A Web/Grid Services Approach for a Virtual Research Environment Implementation

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

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Agenda

- Motivation
- Proposed Solution
- The VOEU Approach
- The CORE Approach
- Requirement study
- Architecture
- Conclusions

Motivation

- Infrastructures to support increasing number of researchers in biomedical field

- Integration of data generated by diverse bio-informatics tools

- The need of collaborative research to reduce cost

- Grid focuses only upon the immediate aspects of science

Proposed Solution

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

The VOEU Approach

- The CORE is a follow-up project to VOEU, which supports the educational process and to aid surgeons in preparing findings for publications

- The VOEU VRE consists of schema space and user space

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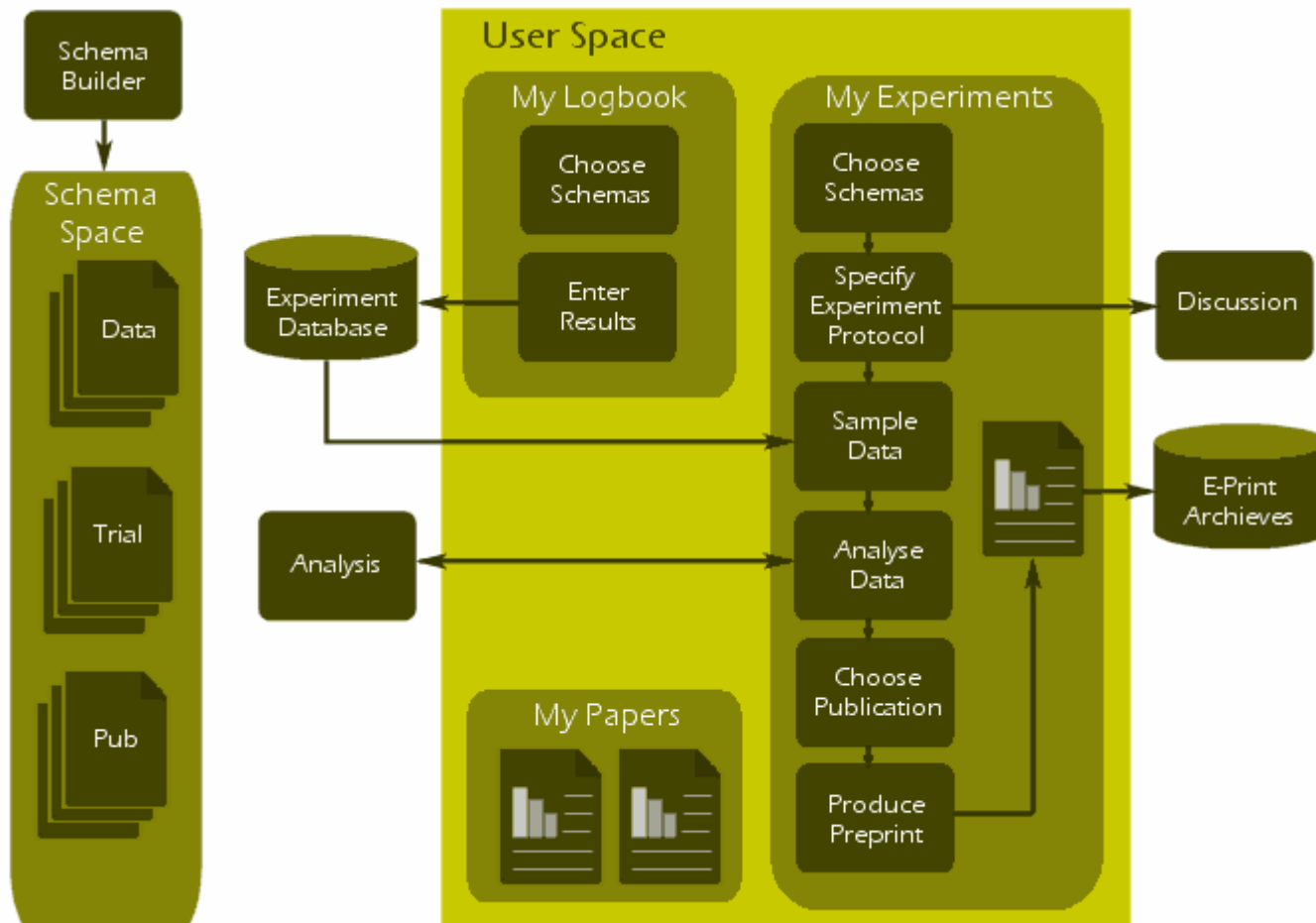
The VOEU Approach

The CORE Approach

- The VRE in VOEU is based on a tightly coupled architecture
- The CORE takes the foundations of VRE in VOEU and decomposes them into Grid/Web services within a SOA

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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

- 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 tools (services)
  - Some participants are concerned with the issues of intellectual capital

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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
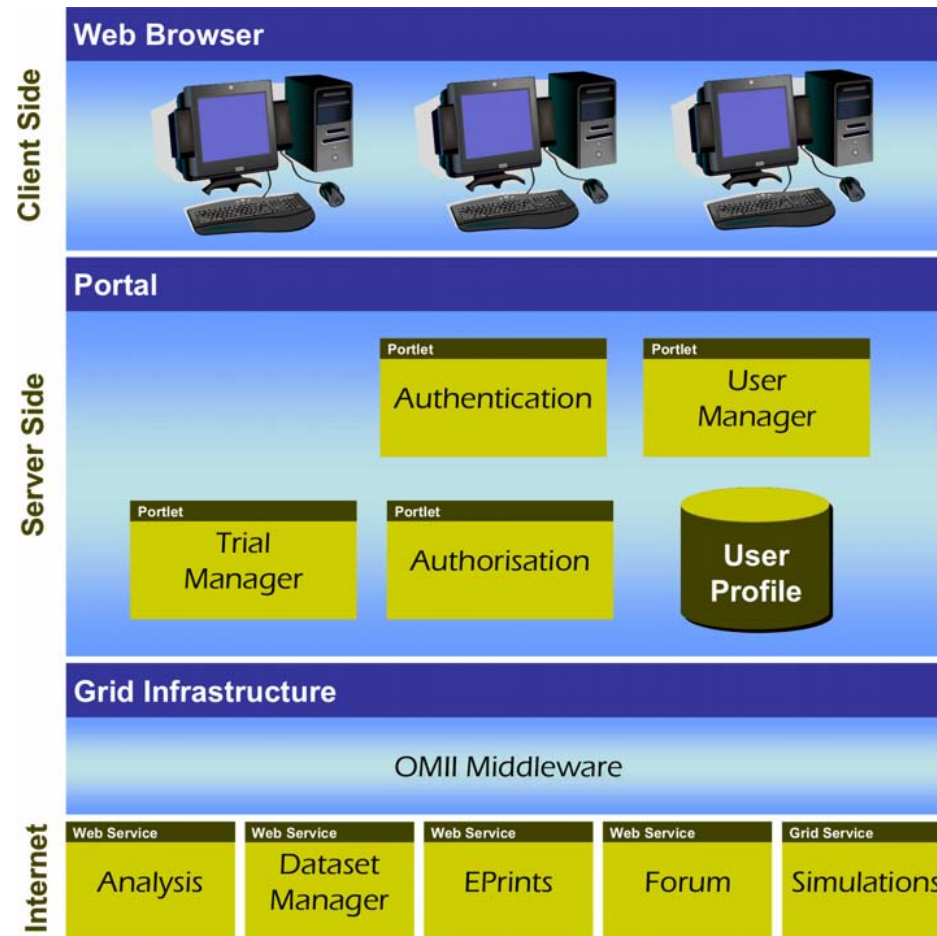
Architecture

- **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
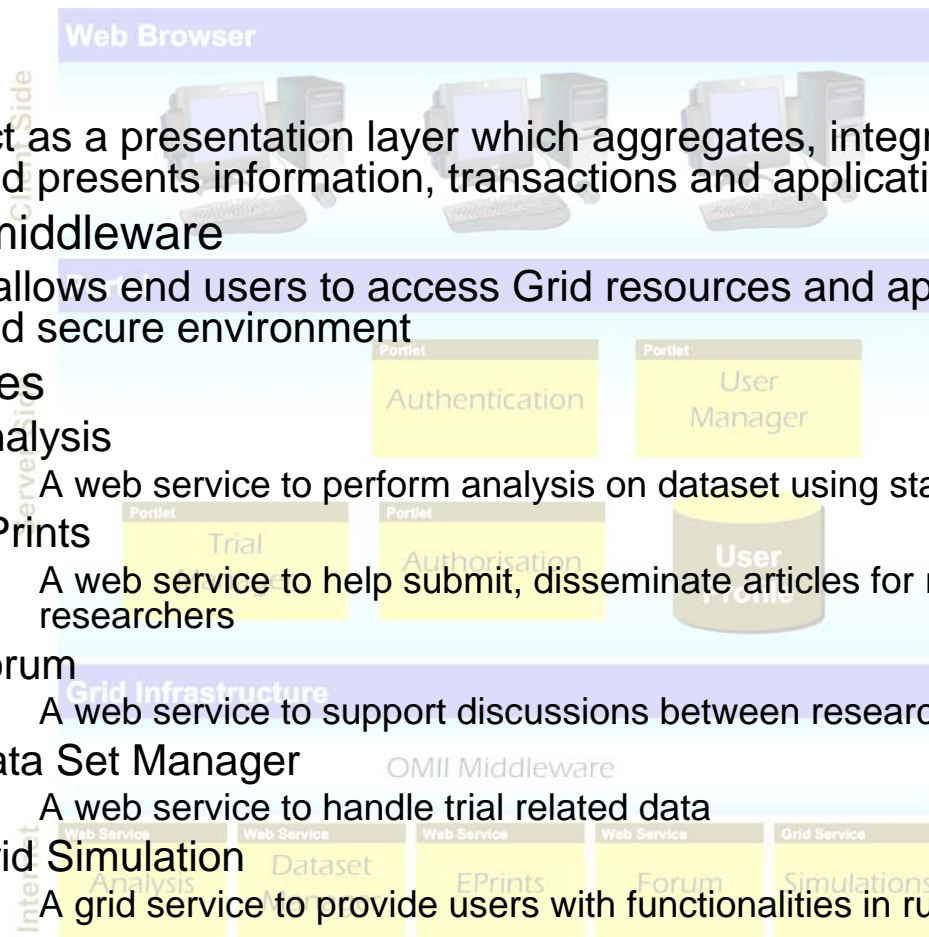 - Forum
    - A web service to support discussions between researchers
  - Data Set Manager
    - A web service to handle trial related data
  - Grid Simulation
    - A grid service to provide users with functionalities in running their simulations

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Conclusions

- VRE in VOEU 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
- Building a VRE demonstrator and conduct a evaluation

Questions

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