

CHAPTER 1

INTRODUCTION

1.1 Introduction

Grid computing in general is a special type of parallel computing which relies on complete computers with onboard Central Processing Unit (CPU), storage, power supply, network interface and more connected to a network like private, public or the Internet by a conventional network interface, such as Ethernet. The analogy of grid can be described as below.

When a user plugs an appliance or other object requiring electrical power into a receptacle, the user expects that there is power of the correct voltage available, but the actual source of that power is not known. Any local utility company provides the interface into a complex network of generators and power sources and provides the public with an acceptable quality of service for public energy demands. Rather than each house or neighborhood having to obtain and maintain its own generator of electricity, the grid infrastructure provides a virtual generator and it is a highly reliable generator.

Grid technology also enables complex interactions among computational and data resources. The sharing of the resources in grid computing will increase the range of computer applications. This sharing may involve not only file exchange but also direct

access to computers, software, data, and other resources, as is required by a range of collaborative problem solving and resource-brokering strategies emerging in industry, science and engineering. When a user wants to request some computing and data resources, the grid can seamlessly, transparently and dynamically supply the resources over Internet.

1.2 Problem Background

The sharing process in grid is necessarily and highly controlled with resource providers and users or consumers defining clearly and carefully just what is shared, who is allowed to share, and the conditions under which sharing occurs. The controlling process is important because the goal of grid computing is to only provide secure grid service resources to legal users (Lu. R. *et al*, 2007). This statement clears out that, the security issues becomes an important concern of grid computing.

To prevent the illegal users from visiting the grid resources, it should be guaranteed that strong mutual authentication needed for users and servers. Authentication is believed, as a cornerstone service, since other services depend on the authentication of communication entities. As mentioned above, the grid systems should be guaranteed that stronger authentication needed for users and servers and ensure that resources and data not provided by an attacker. Generally, the authentication in the grid computing aims to:-

1. Allow a user, the processes that comprise a user's computation, and the resources used by those processes, to verify each other's identity.
2. Guarantee the safety of the information in grid.

Beside these aims, two main issues of authentication process must be considered. First is the security of the authentication and second is the time complexity of the authentication. The security of the authentication can be found by analyze the security properties which consist of some security attacks. The authentication process must resist some security attack to fulfill the grid's aims.

Authentication process must control the time complexity, whereby the time complexity is important to have efficient authentication process. The time consuming of authentication can be found by analyze the time of complexity and the types of computation.

1.3 Problem Statement

Grid computing, as a distributed computing model, stands for the new kind of systems that combine heterogeneous computational resources, such as computers, storage space, sensors, application software, and experiment data, connected by the Internet and make them easy access to a wide user community.

From the problem background for flexibility in grid computing the authentication framework should strike a proper balance between the entirely demands of the security and the access speed. Fluent choosing different security mechanisms based on different demands is a powerful solution. The authentication framework also should be designed to have the interoperability with local security solutions, and apply the local access control mechanism without change to get lightweight grid environment.

Beside that, the authentication should not be bundled with any concrete and fixed mechanism of security, because of the dynamic nature of the grid (Chen.J. 2006), even though certificate based authentication more appropriate and secure than password based authentication (Chakrabarti.A. 2007).

1.4 Project Aim

This project aimed to enhance the method of password based authentication scheme and to get better password based authentication scheme in grid computing environment through its time complexity.

1.5 Project Objectives

To achieve the aim of the project, there are three major objectives have to be fulfilled:

1. To analyze the characteristics of grid computing environments, the security challenges in grid computing, the existing password based authentication scheme, the existing grid security infrastructure.

2. To design and develop the enhanced password based authentication scheme that will secure the grid computing environment using selected existing authentication scheme.
3. To test and implement the enhanced authentication scheme using lab testing.

1.6 Project Scope

1. The study focused on the existing authentication scheme and especially on password based authentication scheme.
2. The features selection of password based authentication scheme done by comparative studies and lab experiment.
3. The grid security infrastructure involve in this study should support password based authentication.
4. The development is using C++ programming language.

1.7 Significance of Project

This study first identified the overview of grid computing including the evolution of grid computing and the concern areas of the grid. The security issues of grid computing also will identified. The next step is to find the existing authentication schemes and existing grid security infrastructures that used for grid computing authentication process. By develop and perform lab testing, a new way of securing the grid computing through authentication is then enhanced and compared to the selected existing scheme of password based authentication system to see whether this approach can give a better solution. The enhanced scheme must give better result rather than the existing scheme.

1.8 Organization of the Report

This report consists of six chapters. First chapter presents introduction to the project which includes the problem background, problem statements, aim of project, the main objectives and scope of the project. Chapter 2 is about literature review on grid computing, which focused on identifying the security challenges in grid computing, the existing schemes and its security infrastructure of password based authentication schemes. The project methodology is covered in Chapter 3 where comparative study and pre-lab testing have been used as the research strategy. In Chapter 4, the implementation of the methodology where the findings of comparative study and pre-lab testing take place and the result and findings of the lab testing is explained in Chapter 5. The overall project will concluded in Chapter 6.