

Application Hosting Service (AHS)

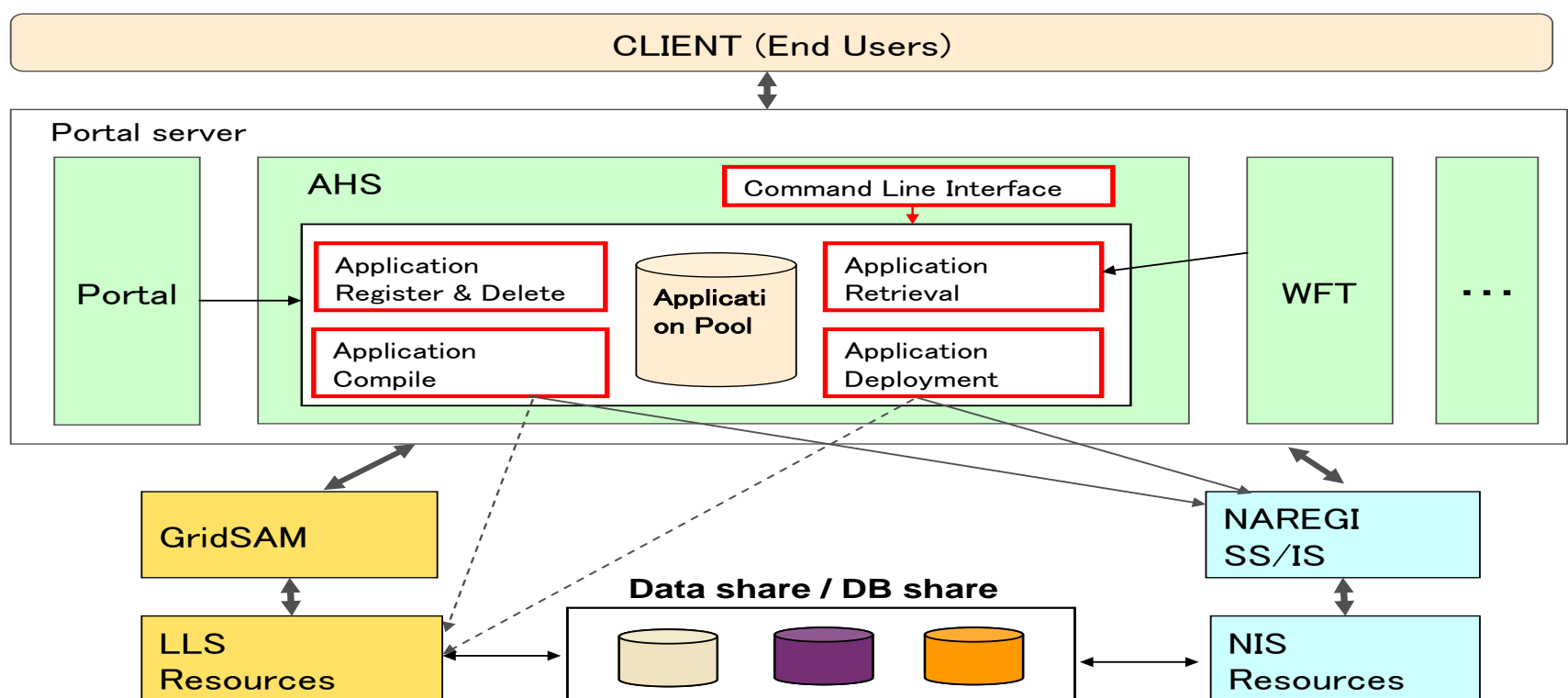
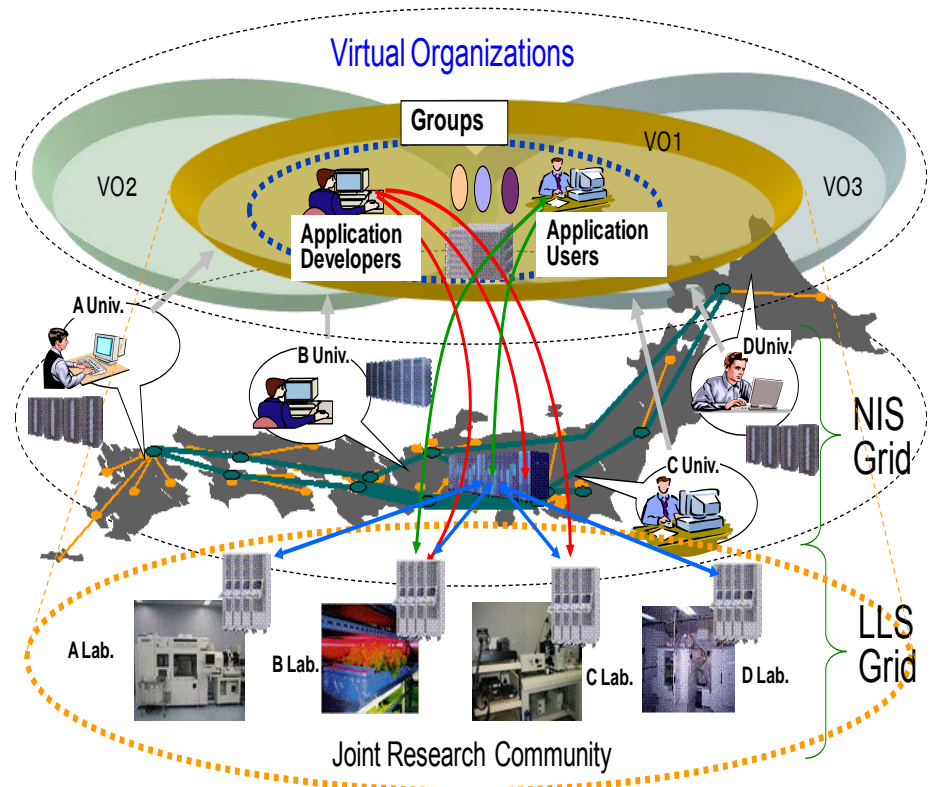
Application Hosting Service (AHS) provides repository of application information to the research community created by grid virtual organization (VO). Community members can share the applications and their execution environment on the hierarchical grid environments as shown in the right Figure. In a research community, application users need to know only the application specifications, such as the application name or keywords for selecting the applications.

Architecture

AHS basic architecture is constructed as a set of Web/Grid service infrastructure on top of WSRF (Web Services Resource Framework) specifications. WSRF is a messaging model and provides the ability to model stateful resources in a framework of Web services. AHS operates cooperatively with the workflow tool and access to NAREGI-SS (Super Scheduler) for the NIS or GridSAM for the LLS as shown in the bottom Figure.

Collaboration in the research community

The developed application is provided to users or user groups who are collaborating closely with the developers. Because the application users have relatively less knowledge about the application than developers, it is necessary to encapsulate that information at the time of the use of the application. Also, detailed information about the grid environment should be hidden from the application users.



Grid Interoperation

During the past decade, computing environments for scientific research and engineering have been big innovated by grid technologies. In the past, computing environment was organization closed systems. But nowadays, many organizations participate virtual organizations and share their resources with other organizations using grid technologies. This made that the end users can use variety of systems, data, applications, and so on beyond the wall of real organizations. These resource sharing are prospected to accelerate scientific collaborations. However, there is a problem in international collaborations. The regional grid infrastructures are using different grid middleware and they can't share resources across grids because they are using proprietary specifications. To solve this problem, many grid projects are making efforts to develop standard specifications in the OGF (Open Grid Forum) and implement them. The RENKEI project is participating these efforts, **The Grid Interoperation**.

Architecture

The RENKEI grid interoperation feature is developed as extensions of NAREGI grid middleware. The extensions are compliant with the OGF/HPCBP (HPC Basic Profile) and related specifications. Figure 1 shows the architecture of grid interoperation.

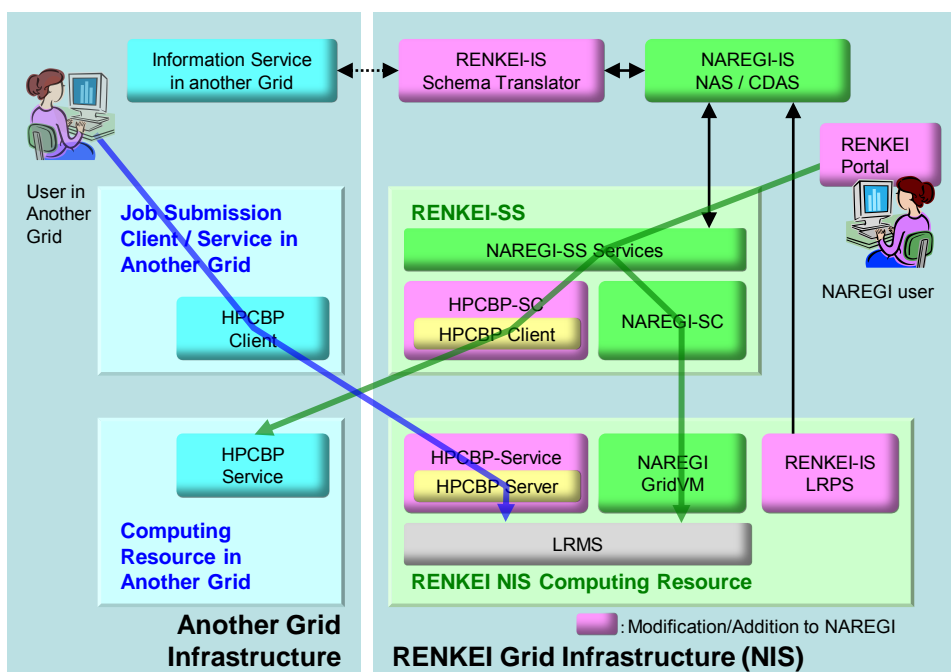


Fig. 1 Grid Interoperation Architecture

The HPCBP-Service accepts the HPCBP compliant job requests from other grids, and submit the jobs into under laying LRMS. The HPCBP-SC is the job submission point to the HPCBP compliant resources in other grids.

The IS Schema Translator exchanges resource information with other grids using GLUE schema, and translates it to/from CIM schema which is commonly used in the RENKEI/NAREGI middleware. The LRPS provides interoperation related resource properties to IS.

Interoperation Demonstrations

The RENKEI project participates OGF/GIN (Grid Interoperation Now) activities with some other grids. We have succeeded in submitting an application job from UK to five computing resources on different grid infrastructures in different countries (Fig. 2). This activity was demonstrated at the 5th IEEE eScience conference and OGF28.

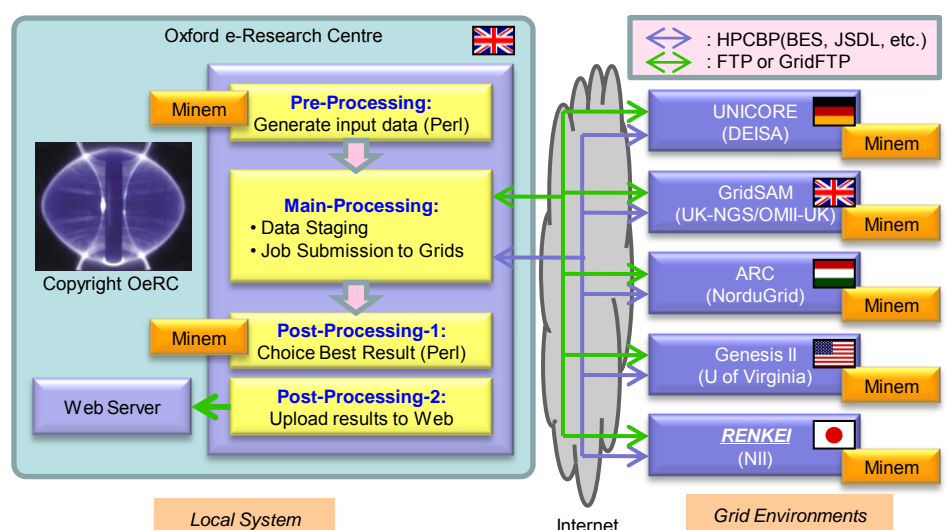


Fig. 2 Grid Interoperation Demonstration

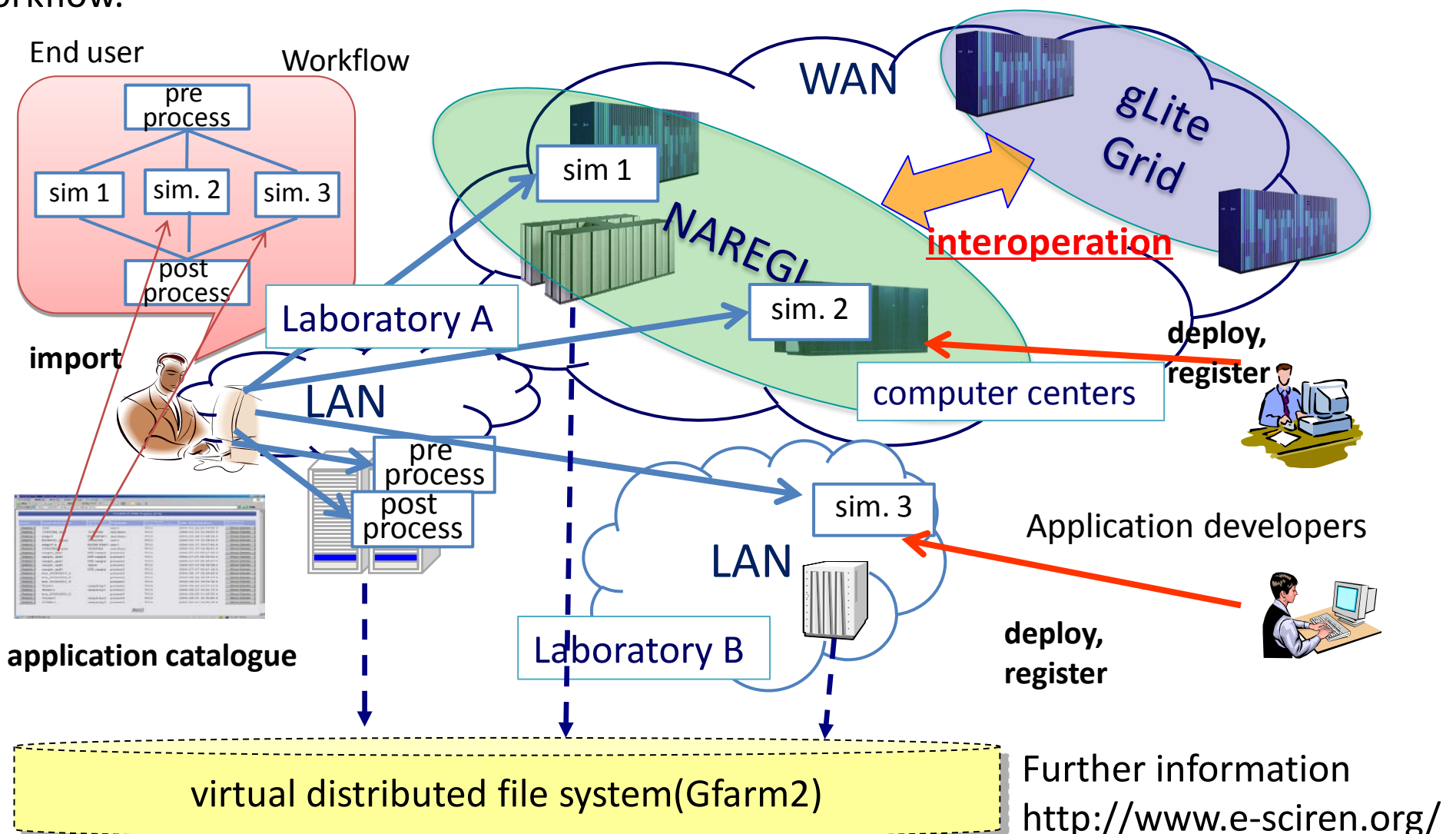
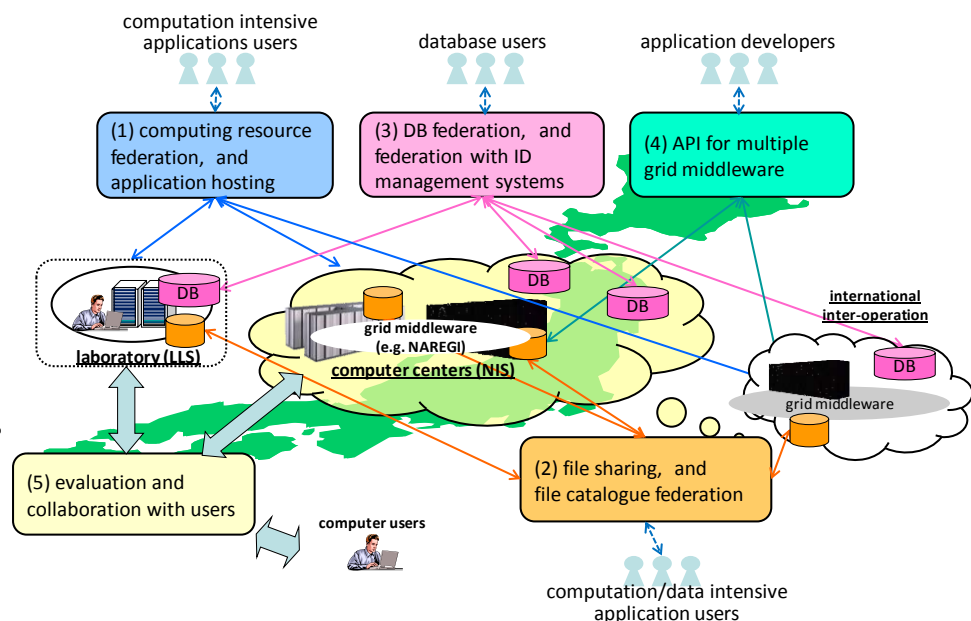
Grid Technology Enabling e-Science

RENKEI(Resources liNKage for E-science) is a new project designed for an software environment where researchers can create and operate research community easily. They can develop and run sharing application programs on distributed various grid resources without knowing the details of any particular underlying grid middleware.

AHS(Application Hosting Service) provides a software environment for developing and deploying scientific applications on NAREGI grid resources and on laboratory resources. Application developers use the AHS to register and deploy applications and to share them within research community members.

WFT(Workflow Tool) provides end users with a single seamless interface to manage workflow jobs. They use the WFT to discover appropriate resources, to specify workflow jobs consisting of applications deployed by using the AHS on various grid resources, to launch jobs , to monitor running jobs, to terminate jobs and to retrieve files to client machine.

The **grid interoperation** feature enables mutual job submission with other grids using OGF/HPCBP and related standards (BES, JSDL, etc.). The users can use computing resources in both RENKEI/NAREGI NIS and other grids seamlessly in a single NAREGI workflow.



How To Use REKEI –WorkFlow Tool

WFT(WorkFlow Tool) is a set of end-user tools to interact with a service exposing heterogeneous execution resources uniformly. Using it they can submit and start jobs to LLS and NIS computer resources, monitor jobs, terminate jobs and transfer files between them. The following demonstration of a flow simulation around cylinder using LLS computer resources here in Jimbocho and NIS computer resources in Nishi-Chiba will show a good example of the effectiveness of this interface.

Assumption: Program consists of preprocess code preparing simulation execution, number crunching simulation code for fluid and postprocess code visualizing numerical results. They have been already developed, registered and deployed with LLS/NIS resources by you or a member of a research community using AHS.

1.Single Sign On : Sign on to the RENKEI-Portal, which enables a user to access WFT/AHS tools, to permit using computer resources in LLS and resources in NIS belonging to a research community.

2.Workflow Preparation: Create or modify a workflow using LLS, NIS program icons and LLS, NIS data icons. i.e. Specify execution properties for preprocess, postprocess in LLS and flow simulation in NIS by using Program Icons(■ LLS ■ NIS). They contain generic job identification information, application description, resource requirements and description of required data files. Specify file's URI for input and output files using LLS, NIS data icons.

3.Workflow Execution: Submit the coded workflow job into LLS and NIS system. Monitor its execution. Visualization of flow simulation is displayed in your computer in LLS. Another scenario execution can be obtained easily by changing the data icons acting for input files.

