Mobile Agent System Using Implementation of Connection Method

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1. INTRODUCTION

One of the reasonable and economically suitable solutions of those cases is mobile agent system. The mobile agent paradigm can be exploited in a variety of ways, ranging from low-level system administration tasks to middle ware to user-level applications. An example of a system-level application is in real-time control. If the application uses remote procedure calls to control a device, it may be difficult (if not impossible) to guarantee that it will meet the real-time deadlines associated with the device. This is because communication delays are usually neither bounded nor accurately predictable, unless the underlying network provides quality of service guarantees. Instead, the application can send an agent to the device and control the device locally, resulting in better predictability. Other examples of system-level applications include network maintenance, testing and fault diagnosis, installing and upgrading software on remote machines, etc.

Advanced technologies on super high-speed communication nets by ATM[1][2] and microprocessor make it possible to provide multimedia services which perform the transmission of multimedia data to video information user through communication nets. Among the related works on multimedia[3] services, multimedia servers and communication technologies are very important part.

Despite of the super high-speed processing capability of server, it is more important to us to communication[13] resources effectively since multimedia data should be delivered to video information user.

In mobile agent[4] systems, communication is the basis for interactions and remote control.

Without communication, the agent is merely an isolated individual, desk and dump to other agents, closed into its perception- deliberation- action loop.

Communication is expressed as a form of interaction in which the dynamic relationship between agents[6] is expressed through the intermediary of mediators, signals, which, once interpreted, will affect these agents.

We have implemented this system framework and are developing collaborating agents in diverse complex remote control agent model design.[5]

There is a close relation between QoS(Quality of Service) and system resources in distributer multimedia communication. Resources manage reports the system resource information periodically or when resources are in the overload state, or on demand by the QoS manager. By using this information, this QoS manager can predict QoS

degradation and perform CAC(call Admission Control). If QoS degradation has happened, QoS manager could maintain the contracted QoS level by means of fine grained resources tuning strategies.

A system composition at Fig. 1 constructs composition of remote control system in ATM communication nets concatenation distributed system.

This paper improves transmission search and analysis function in real time multimedia data in ATM communication nets.

The rest of this paper is organized as follows. In the next section, we describe research and implementation environment about mobile agent system. Section 3 presents the mobile agent control system by using both RDBMS and ATM API. The mobile agent system embodiment are shown in Section 4. Section 5 states this paper's conclusions.
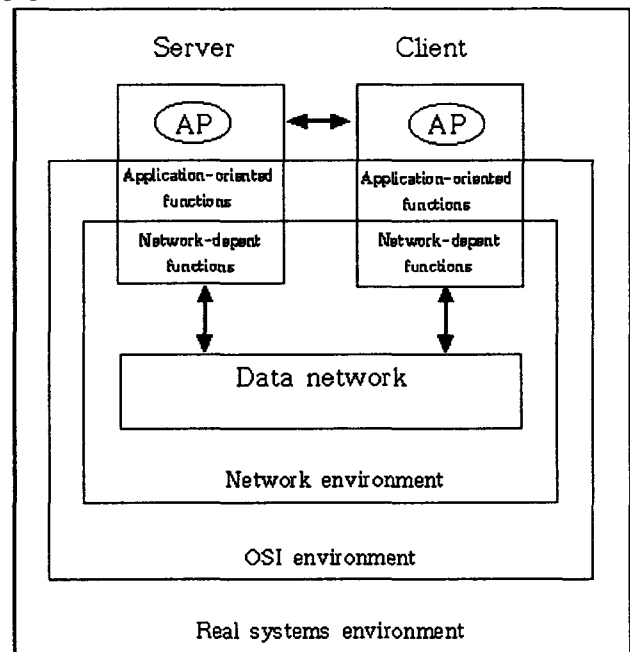

Figure 1- The Composition of Remote Control System

2. RESEARCH AND, IMPLEMENTATION ENVIRONMENT ABOUT MOBILE AGENT SYSTEM

The use of the internet has accelerated with an unprecedented pace.

However, effective use of the internet by humans or decision support mobile agent system has been hampered by some dominant characteristics of the info sphere.

First, information available from the net is unorganized
mobile agent. Second, the number and variety of data
sources and services is dramatically increasing every day.

Furthermore, the availability, type and reliability of
information services are constantly changing. Third, the
same piece of information can be accessible from a variety
of different information sources. Fourth, information is
ambiguous and possibly erroneous due to the dynamic
nature of the information sources and potential
information updating and maintenance problems.

Therefore, information is becoming increasingly more
difficult for a person or machine system to collect, filter,
valuate, and use in problem solving.

As a result, the problem of locating information sources,
accessing, filtering, and integrating information in support
of decision making, as well as coordinating information
retrieval and problem solving efforts of information
sources and decision-making systems has become a very
critical task.

The crucial factors influencing the determination of the
type of an agent are: first, its functional and informational
scope, second, predominant types of agent interactions,
and third, constituent reusable agent architecture
components.

It is required RDBMS to construct a great database that
supports the data of various shapes that is no depreciation
situation due to the data increase of mobile agent system,
and that can search real-time[7][9] data used super high-
speed communication nets.

This paper embodies the environment of mobile agent
system by using server system and client system that is
much using RDBMS these days and presents the
construction method not be exclusive system to support
the service of mobile agent system.

Table 1. Server/Client Construction Environment

Division	Server Environment	Client Environment
Operation Structure	Windows NT	Windows 95 over
Memory	128M over	64M over
DBMS	SQL Support possibility	
Protocol	NetBEUI/TCP/IP	TCP/IP
Development Tool	Visual Basic	
Communication Nets	ATM	

3. THE MOBILE AGENT SYSTEM BY UNING BOTH RDBMS AND ATM API

We embody mobile agent system using API providing
common RDBMS to receive more fast transmissible
ability, and ATM service of varied quality in ATM
communication due to providing ATM API in order to use
pure ATM service without passing protocols like
TCP/IP,[8][10] SPX/IPX to be used in established LAN
environment.

Hereafter, it brings on a viewpoint that same RDBMS
must be used in each system and that TCP/IP's[12] specific
properties must be used in great-capacity data transmission
unless the API supports ATM communication nets in
replacement of RDBMS. In order to solve these problems,
it is required the mobile agent service realization of the
independent structure of RDBMS.

This study designs independent continuance of RDBMS
that provides API like Fig.2 and mobile agent to accept the
ATM communication net. Also, this study designs
protocols connected in data transmission and connection
setup between Control Agent and Service Agent in order
to use in ATM communication nets that the remote control
is so included in a hierarchical agent to be functioned in
IPC(Inter Process Communication).

Remote Control Agent consists of Control Agent and
Service Agent,[14][15] divides Service Agent structure to
take the transference of data and Control Agent to execute
the initial connection setup as well as the management
function.

Database query class is designed able to correspond to a
plenty of RDBMS only to replace query class not to
modify a remote control service program in order to
manage independence to the RDBMS. Also, it is able to
provide Multiplexing service due to a connection aim
oriented-changeable bit service transmission section used
AAL5 to provide C class and D class for ATM
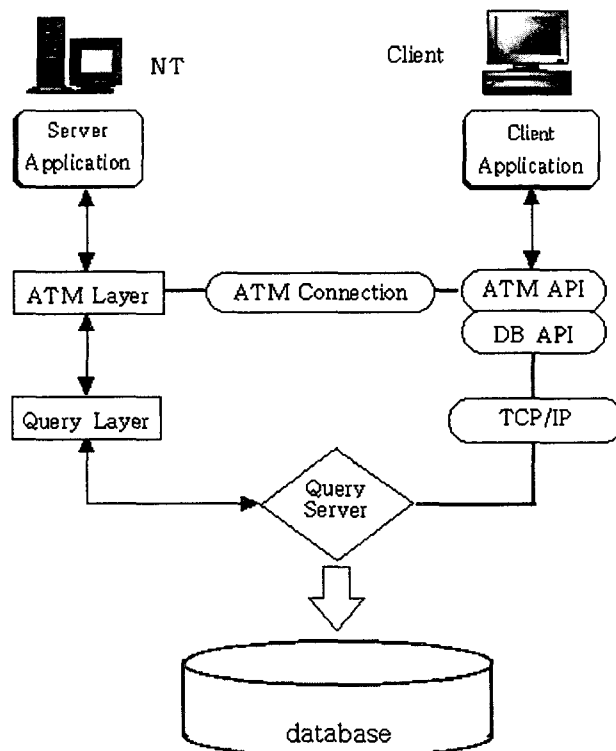communication nets service.

Figure 2- Remote Agent Search Function

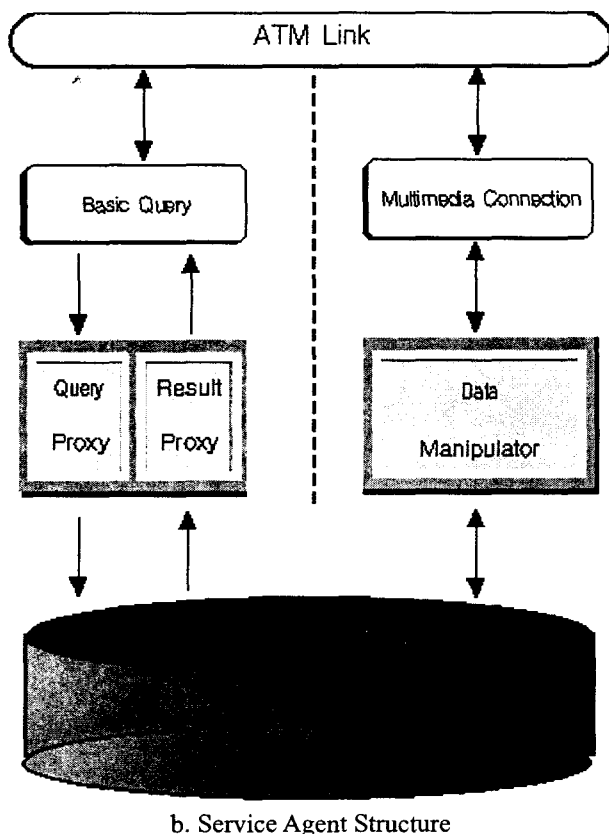## 4. THE EMBODIMENT OF REMOTE CONTROL AGENT SYSTEM

a. Control Agent Structure

Class when there is demand of a Remote Control Service program by ATM. If a slot empties Coordinator class recognizes so possible in services that it executes the connection setup process. If a empty sol doesn't exist it informs to the remote control service program that services is impossible.

CCD(Connection Control Data) class that is data structure storing the necessary information in the connection management consists of the service state field to confirm whether services are able to do or not to do, the SAP number field to keep the Service Access Point number of the Service Agent and the Service address field to keep ATM address of a computer where the Remote Control System operates.

PT	RT	CC	RC	PS	Payload	CRC

PT : Packet Type
RT : Result Type
CC : Colum Count
RC : Row Count
PS : Payload Type

a. The Structure Data Transmission Packet
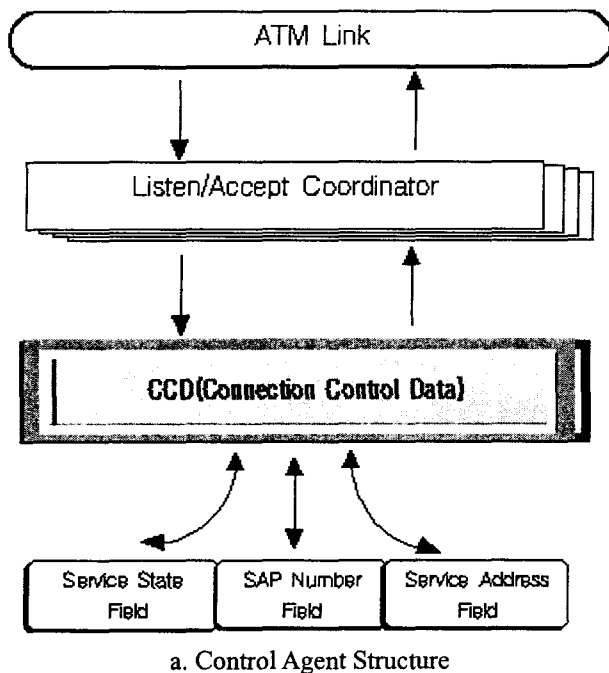

b. Service Agent Structure

Figure 3- Control Agent & Service Agent Structure

As Fig. 3 embodies Control Agent and Service Agent structure, Remote Control Agent is designed types not including Query class because of not executing a direct access to Database. Coordinator class to the Query confirms to be able to use or not to use services after searching an empty slot of CCD(Connection Control Data)

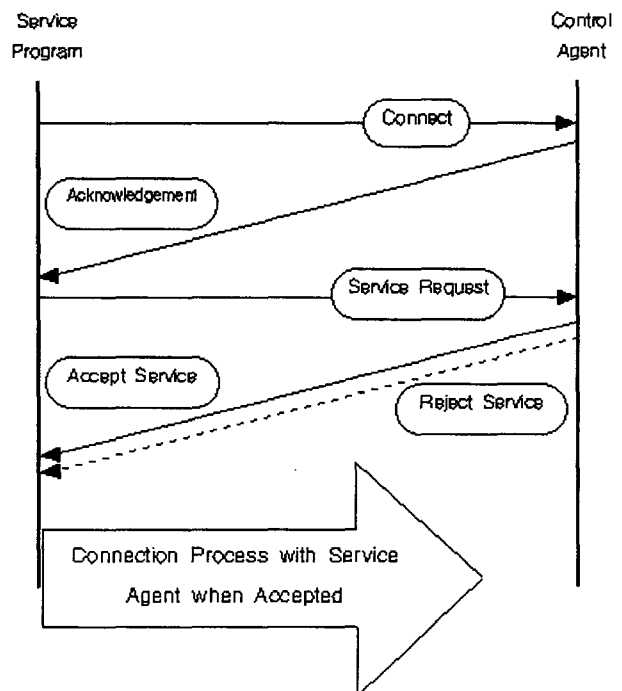b. The Establishment Stage of Incipient Connection
Fig. 4 Incipient Connection Establishment Stage and Data Transmission Packet Structure
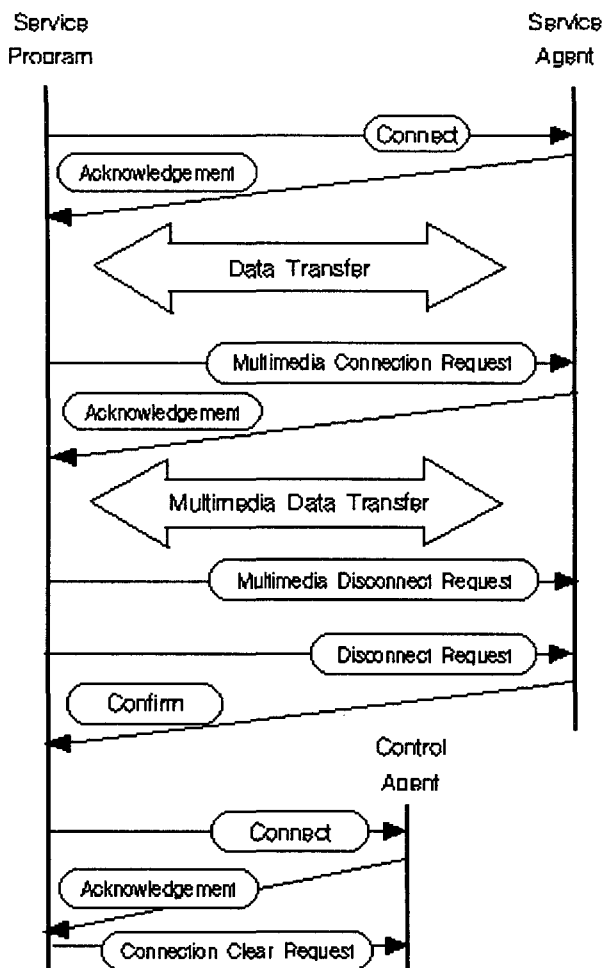
Figure 5- Service Agent Protocol Structure

The PT indicate a sequential data in the data packet structure of Fig. 4 if a data length is more bulky, the RT field indicates whether a transferred data is a result or the information to the error.

Each RC and CC records the number of a column and a row of the searched data record.

The PS field records a recorded data size in payload. The CRC has a function detecting a 32 bit error to execute the error search in the application field for the confidence degree of the transmission information.

The connection setup process divides into the BQC(Basic Query Connection) and the multimedia data channel composition like Fig.5. The Remote Search Service must be removed for a reuse of a assigned slot through the connection removal process and the Control Agent from the point of time when a job is finished.

5. CONCLUSIONS

With one rather narrow exception, there is nothing that can be done with mobile agents that cannot also be done with other means. The exception is remote real-time control when the network latency prevents real-time constraints being met by remote command sequences.

The individual advantages of mobile agents therefore rest on relative technical and commercial factors compared to alternative methods. The technical advantages of mobile agents identified in this assessment are:

a. High bandwidth remote interaction
b. Support for disconnected operation
c. Support for weak clients
d. Ease of distributing individual service clients
e. Semantic routing
f. Scalability
g. Lower overhead for secure transactions
h. Robust remote interaction

While none of the individual advantages of mobile agents given above is over-whelmingly strong, we believe that the aggregate advantage of mobile agents is overwhelmingly strong, because:

a. They can provide a pervasive, open, generalized framework for the development and personalization of network services.

b. While alternatives to mobile agents can be advanced for each of the individual advantages, there is no single alternative to all of the functionality supported by a mobile agent framework.

c. In addition to providing an efficient support for existing services, a mobile agent framework also enables new, derivative network services and hence new businesses.

d. Mobile agents are expected to appeal strongly to the Internet community, since they can provide an effective means for dealing with the problems of finding services and information and since they empower the individual user.

The individual technical disadvantages of mobile agents identified in this assessment are:

a. Need for highly secure agent execution environments.

b. Performance and functional limitations resulting from security.

c. Virus scanning and epidemic control mechanisms.

d. Transmission efficiency, for example a courier agent compared to a simple SMTP mail object.

The security and virus problems in particular require very close study and consider-able technical innovation.

Commercial issues raised by mobile agents include:

a. Difficulty of propagating agent execution environments onto large numbers of third-party servers.

b. Balance to be struck between open and closed electronic commerce.

c. Trust on the part of third-party server providers in the face of security concerns.

d. Willingness of the third-party server providers to permit users the ability to customize server behavior.

e. Willingness of the third-party server providers to support the computational load of mobile agents.

f. Perceived value among users.

g. Enthusiasm for this approach among the Internet community.

This assessment suggests further studies:

a. What degree of expressiveness can be safely accepted in an agent scripting language? Is it possible to devise languages that permit the expression of useful, quasi-general procedures, but which permit the non-existence of viruses to be proven?

b. How strong are the qualitative arguments for performance advantages? We could compare existing services with hypothetical mobile agent-based services?

c. Alternatively, what could be done to enable RPC-based client-server interactions to match the advantages of mobile agents.

The mobile agent approach continues to intrigue and shows signs of offering important qualitative advantages for network services. Assuming that solutions to the security problems can be found - and efforts are underway the signs are sufficiently positive that we cannot rule out the possibility that mobile agents will be a successful new method of client-server interaction in network services. We are now engaged in developing plans to prudently explore this opportunity.

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