



NGS Site Level Services

Version: 3.2 (Working Document)

Date: 08/09/2009

David Wallom (david.wallom@oerc.ox.ac.uk)

Peter Oliver (p.m.oliver@rl.ac.uk)

Andrew Richards (a.j.richards@rl.ac.uk)

Steven Young (steven.young@oerc.ox.ac.uk)

DATE	REVISION	CHANGES
01/09/09	3.2	Client Tools have been added as part of user applications
06/07/09	3.1	Name changed to NGS Site Level Services
25/06/09	3.0	Small changes
11/05/09	2.2	Various changes including addition of database profile
26/08/08	2.1	Final changes before publishing
21/04/08	2.0	Change of format to recognise modularity of software stack. This includes a change of name removing Minimum.
21/03/06	1.0	Typos and clarification of tests
23/01/06	0.9	Clarified Affiliates, added Accounting information URL and update SRB version to 3.3.1
25/07/05	0.8	Added accounting info as requirement for level 0
15/04/05	0.7	typos
23/03/05	0.6	Added gsissh and SRB
5/12/04	0.5	Added NGS Conformance Levels and CA tarball
22/10/04	0.4	
15/10/04	0.3	
07/10/04	0.2	
4/10/04	0.1	Initial document

Abstract

This document describes the different software services that may be deployed by member sites of the UK National Grid Service (NGS) including both Partners and Affiliates. These services are described in a modular structure allowing flexibility in the interfaces to services that a particular site may deploy. The stack references types of interface and standards that apply to them to allow

for solutions being made using a number of different technical solutions. There are a number of different combinations of these services that are described within the Profiles section and as such these are the recommended configurations and combinations of the individual services.

Contents

1. Distribution	3
2. NGS Site Level Services.....	3
3. Functional modules.....	3
3.1 Module Designations.....	4
3.2 Software Components	5
4. Site Level Service Profiles	8
4.1 Site configurations.....	8
4.1.1 Examples based on current sites	8
4.1.2 Suggested Configuration.....	9
5. Conclusion.....	9

1. DISTRIBUTION

This document is now available publicly, although it should not be re-distributed without the consent of the NGS-Technical Board.

2. NGS SITE LEVEL SERVICES

This document describes the composition of Site Level Services for the National Grid Service (NGS). To allow sites to provide NGS compliant services without needing to install a prescribed monolithic set of software components we have divided the functionality needed into components within a functional module. This division of functionality into modules will allow member sites of the NGS to provide services that fulfil specific functionality that may be significantly different from other sites but nevertheless fulfils a significant function to a community of users. The overall service of the NGS will be improved by broadening the type of interfaces the NGS uses to provide core services.

These components are divided into four different types of functional module, designated as Foundation, Service, Application, and Pioneer, labelled in this document as M0 thorough to M3 respectively. Each module is then further divided into functional units from which specific technological solutions may be deployed. Through a combination of different types of functional units, chosen from a combination of modules, the overall service level of a site can be defined. There are six different levels S0, S1, S2, S3, S*, S**. These service levels allow both the site to define the type of service that it is providing and the NGS management to categorise the site. Examples of different sites and their associated service level are given in section 4.1.

Should a site wish to define a new piece of software within the NGS Stack then there are two key considerations that must be made. Firstly each software solution used to provide the functionality within a module must include a method of confirming its correct operation. To ensure compatibility and an independent verification of the service status this should be pluggable with the NGS central monitoring system (currently INCA). Secondly it must interoperate with the Authentication and Authorisation solution chosen for the NGS as a whole.

This document is written as a guide for owners of systems who want to become members of the NGS and as such includes services rather than user level client interfaces.

3. FUNCTIONAL MODULES

The following sections describe the functional module from which the member site is able to install a software solution (this may be one piece of software or a suite). There are certain types of service that must be installed on a service to ensure compatibility with the core services of the NGS. Each of the packages is set a designation that defines the compulsion for a resource to install them.

3.1 Module Designations

- M0: Foundation, these services are the fundamental base on which the rest of the service that a site is offering will be based. An instance of each type of service must be installed on a site that wishes to be labelled as NGS certified.
- M1: Service, these types of service provide the interface to low-level functionality such as computational submission, data transport etc. These define the type of service that a site provides and as such which instance they provide can be chosen by the site.
- M2: Application, These services are those that enable access to higher-level functionality of the grid. These are generally provided centrally within the NGS and within a single grid environment there may only be one instance of each of these type of service. There is the opportunity for an enhancement to the service provided by a member site supplying some of these services as well as in parallel to the central provision, for example with multiple Resource Brokers we may increase the resilience of the whole system. This group also includes all user interface systems and client software.
- M3: Pioneer. These services are those that are being offered from resources that can be classified as significantly different that the rest of the NGS. As the service develops their designation may change.

Within these levels there will be instances where there is interdependence between particular functional modules depending on the software solution selected. For each function module we have listed known software packages that fulfil the role described. These should however be considered a guide and references are given in the examples in section 4.

3.2 Software Components

This table details the different components of NGS Site Level Services.

<i>Designation</i>	<i>Functional Unit</i>	<i>Description</i>	<i>Example Software Solution</i>	<i>Reference</i>
M0	User Authentication and Authorisation	The service that the user wishes to access should be secure with clear user separation etc. There are several methods that can be used to achieve this.	<ol style="list-style-type: none"> 1) GSI(including IGTF recognised CA root certificates etc.) 2) Shibboleth (PERMIS) (including recognition of the UK Identity Management Federation) 	http://vdt.cs.wisc.edu/vdt http://shibboleth.internet2.edu/ http://www.permis.org/
M0	Information System	The current status of the system as well as the location of access endpoints for the services located on the systems must be available for users and automated services.	<ol style="list-style-type: none"> 1) GLUE (LDAP, XML) 2) MDS (2,4) 	http://forge.gridforum.org/sf/projects/glue-wg http://www.globus.org or http://www.cs.wisc.edu/vdt
M1	Compute Resource Services	The core of a current grid system is to run a remote task on a resource, these interfaces must be one of the following systems.	<ol style="list-style-type: none"> 1) PreWS GRAM 2) WS GRAM 3) GridSAM 4) UNICORE 5) gLite 	http://www.cs.wisc.edu/vdt http://www.globus.org http://www.omii.ac.uk http://www.unicore.eu/ http://glite.web.cern.ch/
M1	Data Transfer Tools	The data required to successfully fulfil a task must be able to be transferred to and from the remote resource.	<ol style="list-style-type: none"> 1) GridFTP 2) Reliable File Transfer Services 	http://www.globus.org http://www.globus.org
M1	Storage Management, Database Hosting & User Data access Services	For data management beyond simple staging of files there must be available tools that will manage users data. These come in a number of forms from the database to a metadata related store. Within this we have also located global filesystems.	<ol style="list-style-type: none"> 1) Oracle 2) SRB 3) iRODS 4) SRM 5) Grid Catalogue Services 6) AFS 7) GPFS 8) OGSA-DAI 9) FUSE 10) POSIX-like I/O Services 	http://www.oracle.com http://www.sdsc.edu/srb http://www.irods.org http://sdm.lbl.gov/srm-wg/ http://www.openafs.org/ http://www-03.ibm.com/systems/clusters/software/gpfs/index.html http://www.ogsadai.org.uk/http://fuse.sourceforge.net/
M1	Virtual Organisation Management and Accounting	Within the NGS we use the concept of virtual organisations to group our users both in terms of home institution and project. Utilisation of services should also be accounted for using agreed standards.	<ol style="list-style-type: none"> 1) VOMS 2) RUS & UR 3) APEL 	http://infnforge.cnaf.infn.it/projects/voms https://forge.gridforum.org/projects/rus-wg https://forge.gridforum.org/projects/ur-wg

M1	User Applications and client tools	For the resources of the NGS users need to be able to either compile their own codes or run pre-built applications. Necessary clients for user communities to use connected NGS resource to utilise other services provided	<ol style="list-style-type: none"> 1) Compilers 2) Applications 3) Client Tools for the following are examples though others and may be included and listed within a sites SLD <ul style="list-style-type: none"> • SRB • AFS • SRM • GridSAM 	
M2	Information Aggregation	These services are used within the NGS to collect published data from a number of different disparate resources. There are several methods that can be used to collect this information.	<ol style="list-style-type: none"> 1) BDII 2) Grimoires (WS Registry) 	http://glite.web.cern.ch/glite/packages/R3.1/deployment/glite-BDII/glite-BDII.asp http://www.omii.ac.uk/wiki/Grimoires
M2	Service Monitoring	This service runs as a single instance within the Grid and performs a set of predetermined checks and tests on the published services that NGS sites are making available	<ol style="list-style-type: none"> 1) INCA 2) SAM 	
M2	Workload Management	These higher level services are those that distribute and control work/operations as they are passed out/retrieved to/from the connected resources.	<ol style="list-style-type: none"> 1) gLite WMS/RB 2) TAVERNA 3) P-GRADE Portal 	http://glite.web.cern.ch/glite/packages/R3.1/deployment/glite-WMS/glite-WMS.asp http://taverna.sourceforge.net/ http://www.lpds.sztaki.hu/pgportal/
M2	User and Resource Management	In a production context a grid system should have maintain a register of both the approved users and resources. This is essential to preserve security within the system as well as the quality that the service provides. Management of user credentials is a service that though done centrally may also be done by a site, possibly as an internally facing service that is available to others.	<ol style="list-style-type: none"> 1) VOMS 2) GOLD 3) myProxy, authentication token storage 	http://infnforge.cnaf.infn.it/projects/voms http://www.clusterresources.com/pages/products/gold-allocation-manager.php http://myproxy.ncsa.uiuc.edu/
M2	User Interface Service	These services are those that are provided to users to enable access to the system. These are generally connecting to a workload management system.	<ol style="list-style-type: none"> 1) NGS Application Repository 2) Application Hosting Environment 3) GSI-SSH 	https://portal.ngs.ac.uk/ http://www.realitygrid.org/AHE/ http://grid.ncsa.uiuc.edu/ssh/
M3	Hosting	These services are generally bespoke in what they provide. We have separately categorised them to ensure that they are individually assessed as to their usage.		

M3	Virtualization	Providing users with a place to run virtual machines either to provide flexible services or development	Possibly including; Eucalyptus VM-Ware Xen
----	----------------	---	---

4. SITE LEVEL SERVICE PROFILES

To ease the method by which a resource is assessed as to its contributions to the NGS the following profiles have been defined:

- S0: Must include suitable M0 service instance for each functional group
- S1: S0 + n M1 services
- S2: S0 + M2 service
- S3: S1 + M2 service
- S*: M3 service
- S***: Experimental service aligned with the NGS mission

Future NGS software components can be proposed and such components will require approval of the NGS Technical Board for inclusion in the NGS Software Stack. This will decide their designation within the structure. The Technical Board will decide changes of designation. Each new NGS software stack component should provide descriptions of how the software component will provide user accounting information and provide metrics for reporting on the service at a site review.

4.1 Site configurations

4.1.1 Examples based on current sites

An NGS core node:

- M0: User Authentication and Authorisation: x509 (VDT)
- M0: Information System: GLUE (VDT)
- M1: Compute resource Service: Pre-WS GRAM (VDT)
- M1: Data Transfer Tools: GridFTP (VDT)
- M1: Storage Management, Database Hosting & User Data access Services: Clients (SRB, SRM, OGSA-DAI)
- M1: User Application and Compilation: C, C++ & Fortran Compilers (Intel, Portland),
- M2: User Interface Service: GSISSH (VDT)

In this case the node is an S3 service.

Belfast Partner Node:

- M0: User Authentication and Authorisation (OMII-UK)
- M0: Information System: WS-Registry (OMII-UK)
- M1: Compute Resource Services: GridSAM (OMII-UK)
- M3: Hosting: WS-Hosting

In this case the site is an S1 service.*

EGEE/LCG/GridPP node:

- M0: User Authentication and Authorisation: x509 (gLite)
- M0: Information System: GLUE (gLite)
- M1: Compute resource Services: Pre-WS GRAM (gLite)
- M1: Data Transfer Tools: GridFTP (gLite)
- M1: Storage Management, Database Hosting & User Data access Services: Clients (SRM)

In this case the site is an S1 service.

MIMAS:

- M0: User Authentication and Authorisation: Shibboleth (SARoNGS)
- M1: Storage Management, Database Hosting & User Data access Services, OGSA-DAI interface to national archive

In this case MIMAS is an S1 service.

Database:

- M0: User Authentication and Authorisation: Shibboleth
- M0: Information System
- M1: Storage Management, Database Hosting & User Data access Services (Oracle, MySQL, OGSA-DAI)

- M1: User Applications: (RDBMS Management)

4.1.2 Suggested Configuration

Many sites within the NGS are Condor pools acting as the university campus grid or institutional HPC systems. We would recommend the following minimum configuration for those sites. The site should aim to provide the compute and data transfer services onto of the mandatory base level services.

- M0: User Authentication and Authorisation x509 (VDT)
- M0: Information System: GLUE (VDT)
- M1: Compute resource Service: Pre-WS GRAM (VDT)
- M1: Compute resource Service: WS GRAM (VDT)
- M1: Data Transfer Tools: GridFTP (VDT)
- M1: Data Transfer Tools: RFT (VDT)

This configuration will allow for prospective member sites to pass the NGS conformance tests and can be downloaded as per the NGS installer. This installation is an S1 service.

5. CONCLUSION

The functional units described in the document are a breakdown of how a site may provide a service to the users of the NGS, a specific user community or a specific institution's users. We have provided examples as to how a currently known site may be classified depending on the services that it has installed as conforming to a specific profile allowing for easy classification. We have also provided an example of how a campus grid, using Condor, may install suitable software to pass NGS conformance testing. More advanced sites with virtualisation, hosting etc are dealt with such that they are considered special cases and sites wishing to provide these services should contact the NGS.

