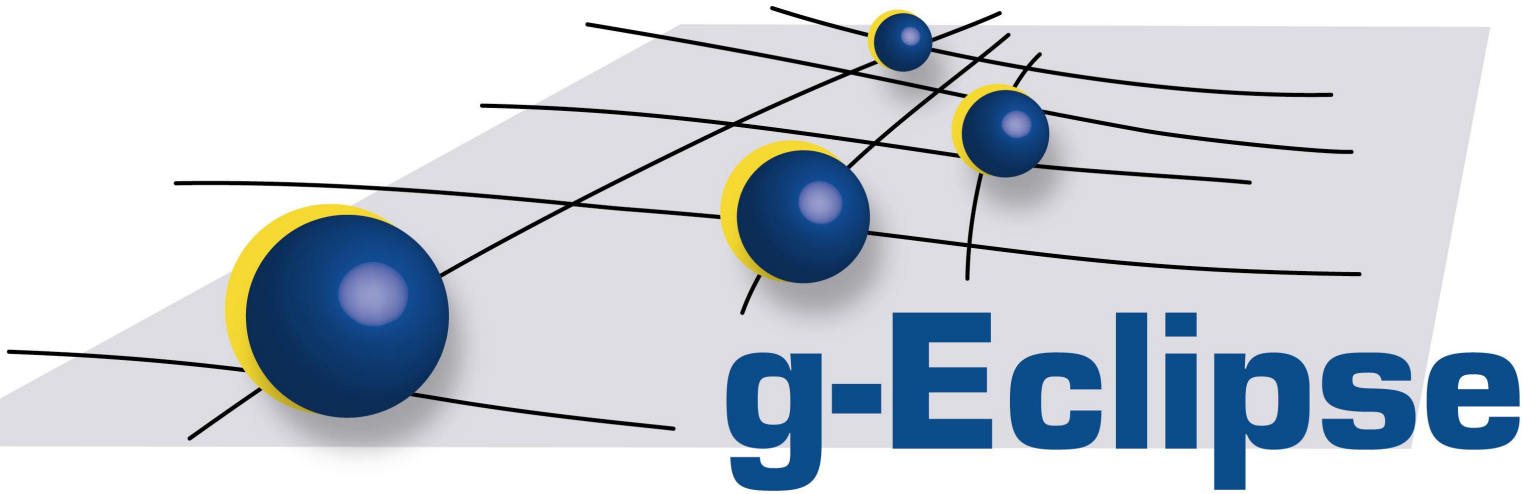


Eclipse Webinar:

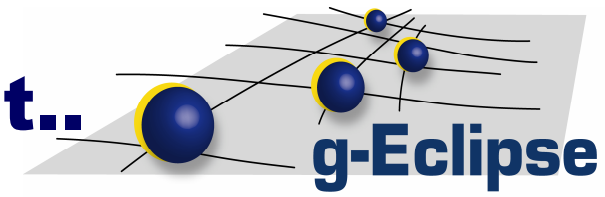
Access a worldwide Grid Infrastructure

Dr. Harald Kornmayer (NEC Laboratories Europe)
Mathias Stuempert (Forschungszentrum Karlsruhe)

on behalf of the g-Eclipse consortium

Information Society

Which Grid do we talk about..

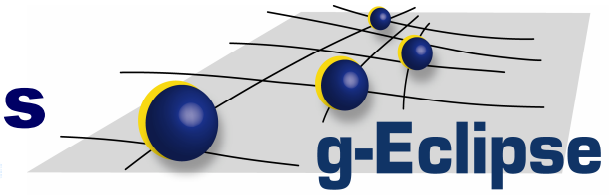


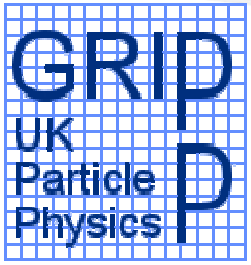
- The “Grid Vision” is
  - “To solve together a (scientific) problem, by connecting the distributed resources (of scientists) within different administrative domains dynamically and coordinately with the help of fast networks to build a „virtual computing center/organization”

    (According to Foster/Kesselman)

- When we talk here about Grid infrastructure,
  - we expect that the Grid infrastructure exists
  - This is not about building a Grid infrastructure

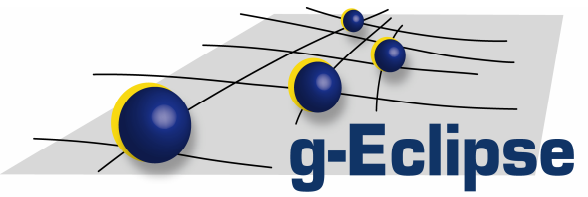
Existing Grid infrastructures





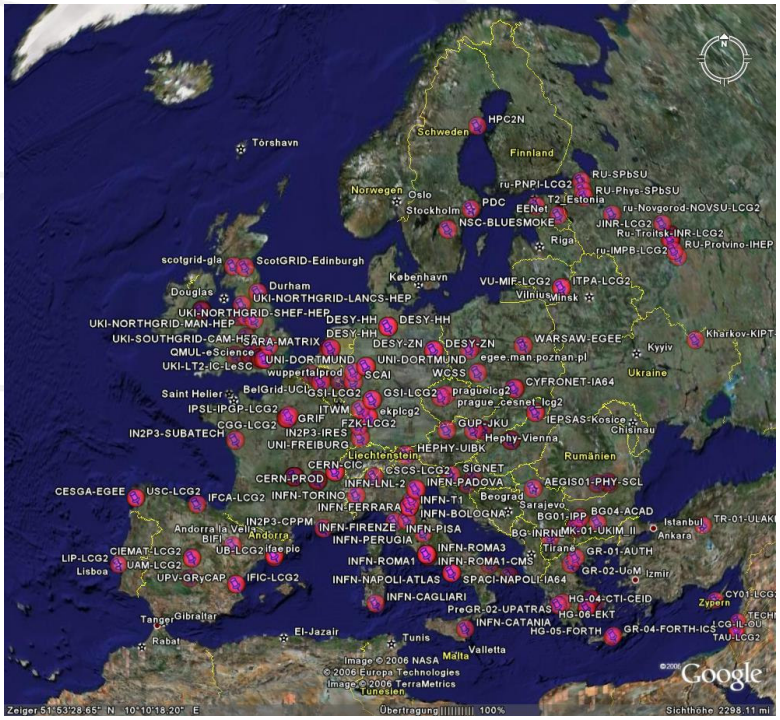
And many, many more…..

Grid architecture



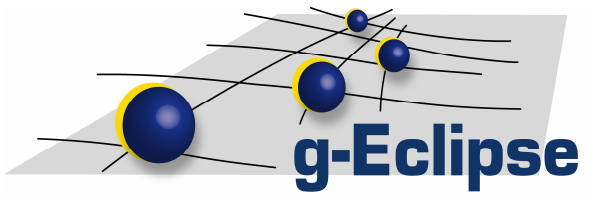
User Interface
Domain specific Services
High Level Grid Services (Resource Broker, Replica Services)
Grid Middleware
Fabrics (computing, storage, network)

i.e. European part of the EGEE infrastructure



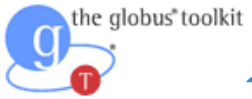
g-Eclipse is about the User interface

Grid middleware basics



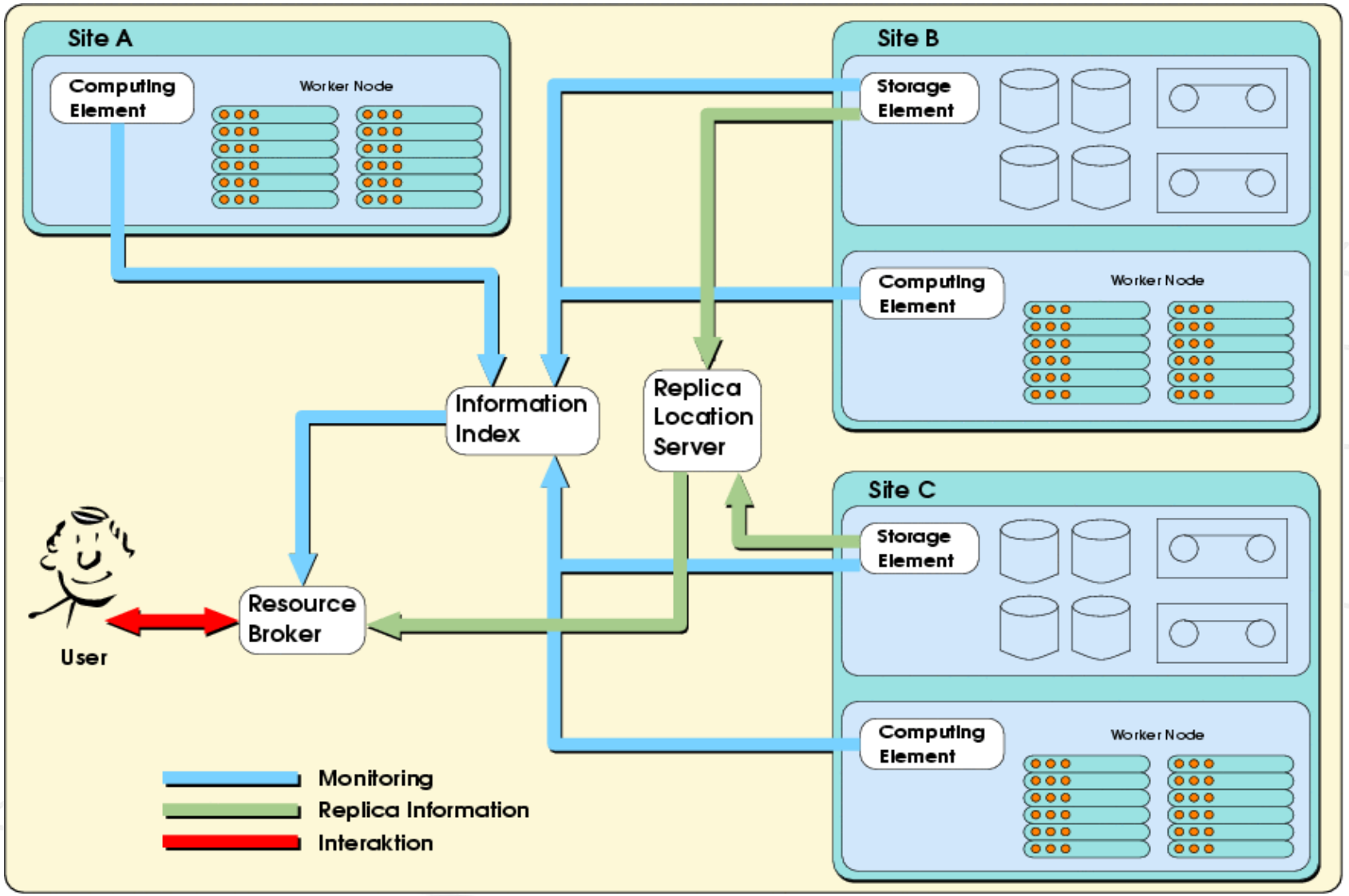
- Basic functionalities:
  - Security mechanisms
  - Execution of computations
  - Seamless access to data

  Analogy: “Operating System” of the Grid
    - Grid resources must run Grid middleware services
- Implementations:

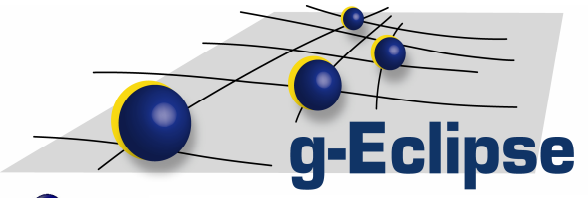


- Standards are emerging!

Grid components

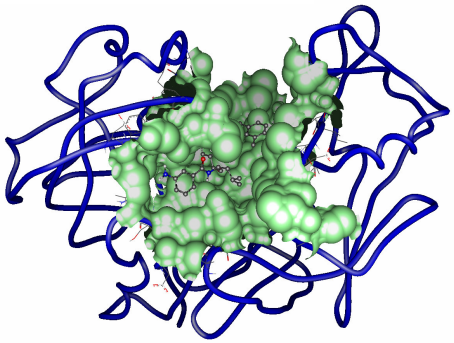


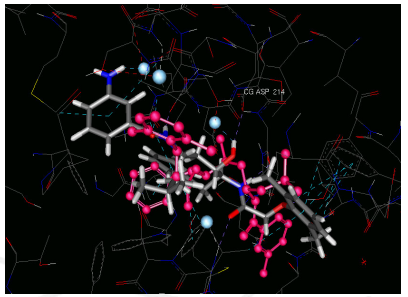
Grid application



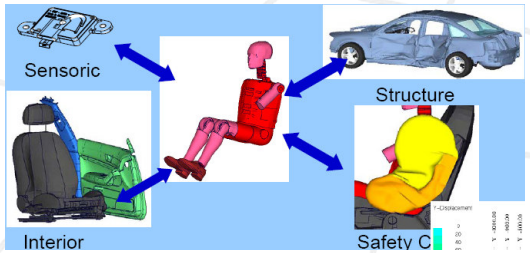
Examples:

- Bio-Med
  - new drugs against malaria

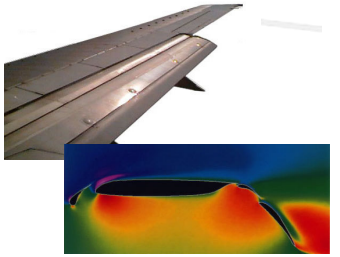




- Financial sector
  - Risk management

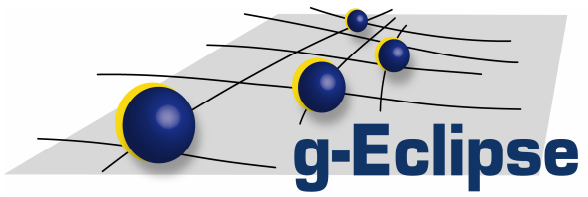


- Engineering
  - Automotive
    - Integration of the product design process chain (CAE/CAD/CAT) including external engineering companies, developers and suppliers
  - Aerospace
    - collaborative configuration design of complex products



- Many, many others…

The reality for the Grid user



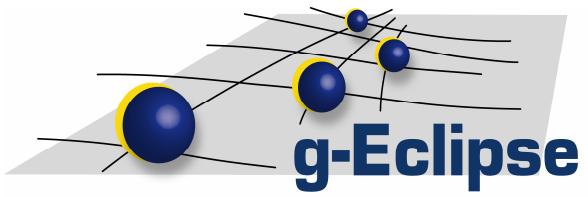
- Infrastructure for scientists were built in the past years
- Many application domains start using Grid infrastructures
- But…
  - Grid technology is complex
    - Different middleware systems are used
      - gLite, Globus, GRIA, UNICORE, …
  - **Different programming paradigms**
    - Batch type systems vs. service oriented systems
    - Many programming languages

→ The threshold is too high for the “standard” user!

Grid application life cycle

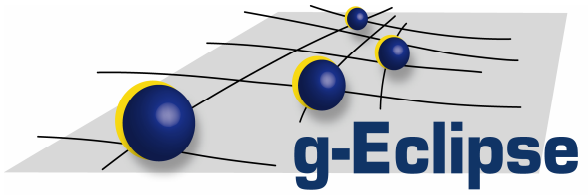
- In most cases, e-Users (e-Scientists, e-Engineers, e-Stock Traders) have their application(s)
  - Legacy code written in different languages (FORTRAN, C, C++, …)
- e-Users want to collaborate
  - A Virtual Organisation is build around a Virtual Computing Center on existing (and new) infrastructure
- e-Users create Grid projects
- e-Users want to interact with the Grid
  - without knowing all details!! (development, deployment, testing, management, …)
- → Tooling is necessary!!
  - Wizards, Editors, …
  - Hide the complexity!!

g-Eclipse – the idea



- Users want easy access to the system
- Users act within different roles
  - Grid applications users
  - Grid resource providers and operators
  - Grid application developers
- Users are middleware agnostic
  - → Build a middleware independent framework
- Provide a general UI framework/eco system for the different Grid actors based on a reliable platform
  - → (re-)use Eclipse and contribute!
  - → gain OS independence (by using JAVA!)

g-Eclipse – the project



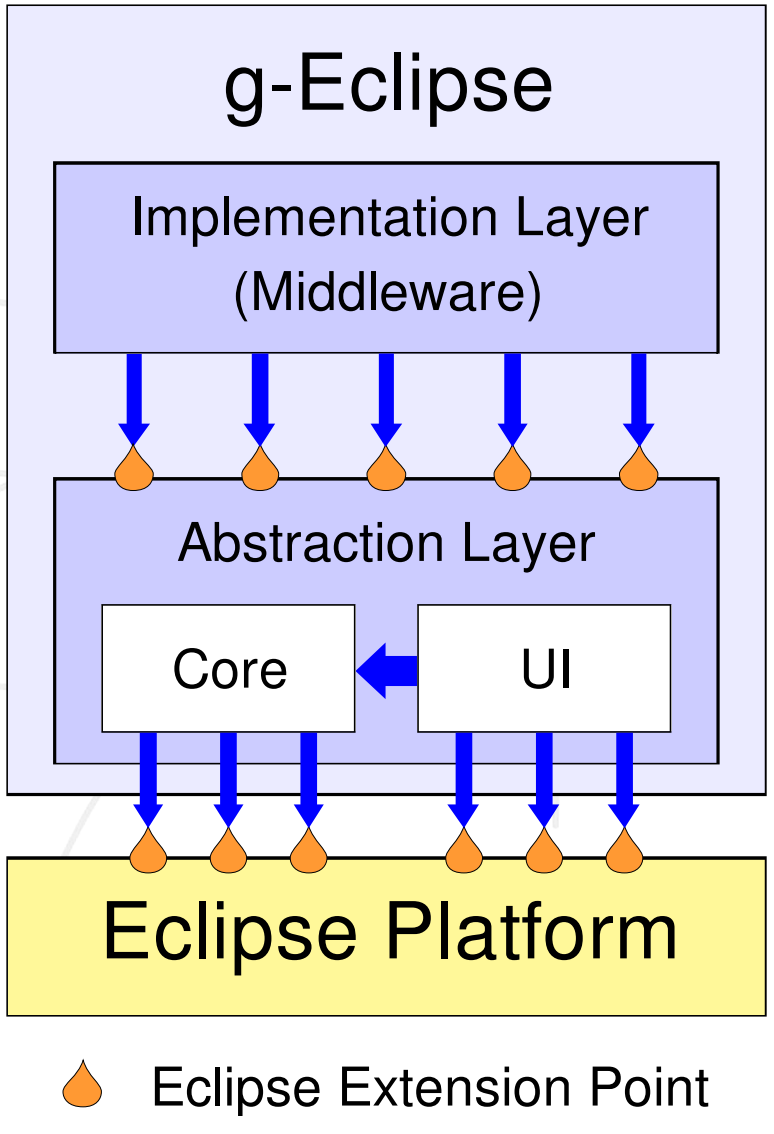
- www.geclipse.eu
- Project funded by the European Commission (INFSO-32347)
- 7 partners

- Until autumn of 2008

- www.eclipse.org/geclipse
- Technology project at Eclipse Foundation
- Release 0.5.0 finished at 28th of September 2007
- Release 1.0.0 with stable API scheduled for autumn of 2008

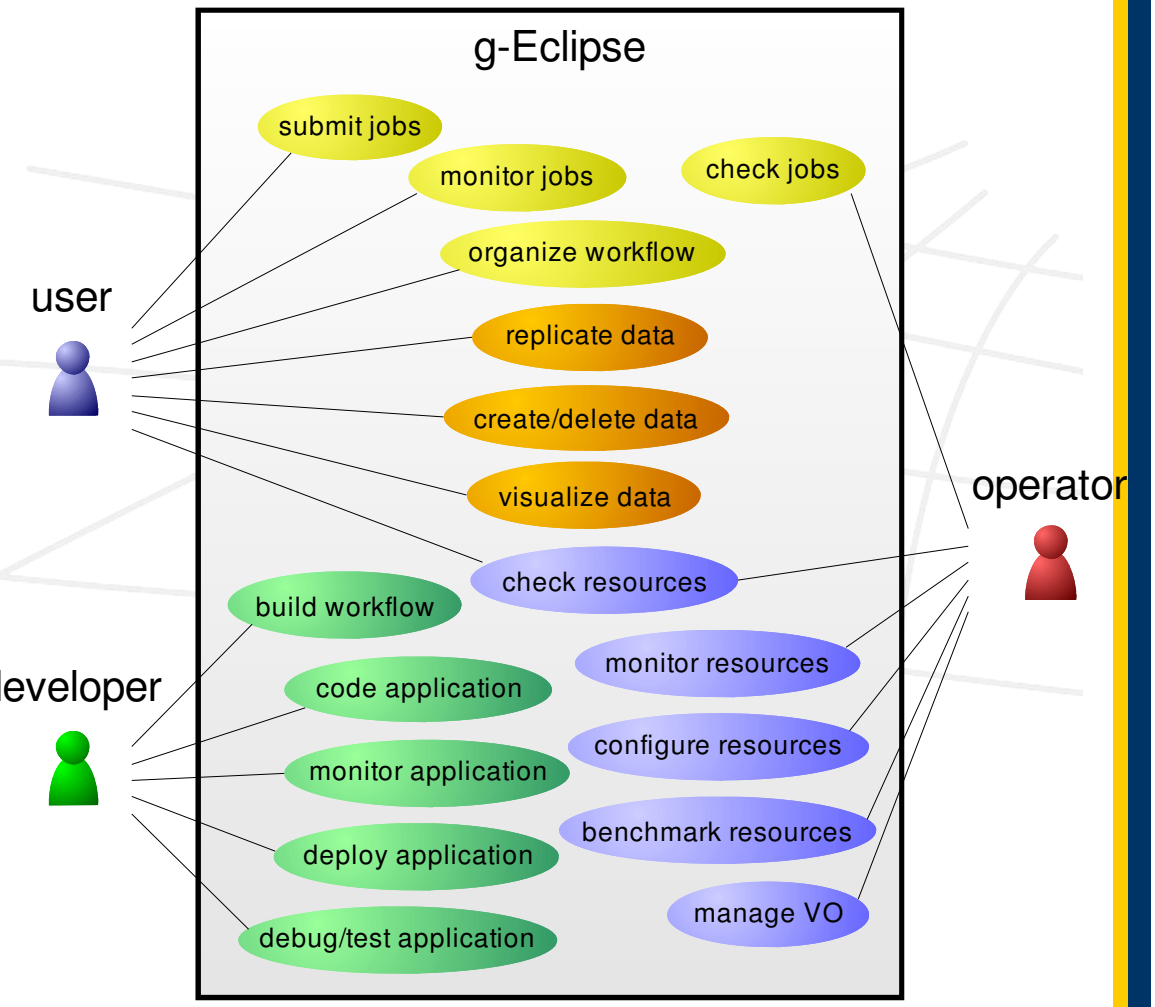
Architecture - Overview

- Abstraction Layer
  - Core functionalities, e.g.
    - Authentication/Authorization
    - VO management
    - Data management
    - Job submission
  - Common user interface, e.g.
    - Views
    - Wizards
    - Dialogs
    - Preference pages
- Implementation Layer
  - Extended core functionalities
  - Middleware specific functionalities



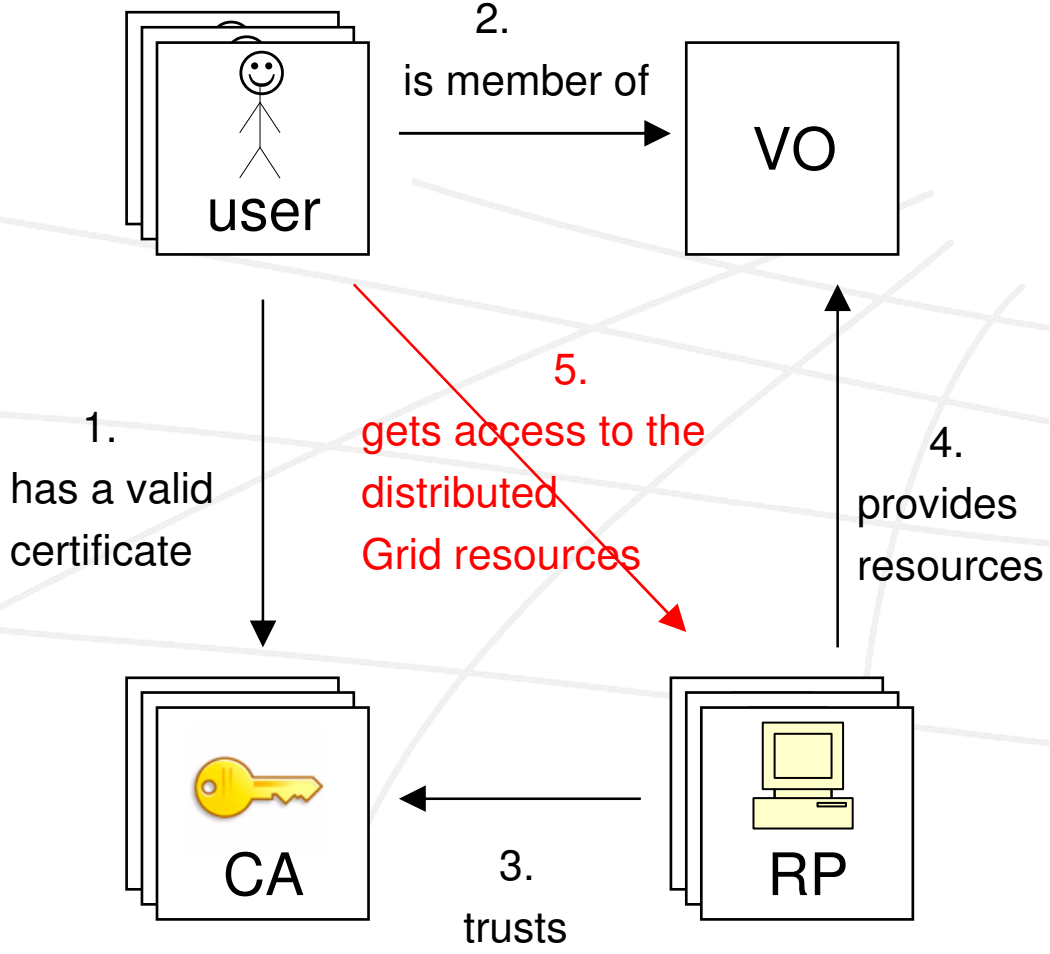
Demo

- Set-up
- VO Declarations
- Create a Grid project
- Data management
- Job management
- Remote Queue management
- Application development
- Visualization

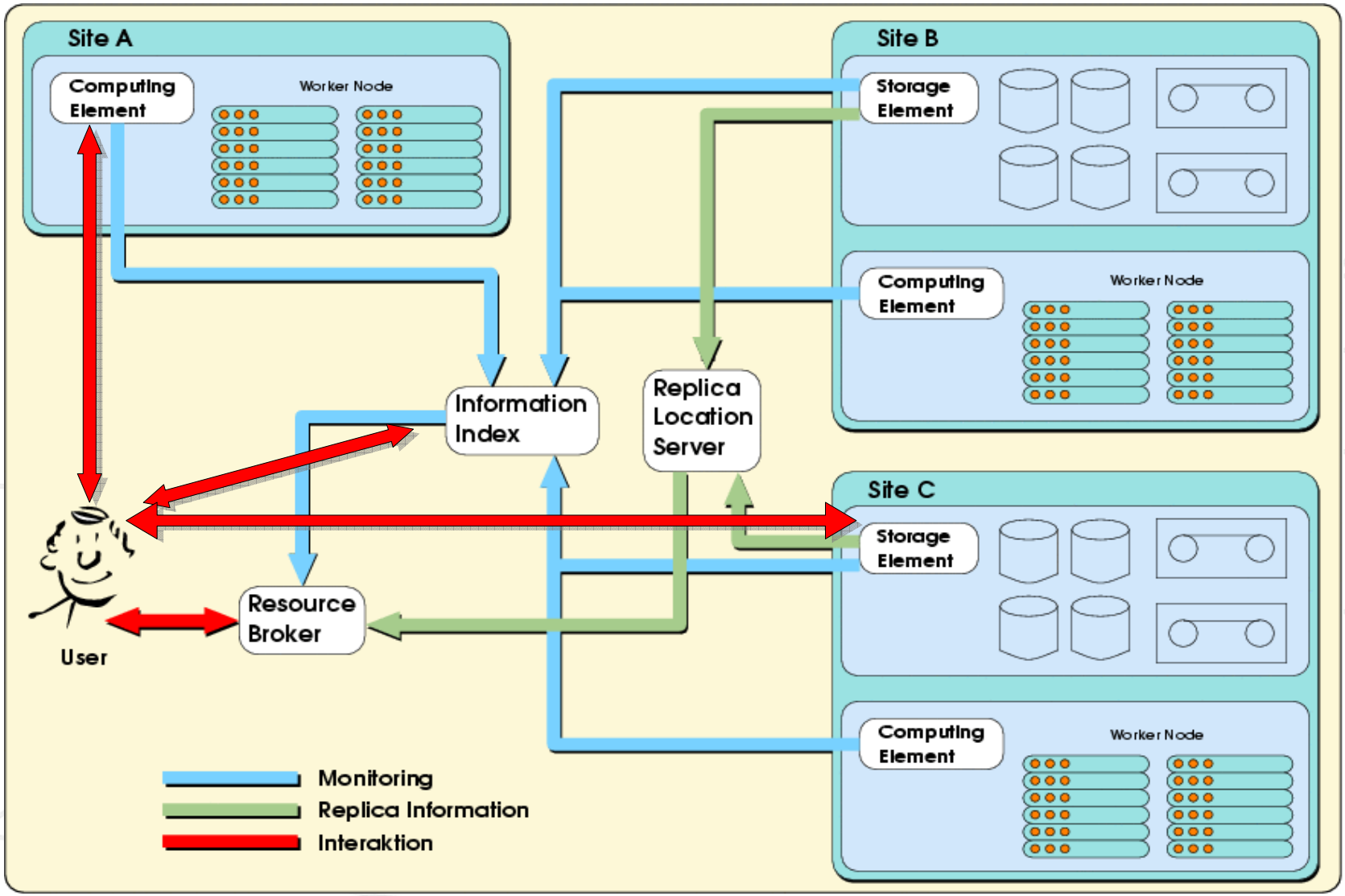


Virtual Organization

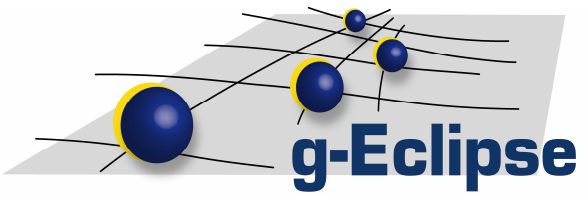
- Authentication
- Authorization
- Membership
- Access rights
- Collaboration
- …
  - Based on X.509 certificates



Grid components (II)



Grid Resource Provider



- How can a site A support a new VO with computing resources?

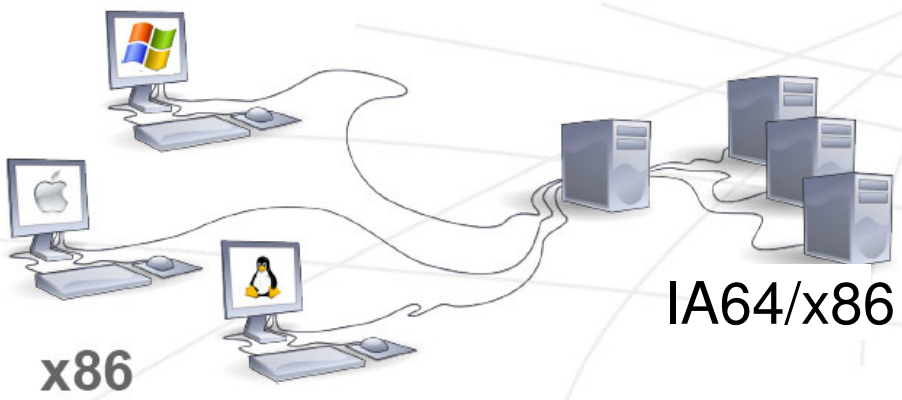
  Set up a queuing system:
  - Old: Know all the details of the queuing system

```
                                                          0     0
[root@ce201 root]# qmgr -c 'create queue test2 queue_type=executi
on" ; qmgr -c 'set queue test2 resources_max.walltime=48:00:00" ;
 qmgr -c 'set queue test2 resources_max.cput=72:00:00" ; qmgr -c
"set queue test2 acl_group_enable=true" ; qmgr -c "set queue test
2 acl_groups= +see'
[root@ce201 root]#
```

  - New: Configure the batch system on site with g-Eclipse
    - Set up a VO specific queue
    - Drain queues
    - Manage Cluster nodes

Grid Application development

How to “gridify” a Legacy application?

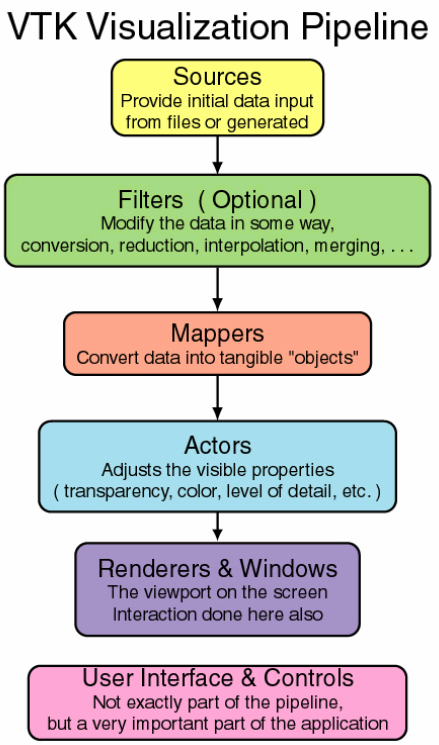


1. Develop them on your local computer as a separate JDT/CDT project
2. After a code change, compile them locally and on a remote Grid resource
3. (if needed debug them locally or on a remote Grid site)
4. Deploy the application

Usage of gLogin introduce some firewall issues!!!

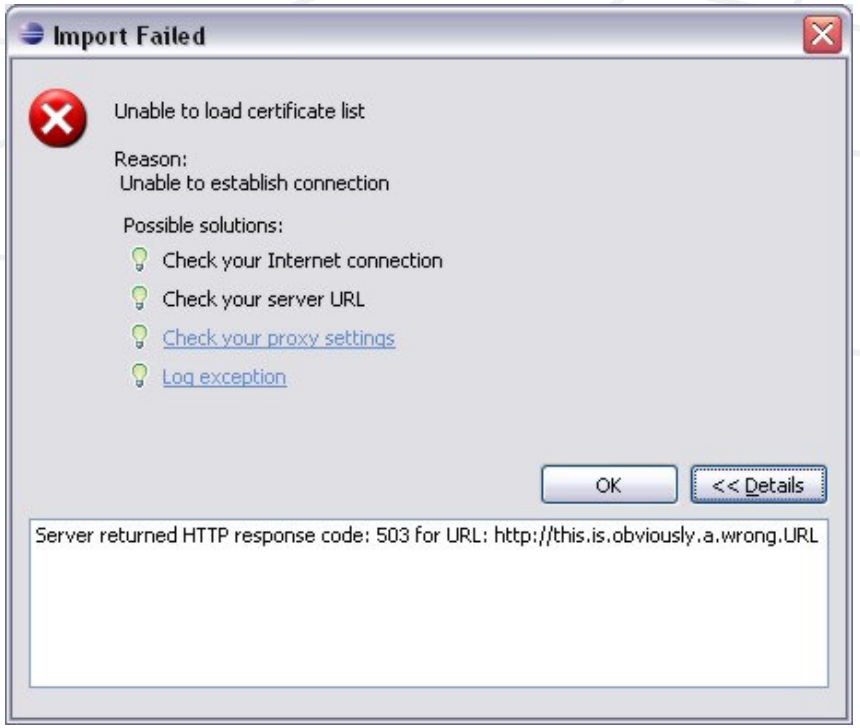
Visualization

- Scientific computing often creates big data files, which must be visualized for further studies
- Usage of Open Source VTK library / GVK library
- 2 possible solutions:
  - VTK: Download the data from the Grid and start the visualization locally on your computer!
  - GVK: Leave the data on the Grid and start a remote visualization service and connect to it!



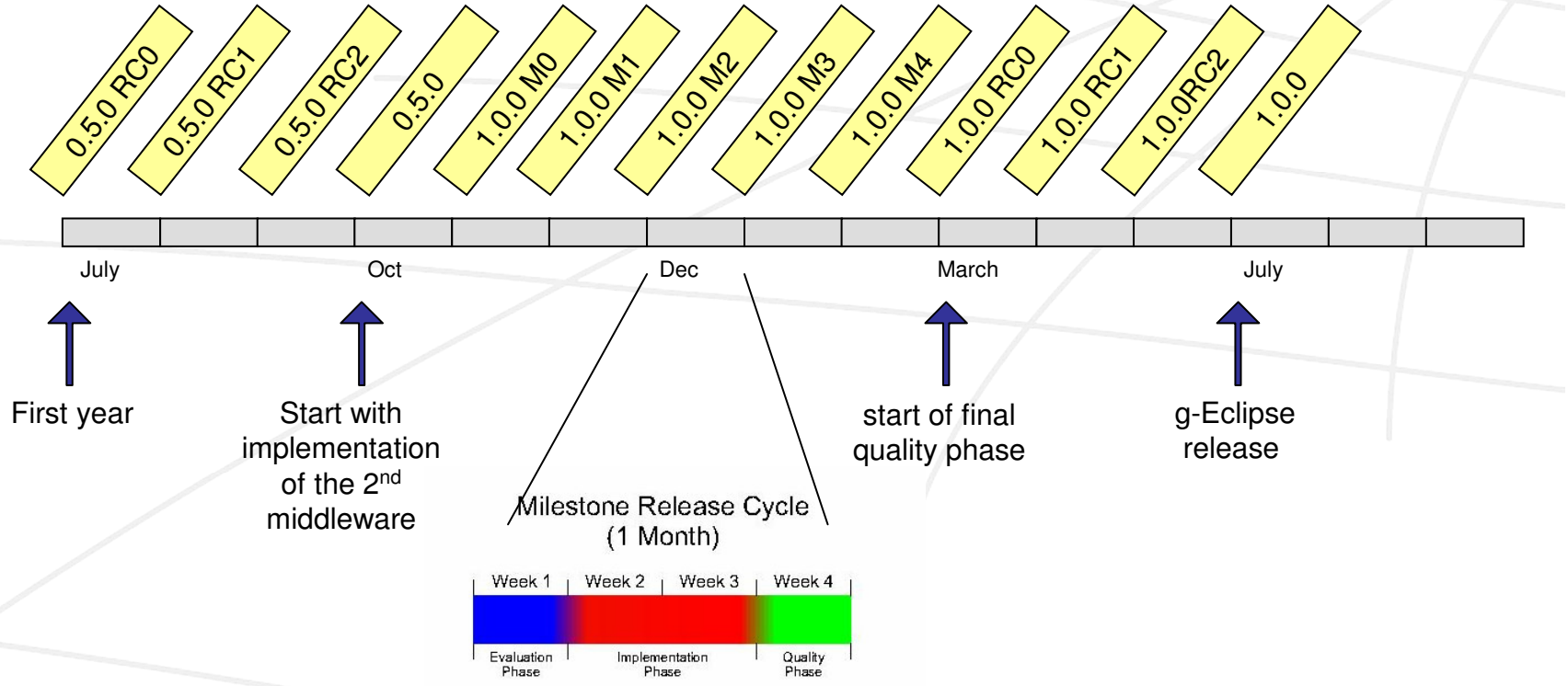
Manage Complexity

- By providing solution to common problems on Grid infrastructures
  - g-Eclipse provides an extended problem reporting mechanism based on the Eclipse core exception
  - Problems have associated solutions
  - Solutions may be
    - passive: just a descriptive text
    - active: provide an action that helps the user to solve the problem, e.g. open an associated preference page

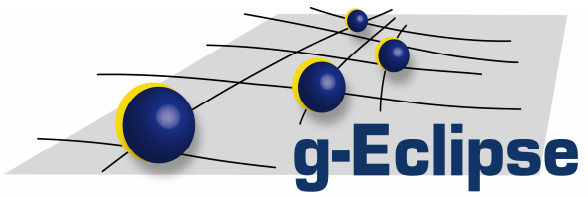


Roadmap

- g-Eclipse release cycle
  - for assuring the quality a monthly milestone release cycle is applied

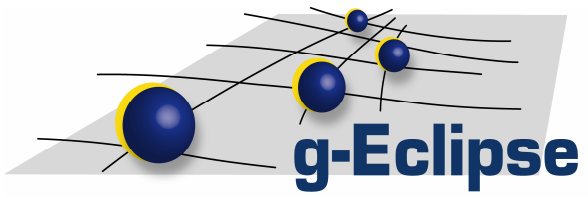


Summary



- g-Eclipse can be used to access Grid infrastructures
  - first Release g-Eclipse 0.5.0 supporting the gLite middleware is available since September
  - g-Eclipse will support a second Grid middleware in 2008
  - the middleware independent approach will be proved with the GRIA middleware (www.gria.org)
- g-Eclipse is open for contributions
  - more middleware implementation
  - based on the “Eclipse way”
  - integration of existing tools

How to contribute



- Use our tool and send us feedback!
  - We do it the Eclipse way!
  - Webpage www.eclipse.org/geclipse or www.geclipse.eu
  - Newsgroup
    - http://dev.eclipse.org/newslists/news.eclipse.technology.g-eclipse/
  - Developer mailing list
    - https://dev.eclipse.org/mailman/listinfo/geclipse-dev
  - Bugzilla
    - https://bugs.eclipse.org/bugs
- Collaborate and provide patches for other middleware systems
  - Contact {at} geclipse.eu