

THE PLACE OF CLOUD TECHNOLOGIES IN EDUCATION

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ANNOTATION

The article discusses the use of cloud technologies in education. The benefits and harms of cloud technologies were also discussed. There is also information about the architecture of cloud technology and the types of cloud technology and their application and advantages.

Keywords: Cloud computing, ARPAN (Advanced Research Projects Agency Network), public cloud, hybrid cloud, community cloud IaaS, PaaS, DaaS, SaaS, WaaS, IP address, Microsoft Office, Google's cloud service, Google Drive

INTRODUCTION

In the modern world, the characteristics of modern hardware and software change and improve almost daily, and any educational institution is unlikely to be able to update its technical and software base in accordance with the rapidly changing computing capabilities of modern computers and provide the educational process with the latest innovations, which, in turn, imply considerable material costs for maintaining appropriate information services for students.

The introduction of modern information technologies in training allows you to achieve the planned results only under the condition of reliable, safe and efficient operation of the entire IT infrastructure. Increasing demands are made on it to improve performance and reliability with a constant increase in the volume of processed information. At the same time, requirements are put forward to reduce the costs of maintaining and developing the IT infrastructure and increase its adaptability to the changing needs of educational institutions and companies in IT resources.

The most effective way to meet these requirements is the development of information technologies for training based on the implementation of cloud computing (Cloud Computing), which are one of the most promising innovative directions in the development of service IT.

"Cloud computing is a technology of distributed data processing, in which computer resources and power are provided to the user as an Internet service" .

The idea of what we call cloud computing today was first voiced by Joseph Carl Robnett Licklider in 1970. During these years he was responsible for the creation of ARPAN (Advanced Research Projects Agency Network). His idea was that every person on earth would be connected to a network from which he would receive not only data, but also programs. Another scientist, John McCarthy, expressed the idea that computing power would be provided to users as a service (service). On this, the development of cloud technologies was suspended until the 90s. The next step was the development of a cloud web service by Amazon in 2002. This service made it possible to store information and perform calculations. In 2008, Microsoft announced

its plans in this area. Moreover, Microsoft announced not just a service, but a full-fledged cloud operating system Windows Azure.

The ideology of "cloud computing" is to transfer the organization of computing and data processing to a significant extent from personal computers to the servers of the World Wide Web. Cloud Computing is based on the belief that the Internet is able to meet the needs of users to generate and process data across a wide range of their needs. The concept of cloud technologies comes from the fact that cloud technologies are based on the Internet network, and the Internet is often denoted by the cloud in the diagrams, hence the name of the technologies. The cloud offers new opportunities for educational institutions to deliver dynamic and relevant Internet-based e-learning applications. Cloud technologies provide a high level of customer service and compliance of the e-course with educational policy and government educational standards.

The following types of clouds are distinguished. A private cloud is an infrastructure designed to be used by a single organization that includes multiple consumers (for example, divisions of the same organization). A private cloud can be owned, managed and operated by the organization itself or by a third party (or some combination of these), and it can physically exist both inside and outside the owner's jurisdiction.

A public cloud is an infrastructure designed for free use by the general public. The public cloud can be owned, operated and operated by commercial, academic, and government organizations (or any combination of these). The public cloud physically exists in the jurisdiction of the owner - the service provider.

A hybrid cloud is a combination of two or more different cloud infrastructures (private, public) that remain unique objects, but are interconnected by standardized or private technologies for transferring data and applications (for example, short-term use of public cloud resources for balancing loads between clouds).

A community cloud is a type of infrastructure designed for use by a specific community of consumers from organizations with common tasks. A public cloud can be co-owned, operated and operated by one or more of the community organizations or a third party (or any combination of these), and it can physically exist both within and outside the owner's jurisdiction

In practice, the boundaries between all these types of computation are blurry.

The user has access to his information, which is constantly stored on Web servers, only as a client during Internet sessions, with the placement of this information (and the results of its processing) on personal computers, laptops, netbooks, smartphones, etc. To date, there are several main technologies (models) in this area: infrastructure as a service (Infrastructure as a Service, IaaS); Platform as a Service (PaaS); data as a service (Data as a Service, DaaS); software as a service (Software as a Service, SaaS); Workplace as a Service (WaaS); all as a service (AaaS).

In the IaaS, PaaS, DaaS, SaaS and WaaS models, customers pay not to own the software product as such, but to rent it (AaaS model). The customer bears only relatively small recurring costs in the form of a subscription fee, with the possibility of its termination or suspension after the need for a software product expires and its renewal if necessary (Fig. 1).

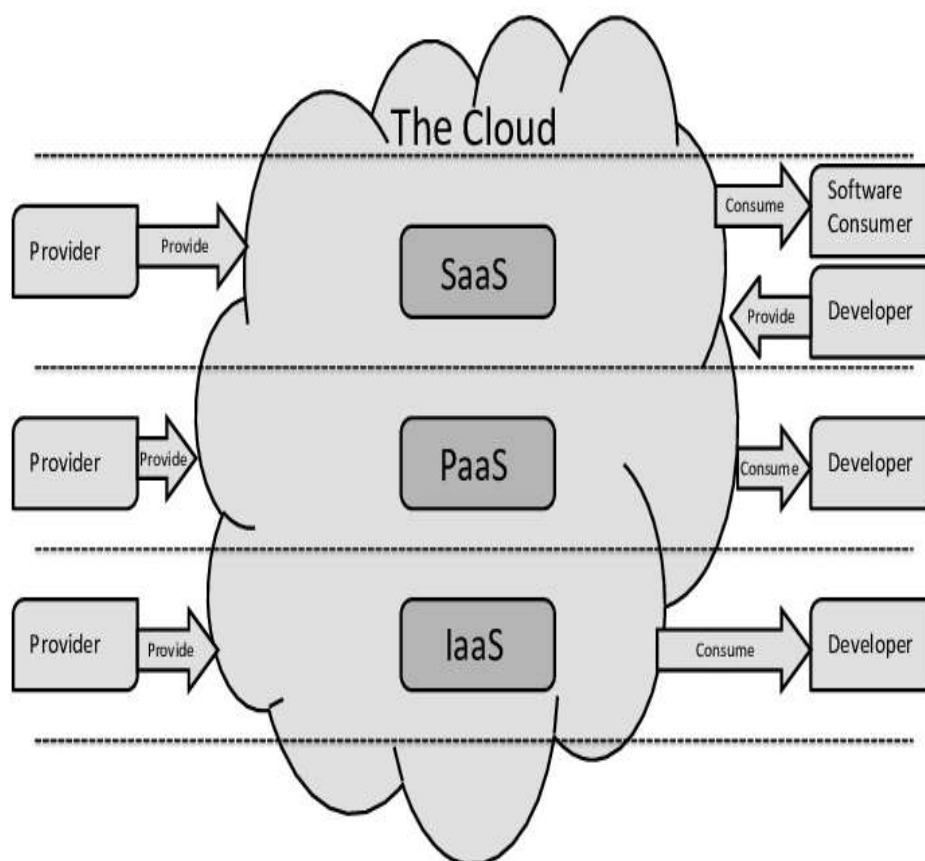


Figure 1. Cloud computing architecture

Infrastructure as a Service (IaaS). Infrastructure for rent. The user is provided with a "clean" instance of a virtual server with a unique IP address or set of addresses and part of the storage system. To control the parameters, start and stop this instance, the provider provides the user with a programming interface (API).

Platform as a Service (PaaS). PaaS can be thought of as a turnkey virtual platform consisting of one or more virtual servers with operating systems and specialized applications installed. Most cloud providers offer the user a choice of a variety of ready-to-use cloud environments.

Software as a Service (SaaS). The SaaS concept provides the ability to use software as a service and do it remotely over the Internet. This approach allows you not to buy a software product, but simply temporarily use it when a need arises.

For companies planning to use cloud computing, Chris Richter, the world's leading computer security expert, offers 6 steps to transition to a new infrastructure: evaluate the applications used; classify; determine the most suitable type of cloud computing, namely choose IaaS, PaaS or SaaS; find out the architecture of the platform; learn control technology; find out the level of confidentiality.

Cloud technologies are developing rapidly and cover more and more areas of activity. Like any technology, cloud computing has both advantages and disadvantages.

Benefits of Cloud Computing:

The user pays for the service only when he needs it, and most importantly, he pays only for what he uses;

Cloud technologies allow you to save money on purchasing, maintaining, upgrading software and equipment;

Scalability, fault tolerance and security - automatically allocate and release the necessary resources depending on the needs of the application. Maintenance, software updates are performed by the service provider;

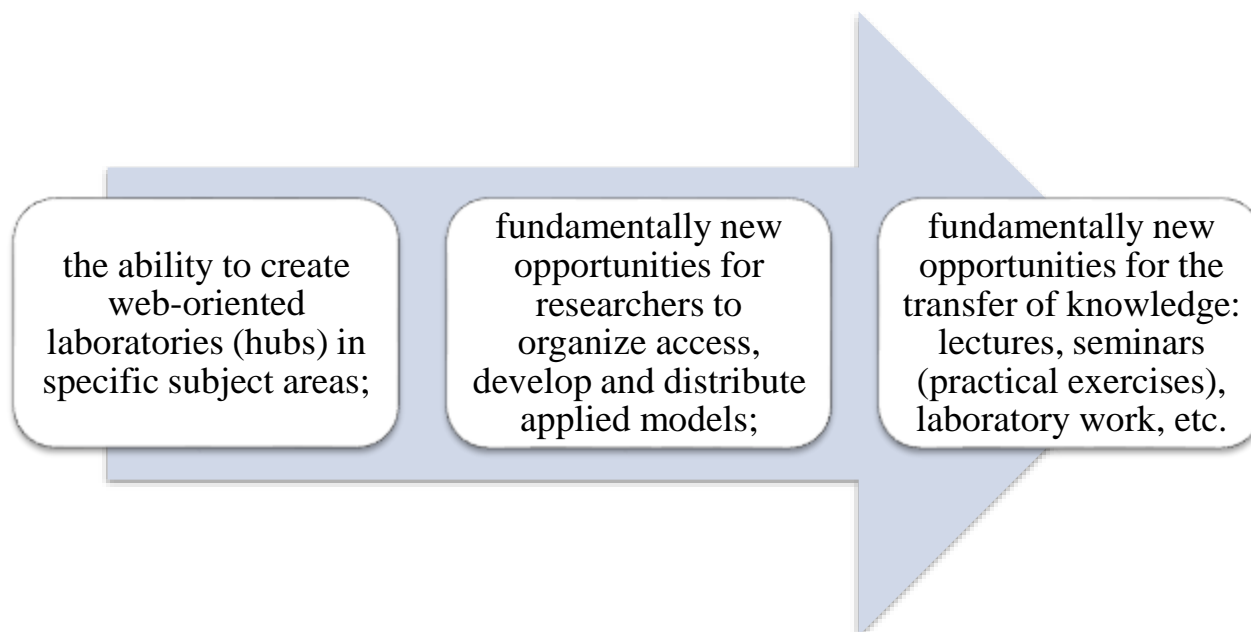
Remote access to data in the cloud - you can work from anywhere on the planet where you have access to the Internet.

Disadvantages of Cloud Computing:

- ✚ The user is not the owner and does not have access to the internal cloud infrastructure. The safety of user data is highly dependent on the provider company;
- ✚ Disadvantage that is relevant for Kazakhstani users: in order to receive quality services, the user must have reliable and fast access to the Internet;
- ✚ Not all data can be entrusted to an Internet provider not only for storage, but even for processing;
- ✚ Not every application allows you to save, for example, on a flash-carrier intermediate stages of information processing, as well as the final result of the work, and after all, online results are not always convenient;
- ✚ There is a risk that the online service provider will not back up the data one day, and it will be lost as a result of a server crash;
- ✚ Trusting his data to an online service, control over them is lost, and the user limits his freedom (the user will not be able to change some of his information, it will be stored in conditions beyond his control).

Cloud technologies provide the ability to store all your data, perform basic computing work, you will always have all your data, programs and settings with you, an Internet connection is enough. Cloud technologies have a huge number of advantages: no powerful computers are

required, which reduces the price of a PC, an increase in the power of your PC at the expense of servers, less costs for purchased software (programs in the clouds), constant updates are not required, since everything is in the cloud, absence of piracy, unlimited amount of stored data, availability from various devices and from various places, data resistance to loss, performing many types of educational work, monitoring and evaluating online; saving money on the payment of technical specialists; saving disk space; openness of the educational environment. The use of cloud computing in science and education provides a number of opportunities :



As an example of the use of cloud technologies in education, one can name electronic diaries and magazines, classrooms for students and teachers, an interactive reception room, and more. These are thematic forums where students can exchange information. This is also a search for information, where students can solve certain educational problems even in the absence of a teacher or under his guidance. To do this, you can use:

- ✓ Computer programs;
- ✓ Electronic textbooks;
- ✓ Simulators;
- ✓ Diagnostic, test and training systems;
- ✓ Applied and instrumental software;
- ✓ Laboratory complexes;
- ✓ Systems based on multimedia technology;
- ✓ Telecommunication systems (eg e-mail, teleconferencing);
- ✓ Electronic libraries and more.

There are many public cloud services that allow you to work with office applications, but most of them are paid for organizations that choose to use them to collaborate their employees. The cloud office service from Microsoft is called Office 365, and this corporation also offers Windows Azure. Their main competitor is Google Docs.

Microsoft Office 365 Education delivers the full power of the cloud, helping you save time, money, and student and employee productivity. Basic functionality, which includes cloud versions of Exchange Online, Share Point Online and Office Web Apps, as well as LyncOnline with video conferencing capabilities, will be provided free of charge. Office 365 is easy to use and administer, with the robust security and reliability of a leading global service provider.

With the Windows Azure in education offering, educators have the opportunity to incorporate one of the most innovative and rapidly evolving technologies into their learning experience, both in theory and practice. Windows Azure is based on running a virtual machine for each instance of an application. The developer determines the required amount of data storage and the required computing power (number of virtual machines), after which the platform provides the appropriate resources.

Google's cloud service is called Google Drive. It includes document creation (Google Docs) and cloud storage capabilities (Gmail email, Google Translate auto-translator, GoogleMaps mapping service, Google Talk messenger). Google Drive lets you store and access files on the Internet and on your hard drive from anywhere, even on the road. Changes made to a file on the Internet, on a computer or mobile phone are reflected on all devices on which Google Drive is installed (Fig. 2).



Figure 2. Google Apps

From the above, it follows that cloud computing has broad prospects for application in education, research and applied development, as well as for distance learning for specialists, graduate students and students.

Cloud technologies are not only the future, in many ways they are already present.

Thus, during the transition to new educational standards, cloud technologies help to form a new information culture of a teacher and a student, and provide a unique opportunity to combine project methods and information and communication technologies.

The use of cloud technologies in the educational process allows you to make the educational space open.

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