euchinagrid

Interconnection & Interoperability of Grids between Europe & China

Interoperability between GOS and GLite

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Information Society and Media

Agenda

- Interoperability approach
- batch job interoperability
- Introduction to testbed

Interoperability Approach

Interoperability on different levels

- **Interoperability can be implemented on different levels:**
  - **Soap message level**
    - **Message format translation**
    - **Security information extraction & translation**
      - ***some implementations put WS-Security information into soap header and but other into attachment etc***
  - **Service level**
    - **Batch job**
      - ***Submit batch job to each other***
      - ***It seems batch job level interoperability is most important between COS and GLite***
    - **Information integrated**
      - ***Aggregate service & resource information from different middleware***
      - ***Provide query & update functions***
    - **Security mapping**
      - ***Mapping user certificate and other security information between different middleware***
  - **Application level**

Interoperability principle

- **Principles of interoperability**
  - **Don’t interrupt deployed applications**
  - **Make least or no modification to grid middleware**
    - **make full use of extension points of grid middleware**

Interoperability Approach(1/3)

- **Interoperability approach consists of following components**
  - **Gateway**
    - **Bridge different grid middleware together**
    - **Make it easy for management, monitor and control**
  - **Workflow Enactor**
    - **Assemble distributed services into one**
    - **Work in client side manner**
    - **Extensible or easily develop**
  - **Adaptor**
    - **Different adaptor for different underlying middleware**
      - ***service invocation***
      - ***soap message translation and so on***

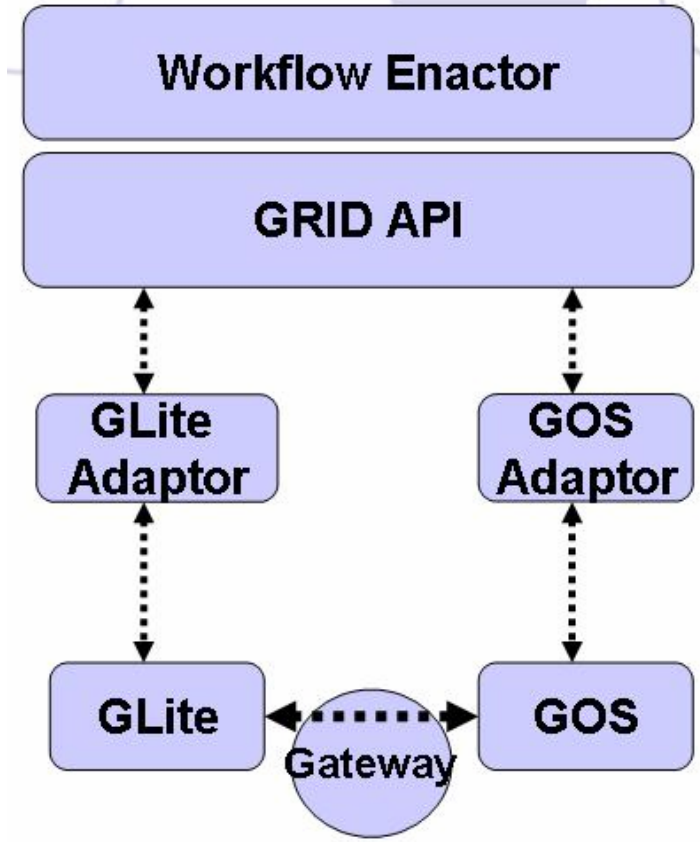
Interoperability Approach(2/3)

Workflow

- Assemble distributed services across different grid infrastructures
- Based on abstract common grid API
  - axis toolkit for GOS
  - gSoap toolkit for GLite?
- BEPL Engine

Adaptor

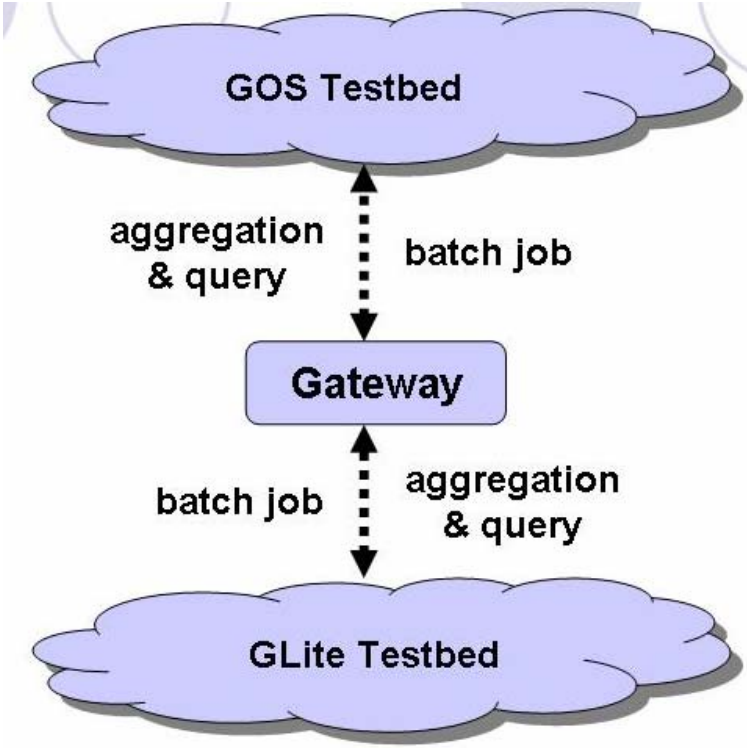
- Comply with GRID API and BPEL
- Soap message translation
- Security mapping
  - username / password
  - User certificate and so on



Interoperability Approach(3/3)

Gateway

- Information aggregate& publish & query
  - WSDL repository
  - resource information registry
- Scheduling batch job between different grid infrastructures
  - submit & monitor batch job
    - batch job description language conversion such as JDL, JSDL
    - data stagein & stageout
  - security mapping
    - username / password
    - user certificates

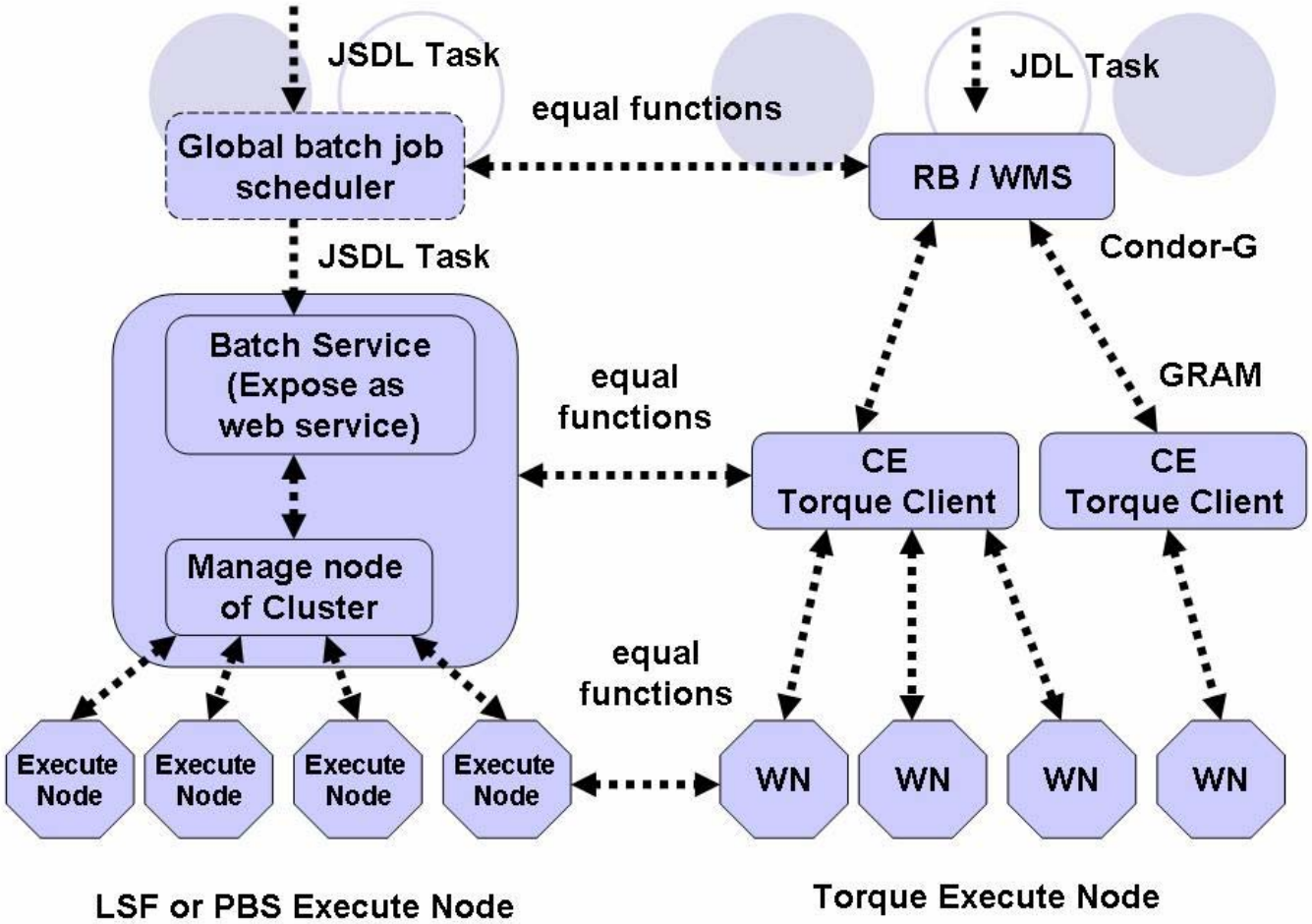


Steps for interoperability

- Service level interoperability seems easy to implement through workflow and adaptors
- I think the first thing is GOS and GLite can submit batch job to each other through gateway
  - gateway to bridge different middleware together
  - resource information aggregating, publishing and querying
  - find simplest way to submit batch job to each other
    - How GOS submit batch job to GLite
    - How GLite submit batch job to GOS

Batch job interoperability

Comparison of batch job execution process



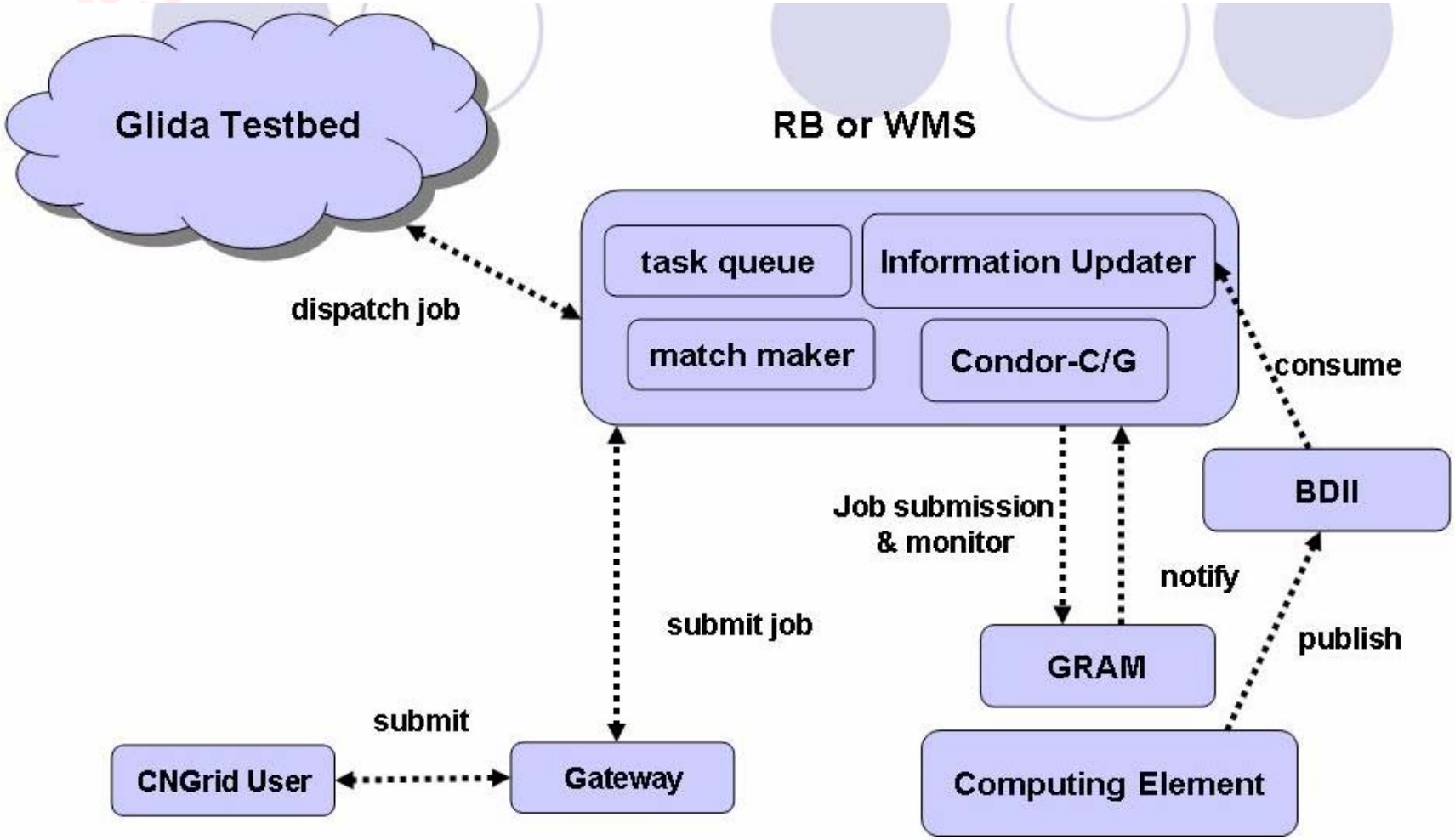
Conclusion

- **Different batch job schedule mechanism used in GOS and GLite**
  - **GOS**
    - **GOS needs a robust and effective global batch job scheduler**
      - ***GOS provides extension point for it***
    - **local batch job scheduler exposed as web service but not compatible with GRAM**
    - **It seems relatively easy to find extension points and insert some interceptors to dispatch batch job to GLite**
  - **GLite**
    - **Resource Broker or Workload Management System can be treated as global batch job scheduler if query a global BDII**
    - **Relationships between components are tight coupling, such as condor-G, BDII, CE and so on, and it seems difficult to find extension points and insert some interceptors**
      - ***perhaps because details are lack so we need more details about GLite***

GOS dispatch batch job to GLite (1/2)

- Roles and functions of gateway
  - Roles
    - Global batch job scheduler for GOS
    - Client of Resource Broker or Workload Management System
  - Functions
    - abstract GLite as a special GOS node
      - *collect and publish GLite resource information to other GOS nodes*
      - *forward received batch jobs from GOS directly to GLite*
      - *Interacts with Resource Broker or Workload Management System*
    - batch job submission and monitor
      - *JSDL to JDL conversion*
      - *Data stagein & stageout*
        - GridFTP preferred
- Client library should be provided to simplify job submission and monitor operation

GOS dispatch batch job to GLite (2/2)

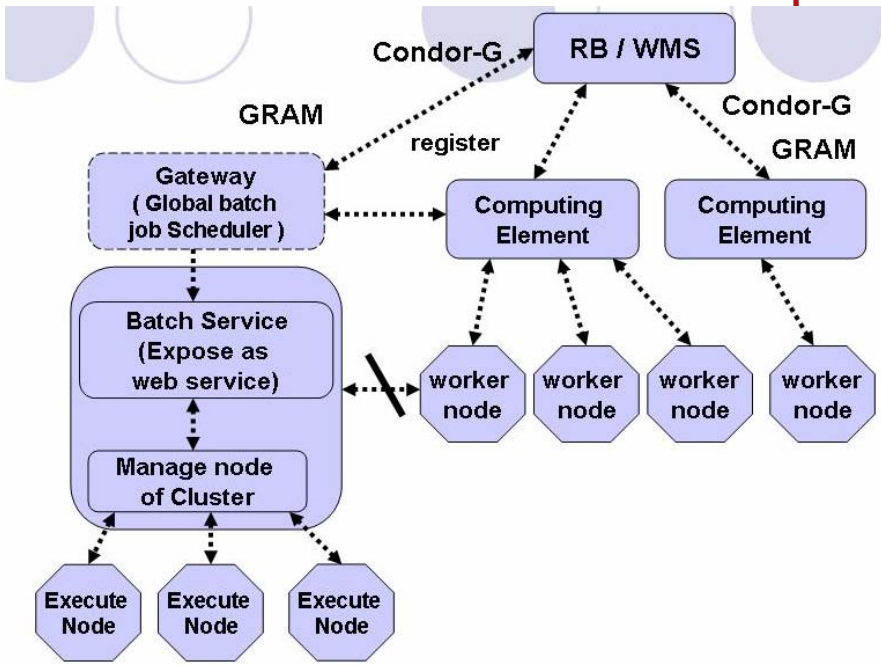


GLite dispatch batch job to GOS (1/6)

- **The first question is how GOS can receive batch job from GLite**
  - **two alternative ways to choose**
    - **update RB or WMS to dispatch batch job directly to gateway**
      - ***It is much different from GLite's batch job schedule mechanism***
      - ***Can't work well with other components of GLite such as Storage Element ,BDII and so on, may cause many new problems***
    - **register gateway as computing element of GLite**
      - ***Comply with GLite' s batch job schedule mechanism***
      - ***Work well with other components of GLite such as SE,BDII and so on***
  - **So it seems register gateway as Computing Element of GLite is more elegant and has least interrupt into GLite**

GLite dispatch batch job to GOS (2/6)

- **Treat gateway as computing element will cause mismatch between batch service and worker node. We have two alternative chooses to resolve this mismatch**
  - **Gateway directly interacts with underlying execute node through GRAM + Torque**
    - **Many no-technical difficulties because clusters are owned by different institutes**
  - **Extend GRAM to support a user defined manner for job submission and monitor**
    - **Condor pool, a optional manner**
    - **Web service interface, now GOS support submit and monitor by JSDL**



GLite dispatch batch job to GOS (3/6)

- **Roles and functions of gateway**
  - **Roles:**
    - **global batch job scheduler of GOS**
    - **Computing Element of GLite**
  - **Functions:**
    - **abstract GOS computing resource into one Computing Element of GLite**
      - ***collect and publish resource information to BDII***
      - ***dispatch received batch job to underlying GOS***
      - ***security mapping such as user/password, certificates and so on***
    - **batch job submission and monitor**
      - ***convert JDL to JSDL***
      - ***data stagein or stateout***
        - **GridFTP preferred**

GLite dispatch batch job to GOS (4/6)

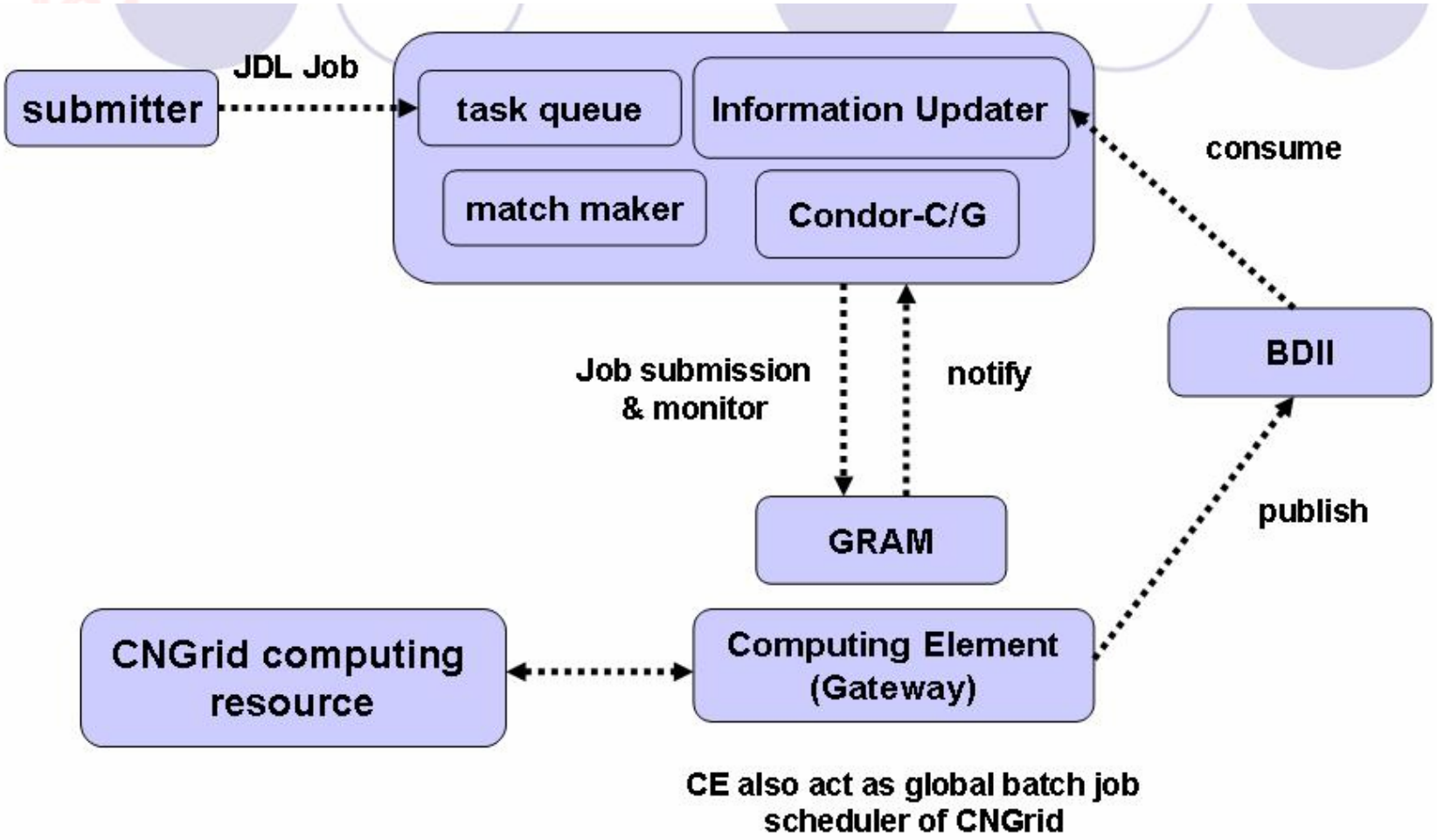
- **Problems remained**
  - **How GOS can receive batch job from GLite**
    - **Update Resource Broker or Workload Management System?**
    - **Register gateway as Computing Element of GLite?**
  - **Evaluate the difficulty of extending GRAM to support user defined job submission manner**
    - **Web service interface**
    - **condor interface**
      - ***GRAM can support condor easily***
      - ***Mismatch problems still present : what is the basic unit of condor pool, GOS node or execute node of different underlying cluster ?***
      - ***No technical problems still present such as firewall, lack of independent IP Addresses and clusters owned by different institutes***

GLite dispatch batch job to GOS (5/6)

- More details information about Resource Broker, Workload Management System and Computing Element are urgently needed, perhaps we can find a more better manner

- version problems
  - GOS
    - Engine version (GOS2.1) will be released and deployed by the end of October
      - *More stable and effectively*
      - *IPv6 support*
    - Interoperability will based on this version
  - GLite
    - Which version of GLite to use?
      - *Resource Broker or Workload Management System?*
      - *Condor-G or Condor-C?*
      - *BDII or RGMA?*
    - Could we just based on Glite version used glida environment?

GLite dispatch batch job to GOS (6/6)



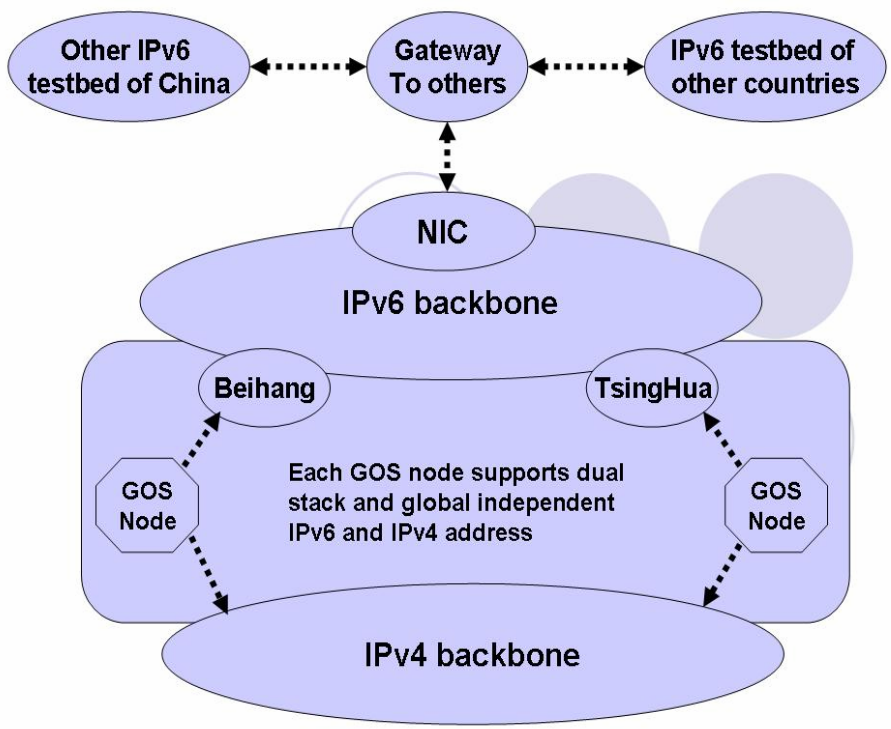
Testbed for interoperability

Testbed for interoperability(1/3)

- We have set up testbed for interoperability between GOS and GLite, and it consists of three parts:
  - **GLite environment**
    - **6 PC**
      - ***RB***
      - ***Computing Element***
      - ***Work Node***
    - **register into glida VO**
  - **GOS environment**
    - **two different GOS nodes including Beihang university and Tsinghua university**
    - **Node information in Beihang university**
      - ***2 PC and a cluster of 9 node***
        - **PC acts as GOS node and access cluster through PBS**
        - **Because we doesn't have enough independent IP address, we don't register cluster into GLite environment**

Testbed for interoperability(2/3)

- GOS testbed
  - used to test both IPv6 and interoperability
  - consists of two GOS nodes

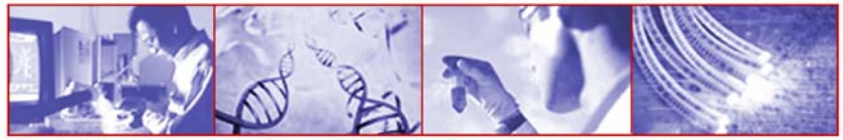


Testbed for interoperability (2/3)

```
wyj@gilda07:~
[gilda07] /home/wyj > lcg-infosites --vo gilda ce
valor del bdii: gilda06.ihep.ac.cn:2170
#CPU    Free    Total Jobs      Running Waiting ComputingElement
----------------------------------------------------------
   2       2       0               0       0    euchinagrid3.buaa.edu.cn:2119/blah-pbs-short
   2       2       0               0       0    euchinagrid3.buaa.edu.cn:2119/blah-pbs-long
   2       2       0               0       0    euchinagrid3.buaa.edu.cn:2119/blah-pbs-infinite
   4       4       0               0       0    gilda01.ihep.ac.cn:2119/blah-pbs-short
   4       4       0               0       0    gilda01.ihep.ac.cn:2119/blah-pbs-long
   4       4       0               0       0    gilda01.ihep.ac.cn:2119/blah-pbs-infinite
   4       4       0               0       0    gilda01.ihep.ac.cn:2119/jobmanager-lcgpbs-short
   4       4       0               0       0    gilda01.ihep.ac.cn:2119/jobmanager-lcgpbs-long
   4       4       0               0       0    gilda01.ihep.ac.cn:2119/jobmanager-lcgpbs-infinite
   3       3       0               0       0    gildace.oact.inaf.it:2119/jobmanager-lcgpbs-short
   3       3       0               0       0    gildace.oact.inaf.it:2119/jobmanager-lcgpbs-long
   3       3       0               0       0    gildace.oact.inaf.it:2119/jobmanager-lcgpbs-infinite
  46      46       0               0       0    grid010.ct.infn.it:2119/jobmanager-lcgpbs-short
  46      46       1               1       0    grid010.ct.infn.it:2119/jobmanager-lcgpbs-long
  46      46       0               0       0    grid010.ct.infn.it:2119/jobmanager-lcgpbs-infinite
[gilda07] /home/wyj >
```

- register our computing Element into gilda test environment
  - **Computing Element name with prefix:euchinagird3**

euchinagrid



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Thanks!

Q&A

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