

# Eclipse Technology Project: g-Eclipse

Release Review Version 1.0

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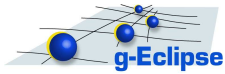
Date:                              **November 13, 2009**

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Abstract: This document contains the Release Review Documentation for the Eclipse Technology g-Eclipse Project

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# 1 Overview

Since end of 2006 the g-Eclipse project is hosted under the Eclipse foundation. The project started to develop a Eclipse based workbench in order to access emerging Grid infrastructures which became the backbone of those fields of science and research that require solving complex computational problems. During the project runtime, the commercial application of Grid technologies has led to new categories of service offerings (e.g. on-demand offerings from Amazon Web Service, etc.) called Cloud services. Grid and Cloud services are somehow the two sides of one coin. Both will likely play an important role in the “software as a service” landscape. However, the complexity of Grid and Cloud infrastructures were often discouraging to new and inexperienced users.

By providing g-Eclipse, an integrated, Grid-enabled environment based on Eclipse, this project aims at facilitating the use of Grid infrastructures. As an integrating tool, g-Eclipse has an impact on the different actors in the Grid/Cloud domain:

- Grid/Cloud **application users** are able to access the Grid with standardized, but customized user-friendly interfaces in g-Eclipse
- Grid/Cloud **resource providers** can reduce the cost of operation while the complexity of the Grid is reduced with supporting tools
- Grid/Cloud **application developers** are empowered to speed up the development cycle of new Grid applications

The consortium that started the g-Eclipse project received funding from the European Union under contract number IST-034327 to implement and establish g-Eclipse. Since end of 2009 the funding ended and the project partners continue to develop the g-Eclipse framework as an Open Source project within the Eclipse Foundation. It is worth to mention that subsequent Grid projects do already use the framework and are contributing to the code base too.

Since March 2007, the project delivers monthly milestone releases. Currently, there are about 1,600 files with more than 155,000 lines of code (LoC) in the SVN repository of the project at the Eclipse Foundation, as well as 1,500 files with around 160,000 LoC contributed in the project’s external CVS repository.

With the release 1.0, g-Eclipse provides a Grid/Cloud middleware independent model including “quasi”-standardized user interfaces to interact with existing Grid/Cloud infrastructures. Beyond this Grid/Cloud mode, the code base at Eclipse.org contains the exemplary support for the services S3 and EC2 from Amazon Web Services. Additionally two further implementations for Grid exist as Open Source, but due to licensing issues, the implementation can be download from the webpage <http://www.geclipse.eu>. Support for the EGEE Middleware gLite/LCG (see <http://glite.web.cern.ch>), which is deployed on the biggest Grid infrastructure currently existing, is available as well as support for the GRIA Middleware (GRIA, <http://www.gria.org>), which provides an implementation of WSRF standards. Both mentioned Grid Middleware specific implementations are not included in the 1.0 release from the Eclipse webpage due to licensing issues. But together with the available exemplary AWS implementation, the middleware/infrastructure independent platform approach of the Grid/Cloud model is proven.

## 2 Features

g-Eclipse in version 1.0 includes the Grid Middleware-independent Grid/Cloud model and exemplary tooling on top of it:

The following User Interfaces Contributions are provided:

- Views: Grid/Cloud Project View, Grid/Cloud Authentication Token View, Grid/Cloud Connections View, Grid/Cloud Terminal View, Grid Job Details View, Grid Jobs View, Grid Process Status Viewer, Web View, GView (Grid Visualisation) View
- Wizards: Grid/Cloud Project Wizard, Grid/Cloud Connection Wizard, Grid Job Description Wizard, Grid Workflow Diagram Wizard
- Preference pages for Grid/Cloud Virtual Organisations (VO), Grid/Cloud Security (CA Certificates), Grid/Cloud Terminals, Grid Job Settings, Webview, Grid Workflow Diagram
- Editors: Grid JSDL Editor, Grid JDL Editor, Grid Workflow Editor

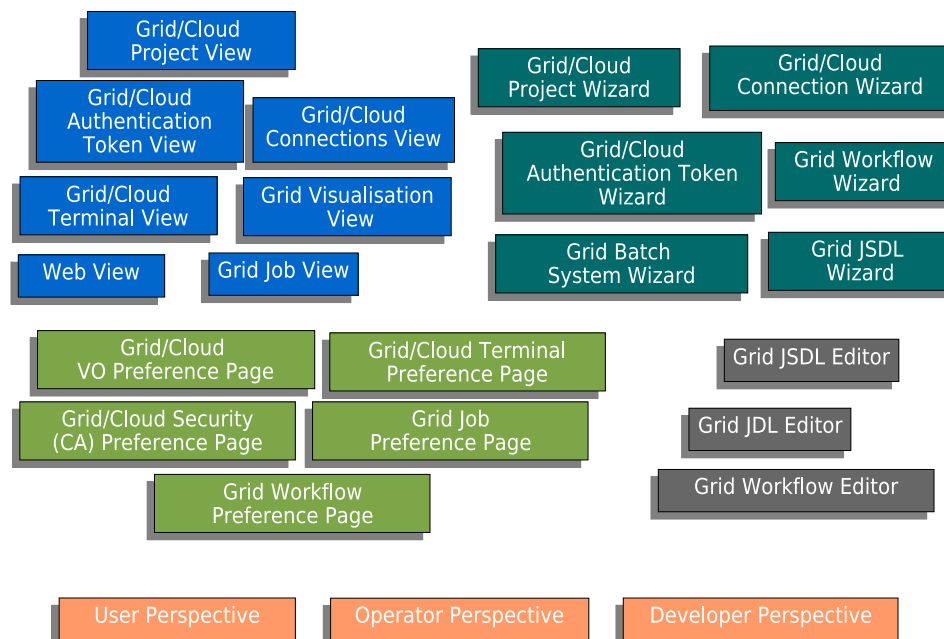
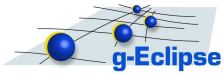


Figure 2.1: g-Eclipse User Interface Contributions

With release 1.0, the following plugins are part of the g-Eclipse framework:

`eu.geclipse.core` core g-Eclipse framework with extension points for Grid Middleware-specific implementations; this plug-in provides interfaces, abstract implementations, and appropriate managers that must be used in a Middleware-specific way.



eu.geclipse.ui central UI classes for Wizards and Views used by different Middleware implementations

eu.geclipse.core.filesystem Grid filesystem based on the Eclipse Filesystem

eu.geclipse.core.jobs Grid jobs API

eu.geclipse.core.reporting framework to report on common Grid/Cloud exceptions including a mechanism to propose corresponding solutions

eu.geclipse.batch.\* a framework to manage batch systems of Grid infrastructures

eu.geclipse.glite.editor an editor for GRID JDL (Job Description Language) for the gLite middle-ware

eu.geclipse.gvid.\* a framework to integrate Grid Visualisation toolkits

eu.geclipse.info.\* a model for Grid information systems using the emerging GLUE standard

eu.geclipse.jsdl.\* an editor for Grid JSDL (Job Submission Description Language) files

eu.geclipse.servicejob.\* a framework to integrate management and service jobs

eu.geclipse.sla.\* a framework to integrate Service Level Agreements (SLA) tools

eu.geclipse.terminal.\* Grid/Cloud terminal emulation and ssh connection

eu.geclipse.traceview.\* a viewer for tracefiles for message passing parallel applications

eu.geclipse.webview integrated web browser

eu.geclipse.workflow.\* workflow editor for Grid workflows

Release 1.0 contains the exemplary support for Amazon Web Services (AWS) which is provided by the following plugins:

eu.geclipse.aws.\* implementations for the AWS services S3 and EC2.

Further implementations for the g-Eclipse framework exist and are available from the webpage [www.geclipse.eu](http://www.geclipse.eu). The Grid middlewares supported are gLite and GRIA, with development for Globus Toolkit 4 currently ongoing.

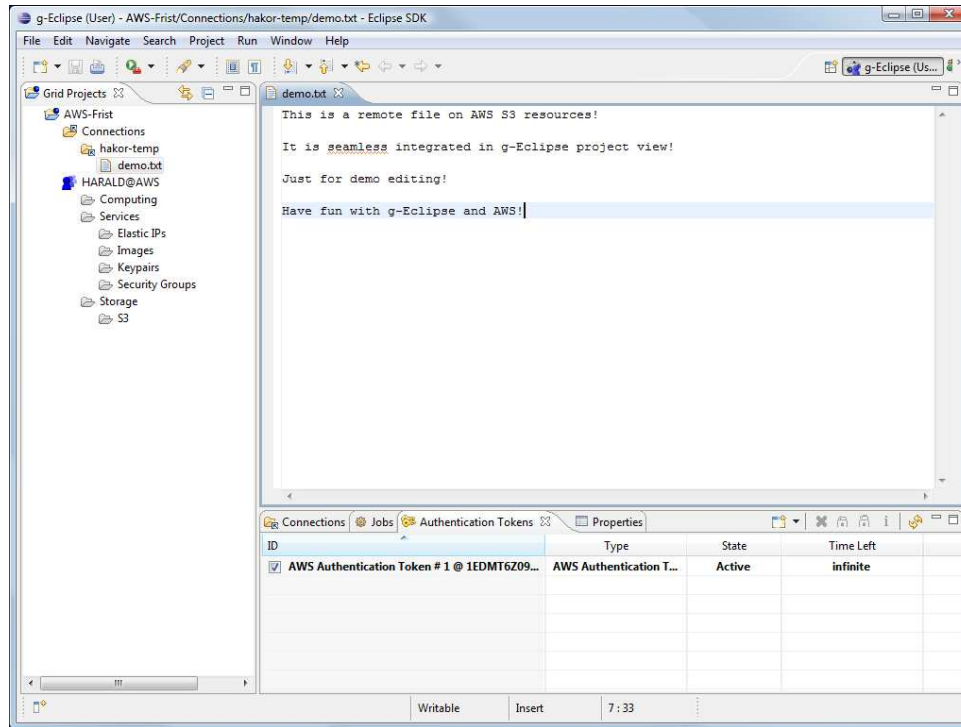


Figure 2.2: g-Eclipse User Perspective

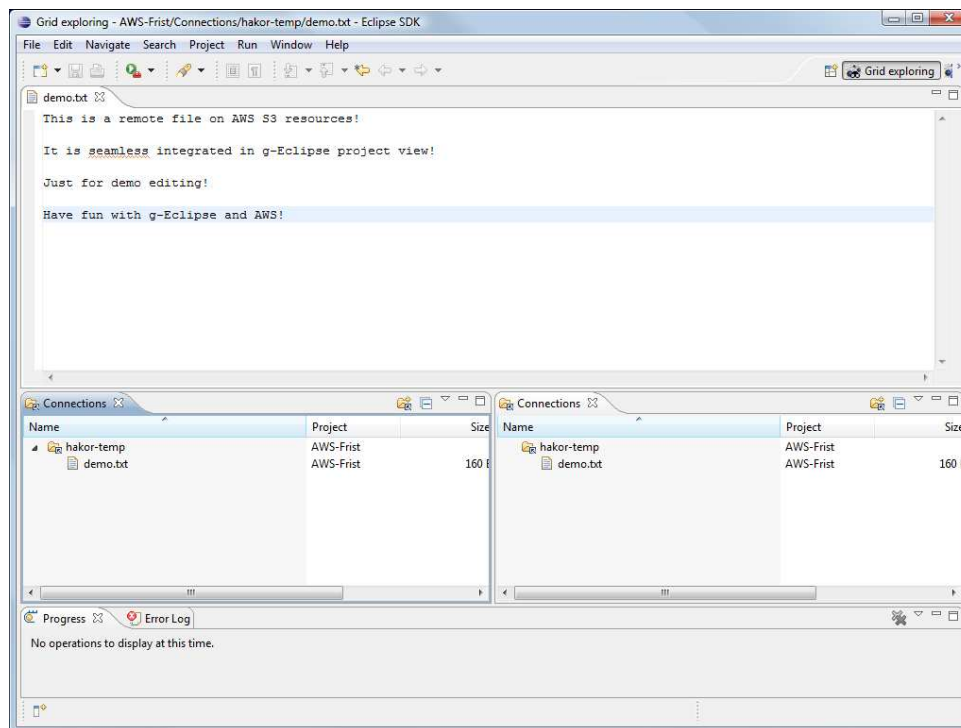


Figure 2.3: g-Eclipse Grid Explorer Perspective

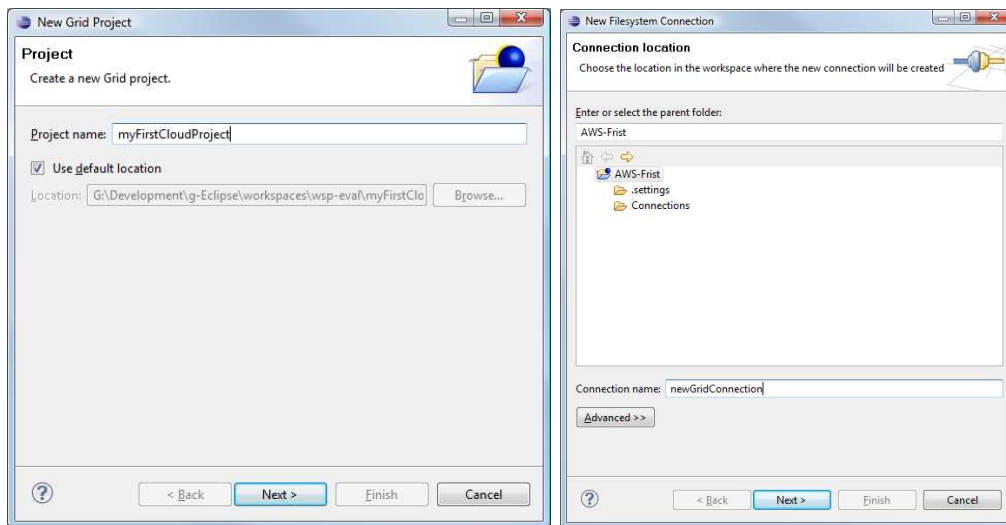


Figure 2.4: g-Eclipse: New Grid-Project Wizard and the New GridConnection Wizard

## 3 Non-Code Aspects

### 3.1 User Documentation

User documentation has been created for the release 1.0

- Documentation is provided within the Eclipse help system by the plugins `eu.geclipse.doc.user`, `eu.geclipse.doc.isv` and `eu.geclipse.aws.doc.user`
- Eclipse Cheat-Sheets are part of the documentation
- Online documentation of the Eclipse help is available on the web (see <http://www.g-eclipse.eu/documentation/index.jsp>)
- The user documentation is available as pdf from [http://www.geclipse.eu/fileadmin/Documents/Deliverables/D2.9\\_D3.8\\_D4.8-UserGuide.pdf](http://www.geclipse.eu/fileadmin/Documents/Deliverables/D2.9_D3.8_D4.8-UserGuide.pdf)
- The technical documentation is available as pdf from [http://www.geclipse.eu/fileadmin/Documents/Deliverables/D2.9\\_D3.8\\_D4.8-TechnicalDocumentation.pdf](http://www.geclipse.eu/fileadmin/Documents/Deliverables/D2.9_D3.8_D4.8-TechnicalDocumentation.pdf)
- The developer documentation is available as pdf from [http://www.geclipse.eu/fileadmin/Documents/Deliverables/D2.9\\_D3.8\\_D4.8-DeveloperGuide.pdf](http://www.geclipse.eu/fileadmin/Documents/Deliverables/D2.9_D3.8_D4.8-DeveloperGuide.pdf)
- The architecture documentation is available as pdf from <http://www.geclipse.eu/fileadmin/Documents/Deliverables/D1.8.pdf>)
- Beginning of 2009, two articles in the German Eclipse Magazin were published
- Demo videos about the framework are available from <http://www.geclipse.eu/index.php?id=89>
- The material from the EclipseCon 2008 tutorial is available. (<http://www.eclipsecon.org/2008/index.php?page=sub/&id=99>)

### 3.2 Localization or Externalization

g-Eclipse is available for the English language; strings are externalized.



## 4 APIs

- The core API of g-Eclipse is the Grid Middleware independent framework `eu.geclipse.core.*`.
- The UI contributions are built on top of this API `eu.geclipse.ui.*`
- The framework was proved by three Grid/Cloud middlewares. The framework at Eclipse.org contains the exemplary implementation for Amazon Web Service (AWS). Two other implementations exist already for the Grid middlewares gLite and GRIA. Altogether, this implementation prove the general quality of the framework and it APIs.
- The plugins for the JSDL Editor and the JDL Editor are independent from any Grid Middleware implementations

The main goal of providing a Grid model and framework that is independent from the underlying Grid Middleware has been met. Additional Middleware support can be added by implementing the interfaces defined in the core plug-in (`eu.geclipse.core`) and the extension points:

- `gridElementCreator`
- `authTokens`
- `authTokenProvider`
- `applicationDeployment`
- `caCertificateLoader`
- `connectionManagement`
- `gridJobStatusServiceManager`
- `problemProvider`

User interface contributions that are Middleware specific can be added via the extension points declared in the UI plug-in `eu.geclipse.ui`:

- `jobSubmissionWizard`
- `jobDetailsFactory`
- `connectionWizard`
- `newVoWizards`
- `efs`
- `authTokenUI`

With the exemplary implementations mentioned above, the API has reached a high level of stability with release 1.0.

## 5 Architectural Issues

One of the main goals of the g-Eclipse project was the development of a generic Grid model, providing an abstraction of today's distributed computing environments such as Grids or Clouds. This model consists of a big set of Java-interfaces, some representing dedicated resources such as compute or storage nodes, others representing compute jobs, workflows or simply blobs of data. The purpose of this core architecture is not only the abstraction of all elements forming a Grid and the provision of well-defined functional interfaces between these elements and the outside world, but also the modelling of the relationships between these elements.

Besides this abstraction layer the Grid model contains a basic implementation layer providing common functionality for at least some of the core interfaces. Middleware-implementations are free to either directly implement the core interfaces or to make use of the basic implementation layer, which mainly takes care of the proper integration of the Grid model with the Eclipse resource framework, e. g. `IResources` or the Eclipse File System (EFS).

Currently the Grid model is implemented for two totally different Grid-middlewares (gLite and GRIA) and one Cloud-infrastructure (AWS), proving the usability of the model. An implementation for one additional middleware, Globus Toolkit 4, is ongoing.

For securely accessing and managing the remote resources of Grids and Clouds g-Eclipse comes with a Grid Authentication and Authorization Framework (GAAF). The main purpose of this framework is the creation of authentication/authorization (AA) tokens and the management of their lifecycle. Furthermore this framework contains management facilities for PKI and ACLs.

Current implementations of the GAAF reach from simple passphrases for SSH-based server access up to X.509-based proxy certificates with Grid-specific extensions.

For transparently accessing remote filesystems g-Eclipse makes use of linked resources in combination with the Eclipse File System. Unfortunately it turned out that this unholy combination causes serious problems when working with true remote resources. The main problems are the poor caching and lazy-loading capabilities of the Eclipse resource framework. During such a simple operation like a refresh one and the same resource turned out to be accessed multiple times. This may be acceptable for local resources but is definitely a show-stopper for remote resources. Therefore g-Eclipse contains a framework wrapping around EFS and encapsulating all true remote calls. Resources linked to this g-Eclipse File System profit from the caching and lazy-loading capabilities that are mandatory when accessing remote resources.

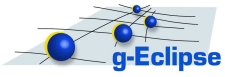
As accessing Grid infrastructures is an intrinsically difficult task and therefore the barrier of entering the world of Grid computing for newbies is rather high, g-Eclipse ships with a error reporting framework that does not only present plain error messages to the user. Each error that occurs in the Grid model is delivered as an implementation of the `IProblem`-interface. Besides the original error message such `IProblems` also contain reasons and solutions. Reasons can give more details about the problems causes. Solutions are descriptive texts that give hints to the user how to work around a problem. These solutions can either be passive or active. In the second case they can trigger an action in the g-Eclipse UI – such as opening a view or a preference page – that directly directs the user to the solution of his problem.

A more detailed description of the architecture can be found in the architecture document that is available for download from <http://www.geclipse.eu/fileadmin/Documents/Deliverables/D1.8.pdf>.

The architecture uses extension points listed in the previous section.

## 6 Tool Usability

g-Eclipse contains tooling to interact with Grid and Cloud infrastructures. Almost all tasks necessary in such an environment are addressed. This includes accessing and managing data seamlessly, creating virtual computing resources like job descriptions or running instances, starting and controlling computing resources. Beyond these basic interactions and depending on the used infrastructures, further tools exist to create complex workflows, to visualize data and to remotely debug applications in Grid/Clouds.



## 7 End-of-Life

This is the initial release 1.0, so there are currently no deprecated or removed APIs or features.

## 8 Bugzilla

As of 2009-11-13 there are

- 1509 bugs in technology/gEclipse
- 1246 of them are in state **resolved**, **verified**, or **closed**
- 263 of them are in state **unconfirmed**, **new**, **assigned** or **reopened**

## 9 Standards

- g-Eclipse requires a Java 1.5 environment, and is compatible with Java 1.6
- g-Eclipse minimally requires Eclipse 3.4 and also runs on top of Eclipse 3.5
- Job Submission Description Language (JSDL) Specification, Version 1.0 (OGF)  
(see <http://www.ogf.org/documents/GFD.56.pdf>)
- JSDL Parameter Sweep extension (OGF)  
(see <http://www.ogf.org/documents/GFD.149.pdf>)
- Grid Laboratory Uniform Environment (GLUE) schema support  
(see <http://glueschema.forge.cnaf.infn.it/Spec/V13>)
- Job Description Language Attributes Specification for the gLite Middleware (JDL)  
(see <https://edms.cern.ch/file/555796/1/EGEE-JRA1-TEC-555796-JDL-Attributes-v0-8.pdf>)

## 10 UI Usability

- Following Eclipse UI usability guidelines
- Usability changes based on users' feedback

## 11 Schedule

During the life of the g-Eclipse project, the following release were produced.

Release name	Date	Public
0.5M0	February 2, 2007	internal
0.5M1	March 2, 2007	internal
0.5M2	March 30, 2007	internal
0.5M3	April 27, 2007	yes
0.5M4	June 1, 2007	yes
0.5RC0	June 29, 2007	yes
0.5RC1	July 27, 2007	yes
0.5RC2	August 31, 2007	yes
0.5	September 28, 2007	yes
1.0M0	November 1, 2007	yes
1.0M1	December 3, 2007	yes
1.0M2	February 4, 2008	yes
1.0M3	March 3, 2008	yes
1.0M4	March 28, 2008	yes
1.0M5	April 30, 2008	yes
1.0M6	June 6, 2008	yes
1.0M7	July 1, 2008	yes
1.0M8	August 1, 2008	yes
1.0M9	September 3, 2008	yes
1.0M10	October 3, 2008	yes
1.0RC0	November 3, 2008	yes
1.0RC1	December 4, 2008	yes
1.0RC2	January 18, 2009	yes
1.0	December, 2009	yes

Table 11.1: All g-Eclipse releases

The release 1.0 was scheduled for December 2008, but was delayed for IP reasons. Now that all IP issues could be resolved, the release 1.0 is re-scheduled for December 2009.



## 12 Communities

- Active committers (14) and contributors from 6 partners (Forschungszentrum Karlsruhe GmbH, IN-NOOPRACT, Inc., Poznan Supercomputing and Networking Center, Johannes Kepler Universität, University of Reading, University of Cyprus)
- Positive voting of 3 contributors
- Participation (Talks, Demo, BoF) at Eclipse events (Eclipse Summit 2006, EclipseCon 2007, Eclipse Summit 2007) and dedicated Grid events
- Presentations (Talks, Posters) at scientific conferences addressing High Energy Physics, Earth Science, Chemistry and other field of sciences
- Weekly public conference calls on VRVS
- Developer mailing list with about 2100 e-mails, newsgroup not actively used by the team and by the users
- User mailing list with about 70 e-mails
- g-Eclipse is used for grid lectures and trainings
- First g-Eclipse related publication by non-committers
- Increasing number of Virtual Organisations tested and uses g-Eclipse (Balticgrid, egeode, atlas)
- PR activities: The g-Eclipse team created newsletters that were distributed on several events and conferences and from the Eclipse Foundation web site.

## 13 IP Issues

See the IP Log at [http://www.eclipse.org/projects/ip\\_log.php?projectid=technology.g-eclipse](http://www.eclipse.org/projects/ip_log.php?projectid=technology.g-eclipse)

- Initial code contribution got IP clearance from Eclipse Legal (CQ 1351)
- All CQs for release 0.5 got IP clearance from Eclipse Legal (CQ 1698)
- Further external libraries required for release 1.0 got IP clearance from Eclipse Legal (CQ 1986, CQ 1988, CQ 2150, CQ 2152, CQ 2153, CQ 2373, CQ 2599, CQ 2886, CQ 2887, CQ 2888)
- Additional code contributions which were first developed in the project's external CVS repository got IP clearance from Eclipse Legal (CQ 2154, CQ 2509, Q 2512, CQ 2849, CQ 2889)
- External code contributions are listed in the IP Log and were submitted via Bugzilla

List of active and participating committers:

- athandava - initial committer
- hkornmaye - initial committer
- kbylec - initial committer
- mknauer - initial committer
- mpabis - initial committer
- mstumpert - initial committer
- pwołniewi - initial committer
- tkockerba - initial committer
- hgjermund - committer since 2007
- mwojtysia - committer since 2007
- nloulloud - committer since 2007
- sgirtelsc - committer since 2007
- agarcia - committer since 2007
- jtao - committer since 2007
- mpost - committer since 2008

List of inactive comitters:

- mpolak - initial committer, inactive

List of ex-committers:

- gtsouloup - initial committer, removed
- rlichwala - initial committer, removed

## 14 Project Plan

After the release 1.0, the g-Eclipse project will concentrate on smaller improvements. Therefore the frequency of the monthly milestone will be reduced to a bi-monthly scheme. The following improvements will be addressed in the future.

- Integration of SFTP connection for Cloud infrastructures
- Implementation of key binding support in the project view.
- Separation of Grid and Cloud releases by providing a finer granularity of modules.
- Dependent on available infrastructure offers and their API, new infrastructure dependent implementations will be supported.

The following schedule is foreseen for the next year of the g-Eclipse project.

Date	release/milestone
Dec. 2009	Release 1.0
Feb. 2010	Milestone 1.1M1
Apr. 2010	Milestone 1.1M2
June. 2010	Milestone 1.1M3
Aug. 2010	Milestone 1.1M4
Oct. 2010	Milestone 1.1M5