Mobility in Cloud Systems

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ABSTRACT:

Cloud computing is a huge amount of distributed and dynamic resources that are provided on request to clients over the Internet. This technology improves applications services by arranging machines and distributed resources in a single huge computational entity. Normally, cloud servers don't operate at full capacity; means there's some processing power will be wasted. To make use of this wasted power, it's possible to use the mobility feature, which is the ability to move, migrate or relocate data, application software or jobs among cloud servers. In this paper I have presented a suggested framework that can deal with the mobility feature in the cloud environment.

Keywords
Application Server, Cloud, Database Storage, Distributed Systems, Mobility.

I. INTRODUCTION

Cloud computing is a massive quantity of distributed and dynamic resources from computing power, storage and services that are provided on request to clients over the Internet [13]. In general, the cloud computing resources situates in massive data storage centers and is managed by a third group, who offers computing infrastructures which can be approached from anywhere by anyone with internet services [9]. A lot of authors, such as [5, 11, 15, 10, 14], draw up the fact that cloud computing provides computing power, software, storage on demand distributed over the internet and managing large scale of data. Figure (1) shows the architecture model for the cloud computing. Cloud services permit individuals and businesses to utilize software and hardware that are organized by third parties at remote sites. Such examples of cloud benefits include social networking sites, online file storage and webmail. Because of the economic benefits for providers and users, cloud computing becomes popular as it increases the revenue for cloud provider and lowers the costs for cloud users [1, 17, 6]. The cloud computing system gains access to information and computer resources from anyplace that has a network connection [2].
integration, optimization of hardware deals and scalability. The main worry is the complexity, as this environment is organized and hosted by internal resources. Security is not a main issue compared to the public cloud as the services are reachable only through private and internal networks.

- **Community:** Services and resources of this method are shared by different organizations with a shared aim. It may be arranged by one of the organizations or a third party [16].
- **Hybrid:** This method mixes the methods from the private and public clouds. Where resources can be utilized either in a public or a private cloud environment [18]. The advantages and the concerns are a combination of the earlier methods.

### III. Mobility

Mobility is the ability to move, migrate or relocate data, application software and/or jobs among cloud servers. This mobility is called Computational Mobility. Mobility makes possible to accomplish the jobs and users requirements in cloud environment. In addition, it assists cloud evolution, enhances performance of operating applications by repositioning data to the intention host, consequently; reducing the communication consumption and solving the load balancing problems. Computational mobility can be called a control migration, data migration, link and object migration [3]. In this type of migration data and codes are allowed to migrate and execute on many systems among the network. Also it presents shifting execution control and the capability to link software elements at runtime as migrating from one system to another and back to the original system over again. There are two types of mobility [8, 19]:

- **Weak Mobility** it allows code to migrate through the networks. In some cases the code has initial data assigned but without execution states. In other words the codes migrate without its execution states.

- **Strong Mobility** it allow the code and execution state to start again at a new resource. Using this way can save running time, processor, registers and program counters.

### IV. Cloud Computing Architecture

Figure (2) shows the components of the cloud computing system. Usually it is divided into two parts; the front end and the back end parts. The two parts are connected to each other through a network, normally the Internet. The first side (front end side) is the side where the computer users, or clients, access the cloud computing system using computer (or computer network) and the applications required for this connection. Not all cloud computing systems own the similar user interface. The other side (the back end side) consists of various servers, computers and data storage systems that build the “cloud” of computing services environments. The organizer of the cloud system is a central server which is responsible for administrative, monitoring traffic and client requests to guarantee that the whole thing runs efficiently [20].

![Fig. 2 Cloud Computing Architecture](image)

### V. Cloud and Mobility

The central server in the cloud system follows a group of rules called protocols and employs particular software called middleware [20]. Middleware lets networked computers to speak to each other. Generally, servers don’t operate at full capacity; means there’s some processing power will be wasted. To make use of this wasted power, it’s possible to divide the server into multiple virtual servers, each one running with its own operating system. This method is called server virtualization. The advantages of such method are maximizing the output of single servers and cut down the need for additional physical machines.

#### A. Mobile Cloud Framework

In this paper I presented a mobile cloud framework. In this framework, the central server has the ability to relocate jobs or data or even
applications from one server to another depending on the new jobs requirements. To explain this process, let’s assume that a new job comes to the cloud system and this job has specific requirements (application, data or hardware requirements) and these requirements are available only on some servers. In this case the central server can move, migrate, one or more running jobs with its execution code (strong mobility) to other available servers that can fulfill their requirements. These process of moving have created a chance for the new job to be process in the vacated server(s).

The mobility is done when a new job comes to the cloud system, the central server checks if this job can be processed in one of the available servers. When the central server reached to the result that no available server has the needed requirements to fulfill the new job, it asks the mobility server (one of the sub servers of the central server) to determine the busy servers that can process the new job and the availability to relocate any of the running jobs from those servers. If the mobility server managed to relocate one of the running jobs, in this case the new job can be processed in the vacated server.

The mobility process can also be applied for data storage in the cloud. If a new request for data storage comes to the cloud and the space that is needed for this request is bigger than any available database storage, the mobility method can be applied to solve this problem. The next section presents a case study that can explain the mobility process.

**B. Mobile Cloud Example**

Suppose we have the cloud system shown in Figure (3). Each application server in this system has the specifications shown in Table (1). I will assume that Job (A) has the requirements shown in Table (2). This job reached the cloud system as shown in Figure (3) and asks to be processed.

In the normal case if the previous cloud system does not have the mobility feature it will refuse Job (A) as the system does not have any available server that has the requirements to process Job (A), or at least going to put that job on a queue. But in the case of mobility model the central server will ask the mobile server to move Job (B) from the Application Server (1) to the Application Server (2) as this server has the requirements for Job (B). As a result, Job (A) has been sent to Server (1) to be processed and Job (2) moved with its execution codes to be continued in Server (2). The previous processes are shown in Figure (4).

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VI. CONCLUSIONS

Cloud computing technology is used as inexpensive systems to gather and utilize computational capability. This technology improves applications services by arranging machines and distributed resources in a single huge computational entity. As cloud servers don’t run at full power; means there’s some processing power will be wasted. The mobility technology has solved such a problem by migrating or relocating data, application software or jobs among cloud servers. I presented a framework that can deal with the mobility feature in the cloud environment. Based on my contributions, I am confident that the mobile cloud framework can be addressed efficiently in the future.

REFERENCES


