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The Importance of "Virtualization" Technologies in the Emergence of Cloud Computing

Jamankulova F.

PhD, Associate Professor of the Department of Information technologies of Samarkand Institute of Economics and Service. Uzbekistan. Samarkand. e-mail:fazilat_72@mail.ru.

Rashidova Dilfuza

Assistant of the Department of Information technologies of Samarkand Institute of Economics and Service.

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Abstract

This article discusses the cloud technologies that are gaining popularity today . The types of services in it are analyzed. New cloud technologies created as a result of the development of information technologies create opportunities for the introduction of information services directly in education.

Keywords - Cloud Computing, Arpanet, Amazon, Google Apps, Saas, Paas, Iaas, Private Cloud, Public Cloud, Community Cloud, Hybrid Cloud, Service, Performance Growth, Maintenance, Development, Multi Core Processor, External Memory.

I. INTRODUCTION

Cloud technologies – this model presents information technologies to the consumer as a service through the Internet. "Virtualization" technologies are of great importance in the emergence of cloud computing. Virtualization technology was first proposed by IBM in the 1960s, but the term virtualization was long forgotten after the transition from expensive mainframe computer technology to inexpensive x86 processor computer servers. From 2000, the situation started to change, until these years, WMware won the monopoly in x86 discharge virtualization. In 2005, WMware made virtual machines available for free using DT. In 2006, Microsoft launched the Windows version of Microsoft Virtual PC. In 2006, the Amazon Elastic Compute Cloud was created by expanding virtual servers on its own devices, another

main reason for this was the emergence of cloud technologies by renting virtual servers to other devices (consumers).

The cloud is an innovative model (concept) of information technology-infrastructure organizations, which consists of separately separated and distributed configured hardware and network resources, software, and is located in the data center of remote providers.

Cloud computing is an information-technological concept, which is a common "pool" of computing resources (in the sense of pool-combination) (for example, data transmission in the network, servers, data storage provides convenient access to devices, applications and services - individually and collectively) through the network.

simply, it can be stated as follows: Cloud computing is a distributed technology of data processing, in which computer resources and capabilities are provided to the user as an Internet service . In this case, Internet service is provided in local networks based on web technologies.

This technology was created in 2006, and according to IDC, services in 2009 amounted to $17 billion, that is, 5% of information technology services, and in 2014, they amounted to $175 billion.

The common resource principle of computing resources is associated with John McCarthy and Joseph Licklider in the 1960s. Licklider proposed this idea in 1970, when he was in charge of the Arpanet (Advanced Research Projects Agency Network) project. According to him, everyone will be connected to the network and will receive programs and information from it. John McCarthy emphasized that computing capabilities of computers are provided to users as a service.

Later, after the 1990s, as a result of the development of information technologies, the following factors made it possible to implement these ideas:

1. A sharp increase in Internet speed;
2. In 1999, the creation of Salesforce.com, that is, through the site, this company made it possible to use its applications. (SaaS service).
3. In 2002, the appearance of the Amazon web service made it possible to store information and perform calculations;
4. In 2006, the creation of a new Elastic Compute cloud (EC2) service on the Amazon web service, in which the user could calculate his personal applications. Amazon EC2 and Amazon S3 are the first cloud computing services.
5. The next step is the Google Apps platform created by Google;
6. Creation of virtual infrastructure;
7. The development of technical support, in particular, the creation of multi-core processors and a sharp increase in the size of external memory devices.

Thus, the CRM-system of Salesforce.com became the basis for cloud technologies (1999). This is because it included subscription services, and it is related to Amazon.com (2002), which developed the idea of a bookstore on the Internet. The development of Amazon services later led to the Elastic Computing Cloud (Amazon EC2) project in 2006, giving birth to the idea of elastic computing. After that, the concepts of "cloud" and "cloud computing" were mentioned in the speeches of the head of Google, Eric Schmidt. The creation of Google Apps in 2009 caused this idea to spread widely. In 2009-2011, the main concepts appeared (SaaS, PaaS, IaaS), later all these were called cloud technologies.

II. LITERATURE REVIEW

The following scholars have considered the importance of "virtualization" technologies in the emergence of cloud computing in their research: Monakhov D.N., Monakhov N.V., Pronchev G.B., Kuzmenkov D.A. [1], Akhmedova O. [3], Amirov D.M., Atajonov A.Y., Ibragimov D.A., Rakhimjonov Z.Y., Saidkhojayev S.S. [4], Usmanova N.B. [5].

III. RESEARCH METHODOLOGY

The methodological basis of the research was formed as a result of the study of theoretical and practical information, legislation and other legal documents, literary sources and publications. The research is based on the connections between theory and practice, but also made extensive use of methods such as analysis, comparison, and synthesis.

IV. ANALYSIS AND RESULTS

Modern cloud technologies create many opportunities for the organization and management of information networks, especially for small businesses and private enterprises.

For example, the hybrid systems being created on their basis allow the points of use to work in several modes at the same time without being interrupted from the work process . At the same time, new technical developments are also solving many problems related to the management and use of networks that network administrators face.

By using cloud computing power, computer system resources are based on innovative technologies of "collective intelligence" to reduce the protection effect. Antivirus servers use the data obtained from Panda antivirus products of millions of users around the world to automatically identify and classify new types of malicious programs that appear every day.

As mentioned above, the rapid development of cloud computing systems was caused by the emergence of Google, Amazon and other Internet services.

This technical development was made possible due to the following changes in the field of information technology:

1. As a result of the development of multi-core processors:

- productivity growth;
- a decrease in the price of devices;
- decrease in demand for electricity supply.

2. As a result of the increase in the size of data carriers, that is, the decrease in the cost of storing 1 Mb of information:

- "infinite" amount of stored information;
- reduction of information storage costs.

3. As a result of the development of parallel computing technologies:

- effective use of multi-core computing systems;
- allocation of computer resources on demand.

4. As a result of the development of virtual technologies:

- development of virtual infrastructure creation software;
- easy scaling of the system;
- reduction of management costs of cloud systems;
- Ease of access to virtual infrastructure via the Internet.

5. As a result of the increase in the information transfer capabilities of the network:

- increase in the speed of operation in cloud systems;
- Decrease in the cost of Internet traffic;
- widespread use of cloud computing.

All this has led to the widespread use of cloud technologies.

Currently, cloud technologies provide users with the following opportunities:

-**service** (see self-service on demand) — the consumer independently determines the needs of the computing system, for example, server operation time, connection and processing speed, necessary for data storage allocate disk space in the amount of l;

-**Universality of network connection** — users are provided with data transfer service through the network, regardless of the device used as a terminal;

-**Pooling of** resources (visual resource pooling) — when the number of users of the service increases, it combines its resources to form a single "money" and dynamically distributes its capabilities to users based on their requirements;

-Flexibility — services can be automatically offered, expanded, reduced at any time, and this is done without additional impact on communication with the service provider;

-Consumption accounting - the service provider automatically calculates the resources consumed, for example, the amount of data stored, the capacity to transfer data, the number of users, the number of transactions, and based on this, determines the amount of services provided. .

From the point of view of the service provider, since the pooling of resources and their consumption are not constant, cloud computing allows solving large problems at the expense of small hardware resources. If each user's resources are clearly defined, such a result cannot be achieved. In this technology, allocation of resources is automatically redistributed.

From the user's point of view, this technology has virtually no service interruptions.

Based on the principle of organization of cloud technologies, the following types are recognized:

1) Private cloud (eng. private cloud) technology is an infrastructure intended for use within an organization, and the organization's departments and customers are its consumers.

2) Public cloud (visual public cloud) — infrastructure designed for free use by the general public. In this case, users have no control over this cloud. All guarantees are transferred to the owner of this cloud. Examples of these are Amazon EC2 and Simple Storage Service (S3), Google Apps/Docs, Salesforce.com, and Microsoft Office Web services.

3) Community cloud (ingl. community cloud) is an infrastructure focused on general issues, intended for use by specific customers of the organization (for example, purpose, security requirements, policy).

4) Hybrid cloud is a combination of various cloud infrastructures (Private, Public, Community), but standard or proprietary data transmission technologies and applications (for example, normalization of a large load from the public cloud to the network, or load balancing between clouds).

This technology has the following service models:

1) **Everything as a Service** — in this model, all services are provided to the consumer, that is, management of hardware and business processes, only the user needs to be connected to the Internet;

2) **Software** as a Service (SaaS) — in this model, the consumer is allowed to use application software. In this case, the application software may be provided by a cloud infrastructure service provider or may be browser services, such as webmail.

In this type of service, the control and management of the physical and virtual capabilities of the cloud infrastructure is carried out by the cloud provider, for example, networks, servers, operating systems, special capabilities of applications (except for user-changeable parameters of the application).

3) Platform service (PaaS, see Platform as a Service) — in this model, the consumer is given the opportunity to deploy the basic software in the cloud infrastructure. Then it will be possible to place practical applications on it, for example, a personal application or applications developed by other companies.

This platform includes tools for creating, testing, and executing applications, such as database management systems, linking software, and programming languages provided by the cloud provider.

The middleware referred to here is referred to by various names in the literature, such as middleware, middleware, and middleware. support, cross-platform software.

The following types of this linking software are available:

- Distributed object system (DOS, visual distributed object system) or distributed object technology (DOT, visual distributed object technology);
- database access middleware
- transaction tracker;
- remote procedure call (RPC, visual remote procedure call);
- message-oriented middleware (MOM, visual message-oriented middleware).

It is intended for use in the following areas:

- when working with the database of the client part of the software;
- interconnection of system and application software;
- when connecting the operating system and application software;
- when connecting the application software to the network.

4) Infrastructure creation service (IaaS, see Infrastructure as a Service) - independently manages cloud infrastructure resources, that is, processing, storage, networks and other computing resources. In this case, the user will be able to install and run any software (operating system, application software, platform software) on the computer. The user controls the operating system, virtual storage system, installed applications, and also controls network services, for example, firewall,

DNS, to a limited extent. A cloud provider controls and manages the physical and virtual aspects of the cloud infrastructure.

The following services are also mentioned in some literature.

- Hardware as a Service - in which technical equipment is rented to the user and we use it for any purpose. This type of service is close to **"Infrastructure creation service"**, only here the user creates the desired infrastructure on technical devices with the help of software of his choice.
- **Workplace service** (Workplace as a Service) - of the enterprise involves the use of cloud technology to create automated jobs for employees, such as installing and configuring the necessary software.
- **Data storage service** (Data as a Service) - in which the user is allocated space from the external permanent memory, and the user has the opportunity to store a large amount of data in it.
- **Security** as a Service - this refers to the use of software options to ensure the security of the user when using web technology using cloud technology, when using e-mail and similar situations.

V. CONCLUSION/RECOMMENDATIONS

Thus, the increase in demand for cloud technology services will determine the development of information technologies in the next decade . The share of information technologies in the service sector will grow through this direction. One of the main reasons for this is a sharp decrease in the direct costs of enterprises in creating and developing computer networks.

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