

Mobile Agent for Fast and Secure Services in Client-Server Environment

Kishor T. Mane

Asst. Prof. Dept. of Info. Tech.
D. Y. Patil College of Engg. & Tech.,
Kolhapur, Maharashtra, India
kishormane1@yahoo.co.in

Vandana G. Pujari

ME (E & TC) Student
D. Y. Patil College of Engg. & Tech.
Kolhapur, Maharashtra, India
vandanakmane@yahoo.com

Abstract— The amount of available on-line information has been expanding rapidly due to the growth of internet. Communication may increase the networks traffic, waste network bandwidth and causes delays. To efficiently find, gather and retrieve information is a major concern. The solution to this problem is use of Mobile Agents (MA's) technology. A mobile agent is a program (encapsulating code, data, and state) sent by a client to a server machine in order to satisfy requests made by their clients. If the machine does not contain the needed resource, MA is transferred to a new machine containing the necessary resource, and the MA resumes execution at the new machine. Once the mobile agent has migrated, the connection between client and server will be disconnected. This saves network bandwidth, especially in a wireless environment.

In this paper the attempt has been made to design and implement the mobile agents for providing fast and secure services to the user in the client-server environment. These agents can be used in the military network for accessing the information in secure way. The results are obtained is better than previous system.

Keywords-Mobile Agent; encryption; RSA algorithm; client server architecture.

I. INTRODUCTION

As the Internet expands consistently the online available information also expands rapidly. Communication may cause problems like network traffic, waste of network bandwidth, delays, disconnected computing [1][2]. So, it is required to find, gather and retrieve information in efficient way. The solution to this problem is Mobile Agents (MA) technology.

There are many other technologies are present before agent technology for client server communication such as, Message Passing (MP), Remote Procedure Call (RPC) and Remote Evaluation (REV). In a client-server model, a server provides some services and a client makes requests for those services through a wireless or wired media. Communication between the client and the server is usually through message passing. Thus, when a client needs a particular service, it usually sends a request message to the server that contains the needed service. A limitation of the client-server model is that the client is limited to the operations provided at the server. If the client needs a service that a particular server does not provide, it must again find

another server that can satisfy the request by sending one or more messages to other servers. This clearly is an inefficient use of network bandwidth. In addition, this kind of communication may increase the networks traffic, waste network bandwidth and causes delays of the reply due to server down time or crashes. Due to the mobility factor of mobile devices (mobile phones, PDAs, Laptops), sporadic disconnection is frequent in the wireless environment. Mobile agent provides a solution to these problems as Machine that wants a service creates a mobile agent for that application.

Mobile agent transfers code, data and state from one machine to another machine in order to get services. Once the mobile agent has migrated, the connection between client and server will be disconnected. This saves network bandwidth, especially in a wireless environment. When a mobile agent finishes its job at the server, it will then be ready to reconnect to its host or to migrate to another node to perform other duties within the network. If the server is not capable to fulfill the request then mobile agent will migrate to another server and will finally provide the service to the client.

The mobile agent system developed to access the resource in the encrypted manner. In the military application or in the hospital the information is very crucial. So, to transfer that information the secure mobile agent is used.

II. RELATED WORK

In the past many mobile agent systems are developed for client-server environment such as Aglets [8] & Concordia [9]. Aglet system uses event and message-based communication with the help of RMI technology. In RMI, java objects on different hosts communicate with each other by calling methods in objects. The Concordia system uses TCP socket networking facility. Concordia mobile agent system supports group communication.

But, above systems have many drawbacks as-

1. Group oriented communication is not provided by the Aglet system.
2. Remote method invocation is less reliable and slow in aglet system.
3. It doesn't provide the security and compression for data.
4. In Concordia it is not possible to join to the group arbitrary.

The present work overcomes the above limitations by providing following advantages as –

1. The security will provided by encrypting the data using RSA encryption algorithm.
2. The compression is done for minimizing the network traffic.
3. It also provide the mobile agent for low bandwidth and reliable assess of resources.

III. SYSTEM ARCHITECTURE

The work presented in this paper is focused on accessing the resources from server in the compressed and secure manner using mobile agent as shown in fig. 1. In the fig. 1(a), the client create agent for establishing communication with the server. In fig. 1(b), once connection is established then client transfer the agent to server and disconnected from server to avoid traffic in the network. Once mobile agent finds appropriate resource then it again reconnects to the client as shown in fig. 1(c).

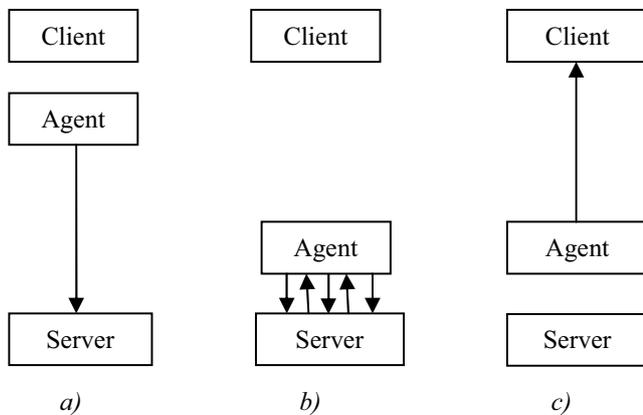


Figure 1. System Architecture

The design and development work includes two modules such as client and server as follows,

A. Client Module

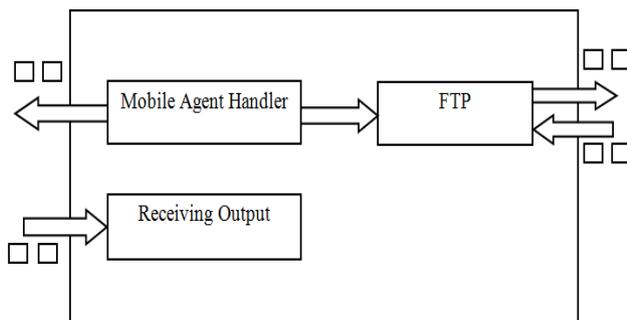


Figure 2. Client Module

Client module handles all the activities that take place at the client side as shown in fig. 2. It performs number of works like creating the mobile agents, sending the mobile agent, handling the public keys, receiving and displaying the answer and entering the log details.

B. Server Module

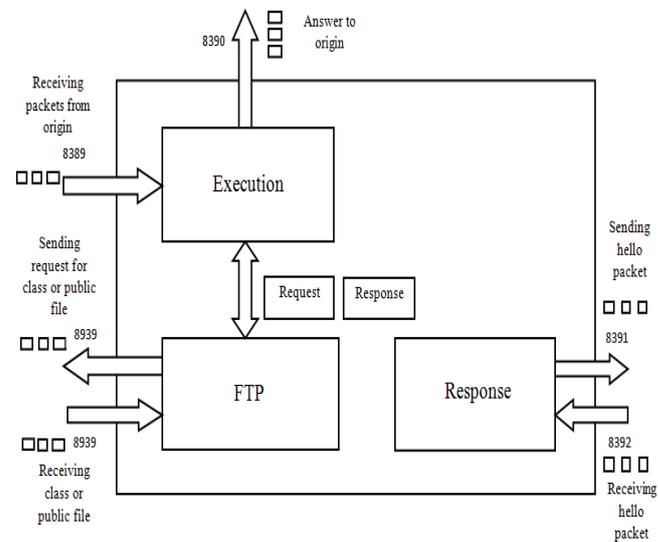


Figure 3. Server Module

Server module handles all the activities that take place at the server side as shown in fig. 3. It performs number of works like providing the services to the client, sending the mobile agent, handling the public keys, receiving the agent and enters the log details.

IV. ENCRYPTION AND DECRYPTION

Asymmetric cryptographic RSA algorithm has been used in this work. It applies block ciphering technique for encryption and decryption. The block size is 68 bits. The RSA algorithm creates public key and private key. The size of the public key is 128 bits. For the purpose of security the packets are compressed and then encrypted with public key. While, the decryption process has been carried out with private key of its own.

V. IMPLEMENTATION

Our experimental platform includes each node having Intel core to duo processor, 2GHz with 2GB RAM connected to each other via 3 switch. On each node, Windows Xp operating system has been installed. The server machine listens for the request from client. The server must provide the services like providing patient database, music file, providing the requested image file and the contents of the different folder. Client can request for any of these service to

the server. So, the four machines are setup as server for providing the different services as mentioned above.

The implementation of the above system has been performed using the netbeans with java language and Bouncy castle security package [10]. The following different packages and classes are used for implementing this system.

A. Client

This package is used for the purpose of sending the agent, receiving the agent, displaying the answer form agent. It is also used for providing the GUI. For designing the client module it is required to build many classes as –

i) *ClientSendRecord*:

It is used for creating the internal frame to show the details of mobile agent send from the client side.

ii) *DisplayThread*:

This class is used for showing the receiving frame for the answer of the mobile agent.

iii) *IPList*:

This class is for the purpose of finding the IP List.

iv) *ReceivingThread*:

It is used for receiving the packets from the network.

B. Agent

Agent package consists of following classes and interfaces as -

i) *Agent*:

It is an interface implemented by the different agent like DatabaseAgent, MusicAgent, Imageagent and DirAgent. It checks for the resources, run on machine and bring the output.

ii) *AgentAdapter*:

It perform the different operation like setting key, getting key, setting origin, getting origin, adding the node, removing the node etc.

iii) *LogInternalFrame*:

This creates a frame in which log records are written.

iv) *GenerateKeys*:

This class generates public key and private key for that particular machine for the encryption and decryption.

C. Server

This package is used for providing the services to the client, sending the mobile agent, handling the public keys, receiving the agent. It consists of different classes as –

i) *ReceivingThread*:

It is useful for receiving the packet from the network.

ii) *SendingThread*:

It is useful for sending the packet from the network.

iii) *ExecuteThread*:

ExecuteThread executes the agent received by the receiving thread.

iv) *AgentList*:

It gives all the information about the mobile agents. It gives the class of mobile agent, when it was received, status of the mobile agent etc.

VI. CONCLUSION

Mobile technology provides new way for communication between client and server in the distributed environment. It provides many advantages such as reducing network traffic, robust, fault tolerance, execute automatically. With the help of this agent technology the network performance has been increased. The UDP implementation consumes low consumption time & response as compared with TCP implementation. In this the compression and encryption are inserted to apply this technology in the military network or in any industry where data is important. The effort & time required to move the agent from one machine to another machine is reduced by applying compression techniques. As the size of network increases the response time also get increased but comparatively low than other system.

This work can be further work extended to build dynamic and intelligent mobile agent for replacement of the client server model.

REFERENCES

- [1] Peter Braun, Wilhelm Rossak Swinburne University of Technology, Victoria, Australia: Mobile Agents Basic Concepts, Mobility Models, and the Tracy Toolkit
- [2] Adel aneiba, S.J. Rees. Mobile Agent Technology And Mobility.
- [3] Alf Inge Wang Carl-Fredrik Sørensen Eva Indal : A Mobile Agent Architecture for Heterogeneous Devices
- [4] Glitho, R.H, E. Olougouna, S. Pierre, : Mobile agents and their use for information retrieval: a brief overview and an elaborate case study, Ericsson Res., Montreal, Que IEEE, on page(s): 34-41, Volume: 16, issue: 1, ISSN: 0890-8044, INSPEC Accession Number: 7165883
- [5] D. Johansen, V. Renesse, F. Schneider.: Operating system support for mobile agents, Proc. Of the 5th. IEEE HOTOS Workshop, Orcas Island, USA .
- [6] D. Jonathan, D. DeRoure, :A mobile agent architecture for distributed information management, Proceedings of the International Workshop on the Virtual Multicomputer.
- [7] Weippl, E. et al. : Mobile database agents for building data warehouses, Proc. 11th Int. Workshop on database and expert systems applications, Sept. 04-08, 2000, London. IEEE On page(s): 477-481, References Cited: 11, INSPEC Accession Number: 6742202
- [8] <http://en.wikipedia.org/wiki/Aglets>
- [9] http://www.merl.com/areas/concordia/WWW/MobileAgentConf_for_web.pdf
- [10] <http://www.bouncycastle.org/>
- [11] Beginning Cryptography with Java by David Hook
- [12] Java™ I/O, 2nd Edition by Elliotte Rusty Harold
- [13] Java Network programming by ORELLY
- [14] JAVA SWING by ORELLY