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## USE OF CLOUD TECHNOLOGIES AT THE ENTERPRISE

*The article considers the concept of "cloud" technologies or cloud computing, systems of "cloud technologies", the main characteristics of cloud computing, advantages and disadvantages of using cloud computing at the enterprise. Examples of programs that can be used at the enterprise were analyzed. The advantages and disadvantages of using cloud technologies at the enterprise are formulated.*

**Keywords:** cloud technologies, cloud computing, application as a service (SaaS), infrastructure as a service (IaaS), platform as a service (PaaS) private cloud, community cloud.

**Articulation of issue.** Ensuring the transfer of economic and other data at different enterprises is carried out with a variety of software, communication tools and technologies. In addition the enterprise uses those variants of communication which are available at present at its enterprise. This leads to difficulties in synchronizing different versions of documents, the correct consolidation of numerical data obtained, for example, from different departments, and so on. The solution to this problem of ensuring the reliability and efficiency of data collection can be the use of cloud technology in the work of specialists of the enterprise, which today are increasingly used in this field of human activity.

**Analysis of recent researches.** The use of cloud technologies is taken care of by both domestic and foreign scientists, they are the subject of discussions for users and specialists in information technology (IT), as well as the business sphere of IT companies. Moreover, practitioners are mainly concerned with technical matters of work and operation, security features, ensuring the confidentiality and safety of data and more. In particular, I.L. Yakovytsky analyzed the software of various suppliers and their implementation in the information infrastructure of the enterprise [1]. Scientists are more concerned with theoretical problems, including inconformity and interpretations of basic concepts. It is noted that companies use mainly e-mail, Internet telephony, exchange of documents over the network, which in our opinion are Internet services than cloud computing in a greater degree.

The following international IT companies "Google", "Amazon.com", "Microsoft" have made a significant contribution to the development and theoretical research of applications in the field of cloud computing.

The use of information technologies is becoming increasingly important in the management of the enterprise. The experience of successful companies proves that effective management of the enterprise is impossible without the management of its information activities and the entire corporate information system.

The use of information technologies in the management of the enterprise is carried out for the purpose of efficient and on-line computer processing of information resources, sto-

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rage of large amounts of economically important information and its transmission at any distance in the shortest possible time. That is, the main task is to optimize the activities of the enterprise based on the use of information technologies. Most importantly, it will save a lot of time for obtaining information and organizing interaction between executive officers. Therefore, the introduction of cloud computing at the enterprise in order to optimize its work is a topical issue today.

**The purpose of the article** is to analyze cloud technologies, determine the existing advantages and disadvantages of cloud computing in terms of their implementation at the enterprise.

**Presenting main material.** The first ideas that indirectly concerned what later became cloud computing were in the 70's and 80's. The countdown to the modern history of cloud computing was 2006, when Amazon, which was already one of the largest at the time, presented its web services infrastructure, which was able to provide the user not only hosting but also providing remote computing power to the customer. The innovation was accepted and approved by such giants as Google, Sun and IBM, and in 2008 Microsoft Corporation announced its interest in this area.

Analyzing the literature, you can find many terms and definitions for "clouds", in particular, it is cloud computing, cloud technologies, cloud service.

Consider the basic definitions and terminology:

**Cloud technologies** are data processing technologies in which computer resources are provided to the Internet user as an online service, one big concept that includes many different concepts that provide services.

**Cloud service** is a service of providing cloud resources with the help of "cloud computing" technologies.

**Cloud computing** is hardware-software available to the user via the Internet or a local area network in the form of a service that allows the use of a user-friendly interface for remote access to dedicated resources (computing resources, programs and data). The user's computer serves as an ordinary terminal connected to the Network. Computers that perform cloud computing are called «computing cloud ". In this case, the load between the computers included in the "computing cloud" is distributed automatically.

Cloud computing is a model of providing convenient on-demand network access to a collectively used set of configurable computing resource parameters (e.g. networks, servers, data warehouses, applications, and /or services) that a user can quickly use and free for their tasks while minimizing the number of interactions with the service provider or their own management efforts. This model aims to increase the availability of computing resources and combines five main features, three service models and four deployment models [2].

Thanks to the latest technologies, tending to the cloud has opened the door to alternative applications that have had a huge impact on the way data is processed and managed at the enterprise.

There are the following models of service using the cloud Fig.1:

### **1. Application as a service (SaaS)**

The SaaS concept allows you to use the software as a service and do it remotely over the Internet. This approach allows you not to buy a software product, but simply to use it temporarily when needed. Examples of software as a cloud-based service are Gmail and Google docs.

The SaaS model has a number of advantages over conventional software products [3]:



Figure 1. **Cloud service models**

- The application is provided remotely, through a web interface that allows use it anywhere in the world where there is an Internet connection;
- the service can be used in different operating systems and in any browser;
- one application can be used by several users;
- constant technical support;
- deployment and development of web applications is carried out by powerful computers on the service of the provider;
- reducing the burden on IT professionals;
- providing the opportunity to legally work with software products;
- the ability to significantly reduce the cost of software development and purchase.

### **2. Infrastructure as a service (IaaS)**

In this case, the client's IT specialists receive a virtual infrastructure in which they can deploy their information system. Companies no longer need a local data processing center or local server room. The biggest players in the infrastructure market such as services are Amazon, Microsoft, VMWare, Rackspace and Red Hat. While some offer more than just infrastructure, they share the goal of selling basic computing resources.

### **3. Platform as a service (PaaS)**

Under this cloud-based model, programmers can create their own application systems or offer developed information systems in the cloud. For example, Google Apps provides online business relationships that are accessed through an Internet browser while software and data are stored on Google's servers.

Each model of cloud technology has its differences, which are shown in table 1.

The cloud can be deployed as: private, public, community or hybrid, personal.

## РЕЙКОВИЙ РУХОМИЙ СКЛАД

A **private cloud** is a cloud infrastructure that is designed to be used by a single organization that includes multiple users (e.g. departments).

A private cloud can be owned, controlled, and operated either by the organization itself or a third party (or a combination of them). Such a cloud can be physically located both in and outside the jurisdiction of the owner.

*Table 1.-The difference between the models of cloud technologies*

	Traditional approach	Service approach to management of IT infrastructure		
Install patches and updates throughout the program lifecycle	-	-	-	+
Download user data	-	-	-	+
Installing complex applications with multilevel architecture	-	-	-	+
Installing patches and updates during the Middleware and Runtime lifecycle	-	-	+	+
Installation of additional software, libraries, executable environments: JAVA, .NET (Middleware and Runtime)	-	-	+	+
Installation of patches and updates during the life cycle of the OS	-	+	+	+
OS installation and configuration	-	+	+	+
Installation and configuration of virtualization	-	+	+	+
Allocation of network resources (physical ports, VLAN, IP addressing)	-	+	+	+
Allocation of resources, storage systems	-	+	+	+
Allocation of the physical server	-	+	+	+

Note: "+" - supports, "-" - does not support.

**The public cloud** is a cloud infrastructure that is designed for free use by the general public. The public cloud may be owned, controlled and operated by commercial or governmental organizations (or a combination them).

The public cloud is under the jurisdiction of the cloud service provider. A community cloud is a cloud infrastructure that is designed to be used by a specific consumers' community of organizations that share common goals (such as mission, security requirements, policies, and compliance with various requirements). The public cloud may be jointly owned, controlled, and operated by one or more community organizations or a third party (or a combination of them). Such a cloud can be physically located both in and outside the jurisdiction of the owner.

A **hybrid cloud** is a cloud infrastructure that consists of two or more different cloud infrastructures (private, community, or public) that remain unique entities but are interconnected by standardized or private technologies that enable data and application transmis-

sion programs (for example, the use of public cloud resources to balance the load between the clouds).

In general, the hybrid cloud is very popular among consumers of cloud services. Such cloud environments are designed to meet specific technological and business needs: they combine an acceptable level of security and confidentiality with cost minimization.

Here are the reasons why cloud computing can benefit any organization that wants to use enterprise programs:

- Free service. One of the most expensive features of a traditional server installation is support for software updates and security updates. Most companies have to hire IT staff to manage regular server maintenance. Instead, cloud computing services manage all maintenance and upgrades, giving the company the ability to focus on doing its business;

- Increased security. While some business owners fear that cloud computing poses a security threat, this is not the case. Many "cloud" vendors are developing strong security measures, and may be equipped with frequent security updates as they service for many customers. Without the use of cloud solutions, backups are usually done once a day. In the case of a hardware failure, data may be lost. When using cloud computing, backup is performed in real time or at certain intervals, resulting in practically no data loss in the event that something happens to the infrastructure;

- Easy access to data.

Having constant access to company data is very important for any business.

As long as the user is connected to the Internet, cloud computing provides instant access to data at any convenient time.

As more companies prefer remote systems for their enterprise applications, cloud computing will eventually become a way of life for many.

Considering the advantages of "cloud" computing, it is worth mentioning the disadvantages associated with the transition to "clouds". The most significant of them is the threat to information security. In conditions of severe competition, most companies are afraid of data leaks from the network of the "cloud" provider due to interception of information, loss of control over data and applications, inability to destroy data, actions of insiders on the provider or other users of the "cloud". You can use data encryption or depersonalization for protection. It is necessary to encrypt not only the data stored by the provider, but also the communication channel with him. However, decisions that would effectively protect data in the "cloud" have not yet been made.

Another disadvantage is the binding of "cloud" technology to a particular service provider, failures on the part of the provider, failure of the administration interface, bankruptcy and takeover of the operator. Companies are not afraid of these events in vain, as it can bring significant financial loss to their business [4].

Other risks include loss of connection to the provider's network, DDoS attacks, and loss of compliance with regulatory requirements. These risks can be reduced by properly drawing up a Service Level Agreement (SLA), which will allow compensation of some losses. Regulatory requirements may change over time, and the Law on Personal Data makes cloud computing completely unusable in practice.

However, in some cases, the cloud system can be made even more secure than traditional architecture by sharing responsibilities and making the right arrangements.

First of all, it is, of course, the complete dependence of the user on the Internet connection. Without the Internet, everything disappears at once - letters, documents, contacts, games, scheduled tasks, set alarms, and so on. And, of course, the price of error increases. If the manufacturer has any failure, he risks losing or making public all the data. For example, Magnolia, a bookmarking service, lost all its data in 2009. It can't be said that the

probability of this is higher than the breakdown or loss of a user's laptop, but just the scale of the disaster can be really large.

The user is not the owner and does not have access to the internal cloud infrastructure. The storage of user data depends on the provider company. Specify some disadvantages:

- the disadvantage is relevant for Ukrainian users: to receive quality services, the user must have reliable and fast access to the Internet;
- absence of accepted standards in the field of cloud technologies security.

An example of the application of cloud technologies in the automation of enterprise management is Microsoft's solution for creating a private cloud designed to implement the service model Infrastructure as a Service based on the company's own IT resources.

The model involves the consolidation of available resources: servers, storage resources, network resources and software assets. Several consumers (for example, several different enterprises or several divisions of one enterprise) can share consolidated resources, which increases the efficiency of investment in hardware and software. Consolidation of resources is usually implemented using different virtualization technologies, such as virtualization of servers, networks, storage systems, applications, etc. Typically, in addition to the company's existing resources in the process of creating a private cloud requires additional equipment needed to prepare a reliable scalable hardware infrastructure, which includes servers, network devices and storage systems.

The size of private clouds varies greatly depending on the number of loads that are expected to be placed on them. Minimum settings include 4-5 physical servers running an average of 40-50 virtual machines. Corporate private clouds have hundreds of servers and thousands of virtual machines.

At the heart of the private cloud based on Microsoft solutions are the following principles:

- Elasticity and range - the ability to expand the resource base with additional equipment and predict such a need;
- Continuous availability - guaranteed availability of all resources, which is achieved through the automation of control and management systems of the infrastructure and the prevention of any failures associated with equipment wear, sudden changes in load, etc;
- Security and identification - flexible control of access to physical and virtual machines, information and applications in the data processing center. Thanks to the use of such a user identification platform, secure access to IT resources from a variety of devices is done.

In addition, the features of Microsoft's private cloud are the availability of tools to automate all aspects of cloud infrastructure maintenance. It is also worth saying about the focus on applications, which allows you to track the status and manage complex multi-tier applications, rather than just virtual machines. A significant advantage is interoperability - support for operating systems, hypervisor, control systems and applications from other developers. From a business point of view, Microsoft's private cloud is attractive due to the low cost of acquisition and ownership, as well as the lack of additional costs with increasing load density.

Finally, it should be noted that despite the fact that cloud technologies have recently begun to be used in Ukraine, global trends are moving forward. Thus, according to PwC's head of global business and innovation practice, Vicki Huff Eckert, "most companies have laid the foundation for technology development by investing in areas such as social networking, mobile, analytics and cloud technologies [5]."

### Conclusion.

As a result of the review of models and types of cloud computing, the main advantages and disadvantages of use are specified and an example of application of cloud technologies in automation of enterprise management is given. Concerns about data security and the legal aspects of using cloud services may be the main reasons why companies do not use cloud computing.

In order to promote the use of cloud computing at enterprises of Ukraine, we can offer the following:

1) in the scientific environment: popularization of the advantages of the use of cloud technologies by enterprises through the organization of scientific conferences, publication of scientific and popular scientific articles; conducting research related to various aspects of the application of cloud computing in the economic activities of enterprises.

2) in the didactic process: introduction into the educational process of subjects related to the use of cloud services. Such subjects can be, for example, "Information and communication technologies", "Information management when using cloud services" and so on.

3) at the state level: modernization and adaptation of the regulatory framework taking into account appearance of new information and communication technologies; development of appropriate standards for unification of data protection when using cloud technologies; providing funding for specialized research in the field of cloud technologies [6].

Thus, cloud technologies play an important role not only in ensuring the operation and management of the enterprise, which can significantly reduce the cost of using licensed programs, but also for the ordinary user, providing free space to store files and access them anywhere, and use different programs and applications.

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### ВИКОРИСТАННЯ ХМАРНИХ ТЕХНОЛОГІЙ НА ПІДПРИЄМСТВІ

*У статті розглядається поняття «хмарних» технологій чи хмарних обчислень, системи «хмарних технологій», основні характеристики хмарних обчислень, переваги та недоліки використання хмарних обчислень на підприємстві, Проаналізовано приклади програм, що можуть бути використані на підприємстві. Сформульовано переваги та недоліки використання хмарних технологій на підприємстві.*

**Ключові слова:** хмарні технології, хмарні обчислення, додаток як сервіс (SaaS), інфраструктура як сервіс (IaaS), платформа як сервіс (PaaS) приватна хмара, публічна хмара.