A Study on Resource Management Agent for Multimedia Networks

Kuraoka Takashi

School of Information Science,
Japan Advanced Institute of Science and Technology

February 15, 2000

Keywords: multimedia network, resource management agent, JAIST VideoLAN, Digital Video, database.

This paper describes resource management agent for multimedia networks. In recent years, DV(Digital Video) devices which have IEEE1394 ports for digital connection can construct networks at home. Middleware like Jini and Havi which provide connection of DV devices are developed. If local area networks make use of these DV devices, it is possible to construct high quality multimedia network at low cost. However, there is a problem that it is difficult to construct multimedia network because local area networks don't have the resource management system.

To solve this problem, this research proposes a general-purpose resource management system which can manage various kinds of resources. The resource management system on network has following advantages: reduction of cost, support of application software, application of a security module, and so on. This research compares and examines two resource management methods: the integrated management and the distributed management. This research also covers some examples which make use of each methods in network.

In the distributed management, resources are managed by each devices. It has high reliability in a sense that no single fault causes a catastrophic breakdown of the whole system, but some elaborate mechanism is required to keep the consistency of managed information.

In the integrated management, resources are administrated by a single device, so keeping consistency of information, and looking up information is trivial. But a single fault causes a catastrophic breakdown of the whole system, therefore this critical resource must have redundant components.

This research uses JAIST VideoLAN as an example multimedia network. End users can easily use this system which integrates DV devices with computer equipments. It is working in JAIST campus.

This research propose the resource management agent for JAIST VideoLAN. First, objects and methods of management on JAIST VideoLAN are examined in this research. The advantage of integrated management is also examined. The resource management agent is constructed with three processes: RMAdaemon, SQLdaemon and HTTPdaemon.

The RMAdaemon is the main process in the resource management agent which communicates with users and devices by message passing. It is an agent server processing message requests from users and terminal systems. Messages between the RMAdaemon and intermediate node, which will be added to JAIST VideoLAN, are defined in this research. Flow charts processing those messages are shown.

The SQLdaemon is a database server to store information of resources which answers a inquiry about information of resources from other processes. Conceptual and logical models for JAIST VideoLAN are designed and relational database schema is constructed from it.

The HTTPdaemon is a WWW server which provides GUI contents for WWW browser. In HTTPdaemon design, programming environment to create contents with high functions is examined. As programming environments, JavaServlet is adopted for the server side and JavaApplet is used in the client side. Conceptual flow charts which offer services to users are shown. These services include authentication of users, management of users, connection of DV devices and information of network.

Processes which construct the resource management agent are implemented and experimented in this research. It is shown that the resource management agent administrate information of users and devices, services and provide for users with services.

Considering processes which construct the resource management agent, we examines following issues.

Applying the DBMS to database provides stability and scalability. As a fault of the integrated database causes a critical trouble to the whole system, some solutions are considered.

It is discussed that the resource management agent process cannot stand up to a single fault, therefore multi-agents are given to resist a fault and improve reliability.

Applying WWW technology to GUI is useful for users because many platforms support WWW browser. This research makes use of Java technology to offer GUI contents. Java has a scalability and Havi also adopts this technology, therefore GUI can deal with DV devices including Jini and Havi flexibly.

The following problems are given for the future work. This includes: the expansion of management of resources information, the integration of various protocols for video networks, the support of different data formats, the cooperation with Jini and Havi.