

The G- **lambda** project

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G- **lambda** project

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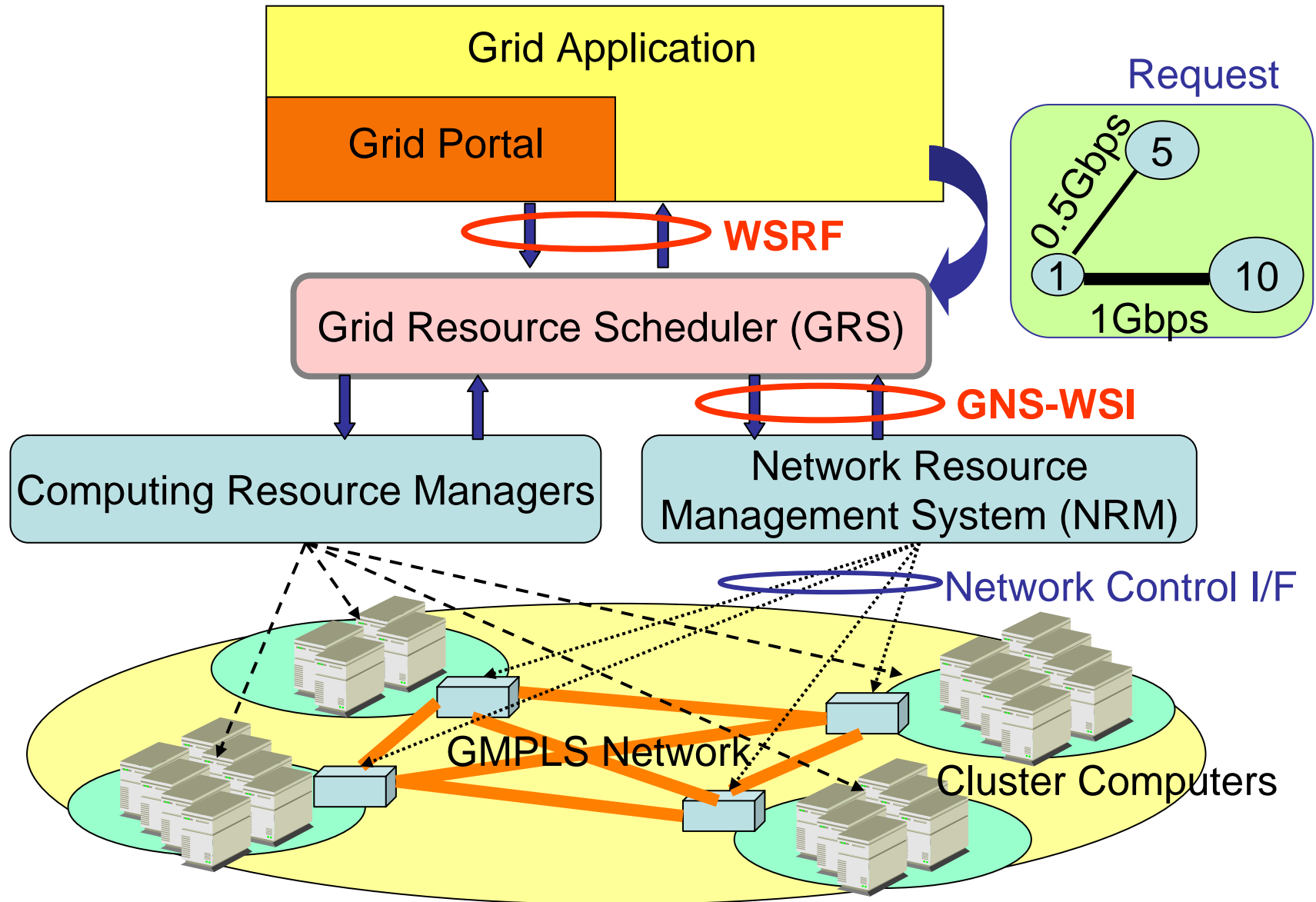
Shinji Shimojo

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Overview of the G- **lambda** project

- G-lambda project has been started in December 2004.
- The goal of this project is to establish a **standard web services interface (GNS-WSI)** between Grid resource manager and network resource manager provided by network operators.
- We have defined a preliminary interface, and conducted a experiment using a JGN II GMPLS-based network test bed.
 - **Live Demonstration at iGrid2005 and SC|05**

System overview



Grid Resource Scheduler (GRS)

- A WSRF based Grid scheduler developed by AIST
 - Implemented using GT4 (Globus Toolkit 4)
- According to users' request, reserves computing and network resources (lambda paths) in advance
 - Accepts requests which specify required # of clusters, # of CPUs at each clusters, and the bandwidth between clusters.
 - GRS selects appropriate clusters by interworking between the NRM and multiple CRMs (Computing Resource Manager)

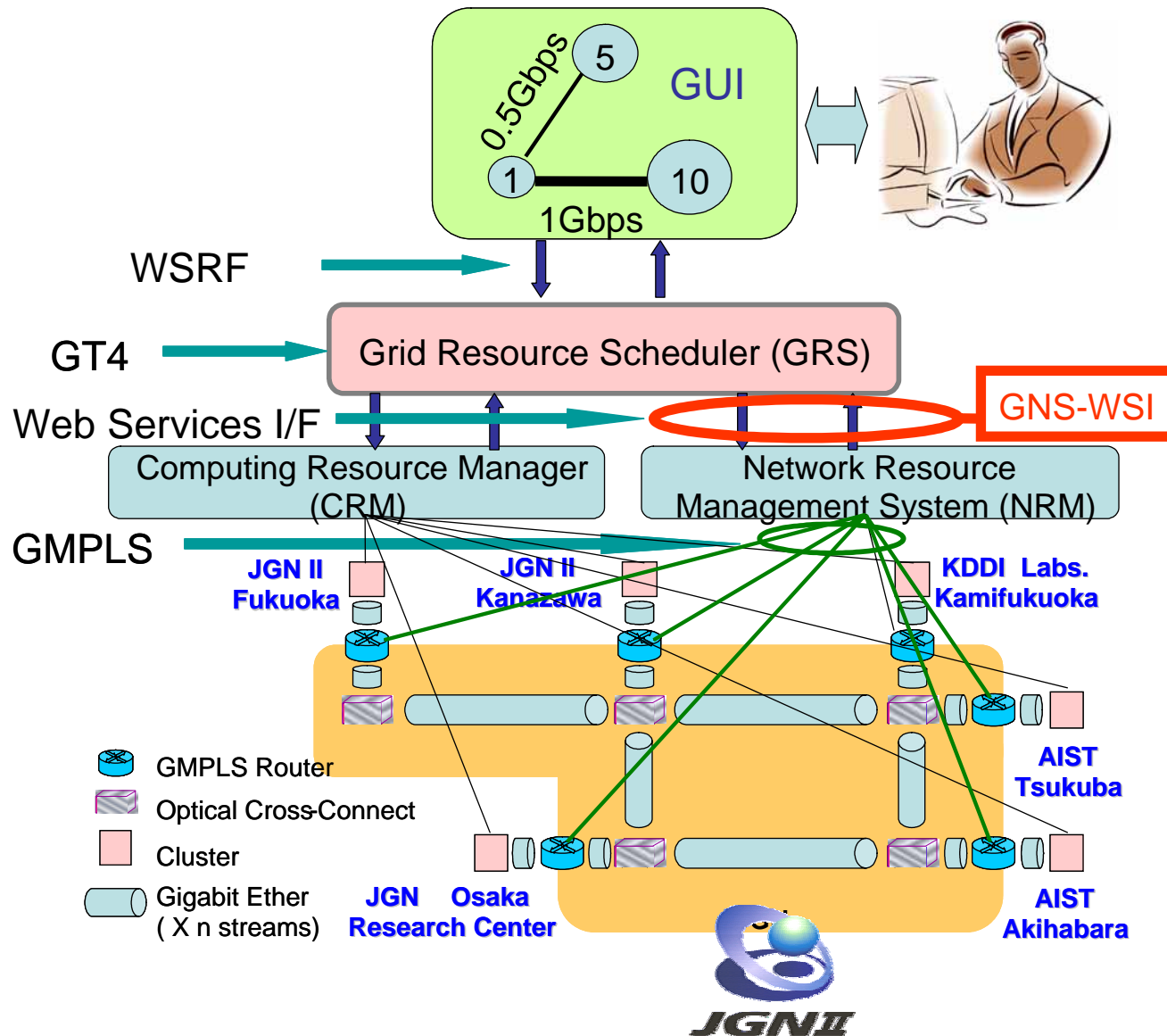
Network Resource Management System (NRM)

- Developed by KDDI R&D Labs.
- **Response to the requests** from GRS through **GNS-WSI**
- Hide detailed path implementation. Provide a path between end points. (**Path virtualization**)
- Schedule and manage lambda paths. When the reserved time arrives, activate paths using GMPLS protocol.

GNS-WSI (Grid Network Service / Web Services Interface)

- Web services interface between GRS and NRM
- KDDI R&D Labs, NTT and AIST are working together to define the specification of the interface.
 - Standardization
- Preliminary interface has been defined
- Polling-based operations
 - Advance reservation of a path between end points
 - Modification of reservation (i.e. reservation time or duration)
 - Query of reservation status
 - Cancellation of reservation

Overview of Demonstration

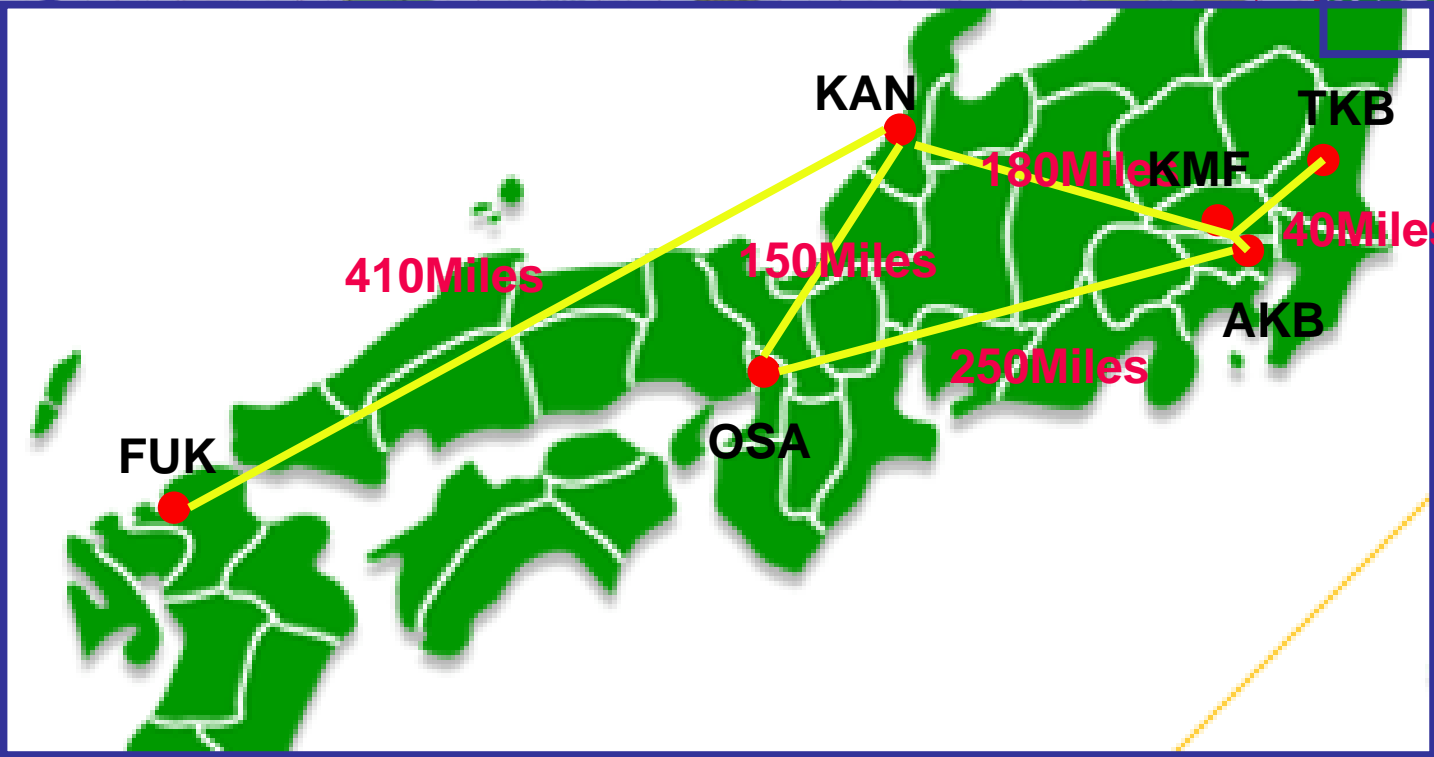
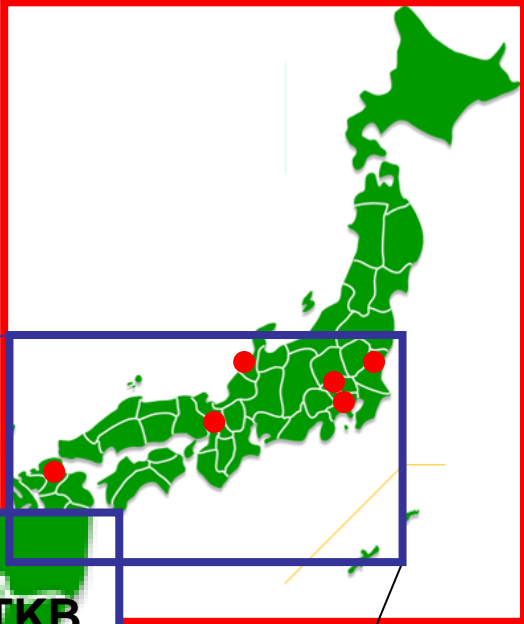


User requests service via GUI, specifying the required number of computers and the network bandwidth needed

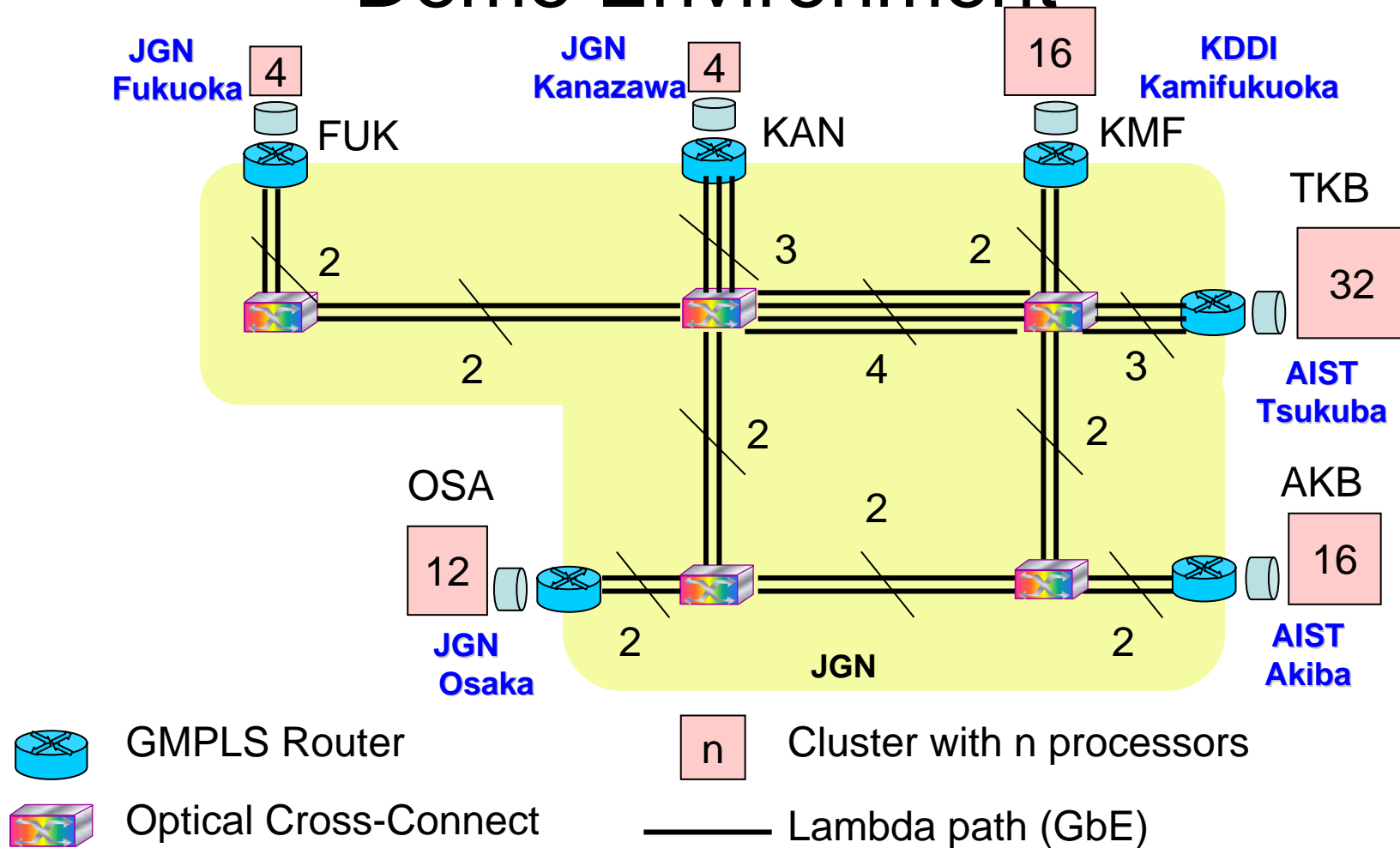
The computing resources and GMPLS network resources are reserved as the result of interworking between the GRS and NRM using GNSWSI (Grid Network Service / Web Services Interface)

A molecular dynamics simulation is executed using the reserved computers and lambda paths. Ninf-G2 and Globus Toolkit 2 (GT2) are used at each cluster.

STANDARD TIME ZONES OF THE WORLD



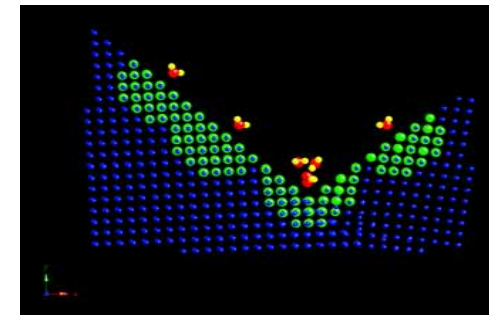
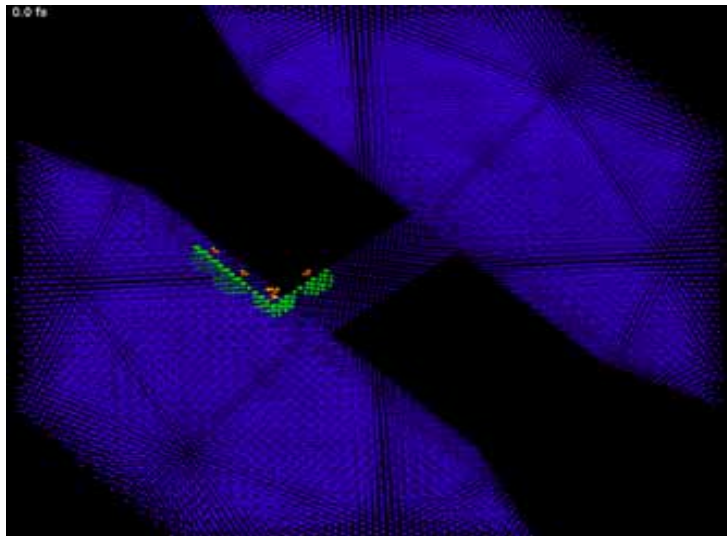
Demo Environment



Clusters distributed over six locations in Japan are connected over GMPLS network test-bed deployed by JGN II

Overview of the Demo Application

- A molecular dynamics simulation implemented with a Grid Middleware called Ninf-G2, that is developed by AIST, Japan
 - Ninf-G2 conforms the GridRPC API, a Global Grid Forum standard programming API for Grid
 - Uses Globus Toolkit 2 for job invocation and communication
- Simulation Scenario
 - [Silicon and water reaction under stress](#)



Start

Global Grid Forum :

A standardization body for grid related technologies

Globus Toolkit :

Infra-ware for the Grid

Future issues of the interface (1)

- Multiple domains
 - Inter-domain control
 - GMPLS (E-NNI...)
 - GMPLS manages everything
 - NRM layer interworking
 - NRM hides implementations. GRS (or user) don't have to care about multiple network domains.
 - Can handle network domains with different control protocols.
 - Requires inter-NRM interface and agreement
 - GRS layer interworking
 - GRS (or user) directly specifies inter-domain connection point
 - Inter-domain exchange point
 - Exchange service

Future issues of the interface (2)

- Information service
 - Do network operators allow centralized information service?
 - Not all the resource availability information may be disclosed
- Definitions of parameters
 - SLA parameters
 - Bandwidth: what is bandwidth, payload?, GbE?
- Lower layer to upper layer notification
 - Action or alarm from lower layer
 - Cancel of reservation from NRM (accident etc.)
 - WS-Notification? Polling?

G- lambda project

<http://www.g-lambda.net/>