On-Line Chain Store Supported by Nomadic Server

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Abstract

With the rapid growth of the Internet and communication technologies, many real-world activities were applied on the Internet, including Education, Entertainment, Academic activities, and Commerce, etc. We proposed the nomadic media server (mobile media server) to achieve the maximum use of bandwidth. The distributed load of central server will be retrenched appropriately. At the same time, the security protection degree will be strengthened via the changeable server. Actually, we use the mobile server/storage pre-broadcasting technique, as well as a communication network optimization algorithm, which is based on a graph compute mechanism. The mobile server will play an important role in the future virtual society, both on narrow band and broadband environment. Chain store over the Internet is a rare management model in electronic commerce. In this paper, we construct many chain stores via using nomadic media server.

Keywords: Nomadic Media Server, Virtual Society, Broadband Communication, Chain Store, Electronic Commerce.

1. Introduction

In recently years, electronic commerce is a very hot research issue. These issues include security, recommendation system, payment mechanism, and so on. According to the idea of our mobile media server, we proposed a new trend in electronic commerce. We still not found any chain store over the Internet because there is not a good mechanism to support the environment. Our mobile server provides the solution for this idea.

As we know, the Internet is very popular in this decade. Many activities were applied on the Internet already. Commercial trade seems very exciting with this medium because it provides a more convenient method for business. Of course, in the flow of business, a complete trade includes cost assessment, payment evaluation, channel management, …etc. And there are many roles in the commerce, including

business, provider, consumer, agent, and so on. So, they perform a supply chain. Actually, these components still exist in the Electronic Commerce (EC) over the Internet.

EC describes the manner in which transactions take place over networks, mostly the Internet. It is the process of electronically buying and selling goods, services, and information. Certain EC applications, such as buying and selling stocks or books on the Internet, are growing at a rate of several hundred percent every year. Electronic commerce could have an impact on a significant portion of the world, on business, professions, and, of course, on people.

Due to many researches about electronic commerce, they always discussed in four directions as following:

- Business to Business (B to B)
- Business to Consumer (B to C)
- Consumer to Business (C to B)
- Consumer to Consumer (C to C)

There are many benefits to manage an electronic store over the Internet. Managers can decrease their cost, response time and higher their income. It is possible for consumer to be a manager since the benefits of managing an electronic store. If there is one way to make the consumer’s dreams coming true, it will be a wonderful contribution.

2. Related Works

Generally speaking, there are many business models over the Internet. Some researches [1,2] mentioned the following illustration.

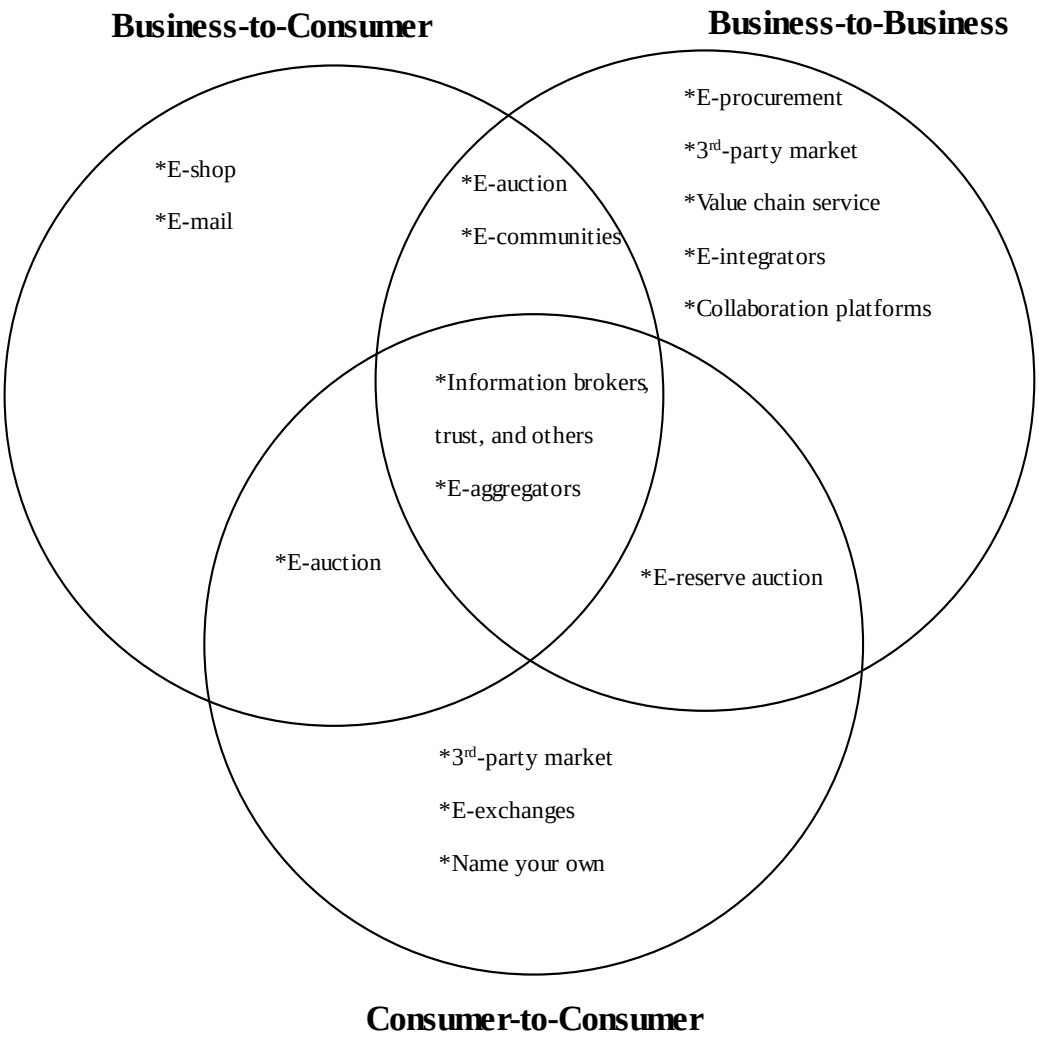

Figure1: The Illustration of Business Model

Some papers discussed the mobile environment. Actually, Mobile Peer to Peer (MP2P) [3] takes a historical view on the subject of mobile networks and underscores some of the main architectural principles enabling MP2P. This concept is further expanded to incorporate a mobile architecture including a ubiquitous end user device, where business model related policies and stored. In order to archive the high utilization of distributed resource, the Mobile Distributed Web Server System [4] provides a good solution.

3. Traditional Chain Store

In the real world, we always discover something when we go shopping. There are many chain stores on the street, such as 7-11, starbucks coffee shop, McDonald's restaurant, …etc. The branch store joins an alliance to the original company and pays

the fees of patent. This is another form of business to business.

The branch store serves consumers and owns their store like the original store. The outward appearance is always the same with other branch stores. These branches come into being chain store. Their services are always similar, too. Since the form is a kind of management in the real world, it should be completely imitated on the Internet. If this way is available, there are many guaranteed benefits as following:

(1) Load Sharing
(2) Heighten Security
(3) Full usefulness of Resource

Load Sharing means that the load of the original store (Headquarter) could be shared by other branch stores. As to the security issue, many hackers always are interested in destroying a web site. If we have a mechanism about mobile server for distributing the content to other site, the security will be heightened and guaranteed. In aspect of Full usefulness of Resource, the same host can open different stores because it can become different branch stores after closing a boring store.

The simple model of chain store is like the following figure 1. It is adapted to the real world and virtual world. In the virtual world, the idea can be realized by our mobile media server strategy we will discuss in next section.

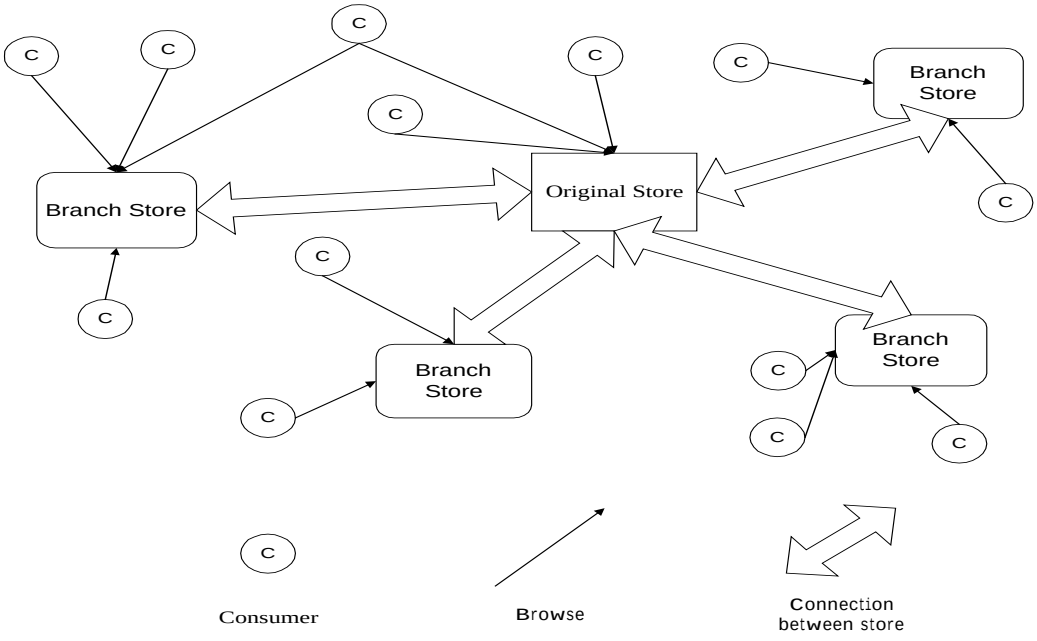

Figure 2: The Model of Chain Store

According to figure 2, the role transition may occur at any time. The consumer can become as provider such as branch store while he registers on the original store. Then, the original store will transfer the content to the client for remote building a server via our mobile media server technique.

4. Nomadic Media Server

Actually, we need the mobile media server provider to provide the service of content. Then, through the transferring medium, including wired medium, or wireless one, even satellite to transfer the content to the received host. After the host with IP received the command from the mobile media server provider, it will be set as a server to serve all users over the Internet. The illustration is as figure 3.

In the mobile environment, we must propose a simple protocol to support the idea. In fact, the migrated data is not only files, but also all continuous media. According to the simple protocol, we have some steps between the mobile media server provider and mobile server.

i. Mobile server end request for service of content.
ii. Mobile Media Server Provider receives the request, then search the goal and detect the hardware and software configuration.
iii. Wait for the condition complete.
iv. After the condition complete, a mobile agent is sent to the mobile server end.
v. Mobile server opens the right to let the agent to write.
vi. Setting as server and migrating the content.

The protocol is illustrated as figure 4.

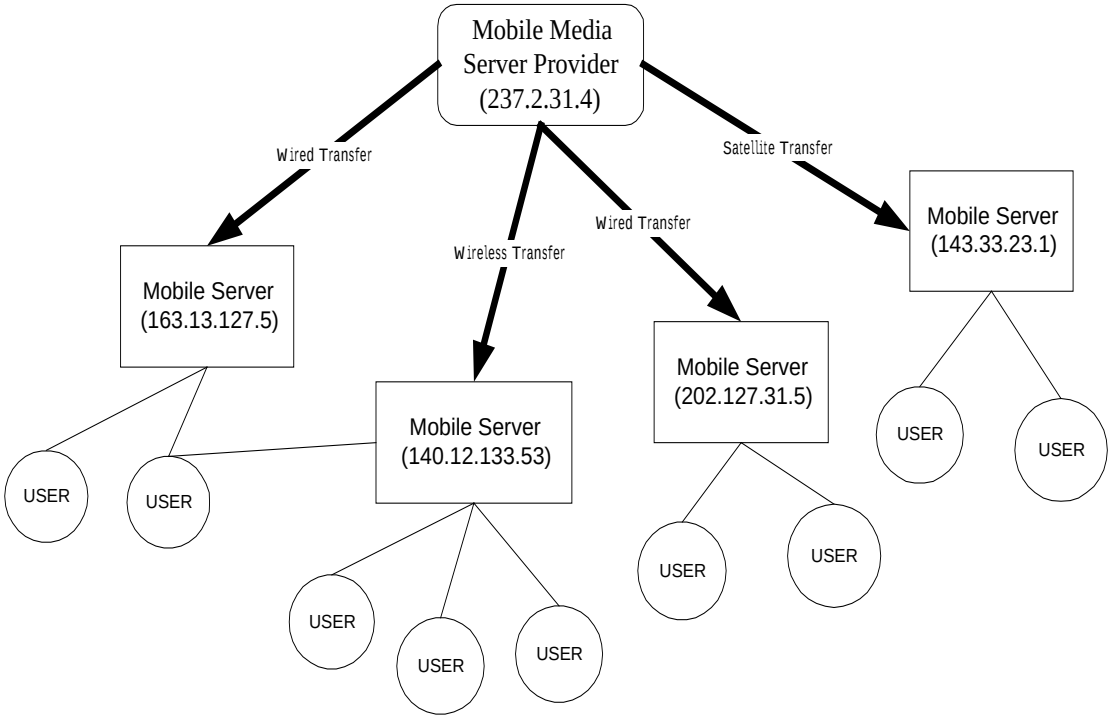

Figure 3: The Illustration of Mobile Server

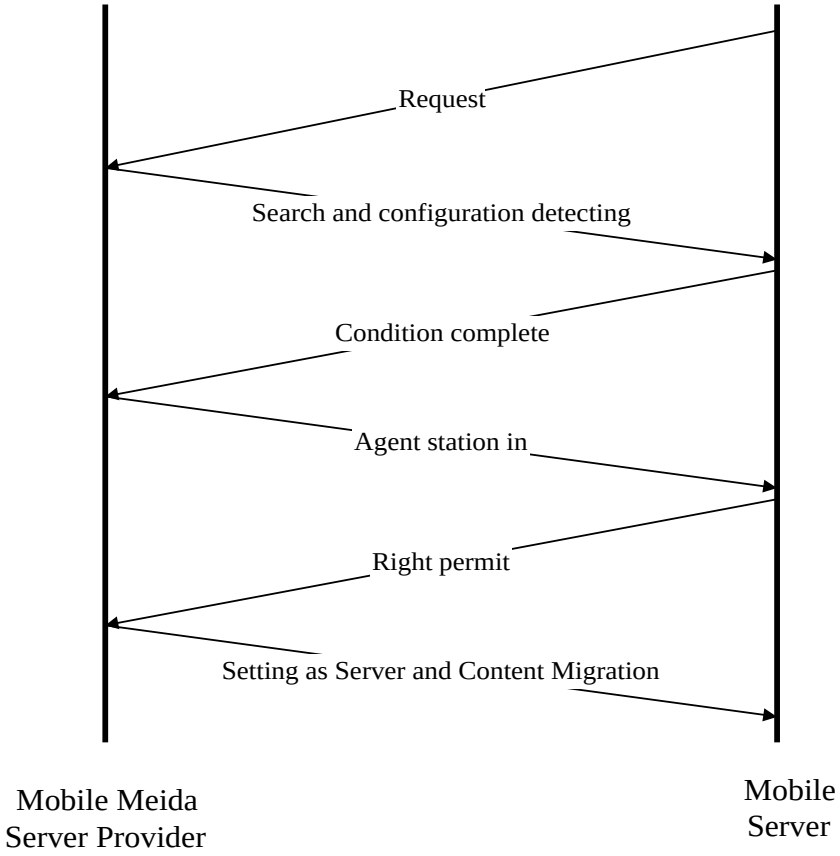

Figure 4: The Migration Protocol

4.1 The Lifecycle of Nomadic (Mobile) Media Server

Actually, a mobile server/storage always has its life. It is like a parasite to live in a shell for a period of time due to some reasons. The mobile server/storage always follows the next states after it is born and before it is killed or died of natural. Figure 5 illustrated the following states.

- Start: the mobile server/storage was created.
- Searching: the mobile server/storage is searching the identified host.
- Suspending: the agent which is embedded in the mobile server/storage is waiting for enough resource in order to enter the host.
- Dangling: the agent which is embedded in the mobile server/storage loses its goal of surviving, it is waiting for a new goal to mutate.
- Mutating: the mobile server/storage is changed to another host.
- Migrating: the contents of mobile server/storage were transferred.
- Restoring: the mobile server/storage will die or mutate, it restores its related data to the original host.
- Dying: the agent which is embedded in the mobile server/storage is died and the mobile server is killed.

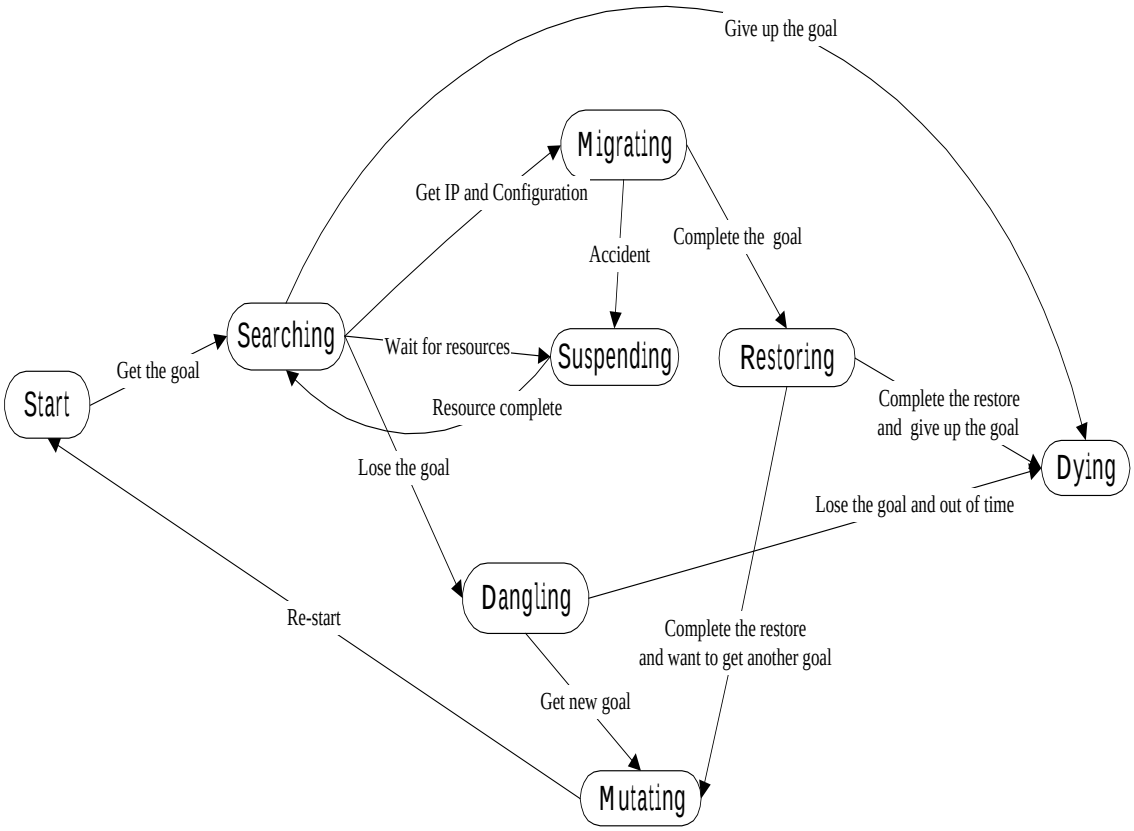

Figure 5: Mobile Server/Storage Living State Diagram

4.2 The Algorithms for Mobile Server Living State

According to the previous section, the living state and simple protocol of mobile server/storage were proposed. In order to justify the description, we provide algorithms to prove. We have a global variable named *state*, to record the living state of mobile server. The developed algorithms are adapted to the migration protocol illustrated in figure 4.

The Searching algorithm describes if a host request for service from mobile media server provider, then mobile media server provider should make sure whether the host's IP is existing there or not. So, the *Result* is a variable in boolean type.

State = Start *// A Global Variable for recording the living state*

Algorithm: Searching
Given:
State is the state of mobile server

The IP of the host
Result is boolean type (TRUE| FALSE)

Constraints:
For each IP, it should accord with IPv4 or IPv6

Input:
An IP

Output:
For each IP, find the Result

Steps:
```
IF State == Start or Suspending THEN
{
    State = Searching
    For each IP, mapping it to IPv4 or IPv6
    IF the IP is qualified, THEN
    {
        Set the Result =TRUE
        State = Migrating
    }
    ELSE
    {
        Result = FALSE and State = Dangling
        Changing the transition
    }
}
ELSE
    Stop            // Nothing to do
```

If the IP is correct, the mobile media server provider sends a mobile agent to detect the configurations of the target as the following algorithm, including the operating platform, software configuration, and hardware configuration. The *state* will be set to Migrating until the complete of the detecting, otherwise, it will be set to Suspending. In software configuration, the program can transfer the suitable agent according to the operating system. Then, setting the remote host as server via the appropriate tool, including IIS (Internet Information Service), APACHE, … and so on for server setting, and SQL, MySQL, ORACLE…etc. for database setting.

Algorithm: Detecting the Configuration
Given:
MA is for a Mobile Agent
OS is for Operating System
IP is for Internet Protocol
SW_Con is for software configuration
HW_Con is for hardware configuration
Q = sequence-of (OS, IP, SW_Con, HW_Con)
Goal_Result is for the Result from the Searching Algorithm, it is boolean type

Constraints:
As to the OS, it may be Windows series, Linux, Unix, …etc.
As to the SW_Con, it will be decided according to OS. It may be IIS,

APACHE, SQL, MySQL, ORACLE…etc.

As to the HW_Con, it may be the list-of (video card, sound card, network card, storage)

Input:

An IP

Output:

A sequence Q = (OS, IP, SW_Con, HW_Con)

Steps:

```
IF the Goal_Result == TRUE THEN
{
  MA collects the configuration of the host through connecting
  Set OS = current platform
  Set IP = the host's IP
  Set SW_Con = one of (IIS, APACHE, …)
  Set HW_Con = list-of (video card, sound card, network card, storage)
  Q = (OS, IP, SW_Con, HW_Con)
  State = Migrating
}
ELSE
{
      Q = Unknown and State = Suspending
      Changing the transition
}
```

If the *state* is equal to Suspending, Dangling, Restoring, or Mutating, it means that the living state should be changed. The algorithm named changing the transition is to deal with this situation.

Algorithm: Changing the transition.

Given:

Current_state is for the current state of mobile server

IP_new is for new Internet Protocol

Waiting_Time is for the time to wait for another goal

Restore_Flag is a boolean type for deciding the restoring status

Constraints:

Current_state = (Suspending, Dangling, Restoring, Mutating)

Input:

Current state

Output:

State = one of new state

Steps:

```
IF Current_state == Suspending THEN
      State = Searching
ELSE IF Current_state == Dangling THEN
{
      IF the host got a new goal and within the Waiting_Time THEN
      {     State = Mutating
            Changing the transition.
      }
```

```
        ELSE
            State = Dying
    }
    ELSE IF Current_state == Restoring THEN
    {
        IF the Restore_Flag == TRUE THEN
            State = Dying
        ELSE
        {   State = Mutating
            Changing the transition.
        }
    }
    ELSE IF Current_state == Mutating THEN
    {
        IF Restore_Flag == FALSE THEN
        {
            Restore data to the callee
            Set Restore_Flag = TRUE
            State = Start
        }
        ELSE
            State = Start
    }
```

The migration appears in the Migrating and Restoring state. If Migrating state, it means the mobile storage or mobile server are moved from the mobile media server provider to the indicated host. On the other hand, the direction is reverse. The following algorithm describes the work.

Algorithm: Migration

Given:
MMSP stands for Mobile Media Server Provider
Move_Flag is a boolean type for presenting the status of migration

Constraints:
State = one of (Migrating, Restoring)

Input: An IP and Current state

Output:
Move_Flag = (TRUE, FALSE)

Steps:

```
    Move_Flag = FALSE
    IF State == Migrating THEN
    {
        Migrate content from the MMSP to the host
        Move_Flag = TRUE
    }
    ELSE IF State == Restoring THEN
    {
        Migrate the data from the host (Mobile Server) to the MMSP
        Move_Flag = TRUE
```

State = Mutating
Changing the transition
}

Finally, the idea could be adapted to many environments, including the Internet, wired network environment, wireless ones, etc. This is a fundamental model for supporting the mobile environment.

5. The Architecture and Implementation of our Chain Store

The architecture of Chain Store illustrated as figure 6

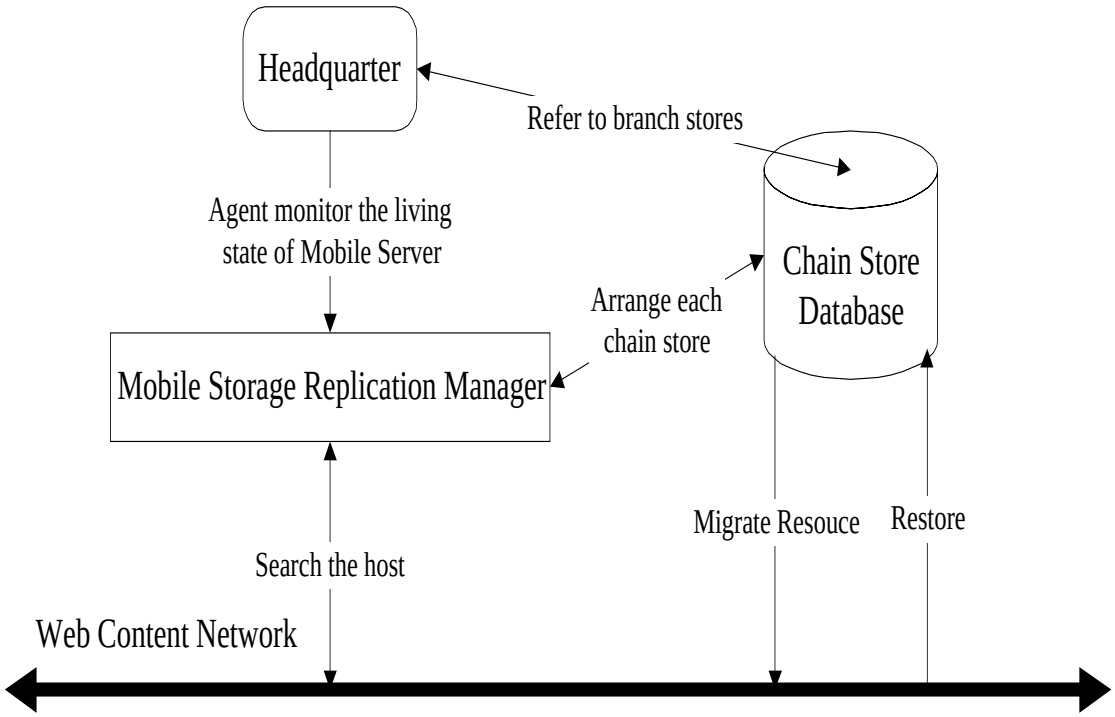

Figure 6: The Architecture of Chain Store

According to the previous section, the model of chain store could be implemented on the Internet. As to the viewpoint of electronic commerce and virtual society, it is very useful for the users of the Internet. It is very difficult to Internet Content Providers to build an electronic chain store because they should complete many complicated steps for building a web server first. In order to solve this complex problem, our mobile media server provides an automatic, convenience solution. The detailed descriptions were presented in section 4. The following figure 7 and figure 8 showed the implementation. Figure 7 showed a branch store at the web site (http://163.13.127.2/index.htm) after joining the chain store of original store (figure 7).

You can become a branch store after clicking the “join us” button.

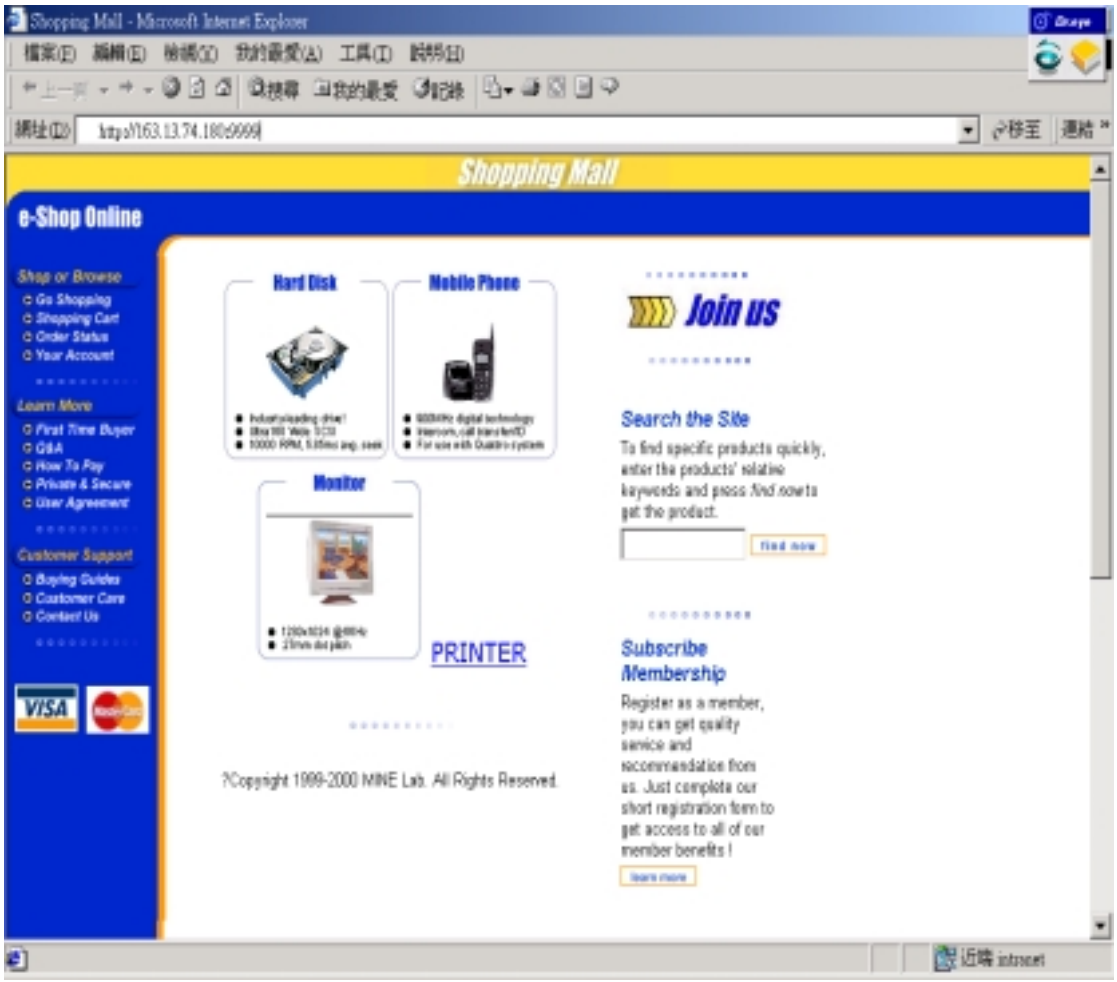

Figure 7: The original store of Shopping Mall

Figure 8: The branch store of Shopping Mall

6. Conclusions

Due to the huge use of Internet, electronic commerce is the trend of business. The chain store is very rare over the Internet. According to our mobile server, the electronic chain store can be built. The contributions about the electronic chain store are as following:

(1) We propose the idea of electronic chain store over the Internet, it is very easy let consumer becomes a business or vendor.
(2) The load of original store will be decreased due to shared by other branch stores.
(3) The problem of security can be solved partially because of the mobile server.
(4) The bandwidth can be reserved adaptively.
(5) Shorter response time can increase income because consumers always browse the nearest branch stores rather than the distant original ones.

References

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