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Cloud Computing Technologies in Uzbekistan

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Abstract: Cloud technologies are one of the most dynamically developing segments of the information technology market. Many companies have already been able to appreciate the benefits that clouds provide: flexibility, mobility, cost-effectiveness, reliability. Buying and maintaining your own servers is a rather difficult task that requires both large investments and qualified personnel.

Business needs around the world are growing, and global market leaders continue to create new cloud solutions to meet them. Most organizations in mature markets relied on cloud services during the pandemic in 2020, fueling a doubling of the digital market.

Keywords: cloud, solution, business, advantage, barriers, services, Uzbekistan.

Cloud computing technology appeared on the IT market about ten years ago. Over this period of time, a lot of digital technologies have appeared and the existing systems in the field of security have been upgraded.

According to Statista report, the global Infrastructure as a Service (IaaS) market is expected to be around 122 billion dollars in 2022, with an average market growth rate of 35% annually. The acceleration of digital transformation and the continued trend towards cloud services for applications, machine learning and other services are fueling the growth of this market worldwide. [6]

Cloud services and technologies around the world are developing at a rapid pace, almost on an exponential curve. According to the forecasts of the research company Statista, in 2022 the volume of the global market for public cloud services will grow by about 22% and will amount to about 482 billion dollars. [7]

Despite the active growth of various technologies in the field of processing, both open and closed information, cloud technologies are not losing their positions in the field of practicality and significance in use.

Statistics show that many companies hosted on their own site are moving to cloud computing technology. Existing indicators are growing and becoming relevant whether it is private, public or hybrid cloud storage of information.

The growth trend in the use of cloud technologies in their activities is determined based on the following reasons:

1. Availability of use on all personal computers and mobile devices, thereby saving high-performance software of complexes and means of cloud computing users. Cloud computing consumers can access their work platform from anywhere they connect to the Internet.

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2. The reliability of cloud services is ensured by the fact that the software of platforms and complexes is gradually transferred under the control and monitoring of specialized Data Processing Centers. They are connected to the redundancy of both network and hardware infrastructure.

3. The economic benefit of using cloud technologies is that the availability of digital platforms such as Google docs does not require consumers to purchase licensed software, configure it and constantly update it.

Figure 1 shows the statistics of consumption incentives, and the use of cloud computing, and the growth trend.

Security guarantee indicators are only getting stronger every year.

This is due to the introduction and improvement of protection methods.

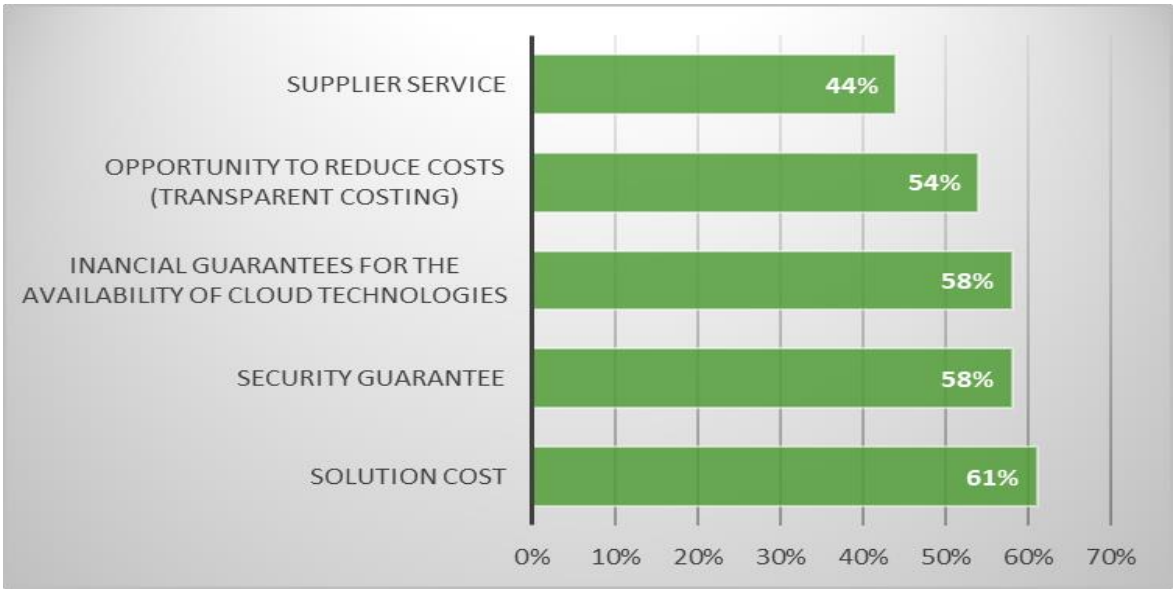

Figure 1. Statistics on incentives to consume and use cloud computing.

However, to begin with, entrepreneurial structures offering technologies must choose from the three areas of cloud computing that suit them best.

Three areas of cloud solutions are proposed below:

1. Infrastructure as a Service (IaaS) is a computing infrastructure that includes servers, data storage, networks, operating systems, they are suitable for creating your own applications. An example is a virtual DPC (Data Processing Centers).

2. Platform as a Service (PaaS) includes information technology platforms: operating systems, DBMS (database management system), middleware, development and testing tools, which are hosted by a cloud provider. An example is a cloud data center.

3. Software as a Service (SaaS) is a ready-made application software that is fully serviced by a cloud provider, for example, it is a service - authentication from the cloud.

But it should be noted that along with the advantages of these developments, there are great risks and threats in the use of cloud technologies.

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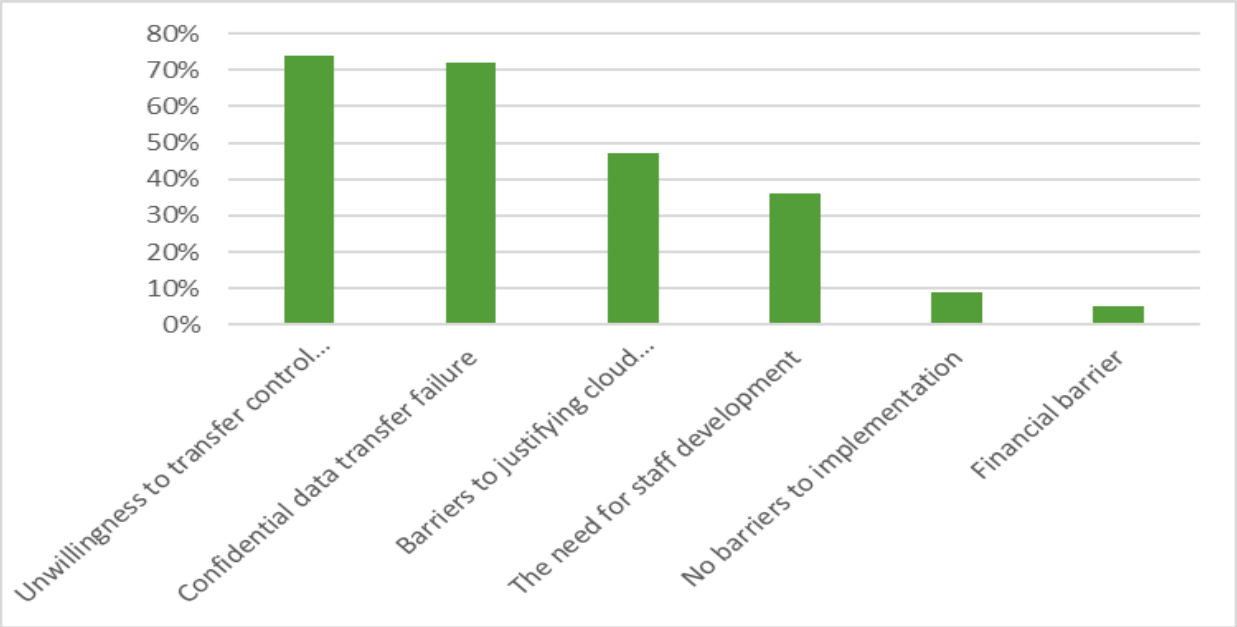

Figure 2 Barriers to cloud adoption

In each of these types of cloud computing, there are a number of threats that may, for any reason, not be taken into account, both by providers and users of cloud computing. Therefore, there are certain barriers to the introduction of cloud technologies.

Figure 2 shows all kinds of barriers to the implementation of cloud services, business structures, the reasons for these barriers are:

- low speed of the cloud computing system, primarily due to failures of the Internet.
- version incompatibility when upgrading the cloud computing system. There is a threat of changing functions when working in the company itself, which leads to an imbalance in work.
- No feedback from cloud service providers.

However, this is an important factor, since attackers can also use this service to crack the encryption key. It is necessary to provide "mutual" protection when working in cloud computing, both on the part of the service provider and on the part of the client.

On the client side, it is necessary to provide data encryption, identification and authentication. You also need to protect yourself from traditional software-level attacks using a firewall, antivirus, and the like.

Most users connect to cloud storage using a regular browser. Known attacks such as Cross Site Scripting await here. The following attacks may follow: interception of web sessions, theft of passwords, theft during transmission of information, and many others. The only defense against this type of attack today is proper authentication and the use of an encrypted connection (SSL) with mutual authentication.

Such technologies are quite well known, for example, algorithms and reliable AES, TLS, IPsec protocols that have long been used by well-known providers.

Virtual networks that are actively used and should be deployed using well-known technologies such as VPN (Virtual Private Network), VLAN (Virtual Local Area Network), and VPLS (Virtual Private LAN Service).

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Very often, providers use the isolation of user data from each other by changing code data in a single software environment.

This approach also has its risks, which are associated with the danger of finding holes in non-standard code, through which attackers can gain access to confidential information. In the event of a possible error in the code, the user may receive data from another code, which is unacceptable while maintaining an appropriate level of security.

The Republic of Uzbekistan, as well as the world community, in its rapid development, has taken a course towards the use of digital economy technologies in the systems of state and public administration.

In this regard, the issue of developing the foundations for the formation of state information policy in the Republic of Uzbekistan, information security, data protection from cyber-attacks, and prevention of cybercrimes is being updated.

The introduction of modern information and communication systems in the field of state and public administration is an important condition for the effective implementation of ongoing socio-economic and socio-political reforms and transformations in any country.

According to the Decree of the President of Uzbekistan “On the State Program for the Implementation of the Action Strategy in five priority areas of development of the Republic of Uzbekistan in 2017-2021 in the Year of the Development of Science, Education and the Digital Economy”, it is planned to further improve the cybersecurity system and the foundations of the information policy of the state. Thus, paragraphs 243, 244, 245 and 246 of the State Program provide for the preparation of the National Cybersecurity Strategy for 2020-2023, the draft Law "On Cybersecurity", the draft Concept of a unified information policy of the Republic of Uzbekistan. [1]

Table 1. The number of domains in the national domain zone "UZ" in 2021[5]

Total active domains	88 528
Pending activation	545
For the beginning of the year	86 664
Growth	2.0%
New domains	3 385
Remote domains	1643

Thus, according to the data in 2019, the number of active domains in the UZ national domain zone increased to 74,000. In 2019, 268 incidents, 816 vulnerabilities and about 132,000 cybersecurity threats were detected in information systems and websites of the national segment of the Internet. In 2021, there are already 88,528 of them.[5]

Figure 3 shows an increase in the number of domains in the domain zone for 2021, and then a sharp decline in active domains, this fact can be associated with the cybersecurity of the domain zones of Uzbekistan.

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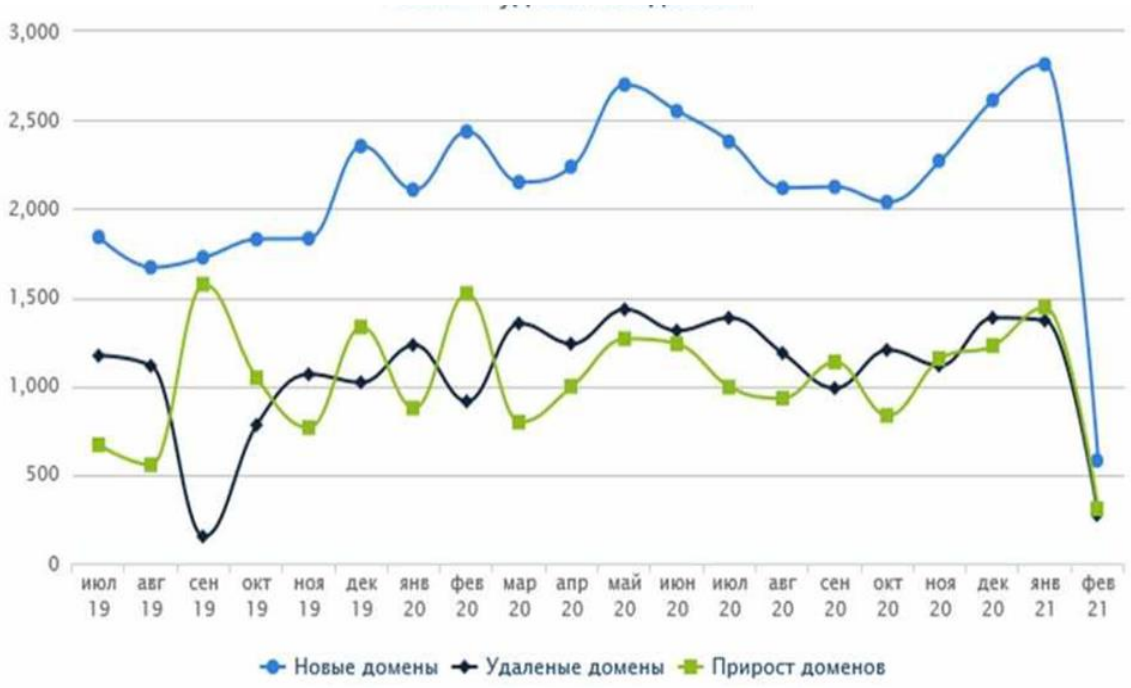

Figure 3 New and deleted domains in the UZ domain zone in Uzbekistan. [5]

Uzbekistan was one of the first among the countries of Central Asia to introduce "cloud" technologies. The Decree of the President of the Republic of Uzbekistan dated July 3, 2018 “On measures to develop the digital economy in the Republic of Uzbekistan” sets the task of introducing various types of “cloud” technologies in the economy as one of the basic areas of digitalization for the period up to 2024.

At the current stage, most IT companies are already actively using infrastructure in the cloud. Clouds help fintech, startups and small businesses to quickly launch new projects and scale existing ones. After all, getting access to cloud servers takes only 1-2 business days, while the process of purchasing their own servers from small companies takes 3-4 days, and from large companies-2-3 months, and this is provided that they are ready to bear capital costs in a changing market environment.

For service providers, the fuel and energy complex, industry representatives and large businesses, servers in the cloud help increase the fault tolerance of mission-critical IT systems. High reliability indicators are difficult to achieve on their own, even for large companies, since it is necessary to reserve all data center nodes without exception: power lines, transformers, generators, UPS, air conditioners, power supplies, and even the servers themselves.

For companies in finance, education, and retail, cloud services help prepare for peak and seasonal workloads through the flexibility of cloud infrastructure - performance can be changed almost on the fly. Adding processor cores, RAM and hard drives takes no more than 30 minutes.

The national communications operator JSC O'zbektelekom has created a "cloud" data center UZCLOUD (providing videoconferencing and remote work services), which satisfies the growing demand from government agencies, institutions, businesses, the population in the storage and transmission of information, as well as in modern services based on cloud computing.

On the basis of the "cloud" data center of JSC O'zbektelekom, in cooperation with global companies providing Internet services, localization of server equipment and numerous services of IT giants was

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carried out. Thanks to this, Internet users in Uzbekistan can receive information and download data much faster.

O'zbektelekom has also developed a number of "cloud" services and data center services, such as "VDC Virtual Data Center", "VDI Virtual Desktop", "VKS - Videoconferencing", Colocation, Webhosting, "Cloud Video Surveillance" and others that meet the standards of the international Tier III system according to the Uptime Institute classification.

In cooperation with the Russian VoD service IVI, an exclusive project for the territory of Uzbekistan https://ivi.uztelecom.uz was launched - an online cinema with a subscription to a catalog with more than 95,000 films that can be viewed on any device for residents of Uzbekistan. In addition, in 2019, a gaming cluster of one of the most popular companies in the world, Wargaming, was installed in Uzbekistan. Together with the largest "cloud" providers of the Russian Federation, a project is being implemented to digitalize business in Uzbekistan. [3]

Taking into account the needs of the modern business environment, as well as the technical capabilities of JSC O‘zbektelekom, it offers the following areas of services: computing services for B2G; interactive B2C market; interactive market for small and medium businesses; big business and financial institutions; subprovidership.

Large and medium-sized companies in Uzbekistan that have already invested in their own infrastructure and servers use clouds to duplicate critical systems and back up valuable business data. This is a hybrid model, taking advantage of both on-premises and cloud servers.

One of the drivers of the local market of cloud services was the new requirement of regulators in terms of personal data of citizens of Uzbekistan, which from April 1, 2021 must be stored and processed exclusively on the territory of Uzbekistan. So many service providers, e-commerce representatives, owners of loyalty programs, social networks and other companies working with personal data of citizens of Uzbekistan had to transfer data and systems to Uzbekistan with the help of local and international providers that have technical platforms here.

On the other hand, local company leaders still have stereotypes and fears that cause distrust in the "clouds", including: data security and portability, loss of control, software compatibility, difficulty changing providers, and unclear savings. The pace of industry development and modern technologies to date make it possible to completely eliminate or competently manage these risks, as well as make the transition to the cloud a predictable and manageable process.

To correctly compare the cost of your own and cloud servers, you should take into account the capital costs of duplicating your own equipment and systems, as well as the main operating costs for maintenance, spare parts, Internet access, cooling and power supply. The cost of cloud servers is determined by their performance. Some customers use basic servers and pay 100-200 thousand sums per month. Most Uzbek clients need medium-capacity servers, which cost 2-3 million sums per month. Large customers enjoy productive configurations and server groups, the cost of which exceeds 10 million sums per month.

Due to the large capacity of providers and payment only for the necessary resources, it is possible to significantly reduce the cost of IT infrastructure. After all, the total cost of infrastructure as a service is much lower than the cost of owning your own servers.

The infrastructure as a service market in Uzbekistan has already been formed. Large telecom operators and Internet providers operate on it, which provide virtual servers as an additional service to their customers. There are local providers that also provide hosting and other services.

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The leaders of the global market do not plan to place their sites in Uzbekistan in the coming years, because they are focused on large markets. However, international companies specializing in exclusively cloud technologies, having deep expertise in this area and applying international standards, have entered the Uzbek market.

According to PRO DATA experts, the size of the IaaS market in Uzbekistan at the end of 2020 is 9.17 million US dollar and will more than double by 2025 and amount to 20.89 million dollars.

In a short period of time, digital data centers, technology parks, innovation and scientific centers were created in Uzbekistan.

Five data centers in Tashkent run by three organizations:

- Independent Telecom Innovations Metro telecom, Independent Telecom Innovations ITI-IX and IPlus.
- Huawei data center in Uzbekistan (for irrigation engineers, agriculture)
- International Innovation Center of the Aral Sea Basin under the President of the Republic of Uzbekistan
- Technopark in Tashkent (2019)
- Technopark in Andijan (2020)
- Similar parks will be created in Nukus, Bukhara, Namangan, Samarkand, Gulistan and Urgench.(2025)

More and more companies in Uzbekistan are moving towards the "cloud", they carefully consider all costs, get flexibility and unlimited scalability, increase the reliability and fault tolerance of their systems. The transfer of the server ownership and maintenance function allows such organizations to focus on their business and solving core tasks.

The needs of the digital economy of Uzbekistan in "cloud" services will constantly grow. Therefore, within the framework of the project “Development of the telecommunications infrastructure of JSC O‘zbektelekom for 2021-2022”, it is planned to create two more Data Processing and Storage Centers in Bukhara and Kokand with a total capacity of 50 petabytes each.

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