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Mobile agent based data retrieval from distributed database

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ABSTRACT

This paper describes the process involved in data retrieval from heterogeneity distributed database environment which employ multiple agent system. When a user request in any environment the request is converted to a query using Natural language Processing and passed for search through specific domains which helps to reduce the computation time and further complexity. But the transfer of record to and fro between system and base station increases the network traffic, communication cost, and response time. In order to minimize the overall complexity mobile agents are used to fetch the data required from various domains. This will help to improve the performance by exploiting the sites in parallel process

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Introduction

In today's mobile computing environment users can access information easily independent of their location through wireless connections. However, location of accessing information should not restrict the mobile users to specific location from where information can be retrieved. As per the view of data management, mobile users often are likely to bring only the small fraction of data they need to access, because of the resources available to them are very limited. In order to solve the problem the data sharing among mobile and extended hosts, need to be employed with distributed computing technologies. Mobile agent technology is identified as an ancient tool for searching and retrieving information from the remote databases in spite of its location. The main advantage of using this technique is that a mobile agent are used to search information instead of the users. However the mobile agent can migrate to and from the node where the data is located instead of transmitting the whole required data across the network, it performs its task there, and returns to the query node along with the results taken from the different nodes that have been visited during the search. Since the transmission of data may cause any problem to data, mobile agent is one of the alternative technique to be used to reduce the time of execution. Thus, a mobile agent can utilize the bandwidth of a network much more than a direct connection while it is accessing remote databases. The distributed information retrieval task deals with the collection of information from multiple and usually heterogeneous information sources that exist in overall distributed environment. One way to address such kinds of issues is to use different types of agents in overall system.

Thus the different Retrieval agents should be able to accept a request from a human or agent client,

- [1] to translate his request into a language understood by the information sources,
- [2] to identify the information sources that contain information relevant to the request,
- [3] to pose the request to these sources,

- [4] to collect the corresponding results,
- [5] to process the returned results and
- [6] to present the results to the client.

Mobile-Agent Systems (MAS) is the emerging subfield of Artificial Intelligence that aims to provide both the principles required for construction of complex systems involving multiple information retrieval agents and mechanisms for coordination of independent agents and behaviors. Agent are provided with goals, actions and domain knowledge about the environment in which they are situated. The way it acts upon the different conditions is called its behavior. This paper is organized as a series of increasingly complex general multi agent scenarios. For each scenario: Heterogeneous and Homogeneous environment; the issues that arise are described using the National Language Processing(NLP) that makes use of Dictionary. The techniques presented here highlights how the mobile agent systems can be used to build complex database systems.

Agent communication

Traditionally the inter-process communication is followed through the Multi-Agent applications. These mechanisms were too low level which are required for supporting the communication requirements of interacting mobile agents. The mobility is a distinguishing feature of MA, the locations where Different agents are executing at the same time of communication, and the location where actual communication takes place plays an important role in overall process of Data extraction but the traditional inter-process communication mechanisms does not considers the mobility of interacting agents. In the inter-agent communication, mobile agents communicate with one another at a specific location in the system. Either the sender agent, or the receiver agent, or both of the agents need to visit the location to communicate. The inter-agent communication technique as shown Fig. involves a Coordinator agent (CA) running on Base Station, a searcher agent (SA) running on database server, for data to be communicated. But in this work of inter-agent communication,

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agents communicate with one another independent of the location in the network. A responsibility of large amount of work is on coordinator agent who, subcontracts various tasks of the work to one or more searcher agents by negotiation. To implement this efficiently, the coordinator agent and one or more searcher agent(SA) communication need to take place. Some of the important terms are explained as below

Mobile Agent : Mobile agent is a technology which is used as a useful and efficient tool for searching and retrieving data in distributed environment where the data is stored at a various nodes of the system. The advantage of mobile agent is that it searches for information instead of users. Mobile agents carry code of execution or query to be fired on database and extract the information required by the user any time any where.

Coordinator Agent(CA) : CA agent accept the input from mobile agents and translate it into SQL query using Natural language processing(NLP). It converts the sentence into tokens and removes stop word using streaming algorithm. CA also have local directory to find the active word to traverse to particular database. Computation of data is carried out at the CA node.

Search Agent(SA)

The Distributed Information Retrieval task deals with the collection of information from multiple and usually heterogeneous information sources that exist in a distributed environment. One way to address these issues is to use search agents. SA identify the information sources that contain information relevant to the request and local agent pose the request to these sources.

Proposed system architecture

The following figure shows proposed system for distributed data retrieval by using multiple agents. The architecture shows a multi agent system for retrieving data from distributed databases. We have followed this approach in developing a retrieval system from the heterogeneous Database Servers. The overall agent architecture is as follows. The inter-agent communication is based on standard Query Manipulation Language (QML). The National Language Processing Convert chunks of text from the base station into more formal representations such as first-order logic structures that are easier for computer programs to understand.

Our system supports a collection of Database Domains. The notion of Database Domain is used to describe a logical entity that contains a set of information sources in different Database Languages. It provides a logical combination of actual-physical Databases domains. In each database domains, we extend the local agent and the mobile agent. The search agent periodically scans through all the database sources, represented by query. These can be domain name or table name of the of various database groups, for example. The search agent traverses through all the local agent (e.g. database belonging to Company or Employee group). It classifies each such domain as referred by query and extracts results from each domain For example, it will Search all the Employee Information from Employee Domain like Name, Designation, Gender and sends the result back to NLP. The NLP Convert information from computer databases into user readable language. It uses Natural Language Generation (NLG) for generating natural language from a machine representation system such as a knowledge base or a logical form.

The converted output can be viewed from mobile unit. Finally, these important features are passed to the coordinator agent. The coordinator agent handles the query answering process. It acts as an information gateway to the records sources

it manages. In contrast to the above, the user agent is the one that the end user interacts with. It formulates the user's query, entered via a application, translates into an appropriate query message format and displays the answers. The user agent makes use of the services of a corresponding Coordinator agent. This agent accepts requests from user agents. It has the role to identify which database the user is actually referring. Concluding with the overall agent architecture, there are three agents: the coordinator agent, the search agent and local agent.. operating environment.

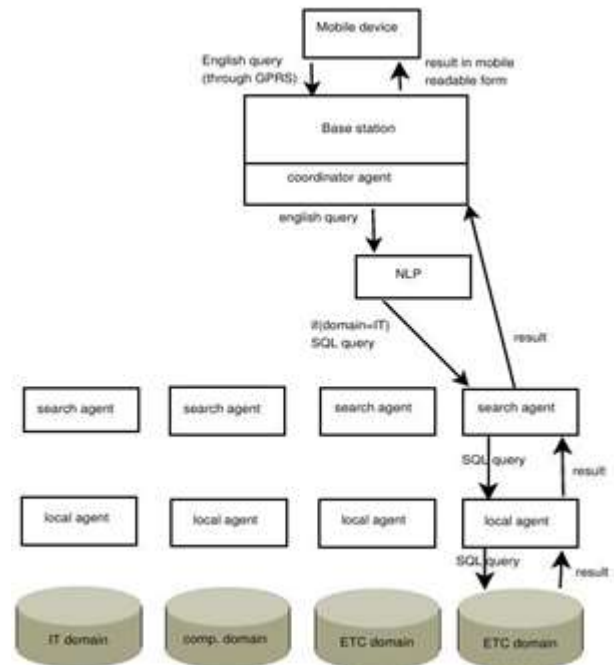


Fig 2. Architectural diagram

Java Agent Development Framework(JADE) is a middle ware layer which simplifies the implementation by providing different tools set that support the debugging and deployment phases of system. In JADE, the configuration can be controlled via a remote Graphical User Interface (GUI) and the agent platform can be distributed across different machines. JADE comprises of several interesting features which make the process of implementation easier. The several features includes platform for distributed agents, GUI ,tools for debugging, inter platform agent mobility and agent sniffers etc. The classes in JADE easily support the development of multi-agent systems. It helps for syntactic and semantic compliance where ever possible with Foundation for Intelligent Physical Agents (FIPA) specifications. The Figure is showing the architecture of FIPA. The Agent Management System (AMS) is the agent system, who has exerts supervisory control over access and use of the agent platform. There can be only one AMS which will exist in a single platform. The AMS provides services such as life-cycle white-page,a directory for maintaining details of Agent Identifiers (AID) and agent state. Each agent in system must register or must be validated with an AMS in order to get a valid AID. The Directory Facilitator (DF) is the agent which provides the default yellow page service in the platform. The Message Transporter, also called Agent Communicating Channel (ACC), is the software component controlling all the exchange of messages within the platform, including messages passing between remote platforms. JADE fully complies of reference architecture and when JADE platform is launched, the creation of AMS and DF takes place immediately. Furthermore the

Messaging Service is always activated to allow message-based communication. The agent platform can be split to be on several hosts. Each JVM is a basic container of agents that provides a complete run time environment for agent execution and allows several agents to concurrently execute on the same host. The main container is the one where the DF and AMS are located. The other containers, instead helps to connect the main container and provide a complete run-time environment for the execution of any set of JADE agents scope

The main objective of this project is to extract the maximum data to the client on their mobile phone, when the client is unable to fetch the data which is placed at other location. The inter-agent communication is based on standard Query Manipulation Language(QML). The query is generated by user which is general user understandable form. The Natural Language Processing Convert the query text from the base station into more formal representations such as first-order logic structures that are easier for computer programs to understand. As the database system supports multiple collection of data from different domains. The database uses different notion to describe a logical data entities which contain a set of information sources from different databases languages. Simply it performs the logical clustering of the actual-physical data present on database servers. At each database servers we extend the search agent and local agents. The search agents processes the query with respect to particular domain to which it belongs and performs action accordingly.

These can be the name of domain or table name or classification attribute of the of various database groups, for example. The search agent traverses through all the local agent (example. database belonging to Different institutes and Employee group). It classifies each domain as referred by query and extracts results from domain which contain the details of data to be extracted For example, it will Search all the Staff Information from E_Staff Domain like Name, Designation, Gender and sends the result back to NLP. The NLP converts information from computer databases into readable human language. It uses Natural Language Generation (NLG) for generating natural language from a machine representation system such as a knowledge base or a logical form. The converted output can be viewed from mobile unit or mobile agent. Finally, these important features are passed to the coordinator agent. The coordinator agent handles the query processing features. It acts as an information gateway to the records sources it manages. In contrast to the above, the user agent is the one that the end user interacts with. It formulates the user's query, entered via a application, translates into an appropriate query message format and displays the answers. The user agent makes use of the services of a corresponding Coordinator agent. This agent accepts requests from user agents. It has the role to identify which database the user is actually referring. Concluding with the overall agent architecture, there are three agents: the coordinator agent, the search agent and local agent

Conclusion

This paper presents a Multi-agent system study and usage for the management of distributed data and its retrieval. An alternative approach to the client-server traditional systems is Multi-agent technology. In this proposed system the mobile

agents can dispatch from source to a destination host carrying the data which is to be computed at remote site. Here the Mobile agents move the data towards the remote distributed databases, no from the databases to the data. Therefore, the proposed system has huge bandwidth savings and can overcome network latency. Also this Mobile agent based system approach offers some advantages over the traditional system, such as system scalability, low traffic in the network and load balancing. The mobile agents system architecture require a proper environment for its implementation and execution of overall processes. The implementation of the mobile agents is done by using, the JADE (Java Agent Development Framework). The Natural Language Processing helps to speeds up performance of execution, by simply avoiding the unnecessary action on all the agents. Further work will be related to the security of the mobile agent.

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