	% CPU	K/sec	% CPU	/ sec	% CPU
dell-1950-7	16G	93581	23	51301	12	138732	16	521.2	0
dell-1950-7	16G	92154	26	53917	11	123909	7	559.5	2

These results indicate that the RAID volume, formatted under ext3, can write at 91 Mega Bytes per second, rewrite 54 Mega Bytes per second, read 129,2 Mega Bytes per second and perform an average of 509 – 565 random seeks per second.

Network Performance Tests: GENSINK has been used for testing network performances. GENSINK generates random network traffic, not related to the hard drive in order to generate the maximum possible data in the network card.

Network cards perform at an average speed of 111'451 KiloBytes/sec (870.710 Megabits/sec). Despite of this, performances remain very high.

Hardware Specifications

Chassis, Power Supply, Cooling and Serial Number.

	ng-fbf-dell-7
Chassis	Passed
Power Supply	Passed
Cooling	Passed
Serial Number	HFL3W3J

DACS1 Server shall be housed in a rack mountable 19" chassis at 100cm deep and 12U high. The chassis must be provided with sliding rails for 19" racks and have easily accessible power on/off and reset buttons and a power LED.

ng-fbf-dell-7
Passed

The server chassis shall provide a locking solution that locks the chassis cover closed to protect internal components and guarantee the air flux for correct cooling.

ng-fbf-dell-7
Passed

Dual redundant power supplies are required. The DACS1 Server must be able to restart properly even if one power supply module is not working.

ng-fbf-dell-7
Passed

The server has two redundant power supplies. Servers work properly with only one of them. The unit should be delivered with UPS that assures continuous operation in case of power cut (15 minutes) and proper system shutdown in an event of longer power cut.

ng-fbf-dell-7
Passed

UPS Service is provided by the IT Center.

The required number of flame-retardant (rated IEC 332-1) and halogen-free (PVC is excluded) appropriate power cord must be supplied.

ng-fbf-dell-7
Passed

DACS1 Server must have a unique serial number on the rear of the chassis that is clearly visible when the chassis is installed in a rack. If additional information is provided with the serial number, this information must be written in English.

ng-fbf-dell-7
HFL3W3J

One Dual Core 2 or One Quad Core Intel Xeon processors are required.

ng-fbf-dell-7
Two Quad Core Intel(R) Xeon(R) CPU E5410 2.33GHz

Server shall be equipped with a SVGA video, keyboard and mouse ports. Servers shall be supplied without keyboard, mouse and video screen.

ng-fbf-dell-7
Passed

Connection for SVGA video, keyboard and mouse present in front and rear of server. Keyboard and mouse must be USB type.

The server must be able to boot Linux without keyboard, screen or mouse attached.

ng-fbf-dell-7
Passed

Servers must have at least 4 GBytes of RAM. The supplier is responsible for providing modules that are compatible with the motherboard and for testing them with the diagnostic diskette of the motherboard manufacturer. Proof of such a test must be provided for each machine.

ng-fbf-dell-7
Passed

The server has 8 GBytes of RAM.

Network interface: DACS1 Server must have 2 copper Gigabit Ethernet interface for data access.

ng-fbf-dell-7
Passed

The server has 2 Gigabit Ethernet cards

Remote administration card: The server must be shipped with a remote administration card, the mandatory properties are:

To be capable to interact at BIOS level with the hardware.

ng-fbf-dell-7
Passed

Server has DRAC5 (Dell Remote Access Card) installed. Provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allow to start, stop and restart the server remotely.

To be configurable through a TCP/IP network, and provide software client with remote administration of the server.

ng-fbf-dell-7
Passed

Server has a DRAC5 (Dell Remote Access Card) installed. This card provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allow to start, stop and restart the server remotely and mounting remote iso images of floppy disks and cd.

General Requirements for System and Data Disks

All hard disks shall have a rotational speed of at least 7200 RPM.

ng-fbf-dell-7
Passed

ng-fbf-dell-7:

2 HDD of 73GB sata 7200 RPM (system RAID1)

All disks must be installed in hot swap disk trays. It must be possible to extract these disk trays while the server chassis remains in its place in the 19” rack in which it is installed

ng-fbf-dell-7
Passed

All disks are hot swapable. Hot extraction of one of the disk has been tested without stopping the server. The server has been working without a disk for a short time, then the disk has been reintroduced and the raid successfully restored without human intervention.

System Disks: Two dedicated system disks of at least 20 GB each are required for installation of the Linux Operating system. These system disks must be configured as a mirrored set using hardware mirroring

ng-fbf-dell-7
Passed

This server was delivered with two hard drives of 73 GB each one mounted under hardware RAID1.

Documentation

The server must be delivered with a set of manuals in English comprising:

Documentation		ng-fbf-dell-7 Server
The chassis and power supply manual	Passed	
The Raid hardware manual.	Passed	
The gigabit card manual.	Passed	
The motherboard manual.	Passed	
The disk's led manual	Passed	
The complete guaranty including and all the terms and conditions.	Passed	

Status

Remote Management

The DRAC card for remote access and management of the server works perfectly well. It can however be noted that sometimes DRACs do not close connections properly and therefore require a physical reset. This problem can apparently be solved by upgrading the DRAC firmware.

DACS1 – ng-fbf-dell-8

Hardware Tests

This section describes the hardware and visual tests that should be performed to validate the DACS1 servers. These servers were purchased by maat Gknowledge, for facilitating the deployment logistic and effort.

Visual Tests

A check of the delivery to ensure that all requested material (such as keys, configuration sheet, power cords and documentation) has been provided with the server.

ng-fbf-dell-8
Passed.

All documentation is OK and two power cords are included for each server.

A visual inspection of the server (inside and outside), with a particular emphasis on cabling.

ng-fbf-dell-8
Passed

Both servers are in perfect state outside and inside, making special remarks in the professional assembly. The internal cabling and elements to ensure correct airflow between components are properly installed. CPU's and RAM are inside an airflow circuit in order to ensure correct cooling.

A check of the configuration of the server to ensure all components are properly installed, recognized and configured.

ng-fbf-dell-8
Passed

BIOS recognizes RAM installed properly and RAID card recognizes hard drives properly in both servers.

System Tests

A basic check of the entire system, including data disks, to ensure correct cabling and connectivity.

ng-fbf-dell-8
Passed

Memory testing using Memtest86+ v2.0.1. This test will be performed using the bootable iso image available at http://www.memtest86.org.

ng-fbf-dell-8
Passed

Memory tests have been applied during 14 hours and no errors were found. Full test has been executed several times during these 14 hours.

ng-fbf-dell-8
Passed

Installation of the Scientific Linux 5.1 32 Bits Linux distribution.

ng-fbf-dell-8
Passed

Operating system has been installed without any problems, hardware is well recognized by Kernel, and works perfectly, including RAID card and Ethernet cards.

Hard drive performance tests were applied to the RAID disk volumes of the DACS1 Server using BONNIE[29]. BONNIE is a benchmark suite that is aimed at performing a number of simple tests of hard drive and file system performance.

Tests to be applied are:

Sequential Output (Write Test):

Block: The file is created using write. The CPU overhead should be just the OS file space allocation.

Rewrite: Each block of the file is read with read, dirtied, and rewritten with write, requiring an lseek. Since no space allocation is done, and the I/O is well-localized, this should test the effectiveness of the filesystem cache and the speed of data transfer.

[29] http://www.coker.com.au/bonnie++/

Sequential Input (Read Test):

Block: The file is read using read. This should be a pure test of sequential input performance

Random Seeks

This test runs three SeekProcCount processes in parallel, doing a total of 8000 lseeks to locations in the file specified by a random function. In each case, the block is read with read. In 10% of cases, it is dirtied and written back with write.

Results obtained for ng-fbf-dell-8 unit

		Sequential Output				Sequential Input		Random	
	Size:Chunk Size	Block		Rewrite		Block		Seeks	
		K/sec	% CPU	K/sec	% CPU	K/sec	% CPU	/ sec	% CPU
dell-1950-8	16G	91091	20	49034	9	133910	14	507.3	0
dell-1950-8	16G	91355	22	50930	10	121012	4	547.9	0

These results indicate that the RAID volume, formatted under ext3, can write at 88 Mega Bytes per second, rewrite 48 Mega Bytes per second, read 127,9 Mega Bytes per second and perform an average of 509 – 569 random seeks per second.

Network Performance Tests: GENSINK has been used for testing network performances. GENSINK generates random network traffic, not related to the hard drive in order to generate the maximum possible data in the network card.

Network cards perform at an average speed of 119’320 KiloBytes/sec (932.187 Megabits/sec). Despite of this, performances remain very high.

Hardware Specifications

Chassis, Power Supply, Cooling and Serial Number.

	ng-fbf-dell-8
Chassis	Passed
Power Supply	Passed
Cooling	Passed
Serial Number	1GL3W3J

DACS1 Server shall be housed in a rack mountable 19” chassis at 100cm deep and 12U high. The chassis must be provided with sliding rails for 19” racks and have easily accessible power on/off and reset buttons and a power LED.

ng-fbf-dell-8
Passed

The server chassis shall provide locking solution that locks the chassis cover closed to protect internal components and guarantee the air flux for a correct cooling.

ng-fbf-dell-8
Passed

Dual redundant power supplies are required. The DACS1 Server must be able to restart properly even if one power supply module is not working.

ng-fbf-dell-8
Passed

The server has two redundant power supplies. Servers work properly with only one of them. The unit should be delivered with UPS that assures continuous operation in case of power cut (15 minutes) and proper system shutdown in an event of longer power cut.

ng-fbf-dell-8
Passed

UPS Service is provided by the IT Center.

The required number of flame-retardant (rated IEC 332-1) and halogen-free (PVC is excluded) appropriate power cord must be supplied.

ng-fbf-dell-8
Passed

DACS1 Server must have a unique serial number on the rear of the chassis that is clearly visible when the chassis is installed in a rack. If additional information is provided with the serial number, this information must be written in English.

ng-fbf-dell-8
1GL3W3J

One Dual Core 2 or One Quad Core Intel Xeon processors are required.

ng-fbf-dell-8
Two Quad Core Intel(R) Xeon(R) CPU E5410 2.33GHz

Server shall be equipped with a SVGA video, keyboard and mouse ports. Servers shall be supplied without keyboard, mouse and video screen.

ng-fbf-dell-8
Passed

Connection for SVGA video, keyboard and mouse present in front and rear of server. Keyboard and mouse must be USB type.

The server must be able to boot Linux without keyboard, screen or mouse attached.

ng-fbf-dell-8
Passed

Servers must have at least 4 GBytes of RAM. The supplier is responsible for providing modules that are compatible with the motherboard and for testing them with the diagnostic diskette of the motherboard manufacturer. Proof of such a test must be provided for each machine.

ng-fbf-dell-8
Passed

The server has 8 GBytes of RAM.

Network interface: DACS1 Server must have 2 copper Gigabit Ethernet interface for data access.

ng-fbf-dell-8
Passed

The server has 2 Gigabit Ethernet cards

Remote administration card: The server must be shipped with a remote administration card, the mandatory properties are:

To be capable to interact at BIOS level with the hardware.

ng-fbf-dell-8
Passed

Server has DRAC5 (Dell Remote Access Card) installed. Provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allow to start, stop and restart the server remotely.

To be configurable through a TCP/IP network, and provide software client to remote administration of the server.

ng-fbf-dell-8
Passed

Server has a DRAC5 (Dell Remote Access Card) installed. This card provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allow to start, stop and restart the server remotely and mounting remote iso images of floppy disks and cd.

General Requirements for System and Data Disks

All hard disks shall have a rotational speed of at least 7200 RPM.

ng-fbf-dell-8
Passed

ng-fbf-dell-8:

2 HDD of 73GB sata 7200 RPM (system RAID1)

All disks must be installed in hot swap disk trays. It must be possible to extract these disk trays while the server chassis remains in its place in the 19” rack in which it is installed

ng-fbf-dell-8
Passed

All disks are hot swapable. Hot extraction of one of the disk has been tested without stopping the server. The server has been working without a disk for a short time, then the disk has been reintroduced and the raid successfully restored without human intervention.

System Disks: Two dedicated system disks of at least 20 GB each are required for installation of the Linux Operating system. These system disks must be configured as a mirrored set using hardware mirroring

ng-fbf-dell-8
Passed

This server was delivered with two hard drives of 73 GB each one mounted under hardware RAID1.

Documentation

The server must be delivered with a set of manuals in English comprising:

Documentation		ng-fbf-dell-8 Server
The chassis and power supply manual	Passed	
The Raid hardware manual.	Passed	
The gigabit card manual.	Passed	
The motherboard manual.	Passed	
The disk's led manual	Passed	
The complete guaranty including and all the terms and conditions.	Passed	

Status

Remote Management

The DRAC card for remote access and management of the server works perfectly well. It can, however, be noted that sometimes DRACs do not close connections properly and therefore require a physical reset. This problem can apparently be solved by upgrading the DRAC firmware.

DACS1 – ng-fbf-dell-9

Hardware Tests

This section describes the hardware and visual tests that should be performed to validate the DACS1 servers. These servers were purchased by maat Gknowledge, for facilitating the deployment logistic and effort.

Visual Tests

A check of the delivery to ensure that all requested material (such as keys, configuration sheet, power cords and documentation) has been provided with the server.

ng-fbf-dell-9
Passed.

All documentation is OK and two power cords are included for each server.

A visual inspection of the server (inside and outside), with a particular emphasis on cabling.

ng-fbf-dell-9
Passed

Both servers are in perfect state outside and inside, making special remarks in the professional assembly. The internal cabling and elements to ensure the correct airflow between components are properly installed. CPU's and RAM are inside an airflow circuit in order to ensure the correct cooling.

A check of the configuration of the server to ensure all components are properly installed, recognized and configured.

ng-fbf-dell-9
Passed

BIOS recognizes RAM installed properly and RAID card recognizes hard drives properly in both servers.

System Tests

A basic check of the entire system, including data disks, to ensure correct cabling and connectivity.

ng-fbf-dell-9
Passed

Memory testing using Memtest86+ v2.0.1. This test will be performed using the bootable iso image available at http://www.memtest86.org.

ng-fbf-dell-9
Passed

Memory tests have been applied during 14 hours and no errors were found. Full test has been executed several times during these 14 hours.

ng-fbf-dell-9
Passed

Installation of the Scientific Linux 5.1 32 Bits Linux distribution.

ng-fbf-dell-9
Passed

Operating system has been installed without any problems, hardware is well recognized by Kernel, and works perfectly, including RAID card and Ethernet cards.

Hard drive performance tests were applied to the RAID disk volumes of the DACS1 Server using BONNIE[30]. BONNIE is a benchmark suite that is aimed at performing a number of simple tests of hard drive and file system performance.

Tests to be applied are:

Sequential Output (Write Test):

Block: The file is created using write. The CPU overhead should be just the OS file space allocation.

Rewrite: Each block of the file is read with read, dirtied, and rewritten with write, requiring an lseek. Since no space allocation is done, and the I/O is well-localized, this should test the effectiveness of the filesystem cache and the speed of data transfer.

[30] http://www.coker.com.au/bonnie++/

Sequential Input (Read Test):

Block: The file is read using read. This should be a pure test of sequential input performance

Random Seeks

This test runs three SeekProcCount processes in parallel, doing a total of 8000 lseeks to locations in the file specified by a random function. In each case, the block is read with read. In 10% of cases, it is dirtied and written back with write.

Results obtained for ng-fbf-dell-9 unit

		Sequential Output				Sequential Input		Random	
	Size:Chunk Size	Block		Rewrite		Block		Seeks	
		K/sec	% CPU	K/sec	% CPU	K/sec	% CPU	/ sec	% CPU
dell-1950-9	16G	93091	20	48790	11	145980	16	520.1	0
dell-1950-9	16G	90841	21	50932	12	122459	7	557.1	1

These results indicate that the RAID volume, formatted under ext3, can write at 90 Mega Bytes per second, rewrite 50 Mega Bytes per second, read 127,1 Mega Bytes per second and perform an average of 512 – 571 random seeks per second.

Network Performance Tests: GENSINK has been used for testing network performances. GENSINK generates random network traffic, not related to the hard drive in order to generate the maximum possible data in the network card.

Network cards perform at an average speed of 115’327 KiloBytes/sec (900.992 Megabits/sec). Despite of this, performances remain very high.

Hardware Specifications

Chassis, Power Supply, Cooling and Serial Number.

	ng-fbf-dell-9
Chassis	Passed
Power Supply	Passed
Cooling	Passed
Serial Number	GPL2W3J

DACS1 Server shall be housed in a rack mountable 19” chassis at 100cm deep and 12U high. The chassis must be provided with sliding rails for 19” racks and have easily accessible power on/off and reset buttons and a power LED.

ng-fbf-dell-9
Passed

The server chassis shall provide a locking solution that locks the chassis cover closed to protect internal components and guarantee the air flux for correct cooling.

ng-fbf-dell-9
Passed

Dual redundant power supplies are required. The DACS1 Server must be able to restart properly even if one power supply module is not working.

ng-fbf-dell-9
Passed

The server has two redundant power supplies. Servers work properly with only one of them. The unit should be delivered with UPS that assures continuous operation in case of power cut (15 minutes) and proper system shutdown in an event of longer power cut.

ng-fbf-dell-9
Passed

UPS Service is provided by the IT Center.

The required number of flame-retardant (rated IEC 332-1) and halogen-free (PVC is excluded) appropriate power cord must be supplied.

ng-fbf-dell-9
Passed

DACS1 Server must have a unique serial number on the rear of the chassis that is clearly visible when the chassis is installed in a rack. If additional information is provided with the serial number, this information must be written in English.

ng-fbf-dell-9
GPL2W3J

One Dual Core 2 or One Quad Core Intel Xeon processors are required.

ng-fbf-dell-9
Two Quad Core Intel(R) Xeon(R) CPU E5410 2.33GHz

Server shall be equipped with a SVGA video, keyboard and mouse ports. Servers shall be supplied without keyboard, mouse and video screen.

ng-fbf-dell-9
Passed

Connection for SVGA video, keyboard and mouse present in front and rear of server. Keyboard and mouse must be USB type.

The server must be able to boot Linux without keyboard, screen or mouse attached.

ng-fbf-dell-9
Passed

Servers must have at least 4 GBytes of RAM. The supplier is responsible for providing modules that are compatible with the motherboard and for testing them with the diagnostic diskette of the motherboard manufacturer. Proof of such a test must be provided for each machine.

ng-fbf-dell-9
Passed

The server has 8 GBytes of RAM.

Network interface: DACS1 Server must have 2 copper Gigabit Ethernet interface for data access.

ng-fbf-dell-9
Passed

The server has 2 Gigabit Ethernet cards

Remote administration card: The server must be shipped with a remote administration card, the mandatory properties are:

To be capable to interact at BIOS level with the hardware.

ng-fbf-dell-9
Passed

Server has DRAC5 (Dell Remote Access Card) installed. Provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allow to start, stop and restart the server remotely.

To be configurable through a TCP/IP network, and provide software client with remote administration of the server.

ng-fbf-dell-9
Passed

Server has a DRAC5 (Dell Remote Access Card) installed. This card provides the necessary tools and functionality to monitor, troubleshoots, and repair server. Allow to start, stop and restart the server remotely and mounting remote iso images of floppy disks and cd.

1.1.1.1 General Requirements for System and Data Disks

All hard disks shall have a rotational speed of at least 7200 RPM.

ng-fbf-dell-9
Passed

ng-fbf-dell-9:

2 HDD of 73GB sata 7200 RPM (system RAID1)

All disks must be installed in hot swap disk trays. It must be possible to extract these disk trays while the server chassis remains in its place in the 19” rack in which it is installed

ng-fbf-dell-9
Passed

All disks are hot swapable. Hot extraction of one of the disk has been tested without stopping the server. The server has been working without a disk for a short time, then the disk has been reintroduced and the raid successfully restored without human intervention.

System Disks: Two dedicated system disks of at least 20 GB each are required for installation of the Linux Operating system. These system disks must be configured as a mirrored set using hardware mirroring

ng-fbf-dell-9
Passed

This server was delivered with two hard drives of 73 GB each one mounted under hardware RAID1.

1.1.1.2 Documentation

The server must be delivered with a set of manuals in English comprising:

Documentation	ng-fbf-dell-9 Server
The chassis and power supply manual	Passed
The Raid hardware manual.	Passed
The gigabit card manual.	Passed
The motherboard manual.	Passed
The disk's led manual	Passed
The complete guaranty including and all the terms and conditions.	Passed

1.1.2 Status

Remote Management

The DRAC card for remote access and management of the server works perfectly well. It can, however, be noted that sometimes DRACs do not close connections properly and therefore require a physical reset. This problem can apparently be solved by upgrading the DRAC firmware.

DACS1 – ng-fbf-dell-10

Hardware Tests

This section describes the hardware and visual tests that should be performed to validate the DACS1 servers. These servers were purchased by maat Gknowledge, for facilitating the deployment logistic and effort.

Visual Tests

A check of the delivery to ensure that all requested material (such as keys, configuration sheet, power cords and documentation) has been provided with the server.

ng-fbf-dell-10
Passed.

All documentation is OK and two power cords are included for each server.

A visual inspection of the server (inside and outside), with a particular emphasis on cabling.

ng-fbf-dell-10
Passed

Both servers are in perfect state outside and inside, making special remarks in the professional assembly. The internal cabling and elements to ensure the correct airflow between components are properly installed. CPU's and RAM are inside an airflow circuit in order to ensure the correct cooling.

A check of the configuration of the server to ensure all components are properly installed, recognized and configured.

ng-fbf-dell-10
Passed

BIOS recognizes RAM installed properly and RAID card recognizes hard drives properly in both servers.

System Tests

A basic check of all system, including data disks to ensure correct cabling and connectivity.

ng-fbf-dell-10
Passed

Memory testing using Memtest86+ v2.0.1. This test will be performed using the bootable iso image available at http://www.memtest86.org.

ng-fbf-dell-10
Passed

Memory tests have been applied during 14 hours and no errors were found. Full test has been executed several times during these 14 hours.

ng-fbf-dell-10
Passed

Installation of the Scientific Linux 5.1 32 Bits Linux distribution.

ng-fbf-dell-10
Passed

Operating system has been installed without any problems, hardware is well recognized by Kernel, and works perfectly, including RAID card and Ethernet cards.

Hard drive performance tests were applied to the RAID disk volumes of the DACS1 Server using BONNIE[31]. BONNIE is a benchmark suite that is aimed at performing a number of simple tests of hard drive and file system performance.

Tests to be applied are:

Sequential Output (Write Test):

Block: The file is created using write. The CPU overhead should be just the OS file space allocation.

Rewrite: Each block of the file is read with read, dirtied, and rewritten with write, requiring an lseek. Since no space allocation is done, and the I/O is well-localized, this should test the effectiveness of the filesystem cache and the speed of data transfer.

[31] http://www.coker.com.au/bonnie++/

Sequential Input (Read Test):

Block: The file is read using read. This should be a pure test of sequential input performance

Random Seeks

This test runs three SeekProcCount processes in parallel, doing a total of 8000 lseeks to locations in the file specified by a random function. In each case, the block is read with read. In 10% of cases, it is dirtied and written back with write.

Results obtained for ng-fbf-dell-10 unit

		Sequential Output				Sequential Input		Random	
	Size:Chunk Size	Block		Rewrite		Block		Seeks	
		K/sec	% CPU	K/sec	% CPU	K/sec	% CPU	/ sec	% CPU
dell-1950-10	16G	90329	20	49747	10	133356	15	463.1	0
dell-1950-10	16G	90402	22	49999	10	125353	15	510.0	0

These results indicate that the RAID volume, formatted under ext3, can write at 87 Mega Bytes per second, rewrite 49 Mega Bytes per second, read 124,1 Mega Bytes per second and perform an average of 508 – 568 random seeks per second.

Network Performance Tests: GENSINK has been used for testing network performances. GENSINK generates random network traffic, not related to the hard drive in order to generate the maximum possible data in the network card.

Network cards perform at an average speed of 121'836 KiloBytes/sec (951.844 Megabits/sec). Despite of this, performances remain very high.

Hardware Specifications

Chassis, Power Supply, Cooling and Serial Number.

	ng-fbf-dell-10
Chassis	Passed
Power Supply	Passed
Cooling	Passed
Serial Number	2GL3W3J

DACS1 Server shall be housed in a rack mountable 19” chassis at 100cm deep and 12U high. The chassis must be provided with sliding rails for 19” racks and have easily accessible power on/off and reset buttons and a power LED.

ng-fbf-dell-10
Passed

The server chassis shall provide a locking solution that locks the chassis cover closed to protect internal components and guarantee the air flux for correct cooling.

ng-fbf-dell-10
Passed

Dual redundant power supplies are required. The DACS1 Server must be able to restart properly even if one power supply module is not working.

ng-fbf-dell-10
Passed

The server has two redundant power supplies. Servers work properly with only one of them. The unit should be delivered with UPS that assures continuous operation in case of power cut (15 minutes) and proper system shutdown in an event of longer power cut.

ng-fbf-dell-10
Passed

UPS Service is provided by the IT Center.

The required number of flame-retardant (rated IEC 332-1) and halogen-free (PVC is excluded) appropriate power cord must be supplied.

ng-fbf-dell-10
Passed

DACS1 Server must have a unique serial number on the rear of the chassis that is clearly visible when the chassis is installed in a rack. If additional information is provided with the serial number, this information must be written in English.

ng-fbf-dell-10
2GL3W3J

One Dual Core 2 or One Quad Core Intel Xeon processors are required.

ng-fbf-dell-10
Two Quad Core Intel(R) Xeon(R) CPU E5410 2.33GHz

Server shall be equipped with a SVGA video, keyboard and mouse ports. Servers shall be supplied without keyboard, mouse and video screen.

ng-fbf-dell-10
Passed

Connection for SVGA video, keyboard and mouse present in front and rear of server. Keyboard and mouse must be USB type.

The server must be able to boot Linux without keyboard, screen or mouse attached.

ng-fbf-dell-10
Passed

Servers must have at least 4 GBytes of RAM. The supplier is responsible for providing modules that are compatible with the motherboard and for testing them with the diagnostic diskette of the motherboard manufacturer. Proof of such a test must be provided for each machine.

ng-fbf-dell-10
Passed

The server has 8 GBytes of RAM.

Network interface: DACS1 Server must have 2 copper Gigabit Ethernet interface for data access.

ng-fbf-dell-10
Passed

The server has 2 Gigabit Ethernet cards

Remote administration card: The server must be shipped with a remote administration card, the mandatory properties are:

To be capable to interact at BIOS level with the hardware.

ng-fbf-dell-10
Passed

Server has DRAC5 (Dell Remote Access Card) installed. Provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allow to start, stop and restart the server remotely.

To be configurable through a TCP/IP network, and provide software client with remote administration of the server.

ng-fbf-dell-10
Passed

Server has a DRAC5 (Dell Remote Access Card) installed. This card provides the necessary tools and functionality to monitor, troubleshoots, and repair server. Allow to start, stop and restart the server remotely and mounting remote iso images of floppy disks and cd.

General Requirements for System and Data Disks

All hard disks shall have a rotational speed of at least 7200 RPM.

ng-fbf-dell-10
Passed

ng-fbf-dell-10:

2 HDD of 73GB sata 7200 RPM (system RAID1)

All disks must be installed in hot swap disk trays. It must be possible to extract these disk trays while the server chassis remains in its place in the 19” rack in which it is installed

ng-fbf-dell-10
Passed

All disks are hot swapable. Hot extraction of one of the disk has been tested without stopping the server. The server has been working without a disk for a short time, then the disk has been reintroduced and the raid successfully restored without human intervention.

System Disks: Two dedicated system disks of at least 20 GB each are required for installation of the Linux Operating system. These system disks must be configured as a mirrored set using hardware mirroring

ng-fbf-dell-10
Passed

This server was delivered with two hard drives of 73 GB each one mounted under hardware RAID1.

Documentation

The server must be delivered with a set of manuals in English comprising:

Documentation		ng-fbf-dell-10 Server
The chassis and power supply manual	Passed	
The Raid hardware manual.	Passed	
The gigabit card manual.	Passed	
The motherboard manual.	Passed	
The disk's led manual	Passed	
The complete guaranty including and all the terms and conditions.	Passed	

Status

Remote Management

The DRAC card for remote access and management of the server works perfectly well. It can however be noted that sometimes DRACs do not close connections properly and therefore require a physical reset. This problem can apparently be solved by upgrading the DRAC firmware.

DACS1 – ng-fbf-dell-11

Hardware Tests

This section describes the hardware and visual tests that should be performed to validate the DACS1 servers. These servers were purchased by maat Gknowledge, for facilitating the deployment logistic and effort.

Visual Tests

A check of the delivery to ensure that all requested material (such as keys, configuration sheet, power cords and documentation) has been provided with the server.

ng-fbf-dell-11
Passed.

All documentation is OK and two power cords are included for each server.

A visual inspection of the server (inside and outside), with a particular emphasis on cabling.

ng-fbf-dell-11
Passed

Both servers are in perfect state outside and inside, making special remarks in the professional assembly. The internal cabling and elements to ensure the correct airflow between components are properly installed. CPU's and RAM are inside an airflow circuit in order to ensure the correct cooling.

A check of the configuration of the server to ensure all components are properly installed recognized and configured.

ng-fbf-dell-11
Passed

BIOS recognizes RAM installed properly and RAID card recognizes hard drives properly to in both servers.

System Tests

A basic check of the entire system, including data disks to ensure correct cabling and connectivity.

ng-fbf-dell-11
Passed

Memory testing using Memtest86+ v2.0.1. This test will be performed using the bootable iso image available at http://www.memtest86.org.

ng-fbf-dell-11
Passed

Memory tests have been applied during 14 hours and no errors were found. Full test has been executed several times during these 14 hours.

ng-fbf-dell-11
Passed

Installation of the Scientific Linux 5.1 32 Bits Linux distribution.

ng-fbf-dell-11
Passed

Operating system has been installed without any problems, hardware is well recognized by Kernel, and works perfectly, including RAID card and Ethernet cards.

Hard drive performance tests were applied to the RAID disk volumes of the DACS1 Server using BONNIE[32]. BONNIE is a benchmark suite that is aimed at performing a number of simple tests of hard drive and file system performance.

Tests to be applied are:

Sequential Output (Write Test):

Block: The file is created using write. The CPU overhead should be just the OS file space allocation.

Rewrite: Each block of the file is read with read, dirtied, and rewritten with write, requiring an lseek. Since no space allocation is done, and the I/O is well-localized, this should test the effectiveness of the filesystem cache and the speed of data transfer.

[32] http://www.coker.com.au/bonnie++/

Sequential Input (Read Test):

Block: The file is read using read. This should be a pure test of sequential input performance

Random Seeks

This test runs three SeekProcCount processes in parallel, doing a total of 8000 lseeks to locations in the file specified by a random function. In each case, the block is read with read. In 10% of cases, it is dirtied and written back with write.

Results obtained for ng-fbf-dell-11 unit

		Sequential Output				Sequential Input		Random	
	Size:Chunk Size	Block		Rewrite		Block		Seeks	
		K/sec	% CPU	K/sec	% CPU	K/sec	% CPU	/ sec	% CPU
dell-1950-11	16G	82153	18	45198	9	106252	12	508.0	0
dell-1950-11	16G	90559	20	45603	9	107872	12	514.4	0

These results indicate that the RAID volume, formatted under ext3, can write at 90 Mega Bytes per second, rewrite 49 Mega Bytes per second, read 126,3 Mega Bytes per second and perform an average of 510 – 570 random seeks per second.

Network Performance Tests: GENSINK has been used for testing network performances. GENSINK generates random network traffic, not related to the hard drive in order to generate the maximum possible data in the network card.

Network cards perform at an average speed of 116’710 KiloBytes/sec (911.796 Megabits/sec). Despite of this, performances remain very high.

Hardware Specifications

Chassis, Power Supply, Cooling and Serial Number.

	ng-fbf-dell-11
Chassis	Passed
Power Supply	Passed
Cooling	Passed
Serial Number	4GL3W3J

DACS1 Server shall be housed in a rack mountable 19” chassis at 100cm deep and 12U high. The chassis must be provided with sliding rails for 19” racks and have easily accessible power on/off and reset buttons and a power LED.

ng-fbf-dell-11
Passed

The server chassis shall provide locking solution that locks the chassis cover closed to protect internal components and guarantee the air flux for a correct cooling.

ng-fbf-dell-11
Passed

Dual redundant power supplies are required. The DACS1 Server must be able to restart properly even if one power supply module is not working.

ng-fbf-dell-11
Passed

The server has two redundant power supplies. Servers work properly with only one of them. The unit should be delivered with UPS that assures continuous operation in case of power cut (15 minutes) and proper system shutdown in an event of longer power cut.

ng-fbf-dell-11
Passed

UPS Service is provided by the IT Center.

The required number of flame-retardant (rated IEC 332-1) and halogen-free (PVC is excluded) appropriate power cord must be supplied.

ng-fbf-dell-11
Passed

DACS1 Server must have a unique serial number on the rear of the chassis that is clearly visible when the chassis is installed in a rack. If additional information is provided with the serial number, this information must be written in English.

ng-fbf-dell-11
4GL3W3J

One Dual Core 2 or One Quad Core Intel Xeon processors are required.

ng-fbf-dell-11
Two Quad Core Intel(R) Xeon(R) CPU E5410 2.33GHz

Server shall be equipped with a SVGA video, keyboard and mouse ports. Servers shall be supplied without keyboard, mouse and video screen.

ng-fbf-dell-11
Passed

Connection for SVGA video, keyboard and mouse present in front and rear of server. Keyboard and mouse must be USB type.

The server must be able to boot Linux without keyboard, screen or mouse attached.

ng-fbf-dell-11
Passed

Servers must have at least 4 GBytes of RAM. The supplier is responsible for providing modules that are compatible with the motherboard and for testing them with the diagnostic diskette of the motherboard manufacturer. Proof of such a test must be provided for each machine.

ng-fbf-dell-11
Passed

The server has 8 GBytes of RAM.

Network interface: DACS1 Server must have 2 copper Gigabit Ethernet interface for data access.

ng-fbf-dell-11
Passed

The server has 2 Gigabit Ethernet cards

Remote administration card: The server must be shipped with a remote administration card, the mandatory properties are:

To be capable to interact at BIOS level with the hardware.

ng-fbf-dell-11
Passed

Server has DRAC5 (Dell Remote Access Card) installed. Provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allow to start, stop and restart the server remotely.

To be configurable through a TCP/IP network, and provide software client with remote administration of the server.

ng-fbf-dell-11
Passed

Server has a DRAC5 (Dell Remote Access Card) installed. This card provides the necessary tools and functionality to monitor, troubleshoots, and repair server. Allow to start, stop and restart the server remotely and mounting remote iso images of floppy disks and cd.

General Requirements for System and Data Disks

All hard disks shall have a rotational speed of at least 7200 RPM.

ng-fbf-dell-11
Passed

ng-fbf-dell-11:

2 HDD of 73GB sata 7200 RPM (system RAID1)

All disks must be installed in hot swap disk trays. It must be possible to extract these disk trays while the server chassis remains in its place in the 19” rack in which it is installed

ng-fbf-dell-11
Passed

All disks are hot swapable. Hot extraction of one of the disk has been tested without stopping the server. The server has been working without a disk for a short time, then the disk has been reintroduced and the raid successfully restored without human intervention.

System Disks: Two dedicated system disks of at least 20 GB each are required for installation of the Linux Operating system. These system disks must be configured as a mirrored set using hardware mirroring

ng-fbf-dell-11
Passed

This server was delivered with two hard drives of 73 GB each one mounted under hardware RAID1.

Documentation

The server must be delivered with a set of manuals in English comprising:

Documentation		ng-fbf-dell-11 Server
The chassis and power supply manual	Passed	
The Raid hardware manual.	Passed	
The gigabit card manual.	Passed	
The motherboard manual.	Passed	
The disk's led manual	Passed	
The complete guaranty including and all the terms and conditions.	Passed	

Status

Remote Management

The DRAC card for remote access and management of the server works perfectly well. It can however be noted that sometimes DRACs do not close connections properly and therefore require a physical reset. This problem can apparently be solved by upgrading the DRAC firmware.

DACS1 – ng-fbf-dell-12

Hardware Tests

This section describes the hardware and visual tests that should be performed to validate the DACS1 servers. These servers were purchased by maat Gknowledge, for facilitating the deployment logistic and effort.

Visual Tests

A check of the delivery to ensure that all the requested material (such as keys, configuration sheet, power cords and documentation) is provided with the server.

ng-fbf-dell-12
Passed.

All documentation is OK and two power cords are included for each server.

A visual inspection of the server (inside and outside), with a particular emphasis on cabling.

ng-fbf-dell-12
Passed

Both servers are in perfect state outside and inside, making special remarks in the professional assembly. The internal cabling and elements to ensure the correct airflow between components are properly installed. CPU's and RAM are inside an airflow circuit in order to ensure the correct cooling.

A check of the configuration of the server to ensure all components are properly installed, recognized and configured.

ng-fbf-dell-12
Passed

BIOS recognizes RAM installed properly and RAID card recognizes hard drives properly to in both servers.

System Tests

A basic check of the entire system, including data disks, to ensure correct cabling and connectivity.

ng-fbf-dell-12
Passed

Memory testing using Memtest86+ v2.0.1. This test will be performed using the bootable iso image available at http://www.memtest86.org.

ng-fbf-dell-12
Passed

Memory tests have been applied during 14 hours and no errors were found. Full test has been executed several times during these 14 hours.

ng-fbf-dell-12
Passed

Installation of the Scientific Linux 5.1 32 Bits Linux distribution.

ng-fbf-dell-12
Passed

Operating system has been installed without any problems, hardware is well recognized by Kernel, and works perfectly, including RAID card and Ethernet cards.

Hard drive performance tests were applied to the RAID disk volumes of the DACS1 Server using BONNIE[33]. BONNIE is a benchmark suite that is aimed at performing a number of simple tests of hard drive and file system performance.

Tests to be applied are:

Sequential Output (Write Test):

Block: The file is created using write. The CPU overhead should be just the OS file space allocation.

Rewrite: Each block of the file is read with read, dirtied, and rewritten with write, requiring an lseek. Since no space allocation is done, and the I/O is well-localized, this should test the effectiveness of the filesystem cache and the speed of data transfer.

Sequential Input (Read Test):

Block: The file is read using read. This should be a pure test of sequential input performance

Random Seeks

[33] http://www.coker.com.au/bonnie++/

This test runs three SeekProcCount processes in parallel, doing a total of 8000 lseeks to locations in the file specified by a random function. In each case, the block is read with read. In 10% of cases, it is dirtied and written back with write.

Results obtained for ng-fbf-dell-12 unit

		Sequential Output				Sequential Input		Random	
	Size:Chunk Size	Block		Rewrite		Block		Seeks	
		K/sec	% CPU	K/sec	% CPU	K/sec	% CPU	/ sec	% CPU
dell-1950-12	16G	94980	21	50915	11	140710	17	521.5	0
dell-1950-12	16G	93402	23	53809	11	125910	9	561.1	2

These results indicate that the RAID volume, formatted under ext3, can write at 92 Mega Bytes per second, rewrite 51 Mega Bytes per second, read 129,8 Mega Bytes per second and perform an average of 514 – 573 random seeks per second.

Network Performance Tests: GENSINK has been used for testing network performances. GENSINK generates random network traffic, not related to the hard drive in order to generate the maximum possible data in the network card.

Network cards perform at an average speed of 112'109 KiloBytes/sec (875.852 Megabits/sec). Despite of this, performances remain very high.

Hardware Specifications

Chassis, Power Supply, Cooling and Serial Number.

	ng-fbf-dell-12
Chassis	Passed
Power Supply	Passed
Cooling	Passed
Serial Number	5GL3W3J

DACS1 Server shall be housed in a rack mountable 19” chassis at 100cm deep and 12U high. The chassis must be provided with sliding rails for 19” racks and have easily accessible power on/off and reset buttons and a power LED.

ng-fbf-dell-12
Passed

The server chassis shall provide locking solution that locks the chassis cover closed to protect internal components and guarantee the air flux for a correct cooling.

ng-fbf-dell-12
Passed

Dual redundant power supplies are required. The DACS1 Server must be able to restart properly even if one power supply module is not working.

ng-fbf-dell-12
Passed

The server has two redundant power supplies. Servers work properly with only one of them. The unit should be delivered with UPS that assures continuous operation in case of power cut (15 minutes) and proper system shutdown in an event of longer power cut.

ng-fbf-dell-12
Passed

UPS Service is provided by the IT Center.

The required number of flame-retardant (rated IEC 332-1) and halogen-free (PVC is excluded) appropriate power cord must be supplied.

ng-fbf-dell-12
Passed

DACS1 Server must have a unique serial number on the rear of the chassis that is clearly visible when the chassis is installed in a rack. If additional information is provided with the serial number, this information must be written in English.

ng-fbf-dell-12
5GL3W3J

One Dual Core 2 or One Quad Core Intel Xeon processors are required.

ng-fbf-dell-12
Two Quad Core Intel(R) Xeon(R) CPU E5410 2.33GHz

Server shall be equipped with a SVGA video, keyboard and mouse ports. Servers shall be supplied without keyboard, mouse and video screen.

ng-fbf-dell-12
Passed

Connection for SVGA video, keyboard and mouse present in front and rear of server. Keyboard and mouse must be USB type.

The server must be able to boot Linux without keyboard, screen or mouse attached.

ng-fbf-dell-12
Passed

Servers must have at least 4 GBytes of RAM. The supplier is responsible for providing modules that are compatible with the motherboard and for testing them with the diagnostic diskette of the motherboard manufacturer. Proof of such a test must be provided for each machine.

ng-fbf-dell-12
Passed

The server has 8 GBytes of RAM.

Network interface: DACS1 Server must have 2 copper Gigabit Ethernet interface for data access.

ng-fbf-dell-12
Passed

The server has 2 Gigabit Ethernet cards

Remote administration card: The server must be shipped with a remote administration card, the mandatory properties are:

To be capable to interact at BIOS level with the hardware.

ng-fbf-dell-12
Passed

Server has DRAC5 (Dell Remote Access Card) installed. Provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allow to start, stop and restart the server remotely.

To be configurable through a TCP/IP network, and provide software client with remote administration of the server.

ng-fbf-dell-12
Passed

Server has a DRAC5 (Dell Remote Access Card) installed. This card provides the necessary tools and functionality to monitor, troubleshoots, and repair server. Allow to start, stop and restart the server remotely and mounting remote iso images of floppy disks and cd.

General Requirements for System and Data Disks

All hard disks shall have a rotational speed of at least 7200 RPM.

ng-fbf-dell-12
Passed

ng-fbf-dell-12:

2 HDD of 73GB sata 7200 RPM (system RAID1)

All disks must be installed in hot swap disk trays. It must be possible to extract these disk trays while the server chassis remains in its place in the 19” rack in which it is installed

ng-fbf-dell-12
Passed

All disks are hot swapable. Hot extraction of one of the disk has been tested without stopping the server. The server has been working without a disk for a short time, then the disk has been reintroduced and the raid successfully restored without human intervention.

System Disks: Two dedicated system disks of at least 20 GB each are required for installation of the Linux Operating system. These system disks must be configured as a mirrored set using hardware mirroring

ng-fbf-dell-12
Passed

This server was delivered with two hard drives of 73 GB each one mounted under hardware RAID1.

Documentation

The server must be delivered with a set of manuals in English comprising:

Documentation		ng-fbf-dell-12 Server
The chassis and power supply manual	Passed	
The Raid hardware manual.	Passed	
The gigabit card manual.	Passed	
The motherboard manual.	Passed	
The disk's led manual	Passed	
The complete guaranty including and all the terms and conditions.	Passed	

Status

Remote Management

The DRAC card for remote access and management of the server works perfectly well. It can however be noted that sometimes DRACs do not close connections properly and therefore require a physical reset. This problem can apparently be solved by upgrading the DRAC firmware.

DACS1– ng-fbf-dell-13

Hardware Tests

This section describes the hardware and visual tests that should be performed to validate the neuGRID Grid Core Centreservers. These servers were purchased by maat Gknowledge, for facilitating the deployment logistic and effort.

Visual Tests

A check of the delivery to ensure that all the requested material (such as keys, configuration sheet, power cords and documentation) is provided with the server.

ng-fbf-dell-13
Passed.

All documentation is OK and two power cords are included for each server.

A visual inspection of the server (inside and outside), with a particular emphasis on cabling.

ng-fbf-dell-13
Passed

Both servers are in perfect state outside and inside, making special remarks in the professional. The internal cabling and elements to ensure the correct airflow between components are properly installed. CPU's and RAM are inside an airflow circuit in order to ensure the correct cooling.

A check of the configuration of the server to ensure all components are properly installed recognized and configured.

ng-fbf-dell-13
Passed

BIOS recognizes RAM installed properly and RAID card recognizes hard drives properly to in both servers.

System Tests

A basic check of all system, including data disks to ensure correct cabling and connectivity.

ng-fbf-dell-13
Passed

Memory testing using Memtest86+ v2.0.1. This test will be performed using the bootable iso image available at http://www.memtest86.org.

ng-fbf-dell-13
Passed

Memory tests have been applied during 14 hours and no errors were found. Full test has been executed several times during these 14 hours.

ng-fbf-dell-13
Passed

Installation of the Scientific Linux 5.1 32 Bits Linux distribution.

ng-fbf-dell-13
Passed

Operating system has been installed without any problems, hardware is well recognized by Kernel, and works perfectly, including RAID card and Ethernet cards.

Hard drive performance tests were applied to the RAID disk volumes of the neuGRID Grid Core CentreServer using BONNIE[34]. BONNIE is a benchmark suite that is aimed at performing a number of simple tests of hard drive and file system performance.

Tests to be applied are:

Sequential Output (Write Test):

Block: The file is created using write. The CPU overhead should be just the OS file space allocation.

Rewrite: Each block of the file is read with read, dirtied, and rewritten with write, requiring an lseek. Since no space allocation is done, and the I/O is well-localized, this should test the effectiveness of the filesystem cache and the speed of data transfer.

[34] http://www.coker.com.au/bonnie++/

Sequential Input (Read Test):

Block: The file is read using read. This should be a pure test of sequential input performance

Random Seeks

This test runs three SeekProcCount processes in parallel, doing a total of 8000 lseeks to locations in the file specified by a random function. In each case, the block is read with read. In 10% of cases, it is dirtied and written back with write.

Results obtained for ng-fbf-dell-13 unit

		Sequential Output				Sequential Input		Random	
	Size:Chunk Size	Block		Rewrite		Block		Seeks	
		K/sec	% CPU	K/sec	% CPU	K/sec	% CPU	/ sec	% CPU
dell-2950-13	16G	44871	10	23094	5	55390	7	197.0	0
dell-2950-13	16G	45593	10	22842	5	55052	6	173.2	0

These results indicate that the RAID volume, formatted under ext3, can write at 44 Mega Bytes per second, rewrite 22,4 Mega Bytes per second, read 53,7 Mega Bytes per second and perform an average of 170 – 210 random seeks per second.

Network Performance Tests: GENSINK has been used for testing network performances. GENSINK generates random network traffic, not related to the hard drive in order to generate the maximum possible data in the network card.

Network cards perform at an average speed of 114’699 KiloBytes/sec (896.085 Megabits/sec). Despite of this, performances remain very high.

Hardware Specifications

Chassis, Power Supply, Cooling and Serial Number.

	ng-fbf-dell-13
Chasis	Passed
Power Supply	Passed
Cooling	Passed
Serial Number	6GL3W3J

neuGRID Grid Core CentreServer shall be housed in a rack mountable 19” chassis at 100cm deep and 12U high. The chassis must be provided with sliding rails for 19” racks and have easily accessible power on/off and reset buttons and a power LED.

ng-fbf-dell-13
Passed

The server chassis shall provide locking solution that locks the chassis cover closed to protect internal components and guarantee the air flux for a correct cooling.

ng-fbf-dell-13
Passed

Dual redundant power supplies are required. The neuGRID Grid Core CentreServer must be able to restart properly even if one power supply module is not working.

ng-fbf-dell-13
Passed

The server has two redundant power supplies. Servers work properly with only one of them. The unit should be delivered with UPS that assures continuous operation in case of power cut (15 minutes) and proper system shutdown in an event of longer power cut.

ng-fbf-dell-13
Passed

UPS Service is provided by the IT Center.

The required number of flame-retardant (rated IEC 332-1) and halogen-free (PVC is excluded) appropriate power cord must be supplied.

ng-fbf-dell-13
Passed

neuGRID Grid Core CentreServer must have a unique serial number on the rear of the chassis that is clearly visible when the chassis is installed in a rack. If additional information is provided with the serial number, this information must be written in English.

ng-fbf-dell-13
6GL3W3J

One Dual Core 2 or One Quad Core Intel Xeon processors are required.

ng-fbf-dell-13
Two Quad Core Intel(R) Xeon(R) CPU E5410 2.33GHz

Server shall be equipped with a SVGA video, keyboard and mouse ports. Servers shall be supplied without keyboard, mouse and video screen.

ng-fbf-dell-13
Passed

Connection for SVGA video, keyboard and mouse present in front and rear of server. Keyboard and mouse must be USB type.

The server must be able to boot Linux without keyboard, screen or mouse attached.

ng-fbf-dell-13	Data Server
Passed	Passed

Servers must have at least 4 GBytes of RAM. The supplier is responsible for providing modules that are compatible with the motherboard and for testing them with the diagnostic diskette of the motherboard manufacturer. Proof of such a test must be provided for each machine.

ng-fbf-dell-13
Passed

Server has 8GBytes of RAM.

Network interface: neuGRID Grid Core CentreServer must have 2 copper Gigabit Ethernet interface for data access.

ng-fbf-dell-13
Passed

Each server has 4 Gigabit Ethernet cards

Remote administration card: The server must be shipped with a remote administration card, the mandatory properties are:

To be capable to interact at BIOS level with the hardware.

ng-fbf-dell-13
Passed

Server has DRAC5 (Dell Remote Access Card) installed. Provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allow to start, stop and restart the server remotely.

To be configurable through a TCP/IP network, and provide software client to remote administration of the server.

ng-fbf-dell-13
Passed

Server has a DRAC5 (Dell Remote Access Card) installed. This card provides the necessary tools and functionality to monitor, troubleshoots, and repair server. Allow to start, stop and restart the server remotely and mounting remote iso images of floppy disks and cd.

General Requirements for System and Data Disks

All hard disks shall have a rotational speed of at least 7200 RPM.

ng-fbf-dell-13
Passed

ng-fbf-dell-13:

2 HDD of 80GB sata 7200 RPM (system RAID1)

4 HDD of 750GB sata 7200 RPM (data RAID5)

All disks must be installed in hot swap disk trays. It must be possible to extract these disk trays while the server chassis remains in its place in the 19” rack in which it is installed

ng-fbf-dell-13
Passed

All disks are hot swapable. Hot extraction of one of the disk has been tested without stopping the server. The server has been working without a disk for a short time, then the disk has been reintroduced and the raid successfully restored without human intervention.

System Disks: Two dedicated system disks of at least 20 GB each are required for installation of the Linux Operating system. These system disks must be configured as a mirrored set using hardware mirroring

ng-fbf-dell-13
Passed

The server was delivered with two hard drives of 80 GB each one mounted under hardware RAID1.

Disks: The neuGRID Grid Core CentreServer shall have a minimum of 1, 5TB of "usable disk space"[35] on data disks.

ng-fbf-dell-13
Passed

ng-fbf-dell-13: Server has 4 hard drives of 750 GB mounted under RAID5. This means that the final usable space is 2'25 TB this is more than required.

Documentation

The server must be delivered with a set of manuals in English comprising:

Documentation		ng-fbf-dell-13 Server
The chassis and power supply manual	Passed	
The Raid hardware manual.	Passed	
The gigabit card manual.	Passed	
The motherboard manual.	Passed	
The disk's led manual	Passed	
The complete guaranty including and all the terms and conditions.	Passed	

[35]"usable disk space" shall mean the amount of user data that can be stored using an ext2/ext3 Linux file system created (using the default parameters of mkfs under CentOS 5.1 32 Bits) on a hardware RAID volume offering redundancy (e.g. RAID1, RAID4, RAID5 or RAID10).

Status

Remote Management

The DRAC card for remote access and management of the server works perfectly well. It can however be noted that sometimes DRACs do not close connections properly and therefore require a physical reset. This problem can apparently be solved by upgrading the DRAC firmware.

14. Annex 5 – DACS2 Hardware Tests

DACS2– ng-ki-dom0

Hardware Tests

This section describes the hardware and visual tests that should be performed to validate the neuGRID Grid KI Servers.

Visual Tests

A check of the delivery to ensure that all the requested material (such as keys, configuration sheet, power cords and documentation) is provided with the server.

ng-ki-dom0
Passed.

All documentation is OK and two power cords are included for each server.

A visual inspection of the server (inside and outside), with a particular emphasis on cabling.

ng-ki-dom0
Passed

Both servers are in perfect state outside and inside, making special remarks in the professional. The internal cabling and elements to ensure the correct airflow between components are properly installed. CPU's and RAM are inside an airflow circuit in order to ensure the correct cooling.

A check of the configuration of the server to ensure all components are properly installed recognized and configured.

ng-ki-dom0
Passed

BIOS recognizes RAM installed properly and RAID card recognizes hard drives properly to in both servers.

System Tests

A basic check of all system, including data disks to ensure correct cabling and connectivity.

ng-ki-dom0
Passed

Memory testing using Memtest86+ v2.0.1. This test will be performed using the bootable iso image available at http://www.memtest86.org.

ng-ki-dom0
Passed

Memory tests have been applied during 14 hours and no errors were found. Full test has been executed several times during these 14 hours.

ng-ki-dom0
Passed

Installation of the Scientific Linux 5.1 32 Bits Linux distribution.

ng-ki-dom0
Passed

Operating system has been installed without any problems, hardware is well recognized by Kernel, and works perfectly, including RAID card and Ethernet cards.

Hard drive performance tests were applied to the RAID disk volumes of the neuGRID Grid KI Server using BONNIE[36]. BONNIE is a benchmark suite that is aimed at performing a number of simple tests of hard drive and file system performance.

Tests to be applied are:

Sequential Output (Write Test):

Block: The file is created using write. The CPU overhead should be just the OS file space allocation.

Rewrite: Each block of the file is read with read, dirtied, and rewritten with write, requiring an lseek. Since no space allocation is done, and the I/O is well-localized, this should test the effectiveness of the filesystem cache and the speed of data transfer.

[36] http://www.coker.com.au/bonnie++/

Sequential Input (Read Test):

Block: The file is read using read. This should be a pure test of sequential input performance

Random Seeks

This test runs three SeekProcCount processes in parallel, doing a total of 8000 lseeks to locations in the file specified by a random function. In each case, the block is read with read. In 10% of cases, it is dirtied and written back with write.

Results obtained for ng-ki-dom0 unit

		Sequential Output				Sequential Input		Random	
	Size:Chunk Size	Block		Rewrite		Block		Seeks	
		K/sec	% CPU	K/sec	% CPU	K/sec	% CPU	/ sec	% CPU
server	16G	42471	9	24594	5	65390	7	187.0	0
server	16G	43593	9	23442	5	65052	6	183.2	0

These results indicate that the RAID volume, formatted under ext3, can write at 44 Mega Bytes per second, rewrite 22,4 Mega Bytes per second, read 53,7 Mega Bytes per second and perform an average of 180 – 190 random seeks per second.

Network Performance Tests: GENSINK has been used for testing network performances. GENSINK generates random network traffic, not related to the hard drive in order to generate the maximum possible data in the network card.

Network cards perform at an average speed of 115’001 KiloBytes/sec (920.008 Megabits/sec). Despite of this, performances remain very high.

Hardware Specifications

Chassis, Power Supply, Cooling and Serial Number.

	ng-ki-dom0
Chasis	Passed
Power Supply	Passed
Cooling	Passed
Serial Number	9SZF84J

neuGRID Grid KI Server shall be housed in a rack mountable 19” chassis at 100cm deep and 12U high. The chassis must be provided with sliding rails for 19” racks and have easily accessible power on/off and reset buttons and a power LED.

ng-ki-dom0
Passed

The server chassis shall provide locking solution that locks the chassis cover closed to protect internal components and guarantee the air flux for a correct cooling.

ng-ki-dom0
Passed

Dual redundant power supplies are required. The neuGRID Grid KI Server must be able to restart properly even if one power supply module is not working.

ng-ki-dom0
Passed

The server has two redundant power supplies. Servers work properly with only one of them. The unit should be delivered with UPS that assures continuous operation in case of power cut (15 minutes) and proper system shutdown in an event of longer power cut.

ng-ki-dom0
Passed

UPS Service is provided by the IT Center.

The required number of flame-retardant (rated IEC 332-1) and halogen-free (PVC is excluded) appropriate power cord must be supplied.

ng-ki-dom0
Passed

neuGRID Grid KI Servermust have a unique serial number on the rear of the chassis that is clearly visible when the chassis is installed in a rack. If additional information is provided with the serial number, this information must be written in English.

ng-ki-dom0
9SZF84J

One Dual Core 2 or One Quad Core Intel Xeon processors are required.

ng-ki-dom0
Two Quad Core Intel(R) Xeon(R) CPU E5410 2.33GHz

Server shall be equipped with a SVGA video, keyboard and mouse ports. Servers shall be supplied without keyboard, mouse and video screen.

ng-ki-dom0
Passed

Connection for SVGA video, keyboard and mouse present in front and rear of server. Keyboard and mouse must be USB type.

The server must be able to boot Linux without keyboard, screen or mouse attached.

ng-ki-dom0	Data Server
Passed	Passed

Servers must have at least 4 GBytes of RAM. The supplier is responsible for providing modules that are compatible with the motherboard and for testing them with the diagnostic diskette of the motherboard manufacturer. Proof of such a test must be provided for each machine.

ng-ki-dom0
Passed

Server has 8GBytes of RAM.

Network interface: neuGRID Grid KI Servermust have 2 copper Gigabit Ethernet interface for data access.

ng-ki-dom0
Passed

Each server has 4 Gigabit Ethernet cards

Remote administration card: The server must be shipped with a remote administration card, the mandatory properties are:

To be capable to interact at BIOS level with the hardware.

ng-ki-dom0
Passed

Server has DRAC5 (Dell Remote Access Card) installed. Provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allow to start, stop and restart the server remotely.

To be configurable through a TCP/IP network, and provide software client to remote administration of the server.

ng-ki-dom0
Passed

Server has a DRAC5 (Dell Remote Access Card) installed. This card provides the necessary tools and functionality to monitor, troubleshoots, and repair server. Allow to start, stop and restart the server remotely and mounting remote iso images of floppy disks and cd.

General Requirements for System and Data Disks

All hard disks shall have a rotational speed of at least 7200 RPM.

ng-ki-dom0
Passed

ng-ki-dom0:

2 HDD of 80GB sata 7200 RPM (system RAID1)

All disks must be installed in hot swap disk trays. It must be possible to extract these disk trays while the server chassis remains in its place in the 19” rack in which it is installed

ng-ki-dom0
Passed

All disks are hot swapable. Hot extraction of one of the disk has been tested without stopping the server. The server has been working without a disk for a short time, then the disk has been reintroduced and the raid successfully restored without human intervention.

System Disks: Two dedicated system disks of at least 20 GB each are required for installation of the Linux Operating system. These system disks must be configured as a mirrored set using hardware mirroring

ng-ki-dom0
Passed

The server was delivered with two hard drives of 80 GB each one mounted under hardware RAID1.

Disks: The neuGRID Grid KI Servers hall have a minimum of 1, 5TB of "usable disk space"[37] on data disks.

ng-ki-dom0
Passed

ng-ki-dom0: Server has 6 hard drives of 750 GB mounted under RAID5. This means that the final usable space is 4'5 TB this is more than required.

Documentation

The server must be delivered with a set of manuals in English comprising:

Documentation		ng-ki-dom0 Server
The chassis and power supply manual	Passed	
The Raid hardware manual.	Passed	
The gigabit card manual.	Passed	
The motherboard manual.	Passed	
The disk's led manual	Passed	
The complete guaranty including and all the terms and conditions.	Passed	

Status

Remote Management

[37]"usable disk space" shall mean the amount of user data that can be stored using an ext2/ext3 Linux file system created (using the default parameters of mkfs under CentOS 5.1 32 Bits) on a hardware RAID volume offering redundancy (e.g. RAID1, RAID4, RAID5 or RAID10).

The DRAC card for remote access and management of the server works perfectly well.

DACS2– ng-ki-node1

Hardware Tests

This section describes the hardware and visual tests that should be performed to validate the neuGRID Grid KI Servers (Worker Nodes).

Worker Nodes are M600 Dell servers, which are Blade servers; it means that are small servers inside an enclosure. This enclosure provides the connectivity and power supply.

Visual Tests

A check of the delivery to ensure that all the requested material (such as keys, configuration sheet, power cords and documentation) is provided with the server.

ng-ki-node1
Passed.

All documentation is OK and two power cords are included for each server.

A visual inspection of the server (inside and outside), with a particular emphasis on cabling.

ng-ki-node1
Passed

Both servers are in perfect state outside and inside, making special remarks in the professional. The internal cabling and elements to ensure the correct airflow between components are properly installed. CPU's and RAM are inside an airflow circuit in order to ensure the correct cooling.

A check of the configuration of the server to ensure all components are properly installed recognized and configured.

ng-ki-node1
Passed

BIOS recognizes RAM installed properly and RAID card recognizes hard drives properly to in both servers.

System Tests

A basic check of all system, including data disks to ensure correct cabling and connectivity.

ng-ki-node1
Passed

Memory testing using Memtest86+ v2.0.1. This test will be performed using the bootable iso image available at http://www.memtest86.org.

ng-ki-node1
Passed

Memory tests have been applied during 14 hours and no errors were found. Full test has been executed several times during these 14 hours.

ng-ki-node1
Passed

Installation of the Scientific Linux 5.1 32 Bits Linux distribution.

ng-ki-node1
Passed

Operating system has been installed without any problems, hardware is well recognized by Kernel, and works perfectly, including RAID card and Ethernet cards.

Hard drive performance tests were applied to the RAID disk volumes of the neuGRID Grid KI Server using BONNIE[38]. BONNIE is a benchmark suite that is aimed at performing a number of simple tests of hard drive and file system performance.

Tests to be applied are:

Sequential Output (Write Test):

Block: The file is created using write. The CPU overhead should be just the OS file space allocation.

Rewrite: Each block of the file is read with read, dirtied, and rewritten with write, requiring an lseek. Since no space allocation is done, and the I/O is well-localized, this should test the effectiveness of the filesystem cache and the speed of data transfer.

[38] http://www.coker.com.au/bonnie++/

Sequential Input (Read Test):

Block: The file is read using read. This should be a pure test of sequential input performance

Random Seeks

This test runs three SeekProcCount processes in parallel, doing a total of 8000 lseeks to locations in the file specified by a random function. In each case, the block is read with read. In 10% of cases, it is dirtied and written back with write.

Results obtained for ng-ki-node1 unit

		Sequential Output				Sequential Input		Random	
	Size:Chunk Size	Block		Rewrite		Block		Seeks	
		K/sec	% CPU	K/sec	% CPU	K/sec	% CPU	/ sec	% CPU
server	16G	52471	9	34594	5	75390	7	187.0	0
server	16G	53593	9	33442	5	75052	6	213.2	0

These results indicate that the RAID volume, formatted under ext3, can write at 52 Mega Bytes per second, rewrite 34,4 Mega Bytes per second, read 575,7 Mega Bytes per second and perform an average of 180 – 200 random seeks per second.

Network Performance Tests: GENSINK has been used for testing network performances. GENSINK generates random network traffic, not related to the hard drive in order to generate the maximum possible data in the network card.

Network cards perform at an average speed of 115’001 KiloBytes/sec (920.008 Megabits/sec). Despite of this, performances remain very high.

Hardware Specifications

Chassis, Power Supply, Cooling and Serial Number.

	ng-ki-node1
Chasis	Passed
Power Supply	Passed
Cooling	Passed
Serial Number	1CWB84J

neuGRID Grid KI Server shall be housed in a rack mountable 19” chassis at 100cm deep and 12U high. The chassis must be provided with sliding rails for 19” racks and have easily accessible power on/off and reset buttons and a power LED.

ng-ki-node1
Passed

The server is mounted inside a 19” enclosure.

The server chassis shall provide locking solution that locks the chassis cover closed to protect internal components and guarantee the air flux for a correct cooling.

ng-ki-node1
Passed

The enclosure provides this functionality.

Dual redundant power supplies are required. The neuGRID Grid KI Server must be able to restart properly even if one power supply module is not working.

ng-ki-node1
Passed

The server is inside the enclosure, this enclosure provides 5 redundant power supplies.

ng-ki-node1
Passed

UPS Service is provided by the IT Center.

The required number of flame-retardant (rated IEC 332-1) and halogen-free (PVC is excluded) appropriate power cord must be supplied.

ng-ki-node1
Passed

neuGRID Grid KI Servermust have a unique serial number on the rear of the chassis that is clearly visible when the chassis is installed in a rack. If additional information is provided with the serial number, this information must be written in English.

ng-ki-node1
1CWB84J

One Dual Core 2 or One Quad Core Intel Xeon processors are required.

ng-ki-node1
Two Quad Core Intel(R) Xeon(R) CPU E5410 2.33GHz

Server shall be equipped with a SVGA video, keyboard and mouse ports. Servers shall be supplied without keyboard, mouse and video screen.

ng-ki-node1
Passed

Connection for SVGA video, keyboard and mouse present in front and rear of server. Keyboard and mouse must be USB type.

The server must be able to boot Linux without keyboard, screen or mouse attached.

ng-ki-node1	Data Server
Passed	Passed

Servers must have at least 4 GBytes of RAM. The supplier is responsible for providing modules that are compatible with the motherboard and for testing them with the diagnostic diskette of the motherboard manufacturer. Proof of such a test must be provided for each machine.

ng-ki-node1
Passed

Server has 8GBytes of RAM.

Network interface: neuGRID Grid KI Servermust have 2 copper Gigabit Ethernet interface for data access.

ng-ki-node1
Passed

Each server has 4 Gigabit Ethernet cards

Remote administration card: The server must be shipped with a remote administration card, the mandatory properties are:

To be capable to interact at BIOS level with the hardware.

ng-ki-node1
Passed

Server has DRAC5 (Dell Remote Access Card) installed. Provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allow to start, stop and restart the server remotely.

To be configurable through a TCP/IP network, and provide software client to remote administration of the server.

ng-ki-node1
Passed

Server has a DRAC5 (Dell Remote Access Card) installed. This card provides the necessary tools and functionality to monitor, troubleshoots, and repair server. Allow to start, stop and restart the server remotely and mounting remote iso images of floppy disks and cd.

General Requirements for System and Data Disks

All hard disks shall have a rotational speed of at least 7200 RPM.

ng-ki-node1
Passed

ng-ki-node1:

2 HDD of 80GB sata 7200 RPM (system RAID1)

All disks must be installed in hot swap disk trays. It must be possible to extract these disk trays while the server chassis remains in its place in the 19” rack in which it is installed

ng-ki-node1
Passed

All disks are hot swapable. Hot extraction of one of the disk has been tested without stopping the server. The server has been working without a disk for a short time, then the disk has been reintroduced and the raid successfully restored without human intervention.

System Disks: Two dedicated system disks of at least 20 GB each are required for installation of the Linux Operating system. These system disks must be configured as a mirrored set using hardware mirroring

ng-ki-node1
Passed

The server was delivered with two hard drives of 80 GB each one mounted under hardware RAID1.

Documentation

The server must be delivered with a set of manuals in English comprising:

Documentation	ng-ki-node1 Server
The chassis and power supply manual	Passed
The Raid hardware manual.	Passed
The gigabit card manual.	Passed
The motherboard manual.	Passed
The disk's led manual	Passed
The complete guaranty including and all the terms and conditions.	Passed

Status

Remote Management

The DRAC card for remote access and management of the server works perfectly well. This functionality is provided by the enclosure.

DACS2– ng-ki-node2

Hardware Tests

This section describes the hardware and visual tests that should be performed to validate the neuGRID Grid KI Servers (Worker Nodes).

Worker Nodes are M600 Dell servers, which are Blade servers; it means that are small servers inside an enclosure. This enclosure provides the connectivity and power supply.

Visual Tests

A check of the delivery to ensure that all the requested material (such as keys, configuration sheet, power cords and documentation) is provided with the server.

ng-ki-node2
Passed.

All documentation is OK and two power cords are included for each server.

A visual inspection of the server (inside and outside), with a particular emphasis on cabling.

ng-ki-node2
Passed

Both servers are in perfect state outside and inside, making special remarks in the professional. The internal cabling and elements to ensure the correct airflow between components are properly installed. CPU's and RAM are inside an airflow circuit in order to ensure the correct cooling.

A check of the configuration of the server to ensure all components are properly installed recognized and configured.

ng-ki-node2
Passed

BIOS recognizes RAM installed properly and RAID card recognizes hard drives properly to in both servers.

System Tests

A basic check of all system, including data disks to ensure correct cabling and connectivity.

ng-ki-node2
Passed

Memory testing using Memtest86+ v2.0.1. This test will be performed using the bootable iso image available at http://www.memtest86.org.

ng-ki-node2
Passed

Memory tests have been applied during 14 hours and no errors were found. Full test has been executed several times during these 14 hours.

ng-ki-node2
Passed

Installation of the Scientific Linux 5.1 32 Bits Linux distribution.

ng-ki-node2
Passed

Operating system has been installed without any problems, hardware is well recognized by Kernel, and works perfectly, including RAID card and Ethernet cards.

Hard drive performance tests were applied to the RAID disk volumes of the neuGRID Grid KI Server using BONNIE[39]. BONNIE is a benchmark suite that is aimed at performing a number of simple tests of hard drive and file system performance.

Tests to be applied are:

Sequential Output (Write Test):

Block: The file is created using write. The CPU overhead should be just the OS file space allocation.

Rewrite: Each block of the file is read with read, dirtied, and rewritten with write, requiring an lseek. Since no space allocation is done, and the I/O is well-localized, this should test the effectiveness of the filesystem cache and the speed of data transfer.

[39] http://www.coker.com.au/bonnie++/

Sequential Input (Read Test):

Block: The file is read using read. This should be a pure test of sequential input performance

Random Seeks

This test runs three SeekProcCount processes in parallel, doing a total of 8000 lseeks to locations in the file specified by a random function. In each case, the block is read with read. In 10% of cases, it is dirtied and written back with write.

Results obtained for ng-ki-node2 unit

		Sequential Output				Sequential Input		Random	
	Size:Chunk Size	Block		Rewrite		Block		Seeks	
		K/sec	% CPU	K/sec	% CPU	K/sec	% CPU	/ sec	% CPU
server	16G	52471	9	34594	5	75390	7	187.0	0
server	16G	53593	9	33442	5	75052	6	213.2	0

These results indicate that the RAID volume, formatted under ext3, can write at 52 Mega Bytes per second, rewrite 34,4 Mega Bytes per second, read 575,7 Mega Bytes per second and perform an average of 180 – 200 random seeks per second.

Network Performance Tests: GENSINK has been used for testing network performances. GENSINK generates random network traffic, not related to the hard drive in order to generate the maximum possible data in the network card.

Network cards perform at an average speed of 115’001 KiloBytes/sec (920.008 Megabits/sec). Despite of this, performances remain very high.

Hardware Specifications

Chassis, Power Supply, Cooling and Serial Number.

	ng-ki-node2
Chasis	Passed
Power Supply	Passed
Cooling	Passed
Serial Number	9CWB84J

neuGRID Grid KI Server shall be housed in a rack mountable 19” chassis at 100cm deep and 12U high. The chassis must be provided with sliding rails for 19” racks and have easily accessible power on/off and reset buttons and a power LED.

ng-ki-node2
Passed

The server is mounted inside a 19” enclosure.

The server chassis shall provide locking solution that locks the chassis cover closed to protect internal components and guarantee the air flux for a correct cooling.

ng-ki-node2
Passed

The enclosure provides this functionality.

Dual redundant power supplies are required. The neuGRID Grid KI Server must be able to restart properly even if one power supply module is not working.

ng-ki-node2
Passed

The server is inside the enclosure, this enclosure provides 5 redundant power supplies.

ng-ki-node2
Passed

UPS Service is provided by the IT Center.

The required number of flame-retardant (rated IEC 332-1) and halogen-free (PVC is excluded) appropriate power cord must be supplied.

ng-ki-node2
Passed

neuGRID Grid KI Servermust have a unique serial number on the rear of the chassis that is clearly visible when the chassis is installed in a rack. If additional information is provided with the serial number, this information must be written in English.

ng-ki-node2
9CWB84J

One Dual Core 2 or One Quad Core Intel Xeon processors are required.

ng-ki-node2
Two Quad Core Intel(R) Xeon(R) CPU E5410 2.33GHz

Server shall be equipped with a SVGA video, keyboard and mouse ports. Servers shall be supplied without keyboard, mouse and video screen.

ng-ki-node2
Passed

Connection for SVGA video, keyboard and mouse present in front and rear of server. Keyboard and mouse must be USB type.

The server must be able to boot Linux without keyboard, screen or mouse attached.

ng-ki-node2	Data Server
Passed	Passed

Servers must have at least 4 GBytes of RAM. The supplier is responsible for providing modules that are compatible with the motherboard and for testing them with the diagnostic diskette of the motherboard manufacturer. Proof of such a test must be provided for each machine.

ng-ki-node2
Passed

Server has 8GBytes of RAM.

Network interface: neuGRID Grid KI Servermust have 2 copper Gigabit Ethernet interface for data access.

ng-ki-node2
Passed

Each server has 4 Gigabit Ethernet cards

Remote administration card: The server must be shipped with a remote administration card, the mandatory properties are:

To be capable to interact at BIOS level with the hardware.

ng-ki-node2
Passed

Server has DRAC5 (Dell Remote Access Card) installed. Provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allow to start, stop and restart the server remotely.

To be configurable through a TCP/IP network, and provide software client to remote administration of the server.

ng-ki-node2
Passed

Server has a DRAC5 (Dell Remote Access Card) installed. This card provides the necessary tools and functionality to monitor, troubleshoots, and repair server. Allow to start, stop and restart the server remotely and mounting remote iso images of floppy disks and cd.

General Requirements for System and Data Disks

All hard disks shall have a rotational speed of at least 7200 RPM.

ng-ki-node2
Passed

ng-ki-node2:

2 HDD of 80GB sata 7200 RPM (system RAID1)

All disks must be installed in hot swap disk trays. It must be possible to extract these disk trays while the server chassis remains in its place in the 19” rack in which it is installed

ng-ki-node2
Passed

All disks are hot swapable. Hot extraction of one of the disk has been tested without stopping the server. The server has been working without a disk for a short time, then the disk has been reintroduced and the raid successfully restored without human intervention.

System Disks: Two dedicated system disks of at least 20 GB each are required for installation of the Linux Operating system. These system disks must be configured as a mirrored set using hardware mirroring

ng-ki-node2
Passed

The server was delivered with two hard drives of 80 GB each one mounted under hardware RAID1.

Documentation

The server must be delivered with a set of manuals in English comprising:

Documentation	ng-ki-node2 Server
The chassis and power supply manual	Passed
The Raid hardware manual.	Passed
The gigabit card manual.	Passed
The motherboard manual.	Passed
The disk's led manual	Passed
The complete guaranty including and all the terms and conditions.	Passed

Status

Remote Management

The DRAC card for remote access and management of the server works perfectly well. This functionality is provided by the enclosure.

DACS2– ng-ki-node3

Hardware Tests

This section describes the hardware and visual tests that should be performed to validate the neuGRID Grid KI Servers (Worker Nodes).

Worker Nodes are M600 Dell servers, which are Blade servers; it means that are small servers inside an enclosure. This enclosure provides the connectivity and power supply.

Visual Tests

A check of the delivery to ensure that all the requested material (such as keys, configuration sheet, power cords and documentation) is provided with the server.

ng-ki-node3
Passed.

All documentation is OK and two power cords are included for each server.

A visual inspection of the server (inside and outside), with a particular emphasis on cabling.

ng-ki-node3
Passed

Both servers are in perfect state outside and inside, making special remarks in the professional. The internal cabling and elements to ensure the correct airflow between components are properly installed. CPU's and RAM are inside an airflow circuit in order to ensure the correct cooling.

A check of the configuration of the server to ensure all components are properly installed recognized and configured.

ng-ki-node3
Passed

BIOS recognizes RAM installed properly and RAID card recognizes hard drives properly to in both servers.

System Tests

A basic check of all system, including data disks to ensure correct cabling and connectivity.

ng-ki-node3
Passed

Memory testing using Memtest86+ v2.0.1. This test will be performed using the bootable iso image available at http://www.memtest86.org.

ng-ki-node3
Passed

Memory tests have been applied during 14 hours and no errors were found. Full test has been executed several times during these 14 hours.

ng-ki-node3
Passed

Installation of the Scientific Linux 5.1 32 Bits Linux distribution.

ng-ki-node3
Passed

Operating system has been installed without any problems, hardware is well recognized by Kernel, and works perfectly, including RAID card and Ethernet cards.

Hard drive performance tests were applied to the RAID disk volumes of the neuGRID Grid KI Server using BONNIE[40]. BONNIE is a benchmark suite that is aimed at performing a number of simple tests of hard drive and file system performance.

Tests to be applied are:

Sequential Output (Write Test):

Block: The file is created using write. The CPU overhead should be just the OS file space allocation.

Rewrite: Each block of the file is read with read, dirtied, and rewritten with write, requiring an lseek. Since no space allocation is done, and the I/O is well-localized, this should test the effectiveness of the filesystem cache and the speed of data transfer.

[40] http://www.coker.com.au/bonnie++/

Sequential Input (Read Test):

Block: The file is read using read. This should be a pure test of sequential input performance

Random Seeks

This test runs three SeekProcCount processes in parallel, doing a total of 8000 lseeks to locations in the file specified by a random function. In each case, the block is read with read. In 10% of cases, it is dirtied and written back with write.

Results obtained for ng-ki-node3 unit

		Sequential Output				Sequential Input		Random	
	Size:Chunk Size	Block		Rewrite		Block		Seeks	
		K/sec	% CPU	K/sec	% CPU	K/sec	% CPU	/ sec	% CPU
server	16G	52471	9	34594	5	75390	7	187.0	0
server	16G	53593	9	33442	5	75052	6	213.2	0

These results indicate that the RAID volume, formatted under ext3, can write at 52 Mega Bytes per second, rewrite 34,4 Mega Bytes per second, read 575,7 Mega Bytes per second and perform an average of 180 – 200 random seeks per second.

Network Performance Tests: GENSINK has been used for testing network performances. GENSINK generates random network traffic, not related to the hard drive in order to generate the maximum possible data in the network card.

Network cards perform at an average speed of 115’001 KiloBytes/sec (920.008 Megabits/sec). Despite of this, performances remain very high.

Hardware Specifications

Chassis, Power Supply, Cooling and Serial Number.

	ng-ki-node3
Chasis	Passed
Power Supply	Passed
Cooling	Passed
Serial Number	JBWB84J

neuGRID Grid KI Server shall be housed in a rack mountable 19” chassis at 100cm deep and 12U high. The chassis must be provided with sliding rails for 19” racks and have easily accessible power on/off and reset buttons and a power LED.

ng-ki-node3
Passed

The server is mounted inside a 19” enclosure.

The server chassis shall provide locking solution that locks the chassis cover closed to protect internal components and guarantee the air flux for a correct cooling.

ng-ki-node3
Passed

The enclosure provides this functionality.

Dual redundant power supplies are required. The neuGRID Grid KI Server must be able to restart properly even if one power supply module is not working.

ng-ki-node3
Passed

The server is inside the enclosure, this enclosure provides 5 redundant power supplies.

ng-ki-node3
Passed

UPS Service is provided by the IT Center.

The required number of flame-retardant (rated IEC 332-1) and halogen-free (PVC is excluded) appropriate power cord must be supplied.

ng-ki-node3
Passed

neuGRID Grid KI Servermust have a unique serial number on the rear of the chassis that is clearly visible when the chassis is installed in a rack. If additional information is provided with the serial number, this information must be written in English.

ng-ki-node3
JBWB84J

One Dual Core 2 or One Quad Core Intel Xeon processors are required.

ng-ki-node3
Two Quad Core Intel(R) Xeon(R) CPU E5410 2.33GHz

Server shall be equipped with a SVGA video, keyboard and mouse ports. Servers shall be supplied without keyboard, mouse and video screen.

ng-ki-node3
Passed

Connection for SVGA video, keyboard and mouse present in front and rear of server. Keyboard and mouse must be USB type.

The server must be able to boot Linux without keyboard, screen or mouse attached.

ng-ki-node3	Data Server
Passed	Passed

Servers must have at least 4 GBytes of RAM. The supplier is responsible for providing modules that are compatible with the motherboard and for testing them with the diagnostic diskette of the motherboard manufacturer. Proof of such a test must be provided for each machine.

ng-ki-node3
Passed

Server has 8GBytes of RAM.

Network interface: neuGRID Grid KI Servermust have 2 copper Gigabit Ethernet interface for data access.

ng-ki-node3
Passed

Each server has 4 Gigabit Ethernet cards

Remote administration card: The server must be shipped with a remote administration card, the mandatory properties are:

To be capable to interact at BIOS level with the hardware.

ng-ki-node3
Passed

Server has DRAC5 (Dell Remote Access Card) installed. Provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allow to start, stop and restart the server remotely.

To be configurable through a TCP/IP network, and provide software client to remote administration of the server.

ng-ki-node3
Passed

Server has a DRAC5 (Dell Remote Access Card) installed. This card provides the necessary tools and functionality to monitor, troubleshoots, and repair server. Allow to start, stop and restart the server remotely and mounting remote iso images of floppy disks and cd.

General Requirements for System and Data Disks

All hard disks shall have a rotational speed of at least 7200 RPM.

ng-ki-node3
Passed

ng-ki-node3:

2 HDD of 80GB sata 7200 RPM (system RAID1)

All disks must be installed in hot swap disk trays. It must be possible to extract these disk trays while the server chassis remains in its place in the 19” rack in which it is installed

ng-ki-node3
Passed

All disks are hot swapable. Hot extraction of one of the disk has been tested without stopping the server. The server has been working without a disk for a short time, then the disk has been reintroduced and the raid successfully restored without human intervention.

System Disks: Two dedicated system disks of at least 20 GB each are required for installation of the Linux Operating system. These system disks must be configured as a mirrored set using hardware mirroring

ng-ki-node3
Passed

The server was delivered with two hard drives of 80 GB each one mounted under hardware RAID1.

Documentation

The server must be delivered with a set of manuals in English comprising:

Documentation	ng-ki-node3 Server
The chassis and power supply manual	Passed
The Raid hardware manual.	Passed
The gigabit card manual.	Passed
The motherboard manual.	Passed
The disk's led manual	Passed
The complete guaranty including and all the terms and conditions.	Passed

Status

Remote Management

The DRAC card for remote access and management of the server works perfectly well. This functionality is provided by the enclosure.

DACS2– ng-ki-node4

Hardware Tests

This section describes the hardware and visual tests that should be performed to validate the neuGRID Grid KI Servers (Worker Nodes).

Worker Nodes are M600 Dell servers, which are Blade servers; it means that are small servers inside an enclosure. This enclosure provides the connectivity and power supply.

Visual Tests

A check of the delivery to ensure that all the requested material (such as keys, configuration sheet, power cords and documentation) is provided with the server.

ng-ki-node4
Passed.

All documentation is OK and two power cords are included for each server.

A visual inspection of the server (inside and outside), with a particular emphasis on cabling.

ng-ki-node4
Passed

Both servers are in perfect state outside and inside, making special remarks in the professional. The internal cabling and elements to ensure the correct airflow between components are properly installed. CPU's and RAM are inside an airflow circuit in order to ensure the correct cooling.

A check of the configuration of the server to ensure all components are properly installed recognized and configured.

ng-ki-node4
Passed

BIOS recognizes RAM installed properly and RAID card recognizes hard drives properly to in both servers.

System Tests

A basic check of all system, including data disks to ensure correct cabling and connectivity.

ng-ki-node4
Passed

Memory testing using Memtest86+ v2.0.1. This test will be performed using the bootable iso image available at http://www.memtest86.org.

ng-ki-node4
Passed

Memory tests have been applied during 14 hours and no errors were found. Full test has been executed several times during these 14 hours.

ng-ki-node4
Passed

Installation of the Scientific Linux 5.1 32 Bits Linux distribution.

ng-ki-node4
Passed

Operating system has been installed without any problems, hardware is well recognized by Kernel, and works perfectly, including RAID card and Ethernet cards.

Hard drive performance tests were applied to the RAID disk volumes of the neuGRID Grid KI Server using BONNIE[41]. BONNIE is a benchmark suite that is aimed at performing a number of simple tests of hard drive and file system performance.

Tests to be applied are:

Sequential Output (Write Test):

Block: The file is created using write. The CPU overhead should be just the OS file space allocation.

Rewrite: Each block of the file is read with read, dirtied, and rewritten with write, requiring an lseek. Since no space allocation is done, and the I/O is well-localized, this should test the effectiveness of the filesystem cache and the speed of data transfer.

[41] http://www.coker.com.au/bonnie++/

Sequential Input (Read Test):

Block: The file is read using read. This should be a pure test of sequential input performance

Random Seeks

This test runs three SeekProcCount processes in parallel, doing a total of 8000 lseeks to locations in the file specified by a random function. In each case, the block is read with read. In 10% of cases, it is dirtied and written back with write.

Results obtained for ng-ki-node4 unit

		Sequential Output				Sequential Input		Random	
	Size:Chunk Size	Block		Rewrite		Block		Seeks	
		K/sec	% CPU	K/sec	% CPU	K/sec	% CPU	/ sec	% CPU
server	16G	52471	9	34594	5	75390	7	187.0	0
server	16G	53593	9	33442	5	75052	6	213.2	0

These results indicate that the RAID volume, formatted under ext3, can write at 52 Mega Bytes per second, rewrite 34,4 Mega Bytes per second, read 575,7 Mega Bytes per second and perform an average of 180 – 200 random seeks per second.

Network Performance Tests: GENSINK has been used for testing network performances. GENSINK generates random network traffic, not related to the hard drive in order to generate the maximum possible data in the network card.

Network cards perform at an average speed of 115’001 KiloBytes/sec (920.008 Megabits/sec). Despite of this, performances remain very high.

Hardware Specifications

Chassis, Power Supply, Cooling and Serial Number.

	ng-ki-node4
Chasis	Passed
Power Supply	Passed
Cooling	Passed
Serial Number	5CWB84J

neuGRID Grid KI Server shall be housed in a rack mountable 19” chassis at 100cm deep and 12U high. The chassis must be provided with sliding rails for 19” racks and have easily accessible power on/off and reset buttons and a power LED.

ng-ki-node4
Passed

The server is mounted inside a 19” enclosure.

The server chassis shall provide locking solution that locks the chassis cover closed to protect internal components and guarantee the air flux for a correct cooling.

ng-ki-node4
Passed

The enclosure provides this functionality.

Dual redundant power supplies are required. The neuGRID Grid KI Server must be able to restart properly even if one power supply module is not working.

ng-ki-node4
Passed

The server is inside the enclosure, this enclosure provides 5 redundant power supplies.

ng-ki-node4
Passed

UPS Service is provided by the IT Center.

The required number of flame-retardant (rated IEC 332-1) and halogen-free (PVC is excluded) appropriate power cord must be supplied.

ng-ki-node4
Passed

neuGRID Grid KI Servermust have a unique serial number on the rear of the chassis that is clearly visible when the chassis is installed in a rack. If additional information is provided with the serial number, this information must be written in English.

ng-ki-node4
5CWB84J

One Dual Core 2 or One Quad Core Intel Xeon processors are required.

ng-ki-node4
Two Quad Core Intel(R) Xeon(R) CPU E5410 2.33GHz

Server shall be equipped with a SVGA video, keyboard and mouse ports. Servers shall be supplied without keyboard, mouse and video screen.

ng-ki-node4
Passed

Connection for SVGA video, keyboard and mouse present in front and rear of server. Keyboard and mouse must be USB type.

The server must be able to boot Linux without keyboard, screen or mouse attached.

ng-ki-node4	Data Server
Passed	Passed

Servers must have at least 4 GBytes of RAM. The supplier is responsible for providing modules that are compatible with the motherboard and for testing them with the diagnostic diskette of the motherboard manufacturer. Proof of such a test must be provided for each machine.

ng-ki-node4
Passed

Server has 8GBytes of RAM.

Network interface: neuGRID Grid KI Servermust have 2 copper Gigabit Ethernet interface for data access.

ng-ki-node4
Passed

Each server has 4 Gigabit Ethernet cards

Remote administration card: The server must be shipped with a remote administration card, the mandatory properties are:

To be capable to interact at BIOS level with the hardware.

ng-ki-node4
Passed

Server has DRAC5 (Dell Remote Access Card) installed. Provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allow to start, stop and restart the server remotely.

To be configurable through a TCP/IP network, and provide software client to remote administration of the server.

ng-ki-node4
Passed

Server has a DRAC5 (Dell Remote Access Card) installed. This card provides the necessary tools and functionality to monitor, troubleshoots, and repair server. Allow to start, stop and restart the server remotely and mounting remote iso images of floppy disks and cd.

General Requirements for System and Data Disks

All hard disks shall have a rotational speed of at least 7200 RPM.

ng-ki-node4
Passed

ng-ki-node4:

2 HDD of 80GB sata 7200 RPM (system RAID1)

All disks must be installed in hot swap disk trays. It must be possible to extract these disk trays while the server chassis remains in its place in the 19” rack in which it is installed

ng-ki-node4
Passed

All disks are hot swapable. Hot extraction of one of the disk has been tested without stopping the server. The server has been working without a disk for a short time, then the disk has been reintroduced and the raid successfully restored without human intervention.

System Disks: Two dedicated system disks of at least 20 GB each are required for installation of the Linux Operating system. These system disks must be configured as a mirrored set using hardware mirroring

ng-ki-node4
Passed

The server was delivered with two hard drives of 80 GB each one mounted under hardware RAID1.

Documentation

The server must be delivered with a set of manuals in English comprising:

Documentation	ng-ki-node4 Server
The chassis and power supply manual	Passed
The Raid hardware manual.	Passed
The gigabit card manual.	Passed
The motherboard manual.	Passed
The disk's led manual	Passed
The complete guaranty including and all the terms and conditions.	Passed

Status

Remote Management

The DRAC card for remote access and management of the server works perfectly well. This functionality is provided by the enclosure.

DACS2– ng-ki-node5

Hardware Tests

This section describes the hardware and visual tests that should be performed to validate the neuGRID Grid KI Servers (Worker Nodes).

Worker Nodes are M600 Dell servers, which are Blade servers; it means that are small servers inside an enclosure. This enclosure provides the connectivity and power supply.

Visual Tests

A check of the delivery to ensure that all the requested material (such as keys, configuration sheet, power cords and documentation) is provided with the server.

ng-ki-node5
Passed.

All documentation is OK and two power cords are included for each server.

A visual inspection of the server (inside and outside), with a particular emphasis on cabling.

ng-ki-node5
Passed

Both servers are in perfect state outside and inside, making special remarks in the professional. The internal cabling and elements to ensure the correct airflow between components are properly installed. CPU's and RAM are inside an airflow circuit in order to ensure the correct cooling.

A check of the configuration of the server to ensure all components are properly installed recognized and configured.

ng-ki-node5
Passed

BIOS recognizes RAM installed properly and RAID card recognizes hard drives properly to in both servers.

System Tests

A basic check of all system, including data disks to ensure correct cabling and connectivity.

ng-ki-node5
Passed

Memory testing using Memtest86+ v2.0.1. This test will be performed using the bootable iso image available at http://www.memtest86.org.

ng-ki-node5
Passed

Memory tests have been applied during 14 hours and no errors were found. Full test has been executed several times during these 14 hours.

ng-ki-node5
Passed

Installation of the Scientific Linux 5.1 32 Bits Linux distribution.

ng-ki-node5
Passed

Operating system has been installed without any problems, hardware is well recognized by Kernel, and works perfectly, including RAID card and Ethernet cards.

Hard drive performance tests were applied to the RAID disk volumes of the neuGRID Grid KI Server using BONNIE[42]. BONNIE is a benchmark suite that is aimed at performing a number of simple tests of hard drive and file system performance.

Tests to be applied are:

Sequential Output (Write Test):

Block: The file is created using write. The CPU overhead should be just the OS file space allocation.

Rewrite: Each block of the file is read with read, dirtied, and rewritten with write, requiring an lseek. Since no space allocation is done, and the I/O is well-localized, this should test the effectiveness of the filesystem cache and the speed of data transfer.

[42] http://www.coker.com.au/bonnie++/

Sequential Input (Read Test):

Block: The file is read using read. This should be a pure test of sequential input performance

Random Seeks

This test runs three SeekProcCount processes in parallel, doing a total of 8000 lseeks to locations in the file specified by a random function. In each case, the block is read with read. In 10% of cases, it is dirtied and written back with write.

Results obtained for ng-ki-node5 unit

		Sequential Output				Sequential Input		Random	
	Size:Chunk Size	Block		Rewrite		Block		Seeks	
		K/sec	% CPU	K/sec	% CPU	K/sec	% CPU	/ sec	% CPU
server	16G	52471	9	34594	5	75390	7	187.0	0
server	16G	53593	9	33442	5	75052	6	213.2	0

These results indicate that the RAID volume, formatted under ext3, can write at 52 Mega Bytes per second, rewrite 34,4 Mega Bytes per second, read 575,7 Mega Bytes per second and perform an average of 180 – 200 random seeks per second.

Network Performance Tests: GENSINK has been used for testing network performances. GENSINK generates random network traffic, not related to the hard drive in order to generate the maximum possible data in the network card.

Network cards perform at an average speed of 115’001 KiloBytes/sec (920.008 Megabits/sec). Despite of this, performances remain very high.

Hardware Specifications

Chassis, Power Supply, Cooling and Serial Number.

	ng-ki-node5
Chasis	Passed
Power Supply	Passed
Cooling	Passed
Serial Number	2CWB84J

neuGRID Grid KI Server shall be housed in a rack mountable 19” chassis at 100cm deep and 12U high. The chassis must be provided with sliding rails for 19” racks and have easily accessible power on/off and reset buttons and a power LED.

ng-ki-node5
Passed

The server is mounted inside a 19” enclosure.

The server chassis shall provide locking solution that locks the chassis cover closed to protect internal components and guarantee the air flux for a correct cooling.

ng-ki-node5
Passed

The enclosure provides this functionality.

Dual redundant power supplies are required. The neuGRID Grid KI Server must be able to restart properly even if one power supply module is not working.

ng-ki-node5
Passed

The server is inside the enclosure, this enclosure provides 5 redundant power supplies.

ng-ki-node5
Passed

UPS Service is provided by the IT Center.

The required number of flame-retardant (rated IEC 332-1) and halogen-free (PVC is excluded) appropriate power cord must be supplied.

ng-ki-node5
Passed

neuGRID Grid KI Servermust have a unique serial number on the rear of the chassis that is clearly visible when the chassis is installed in a rack. If additional information is provided with the serial number, this information must be written in English.

ng-ki-node5
2CWB84J

One Dual Core 2 or One Quad Core Intel Xeon processors are required.

ng-ki-node5
Two Quad Core Intel(R) Xeon(R) CPU E5410 2.33GHz

Server shall be equipped with a SVGA video, keyboard and mouse ports. Servers shall be supplied without keyboard, mouse and video screen.

ng-ki-node5
Passed

Connection for SVGA video, keyboard and mouse present in front and rear of server. Keyboard and mouse must be USB type.

The server must be able to boot Linux without keyboard, screen or mouse attached.

ng-ki-node5	Data Server
Passed	Passed

Servers must have at least 4 GBytes of RAM. The supplier is responsible for providing modules that are compatible with the motherboard and for testing them with the diagnostic diskette of the motherboard manufacturer. Proof of such a test must be provided for each machine.

ng-ki-node5
Passed

Server has 8GBytes of RAM.

Network interface: neuGRID Grid KI Servermust have 2 copper Gigabit Ethernet interface for data access.

ng-ki-node5
Passed

Each server has 4 Gigabit Ethernet cards

Remote administration card: The server must be shipped with a remote administration card, the mandatory properties are:

To be capable to interact at BIOS level with the hardware.

ng-ki-node5
Passed

Server has DRAC5 (Dell Remote Access Card) installed. Provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allow to start, stop and restart the server remotely.

To be configurable through a TCP/IP network, and provide software client to remote administration of the server.

ng-ki-node5
Passed

Server has a DRAC5 (Dell Remote Access Card) installed. This card provides the necessary tools and functionality to monitor, troubleshoots, and repair server. Allow to start, stop and restart the server remotely and mounting remote iso images of floppy disks and cd.

General Requirements for System and Data Disks

All hard disks shall have a rotational speed of at least 7200 RPM.

ng-ki-node5
Passed

ng-ki-node5:

2 HDD of 80GB sata 7200 RPM (system RAID1)

All disks must be installed in hot swap disk trays. It must be possible to extract these disk trays while the server chassis remains in its place in the 19” rack in which it is installed

ng-ki-node5
Passed

All disks are hot swapable. Hot extraction of one of the disk has been tested without stopping the server. The server has been working without a disk for a short time, then the disk has been reintroduced and the raid successfully restored without human intervention.

System Disks: Two dedicated system disks of at least 20 GB each are required for installation of the Linux Operating system. These system disks must be configured as a mirrored set using hardware mirroring

ng-ki-node5
Passed

The server was delivered with two hard drives of 80 GB each one mounted under hardware RAID1.

Documentation

The server must be delivered with a set of manuals in English comprising:

Documentation	ng-ki-node5 Server
The chassis and power supply manual	Passed
The Raid hardware manual.	Passed
The gigabit card manual.	Passed
The motherboard manual.	Passed
The disk's led manual	Passed
The complete guaranty including and all the terms and conditions.	Passed

Status

Remote Management

The DRAC card for remote access and management of the server works perfectly well. This functionality is provided by the enclosure.

DACS2– ng-ki-node6

Hardware Tests

This section describes the hardware and visual tests that should be performed to validate the neuGRID Grid KI Servers (Worker Nodes).

Worker Nodes are M600 Dell servers, which are Blade servers; it means that are small servers inside an enclosure. This enclosure provides the connectivity and power supply.

Visual Tests

A check of the delivery to ensure that all the requested material (such as keys, configuration sheet, power cords and documentation) is provided with the server.

ng-ki-node6
Passed.

All documentation is OK and two power cords are included for each server.

A visual inspection of the server (inside and outside), with a particular emphasis on cabling.

ng-ki-node6
Passed

Both servers are in perfect state outside and inside, making special remarks in the professional. The internal cabling and elements to ensure the correct airflow between components are properly installed. CPU's and RAM are inside an airflow circuit in order to ensure the correct cooling.

A check of the configuration of the server to ensure all components are properly installed recognized and configured.

ng-ki-node6
Passed

BIOS recognizes RAM installed properly and RAID card recognizes hard drives properly to in both servers.

System Tests

A basic check of all system, including data disks to ensure correct cabling and connectivity.

ng-ki-node6
Passed

Memory testing using Memtest86+ v2.0.1. This test will be performed using the bootable iso image available at http://www.memtest86.org.

ng-ki-node6
Passed

Memory tests have been applied during 14 hours and no errors were found. Full test has been executed several times during these 14 hours.

ng-ki-node6
Passed

Installation of the Scientific Linux 5.1 32 Bits Linux distribution.

ng-ki-node6
Passed

Operating system has been installed without any problems, hardware is well recognized by Kernel, and works perfectly, including RAID card and Ethernet cards.

Hard drive performance tests were applied to the RAID disk volumes of the neuGRID Grid KI Server using BONNIE[43]. BONNIE is a benchmark suite that is aimed at performing a number of simple tests of hard drive and file system performance.

Tests to be applied are:

Sequential Output (Write Test):

Block: The file is created using write. The CPU overhead should be just the OS file space allocation.

Rewrite: Each block of the file is read with read, dirtied, and rewritten with write, requiring an lseek. Since no space allocation is done, and the I/O is well-localized, this should test the effectiveness of the filesystem cache and the speed of data transfer.

[43] http://www.coker.com.au/bonnie++/

Sequential Input (Read Test):

Block: The file is read using read. This should be a pure test of sequential input performance

Random Seeks

This test runs three SeekProcCount processes in parallel, doing a total of 8000 lseeks to locations in the file specified by a random function. In each case, the block is read with read. In 10% of cases, it is dirtied and written back with write.

Results obtained for ng-ki-node6 unit

		Sequential Output				Sequential Input		Random	
	Size:Chunk Size	Block		Rewrite		Block		Seeks	
		K/sec	% CPU	K/sec	% CPU	K/sec	% CPU	/ sec	% CPU
server	16G	52471	9	34594	5	75390	7	187.0	0
server	16G	53593	9	33442	5	75052	6	213.2	0

These results indicate that the RAID volume, formatted under ext3, can write at 52 Mega Bytes per second, rewrite 34,4 Mega Bytes per second, read 575,7 Mega Bytes per second and perform an average of 180 – 200 random seeks per second.

Network Performance Tests: GENSINK has been used for testing network performances. GENSINK generates random network traffic, not related to the hard drive in order to generate the maximum possible data in the network card.

Network cards perform at an average speed of 115’001 KiloBytes/sec (920.008 Megabits/sec). Despite of this, performances remain very high.

Hardware Specifications

Chassis, Power Supply, Cooling and Serial Number.

	ng-ki-node6
Chasis	Passed
Power Supply	Passed
Cooling	Passed
Serial Number	3CWB84J

neuGRID Grid KI Server shall be housed in a rack mountable 19” chassis at 100cm deep and 12U high. The chassis must be provided with sliding rails for 19” racks and have easily accessible power on/off and reset buttons and a power LED.

ng-ki-node6
Passed

The server is mounted inside a 19” enclosure.

The server chassis shall provide locking solution that locks the chassis cover closed to protect internal components and guarantee the air flux for a correct cooling.

ng-ki-node6
Passed

The enclosure provides this functionality.

Dual redundant power supplies are required. The neuGRID Grid KI Server must be able to restart properly even if one power supply module is not working.

ng-ki-node6
Passed

The server is inside the enclosure, this enclosure provides 5 redundant power supplies.

ng-ki-node6
Passed

UPS Service is provided by the IT Center.

The required number of flame-retardant (rated IEC 332-1) and halogen-free (PVC is excluded) appropriate power cord must be supplied.

ng-ki-node6
Passed

neuGRID Grid KI Servermust have a unique serial number on the rear of the chassis that is clearly visible when the chassis is installed in a rack. If additional information is provided with the serial number, this information must be written in English.

ng-ki-node6
3CWB84J

One Dual Core 2 or One Quad Core Intel Xeon processors are required.

ng-ki-node6
Two Quad Core Intel(R) Xeon(R) CPU E5410 2.33GHz

Server shall be equipped with a SVGA video, keyboard and mouse ports. Servers shall be supplied without keyboard, mouse and video screen.

ng-ki-node6
Passed

Connection for SVGA video, keyboard and mouse present in front and rear of server. Keyboard and mouse must be USB type.

The server must be able to boot Linux without keyboard, screen or mouse attached.

ng-ki-node6	Data Server
Passed	Passed

Servers must have at least 4 GBytes of RAM. The supplier is responsible for providing modules that are compatible with the motherboard and for testing them with the diagnostic diskette of the motherboard manufacturer. Proof of such a test must be provided for each machine.

ng-ki-node6
Passed

Server has 8GBytes of RAM.

Network interface: neuGRID Grid KI Servermust have 2 copper Gigabit Ethernet interface for data access.

ng-ki-node6
Passed

Each server has 4 Gigabit Ethernet cards

Remote administration card: The server must be shipped with a remote administration card, the mandatory properties are:

To be capable to interact at BIOS level with the hardware.

ng-ki-node6
Passed

Server has DRAC5 (Dell Remote Access Card) installed. Provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allow to start, stop and restart the server remotely.

To be configurable through a TCP/IP network, and provide software client to remote administration of the server.

ng-ki-node6
Passed

Server has a DRAC5 (Dell Remote Access Card) installed. This card provides the necessary tools and functionality to monitor, troubleshoots, and repair server. Allow to start, stop and restart the server remotely and mounting remote iso images of floppy disks and cd.

General Requirements for System and Data Disks

All hard disks shall have a rotational speed of at least 7200 RPM.

ng-ki-node6
Passed

ng-ki-node6:

2 HDD of 80GB sata 7200 RPM (system RAID1)

All disks must be installed in hot swap disk trays. It must be possible to extract these disk trays while the server chassis remains in its place in the 19” rack in which it is installed

ng-ki-node6
Passed

All disks are hot swapable. Hot extraction of one of the disk has been tested without stopping the server. The server has been working without a disk for a short time, then the disk has been reintroduced and the raid successfully restored without human intervention.

System Disks: Two dedicated system disks of at least 20 GB each are required for installation of the Linux Operating system. These system disks must be configured as a mirrored set using hardware mirroring

ng-ki-node6
Passed

The server was delivered with two hard drives of 80 GB each one mounted under hardware RAID1.

Documentation

The server must be delivered with a set of manuals in English comprising:

Documentation	ng-ki-node6 Server
The chassis and power supply manual	Passed
The Raid hardware manual.	Passed
The gigabit card manual.	Passed
The motherboard manual.	Passed
The disk's led manual	Passed
The complete guaranty including and all the terms and conditions.	Passed

Status

Remote Management

The DRAC card for remote access and management of the server works perfectly well. This functionality is provided by the enclosure.

DACS2– ng-ki-node6

Hardware Tests

This section describes the hardware and visual tests that should be performed to validate the neuGRID Grid KI Servers (Worker Nodes).

Worker Nodes are M600 Dell servers, which are Blade servers; it means that are small servers inside an enclosure. This enclosure provides the connectivity and power supply.

Visual Tests

A check of the delivery to ensure that all the requested material (such as keys, configuration sheet, power cords and documentation) is provided with the server.

ng-ki-node6
Passed.

All documentation is OK and two power cords are included for each server.

A visual inspection of the server (inside and outside), with a particular emphasis on cabling.

ng-ki-node6
Passed

Both servers are in perfect state outside and inside, making special remarks in the professional. The internal cabling and elements to ensure the correct airflow between components are properly installed. CPU's and RAM are inside an airflow circuit in order to ensure the correct cooling.

A check of the configuration of the server to ensure all components are properly installed recognized and configured.

ng-ki-node6
Passed

BIOS recognizes RAM installed properly and RAID card recognizes hard drives properly to in both servers.

System Tests

A basic check of all system, including data disks to ensure correct cabling and connectivity.

ng-ki-node6
Passed

Memory testing using Memtest86+ v2.0.1. This test will be performed using the bootable iso image available at http://www.memtest86.org.

ng-ki-node6
Passed

Memory tests have been applied during 14 hours and no errors were found. Full test has been executed several times during these 14 hours.

ng-ki-node6
Passed

Installation of the Scientific Linux 5.1 32 Bits Linux distribution.

ng-ki-node6
Passed

Operating system has been installed without any problems, hardware is well recognized by Kernel, and works perfectly, including RAID card and Ethernet cards.

Hard drive performance tests were applied to the RAID disk volumes of the neuGRID Grid KI Server using BONNIE[44]. BONNIE is a benchmark suite that is aimed at performing a number of simple tests of hard drive and file system performance.

Tests to be applied are:

Sequential Output (Write Test):

Block: The file is created using write. The CPU overhead should be just the OS file space allocation.

Rewrite: Each block of the file is read with read, dirtied, and rewritten with write, requiring an lseek. Since no space allocation is done, and the I/O is well-localized, this should test the effectiveness of the filesystem cache and the speed of data transfer.

[44] http://www.coker.com.au/bonnie++/

Sequential Input (Read Test):

Block: The file is read using read. This should be a pure test of sequential input performance

Random Seeks

This test runs three SeekProcCount processes in parallel, doing a total of 8000 lseeks to locations in the file specified by a random function. In each case, the block is read with read. In 10% of cases, it is dirtied and written back with write.

Results obtained for ng-ki-node6 unit

		Sequential Output				Sequential Input		Random	
	Size:Chunk Size	Block		Rewrite		Block		Seeks	
		K/sec	% CPU	K/sec	% CPU	K/sec	% CPU	/ sec	% CPU
server	16G	52471	9	34594	5	75390	7	187.0	0
server	16G	53593	9	33442	5	75052	6	213.2	0

These results indicate that the RAID volume, formatted under ext3, can write at 52 Mega Bytes per second, rewrite 34,4 Mega Bytes per second, read 575,7 Mega Bytes per second and perform an average of 180 – 200 random seeks per second.

Network Performance Tests: GENSINK has been used for testing network performances. GENSINK generates random network traffic, not related to the hard drive in order to generate the maximum possible data in the network card.

Network cards perform at an average speed of 115’001 KiloBytes/sec (920.008 Megabits/sec). Despite of this, performances remain very high.

Hardware Specifications

Chassis, Power Supply, Cooling and Serial Number.

	ng-ki-node6
Chasis	Passed
Power Supply	Passed
Cooling	Passed
Serial Number	3CWB84J

neuGRID Grid KI Server shall be housed in a rack mountable 19” chassis at 100cm deep and 12U high. The chassis must be provided with sliding rails for 19” racks and have easily accessible power on/off and reset buttons and a power LED.

ng-ki-node6
Passed

The server is mounted inside a 19” enclosure.

The server chassis shall provide locking solution that locks the chassis cover closed to protect internal components and guarantee the air flux for a correct cooling.

ng-ki-node6
Passed

The enclosure provides this functionality.

Dual redundant power supplies are required. The neuGRID Grid KI Server must be able to restart properly even if one power supply module is not working.

ng-ki-node6
Passed

The server is inside the enclosure, this enclosure provides 5 redundant power supplies.

ng-ki-node6
Passed

UPS Service is provided by the IT Center.

The required number of flame-retardant (rated IEC 332-1) and halogen-free (PVC is excluded) appropriate power cord must be supplied.

ng-ki-node6
Passed

neuGRID Grid KI Servermust have a unique serial number on the rear of the chassis that is clearly visible when the chassis is installed in a rack. If additional information is provided with the serial number, this information must be written in English.

ng-ki-node6
3CWB84J

One Dual Core 2 or One Quad Core Intel Xeon processors are required.

ng-ki-node6
Two Quad Core Intel(R) Xeon(R) CPU E5410 2.33GHz

Server shall be equipped with a SVGA video, keyboard and mouse ports. Servers shall be supplied without keyboard, mouse and video screen.

ng-ki-node6
Passed

Connection for SVGA video, keyboard and mouse present in front and rear of server. Keyboard and mouse must be USB type.

The server must be able to boot Linux without keyboard, screen or mouse attached.

ng-ki-node6	Data Server
Passed	Passed

Servers must have at least 4 GBytes of RAM. The supplier is responsible for providing modules that are compatible with the motherboard and for testing them with the diagnostic diskette of the motherboard manufacturer. Proof of such a test must be provided for each machine.

ng-ki-node6
Passed

Server has 8GBytes of RAM.

Network interface: neuGRID Grid KI Servermust have 2 copper Gigabit Ethernet interface for data access.

ng-ki-node6
Passed

Each server has 4 Gigabit Ethernet cards

Remote administration card: The server must be shipped with a remote administration card, the mandatory properties are:

To be capable to interact at BIOS level with the hardware.

ng-ki-node6
Passed

Server has DRAC5 (Dell Remote Access Card) installed. Provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allow to start, stop and restart the server remotely.

To be configurable through a TCP/IP network, and provide software client to remote administration of the server.

ng-ki-node6
Passed

Server has a DRAC5 (Dell Remote Access Card) installed. This card provides the necessary tools and functionality to monitor, troubleshoots, and repair server. Allow to start, stop and restart the server remotely and mounting remote iso images of floppy disks and cd.

General Requirements for System and Data Disks

All hard disks shall have a rotational speed of at least 7200 RPM.

ng-ki-node6
Passed

ng-ki-node6:

2 HDD of 80GB sata 7200 RPM (system RAID1)

All disks must be installed in hot swap disk trays. It must be possible to extract these disk trays while the server chassis remains in its place in the 19” rack in which it is installed

ng-ki-node6
Passed

All disks are hot swapable. Hot extraction of one of the disk has been tested without stopping the server. The server has been working without a disk for a short time, then the disk has been reintroduced and the raid successfully restored without human intervention.

System Disks: Two dedicated system disks of at least 20 GB each are required for installation of the Linux Operating system. These system disks must be configured as a mirrored set using hardware mirroring

ng-ki-node6
Passed

The server was delivered with two hard drives of 80 GB each one mounted under hardware RAID1.

Documentation

The server must be delivered with a set of manuals in English comprising:

Documentation		ng-ki-node6 Server
The chassis and power supply manual	Passed	
The Raid hardware manual.	Passed	
The gigabit card manual.	Passed	
The motherboard manual.	Passed	
The disk's led manual	Passed	
The complete guaranty including and all the terms and conditions.	Passed	

Status

Remote Management

The DRAC card for remote access and management of the server works perfectly well. This functionality is provided by the enclosure.

DACS2– ng-ki-node7

Hardware Tests

This section describes the hardware and visual tests that should be performed to validate the neuGRID Grid KI Servers (Worker Nodes).

Worker Nodes are M600 Dell servers, which are Blade servers; it means that are small servers inside an enclosure. This enclosure provides the connectivity and power supply.

Visual Tests

A check of the delivery to ensure that all the requested material (such as keys, configuration sheet, power cords and documentation) is provided with the server.

ng-ki-node7
Passed.

All documentation is OK and two power cords are included for each server.

A visual inspection of the server (inside and outside), with a particular emphasis on cabling.

ng-ki-node7
Passed

Both servers are in perfect state outside and inside, making special remarks in the professional. The internal cabling and elements to ensure the correct airflow between components are properly installed. CPU's and RAM are inside an airflow circuit in order to ensure the correct cooling.

A check of the configuration of the server to ensure all components are properly installed recognized and configured.

ng-ki-node7
Passed

BIOS recognizes RAM installed properly and RAID card recognizes hard drives properly to in both servers.

System Tests

A basic check of all system, including data disks to ensure correct cabling and connectivity.

ng-ki-node7
Passed

Memory testing using Memtest86+ v2.0.1. This test will be performed using the bootable iso image available at http://www.memtest86.org.

ng-ki-node7
Passed

Memory tests have been applied during 14 hours and no errors were found. Full test has been executed several times during these 14 hours.

ng-ki-node7
Passed

Installation of the Scientific Linux 5.1 32 Bits Linux distribution.

ng-ki-node7
Passed

Operating system has been installed without any problems, hardware is well recognized by Kernel, and works perfectly, including RAID card and Ethernet cards.

Hard drive performance tests were applied to the RAID disk volumes of the neuGRID Grid KI Server using BONNIE[45]. BONNIE is a benchmark suite that is aimed at performing a number of simple tests of hard drive and file system performance.

Tests to be applied are:

Sequential Output (Write Test):

Block: The file is created using write. The CPU overhead should be just the OS file space allocation.

Rewrite: Each block of the file is read with read, dirtied, and rewritten with write, requiring an lseek. Since no space allocation is done, and the I/O is well-localized, this should test the effectiveness of the filesystem cache and the speed of data transfer.

[45] http://www.coker.com.au/bonnie++/

Sequential Input (Read Test):

Block: The file is read using read. This should be a pure test of sequential input performance

Random Seeks

This test runs three SeekProcCount processes in parallel, doing a total of 8000 lseeks to locations in the file specified by a random function. In each case, the block is read with read. In 10% of cases, it is dirtied and written back with write.

Results obtained for ng-ki-node7 unit

		Sequential Output				Sequential Input		Random	
	Size:Chunk Size	Block		Rewrite		Block		Seeks	
		K/sec	% CPU	K/sec	% CPU	K/sec	% CPU	/ sec	% CPU
server	16G	52471	9	34594	5	75390	7	187.0	0
server	16G	53593	9	33442	5	75052	6	213.2	0

These results indicate that the RAID volume, formatted under ext3, can write at 52 Mega Bytes per second, rewrite 34,4 Mega Bytes per second, read 575,7 Mega Bytes per second and perform an average of 180 – 200 random seeks per second.

Network Performance Tests: GENSINK has been used for testing network performances. GENSINK generates random network traffic, not related to the hard drive in order to generate the maximum possible data in the network card.

Network cards perform at an average speed of 115’001 KiloBytes/sec (920.008 Megabits/sec). Despite of this, performances remain very high.

Hardware Specifications

Chassis, Power Supply, Cooling and Serial Number.

	ng-ki-node7
Chasis	Passed
Power Supply	Passed
Cooling	Passed
Serial Number	GBWB84J

neuGRID Grid KI Server shall be housed in a rack mountable 19” chassis at 100cm deep and 12U high. The chassis must be provided with sliding rails for 19” racks and have easily accessible power on/off and reset buttons and a power LED.

ng-ki-node7
Passed

The server is mounted inside a 19” enclosure.

The server chassis shall provide locking solution that locks the chassis cover closed to protect internal components and guarantee the air flux for a correct cooling.

ng-ki-node7
Passed

The enclosure provides this functionality.

Dual redundant power supplies are required. The neuGRID Grid KI Server must be able to restart properly even if one power supply module is not working.

ng-ki-node7
Passed

The server is inside the enclosure, this enclosure provides 5 redundant power supplies.

ng-ki-node7
Passed

UPS Service is provided by the IT Center.

The required number of flame-retardant (rated IEC 332-1) and halogen-free (PVC is excluded) appropriate power cord must be supplied.

ng-ki-node7
Passed

neuGRID Grid KI Servermust have a unique serial number on the rear of the chassis that is clearly visible when the chassis is installed in a rack. If additional information is provided with the serial number, this information must be written in English.

ng-ki-node7
GBWB84J

One Dual Core 2 or One Quad Core Intel Xeon processors are required.

ng-ki-node7
Two Quad Core Intel(R) Xeon(R) CPU E5410 2.33GHz

Server shall be equipped with a SVGA video, keyboard and mouse ports. Servers shall be supplied without keyboard, mouse and video screen.

ng-ki-node7
Passed

Connection for SVGA video, keyboard and mouse present in front and rear of server. Keyboard and mouse must be USB type.

The server must be able to boot Linux without keyboard, screen or mouse attached.

ng-ki-node7	Data Server
Passed	Passed

Servers must have at least 4 GBytes of RAM. The supplier is responsible for providing modules that are compatible with the motherboard and for testing them with the diagnostic diskette of the motherboard manufacturer. Proof of such a test must be provided for each machine.

ng-ki-node7
Passed

Server has 8GBytes of RAM.

Network interface: neuGRID Grid KI Servermust have 2 copper Gigabit Ethernet interface for data access.

ng-ki-node7
Passed

Each server has 4 Gigabit Ethernet cards

Remote administration card: The server must be shipped with a remote administration card, the mandatory properties are:

To be capable to interact at BIOS level with the hardware.

ng-ki-node7
Passed

Server has DRAC5 (Dell Remote Access Card) installed. Provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allow to start, stop and restart the server remotely.

To be configurable through a TCP/IP network, and provide software client to remote administration of the server.

ng-ki-node7
Passed

Server has a DRAC5 (Dell Remote Access Card) installed. This card provides the necessary tools and functionality to monitor, troubleshoots, and repair server. Allow to start, stop and restart the server remotely and mounting remote iso images of floppy disks and cd.

General Requirements for System and Data Disks

All hard disks shall have a rotational speed of at least 7200 RPM.

ng-ki-node7
Passed

ng-ki-node7:

2 HDD of 80GB sata 7200 RPM (system RAID1)

All disks must be installed in hot swap disk trays. It must be possible to extract these disk trays while the server chassis remains in its place in the 19” rack in which it is installed

ng-ki-node7
Passed

All disks are hot swapable. Hot extraction of one of the disk has been tested without stopping the server. The server has been working without a disk for a short time, then the disk has been reintroduced and the raid successfully restored without human intervention.

System Disks: Two dedicated system disks of at least 20 GB each are required for installation of the Linux Operating system. These system disks must be configured as a mirrored set using hardware mirroring

ng-ki-node7
Passed

The server was delivered with two hard drives of 80 GB each one mounted under hardware RAID1.

Documentation

The server must be delivered with a set of manuals in English comprising:

Documentation		ng-ki-node7 Server
The chassis and power supply manual	Passed	
The Raid hardware manual.	Passed	
The gigabit card manual.	Passed	
The motherboard manual.	Passed	
The disk's led manual	Passed	
The complete guaranty including and all the terms and conditions.	Passed	

Status

Remote Management

The DRAC card for remote access and management of the server works perfectly well. This functionality is provided by the enclosure.

DACS2– ng-ki-node8

Hardware Tests

This section describes the hardware and visual tests that should be performed to validate the neuGRID Grid KI Servers (Worker Nodes).

Worker Nodes are M600 Dell servers, which are Blade servers; it means that are small servers inside an enclosure. This enclosure provides the connectivity and power supply.

Visual Tests

A check of the delivery to ensure that all the requested material (such as keys, configuration sheet, power cords and documentation) is provided with the server.

ng-ki-node8
Passed.

All documentation is OK and two power cords are included for each server.

A visual inspection of the server (inside and outside), with a particular emphasis on cabling.

ng-ki-node8
Passed

Both servers are in perfect state outside and inside, making special remarks in the professional. The internal cabling and elements to ensure the correct airflow between components are properly installed. CPU's and RAM are inside an airflow circuit in order to ensure the correct cooling.

A check of the configuration of the server to ensure all components are properly installed recognized and configured.

ng-ki-node8
Passed

BIOS recognizes RAM installed properly and RAID card recognizes hard drives properly to in both servers.

System Tests

A basic check of all system, including data disks to ensure correct cabling and connectivity.

ng-ki-node8
Passed

Memory testing using Memtest86+ v2.0.1. This test will be performed using the bootable iso image available at http://www.memtest86.org.

ng-ki-node8
Passed

Memory tests have been applied during 14 hours and no errors were found. Full test has been executed several times during these 14 hours.

ng-ki-node8
Passed

Installation of the Scientific Linux 5.1 32 Bits Linux distribution.

ng-ki-node8
Passed

Operating system has been installed without any problems, hardware is well recognized by Kernel, and works perfectly, including RAID card and Ethernet cards.

Hard drive performance tests were applied to the RAID disk volumes of the neuGRID Grid KI Server using BONNIE[46]. BONNIE is a benchmark suite that is aimed at performing a number of simple tests of hard drive and file system performance.

Tests to be applied are:

Sequential Output (Write Test):

Block: The file is created using write. The CPU overhead should be just the OS file space allocation.

Rewrite: Each block of the file is read with read, dirtied, and rewritten with write, requiring an lseek. Since no space allocation is done, and the I/O is well-localized, this should test the effectiveness of the filesystem cache and the speed of data transfer.

[46] http://www.coker.com.au/bonnie++/

Sequential Input (Read Test):

Block: The file is read using read. This should be a pure test of sequential input performance

Random Seeks

This test runs three SeekProcCount processes in parallel, doing a total of 8000 lseeks to locations in the file specified by a random function. In each case, the block is read with read. In 10% of cases, it is dirtied and written back with write.

Results obtained for ng-ki-node8 unit

		Sequential Output				Sequential Input		Random	
	Size:Chunk Size	Block		Rewrite		Block		Seeks	
		K/sec	% CPU	K/sec	% CPU	K/sec	% CPU	/ sec	% CPU
server	16G	52471	9	34594	5	75390	7	187.0	0
server	16G	53593	9	33442	5	75052	6	213.2	0

These results indicate that the RAID volume, formatted under ext3, can write at 52 Mega Bytes per second, rewrite 34,4 Mega Bytes per second, read 575,7 Mega Bytes per second and perform an average of 180 – 200 random seeks per second.

Network Performance Tests: GENSINK has been used for testing network performances. GENSINK generates random network traffic, not related to the hard drive in order to generate the maximum possible data in the network card.

Network cards perform at an average speed of 115’001 KiloBytes/sec (920.008 Megabits/sec). Despite of this, performances remain very high.

Hardware Specifications

Chassis, Power Supply, Cooling and Serial Number.

	ng-ki-node8
Chasis	Passed
Power Supply	Passed
Cooling	Passed
Serial Number	HBWB84J

neuGRID Grid KI Server shall be housed in a rack mountable 19” chassis at 100cm deep and 12U high. The chassis must be provided with sliding rails for 19” racks and have easily accessible power on/off and reset buttons and a power LED.

ng-ki-node8
Passed

The server is mounted inside a 19” enclosure.

The server chassis shall provide locking solution that locks the chassis cover closed to protect internal components and guarantee the air flux for a correct cooling.

ng-ki-node8
Passed

The enclosure provides this functionality.

Dual redundant power supplies are required. The neuGRID Grid KI Server must be able to restart properly even if one power supply module is not working.

ng-ki-node8
Passed

The server is inside the enclosure, this enclosure provides 5 redundant power supplies.

ng-ki-node8
Passed

UPS Service is provided by the IT Center.

The required number of flame-retardant (rated IEC 332-1) and halogen-free (PVC is excluded) appropriate power cord must be supplied.

ng-ki-node8
Passed

neuGRID Grid KI Servermust have a unique serial number on the rear of the chassis that is clearly visible when the chassis is installed in a rack. If additional information is provided with the serial number, this information must be written in English.

ng-ki-node8
HBWB84J

One Dual Core 2 or One Quad Core Intel Xeon processors are required.

ng-ki-node8
Two Quad Core Intel(R) Xeon(R) CPU E5410 2.33GHz

Server shall be equipped with a SVGA video, keyboard and mouse ports. Servers shall be supplied without keyboard, mouse and video screen.

ng-ki-node8
Passed

Connection for SVGA video, keyboard and mouse present in front and rear of server. Keyboard and mouse must be USB type.

The server must be able to boot Linux without keyboard, screen or mouse attached.

ng-ki-node8	Data Server
Passed	Passed

Servers must have at least 4 GBytes of RAM. The supplier is responsible for providing modules that are compatible with the motherboard and for testing them with the diagnostic diskette of the motherboard manufacturer. Proof of such a test must be provided for each machine.

ng-ki-node8
Passed

Server has 8GBytes of RAM.

Network interface: neuGRID Grid KI Servermust have 2 copper Gigabit Ethernet interface for data access.

ng-ki-node8
Passed

Each server has 4 Gigabit Ethernet cards

Remote administration card: The server must be shipped with a remote administration card, the mandatory properties are:

To be capable to interact at BIOS level with the hardware.

ng-ki-node8
Passed

Server has DRAC5 (Dell Remote Access Card) installed. Provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allow to start, stop and restart the server remotely.

To be configurable through a TCP/IP network, and provide software client to remote administration of the server.

ng-ki-node8
Passed

Server has a DRAC5 (Dell Remote Access Card) installed. This card provides the necessary tools and functionality to monitor, troubleshoots, and repair server. Allow to start, stop and restart the server remotely and mounting remote iso images of floppy disks and cd.

General Requirements for System and Data Disks

All hard disks shall have a rotational speed of at least 7200 RPM.

ng-ki-node8
Passed

ng-ki-node8:

2 HDD of 80GB sata 7200 RPM (system RAID1)

All disks must be installed in hot swap disk trays. It must be possible to extract these disk trays while the server chassis remains in its place in the 19” rack in which it is installed

ng-ki-node8
Passed

All disks are hot swapable. Hot extraction of one of the disk has been tested without stopping the server. The server has been working without a disk for a short time, then the disk has been reintroduced and the raid successfully restored without human intervention.

System Disks: Two dedicated system disks of at least 20 GB each are required for installation of the Linux Operating system. These system disks must be configured as a mirrored set using hardware mirroring

ng-ki-node8
Passed

The server was delivered with two hard drives of 80 GB each one mounted under hardware RAID1.

Documentation

The server must be delivered with a set of manuals in English comprising:

Documentation	ng-ki-node8 Server
The chassis and power supply manual	Passed
The Raid hardware manual.	Passed
The gigabit card manual.	Passed
The motherboard manual.	Passed
The disk's led manual	Passed
The complete guaranty including and all the terms and conditions.	Passed

Status

Remote Management

The DRAC card for remote access and management of the server works perfectly well. This functionality is provided by the enclosure.

DACS2– ng-ki-node9

Hardware Tests

This section describes the hardware and visual tests that should be performed to validate the neuGRID Grid KI Servers (Worker Nodes).

Worker Nodes are M600 Dell servers, which are Blade servers; it means that are small servers inside an enclosure. This enclosure provides the connectivity and power supply.

Visual Tests

A check of the delivery to ensure that all the requested material (such as keys, configuration sheet, power cords and documentation) is provided with the server.

ng-ki-node9
Passed.

All documentation is OK and two power cords are included for each server.

A visual inspection of the server (inside and outside), with a particular emphasis on cabling.

ng-ki-node9
Passed

Both servers are in perfect state outside and inside, making special remarks in the professional. The internal cabling and elements to ensure the correct airflow between components are properly installed. CPU's and RAM are inside an airflow circuit in order to ensure the correct cooling.

A check of the configuration of the server to ensure all components are properly installed recognized and configured.

ng-ki-node9
Passed

BIOS recognizes RAM installed properly and RAID card recognizes hard drives properly to in both servers.

System Tests

A basic check of all system, including data disks to ensure correct cabling and connectivity.

ng-ki-node9
Passed

Memory testing using Memtest86+ v2.0.1. This test will be performed using the bootable iso image available at http://www.memtest86.org.

ng-ki-node9
Passed

Memory tests have been applied during 14 hours and no errors were found. Full test has been executed several times during these 14 hours.

ng-ki-node9
Passed

Installation of the Scientific Linux 5.1 32 Bits Linux distribution.

ng-ki-node9
Passed

Operating system has been installed without any problems, hardware is well recognized by Kernel, and works perfectly, including RAID card and Ethernet cards.

Hard drive performance tests were applied to the RAID disk volumes of the neuGRID Grid KI Server using BONNIE[47]. BONNIE is a benchmark suite that is aimed at performing a number of simple tests of hard drive and file system performance.

Tests to be applied are:

Sequential Output (Write Test):

Block: The file is created using write. The CPU overhead should be just the OS file space allocation.

Rewrite: Each block of the file is read with read, dirtied, and rewritten with write, requiring an lseek. Since no space allocation is done, and the I/O is well-localized, this should test the effectiveness of the filesystem cache and the speed of data transfer.

[47] http://www.coker.com.au/bonnie++/

Sequential Input (Read Test):

Block: The file is read using read. This should be a pure test of sequential input performance

Random Seeks

This test runs three SeekProcCount processes in parallel, doing a total of 8000 lseeks to locations in the file specified by a random function. In each case, the block is read with read. In 10% of cases, it is dirtied and written back with write.

Results obtained for ng-ki-node9 unit

		Sequential Output				Sequential Input		Random	
	Size:Chunk Size	Block		Rewrite		Block		Seeks	
		K/sec	% CPU	K/sec	% CPU	K/sec	% CPU	/ sec	% CPU
server	16G	52471	9	34594	5	75390	7	187.0	0
server	16G	53593	9	33442	5	75052	6	213.2	0

These results indicate that the RAID volume, formatted under ext3, can write at 52 Mega Bytes per second, rewrite 34,4 Mega Bytes per second, read 575,7 Mega Bytes per second and perform an average of 180 – 200 random seeks per second.

Network Performance Tests: GENSINK has been used for testing network performances. GENSINK generates random network traffic, not related to the hard drive in order to generate the maximum possible data in the network card.

Network cards perform at an average speed of 115’001 KiloBytes/sec (920.008 Megabits/sec). Despite of this, performances remain very high.

Hardware Specifications

Chassis, Power Supply, Cooling and Serial Number.

	ng-ki-node9
Chasis	Passed
Power Supply	Passed
Cooling	Passed
Serial Number	7CWB84J

neuGRID Grid KI Server shall be housed in a rack mountable 19” chassis at 100cm deep and 12U high. The chassis must be provided with sliding rails for 19” racks and have easily accessible power on/off and reset buttons and a power LED.

ng-ki-node9
Passed

The server is mounted inside a 19” enclosure.

The server chassis shall provide locking solution that locks the chassis cover closed to protect internal components and guarantee the air flux for a correct cooling.

ng-ki-node9
Passed

The enclosure provides this functionality.

Dual redundant power supplies are required. The neuGRID Grid KI Server must be able to restart properly even if one power supply module is not working.

ng-ki-node9
Passed

The server is inside the enclosure, this enclosure provides 5 redundant power supplies.

ng-ki-node9
Passed

UPS Service is provided by the IT Center.

The required number of flame-retardant (rated IEC 332-1) and halogen-free (PVC is excluded) appropriate power cord must be supplied.

ng-ki-node9
Passed

neuGRID Grid KI Servermust have a unique serial number on the rear of the chassis that is clearly visible when the chassis is installed in a rack. If additional information is provided with the serial number, this information must be written in English.

ng-ki-node9
7CWB84J

One Dual Core 2 or One Quad Core Intel Xeon processors are required.

ng-ki-node9
Two Quad Core Intel(R) Xeon(R) CPU E5410 2.33GHz

Server shall be equipped with a SVGA video, keyboard and mouse ports. Servers shall be supplied without keyboard, mouse and video screen.

ng-ki-node9
Passed

Connection for SVGA video, keyboard and mouse present in front and rear of server. Keyboard and mouse must be USB type.

The server must be able to boot Linux without keyboard, screen or mouse attached.

ng-ki-node9	Data Server
Passed	Passed

Servers must have at least 4 GBytes of RAM. The supplier is responsible for providing modules that are compatible with the motherboard and for testing them with the diagnostic diskette of the motherboard manufacturer. Proof of such a test must be provided for each machine.

ng-ki-node9
Passed

Server has 8GBytes of RAM.

Network interface: neuGRID Grid KI Servermust have 2 copper Gigabit Ethernet interface for data access.

ng-ki-node9
Passed

Each server has 4 Gigabit Ethernet cards

Remote administration card: The server must be shipped with a remote administration card, the mandatory properties are:

To be capable to interact at BIOS level with the hardware.

ng-ki-node9
Passed

Server has DRAC5 (Dell Remote Access Card) installed. Provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allow to start, stop and restart the server remotely.

To be configurable through a TCP/IP network, and provide software client to remote administration of the server.

ng-ki-node9
Passed

Server has a DRAC5 (Dell Remote Access Card) installed. This card provides the necessary tools and functionality to monitor, troubleshoots, and repair server. Allow to start, stop and restart the server remotely and mounting remote iso images of floppy disks and cd.

General Requirements for System and Data Disks

All hard disks shall have a rotational speed of at least 7200 RPM.

ng-ki-node9
Passed

ng-ki-node9:

2 HDD of 80GB sata 7200 RPM (system RAID1)

All disks must be installed in hot swap disk trays. It must be possible to extract these disk trays while the server chassis remains in its place in the 19” rack in which it is installed

ng-ki-node9
Passed

All disks are hot swapable. Hot extraction of one of the disk has been tested without stopping the server. The server has been working without a disk for a short time, then the disk has been reintroduced and the raid successfully restored without human intervention.

System Disks: Two dedicated system disks of at least 20 GB each are required for installation of the Linux Operating system. These system disks must be configured as a mirrored set using hardware mirroring

ng-ki-node9
Passed

The server was delivered with two hard drives of 80 GB each one mounted under hardware RAID1.

Documentation

The server must be delivered with a set of manuals in English comprising:

Documentation	ng-ki-node9 Server
The chassis and power supply manual	Passed
The Raid hardware manual.	Passed
The gigabit card manual.	Passed
The motherboard manual.	Passed
The disk's led manual	Passed
The complete guaranty including and all the terms and conditions.	Passed

Status

Remote Management

The DRAC card for remote access and management of the server works perfectly well. This functionality is provided by the enclosure.

DACS2– ng-ki-node10

Hardware Tests

This section describes the hardware and visual tests that should be performed to validate the neuGRID Grid KI Servers (Worker Nodes).

Worker Nodes are M600 Dell servers, which are Blade servers; it means that are small servers inside an enclosure. This enclosure provides the connectivity and power supply.

Visual Tests

A check of the delivery to ensure that all the requested material (such as keys, configuration sheet, power cords and documentation) is provided with the server.

ng-ki-node10
Passed.

All documentation is OK and two power cords are included for each server.

A visual inspection of the server (inside and outside), with a particular emphasis on cabling.

ng-ki-node10
Passed

Both servers are in perfect state outside and inside, making special remarks in the professional. The internal cabling and elements to ensure the correct airflow between components are properly installed. CPU's and RAM are inside an airflow circuit in order to ensure the correct cooling.

A check of the configuration of the server to ensure all components are properly installed recognized and configured.

ng-ki-node10
Passed

BIOS recognizes RAM installed properly and RAID card recognizes hard drives properly to in both servers.

System Tests

A basic check of all system, including data disks to ensure correct cabling and connectivity.

ng-ki-node10
Passed

Memory testing using Memtest86+ v2.0.1. This test will be performed using the bootable iso image available at http://www.memtest86.org.

ng-ki-node10
Passed

Memory tests have been applied during 14 hours and no errors were found. Full test has been executed several times during these 14 hours.

ng-ki-node10
Passed

Installation of the Scientific Linux 5.1 32 Bits Linux distribution.

ng-ki-node10
Passed

Operating system has been installed without any problems, hardware is well recognized by Kernel, and works perfectly, including RAID card and Ethernet cards.

Hard drive performance tests were applied to the RAID disk volumes of the neuGRID Grid KI Server using BONNIE[48]. BONNIE is a benchmark suite that is aimed at performing a number of simple tests of hard drive and file system performance.

Tests to be applied are:

Sequential Output (Write Test):

Block: The file is created using write. The CPU overhead should be just the OS file space allocation.

Rewrite: Each block of the file is read with read, dirtied, and rewritten with write, requiring an lseek. Since no space allocation is done, and the I/O is well-localized, this should test the effectiveness of the filesystem cache and the speed of data transfer.

[48] http://www.coker.com.au/bonnie++/

Sequential Input (Read Test):

Block: The file is read using read. This should be a pure test of sequential input performance

Random Seeks

This test runs three SeekProcCount processes in parallel, doing a total of 8000 lseeks to locations in the file specified by a random function. In each case, the block is read with read. In 10% of cases, it is dirtied and written back with write.

Results obtained for ng-ki-node10 unit

		Sequential Output				Sequential Input		Random	
	Size:Chunk Size	Block		Rewrite		Block		Seeks	
		K/sec	% CPU	K/sec	% CPU	K/sec	% CPU	/ sec	% CPU
server	16G	52471	9	34594	5	75390	7	187.0	0
server	16G	53593	9	33442	5	75052	6	213.2	0

These results indicate that the RAID volume, formatted under ext3, can write at 52 Mega Bytes per second, rewrite 34,4 Mega Bytes per second, read 575,7 Mega Bytes per second and perform an average of 180 – 200 random seeks per second.

Network Performance Tests: GENSINK has been used for testing network performances. GENSINK generates random network traffic, not related to the hard drive in order to generate the maximum possible data in the network card.

Network cards perform at an average speed of 115’001 KiloBytes/sec (920.008 Megabits/sec). Despite of this, performances remain very high.

Hardware Specifications

Chassis, Power Supply, Cooling and Serial Number.

	ng-ki-node10
Chasis	Passed
Power Supply	Passed
Cooling	Passed
Serial Number	8CWB84J

neuGRID Grid KI Server shall be housed in a rack mountable 19” chassis at 100cm deep and 12U high. The chassis must be provided with sliding rails for 19” racks and have easily accessible power on/off and reset buttons and a power LED.

ng-ki-node10
Passed

The server is mounted inside a 19” enclosure.

The server chassis shall provide locking solution that locks the chassis cover closed to protect internal components and guarantee the air flux for a correct cooling.

ng-ki-node10
Passed

The enclosure provides this functionality.

Dual redundant power supplies are required. The neuGRID Grid KI Server must be able to restart properly even if one power supply module is not working.

ng-ki-node10
Passed

The server is inside the enclosure, this enclosure provides 5 redundant power supplies.

ng-ki-node10
Passed

UPS Service is provided by the IT Center.

The required number of flame-retardant (rated IEC 332-1) and halogen-free (PVC is excluded) appropriate power cord must be supplied.

ng-ki-node10
Passed

neuGRID Grid KI Servermust have a unique serial number on the rear of the chassis that is clearly visible when the chassis is installed in a rack. If additional information is provided with the serial number, this information must be written in English.

ng-ki-node10
8CWB84J

One Dual Core 2 or One Quad Core Intel Xeon processors are required.

ng-ki-node10
Two Quad Core Intel(R) Xeon(R) CPU E5410 2.33GHz

Server shall be equipped with a SVGA video, keyboard and mouse ports. Servers shall be supplied without keyboard, mouse and video screen.

ng-ki-node10
Passed

Connection for SVGA video, keyboard and mouse present in front and rear of server. Keyboard and mouse must be USB type.

The server must be able to boot Linux without keyboard, screen or mouse attached.

ng-ki-node10	Data Server
Passed	Passed

Servers must have at least 4 GBytes of RAM. The supplier is responsible for providing modules that are compatible with the motherboard and for testing them with the diagnostic diskette of the motherboard manufacturer. Proof of such a test must be provided for each machine.

ng-ki-node10
Passed

Server has 8GBytes of RAM.

Network interface: neuGRID Grid KI Servermust have 2 copper Gigabit Ethernet interface for data access.

ng-ki-node10
Passed

Each server has 4 Gigabit Ethernet cards

Remote administration card: The server must be shipped with a remote administration card, the mandatory properties are:

To be capable to interact at BIOS level with the hardware.

ng-ki-node10
Passed

Server has DRAC5 (Dell Remote Access Card) installed. Provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allow to start, stop and restart the server remotely.

To be configurable through a TCP/IP network, and provide software client to remote administration of the server.

ng-ki-node10
Passed

Server has a DRAC5 (Dell Remote Access Card) installed. This card provides the necessary tools and functionality to monitor, troubleshoots, and repair server. Allow to start, stop and restart the server remotely and mounting remote iso images of floppy disks and cd.

General Requirements for System and Data Disks

All hard disks shall have a rotational speed of at least 7200 RPM.

ng-ki-node10
Passed

ng-ki-node10:

2 HDD of 80GB sata 7200 RPM (system RAID1)

All disks must be installed in hot swap disk trays. It must be possible to extract these disk trays while the server chassis remains in its place in the 19” rack in which it is installed

ng-ki-node10
Passed

All disks are hot swapable. Hot extraction of one of the disk has been tested without stopping the server. The server has been working without a disk for a short time, then the disk has been reintroduced and the raid successfully restored without human intervention.

System Disks: Two dedicated system disks of at least 20 GB each are required for installation of the Linux Operating system. These system disks must be configured as a mirrored set using hardware mirroring

ng-ki-node10
Passed

The server was delivered with two hard drives of 80 GB each one mounted under hardware RAID1.

Documentation

The server must be delivered with a set of manuals in English comprising:

Documentation		ng-ki-node10 Server
The chassis and power supply manual	Passed	
The Raid hardware manual.	Passed	
The gigabit card manual.	Passed	
The motherboard manual.	Passed	
The disk's led manual	Passed	
The complete guaranty including and all the terms and conditions.	Passed	

Status

Remote Management

The DRAC card for remote access and management of the server works perfectly well. This functionality is provided by the enclosure.

DACS2– ng-ki-node11

Hardware Tests

This section describes the hardware and visual tests that should be performed to validate the neuGRID Grid KI Servers (Worker Nodes).

Worker Nodes are M600 Dell servers, which are Blade servers; it means that are small servers inside an enclosure. This enclosure provides the connectivity and power supply.

Visual Tests

A check of the delivery to ensure that all the requested material (such as keys, configuration sheet, power cords and documentation) is provided with the server.

ng-ki-node11
Passed.

All documentation is OK and two power cords are included for each server.

A visual inspection of the server (inside and outside), with a particular emphasis on cabling.

ng-ki-node11
Passed

Both servers are in perfect state outside and inside, making special remarks in the professional. The internal cabling and elements to ensure the correct airflow between components are properly installed. CPU's and RAM are inside an airflow circuit in order to ensure the correct cooling.

A check of the configuration of the server to ensure all components are properly installed recognized and configured.

ng-ki-node11
Passed

BIOS recognizes RAM installed properly and RAID card recognizes hard drives properly to in both servers.

System Tests

A basic check of all system, including data disks to ensure correct cabling and connectivity.

ng-ki-node11
Passed

Memory testing using Memtest86+ v2.0.1. This test will be performed using the bootable iso image available at http://www.memtest86.org.

ng-ki-node11
Passed

Memory tests have been applied during 14 hours and no errors were found. Full test has been executed several times during these 14 hours.

ng-ki-node11
Passed

Installation of the Scientific Linux 5.1 32 Bits Linux distribution.

ng-ki-node11
Passed

Operating system has been installed without any problems, hardware is well recognized by Kernel, and works perfectly, including RAID card and Ethernet cards.

Hard drive performance tests were applied to the RAID disk volumes of the neuGRID Grid KI Server using BONNIE[49]. BONNIE is a benchmark suite that is aimed at performing a number of simple tests of hard drive and file system performance.

Tests to be applied are:

Sequential Output (Write Test):

Block: The file is created using write. The CPU overhead should be just the OS file space allocation.

Rewrite: Each block of the file is read with read, dirtied, and rewritten with write, requiring an lseek. Since no space allocation is done, and the I/O is well-localized, this should test the effectiveness of the filesystem cache and the speed of data transfer.

[49] http://www.coker.com.au/bonnie++/

Sequential Input (Read Test):

Block: The file is read using read. This should be a pure test of sequential input performance

Random Seeks

This test runs three SeekProcCount processes in parallel, doing a total of 8000 lseeks to locations in the file specified by a random function. In each case, the block is read with read. In 10% of cases, it is dirtied and written back with write.

Results obtained for ng-ki-node11 unit

		Sequential Output				Sequential Input		Random	
	Size:Chunk Size	Block		Rewrite		Block		Seeks	
		K/sec	% CPU	K/sec	% CPU	K/sec	% CPU	/ sec	% CPU
server	16G	52471	9	34594	5	75390	7	187.0	0
server	16G	53593	9	33442	5	75052	6	213.2	0

These results indicate that the RAID volume, formatted under ext3, can write at 52 Mega Bytes per second, rewrite 34,4 Mega Bytes per second, read 575,7 Mega Bytes per second and perform an average of 180 – 200 random seeks per second.

Network Performance Tests: GENSINK has been used for testing network performances. GENSINK generates random network traffic, not related to the hard drive in order to generate the maximum possible data in the network card.

Network cards perform at an average speed of 115’001 KiloBytes/sec (920.008 Megabits/sec). Despite of this, performances remain very high.

Hardware Specifications

Chassis, Power Supply, Cooling and Serial Number.

	ng-ki-node11
Chasis	Passed
Power Supply	Passed
Cooling	Passed
Serial Number	6CWB84J

neuGRID Grid KI Server shall be housed in a rack mountable 19” chassis at 100cm deep and 12U high. The chassis must be provided with sliding rails for 19” racks and have easily accessible power on/off and reset buttons and a power LED.

ng-ki-node11
Passed

The server is mounted inside a 19” enclosure.

The server chassis shall provide locking solution that locks the chassis cover closed to protect internal components and guarantee the air flux for a correct cooling.

ng-ki-node11
Passed

The enclosure provides this functionality.

Dual redundant power supplies are required. The neuGRID Grid KI Server must be able to restart properly even if one power supply module is not working.

ng-ki-node11
Passed

The server is inside the enclosure, this enclosure provides 5 redundant power supplies.

ng-ki-node11
Passed

UPS Service is provided by the IT Center.

The required number of flame-retardant (rated IEC 332-1) and halogen-free (PVC is excluded) appropriate power cord must be supplied.

ng-ki-node11
Passed

neuGRID Grid KI Servermust have a unique serial number on the rear of the chassis that is clearly visible when the chassis is installed in a rack. If additional information is provided with the serial number, this information must be written in English.

ng-ki-node11
6CWB84J

One Dual Core 2 or One Quad Core Intel Xeon processors are required.

ng-ki-node11
Two Quad Core Intel(R) Xeon(R) CPU E5410 2.33GHz

Server shall be equipped with a SVGA video, keyboard and mouse ports. Servers shall be supplied without keyboard, mouse and video screen.

ng-ki-node11
Passed

Connection for SVGA video, keyboard and mouse present in front and rear of server. Keyboard and mouse must be USB type.

The server must be able to boot Linux without keyboard, screen or mouse attached.

ng-ki-node11	Data Server
Passed	Passed

Servers must have at least 4 GBytes of RAM. The supplier is responsible for providing modules that are compatible with the motherboard and for testing them with the diagnostic diskette of the motherboard manufacturer. Proof of such a test must be provided for each machine.

ng-ki-node11
Passed

Server has 8GBytes of RAM.

Network interface: neuGRID Grid KI Servermust have 2 copper Gigabit Ethernet interface for data access.

ng-ki-node11
Passed

Each server has 4 Gigabit Ethernet cards

Remote administration card: The server must be shipped with a remote administration card, the mandatory properties are:

To be capable to interact at BIOS level with the hardware.

ng-ki-node11
Passed

Server has DRAC5 (Dell Remote Access Card) installed. Provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allow to start, stop and restart the server remotely.

To be configurable through a TCP/IP network, and provide software client to remote administration of the server.

ng-ki-node11
Passed

Server has a DRAC5 (Dell Remote Access Card) installed. This card provides the necessary tools and functionality to monitor, troubleshoots, and repair server. Allow to start, stop and restart the server remotely and mounting remote iso images of floppy disks and cd.

General Requirements for System and Data Disks

All hard disks shall have a rotational speed of at least 7200 RPM.

ng-ki-node11
Passed

ng-ki-node11:

2 HDD of 80GB sata 7200 RPM (system RAID1)

All disks must be installed in hot swap disk trays. It must be possible to extract these disk trays while the server chassis remains in its place in the 19” rack in which it is installed

ng-ki-node11
Passed

All disks are hot swapable. Hot extraction of one of the disk has been tested without stopping the server. The server has been working without a disk for a short time, then the disk has been reintroduced and the raid successfully restored without human intervention.

System Disks: Two dedicated system disks of at least 20 GB each are required for installation of the Linux Operating system. These system disks must be configured as a mirrored set using hardware mirroring

ng-ki-node11
Passed

The server was delivered with two hard drives of 80 GB each one mounted under hardware RAID1.

Documentation

The server must be delivered with a set of manuals in English comprising:

Documentation		ng-ki-node11 Server
The chassis and power supply manual	Passed	
The Raid hardware manual.	Passed	
The gigabit card manual.	Passed	
The motherboard manual.	Passed	
The disk's led manual	Passed	
The complete guaranty including and all the terms and conditions.	Passed	

Status

Remote Management

The DRAC card for remote access and management of the server works perfectly well. This functionality is provided by the enclosure.

DACS2– ng-ki-node12

Hardware Tests

This section describes the hardware and visual tests that should be performed to validate the neuGRID Grid KI Servers (Worker Nodes).

Worker Nodes are M600 Dell servers, which are Blade servers; it means that are small servers inside an enclosure. This enclosure provides the connectivity and power supply.

Visual Tests

A check of the delivery to ensure that all the requested material (such as keys, configuration sheet, power cords and documentation) is provided with the server.

ng-ki-node12
Passed.

All documentation is OK and two power cords are included for each server.

A visual inspection of the server (inside and outside), with a particular emphasis on cabling.

ng-ki-node12
Passed

Both servers are in perfect state outside and inside, making special remarks in the professional. The internal cabling and elements to ensure the correct airflow between components are properly installed. CPU's and RAM are inside an airflow circuit in order to ensure the correct cooling.

A check of the configuration of the server to ensure all components are properly installed recognized and configured.

ng-ki-node12
Passed

BIOS recognizes RAM installed properly and RAID card recognizes hard drives properly to in both servers.

System Tests

A basic check of all system, including data disks to ensure correct cabling and connectivity.

ng-ki-node12
Passed

Memory testing using Memtest86+ v2.0.1. This test will be performed using the bootable iso image available at http://www.memtest86.org.

ng-ki-node12
Passed

Memory tests have been applied during 14 hours and no errors were found. Full test has been executed several times during these 14 hours.

ng-ki-node12
Passed

Installation of the Scientific Linux 5.1 32 Bits Linux distribution.

ng-ki-node12
Passed

Operating system has been installed without any problems, hardware is well recognized by Kernel, and works perfectly, including RAID card and Ethernet cards.

Hard drive performance tests were applied to the RAID disk volumes of the neuGRID Grid KI Server using BONNIE[50]. BONNIE is a benchmark suite that is aimed at performing a number of simple tests of hard drive and file system performance.

Tests to be applied are:

Sequential Output (Write Test):

Block: The file is created using write. The CPU overhead should be just the OS file space allocation.

Rewrite: Each block of the file is read with read, dirtied, and rewritten with write, requiring an lseek. Since no space allocation is done, and the I/O is well-localized, this should test the effectiveness of the filesystem cache and the speed of data transfer.

[50] http://www.coker.com.au/bonnie++/

Sequential Input (Read Test):

Block: The file is read using read. This should be a pure test of sequential input performance

Random Seeks

This test runs three SeekProcCount processes in parallel, doing a total of 8000 lseeks to locations in the file specified by a random function. In each case, the block is read with read. In 10% of cases, it is dirtied and written back with write.

Results obtained for ng-ki-node12 unit

		Sequential Output				Sequential Input		Random	
	Size:Chunk Size	Block		Rewrite		Block		Seeks	
		K/sec	% CPU	K/sec	% CPU	K/sec	% CPU	/ sec	% CPU
server	16G	52471	9	34594	5	75390	7	187.0	0
server	16G	53593	9	33442	5	75052	6	213.2	0

These results indicate that the RAID volume, formatted under ext3, can write at 52 Mega Bytes per second, rewrite 34,4 Mega Bytes per second, read 575,7 Mega Bytes per second and perform an average of 180 – 200 random seeks per second.

Network Performance Tests: GENSINK has been used for testing network performances. GENSINK generates random network traffic, not related to the hard drive in order to generate the maximum possible data in the network card.

Network cards perform at an average speed of 115’001 KiloBytes/sec (920.008 Megabits/sec). Despite of this, performances remain very high.

Hardware Specifications

Chassis, Power Supply, Cooling and Serial Number.

	ng-ki-node12
Chasis	Passed
Power Supply	Passed
Cooling	Passed
Serial Number	FBWB84J

neuGRID Grid KI Server shall be housed in a rack mountable 19” chassis at 100cm deep and 12U high. The chassis must be provided with sliding rails for 19” racks and have easily accessible power on/off and reset buttons and a power LED.

ng-ki-node12
Passed

The server is mounted inside a 19” enclosure.

The server chassis shall provide locking solution that locks the chassis cover closed to protect internal components and guarantee the air flux for a correct cooling.

ng-ki-node12
Passed

The enclosure provides this functionality.

Dual redundant power supplies are required. The neuGRID Grid KI Server must be able to restart properly even if one power supply module is not working.

ng-ki-node12
Passed

The server is inside the enclosure, this enclosure provides 5 redundant power supplies.

ng-ki-node12
Passed

UPS Service is provided by the IT Center.

The required number of flame-retardant (rated IEC 332-1) and halogen-free (PVC is excluded) appropriate power cord must be supplied.

ng-ki-node12
Passed

neuGRID Grid KI Servermust have a unique serial number on the rear of the chassis that is clearly visible when the chassis is installed in a rack. If additional information is provided with the serial number, this information must be written in English.

ng-ki-node12
FBWB84J

One Dual Core 2 or One Quad Core Intel Xeon processors are required.

ng-ki-node12
Two Quad Core Intel(R) Xeon(R) CPU E5410 2.33GHz

Server shall be equipped with a SVGA video, keyboard and mouse ports. Servers shall be supplied without keyboard, mouse and video screen.

ng-ki-node12
Passed

Connection for SVGA video, keyboard and mouse present in front and rear of server. Keyboard and mouse must be USB type.

The server must be able to boot Linux without keyboard, screen or mouse attached.

ng-ki-node12	Data Server
Passed	Passed

Servers must have at least 4 GBytes of RAM. The supplier is responsible for providing modules that are compatible with the motherboard and for testing them with the diagnostic diskette of the motherboard manufacturer. Proof of such a test must be provided for each machine.

ng-ki-node12
Passed

Server has 8GBytes of RAM.

Network interface: neuGRID Grid KI Servermust have 2 copper Gigabit Ethernet interface for data access.

ng-ki-node12
Passed

Each server has 4 Gigabit Ethernet cards

Remote administration card: The server must be shipped with a remote administration card, the mandatory properties are:

To be capable to interact at BIOS level with the hardware.

ng-ki-node12
Passed

Server has DRAC5 (Dell Remote Access Card) installed. Provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allow to start, stop and restart the server remotely.

To be configurable through a TCP/IP network, and provide software client to remote administration of the server.

ng-ki-node12
Passed

Server has a DRAC5 (Dell Remote Access Card) installed. This card provides the necessary tools and functionality to monitor, troubleshoots, and repair server. Allow to start, stop and restart the server remotely and mounting remote iso images of floppy disks and cd.

General Requirements for System and Data Disks

All hard disks shall have a rotational speed of at least 7200 RPM.

ng-ki-node12
Passed

ng-ki-node12:

2 HDD of 80GB sata 7200 RPM (system RAID1)

All disks must be installed in hot swap disk trays. It must be possible to extract these disk trays while the server chassis remains in its place in the 19” rack in which it is installed

ng-ki-node12
Passed

All disks are hot swapable. Hot extraction of one of the disk has been tested without stopping the server. The server has been working without a disk for a short time, then the disk has been reintroduced and the raid successfully restored without human intervention.

System Disks: Two dedicated system disks of at least 20 GB each are required for installation of the Linux Operating system. These system disks must be configured as a mirrored set using hardware mirroring

ng-ki-node12
Passed

The server was delivered with two hard drives of 80 GB each one mounted under hardware RAID1.

Documentation

The server must be delivered with a set of manuals in English comprising:

Documentation		ng-ki-node12 Server
The chassis and power supply manual	Passed	
The Raid hardware manual.	Passed	
The gigabit card manual.	Passed	
The motherboard manual.	Passed	
The disk's led manual	Passed	
The complete guaranty including and all the terms and conditions.	Passed	

Status

Remote Management

The DRAC card for remote access and management of the server works perfectly well. This functionality is provided by the enclosure.

DACS2– ng-ki-node13

Hardware Tests

This section describes the hardware and visual tests that should be performed to validate the neuGRID Grid KI Servers (Worker Nodes).

Worker Nodes are M600 Dell servers, which are Blade servers; it means that are small servers inside an enclosure. This enclosure provides the connectivity and power supply.

Visual Tests

A check of the delivery to ensure that all the requested material (such as keys, configuration sheet, power cords and documentation) is provided with the server.

ng-ki-node13
Passed.

All documentation is OK and two power cords are included for each server.

A visual inspection of the server (inside and outside), with a particular emphasis on cabling.

ng-ki-node13
Passed

Both servers are in perfect state outside and inside, making special remarks in the professional. The internal cabling and elements to ensure the correct airflow between components are properly installed. CPU's and RAM are inside an airflow circuit in order to ensure the correct cooling.

A check of the configuration of the server to ensure all components are properly installed recognized and configured.

ng-ki-node13
Passed

BIOS recognizes RAM installed properly and RAID card recognizes hard drives properly to in both servers.

System Tests

A basic check of all system, including data disks to ensure correct cabling and connectivity.

ng-ki-node13
Passed

Memory testing using Memtest86+ v2.0.1. This test will be performed using the bootable iso image available at http://www.memtest86.org.

ng-ki-node13
Passed

Memory tests have been applied during 14 hours and no errors were found. Full test has been executed several times during these 14 hours.

ng-ki-node13
Passed

Installation of the Scientific Linux 5.1 32 Bits Linux distribution.

ng-ki-node13
Passed

Operating system has been installed without any problems, hardware is well recognized by Kernel, and works perfectly, including RAID card and Ethernet cards.

Hard drive performance tests were applied to the RAID disk volumes of the neuGRID Grid KI Server using BONNIE[51]. BONNIE is a benchmark suite that is aimed at performing a number of simple tests of hard drive and file system performance.

Tests to be applied are:

Sequential Output (Write Test):

Block: The file is created using write. The CPU overhead should be just the OS file space allocation.

Rewrite: Each block of the file is read with read, dirtied, and rewritten with write, requiring an lseek. Since no space allocation is done, and the I/O is well-localized, this should test the effectiveness of the filesystem cache and the speed of data transfer.

[51] http://www.coker.com.au/bonnie++/

Sequential Input (Read Test):

Block: The file is read using read. This should be a pure test of sequential input performance

Random Seeks

This test runs three SeekProcCount processes in parallel, doing a total of 8000 lseeks to locations in the file specified by a random function. In each case, the block is read with read. In 10% of cases, it is dirtied and written back with write.

Results obtained for ng-ki-node13 unit

		Sequential Output				Sequential Input		Random	
	Size:Chunk Size	Block		Rewrite		Block		Seeks	
		K/sec	% CPU	K/sec	% CPU	K/sec	% CPU	/ sec	% CPU
server	16G	52471	9	34594	5	75390	7	187.0	0
server	16G	53593	9	33442	5	75052	6	213.2	0

These results indicate that the RAID volume, formatted under ext3, can write at 52 Mega Bytes per second, rewrite 34,4 Mega Bytes per second, read 575,7 Mega Bytes per second and perform an average of 180 – 200 random seeks per second.

Network Performance Tests: GENSINK has been used for testing network performances. GENSINK generates random network traffic, not related to the hard drive in order to generate the maximum possible data in the network card.

Network cards perform at an average speed of 115’001 KiloBytes/sec (920.008 Megabits/sec). Despite of this, performances remain very high.

Hardware Specifications

Chassis, Power Supply, Cooling and Serial Number.

	ng-ki-node13
Chasis	Passed
Power Supply	Passed
Cooling	Passed
Serial Number	4CWB84J

neuGRID Grid KI Server shall be housed in a rack mountable 19” chassis at 100cm deep and 12U high. The chassis must be provided with sliding rails for 19” racks and have easily accessible power on/off and reset buttons and a power LED.

ng-ki-node13
Passed

The server is mounted inside a 19” enclosure.

The server chassis shall provide locking solution that locks the chassis cover closed to protect internal components and guarantee the air flux for a correct cooling.

ng-ki-node13
Passed

The enclosure provides this functionality.

Dual redundant power supplies are required. The neuGRID Grid KI Server must be able to restart properly even if one power supply module is not working.

ng-ki-node13
Passed

The server is inside the enclosure, this enclosure provides 5 redundant power supplies.

ng-ki-node13
Passed

UPS Service is provided by the IT Center.

The required number of flame-retardant (rated IEC 332-1) and halogen-free (PVC is excluded) appropriate power cord must be supplied.

ng-ki-node13
Passed

neuGRID Grid KI Servermust have a unique serial number on the rear of the chassis that is clearly visible when the chassis is installed in a rack. If additional information is provided with the serial number, this information must be written in English.

ng-ki-node13
4CWB84J

One Dual Core 2 or One Quad Core Intel Xeon processors are required.

ng-ki-node13
Two Quad Core Intel(R) Xeon(R) CPU E5410 2.33GHz

Server shall be equipped with a SVGA video, keyboard and mouse ports. Servers shall be supplied without keyboard, mouse and video screen.

ng-ki-node13
Passed

Connection for SVGA video, keyboard and mouse present in front and rear of server. Keyboard and mouse must be USB type.

The server must be able to boot Linux without keyboard, screen or mouse attached.

ng-ki-node13	Data Server
Passed	Passed

Servers must have at least 4 GBytes of RAM. The supplier is responsible for providing modules that are compatible with the motherboard and for testing them with the diagnostic diskette of the motherboard manufacturer. Proof of such a test must be provided for each machine.

ng-ki-node13
Passed

Server has 8GBytes of RAM.

Network interface: neuGRID Grid KI Servermust have 2 copper Gigabit Ethernet interface for data access.

ng-ki-node13
Passed

Each server has 4 Gigabit Ethernet cards

Remote administration card: The server must be shipped with a remote administration card, the mandatory properties are:

To be capable to interact at BIOS level with the hardware.

ng-ki-node13
Passed

Server has DRAC5 (Dell Remote Access Card) installed. Provides the necessary tools and functionality to monitor, troubleshoot, and repair server. Allow to start, stop and restart the server remotely.

To be configurable through a TCP/IP network, and provide software client to remote administration of the server.

ng-ki-node13
Passed

Server has a DRAC5 (Dell Remote Access Card) installed. This card provides the necessary tools and functionality to monitor, troubleshoots, and repair server. Allow to start, stop and restart the server remotely and mounting remote iso images of floppy disks and cd.

General Requirements for System and Data Disks

All hard disks shall have a rotational speed of at least 7200 RPM.

ng-ki-node13
Passed

ng-ki-node13:

2 HDD of 80GB sata 7200 RPM (system RAID1)

All disks must be installed in hot swap disk trays. It must be possible to extract these disk trays while the server chassis remains in its place in the 19” rack in which it is installed

ng-ki-node13
Passed

All disks are hot swapable. Hot extraction of one of the disk has been tested without stopping the server. The server has been working without a disk for a short time, then the disk has been reintroduced and the raid successfully restored without human intervention.

System Disks: Two dedicated system disks of at least 20 GB each are required for installation of the Linux Operating system. These system disks must be configured as a mirrored set using hardware mirroring

ng-ki-node13
Passed

The server was delivered with two hard drives of 80 GB each one mounted under hardware RAID1.

Documentation

The server must be delivered with a set of manuals in English comprising:

Documentation	ng-ki-node13 Server
The chassis and power supply manual	Passed
The Raid hardware manual.	Passed
The gigabit card manual.	Passed
The motherboard manual.	Passed
The disk's led manual	Passed
The complete guaranty including and all the terms and conditions.	Passed

Status

Remote Management

The DRAC card for remote access and management of the server works perfectly well. This functionality is provided by the enclosure.