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Investigation of Cloud Computing: Applications and Challenges

Amid Khatibi Bardsiri
Department of Computer, Science and Research Branch, Islamic Azad University, Sirjan, Iran

Anis Vosoogh
Department of Computer, Science and Research Branch, Islamic Azad University, Sirjan, Iran.
Email: anisvosoogh@yahoo.com

Fatemeh Ahoojoosh
Department of Computer, Science and Research Branch, Islamic Azad University, Sirjan, Iran.

***Abstract* – Cloud computing is a model for saving data or knowledge in distance servers through Internet. It can be save the required memory space and reduce cost of extending memory capacity in users' own machines and etc., Therefore, Cloud Computing has several benefits for individuals as well as organizations. It provides protection for personal and organizational data. Further, with the help of cloud service, one business owner, organization manager or service provider will be able to make privacy and security for customers' data and protect their data or information from abuse or unwanted modifications.**

Since various data types can be save in remote servers so having a database for saving these data is essential and managing the security for this database along with efficient usage of this database is very important. In this article we will make a simple survey about cloud computing and then we will discuss about the effects of Oracle database on cloud computing.

***Keywords* – Cloud Computing, Secure and Protected Data, Oracle Database, Backup Files, Memory and Cost Management.**

I. INTRODUCTION

Cloud computing is identified as a model which is creating possibilities for on-demand access to shared data in configurable computing memories or resources by the help of Networks or Internet. These computing resources are: networks, services, storage and etc., which can be easily and rapidly create or use with minimum management efforts.

Cloud computing provides some facilities for users to share their data, files, documents, Multimedia, resources and their backups, through Internet in available storages or several distance memory spaces. In compare with traditional approaches, cloud computing can be improve the security of shared data, save memory space and price. The storage remote servers' providers can be make charges based on the amount of data which is saved by users in their machines or using their storage facilities, number of users which are accessing these stored data, required disk spaces for saving data and etc.

There are several advantages for cloud computing such as, increasing speed of data access, saving cost, sharing data or resources, maximizing the re-use components and etc.

Further, some special benefits of cloud computing are related to database capabilities such as: creating scalable or flexible cloud server grid, creating scalable and high availability cloud storage grid, improving data security and privacy, providing self-managed database with providing cloud database management [1].

This investigation provides a comprehensive survey about cloud computing, its usages and its advantages and disadvantages. Further, the most popular applications of cloud computing services are highlighted. Finally, the applications of cloud computing in databases especially Oracle database are discussed.

The remaining of this article organized as: Section 2 introduces the main concepts of Cloud Computing. Section 3 includes some of applications of cloud computing. Section 4 includes Oracle applications in Cloud Computing. Section 5 summarizes the paper.

II. CLOUD COMPUTING

Simply whenever we save your own data including photos, text files, videos, class lectures and etc., in our email, social network websites (such as my space, YouTube and etc.). It means, we are using cloud computing [2].

Organizations are using Cloud Computing for saving their data or applications through Internet in distance servers [3]. It will be help them for saving their own memory space and cost (because they will not be require extra software or hardware for updating their applications or data).

Therefore, Cloud Computing provides to us, a shared repository of resources such as social networks (Figure 1), user applications, and powerful computer processors with high powers, specialized corporates and etc.

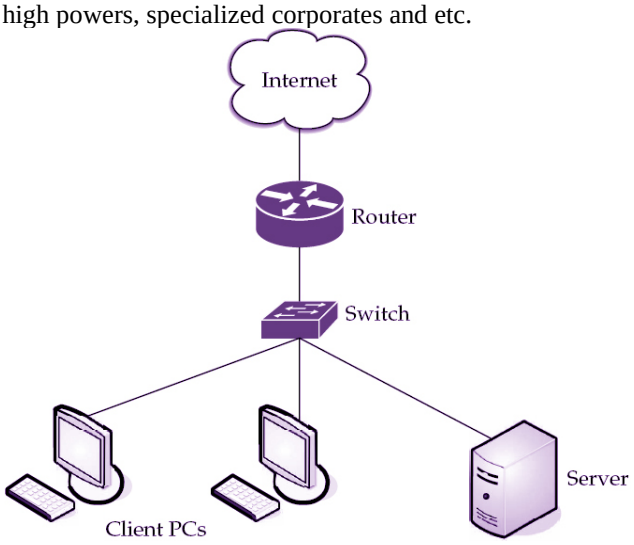

Fig.1. A Network Used by Cloud for Depiction of Internet[4]

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A. Cloud Computing Components

Cloud Computing has several components (Figure 2) [4]:

Clients: Clients in Cloud Computing can be local area network (LAN), Personal Computers (PSs), laptops, tablets, mobile phones and etc.

Datacenter: It is collection of servers which can be located in one office or located in web service center in other country and clients are accessing to these datacenters through the Internet.

Distributed Servers: for providing flexibility and security issues, all servers of cloud computing providers have not located in same place. Therefore, servers of cloud computing facilities providers distributed in different geographical places.

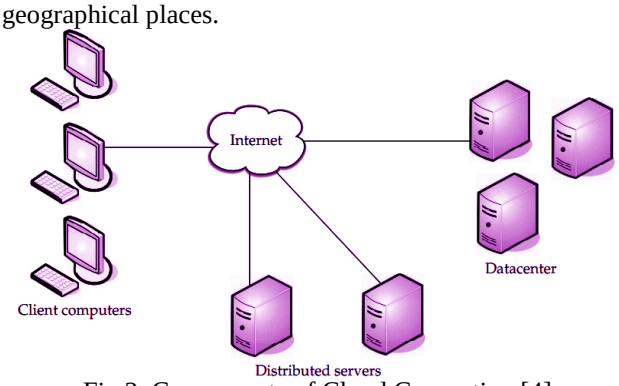

Fig.2. Components of Cloud Computing [4]

B. Cloud Computing Models and Services

Three types of models have been provided by Cloud Computing. These models are:

SaaS (Software as a Service): In this model, a pre-made application with its all requirements (such as operation systems, hardware and software and etc.) are provided.

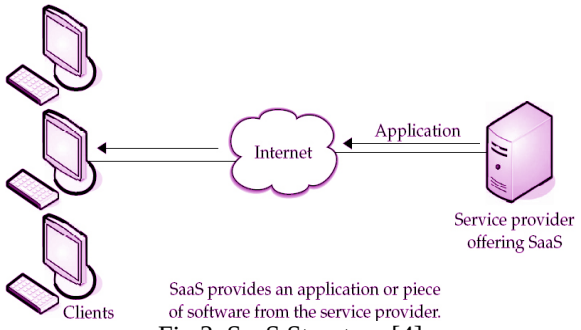

Fig.3. SaaS Structure [4]

PaaS (Platform as a Service): In this case a user should be install and use own software since in this case only operation system along with networks and hardware are provided and software is not provided.

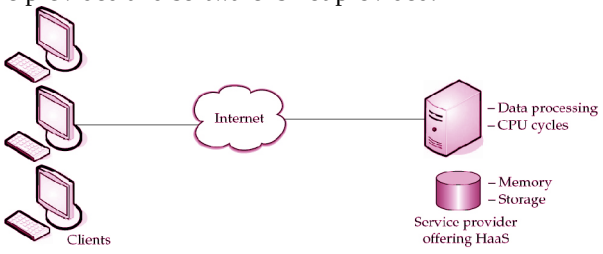

Fig.4. PaaS Structure

IaaS (Interface as a Service): In this case, customer should be provide own software, applications and operating system because in this case only network and hardware are provided.

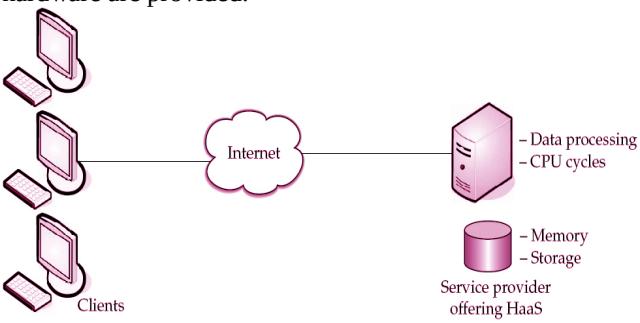

Fig.5. IaaS Structure

The accessibilities of cloud computing services are in 4 types. These 4 types are:

Private Cloud: the facilities of cloud computing are provided for specific organization and not for all customers. Therefore all sources or data can be managed by that organization not else.

Public Cloud: The facilities which are proposed for everyone and every person can access through the Internet to these facilities. Some of these facilities are: emails, social networks, uploading sites (my space, photo bucket and etc.). The main point in this service is, all resources are accessible for that service provider and this service provider is eligible for any changes or modification since s/he is main manager of these created data sources.

Community Cloud: In this case, data can be share by different groups such as academic people, musicians, photographers and etc., but the main point is, these data are manageable by both, these groups and also cloud service provider.

Hybrid Cloud: This case is, combination of the before 3 cloud computing services Such as, combining community and public cloud services).

C. Advantage and Disadvantages of Cloud Computing

There are many benefits for using of Cloud Computing. Some of these benefits or advantages are listed in below [5].

Privacy and Security: Since all individuals and organizations are eligible to save their own data through Internet on distance memories or servers repositories provided by cloud providers, therefore, the security of these data is very important. Security due to transferring data through Internet and also security and privacy of stored data in saving pools in distance computers is also main issue.

Scalability: Because Cloud Computing provides unlimited storage and processing facilities.

Efficiency: Because Cloud Computing allows organizations as well as individuals that save their own huge amount of data in distance repositories and be free to think for planning, development and innovation ideas.

Reliability: Because Cloud Computing allows everyone access own data from anywhere through Internet.

Low Up-Front Costs: Since all individuals as well as organizations are saving data on distance computers and there is no need they buy hardware, expensive network infrastructure or license for any software, therefore, do not need to provide investment cost.

Disadvantages of using Cloud Computing are listed in below [6].

- It needs Internet access so without Internet access it would not be available.
- It needs high speed of network and does not work well with low speed of network.
- Providing Security in Internet connections in the time of transferring data is big issue.
- Owner of data will be losing his/her controls to own data, due to rules of cloud computing service providers. Since service provider has total management permission for modifying content of data or using users' data.
- Cost of data transition is almost very high.
- Integrating all uploaded data is difficult.
- There is no any Standard for covering all data in cloud computing servers and converting all data into centralized databases in cloud computing servers [7].

D. Challenges in Cloud Computing

There are several challenge issues in Cloud Computing such as:

- Security issues
- Performance is not so high(it requires to improve)
- Integration of data in cloud computing should be improve
- Customization is not enough, it needs improvement.
- Implementation and maintenance cost is high
- There are not available enough suppliers for cloud computing.

E. Some Applications of Cloud Computing

Several applications of cloud computing are discussed [4,7-9] .

- One of the main applications of cloud computing is, creating a backup from our data or information [4]. In this case, we can be sure, anytime some unwanted modifications in source data is happening, retrieving the main original data would be possible. In traditional approach, for saving these backup files or documents are saved in taps, disks or some parts of main memories. But it is cost and memory consuming. Cloud computing make possibility to save data or backup of your data in sharable stores. In this approach, the backup data can be save in remote memory by Internet facility and whenever, the owner of these backup files require, can be access and use these data again and again. These stored backup files can be useful in recovery time whenever users such as business owners due to various reasons loses the main data or source files or by accident database is facing with some problems.
- Authors in [8] proposed one new applications of Cloud Computing. This new application is, using Cloud Computing for image mosaics, processing and visualization.
- Some social network such as Skype.com, Box.com, Facebook.com and etc., are platforms for building social networks and share documents of clients, so these are all applications of cloud computing [7].
- Cloud computing visualized computing resources [9].
- Cloud computing make possibility of re-use resources, hardware, software and techniques.
- Its providing facilities for creating future Internet, which will be provide services and memories available online for all people all around of the world.

F. Cloud Computing & Oracle Database

The number of documents and files in cloud computing storages is increasing dramatically. Therefore creating convenience database for managing this huge amount of client's data is essential. These cloud databases allow users to save and manage their data in cloud computing servers safely.

Cloud computing database can be any traditional database such as MySQL, its main duty is delivering data from cloud databases to users whenever users required [10]. Figure 6 shows the structure of cloud database.

Further, Oracle can be help users with creating more security issues for their data which are stored in cloud computing servers or databases.

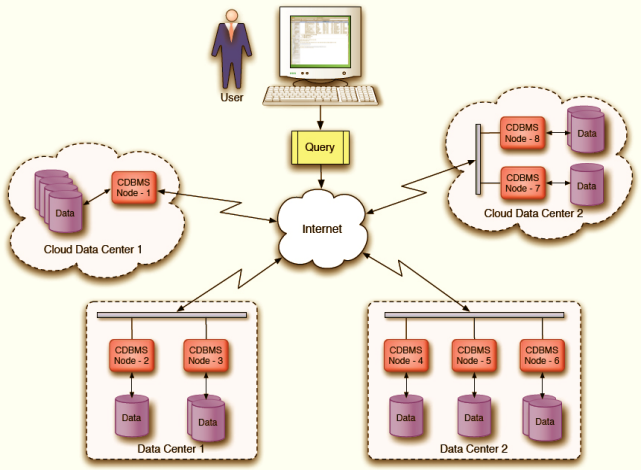

Fig.6. Cloud Database [10]

Oracle Database is one of the most popular databases in the world. It is designed to help customers for creating efficient use of IT resources. Further, it is improving the level of services which are provided for users with the help of cloud facilities.

Oracle proposed three services for creating databases for users in cloud computing. These three services include:

- Oracle database 11g
- Oracle Fusion Middleware
- Oracle Enterprise Manager

Oracle development tools can provide automated software deployments and applications rapidly. Further, Oracle can help users to create own applications with low cost, extend own cloud environment, choice favorite operating systems or hardware, create encrypted backup file and manage backup files and provide complete security for these files, creating network peering connections and etc. [4].

For handling huge amount of data which is available in servers of some companies, they run multiple databases. Since each one of these databases running separately,

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therefore they need a lot of memory spaces and handling or integrating the results or creating backup from these data or results are time consuming.

Oracle uses database as a service (DBaaS) of cloud computing and deploy this service and make more efficient. Therefore, it can provide more security for users' data which are saved in cloud computing Oracle databases [11].

The other improving cloud computing services or applications with the help of oracle is, it helps organizations to organize their management skills. Since most of the organizations are having a lot of data stored on their databases, therefore managing these amount of data is so difficult and these organizations are looking for new methods or techniques for managing these amount of data and Oracle is having capabilities to help for solving this issue.

The efficiency of oracle databases in compare with separate databases which are used in traditional is shown in Figure 7.

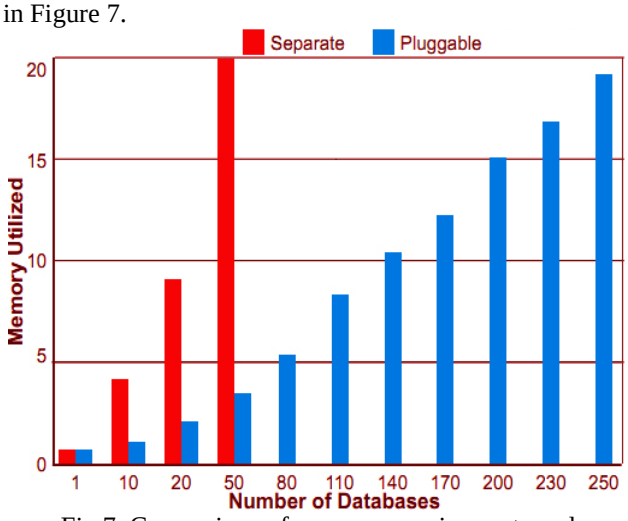

Fig.7. Comparison of memory requirements and scalability of Oracle vs. Separate Databases [11]

Figure 7 shows that, using 50 separate databases need 20 GB memory space whereas, using oracle database need just 3GB memory space.

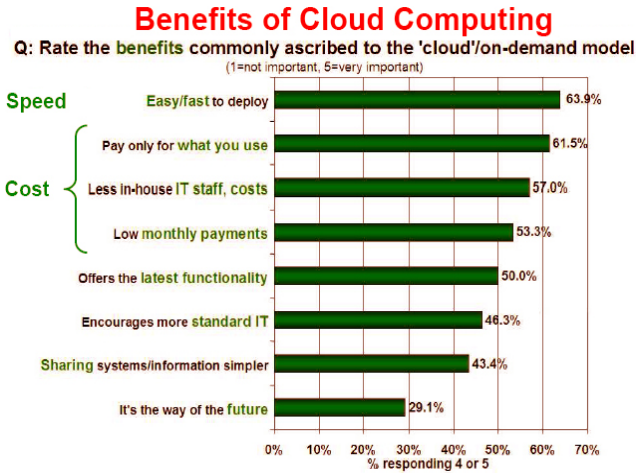

Fig.8. Benefits Obtained by Using Cloud Computing [12]

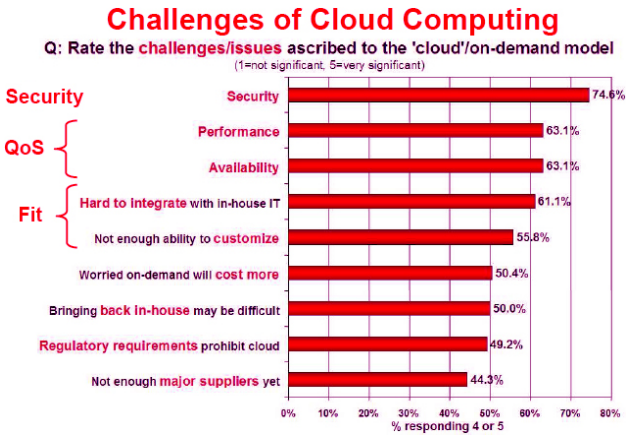

Fig.9. Rate of Challenges in Cloud Computing [12]

The other benefits of Oracle for organizations are: improving performance, increasing scalability, decreasing cost of required software or hardware, providing high speed databases, increasing speed of updating, simplifying management, optimizing storage compressions, optimizing virtualizations and creating web based rapid development tool Applications Express (APEX) [12] and etc.

Figure 8, shows the rate of benefits obtained by using cloud computing database in European countries and Figure 9 shows the rate of challenges in cloud computing.
Some facilities which are provided by Oracle 11g in Cloud computing are [1]:

- Make the process in industry faster than before
- Create databases more scalable along with high tolerance
- Creating clusters in cloud server will be more easy than before
- Creating dynamic storage place in cloud servers
- Possibility of managing storage in cloud computing automatically
- Making more easy and flexible query management and reply performance
- Improving security of databases which are stored in cloud computing servers or databases with providing different access levels for customers.
- Oracle provides life-cycle management including creating, configuration, sharing, booting or migration of data in databases in Cloud Computing servers.

III. Conclusion

Currently the use of cloud computing is dramatically increased. Since it provides facilities for users to save huge amount of data in cloud servers' memory, sharing these data with other users or running users' different programs in cloud servers. Therefore, the cost of purchasing special software, operating system, hardware and etc., would be decrease. But there are several issues regarding integrating data in cloud servers or privacy of data during transferring through network and during saving in cloud databases. We used Oracle 11g in this article for overcoming to these problems. Since Oracle provides special features which can be

Help for improving the security or privacy of data which are shared by users from all around of world and also creates more efficient integrated database from the stored data in cloud computing servers.

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