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БЕЗПЕКА ІНФОРМАЦІЇ У ХМАРНИХ СХОВИЩАХ

THE GROWTH OF CLOUD COMPUTING IN THE EDUCATIONAL PROCESS UNDER TODAY'S CONDITIONS

Ulyana Panovyk[1], Amiran Sharadze[2]

[1]Department of Automation and Computer Technologies of the Ukrainian Academy of Printing, Lviv, Ukraine
[2]Batumi Shota Rustaveli State University, Batumi, Georgia

Abstract. *Today in Ukraine, the urgent issue of distance learning is training qualified specialists in various specialties. The article examines the problems and prospects of using cloud technologies and services in the educational process. Examples and advantages of well-known cloud platforms used in education are considered.*
Keywords: *cloud technologies, cloud services, cloud platforms, cloud storage, virtual computer laboratory.*

Анотація. *Сьогодні в Україні важливим питанням при дистанційному навчанні є підготовка кваліфікованих фахівців різних спеціальностей. У статті досліджуються проблеми та перспективи використання хмарних технологій та сервісів у навчальному процесі. Розглядаються приклади та переваги відомих хмарних платформ, які застосовуються в освіті.*
Ключові слова: *хмарні технології, хмарні сервіси, хмарні платформи, хмарні сховища, віртуальна комп'ютерна лабораторія.*

During the coronavirus pandemic and the military aggression of the Russia against Ukraine, the education system of Ukraine found itself in new realities of functioning, and the organizers of the educational process faced such questions that no one has solved until today. Today's realities have shown that the education system needs the introduction of innovative teaching styles. Technology, especially cloud computing technologies such as cloud tools and cloud storage options, should play a greater role in student learning. Educational institutions should use cloud computing and cloud communications. Only by using the modalities of virtual interaction, educational institutions will be able to remain relevant. Higher education especially needs the use of cloud technologies and virtual (electronic) learning.

Today, cloud computing and e-learning have become more important than at any time in recent history. Educational institutions introduce online learning for students. Online engineering and programming courses are also becoming

increasingly popular. Technology is a tool and catalyst for educational change, solving today's problems. Cloud computing offers the benefits of increased efficiency for both educators and students (Fig. 1).

When using cloud technology in the educational process, all types of services can be used – IaaS, PaaS, and SaaS. The most famous in the world are free cloud platforms Microsoft Live@edu, Google Apps Education Edition, and cloud services based on them [1].

Fig. 1. Architecture of e-learning

Cloud platforms Microsoft Live@edu, and Microsoft Office 365 provide opportunities for the practical study of well-known office applications through a web browser based on cloud technologies. These tools include a set of functions such as the use of e-mail, a calendar, a web conferencing service with the possibility of video communication, the presence of a virtual whiteboard and compatible access to the desktop; creating and maintaining your own website; creation and editing of Word, PowerPoint, Excel, OneNote documents of any complexity. Open access to office applications is possible when using the free SkyDrive cloud file storage.

The main tools that students and teachers can use when using the Google Apps Education Edition cloud platform are Gmail e-mail with Google Talk and video chat; Google calendar; Google Drive; Google Docs; Google sites. Google Apps Education is constantly expanding services for educational institutions, namely additional services are Apps Marketplace; Google Moderator; Google Apps application script (JavaScript cloud scripting language for task automation), etc [2].

Another option for developing your online educational applications is to use the Microsoft Windows Azure cloud platform,: local development environment, Windows Azure computing emulator, Windows Azure storage, Microsoft SQL Azure service of relational databases, Windows Azure Connect interface for configuration of secure IPsec connections, Windows Azure service bus for data exchange, Windows Azure Access Control cloud service for authentication and authorization, Windows Azure Content delivery network, Windows Azure cache service, connection to the Windows Azure Marketplace online store. The most important component of the Windows Azure cloud platform for the development of educational applications is a local development environment with the possibility of using Visual Studio, Java programming languages [3].

The most famous cloud storages are SkyDrive, Apple iCloud, Google Drive, Dropbox, and others. Students can use Apple iCloud cloud storage as storage for any files transferred from Apple devices to remote Apple servers. The iCloud cloud service allows you to use the calendar to plan events and remind them, edit

documents with an automated backup function, use mail, etc.The advantage of SkyDrive cloud storage is the integration with Microsoft Office Web Apps, which enables users of SkyDrive cloud storage to study Word, Excel, PowerPoint, and OneNote office applications in a browser window.

For universities, there is an opportunity to create a private cloud (private cloud) and an educational cloud (educational cloud). Private cloud and educational cloud provide access to remote processors, software and data storage (resources), and infrastructure. However, the private cloud is the space of one university, and the educational cloud combines universities with their resources into one single space.

Well-known manufacturers of IT services offer certain cloud services for educational purposes: Blue Cloud from IBM – tools for supporting data migration from traditional IT infrastructure to the cloud called IBM Cloud Academy; App Engine from Google that is the Google Apps for Education program to support educational institutions; Microsoft Windows Azure that is the cloud solutions for educational institutions.

A separate direction in the application of cloud technologies is the use of virtual computing laboratories (VCL). A virtual computer lab is a technology that is used to deploy distributed small data centers and IT services for educational institutions to support the collaborative work of a team of programmers on code development. Currently, cloud versions of well-known manufacturers of service providers are appearing, including Sage MathCloud, Maple, MATLAB, Maple Net, MATLAB web server, WebMathematica, Calculation Laboratory, etc.

Conclusions. The implementation of cloud technologies in education has special advantages: cloud services provide the possibility of instant processing of huge amounts of information with low cost of computing resources and the possibility of its instant distribution and exchange of analysis results; cloud technologies create an opportunity for continuous learning with the support of mobile technologies and make the learning process itself interactive; cloud technologies make it possible to conduct interactive online counseling of students with the teacher and instantly receive answers to their questions; cloud technologies make it possible to save data in the clouds without the need to transfer them from one device to another, i.e., there is hardware independence from the equipment.

It is unclear how long and to what extent e-learning will be a part of higher education. It is necessary to find new ways of spreading knowledge. These alternative pathways must be able to cross borders and reach all parts of society.

Інформаційні джерела
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