COLAB: Leeds / Beihang Universities CROWN Grid research collaboration

Background

The CROWN (China Research environment Over Wide-area Network) is a grid middleware system developed at Beihang University in Beijing, China. It is based on Globus toolkit version 3.9.3, and supports OGSA/WSRF and WS-I. It includes the concept of RLDS (Resource Locality and Discovery Service) services that provide information on resources within the CROWN system, as well as providing a "CROWN Designer" eclipse plug-in to support the development of WSRF services. In addition to this, the CROWN middleware allows "hot deployment", whereby services may be deployed simply by copying the appropriate GAR file into the deployment directory. There also exists a CROWN portal (found at http://www.crown.org.cn/en/), which aims to provide a unified interface for job submission and system management.

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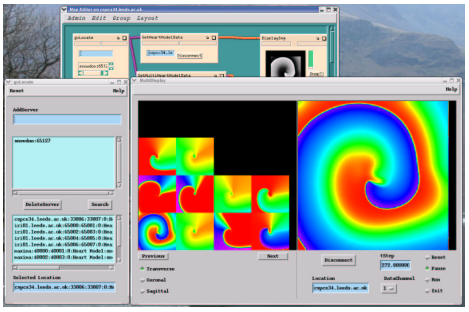


The e-Viz application

The CROWN software is extensive, and is used by pilot applications in a number of Chinese e-Science projects.

COLAB collaboration

Beginning in the summer of 2005, the University of Leeds (UK) and Beihang University (China) have been collaborating together to integrate the White Rose Grid (a virtual organisation which comprises partners from the three Yorkshire Universities of Leeds, York, and Sheffield) with the CROWN Grid system in China. This collaboration is called COLAB (Collaboration between Leeds and Beihang universities), and is co-led by Profs. J. Xu (Leeds) and J. Huai (Beihang), and managed by the EPSRC WRG e-Science Centre of Excellence.

Two research sub-groups have been created, leveraging expertise at the two sites in order to perform research in the areas of Fault and Attack Tolerance, and Fault Injection-based Evaluation, with the intention of publishing a large number of academic papers. These groups are looking at – amongst other topics – the provision of topologically aware fault and intrusion tolerance in Grid systems, and the provision of revised fault models for Grid applications.

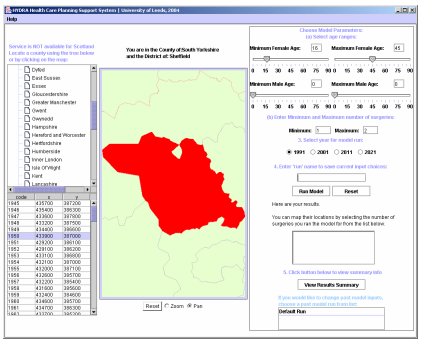
Weekly meetings which involve every participant in the collaboration take place using the Access Grid, and regular research seminars are organized. The results of this are a high level of collaboration and cooperation between Leeds and Beihang.

Integrating CROWN and the White Rose Grid

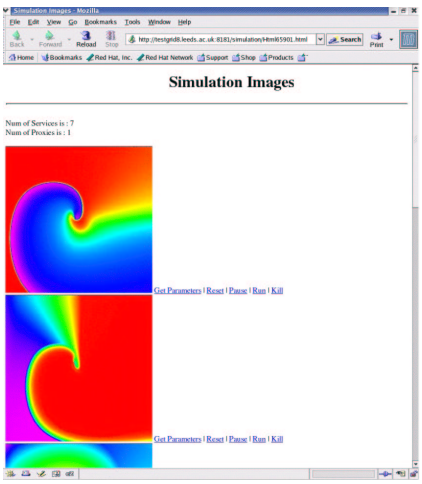
Currently, CROWN middleware has been deployed and registered on a test grid comprising of 6 machines at the University of Leeds, with both normal and "secure" CROWN servers installed.

Work is currently being performed to deploy a computational biological visualization service and a healthcare-planning support system onto these joint systems.

Additionally, a Resource Location and Discovery Service (RLDS) has been deployed to register and maintain information about the resources available at Leeds. This RLDS service is in turn registered with the main CROWN RLDS service located at Beihang University, thus connecting the two Grids together.



HYDRA application



e-Viz Simulation status page

To test the initial linkup, BLAST (Basic Local Alignment Search Tool) and AREM (Advanced Regional Eta-coordinate numerical prediction Model) services have been deployed, and jobs scheduled and executed across the Leeds/Beihang system. The deployment of these services was relatively straightforward, and no difficult issues were encountered. Work is currently being performed to deploy a computational biological visualization service (g-Viz) and a healthcare-planning support system (HYDRA) onto these joint systems, with the aim of then performing a thorough comparison of the levels of security and performance offered by both Globus Toolkit version 4 and CROWN middleware. Once this evaluation is completed, the results will be publicized through appropriate channels. Work will then be performed to move the Leeds CROWN resources onto the White Rose Grid.

Current observations

Efforts to deploy CROWN services at the University of Leeds have been relatively straightforward, and the COLAB collaboration has enabled quick responses to any questions raised. The only minor issues currently encountered have been with documentation (sometimes English translations lag behind the Chinese versions) and occasional poor network performance between the UK and China. We envision rapid progress to be possible during the forthcoming months.

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Related websites:
http://www.crown.org.cn/en/
http://comp.leeds.ac.uk/distsys/