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JOURNAL AND OTHER ARTICLES

- Schemenner, R.W., Huber, J.C. and Cook, R.L. (1987), "Geographic Differences and the Location of New Manufacturing Facilities," Journal of Urban Economics, Vol. 21, No. 1, pp. 83-104.

CONFERENCE PAPERS

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A STANDARD EVACUATION PROCESS OF MOBILE AGENTS USING PRE-PROCESSING TECHNIQUES

L. KATHIRVELKUMARAN
RESEARCH SCHOLAR
DEPARTMENT OF COMPUTER SCIENCE
RATHINAM COLLEGE OF ARTS & SCIENCE
COIMBATORE

R. MURALIDHARAN
HEAD
DEPARTMENT OF COMPUTER SCIENCE
RATHINAM COLLEGE OF ARTS & SCIENCE
COIMBATORE

ABSTRACT

A Mobile agent is "a program that is self-governing enough to act separately, even when the user or application that launched it is not available to provide guidance and handle errors". In general terms, it is a program that acts in behalf of its owner. A mobile agent is an object that migrates through many nodes of a assorted network of computers, under its own control, in order to perform tasks using resources of these nodes.

KEYWORDS

e-commerce, m-commerce, mobile agents, active object.

1. INTRODUCTION

A Mobile agent is "a program that is sovereign enough to act in antagonism, even when the user or application that launched it is not available to provide regulation and handle errors". In general terms, it is a program that acts in behalf of its holder. A mobile agent is an object that migrates through many nodes of a assorted network of computers, under its own control, in order to perform tasks using resources of these nodes. A Mobile Agent is a type of software agent with the feature of autonomy, social ability, learning, and most importantly, mobility. The mobile agent is a process that can transport its state from one environment to another, with its data intact, and be capable of performing appropriately in the new environment.

A mobile agent is a precise form of mobile code, within the field of code mobility. However, in contrast to the isolated valuation and Code on demand programming paradigms, mobile agents are dynamic in that they can desire to drift between computers at any time during their implementation. This makes them a powerful tool for implementing distributed applications in a computer network. An untie multi agent system is a system in which agents that are owned by a mixture of stakeholders incessantly enter and disappear the system.

A mobile agent is an object that migrates through many nodes of an assorted network of computers, under its personal control, in order to perform tasks using resources of these nodes. The uses of this technology represent a change in the disseminated programming paradigm. This approach provides many benefits to the development of distributed applications but introduce new necessities to the engineering of these systems.

The development of distributed applications is directly influenced by the choice of an architecture style. The necessities of the system as scalability, fault tolerance, response time, and support for disconnected operations and so on, are important point to be measured and reasoned before the implementation of a system.

2. NATURE OF MOBILE AGENT

A mobile agent consists of the program code and the program execution state. Originally a mobile agent resides on a computer called the abode machine. The agent is then dispatched to perform on an isolated computer called a mobile agent host (a mobile agent host is also called mobile agent platform or mobile agent server). When a mobile agent is dispatched the complete code of the mobile agent and the execution state of the mobile agent is transfer to the host. The host provides a appropriate execution environment for the mobile agent to execute [6].

The mobile agent uses wherewithal (CPU, memory, etc.) of the host to perform its task. After completing its task on the host, the mobile agents migrate to another computer. While the state information is also transferred to the host, mobile agents can resume the carrying out of the code from where they left off in the previous host instead of having to restart execution from the commencement. This continues awaiting the mobile agent returns to its home machine after completing execution on the last machine in its schedule.

2.1. MOBILE AGENTS FUNCTIONALITY

Mobile agents are distinct as active objects or cluster of objects that have performance, state and position.

- Mobility: Agents that can travel in network
- Autonomy: Agent itself decides when and where to migrate next

Mobile Agent travels from node to node of a distributed system performing tasks in behalf of its owner. At the end of this process, an agent can return to its abode site and report itself to the users who inject this object in the disseminated system. Mobile agents decide when and where to move. Movement is often evolved from Remote Procedure Call (RPC) methods. As like a user directs an Internet browser to "visit" a website, a mobile agent accomplishes a move through data duplication. As the interaction between the agent and the resource after moving is perform in the similar host, not including the transmission of messages through the network, this paradigm is indicating for some kinds of real time distributed applications.

2.2. LIFE CYCLE OF MOBILE AGENT

- The mobile agent is created in the Client Machine.
- The mobile agent is dispatched to the Server A for execution.
- The agent executes on Server A.
- After execution the agent is cloned to create two copies. One copy is dispatched to Server B and the other are dispatched to Server C.
- The cloned copies execute on their respective hosts.
- After execution, Server B and Server C send the mobile agent received by them back to the Client Machine.
- The Client Machine retracts the agents and the data brought by the agents is analyzed. The agents are then disposed.

3. APPLICATIONS OF MOBILE AGENTS

The study describes many applications that can benefit from the use of the mobile agent. These are mobile computing, workflow management and electronic commerce [5]. Additionally, new applications as runtime software change and software exploitation can also benefit from this technology. Some of these applications are listed as follows.

3.1 ELECTRONIC COMMERCE

Mobile agents, acting as customers, can be configured to move through different nodes from a network in order to perform commercial transactions on behalf of its owner. In a virtual shopping center scenario, provisions offer products with different model and price. Agents represent the user needs and interests, being outfitted with a buying list. The agents can search for some kind of product or service, compare its prices and perform purchases and orders on behalf of its owner.

3.1.1. WORKFLOW MANAGEMENT SYSTEM

Workflow is computer interpretable description of activity, and their implementation order. Workflow Management Systems (WFMS) are used to automate and coordinate the execution of technical tasks. Tasks can be performed concurrently by many users and automated applications. These tasks can be modeled as independent agents that move through the network nodes, carrying the data and controlling the execution of the activities in a WFMS.

3.1.2. RUNTIME CHANGE OF SOFTWARE

Software systems can be specially specified and configured to be changed at runtime. Software agents can be deployed conveying updates of modules and software configurations. Its intrinsic capability of conveying data and their ability to execute operations in the current machine can be used to control and coordinate the process of stopping, modifying, and updating a system at runtime.

The other application areas are:

- Data collection from many places
- Searching and filtering
- Monitoring
- Negotiating
- Bartering
- Parallel processing
- Entertainment
- Targeted information dissemination

3.1.3. MOBILE AGENTS IN E-COMMERCE

A few of research effort which uses MA for E-Commerce applications are:

Sakaguchi et al. [2] proposed a shopping assistant agent for Web-shops. The shopping assistant agent works on a web server, a PCs-sale site. The agent has been applied to help potential buyers of built-to-order (BTO) PCs. There are three features of the interaction with this agent. (1) Two interaction channels: selection and conversation. (2) Flexible topic change: the user can trigger a new conversation flow even in the middle of a conversion. (3) Personalized Interaction: the interaction is personalized according to user behavior. There are three methods for the user to get advice from this agent. (1) Answer questions from the agent. (2) Ask the agent questions. (3) Refer to an additional message from the agent.

Lesser et al. [3] developed an information gathering agent that processes Web documents to create product models and recommend purchases based on user selection criteria. The architecture of this information gathering agent includes the following components:

- Resun (Resolving Sources of Uncertainty)
- Planner: a blackboard-based interpretation planner
- Information extractors: test-extraction tools
- Document classifiers: text-processing filters
- Server information database: a local database of information sources stored
- Object database: a local database stores product information
- Design-to-Criteria (DTC) scheduler: an agent-control problem solver
- TAEMS modeling language: a Task, Analysis, Environment Modeling, and Simulation language
- Task assessor: a software module manages the interface between the Resun opportunistic planner and DTC scheduler.

4. DESIGN AND EXECUTION OF PRE-PROCESSING

After an agent has sensed its environment, it needs to form an internal representation. Furthermore, based on this representation, the agent selects which action to perform, i.e. how to react to the state of the environment. However, as in context-aware applications, the sensor measurements often contain errors and some measurements might be missing, the raw signals often need to be preprocessed before reliable inferences can be made.

In order to implement cost minimized search, parallel searching is used. In this technique, multi - mobile agents are used to retrieve information from different servers in parallel and the response will be sent back to the requested user.

FIG. 4.1 PARALLEL SEARCHING – AGENTS

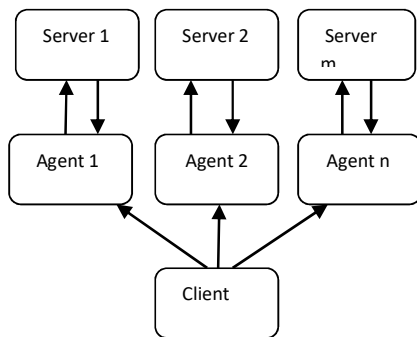


FIG. 4.2 PHASES OF QUERY PROCESSING

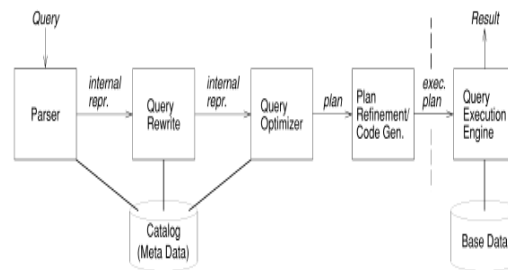


Fig 4.1 illustrates that the search query requested through client will be send to multiple mobile agents which will parallel search from different servers and send the result back to the client and hence perform cost minimized search.

Parser. In the first phase, the query is parsed and translated into an internal representation that can be easily processed by the later phases. The same parser can be used for a centralized and distributed database system.

Query Rewrite. Query rewrite transforms a query in order to carry out optimizations that are good regardless of the physical state of the system (example, the size of tables, presence of indices, locations of copies of tables, speed of machines, etc.). Typical transformations are the elimination of redundant predicates, simplification of expressions, and nesting of sub queries and views.

Query Optimizer. This component carries out optimizations that depend on the physical state of the system. The optimizer decides which indices to use to execute a query, which methods (example, hashing or sorting) to use to execute the operations of a query (example, join and group-by), and in which order to execute the operations of a query. The query optimizer also decides how much main memory to allocate for the execution of each operation.

Plan. A plan specifies precisely how the query is to be executed. Probably every database system represents plans in the same way: as trees. The nodes of a plan are operators, and every operator carries out one particular operation (example, join, group by, sort, scan, etc.).

Plan Refinement/Code Generation. This component transforms the plan produced by the optimizer into an executable plan. In some systems, plan refinement also involves carrying out simple optimizations which are not carried out by the query optimizer in order to simplify the implementation of the query optimizer.

Query Execution Engine. This component provides generic implementations for every operator. All state-of-the-art query execution engines are based on an iterator's model. In such a model, operators are implemented as iterators and all iterators have the same interface. As a result, any two iterators can be plugged together, and thus, any plan can be executed.

Catalog. The catalog stores all the information needed in order to parse, rewrite, and optimize a query. It maintains the schema of the database (i.e., definitions of tables, views, user-defined types and functions, etc.).

It should be noted that the architecture shown in Fig. 4.2 and described in this subsection is not the only possible way to process queries. There is no such thing as a perfect query processor. An alternative architecture has, for example, been developed.

In that architecture, query rewrite and query optimization are carried out in one phase. Furthermore, there have been proposals to optimize a set of queries rather than individual queries.

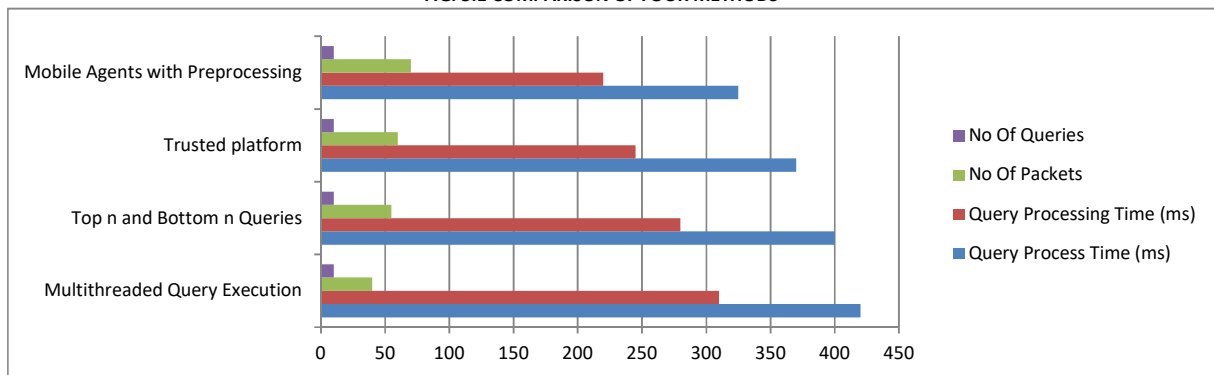
5. RESULT AND DISCUSSION

The aim of performance evaluation is to evaluate the effectiveness of each of the proposed techniques described in this thesis. The analytical models presented in the previous section analyze the elements of each processing component. These models are then incorporated into a simulation model, and the results of our simulation experimentations are presented in the following sections.

The grouped results based on the three key contributions in this thesis, which include Multithreaded Query Execution, Top n and Bottom n queries, trusted platforms and it is compared with Mobile Agent Preprocessing. In the simulation, the analytical models presented earlier are incorporated, to simulate the record and processing distribution. In the experimentations, it is particularly focus on process time, number of packets to be sent and number of queries to be sent. The results are presented as Fig. 4.1. which depicts the comparison chart of the four techniques that is used in the thesis, where Multithreaded Query Execution, Top n and Bottom n queries, trusted platforms provides a lower percentage of result when compared to the Mobile Agent Preprocessing.

GRAPHICAL PATTERN

FIG. 5.1 COMPARISON OF FOUR METHODS



There are three constraints that are measured with the same number of queries. They are:

1. Query process time
2. Query Response time
3. Number of packets

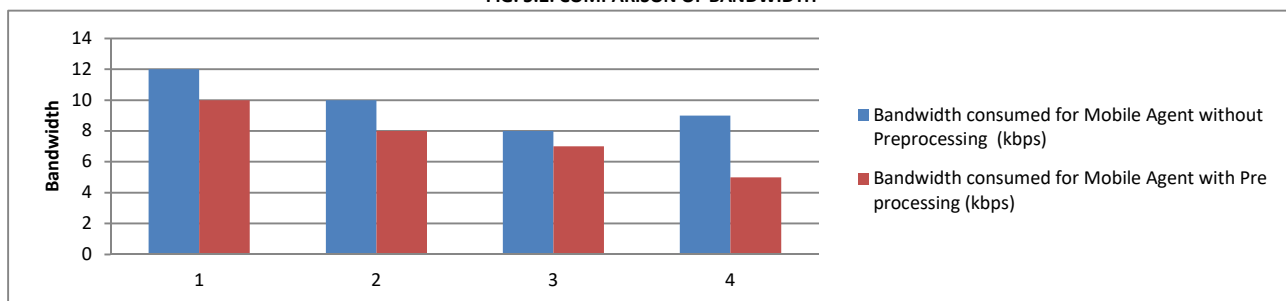
TABLE 5.1: COMPARISON OF ALL THE METHODS

Methods	Multithread query Execution	Top n and Bottom n Queries	Trusted platform	Mobile Agents with Preprocessing
Query Process Time (ms)	420	400	370	325
Query Processing Time (ms)	310	280	245	220
No Of Packets	40	55	60	70
No Of Queries	10	10	10	10

All the three parameters produced a positive result, when compared with the existing techniques.

From the table 5.1, the number of queries sent to the server is kept fixed, so that this parameter is used to measure all the remaining above three parameters. The query process time for the multi-threaded query execution is 420ms whereas the top n and bottom n queries are 400ms which is considerably reduced in the mobile agent preprocessing which is 325ms. But in individual trusted platform technique, it is 370ms. Another measure is query response time, where the query taken to respond to the central server after retrieving the data from the database, which will vary from the trusted platform to that of the mobile agent preprocessing. Similarly, the number of packets to be sent also varies from query execution techniques to mobile agent preprocessing.

FIG. 5.2: COMPARISON OF BANDWIDTH



From fig.5.2, comparison of bandwidth for mobile agent with and without query processing is done for a fixed number of packets that is to be sent from sender to the receiver. From Table 5.2, the packets that is to be sent is 10 and the bandwidth differs for all the techniques and the mobile agent preprocessing consumes a

low bandwidth of 5 kbps when compared to all the above techniques, the main advantage is that, the mobile agent server stores the retrieved data from the concerned servers for a particular TTL, so that it need not fetch the particular data once again, while the request is being generated for the second time.

TABLE 5.2: COMPARISON OF BANDWIDTH WITH AND WITHOUT QUERY PROCESSING OF MOBILE AGENTS FOR A FIXED NUMBER OF PACKETS

No of Packets	Bandwidth consumed for Mobile Agent without Preprocessing (kbps)	Bandwidth consumed for Mobile Agent with Preprocessing (kbps)
10	12	10
10	10	8
10	8	7
10	9	5

6. CONCLUSION

The agents are secluded from routing to malicious host. Also the retrieved data so far will be returned back to the requesting client once the malevolent host is detected. With several advances, the mobile agents will be an important ingredient in producing secure, flexible distributed systems. Also it is focused on a specific part of the overall architecture, which supports distributed preprocessing in ubiquitous environments. In addition, we have also included details about the sensing mechanisms of the agents.

The recital chart produces a better result, when compared to the existing techniques and the bandwidth is also measured for the four techniques. With these features, the recital measure of the mobile agent preprocessing system is much better when compared with the existing techniques.

The use of mobile agent can lead to huge communication savings. As a future work, this model can be further extended for dynamic query updating on the mobile agent query processing server and online purchasing system can be developed on a single web page, with security concern and we are planning to use mobile agent to answer semantic queries in mobile scenarios. In addition, it is also necessary in order to find out how well economic models and data dissemination models work for large-scale query processing.

Further research is necessary in order to find out how well it works for large-scale query processing. Furthermore, it is necessary that the mobile agents should be secluded from multiple malicious hosts that try to modify the data at a point of time.

REFERENCES

1. Anthony H. W. Chan, Caris K. M. Wong, T. Y. Wong, and Michael R. Lyu., 2012., Department of Computer Science and Engineering, The Chinese University of Hong Kong, Shatin, N. T., Hong Kong "Design, Implementation, and Experimentation on Mobile Agent Security for Electronic Commerce Applications."
2. Sakaguchi et al Christoffel M., Pulkowski S., Schmitt B., Lockemann P.C. (2005) Electronic Market: The Roadmap for University Libraries and Members to Survive in the Information Jungle. SIGMOD RECORD, 27(4), 68-73.
3. Lesser R. S. Silva Filho, J. Wainer, E. R. M. Ma-deira, C. Ellis – CORBA Based Architecture for Large Scale Workflow. Special Issue on Autonomous Decentralized Systems of the IEICE Transactions on Communications, Tokyo, Japan, Vol. E83-B, No. 5. May 2009, pp.988-998.
4. Quinn, A., Tesar, L.: A survey of techniques for preprocessing in high dimensional data clustering. In: Proceedings of the Cybernetic and Informatics Eurodays. (2000)
5. L.Kathirvelkumaran: "Data Communication through Mobile Agent with Pre-Processing Techniques in Electronic Environment ", Advance in Electronic and Electric Engineering. ISSN 2231-1297, Volume 3, Number 8 (2013), pp. 983-986
6. Maw Min1, and NyeinNyein Mobile Agent-based Information Retrieval for Shopping Assistant. Proceedings of 2015 International Conference on Future Computational Technologies (ICFCT'2015).

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