SWOT ANALYSIS OF CLOUD COMPUTING

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Abstract- In this study, cloud computing is assessed by SWOT analysis. Information systems occupy everyday life day by day. It is not a distant idea to think that "Future Wars" will be directed against information systems. In future, center of war will be a code line in the software. In parallel to the occupation of information systems in our daily life, strength sides of cloud computing provide fast and reliable data process in an economical way with bringing a new understanding to information systems. In spite of the known strengths, weaknesses that cloud computing brings are questionable. Also cloud computing has opportunities and threats. In this study, cloud computing is researched by SWOT analysis.

Keywords- Cloud Computing, Information Systems, SWOT Analysis.

I. INTRODUCTION

Nowadays, information systems exist in every area of our daily life. One can take accounting services without going to the banks. One can buy tickets whereas sitting at home. Especially after the mobile systems' becoming widespread, this change got faster and faster.

Parallel to this change, information systems create new areas every day. Cloud computing is one of these new areas. According to a study made by International Data Corporation (IDC) which is mentioned in Fig. I, investment in cloud computing in 2017 is going to be over $ 170 billion dollars whereas investments were $47.4 billion in 2013 [4].

According to the same study, between 2013 and 2017, annual increase average of cloud computing will be 23.5 % [4]. Data provided by IDC, which globally makes research and development, show us that cloud computing is going to provide a wider area in future conflicts.

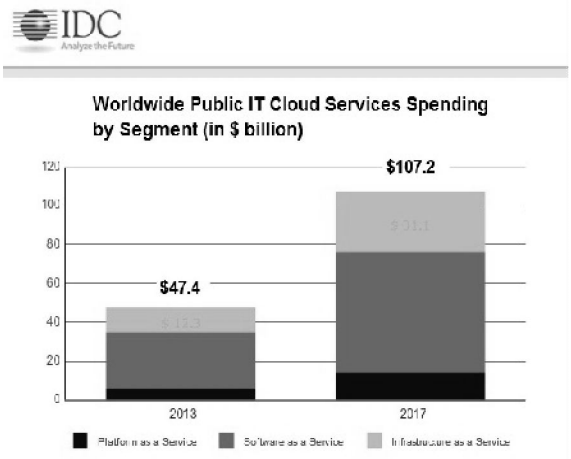


Fig. I Research about Cloud Computing by IDC [4]

By this study, it is aimed to find out Strengths, Weaknesses, Opportunities and Threats (SWOT) of cloud computing. Using literature review method, 2nd section covers general information about cloud computing, 3rd section covers essential characteristics of cloud computing, 4th section covers assessments of SWOT Analysis and results and discussion is given at 5th section.

II. CLOUD COMPUTING

A. Definition

There are lots of definitions about cloud computing [5]. Therefore one single standard definition still has not occurred. Each organization or people according to their respective area make their own definition.

One of cloud computing definitions is huge amount of data managed by shared large data centers [2].
We need cloud computing to solve problems caused by managing mass data. Also data continue to increase day by day in shared wide area network of Internet. Managing this data safely and efficiently emerges as a problem area. Cloud computing is evaluated to find solutions to these problem areas.

Another definition for cloud computing is made by National Institute of Standards and Technology (NIST).
NIST described the cloud computing as "…a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction." [7].
In the literature the most comprehensive and accepted definition is made by the NIST.

B. Service Models

Service providers offer three different ways of providing cloud computing [7]. How these service models work is depicted in Fig. II.

1) Software as a Service (SaaS): Cloud computing consists of not only software applications distributed over the Internet but also software used on data centers [6]. This is called Software as a Service.

"Google Docs" and "Microsoft 365" are the examples of office applications used online.

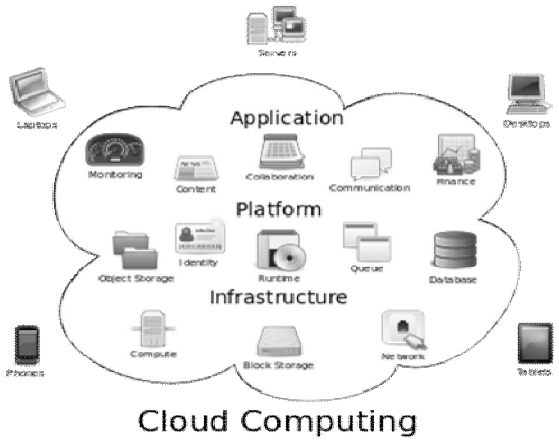


Fig. II Service Models

2) Platform as a Service (PaaS): In this model, service recipient who take applications by a platform that service providers are serving [7]. It is known as PaaS as an abbreviation. "Microsoft Azure" application is the example of this model.

3) Infrastructure as a Service (IaaS): It is a service which recipients have no control over data only service providers offer information technology sources [7]. It is known as IaaS as an abbreviation. Internet web-based "Dropbox" is an example of this service model.

C. Deployment Models

Deployment models differ depending on the purpose of cloud computing usage. Users or service providers can implement the model according to their own needs, privacy and communication policy. It is divided deployment models to four groups [7] that are depicted in Fig. III:

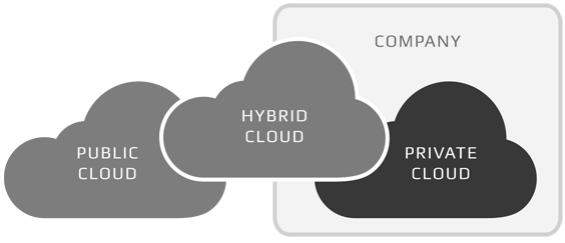


Fig. III Deployment Models

1) Public Cloud: In this model, everyone without any restriction can access to public cloud [7].

2) Community Cloud: Users have the same properties as security needs, policy etc. use the architecture of community cloud [7].

3) Hybrid Cloud: Private or public cloud created hybrid cloud [7]. Purpose of this cloud is to communicate with other cloud by protecting its own architecture.

4) Private Cloud: It is defined private cloud as a service whose recipients build their architecture [7]. Information security is better than the other cloud deployment models. Private cloud must be used by users who care privacy.

III. ESSENTIAL CHARACTERISTICS

First of all, cloud computing is a brand new information technology. Although there may be some disadvantages because of the new technology, cloud computing spreads through the world. In addition to advantages of the conventional information technologies, cloud computing has essential properties that are special for cloud computing.

These essential properties consist of five main titles according to the NIST.

1) On-Demand Self-Service: On-demand self-service means that a consumer can supply or throw over source of information technologies such as software or hardware which are depended on them when they want [1].

In the conventional information technologies, system requirements for software and hardware are planned before beginning of the process. Requirements are supplied according to this situation. After the initial costs are given to suppliers, firms or users have to pay some additional costs for operating.

However, consumer demands source from service provider whenever they need and whatever they want. In the cloud computing, firms or users demand sources when they want differently from the conventional information technologies. Also firms and users throw over sources which they do not need any more when they want.

Thus, firms can utilize all their efforts to the needs of the consumer instead of source planning, source supplying, configuration management and disposal management. Therefore enhancing quality of service is aimed by the firms. In the cloud computing, because of paying what they use, firms or users' initial costs remain at minimum level.

2) Broad Network Access: In broad network access, consumers reach sources through wide network access with standard procedure by different platforms like cell phones, laptops etc. [7].

Internet presents to nowadays computer users' network based capability which is supported by the cloud computing too. Opposing to the conventional information technologies, cloud computing uses this network capability effectively.

Some applications that users transact locally from their personal computers fast are transacted in the network because of the high bandwidth. In the future cloud computing effectiveness will widen by increasing bandwidth capacity.

Furthermore users can access in mobility what they need and when they want with their laptops, smart phones etc. There is no circumstance about the fact that data must be located in a computer's memory or a special network or a server's storage. This condition provides job performance of users by accessing data within the shortest possible time.

3) Resource Pooling: Resource pooling gets sharing all of the sources in service providers to deliver between the consumers [1].

With resource pooling, there is no need to supply for any software or server or hardware differently from the conventional information system.

The hardware or software cost of firms and users reduced through cloud computing. Firms or users who use the cloud computing does not have to get the computers with the best memory or storage any more. Because of that reason, cloud computing service providers try to solve this issue. It is at such point that consumers just have a monitor and a mouse. There is nothing to add.

In conventional information systems, firms have to supply not only hardware or software but also all of the equipments of the computer systems. Moreover firms have to pay for the software license per person in the company. Mistaken software results some additional cost.

There is not such a cost in the cloud computing. Service provider takes all of the responsibilities about supplying. Another advantage of the resource pooling is to prevent the redundancy. Because of centralized data, data security is increased.

Also when users upload their personal data to the data centers which are depended on cloud computing, there is no risk about losing the data. But when users save their data only in laptop it would be a big problem if the laptop is stolen or lost.

4) Rapid Elasticity: Consumers' quickly increased needs can be received. Because, the service providers are rapid and have elasticity [7].

With this property, consumers can demand some sources planning the density in specific eras of the year. Thus cost of unused resources does not pay to the service providers unlike to the conventional information system.

5) Measured Service: Measured service provides to control and assess the information resources however and whenever wanted [7].

Consumers pay for the source which is gained by cloud computing system. Thus the costs will be reduced by scale which depends on measuring the source, and they decide to throw over to take extra sources.

IV. SWOT ANALYSIS

Cloud computing is defined as "future of internet" and has the potential to be widespread in the world [3].

At the underlying philosophy of cloud computing lays the wide usage area of Internet. In the course of time, the numbers of companies increase for using cloud computing.

In the past, users used to download software and ran it on their personal computer. Later on servers began to give this service in a faster and more reliable way.

Whereas internet begins to use all over the world effectively, cloud computing begins to more popular. Because of that, attributes of cloud computing should be analyzed.

SWOT analysis which is one of the analysis methods to find attributes of a system finds out strengths, weaknesses, opportunities and threats of cloud computing in a systematic way. Assessments of SWOT analysis are depicted in Table I:

Table I SWOT Analysis of Cloud Computing

	Helpful	Harmful
Internal Origin	Strengths • Decreasing cost • Remote Access • Unlimited Storage • Flexibility • Efficient Time Planning for Administrators • Simple • Less Personnel • Information Security	Weaknesses • Bandwidth • Unknown Data Locations • Ownership of Data • Integration with Existing Applications
External Origin	Opportunities • Thin Client • Easy Management • Easy Usage of Mobile and Wireless Systems	Threats • Reliability of Service Providers • Loss of Data • Information Security • Special Hardware • Unwillingness of Change • Big Data

Internal origin is consists of strengths and weaknesses of a cloud computing system.

Strength areas can be preserved and managed carefully. If not these areas may pass through weaknesses areas easily.

Weaknesses also are in the internal areas. Cloud computing service providers or administrators should manage these areas with proper and effective methods not only to keep threats away from the system but also to transform these weaknesses areas to the strength areas. On the other hand weakness areas should be monitored every time and prevent from transforming to the threats.

Internal origin areas can be controlled by cloud computing service providers or administrators with a right strategy. But cloud computing service providers or administrators cannot control the external areas.

External origin is consists of opportunities and threats of a cloud computing system.
Managing external origin is more difficult than internal origin because of depending to out of cloud computing system. Therefore external origin cannot be controlled all time directly. Thus administrators of cloud computing should be aware of external origins.
However if right strategies and methods are used, opportunities can be taken.

Threats should be monitored and analyzed every time because they are not only harmful but also in the external origin side. Cloud computer providers and administrators should get under control the threats. Especially information security threats must be suppressed with attention. If external origin areas cannot be managed, there is no benefit of strength areas.

V. RESULTS AND DISCUSSION

Cloud computing may be used more effectively if the following methods can be carried out:
1) Bandwidth should be arranged to the needs of the cloud computing system before working with cloud computing system.
2) Data should be categorized as public, secret, top secret etc. before uploading cloud computing system. Secret or top secret data must be received or sent in encrypted networks with efficient encryption methods.
3) According to the data's category, public or private deployment model must be chosen. Private deployment model must be chosen if data have special attributes.
4) All of the applications, databases and hardware in cloud computing system should be worked properly with multicenter structure instead of centralized structure.
5) Thin client should be used for end users because of its less complicated, low cost and high performance attributes.
The SWOT analysis shows that cloud computing may not replace with all conventional information systems but will be an optimum solution for information systems that need to manage big data.

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