



THE AUSTRALIAN NATIONAL UNIVERSITY

**FACULTY OF ENGINEERING AND INFORMATION TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE**

Web Portal for a Fusion DataGrid

Client & Supervisor: A/Prof. Henry Gardner

Supervisor: Dr. Raju Karia

Student: Xiaobin Wang

(u4266538)

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Abstract

This report outlines the project plan of the development of a web portal for a fusion datagrid for the eScience project course COMP8770, at the Australian National University.

The core idea behind this project is retrieving nuclear fusion datasets from an MDSPlus based data server using a web browser.

In this project what I will add to the existing system is as follows:

- I will implement the Jini architecture to the existing WebScope3 system.
- I will add a CAS-based security sub-system to the existing WebScope3 system.
- I will add other features according to the client's requirement.

1 Introduction

1.1 Overview

1.1.1 Background

Currently nuclear fusion research is being performed at various locations of the world. Millions of nuclear fusion datasets are generated as a result of various nuclear fusion experiments happening at different research organizations. It is very important for the researchers to share the datasets for mutual research benefits. The safe storage and retrieval of fusion datasets is currently done using a data storage and management system known as “MDSPlus” [4].

For research purposes, several students supervised by Dr. Henry Gardner have worked on “Scope projects” over the past two years. By the end of Semester 2 2007, there were two versions of Scope: “EScope” and “WebScope”. The latter is considered to be a web-based version of the former, with the intention of enhancing the universality of its usage.

eScience Data Grid:

In general terms, a Data Grid can be thought of as a loose federation of networked data stores which is supported by grid computing [1].

This concept has evolved because with the development of scientific and engineering applications, the need to access large amounts of distributed data has become more and more obvious.

WebScope:

The project “WebScope” is a project to resolve the existing issues with the retrieval of datasets from the MDSPlus server using EScope. Another highlight of “WebScope” project is the use of Java object relational mapping solution “Hibernate” to solve the caching issues with “EScope” data retrieval system.

At the time of the commencement of this project, there were three versions of WebScope available. Their genealogy is shown in the figure below (Figure 1.1):

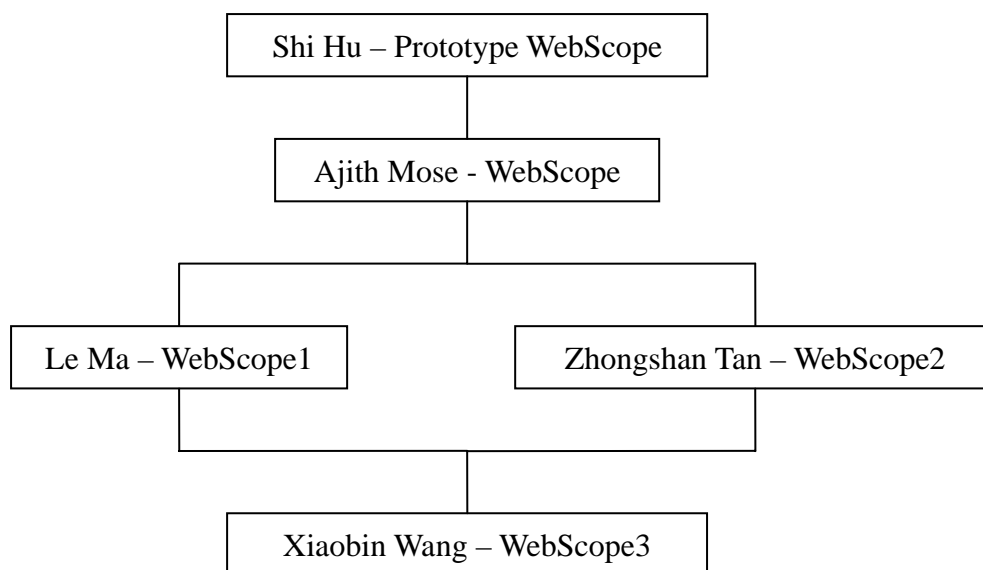


Figure 1.1 The Genealogy of WebScope

As the eScience community is growing, the need for making a web portal more available to scientists is obvious, which means that the web portal should make it very easy for a scientist to find required data and share his/her own data. Although the latest version of the WebScope system, which is WebScope3, is providing scientists a very convenient way to access data through web browsers, it still requires users to specify which MDSPlus server to connect and port, experiment, shot information about which scientists may not have any idea. In addition, the current WebScope systems are not providing users with any secure method to manage their user profiles.

Having taken the reasoning above into account, A/Prof. Henry Gradner has decided to introduce an updated version of WebScope system with Jini & CAS. I shall briefly describe Jini and CAS below:

Jini: Jini is not initials. It is a service oriented architecture that enables the construction of distributed systems consisting of network services. We can make almost everything on the web a Jini service. The Jini services can automatically register themselves with Jini lookup services, which will be automatically found by Jini clients.

CAS: CAS stands for Central Authentication Service. In my project, the main significance of CAS is that it can provide an architecture to centrally manage user profiles, which allows users to have access to all authorized data with just one sign-on process.

1.1.2 Purposes

The main purposes of the current project are as follows:

- Implement Jini in the WebScope3 system, which includes a Jini client for the WebScope3 client and a Jini server for the MDSPlus server. In addition, a Jini lookup service should also be set up.
- Implement CAS in the WebScope3 system to replace the existing logon sub-system. In addition, I will cooperate with Mr. Ajith Hose who is doing a project on CAS project designing.
- Other purposes raised by the client.

1.2 Assumptions and Constraints

The main programming language used in this project is Java combining to AJAX, Java Servlet.

The Web Server that is used in this project is Apache Tomcat.

The database that is used in this project is java-based HSQLDB and MDSPlus Server. The Web Server is supposed to access HSQLDB via Hibernate.

All experiment data is supposed to be provided by third-party.

1.3 Project Deliverables

By the end of this semester, the following material should be handed in:

- Source code of the whole system
- Final report of the system
- All the other documents related to the project

2. Scheduling

2.1 Planned Time Table

The project will run from Feb 25th 2008 to June 1st 2008.

| Phase | Date | Expected Duration(days) | Tasks | Notes |
|-------|---|-------------------------|--|---|
| 1 | 25 th Feb ~ 16 th Mar | 21 | <ul style="list-style-type: none"> ✓ Understanding requirements ✓ Studying the new techniques ✓ Studying the current Web Scope system | <ul style="list-style-type: none"> ● Choose and meet supervisor ● Understand requirements ● Decide tools and install software on the computer ● Study old reports |
| 2 | 17 th Mar ~ 6 th Apr | 21 | Modeling | <ul style="list-style-type: none"> ● Analyze existing project ● Modeling and design architecture for the new project ● Learn various software |
| 3 | 7 th Apr ~ 11 th May | 35 | Implementation | <ul style="list-style-type: none"> ● Do coding, Testing and Debugging |
| 4 | 12 th May~ 25 th May | 14 | Documentation and final report creation | <ul style="list-style-type: none"> ● Complete all documents ● Write the final report |
| 5 | 26 th May ~ 1 st Jun | 7 | Preparation for final presentation | <ul style="list-style-type: none"> ● Edit slides for final presentation |

2.2 Evolution of the plan

As some unexpected issues have not been taken into account when the plan is made, it is possible for me to update the plan from time to time. I will compare the actual progress with the plan and update it in a weekly manner.

3. Reference

- [1] Henry J. Gardner, Raju Karia, Gabriele Manduchi, A Web-Based, Dynamic Metadata Interface to MDSplus, To be published.
- [2] Henry Gardner, Gabriele Manduchi, Design Patterns for e-Science, Springer Verlag, 2007, ISBN 978-3-540-68088-8.
- [3] Xiaobin Wang, Development of WebScope3, the final report for the COMP6703 eScience Project (Semester2, 2007) course,
- [4] MDSPLUS home page, <http://www.mdsplus.org/> .
- [5] Clayton Lewis, John Rieman, Task-Centered User Interface Design, 1993.
- [6] Apache Tomcat Manual, <http://tomcat.apache.org/> .
- [7] Jini home page, http://www.jini.org/wiki/Main_Page .
- [8] CAS home page,
<http://www.ja-sig.org/products/cas/overview/background/index.html> .
- [9] The HSQLDB official website, <http://hsqldb.org/> .

4. Project Organization

4.1 Roles and Responsibilities

A/Prof. Henry Gardner: The supervisor of the project who will give technical supports on both the implementation and design stage. Also, he acts as the client of the project who will make requirements on the project.

Dr. Raju Karia: Another supervisor of the project who will give technical supports on both the implementation and design stage.

Xiaobin Wang: The composer of all the documents related to this project. The programmer who will write all the required codes.