The EU DataGrid Testbed

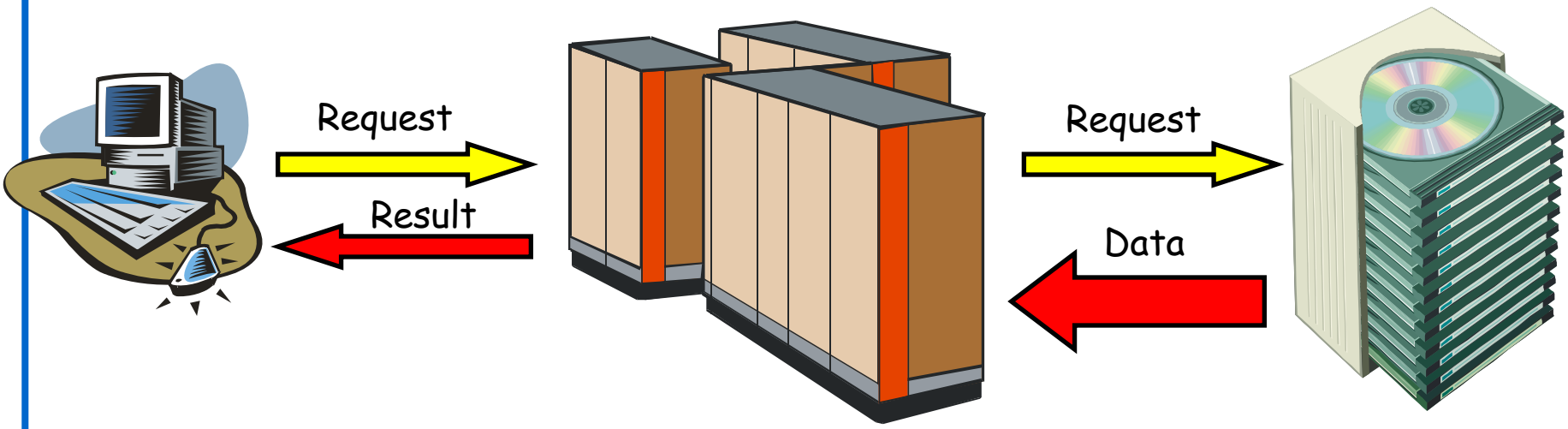
The European DataGrid Project Team

http://www.eu-datagrid.org

Contents

- User's Perspective of the Grid
- Grid Services
- Hardware Components of an EDG Testbed
- Code distribution policy

A 3 Tier Business Architecture



Client

Application Server

Data Server

On the EDG:

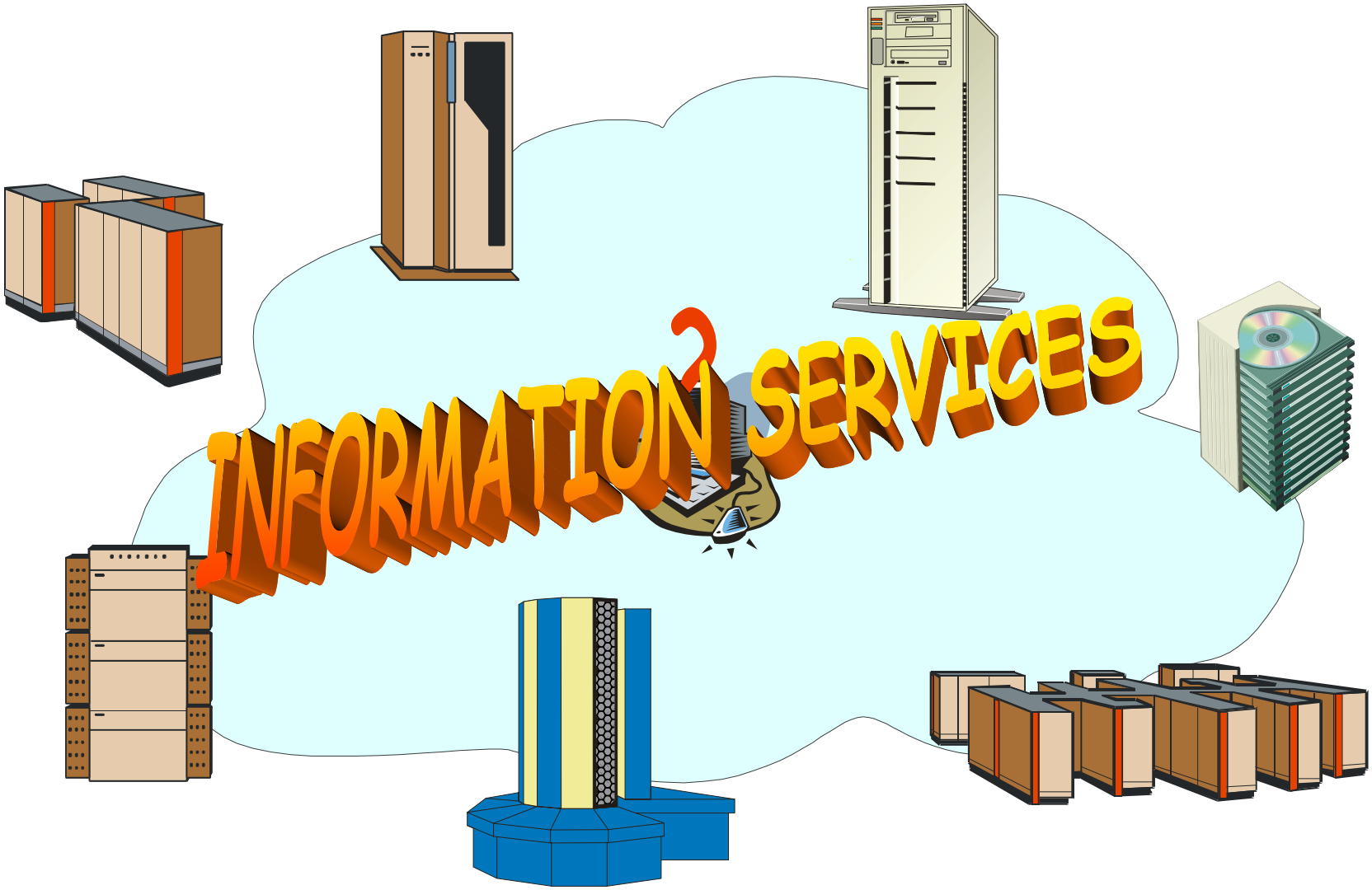
User Interface

Computing Services
(Computing Element)

Storage Services
(Storage Element)

Worker Nodes
Data Servers
Network

Situation on a Grid



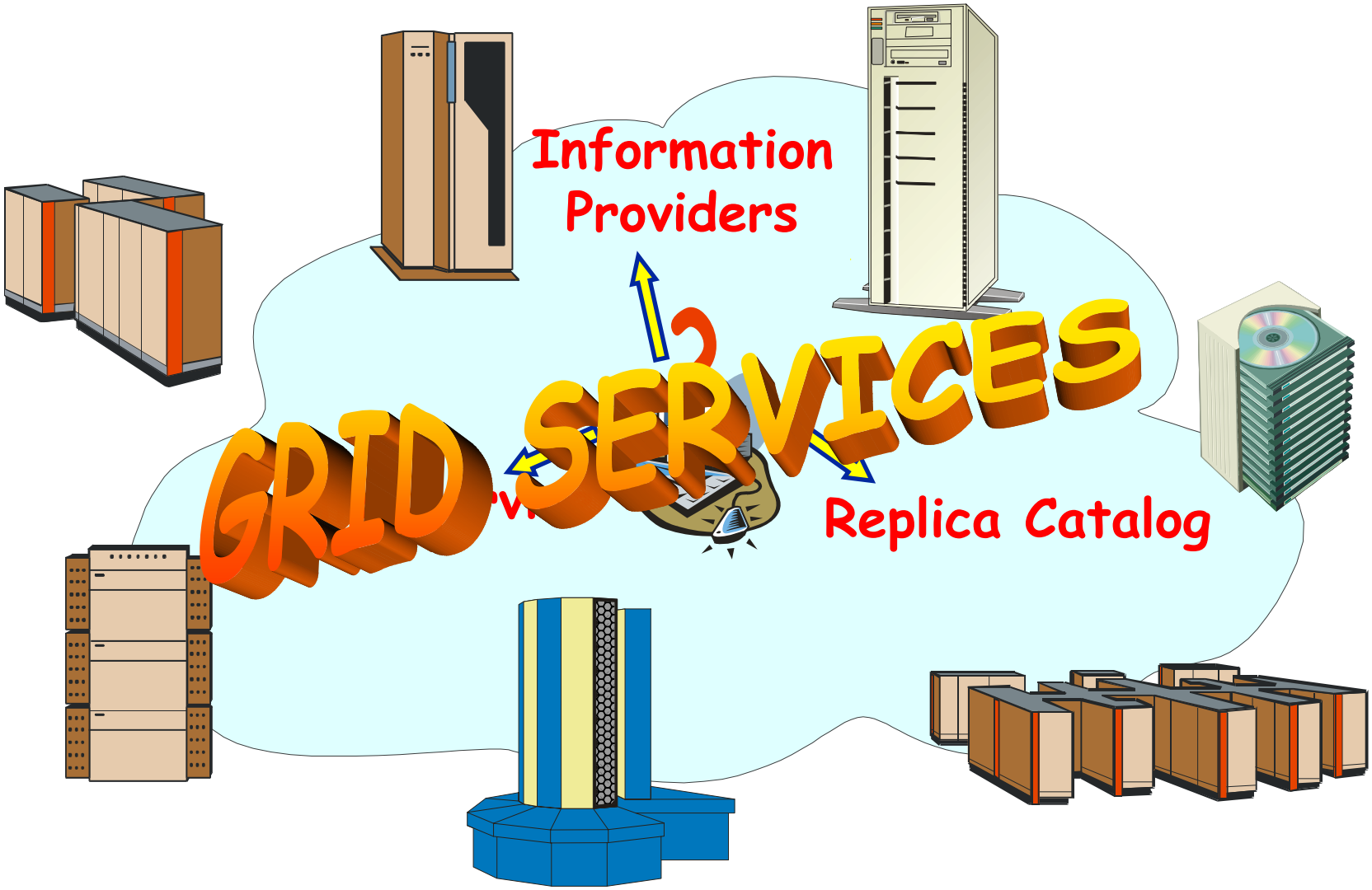
Information Services

- Hardware:
  - EDG Information Service
  - Information Providers
- Data:
  - Replica Location Service
- Software & Services:
  - EDG Grid Services:
    - Information Service
  - Application Services:
    - Currently only EDG applications directly supported

Machine Types:

- Information Service (IS)
- Replica Catalog (RC)

Situation on a Grid Cont'd

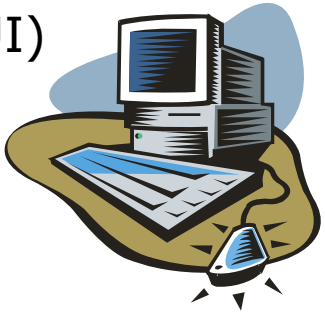


Main EDG Grid Services

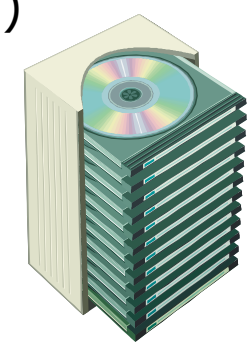
- Authentication & Authorization
- Job submission service
  - Resource Broker
- Replica Management
  - EDG-Replica-Manager
  - Replica Location Service
  - (Mass storage system support)
- Logging & Bookkeeping

EDG Logical Machine Types

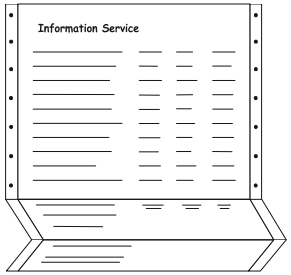
- User Interface (UI)



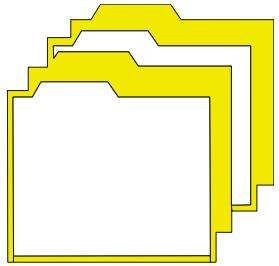
- Storage Element (SE)



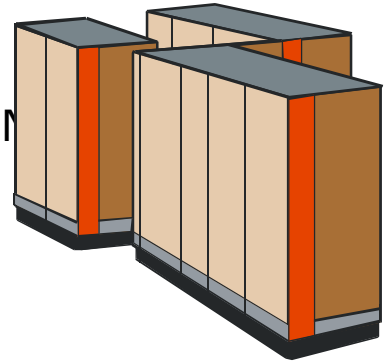
- Information Service (IS)



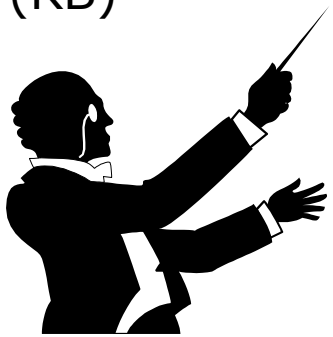
- Replica Catalog (RC)



- Computing Element (CE)
  - Frontend Node
  - Worker Nodes (WN



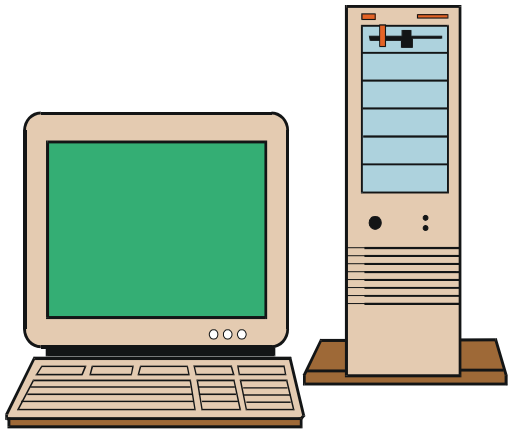
- Resource Broker (RB)



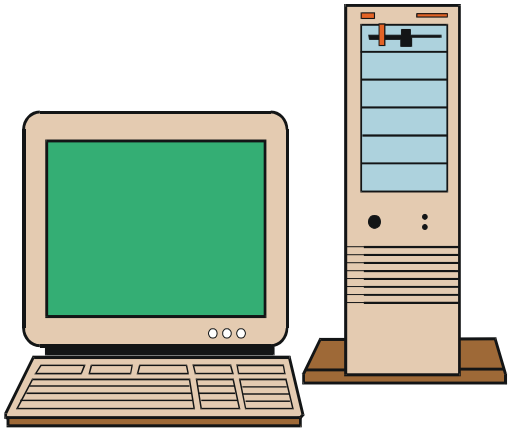
Services per Machine Type

Deamon	UI	IS	CE (frontend)	WN	SE	RC	RB
Globus Gatekeeper	-	-	✓	-	-	-	-
Replica Catalog	-	-	-	-	-	✓	-
GSI-enabled FTPd	-	-	✓	-	✓	-	✓
Globus MDS	-	✓	✓	-	✓	-	-
Info-MDS	-	✓	✓	-	✓	-	-
Broker	-	-	-	-	-	-	✓
Job submission	-	-	-	-	-	-	✓
Information Index	-	-	-	-	-	-	✓
Logging & Bookkeeping	-	-	-	-	-	-	✓
Local Logger	-	-	✓	-	✓	-	✓
CRL Update	-	-	✓	-	✓	-	✓
Grid mapfile Update	-	-	✓	-	✓	-	✓
RFIO	-	-	-	-	✓	-	-
sshd	✓						

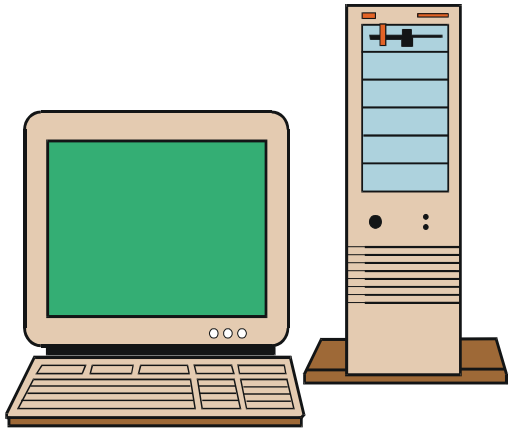
A Simple Testbed Configuration



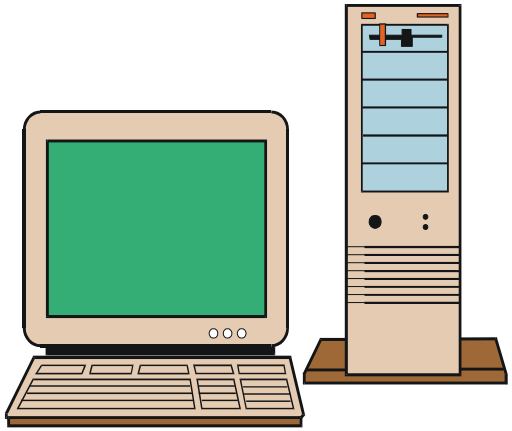
Storage Element 1



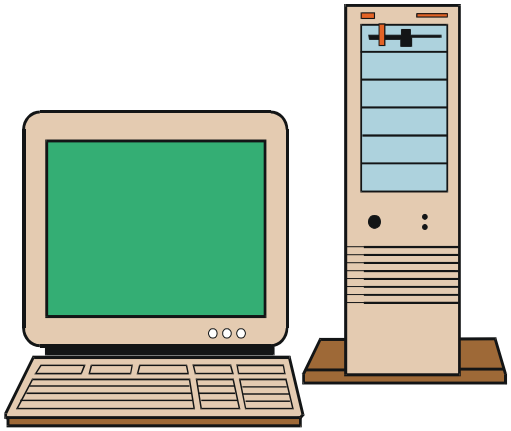
Computing Element 1



User Interface
Resource Broker
Replica Catalog
Information Service



Storage Element 2



Computing Element 2

Testbeds

GriDis dissemination testbed

- Small tutorial and demo testbed
- has access to application testbed

Application Testbed: End-user Applications

- Software: Stable, certified release (EDG 2.0.15)

Certification Testbed: Extended, Detailed Testing

- Software: Tagged release
- State: Starting…; Collaboration with Testing Group/LCG.

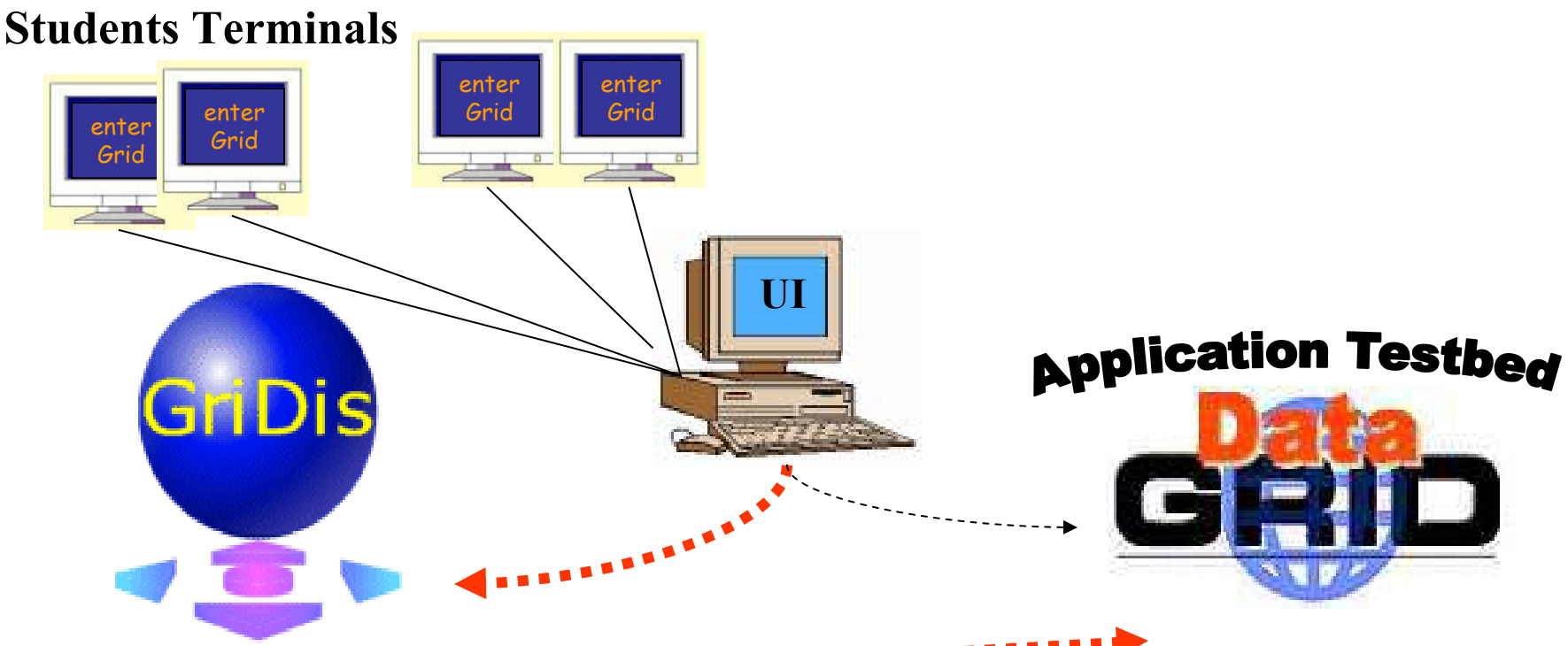
Development Testbed: Integration & Evaluation of SW

- Software: Current tagged release + new pkg. → New tagged release.
- State: Active use; 5 sites involved.

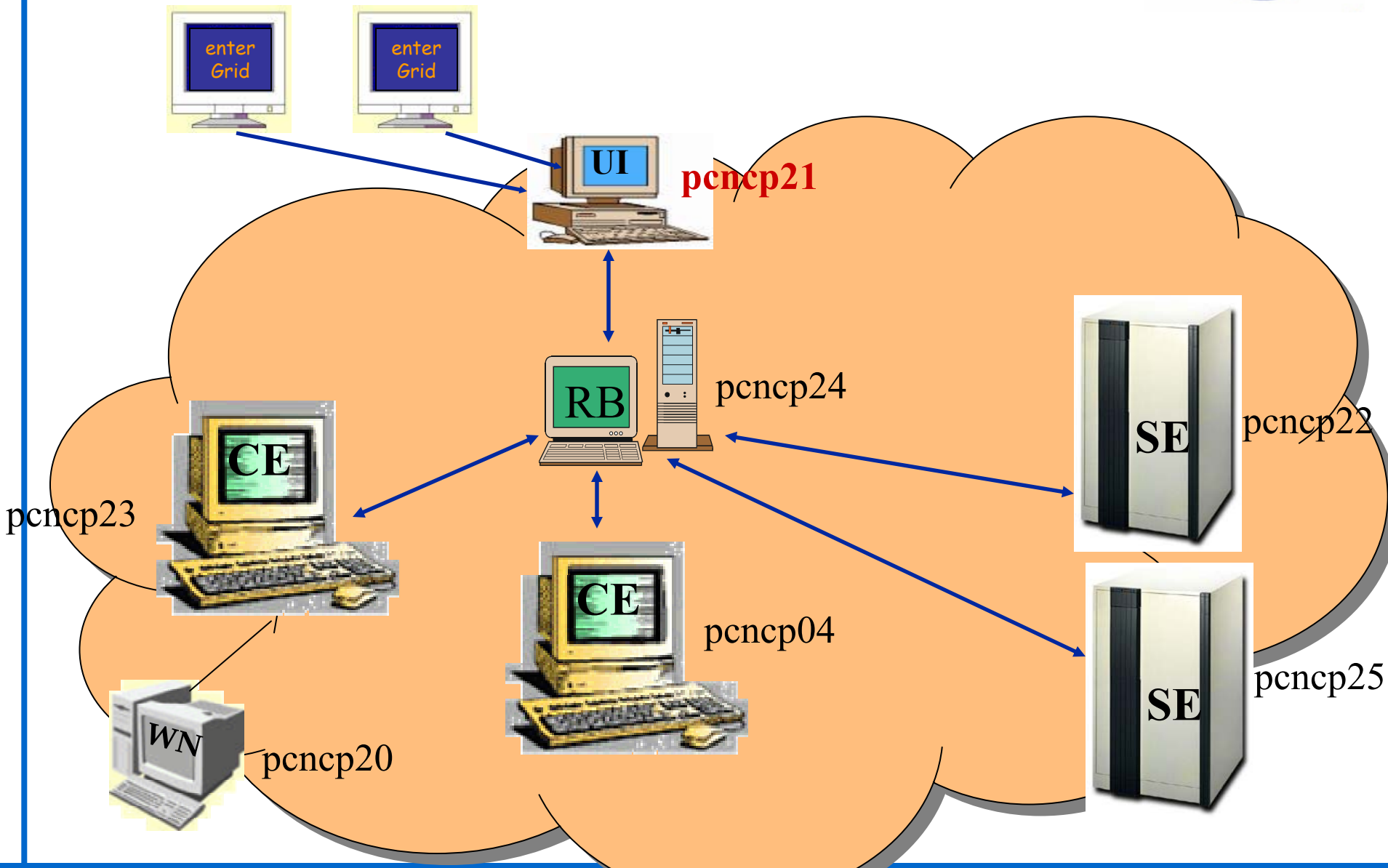
Development Machines: Testing of Middleware in Isolation

- Software: Bleeding edge versions.
- State: Varied; under control of middleware work packages.

General Testbed Overview



NCP Testbed here in Pakistan

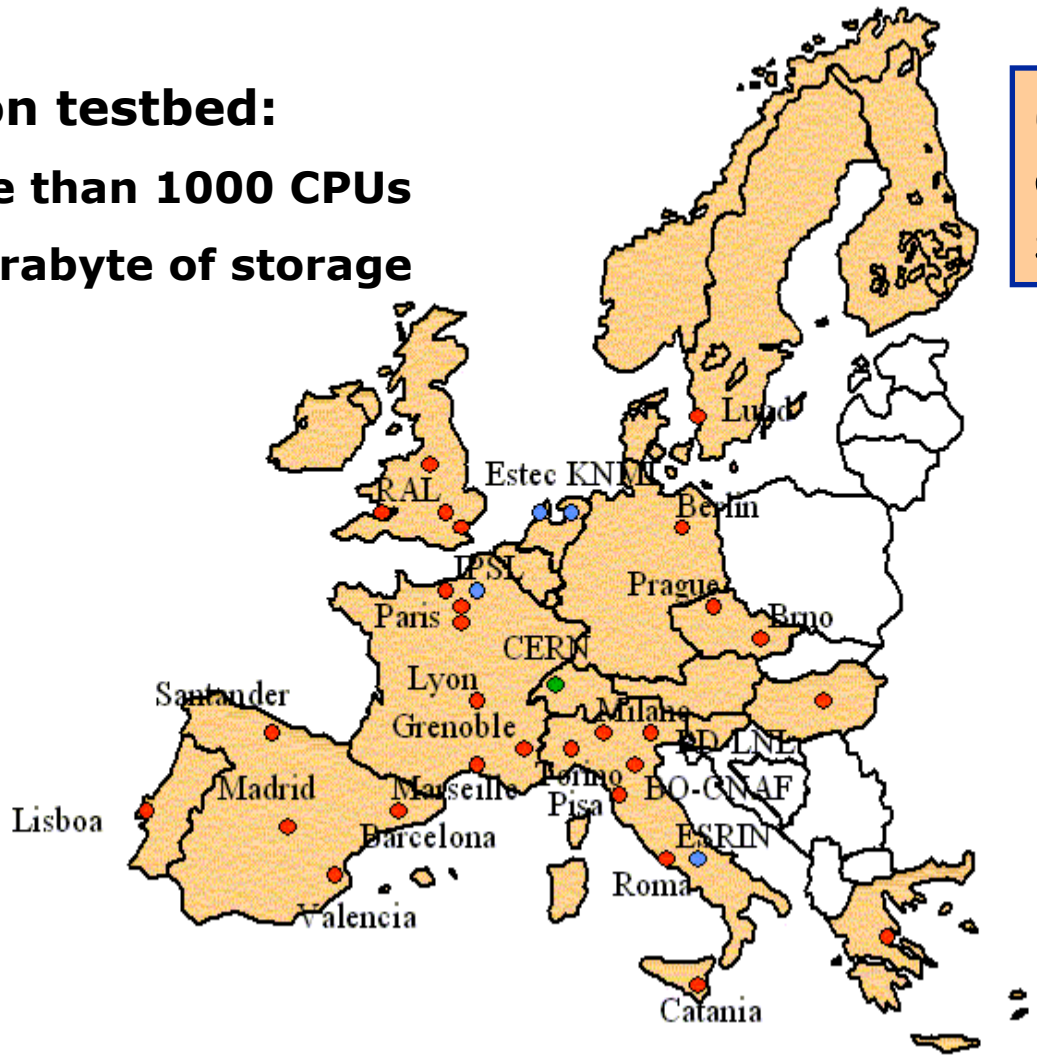


DataGrid testbeds

Application testbed:

More than 1000 CPUs

5 Terabyte of storage



EDG sw installed at more than 40 sites

Application Testbed Resources

Since Last Year:

- Improved software (EDG 1.4.7).
- Doubled sites. More waiting…
  - Australia, Taiwan, USA (U. Wisc.), UK Sites, INFN, French sites, CrossGrid, …
- Significantly more CPU/Storage.

Hidden Infrastructure

- MDS Hierarchy
- Resource Brokers
- User Interfaces
- VO Replica Catalogs
- VO Membership Servers
- Certification Authorities

Site	Country	CPUs	Storage
CC-IN2P3*	FR	620	192 GB
CERN*	CH	138	1321 GB
CNAF*	IT	48	1300 GB
Ecole Poly.	FR	6	220 GB
Imperial Coll.	UK	92	450 GB
Liverpool	UK	2	10 GB
Manchester	UK	9	15 GB
NIKHEF*	NL	142	433 GB
Oxford	UK	1	30 GB
Padova	IT	11	666 GB
RAL*	UK	6	332 GB
SARA	NL	0	10000+ GB
TOTAL	5	1075	14969 GB

*also Dev. TB; +200 TB including tape

Example IS Content

Site: NIKHEF

CE tbn09.nikhef.nl:2119/jobmanager-pbs-qlong:

- PBS queue "qlong" with 96 hours time limit
- Software installed: CMS-1.0.2 ATLAS-1.3.0 ALICE-3.07.01 LHCb-1.1.1 IDL-5.4 NIKHEF D0MCC-0.1-1
- There are 0 jobs running and 0 waiting, with 16 CPUs free

Close SE tbn03.nikhef.nl with mount point /flatfiles

CE tbn09.nikhef.nl:2119/jobmanager-pbs-qshort:

- PBS queue "qshort" with 240 minutes time limit
- Software installed: CMS-1.0.2 ATLAS-1.3.0 ALICE-3.07.01 LHCb-1.1.1 IDL-5.4 NIKHEF D0MCC-0.1-1
- There are 0 jobs running and 0 waiting, with 16 CPUs free

Close SE tbn03.nikhef.nl with mount point /flatfiles

SE tbn03.nikhef.nl close to 2 CEs:

-tbn09.nikhef.nl:2119/jobmanager-pbs-qshort

-tbn09.nikhef.nl:2119/jobmanager-pbs-qlong

- VOs supported: alice atlas biomedical cms earthob lhcb iteam
- gridftp on port 2811
- rfio on port 3147
- file
- 31744 Mb of free space

EDG Software Distribution

- All software available as binary RPMs
- Binaries for RedHat 7.3 > 600 packages including
  - Complete globus distribution
  - EDG packages (~50 packages)
  - Support tools (perl, ant, jdk, …)
- Pre-packaged for different machine types

Issues when Adding new Sites to the Testbed

- EDG is currently setting-up procedures explaining how to add new sites
  - Variations already tested with Taiwan and Romania
  - Step-by-step instructions produced which we expect to become simpler over time
- Need to clarify the "*minimum requirements*" for a site to become a member of the testbed
  - A number of regular tasks have to be performed by the sites administrators
  - A maximum delay needs to be defined for responding to requests/problems if the testbed is to run efficiently
- Sites from new countries have to identify/create a supporting CA
  - Since CAs need mutual trust this could lead to an explosion of inspection activities
- Some tasks will fall on the people responsible for managing the VOs
  - HEP experiment secretariats already perform some level of authentication of their institutes and members. How an we get some leverage from this?

Summary

- Logical machine types of an EDG Testbed
- Mapping of services to logical machines
- Example and current EDG Testbed configuration
- Code distribution strategy

Further Information

- EDG Testbed homepage:

  http://marianne.in2p3.fr/

- Fabric management:

  http://hep-proj-grid-fabric.web.cern.ch/hep-proj-grid-fabric/

- LCFG on EDG Testbed information:

  http://www.lnl.infn.it/datagrid/wp4-install/

http://datagrid.in2p3.fr/distribution/datagrid/wp4/installation/doc/