



Grant agreement no. 283562

N4U

NeuGRID for you:

expansion of NeuGRID services and outreach to new user communities

Combination of Collaborative Project and Coordination and Support Action

Objective INFRA-2011-1.2.1 – e-Science environments

Start date: July 1st 2011- **Duration:** 42 months

Deliverable data

Deliverable reference number and title: D8.2 N4U Science Gateway Release Report

Due date: 30 June 2012

Actual submission date: 23 July 2012

Lead contractor for this deliverable: P2 maatG

Dissemination level: public

Authors

Baptiste Grenier (P2 maatG)
Jérôme Revillard (P2 maatG)

Approval

Workpackage Leader: Baptiste Grenier (P2 maatG)

Project Coordinator: G.B. Frisoni (CO1 FBF)

PMT members: G.B. Frisoni (CO1 FBF), D. Manset (P2 maatG), R. McClatchey (P3 UWE)

History Record

Issue	Date	Notes
1 st draft	02/04/2012	maatG prepared the 1 st draft
2nd draft	06/04/2012	maatG internal review
1.0	07/07/2012	First complete version
1.1	08/07/2012	2nd maatG internal review
1.2	16/07/2012	CFc revises

Table of Contents

- Executive summary 4
- 1. Introduction 5
 - 1.1 Document Organisation..... 5
 - 1.2 Document Review 5
 - 1.3 N4U Science Gateway 5
 - 1.3.1 N4U Science Gateway presentation..... 5
 - 1.4 N4U Science Gateway architecture overview 6
- 2. N4U Science Gateway Backend..... 7
- 3. N4U Science Gateway Frontend10
- 4. Forthcoming services and applications.....18
- 5. Conclusion19
- 6. Annex 1: Table of components20

Executive summary

This document reports on the first version of the N4U Science Gateway, including the web interface, applications and components integrated within the first version of the N4U Science Gateway.

A presentation of the N4U Science Gateway, the User Interface to the N4U facilities and of its main components (a backend and a frontend) will be done before taking a closer look at the details of both the backend and frontend.

During the last months the Science Gateway underwent a complete update of the underlying grid infrastructure and a full rewrite of all the gateway services. The grid update was a first migration to the latest gLite version, 3.2; then due to the gLite 3.2 services being progressively deprecated and replaced by services provided by the European Middleware Initiative (EMI) this update were followed by a second migration of some services to the latest EMI stable version. In parallel with this update of the grid infrastructure on top of which is orchestrating the gateway, the gateway itself was rewritten to replace the usage of the old Globus WS-Resource Framework running in Tomcat 5.5 by the more recent and active Apache CXF framework running in Tomcat 6, allowing to create even more solid and interoperable web services. The gateway is now operating on a fresh up-to-date debian stable Operating System, so everything had to be repackaged from RPM, which was the package format in the former ScientificLinux Operating System, to deb packages.

Now that these migrations have been done, the N4U Science Gateway is in a stabilization and strengthening phase where all the components are being stress tested and consolidated, in order to reach the required level of stability and be the perfect playground for neuroscientists' researches.

1. Introduction

1.1 Document Organisation

The document presents the two main components of the Science Gateway: the backend and the frontend. Both will be detailed.

The Science Gateway underlying infrastructure, the backend, is based on the Pandora Gateway.

The Pandora Gateway is packaged for the debian Squeeze operating system as .deb packages that are available in a dedicated repository located at: <http://repo.maatg.fr/apt/pandora/>.

The Science Gateway frontend is using the Liferay portal which was manually deployed and tuned for the N4U user's needs.

The Liferay frontend allows to aggregate various applications developed using the portlet technology into a single integrated web portal thus offering a centralized and harmonized interface to the N4U services.

1.2 Document Review

According to the N4U Description of Work (DoW), an update of this document will be released in June 2013 (M24) and December 2015 (M42) respectively under the names of *D8.3Science Gateway Release Report* and *D8.4Science Gateway Release Report*. These documents will be mainly focused on updating the portfolio of services offered by the Science Gateway to N4U.

1.3 N4U Science Gateway

1.3.1 N4U Science Gateway presentation

The N4U Science Gateway is the interface to the grid-enabled System Oriented Architecture (SOA), the basis for the applications and services provided by the N4U infrastructure.

The Science Gateway is the single point of access to the N4U tools and resources; it hides the complexity of the underlying architecture while providing users with access to advanced tools such as a command line access to a gLite User Interface and to highly user-friendly tools such as a graphical grid storage browser or a graphical workflow authoring and submission tool.

1.4 N4U Science Gateway architecture overview

The N4U Science Gateway is composed of two components:

- a **backend**, composed by all the Web Services being the ground of the platform with the addition of external applications;
- a **frontend**, offering a user friendly web interface allowing user communities to easily interact with the platform.

The backend and the frontend are decoupled; it is possible to have multiple frontends accessing the same services with heterogeneous and/or specialized interfaces.

The figure 1 gives a simplified overview of the platform architecture.

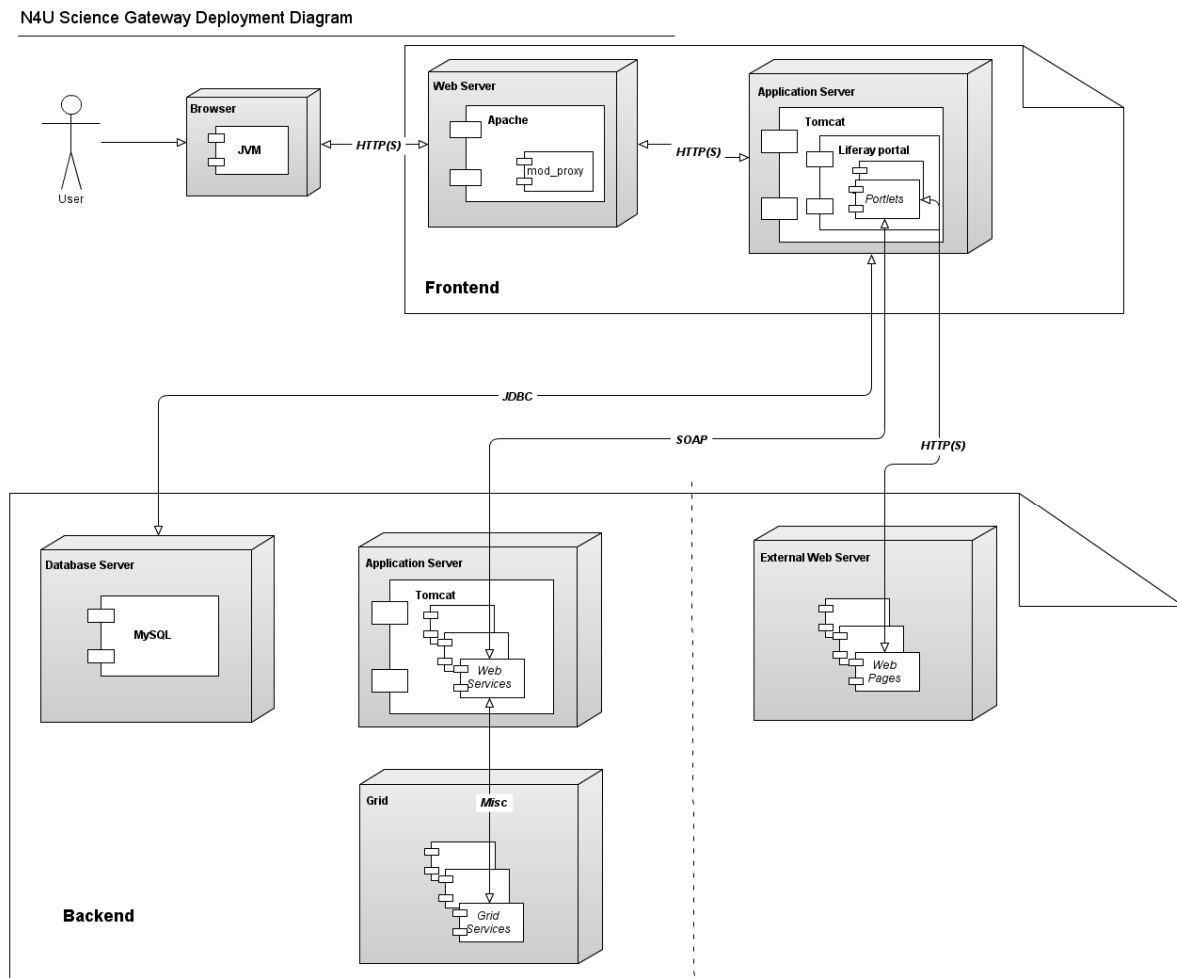


Figure 1: N4U Science Gateway overview

2. N4U Science Gateway Backend

As introduced previously, the N4U Science Gateway is composed of two parts, the frontend and the backend. The backend depicted in Figure 2, is the foundation of the Science Gateway, it is a Service Oriented Architecture (SOA) composed of different components interacting together or with external entities. Most of the platform features are exposed as Web Services, allowing to easily separate the User Interface rendering from the business logic. The user Interfaces can offer powerful features by aggregating the Web Services. The N4U Science Gateway Liferay frontend does this by using portlets.

N4U Science Gateway backend Deployment
Diagram

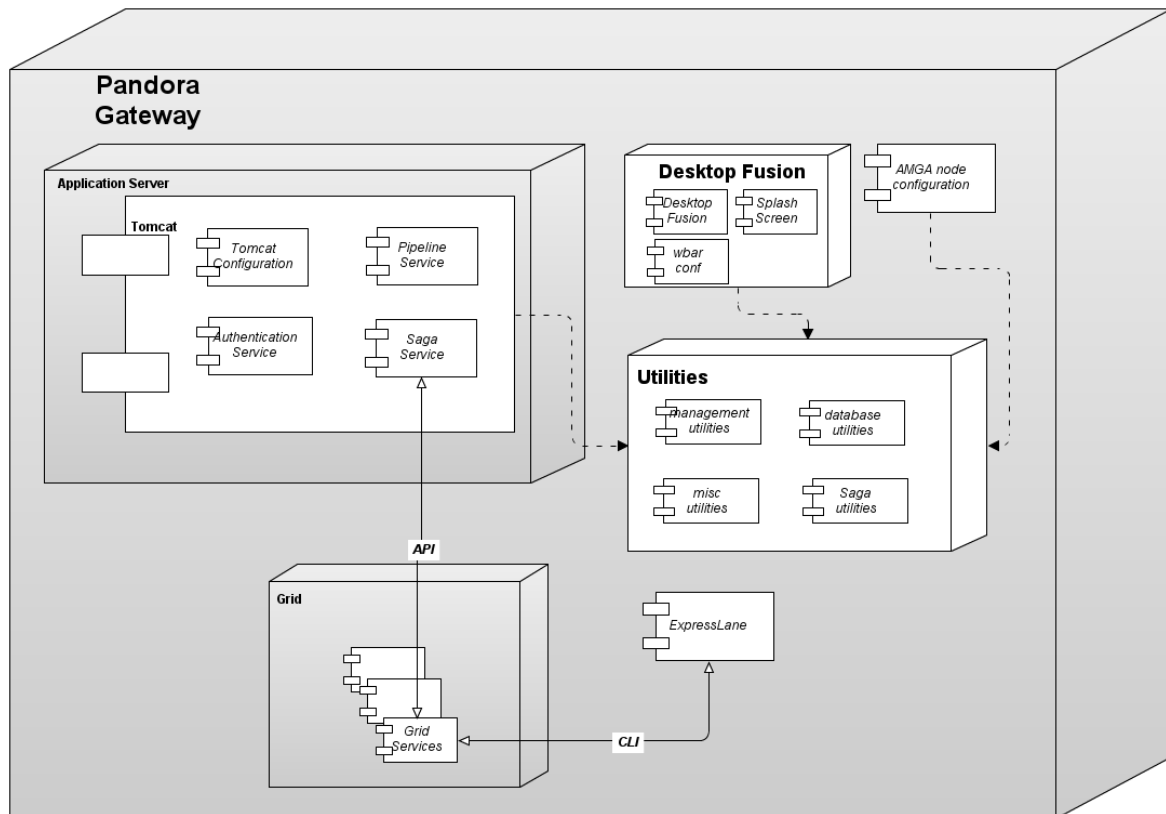


Figure 2: N4U Science Gateway backend

The current N4U Science Gateway services software release is made of the following components:

- **Pandora Desktop Fusion, wbar configuration for the Pandora Desktop Fusion system and Pandora Desktop fusion Splash screen for neurosciences:** Desktop Fusion is a remote desktop infrastructure allowing providing tools to users without requiring them to install them on their computers.
- **Pandora Amga Node Configuration:** the Pandora Gateway is using a distributed architecture where all the Information System is kept in AMGA databases that are interconnected.

- **Pandora Pipeline Service:** the Pipeline Service is a Web Service responsible for executing tasks inside the Pandora Gateway.
- **Pandora Gateway Saga Service:** the Saga Service is a Web Service providing an abstraction layer allowing interacting with various grid or even non-grid middleware or infrastructure.
- **Pandora Gateway Authentication Service:** the Authentication Service is a Web Service that is responsible for handling the connection of the users to the gateway.
- **Pandora tomcat6 configuration:** Pandora Gateway specific tomcat configuration files.
- Pandora Gateway utilities:
 - **Pandora database utilities:** database-related Java archives (jar)
 - **Pandora management utilities:** data management-related Java archives
 - **Pandora misc utilities:** miscellaneous utilities
 - **Pandora Saga utilities:** Saga-related jars containing jSaga Saga implementation and various adapters
- **ExpressLane grid submission wrapper and examples:** ExpressLane is a command line submission framework allowing users to easily submit task to a computing facility, this is a grid-specific version.

These components are installed using the debian packages described in the table 1. Required dependencies have been installed automatically by the software package manager.

All of these components are continuously updated, either for bug fixes or new features implementation.

Package Name	Version – Month 12	Version – Month 24	Version – Month 42
pandora-gateway-desktopfusion	1.0.0+SNAPSHOT-20111223173934 (12/23/2012)		
pandora-gateway-desktopfusion-splash-neurosciences	1.0-1 (12/19/2011)		
pandora-wbar-neugrid	1.1-1 (12/19/2011)		
pandora-gateway-idal-amga-node-configuration	2.0.0.RC1-20120504125509 (05/11/2012)		
pandora-gateway-sal-pipeline	2.0.0.RC3-20120511091030 (06/01/2012)		
pandora-gateway-sal-saga	2.0.0.RC2-20120510174043 (05/24/2012)		
pandora-gateway-sl-authentication	2.0.0.RC2-20120510163907 (11/05/2012)		
pandora-gateway-sl-core	2.0.0.RC1-20120504115053 (11/05/2012)		
pandora-gateway-sl-utils-database	2.0.0.RC3-20120510155124 (11/05/2012)		
pandora-gateway-sl-utils-management	2.0.0.RC3-20120510155124 (11/05/2012)		
pandora-gateway-sl-utils-misc	2.0.0.RC3-20120510155124 (11/05/2012)		
pandora-gateway-sl-utils-saga	2.0.0.RC3-20120511170141 (11/05/2012)		
expresslane-grid	0.0.12 (04/11/2012)		
expresslane-grid-example	0.0.12 (04/11/2012)		

Table 1: N4U Science Gateway backend packages

3. N4U Science Gateway Frontend

The main entry point to the N4U infrastructure is the N4U Science Gateway frontend which exposes all the N4U applications and tools provided by the backend through a common and simple web-based interface.

N4U Science Gateway Frontend Deployment Diagram

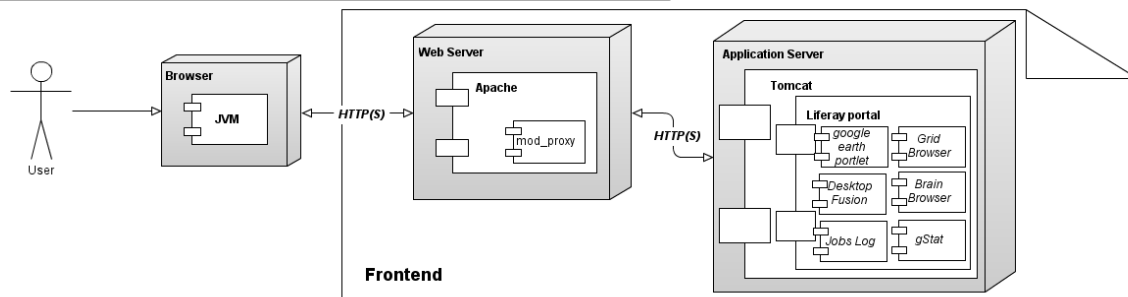


Figure 3: N4U Science Gateway frontend

The N4U Science Gateway front end is powered by Liferay 6.0.6 CE running using a SUN JDK 1.6. The login to this web-interface is provided by a highly customised JASIG CAS (<http://www.iasig.org/cas>) service. CAS provides the single sign-on service to the system. A number of the N4U applications - exposed using portlets - are still being developed and will be delivered during the remaining project timeframe, but a number of applications are already available and accessible using the Liferay portal.

- **Liferay**

Liferay is an award winning Java web portal which can be used as a framework for creating portals made of aggregated data. Liferay is an OpenSource software that is the foundation of the N4U Science Gateway frontend, the N4U backend services are exposed through portlets that are aggregated by the portal. All the Liferay resources are available at <http://liferay.com>.

- **Desktop Fusion**

The desktop Fusion portlet embeds an applet allowing to open a remote desktop connection to the Desktop Fusion backend, offering users to access different tools and facilities (LONI client, an XTerm, an graphical text editor, a file browser) without having to install anything on their computer, only a Java virtual machine is required. This also allows users to mount a shared directory of their local computer inside a folder of the Pandora Gateway, thus allowing them to easily upload content on the grid.

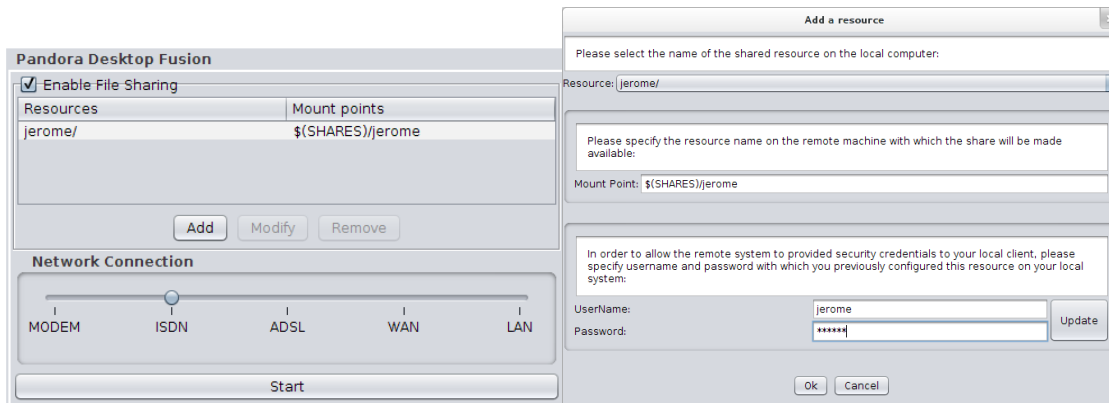


Figure 4: Desktop Fusion applet interfaces

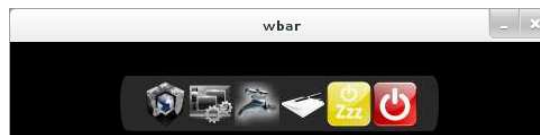


Figure 5: Tools and facilities bar

- **Grid Browser**

The GridBrowser is an AJAX-based portlet allowing users to browse the Logical File Catalog (LFC) and to download or upload files from their computer to the grid. This portlet does not require any special plugin and is a very user-friendly way of interacting with the storage capabilities of the Grid, allowing users to manage their data in an easy way like they are used to with their traditional file manager, they can even drag and drop files from their desktop to the portlet. A full documentation off the portlet can be found in the N4U Science Gateway Knowledge-base: <http://neugrid4you.eu/group/science-gateway/knowledge-base/-/wiki/Main/FrontPage> in the upload, browse and download pages.

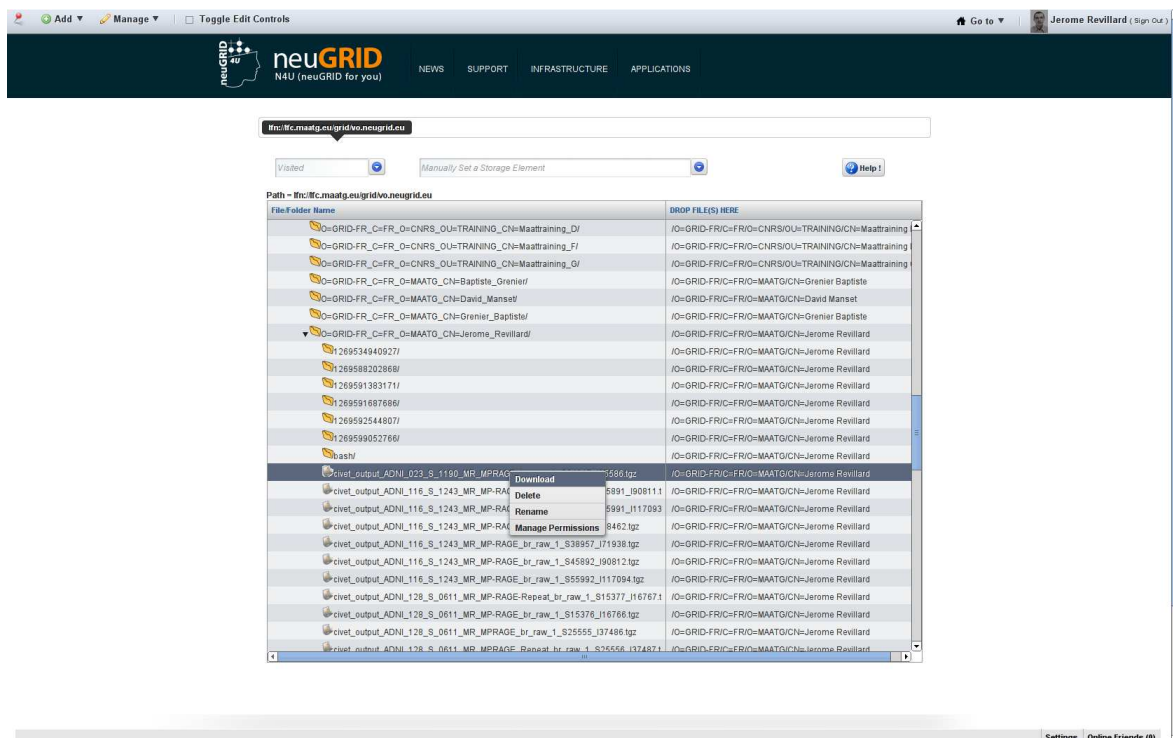


Figure 6: GridBrowser interface

- **Jobs Log**

The Jobs Log displays a view of all the jobs submitted by a user. In order to be authenticated and presented with his jobs, the user must have his grid certificate loaded into the browser. The Jobs Log is provided by the EMI middleware, specifically by the Logging and Bookkeeping service: when accessing a specific URL on the LB, the users are presented with a list of all the jobs they submitted, allowing to list and monitor them. More documentation can be found at <http://www.eu-emi.eu/documentation> or in the old gLite documentation at <http://glite.cern.ch/glite-LB/>.

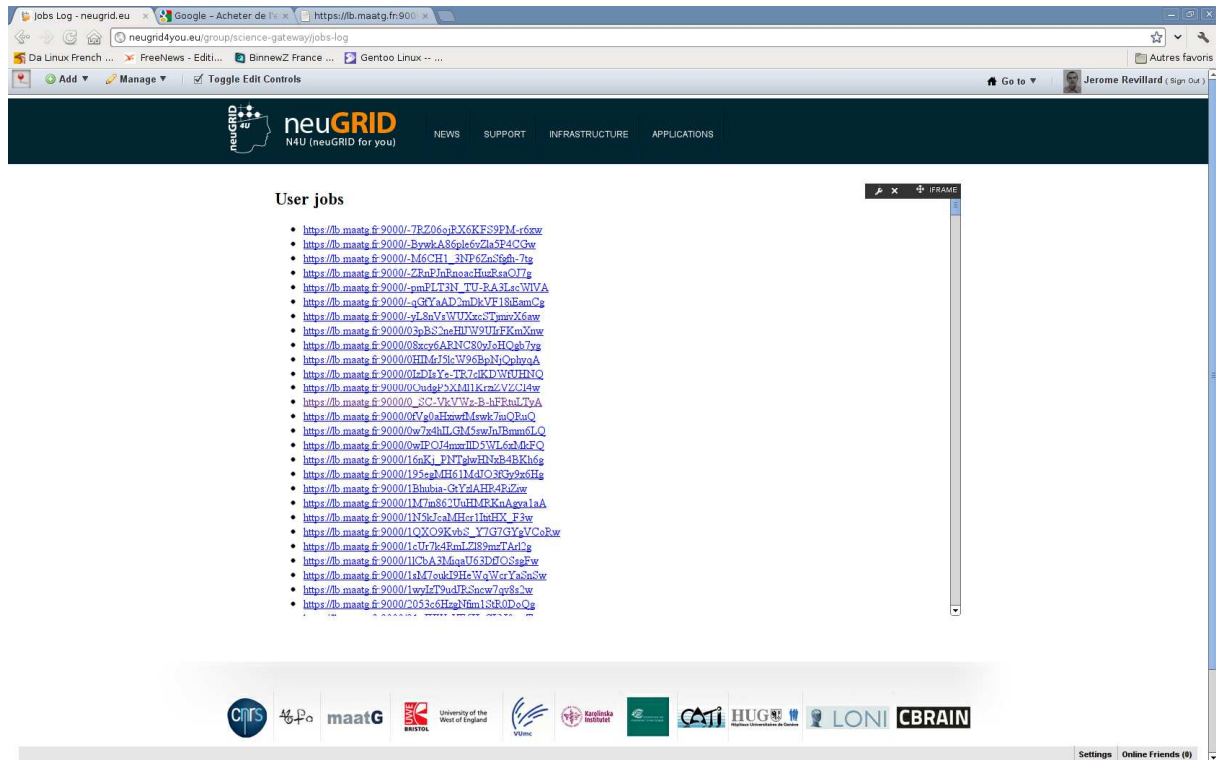


Figure 7: Job Log interface

- **BrainBrowser**

BrainBrowser is an externally hosted web-based, 3D visualization tool for neuroimaging. Using web-standard technologies, such as WebGL and HTML5, it allows for real time manipulation and analysis of 3D neuroimaging data whether it be precalculated maps, or models provided by the user in [MNI object format](#) and data in one of the many currently supported formats (Minc, Nifti, object files, plain text). More documentation can be found at <https://brainbrowser.cbain.mcgill.ca/>.

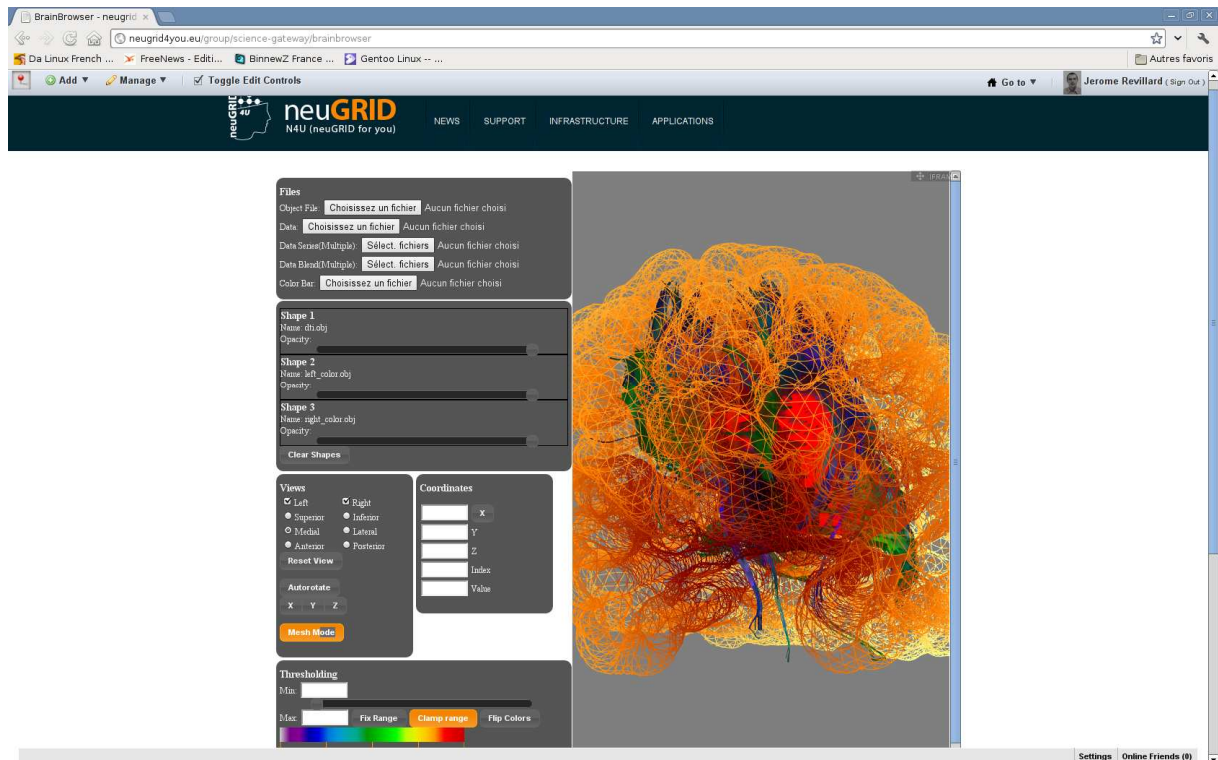
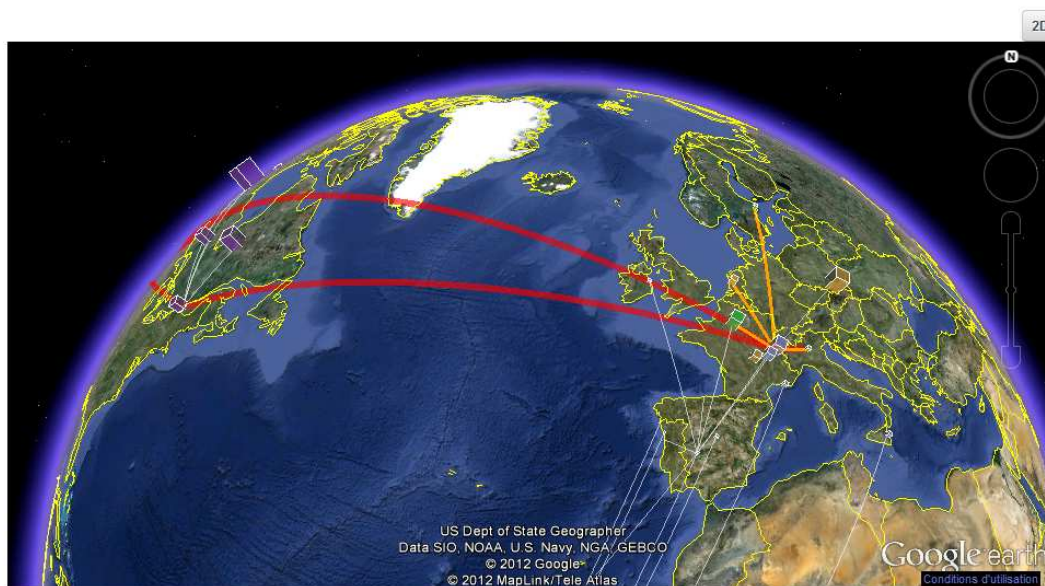


Figure 8: BrainBrowser interface

- **Google earth portlet**

This portlet uses the Google earth plugin to display a view of the N4U infrastructure and resources in a 2D or 3D map. It allows to have an overview of all the N4U infrastructure around the world. More information on the Google earth plugin can be found on <http://www.google.fr/earth/>.





© neuGRID CNRS, 2012. All right reserved. Design by agenceneos.com - The head image in the banner is a courtesy with permission by Mondolithic Studios


 neuGRID4you has received funding from the European Commission's Seventh Framework Programme (FP7/2007-2013) under grant agreement n°283562

Figure 9: GoogleEarthPortlet

- **gStat**

The N4U Science Gateway menu incorporates a link to the external gStat web application allowing having an overview of the public vo.neuGRID.eu Virtual Organization resources. GStat 2.0 provides a method to visualize a grid infrastructure from an operational perspective based on information found in the grid information system. The gStat 2.0 homepage where more documentation and the interface are available is reachable at <http://gstat2.grid.sinica.edu.tw>.

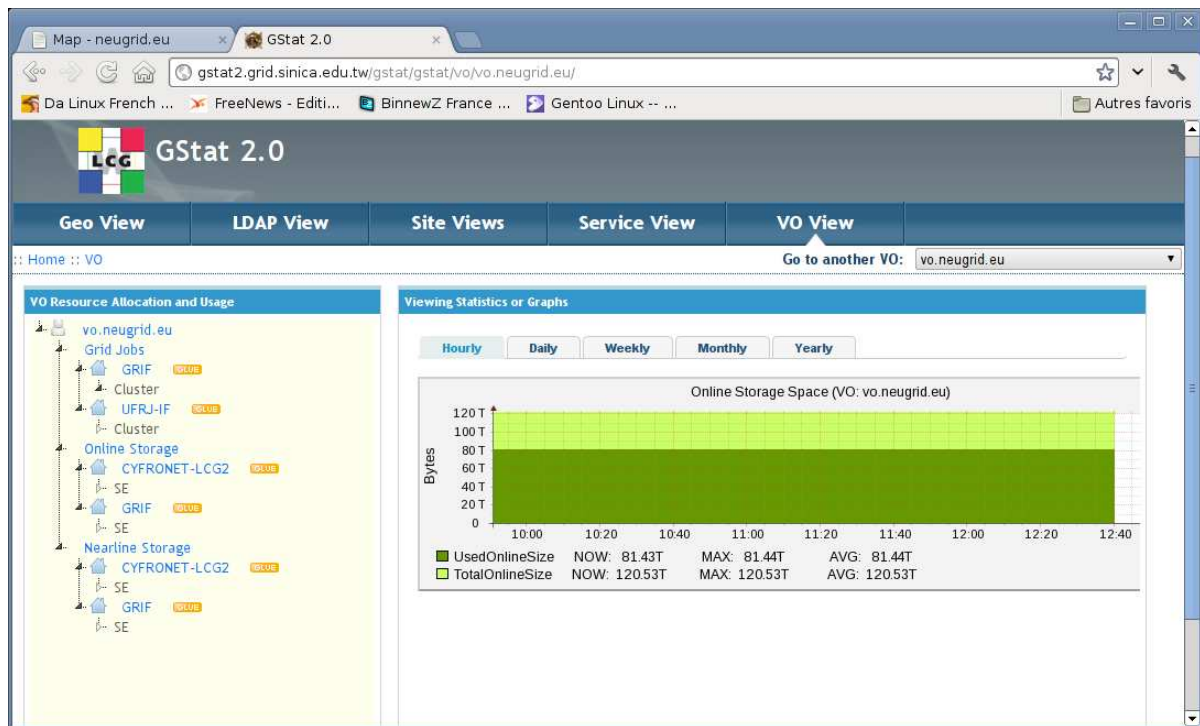


Figure 10: GStat interface

The table 2 references the deployed versions of the aforementioned tools:

Package or Portlet Name	Package version	Version – Month 24	Version – Month 42
Desktop Fusion Portlet	1.2 SNAPSHOT(12/21/2011)		
Grid Browser Portlet	1.1 SNAPSHOT 20120516094407(04/17/2012)	–	
pandora-gateway-sl-cas	-Virtual package-		
pandora-gateway-sl-cas-neugrid	2.0.0-5-20120604173113(06/04/2012)		
Jobs Log	Not available		
BrainBrowser	Not available		
Google earth Portlet	1.0 SNAPSHOT(04/21/2012)		
gStat	2.0		

Table 2: N4U Science Gateway frontend

The Science Gateway also incorporates some portlets built into Liferay 6.0.6 C.E:

- The N4U Knowledge-base is using Liferay's Wiki portlet to allow N4U participants to share and consolidate knowledge on the N4U platform and tools
- The N4U Documents Library is using Liferay's Document Library portlet to allow users to easily share static documentation
- The N4U News page is using:
 - Liferay's calendar portlet for registering N4U-related events
 - Liferay's blog portlet to allow the support team to discuss and share information with the N4U Science Gateway community

The N4U Science Gateway frontend is continuously developed and improved. The already available applications list, while not final, already allows having an overview of what the N4U platform will offer to users.

4. Forthcoming services and applications

In the coming months some brand new applications will be developed and deployed to ease the usage of the N4U platform and give more and more tools to the users' communities.

Following is a list of the already planned services and applications whose developments by N4U partners are ongoing.

The following services will be part of the Science Gateway backend:

- Provenance Service produced by WP9 building the N4U “data atlas” data model ;
- Persistency Service produced by WP9 for populating the Information Services database by interfacing with datasets and data sources integrated into N4U by the WP7 as well with the algorithms, pipelines and toolkits integrated by the WP5 ;
- Analysis Services produced by WP10 providing a customisable environment for allowing users to conduct their neuroscience analyses using the Provenance, Persistency and DCI Pipeline service.

GUIs allowing users to interact in an easy and efficient way with the aforementioned backend services will be deployed:

- An e-learning application will be made available to allow users to play e-learning materials created in the Sharable Content Object Reference Model (SCORM) format to allow interoperability among SCORM-compliant tools ;
- The Analysis Services Graphical User Interfaces (GUI) allowing users to query data, specify and execute pipelines and visualize data by interacting with the Analysis services
- The Virtual Imaging Platform (VIP) is an openly-accessible web platform for multi-modality image simulation. The user-friendly web interface will be integrated with the N4U infrastructure, allowing users to easily launch predetermined workflows.

5. Conclusion

Even if the N4U Science Gateway portfolio is far from being complete, it still offers some really interesting and useful tools to the users, allowing early adopters, advanced users and developers to test and use the N4U platform. The grid tools are available and some interfaces like the Grid Browser already offer a way to easily interact with the N4U infrastructure and underlying Grid infrastructure.

From the issues reported to the N4U Online HelpDesk, as shown on the following screen capture, already used by twenty users for reporting bugs or submitting support requests, accessible at <https://project-mgt.maatg.fr/projects/neugrid4you> it looks like most of the earlier reported problems were related to login. The main reason for this was that the N4U Science Gateway was completely rewritten from scratch making it necessary to take some time for stabilizing it.

Category

	open	closed	Total
Authentication/login support	1	13	14
Data Atlas	-	-	-
Desktop Fusion	2	3	5
Grid browser	-	3	3
Grid infrastructure support	1	4	5
Others	-	1	1
Portal usage support	-	1	1
Specific application support	-	5	5

Figure 11: HelpDesk issues summary

In the coming months, the N4U Science Gateway should undergo a migration to the newest Liferay portal, and new user friendly applications should be made available thus allowing the users to more easily use the platform.

The N4U Science Gateway backend will also continue to be updated from time to time either for bug fixes or new features addition.

The table of components found in annex 1 summarizes all the components and their versions if already deployed.

6. Annex 1: Table of components

Component	Type	Version - Month 12	Version -Month 24	Version - Month 42
pandora-gateway-desktopfusion	Backend	1.0.0+SNAPSHOT-20111223173934 (12/23/2012)		
pandora-gateway-desktopfusion-splash-neurosciences	Backend	1.0-1 (12/19/2011)		
pandora-wbar-neugrid	Backend	1.1-1 (12/19/2011)		
pandora-gateway-idal-amga-node-configuration	Backend	2.0.0.RC1-20120504125509 (05/11/2012)		
pandora-gateway-sal-pipeline	Backend	2.0.0.RC5-20120601115725 (06/01/2012)		
pandora-gateway-sal-saga	Backend	2.0.0.RC3-20120524112242 (05/24/2012)		
pandora-gateway-sl-authentication	Backend	2.0.0.RC2-20120510163907 (11/05/2012)		
pandora-gateway-sl-core	Backend	2.0.0.RC1-20120504115053 (11/05/2012)		

pandora-gateway-sl-utils-database	Backend	2.0.0.RC3- 20120510155124 (11/05/2012)		
pandora-gateway-sl-utils-management	Backend	2.0.0.RC3- 20120510155124 (11/05/2012)		
pandora-gateway-sl-utils-misc	Backend	2.0.0.RC3- 20120510155124 (11/05/2012)		
pandora-gateway-sl-utils-saga	Backend	2.0.0.RC3- 20120511170141 (11/05/2012)		
expresslane-grid	Backend	0.0.12 (04/11/2012)		
expresslane-grid-example	Backend	0.0.12 (04/17/2012)		
Provenance Service	Backend			
Persistency Service	Backend			
Analysis Services	Backend			
Desktop Fusion Portlet	Frontend	1.2 SNAPSHOT (12/21/2011)		
Grid Browser Portlet	Frontend	1.1 SNAPSHOT 20120516094407 (04/17/2012)		

pandora-gateway-sl-cas	Frontend	-Virtual package-		
pandora-gateway-sl-cas-neugrid	Frontend	2.0.0-5-20120604173113 (06/04/2012)		
Jobs Log	Frontend	Not available		
BrainBrowser	Frontend	Not available		
Google earth Portlet	Frontend	1.0 SNAPSHOT (04/21/2012)		
gStat	Frontend	2.0		
e-learning application	Frontend			
Analysis Services GUI	Frontend			
VIP GUI	Frontend			