



**Service Level Definition
for the
Belfast e-Science Centre Container Node
on the
National Grid Service**

**Version 0.4
April 2007**

**Belfast e-Science Centre
The Queen's University Belfast
Belfast BT7 1NN**

[SLD Queries to Terry Harmer](#)

1. Change Control.....	3
2. Introduction.....	4
3. Scope.....	4
4. Aim.....	4
5. Terminology.....	4
5.1. The Service Provider.....	4
5.2 A Service Container.....	4
5.3. The Service.....	4
5.4 The Users.....	5
6. The Service.....	5
6.1. The Service Hardware.....	7
6.2. The Minimum Software Stack.....	7
6.3 Middleware.....	8
6.4 Digital certificates management.....	8
6.5 Information.....	8
6.6 Provision of Accounts.....	8
6.7 Specialist Support.....	8
6.8 Quality.....	9
6.9 Availability.....	9
6.11. Filestore.....	9
6.12. Compliance.....	9
6.13. Operational Framework.....	10
6.14. Change Control.....	10

1. Change Control

Author	Date	Type	Change	Reason
TJH	04/01/06	Creation	Document created	We want to join NGS!
TJH	05/01/06	Revision	Corrections to spelling	
TJH	05/01/06	Revision Creation of V.02	Clarification on user roles and how services share containers.	Need to address issues of what mutual trust is required in deploying services in shared containers.
TJH	06/12/06	Creation of V.03		For submission to NGS Board

2. Introduction

The Mission of the National Grid Service (NGS) is to provide open standards based access to the full range of the UK's computation and data based research facilities, together with a range of sophisticated services to support novel coordinated collaborative and cross resource activities. Each Service Provider within the National Grid Service specify, its own Service Level Definition, the services (hardware, software and operational) it is making available to the UK academic community.

This SLD defines a service-hosting resource that provides (an initial and experimental) collection of NGS web services and a means by which NGS users can deploy their own web services to access NGS compute and data nodes. The service-hosting resource does not itself provide the NGS Service baseline services (<http://www.ngs.ac.uk/man/documents/NGS-Baseline-2.4.pdf>) but aims instead to provide an extensible collection of web services that complement the NGS baseline services; e.g. web services for job submission and data movement by accessing NGS baseline services already deployed on other NGS resources.

3. Scope

This SLD specifically applies to the services provided and operated by the Belfast e-Science Centre. All other services, organisations and hardware are specifically out of scope.

4. Aim

To deliver a web service hosting environment that provides a collection of stable basic execution services to augment the NGS baseline services and provides a hosting environment for utility service deployment.

5. Terminology

5.1. The Service Provider

The Service Provider, from here on, refers to Belfast e-Science Centre at the Queen's University of Belfast.

5.2 A Service Container

A Service Container, from here on, refers to a software system that is used to manage, control and make accessible a web or grid service to users.

5.3. The Service

The Service, from here on, refers to the container and web or grid service hosting capability provided by *The Service Provider*.

5.4 The Users

The Users, from here on, refers to all approved users of *The Service*.

The Users of *The Service* must accept the *Regulations for Use of the NGS* available at <http://www.ngs.ac.uk/NGS-tacu.html>.

6. The Service

The Service consists of two parts:

1. *Basic Execution Services*: these services provide Web service interfaces through which users may submit jobs (describe in JSDL) to NGS execution resources
2. *Service Hosting Service*: a utility service deployment and hosting service. that enables user-contributed Web or Grid services to be hosted on the Service Hardware.

The Basic Execution Services provide a means for e-Science projects to gain experience with Web service interfaces to Grid capabilities, without disrupting the middleware deployments on the NGS core and partner sites. The Service Hosting Service provides e-Science projects with an environment in which their Web and/or Grid services can be hosted on hardware and in containers managed by the Service Provider. Together, the Basic Execution Services and Service Hosting Service will enable NGS providers to develop experience in the deployment, management and monitoring of Web service components in a Grid infrastructure, and will enable NGS users to enjoy the benefits of Web services sooner than would otherwise be possible.

The Basic Execution Services are based on the GridSAM software from OMII. GridSAM accepts jobs described in Job Submission Description Language (JSDL), a proposed recommendation from the Open Grid Forum (OGF), and in future releases, will comply with the emerging OGSA Basic Execution Services (OGSA-BES) and OGSA High Performance Computing Profile (OGSA-HPCP) standards, also from OGF. The Basic Execution Services will consist of GridSAM instances configured for each NGS execution resource (including core and partner sites) that support the Globus (pre-Web service) GRAM protocol. The Basic Execution Services will be open to all registered users of the NGS. Jobs submitted by a user to an NGS execution resource via the Basic Execution Services will execute under the user's own credentials. Updates to the version of GridSAM deployed will be scheduled in consultation with the NGS Technical and Operations Board, and users will be advised at least two weeks in advance.

The provision of a Service Hosting Service is a significant task; the major production Grid projects, nationally and internationally, have little or no practical experience of operating such a service. However, the deployment of environments for utility service hosting and deployment is part of the Grid vision and it is therefore necessary to gain practical experience with the possible software, hardware and operational models that will be necessary to deliver such a capability. The Service Hosting Service is an experimental service, and will, initially at least, require significant dialog between the Service Provider and end user. In the event that the Service Hosting Service

becomes oversubscribed, due either to excessive load on the Service Hardware or demand for support from the Service Provider, applicants will be placed on a waiting list.

The roadmap for the Service Hosting Service envisages:

- i. A general-purpose web/grid service deployment mechanism that enables a UK e-Science user to deploy a service into a BeSC container after a period of review and internal and external testing.
- ii. A closely controlled dynamic web deployment service made available to a restricted set of trusted users.

The objective is that service deployment mechanism (i) will eventually be replaced by service deployment mechanism (ii).

The Service Hosting Service will consist of a collection of separate service containers into which services can be deployed. A service container will provide a *standard environment*¹ for a particular type of container. For example, a GT4 container will provide a standard GT4 Java flavour, Globus container, Tomcat container, ODBC database, etc. and thus provide a typical deployment framework for GT4. Initially, the deployment nodes will provide one node per container type, with nodes hosting containers for the GT4-Globus Container, the GT4-Tomcat Container and OMII providing the initial deployment environment.

As the number of services to be hosted increases then additional service deployment nodes will be allocated to host those services with service deployment demand determining the node type that is provisioned. The environment will deploy a beta² service container and a released service container—with services migrating from beta container to released container after trial usage.

For utility deploy mechanism (i) (above), a web site, maintained by the Service Provider, will provide a mechanism by which a user can specify a container type and a software bundle that specifies the service code to be deployed. The site will require authentication of the user via certificate and will issue an email notice to the user when the service has been installed. This web site will, over time and as technology permits, migrate to become a grid service that enables managed, remote, secure, hot deployment of services. A service when uploaded by the deployment web site will be tested to ensure that it behaves *acceptably* and can be deployed in the beta container test bed. Initially, the pre-deployment testing will ensure that the service does not threaten the efficient and secure operation of the container—in the early phase of the container test bed monitoring and logging will be the primary means of ensuring quality, robustness and security of deployed services. The user will be expected to conduct tests on the service deployed in the beta container leading to the migration of the service to the deployed service container(s).

For utility deploy mechanism ii (above) a dynamic deployment mechanism will be provided to a restricted set of trusted users with the objective of testing possible technologies and gaining experience of utility hot deployment. It is intended that the details of the hot deployment mechanism will be transparent to the user

¹ This will need to be developed in parallel to the deployment of services, as there is currently no standard environment for containers other than the prerequisite software necessary to install the middleware. This highlights a significant role that UK NGS/service node can perform in defining a standard service environment.

² A user is assumed to have performed initial deployment testing in their environment prior to deployment in the test bed.

6.1. The Service Hardware

The services will be hosted on a collection of blade servers with standalone and shared disc storage with configuration as outlined below.

- 2.0 GHz AMD Opteron 64-bit CPUs
- 2 gigabytes of internal RAM
- 100 Gbytes of on board disc storage
- 2 Tbytes of shared RAID 5 file storage
- Twin gigabit Ethernet ports
- OS Red Hat EE

An initial collection of 5 blades will be made available to support the initial implementation with a capability to expand this to 10 blades if required. If there is sufficient demand then a further 20 Sunfire blades are available—these have proven ideal for hosting job submission, information and data movement services and have the specification outline below.

- 2.0 GHz Pentium 4 32-bit CPUs
- 500 megabytes of internal RAM
- 100 Gbytes of on board disc storage
- 2 Tbytes of shared RAID 5 file storage
- Twin gigabit Ethernet ports
- OS Red Hat EE

Each blade server will be configured to run a particular container hosting environment and have the default software configuration specified for that container. Each blade will operate independently. Initially, OMII, Tomcat and Globus containers will be deployed and supported although support for other containers is possible based on user demand.

6.2. The Software Stack

The Service Provider is committed to provide the software components as necessary for the default implementation of each supported service container in the Service Hosting Service as defined by

<http://tomcat.apache.org>

<http://www.omii.ac.uk>

<http://www.globus.org/toolkit/docs/4.0/admin/docbook/ch03.html#s-prereq-required>

In addition, the Service Provider is committed to review this software component definition, in consultation with the NGS Technical and Operations Board, in order to create a general-purpose software stack for each container type.

The Basic Execution Services will initially be based on the latest stable production release of GridSAM and its dependencies from OMII, and will be upgraded as production releases become available and shown to be stable. The Basic Execution Services will be configured so that each GridSAM instance is compatible with the NGS Minimum Software Stack components deployed on the corresponding NGS execution resource.

The current details of software versions will be documented on the NGS web site at:

<http://www.ngs.ac.uk/sites/besc/>

6.3 Middleware

At the start of the service, the Service Hosting Service deployment will provide the following collection of service containers.

1. Vanilla OMII container
2. Vanilla Tomcat Axis 5.5 container
3. Tomcat Axis 5.5 container with Apache WSRF services
4. Tomcat Axis 5.5 container with GT4 WSRF services

6.4 Digital certificates management

The Service recognises certificates issued by

- the UK e-Science Certification Authority; and
- Certification Authorities approved by the International Grid Trust Federation (IGTF).

Certificate Revocation Lists are updated automatically every 24hours. Accepted certificates, their status, and associated CRL, are made available to the Users by Service Provider at <http://www.ngs.ac.uk/sites/besc/CAs/index.html>.

The Service Provider reserves the right to withdraw recognition of any CA if continued recognition of that CA would pose a threat to the integrity of the Service.

6.5 Information

Information available to users of the Service is provided by:

- user documentation on the NGS website, <http://www.ngs.ac.uk/users/userguide.html>
- a FAQ at <http://helpdesk.grid-support.ac.uk/gosc.html>
- the mailing list NGS-ANNOUNCE@jiscmail.ac.uk will be used for The Service's critical announcements (The Users of The Service must be subscribed to this list).
- up-to-date information specific to the Service, including documentation, contact details, and how to apply for the Service Hosting Service, will be available from the Service Provider's page on the NGS web site at <http://www.ngs.ac.uk/sites/besc/>.

6.6 Provision of Accounts

No user accounts will be provided for the use of the Service. Jobs submitted via the Basic Execution Service will execute under the user's account on the NGS execution resource. Services hosted via the Service Hosting Service will be partitioned into groups so that services that do not trust each other will not be hosted in the same container instance.

6.7 Specialist Support

Specialist advice about the Service is available from the Service Provider to research users who are assumed to be familiar with web services and the service hosting container they are using. Details of how to request specialist advice are published on <http://www.ngs.ac.uk/sites/besc/>. Additionally, queries directed to the NGS Helpdesk about the Service will be referred to the Service Provider for resolution.

The Service Provider will ensure that NGS Operations and Helpdesk are always advised of the latest contact details for those staff at BeSC responsible for the technical, administrative, and security aspects of the Service.

6.8 Quality

A web page, linked to from <http://www.ngs.ac.uk/sites/besc/>, will provide status information on the service hosting containers and the services deployed in these containers.

6.9 Availability

The web service hosting containers will be available at all times subject to:

- essential planned maintenance to hardware or software; or
- unplanned outages and failures.

Failures occurring outside working hours (9am-5pm) will be dealt with in the next working day. The Service Provider reserves the right to have extended periods of downtime to perform scheduled major maintenance. Users will be notified at least one week ahead of time.

6.10. Reliability

The reliability of the service is monitored and the availability of services deployed in the hosting containers will be made available for inspection by users via the NGS Web site (<http://www.ngs.ac.uk/sites/besc/>).

6.11. Filestore

The Service will not provide any long-term storage for user data.

6.12. Compliance

All NGS partners are reviewed every 6-12 months. To facilitate these reviews, the Service Provider will collect statistics relating to usage, quality, availability and reliability of the Service. The detail of these statistics may be limited to what can readily be extracted from the underlying software. In addition, the Service Provider will co-operate with NGS Operations for the purpose of integrating probes of the availability of the Service into the NGS monitoring framework.

6.13. Operational Framework

Faults and queries regarding The Service should be reported to the NGS Helpdesk, via the form on the NGS web site, by telephone to 01235 446822 or by e-mail to support@grid-support.ac.uk with the subject “BeSC NGS Container Node”,

The NGS Helpdesk system is used by the Service Provider staff to administer support requests. The Service is monitored by the Service Provider’s monitoring processes and alarms can be raised to notify the Service Provider of faults. No out of hours cover is provided.

6.14. Change Control

New releases of system software are generally agreed in advance with other sites at the NGS Operations Board meetings. Users are informed prior to upgrading taking place via the NGS-ANNOUNCE@jiscmail.ac.uk mailing list, and by notices on the NGS web site: <http://www.ngs.ac.uk/sites/besc/>. Detailed change control logs are maintained by the Service Provider.