Towards a Collaborative Orthopaedics Research Environment

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Funded by: JISC

Project Website: http://www.core.ecs.soton.ac.uk

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Motivation

- Infrastructures to support increasing number of researchers in biomedical field
- Integration of data generated by diverse bio-informatics tools
- Collaborative research to reduce cost

Objectives

- Ascertain the user requirements for a Virtual Research Environment (VRE)
- Develop an infrastructure based on a Service-Oriented Architecture (SOA)
- Build a demonstrator incorporating services that allow users to create, manage and discuss their clinical trials
- Report on the evaluation process and results

Infrastructure

- The CORE is a follow-up project to VOEU, which support the educational process and to aid surgeons in preparing findings for publications
- However, the VRE in VOEU is based on a tightly coupled architecture
- The CORE takes the foundation of VRE in VOEU and decomposes them into Grid/Web services

Planned functionalities

- Formalizing trial protocols
- Storing data
- Analyzing data
- Submitting and reviewing articles
- Discussing trial findings in forum

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Requirement study

- Objectives of the study:
  - To identify the requirements of users for a VRE
  - To discover developments that would enhance the planned functionalities in the CORE
  - To assess the current practice of users in discovering, locating and using research findings to inform the enhancement of such processes through the VRE

Requirement study

- Methodology:
  - Semi-structured interviews
    - Involved five professionals who work as researchers in the computer science field and medical field
  - Online survey
    - Involved 17 orthopedic surgeon (including 14 Higher Surgical Trainees and one consultant)

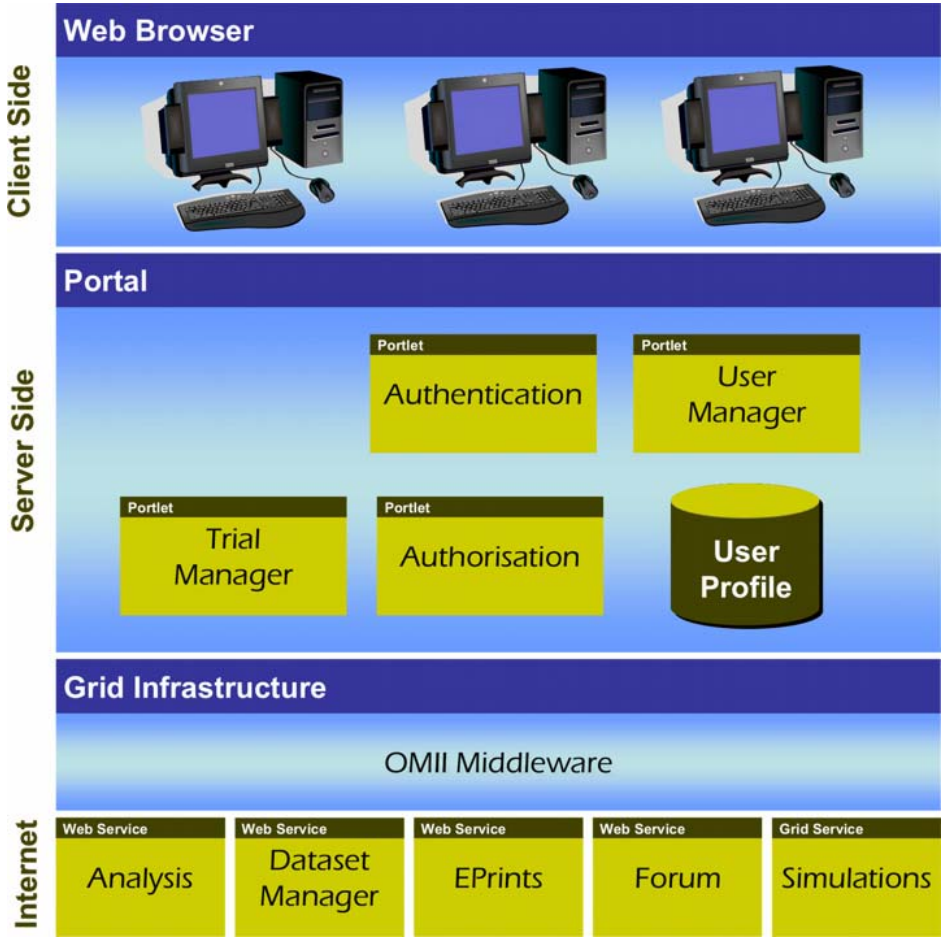
Requirement study

- Major findings:
  - Majority of the participants welcomed the idea of sharing research resources
  - Contextualise resources and data presentation
  - Users would like to utilise Grid in running large scale simulations
  - Toolkit in the VRE should be made easy to use
  - Inclusion of statistical analysis tools and authoring tools is essential in the VRE
  - Majority of the participants use Google and PubMed to locate research materials
  - Flexibility in adding services
  - Some participants are concerned with the issues of intellectual capital

Requirement study

- Recommendations:
  - A portal is an appropriate technology to construct a VRE
  - The accessible resources should be made easy to browse, upload and download
  - There is a need to develop a Grid/Web service based research environment, which can adapt to changing user requirements
  - All participants agreed that the planned functionalities in the VRE are essential
  - Grid infrastructure should be included in the VRE as it provides secure access to resources
  - Metadata in VRE should be utilized effectively so that resources in the portal can be retrieved via search engines

Architecture



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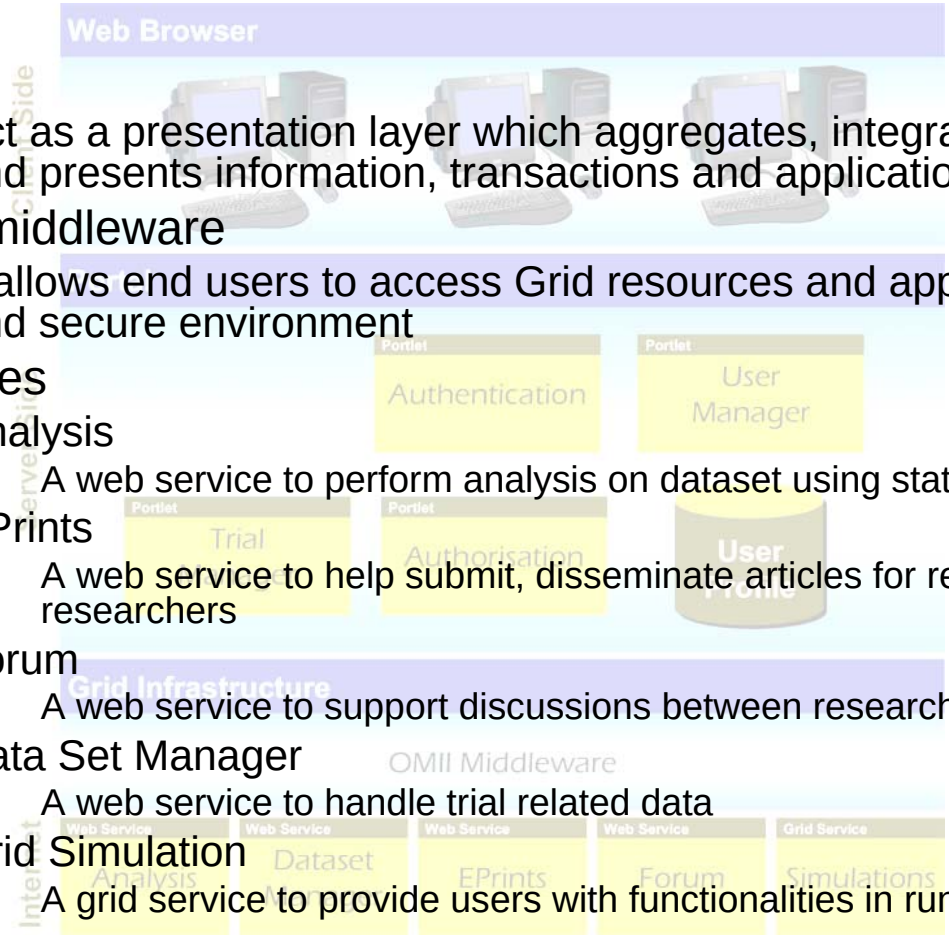
Architecture

- Portal
  - Act as a presentation layer which aggregates, integrates, personalises and presents information, transactions and applications to users
- OMII middleware
  - It allows end users to access Grid resources and applications in a trusted and secure environment
- Services
  - Analysis
    - A web service to perform analysis on dataset using statistical method
  - EPrints
    - A web service to help submit, disseminate articles for reviewing between researchers
  - Forum
    - A web service to support discussions between researchers
  - Data Set Manager
    - A web service to handle trial related data
  - Grid Simulation
    - A grid service to provide users with functionalities in running their simulations



Conclusions

- CORE VRE is being re-engineered as a loosely coupled system using SOA concepts and Grid/Web service technology
- The VRE supports sharing and dissemination of research findings, i.e. data and publications
- The use of Grid services for distributed computation means that powerful analysis and modelling tools can be made accessible to individual researchers
- Investigate semantic Grid/Web services issues to enhance the functionalities of the proposed VRE

Questions

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