A Distributed Services based conference planner application using Software Agents, Grid Services and Web Services

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ABSTRACT

This demonstration highlights the applications of our research work i.e. second generation (Scalable Fault Tolerant Agent Grooming Environment – SAGE) Multi Agent System, Integration of Software Agents and Grid Computing and Autonomous Agent Architecture in the Agent Platform. It is a conference planner application that uses collaborative effort of services deployed geographically wide in different technologies i.e. Software Agents, Grid computing and Web services to perform useful tasks as required.

1. INTRODUCTION

Web is evolving towards machine readable for sharing knowledge among human as well as machines. Agents are able to work at run-time where each component can become commodity. Agents will be able to make decision at run to which resources and/or service to use for particular task. Interaction between grid and user must become an equal partnership. The computer should not just act as a dumb receptor of task descriptions, but should cooperate with the user to achieve their goal. These considerations give rise to the need of agent acting as an expert assistant or delegate with respect to some application, knowledgeable about both the application itself and the user, and capable of acting with the user in order to achieve the user's goals.

We have been working to make the Software Agents integrate with Web Services. By integration we mean two way service discovery transformation, service description transformation and communication protocol transformation among software agents and web services. In order to support the autonomous behavior of agent, autonomous agent architecture is also proposed which has been used in this demo.

In the demo at AAMAS 2005 we want to contribute to demonstrate the working of different distributed services of different technologies in a collaborative environment i.e. Software Agents, Grid Servers and Web Services.

It is an agent based conference planner application in which software agents acts autonomously and also interact with grid services and web services plan a conference as a proxy to their owners (humans).

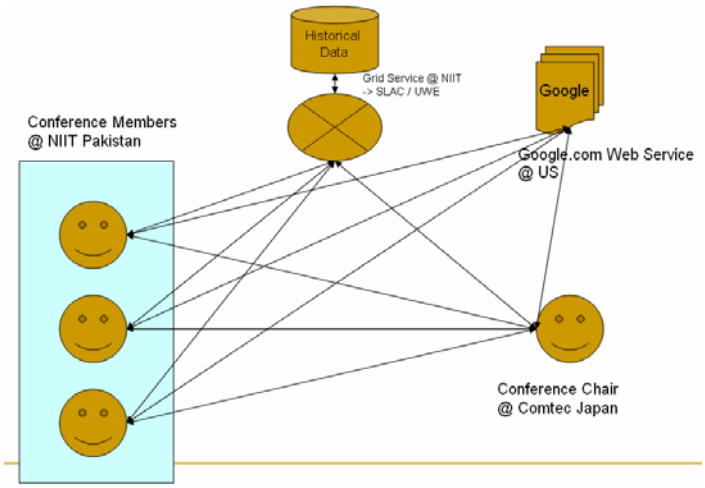


Figure 1: Interaction among distributed services

2. INFRASTRUCTURE REQUIREMENTS

Programming Language: Java

Operating System: MS Windows 2000/XP or
Red Hat Linux 7.3/8/9

JDK: j2sdk1.4.2

AAMAS'05, July 25-29, 2005, Utrecht, Netherlands.

Agent Platform:	Scalable Fault Tolerant Agent Grooming Environment (SAGE)
Grid Toolkit:	Globus 3.2 Grid Computing Toolkit
Web Services	Apache Tomcat web server, Apache Axis (SOAP Engine), Apache ANT

3. GEOGRAPHICAL DISTRIBUTION

Figure 2: Geographical distribution of services

- Software Agents deployed in Comtec Japan and NIIT Pakistan
- Grid Services container deployed at SLAC USA
- Google USA web service is used

4. APPLICATION DETAILS

4.1 Google web service

- Software Agents search for different topics from Google web service.

4.2 Grid service

- Grid service contains historical data about past conferences. Software Agents search for related conference in past data by interacting with grid service

4.3 Agents planning a conference

- Agents are well suited for planning activities as they can negotiate with other Agents and Plan our things.
- The aim is to deign such an application that should allow Personal Agents of various conference members to plan out a conference by negotiating with each other

4.4 Following are the roles of the Agents defined for the application

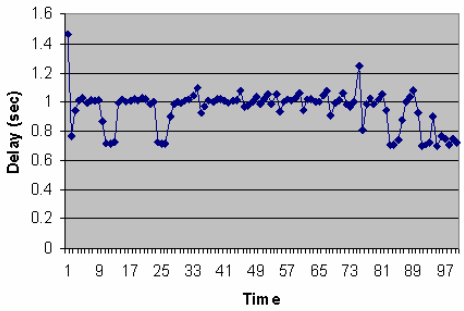
- Conference Chair Agent
- Member Chair Agents

5. NETWORK DELAY ANALYSIS AMONG DISTRIBUTED SERVICES

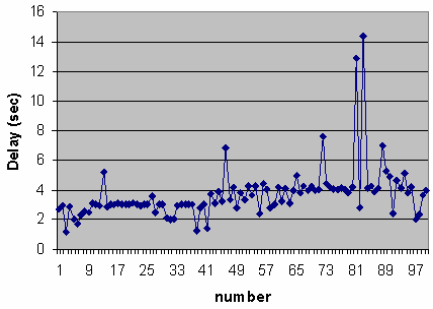
There is some significant delay while distributed services are accessed. Available bandwidth of the network at a particular instant of time is a major cause of this delay and cannot be avoided since we are working on application layer e.g. Multi Agent Systems, Grid Services and Web Services etc.

However, we have prepared graphs in order to analyze the behavior of the access delay of distributed services:

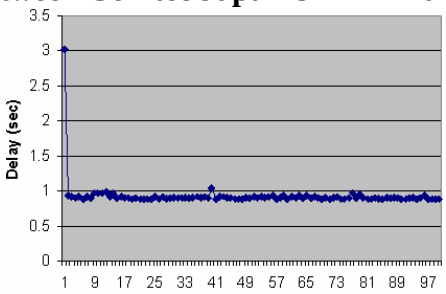
5.1 Between Comtec Japan & Google USA



5.2 Between NIIT Pakistan & Google USA



5.3 Between Comtec Japan & NIIT Pakistan



6. INTENDED USER BASE

At minimum, user base with basic understanding of distributed computing using Multi Agent Systems, Grid Computing and Web Services Framework is expected.