

## Mobile business approach based on mobile agent

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### ABSTRACT

Users today want the opportunity to make (or manage) a businesses in anytime and anywhere via their mobile devices. This paper proposes the architecture with mobile agent for the mobile businesses (m-business). M-business appeared as the promising approach to drive the vague following one of electronic business (e-business). Most of the e-busines [9] applications uses the traditional model client/server in which a commercial operation requires generally a link of stable communication being established between the customer and the server, and the traditional approach client/server [8] constitutes an obstacle to the development of application of m-business. The proposed architecture introduces several advantages: in the first place, allow the consumers to manage their commercial business driven by types of mobile devices (phones, PDAs, etc. ....) at any time and wherever. Secondly, minimize the waiting time of the customer, and the quantity of transferring information. Third, this architecture addresses the problem of time limited and expensive connection for mobile users. The Mobile agents will be used on a single level: research agent. Every research mobile agent will be used to visit the target server site of the application to collect the information's for his client, which allows it to interact locally with a server, and so to reduce the traffic on the

network by transmitting only the useful data.

### KEYWORDS

System multi-agent, mobile agent, M-Business, Aglets, J2ME.

### 1 INTRODUCTION

Users today want to have the opportunity to do business anytime and anywhere via their mobile devices. The applications e-business requires that the users owe connection to Web sites planned by their personal computers or the public terminals. Besides, the users often need to visit numerous sites and are always involved in a boring process. Most of the applications of e-business uses the model traditional client/server in which a commercial operation requires generally a link of stable communication being established between the customer and the server, and the traditional approach client/server suffers numerous problems as: the commercial business (affairs) requires a permanent connection being established between the customer and the server, the increase of the network traffic, the consumer to deal with the limitation of time and space and mode of connected is synchronous. We used the mobile agents to solve its problems and

constitute one paradigm of adequate and effective programming for this genre of application. A mobile agent is a computer program able to run on a remote computer, it may move from one site to another in progress its data, but also with its execution state. [7]

The main objective of our study is to propose of the architecture of an environment based mobile agents for M-business, in us based on the ability of the mobility of agents.

In this architecture, a consumer can connect his mobile device, as a PDA or a mobile phone, to the application server via a wireless connection and sent then a demand (request) of creation of a mobile agent to begin a specific business task on his behalf. Application server provided services such as the creation of mobile agents based on the demands of consumers. After having been created, the mobile agents autonomously travel to several servers-based agents on the Internet where a consumer wants to compare several international markets. The consumer needs only to reconnect later to call the agent for the results, so minimizing the use of resources.

The rest of this article is organized as follows: the section 2 presents some the related works. The section 3 presents our approach. Section 4 presents an experimental evaluation. Section 5 presents the future works and concludes this article.

## 2 RELATED WORKS

In this context, we present a few architectures: first presented an architecture of Zhiyong et al [1] which propose a structure based on the intelligent mobile agent that allows buyers and sellers to execute the business (affairs) by means of mobile devices. This architecture is based on

multi-agent systems because of their characteristics, facilitating the consideration of the very high dynamics of the environment in which to run the business using mobile devices. In this approach, the agent begins its migration of it's the server mediator with an itinerary list acquired from the mediator. If we have N servers, the agent will be visiting these N servers in sequence at a time limited by the mediator server. If the agent reaches its life, he returns to its host where it was created and then finish the migration process, in this case, the agent may be not visited at all servers. This can lead to a loss of opportunity to negotiate with other servers. The disadvantage of this architecture is: increasing the migration time and negotiation, and if the migration agent fails, or the node on which it is running fails, the migration process and negotiation will be destroyed. Secondly we presented the architecture of J-Phone with mobile agent for auctions [2]. In this architecture the server of mediator (AgentGateway) does not contain the itinerary list for auction sites, in this approach the server mediator created the mobile agents according to the number of the auction sites and sends to each auction site a mobile agent. The main advantage of this approach (J-Phone), it is that the mediator server sends a mobile agent for each auction site to minimize the time of migration and avoid the failure of the first approach. The last architecture is IMAGO [3], this architecture represents a distributed environment which allows the consumers to send mobile agents of their portable devices to visit the on-line stores for the search, by comparing, evaluating, the purchase and the payment of the goods. The disadvantage of this approach is that the mobile agent

to cloning in remote servers, and this method is not recommended at all because it violates the integrity of servers, is that consumers send mobile agent from their handheld devices, potentially causing long-term connection with the Internet. We believe that it is important to take account of the limitations of mobile devices, such as bandwidth, battery and calculating capacity limited and expensive connection time.

### 3 OUR APPROACH

Most of e-business applications using the model traditional client/server in which a commercial operation requires generally a link of stable communication being established between the customer and the server, and traditional client/server approach constitute an obstacle to the development of m-business applications. We used the mobile agents to address its problems and constitute a paradigm of adequate and effective programming for this type of application. The main objective of our study is to propose of architecture of environment based mobile agents for M-business, by leaning us on the capacity of the mobility of the agents.

The approach proposed in this work is an approach based mobile agents designed for M-business. The figure 1 shows an environment mobile business, a consumer can connect his mobile device, as a PDA or a mobile phone, to the application server via a wireless connection and sent then a demand of creation of a mobile agent to begin a specific business task on his behalf.

An application server provides services such as the creation of mobile agents according to the demands of

consumers. After being created, the mobile agents in an autonomous way travel to several servers-based agents on the internet when the consumer wishes to proceed to a comparison on several world markets.

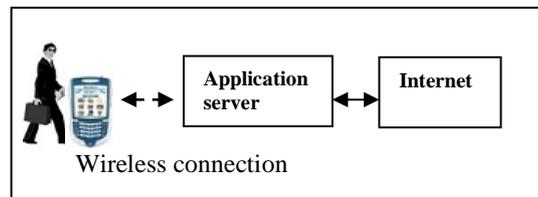


Figure 1. A mobile business environment.

The consumers only have to use twice the connection to low bandwidth, once to introduce a mobile agent and at the next time to collect the results when the task is complete.

#### 3.1 The architecture of the system

The general architecture of our system, illustrated in the figure 2, is structured around three main parties in an interaction:

- Part of the user (mobile part).
- Application server.
- Sites of suppliers.

In the figure 2:

**AR:** agent of the repertory

**ABDR:** Agent of the database of repertory.

**AS:** Agent of the supplier.

**ABDS:** Agent of the database of supplier.

The figure 2 presents our architecture, which is based on the concept "mobile agent" for M-business. As indicated in the figure 2, mobile devices are supported by client agents and connected to the application server via the wireless connection. A client agent is a static agent working on a mobile device and provides a graphical user interface (GUI)

for its user to communicate with the system.

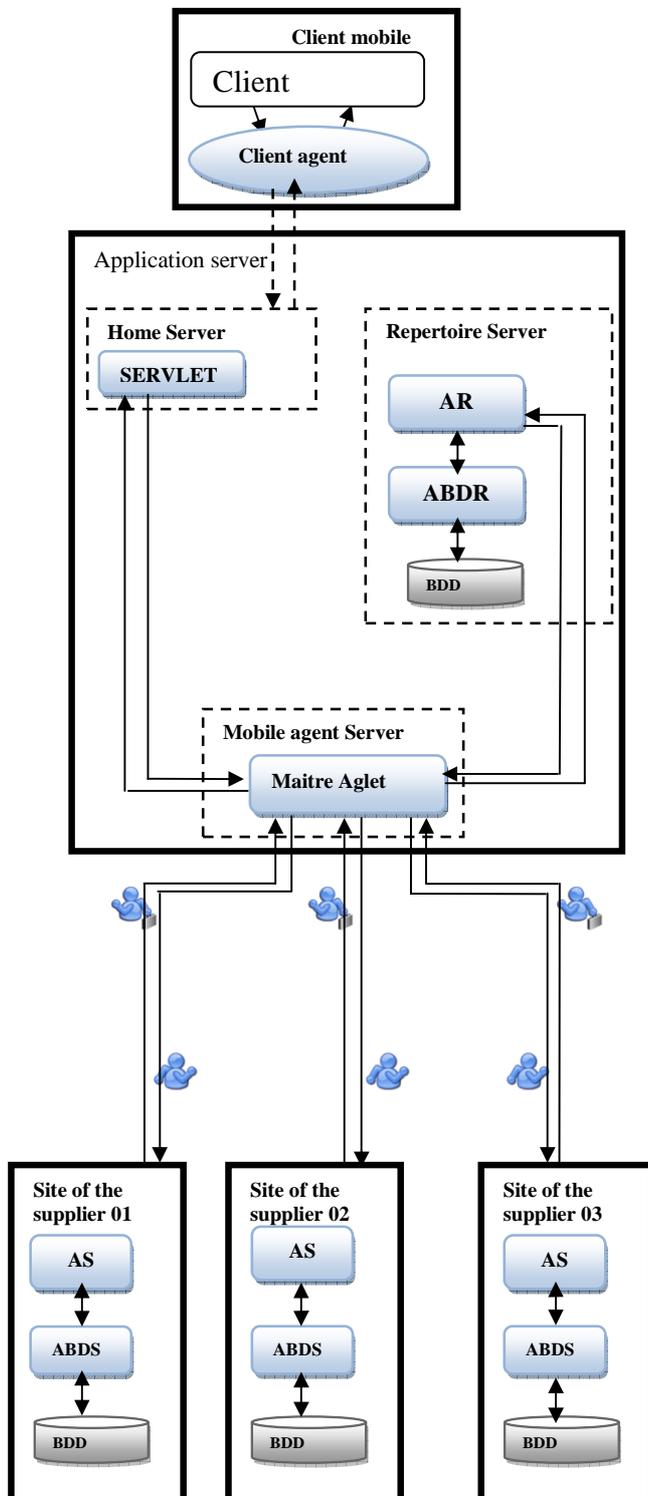


Figure 2. Architecture of the system.

The key to this system architecture is the **Application Server**, which acts as a mediator between the mobile device and supplier sites. In the **Application Server**, a **Server Home** responds to any requests (queries) from the client agent.

### 3.1.1 Part of the user

Generally the interface is the reference element which allows the user to judge the quality of a system. It presents the only means which allows the direct interaction between the system and the user.

This interface allows the user to send demands (requests), and includes:

- Client Agent is a stationary agent that runs on a mobile device of the user and provides a graphical interface (client interface) to interact directly with consumers and examine its personal preferences (from the mobile device). The client agent represents the interests of consumers and allows consumers to have a choice to produce and distribute a mobile buying or sale agent.

Attributes can be configured by a user via their mobile device, according to the following characteristics: the type of agent that specifies a buying agent or selling agent, an agent server (application server address), user identification which can be a mobile phone number or e-mail address, information on predetermined product, quantity, and the price that the agent can provide.

### 3.1.2 Application server

Supplies services as the creation of the mobile agents according to the demands of the consumers. After having been

created, the mobile agents autonomously travel to several servers-based agents on the Internet where a consumer wants to compare several international markets. It includes:

- 1) **The home server** is used to process the application of part of the user that includes the management of Master Aglets. In the home server, a **servlet** responds to any requests (queries) of the client agent.
- 2) The **mobile agent Server** understands **Master Aglets** to create or send mobile agents (slaves) to suppliers' sites. Master Aglets cooperates with the repertory server to receive suppliers' list which possesses information on the product asked by customer.
- 3) The **repertory server** has a directory of database which stores the addresses of all the suppliers, and can receive information on available products, or find the other agents supplying the necessary services to realize its purpose. On this server we have two agents:
  - **Agent of the repertory** is a stationary agent which provides a directory of database that stores the addresses of all the suppliers. According to the demands (requests), the agent directory selects a suppliers' list which possesses information on the wanted product, by means of an agent database.
  - **Agent database of repertory** is responsible for access and retrieval of data from the database.

**3.1.3 Suppliers' sites** welcomes and interacts with the mobile agents of searches and to represent markets, it includes:

- **Agent of the supplier:** is a stationary agent, he receives the mobile agents (slaves) who are sent by Master Aglets, create an database agent and bring consumer requests to it.
- **Agent of the database of supplier:** will generate a query, the results corresponding to the request of the consumer are extracted from the database and returned as a result the **supplier Agent**.

### 3.2 Types of agents

Our system consists of multiple agents cooperating to meet requests for purchases or sale of client proposals, are distinguished:

- A **client agent** is a stationary agent that runs on a mobile device of the user and provides a graphical interface to allow the user to configure a mobile agent (from the mobile device).
- The **mobile agent** will be sent to suppliers' sites where buying agents and selling agents interact and negotiated between them to reach an agreement, provided that they can communicate in a common language.
- An **aglet** is an autonomous software agent based on Java, used on this system and it works on **application server** and the sites of suppliers.
- **Agent of the repertory** is a stationary agent which provides a directory of database which stores the addresses of all the suppliers.
- **Agent of the supplier** is a stationary agent; it receives the mobile agents of research that are sent by "**Master Aglets**" [4].

004









