Demo using sample-application

0. Sample application

<table>
<thead>
<tr>
<th>Program</th>
<th>a.f</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Read number from &quot;param.dat&quot; file</td>
</tr>
<tr>
<td></td>
<td>Write number to standard output.</td>
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| Data       | param.dat |
| Compile    | script comp.sh |
| Test run script | post.sh |

- Make the above files zipball on user’s PC or remote server in the grid.

PSE

1. Login PSE

2. Register application’s properties

- Register the zipball to PSE archive via GUI
- Register application information / requirements

| Compile script | comp.sh |
| Test run scrip | post.sh |
| Executable     | a.out |
| OS             | LINUX |
| inputfile      | param.dat |

3. Compile application (if needed)

- Select an application and servers for compilation.

4. Deploy application

- Select an application and deploy it to servers that meet the system requirements.

WFT

5. Login WFT

6. Make a new project folder

7. Create workflow in the project

- Make Program icon that represents application in the workflow editor.
- by importing deployed application by PSE (in Step4)
- Make Data icon that represents data file in the workflow editor.
- by uploading data file to URI location specified by data icon
- or creating new data file by data icon’s edit menu.
- Draw line between icons for file staging.
- Save as workflow icon to reuse.

8. Run workflow
NAREGI middleware needs several control servers and computing resources. The installation of NAREGI with RPM tree to setup the NAREGI grid environment is controlled by a NAREGI installation tool on a central node in the control servers.

At first, resources (hostname, IP address and host certificate domain name) and roles (portal, super scheduler, etc.) are defined with the NAREGI installation tool. In the next, installation processes are performed in each control server depending on the resources and roles. Finally, the NAREGI grid services are invoked.

Large scale coupled simulations, which are generally constructed from several programs, can be executed on the NAREGI grid environment. For example, the RISM-FMO coupled simulation for structural and functional studies of Nano-scale molecules in a solvent is synchronously executed on the distributed computing resources co-scheduled by the NAREGI middleware. All the operations for the execution were performed on the portal node in the control servers.
NAREGI Middleware demonstration across Osaka Univ. and Tokyo Tech

Online job-submitting and VO based accounting using NAREGI Middleware

The NAREGI middleware beta version demonstration performs across Cybermedia Center (CMC), Osaka University and Global Scientific Information and Computing (GSIC) Center, Tokyo Institute of Technology (Tokyo Tech). All of the NAREGI middlewares are deployed on the CMC site. The GSIC acts a resource provider then IS-CDAS, GridVM server and Grid VM clients are deployed on the GSIC site.

Online job-submitting demo: A RISM-FMO program which developed and deployed by the Kyushu Univ. team performs coupled simulation that determines electronic structure of molecules in a solution. The user submit a RISM-FMO job form Portal in CMC then Super Scheduler (SS) performs the resource reservation, the job execution. For example the FMO part of the job executes on PC Cluster of CMC, Osaka Univ., the RISM part executes on Large memory nodes of GSIC, Tokyo Tech, co-scheduled and communicating via Grid MPI. The Information Service (IS) monitors traffic between CMC and GSIC. During and after the job execution completes, its resource usage is record in Resource Usage Service (RUS) according to the OGF-UR.

VO based accounting system demo: VO based accounting system is able to total the used computing resource by each VO which a user belongs to.
Grid Resource Co-allocation using Advanced Reservation

NAREGI middleware allows users to make advanced reservation of computing resources to execute their jobs and NAREGI Super Scheduler finds and allocates multiple of appropriate resources simultaneously across multiple sites on the Grid according to requirements for the execution. The co-allocation function allows users to execute complex jobs such as coupled simulations in nano-science and specify type of the computing resources to be heterogeneous. The GridVM virtualizes the heterogeneity of advanced reservation and job submission interface to each resource in cooperation with WS-GRAM and local schedulers. Information Service collects and maintains various information in terms of the grid resources, for example, it can show resource administrators how many resources are reserved and used. A user uses the grid as a member of Virtual Organization for his research and NAREGI Portal, Super Scheduler and Information Service can be set up for each VO so that the members could share the grid resources appropriately. NAREGI widely adopts grid standards and will contribute standardization and grid interoperation.
Storing huge-size files into the NAREGI Data Grid Environment

The Data Grid Environment supports **dynamic file striping** for storing very huge files of which sizes exceed the available disk amount of a file server.

1) When a file server causes a disk-full error during a write operation, the Grid File System automatically switches it to another file server and continues the write operation on the server.

2) By arranging the Gfarm metadata information of those file fragments on their servers, one can access them as a single consecutive file as if they are concatenated into the single one.

3) The effectiveness and performance of the file striping is demonstrated on the environment.
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Concept

Targets various applications
- SSO of Web services
- E-mail Digital Signature/Encryption by S/MIME
- Network Services
  - wireless LAN roaming and VPN
- Grid computing

Utilization of PKI
- "U" stands University/Universal/Ubiquitous
- Deployment of Grid/PKI middleware for national academic AA infrastructure
Grid Network Services

The grid middleware, which handles grid resource management such as computing resource, has been proposed and developed for the efficient and distributed processing of grid applications. In order to achieve efficient network resource utilization for grid applications, the network service architecture in cooperation with grid middleware is required. The network services required to grid middleware include monitoring, allocation and scheduling of network resource.

We propose the grid network service framework and develop it as network management system for grid middleware, consisting of these network services and functions cooperating with super scheduler, one of grid middleware. Our developed network management system provides super scheduler the function of search refinement of clusters in the network from the perspective of network resource such as topology information or network monitoring information.

Our grid network service framework enables super scheduler to consider not only utilization of computing resource like CPU or memory but also network resource when task scheduling.