

## METHODS OF USING CLOUD TECHNOLOGIES IN ISLAMIC EDUCATION INSTITUTIONS

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### ABSTRACT

Information and communication Technology is basically making use of ICT tool to store and retrieves information. It plays an important role in growing and maintaining country's economic growth. In recent years, this topic has become one of the most popular in the IT field, many articles have been written about it, even more conferences have been held, and how many solutions already exist on the market cannot be counted at all. Currently, the old classroom system of teaching and teaching ICTs is changing, and students in Uzbekistan who are engaged in religious education are becoming more and more technology-oriented. Therefore, in this changing educational environment, it is important to think about the latest technologies that could be used in teaching and studying ICT in religious institutions. One of the latest technologies prevailing nowadays is cloud computing. By sharing IT services as platform-based, software-based and infrastructure-based in the cloud, educational institutions in Uzbekistan can now out-source non-core services and better concentrate on offering students, teachers, faculty and other staff the essential tools to help them succeed. However, as always, there is one "but", namely, most of the users still don't know what kind of "know-how" is cloud technology and why it generally surrendered. Well, we will correct the situation and we will begin, as expected, with theory. Cloud computing is a distributed data processing technology in which computer resources and capacities are provided to the user as an Internet service. If you explain in an accessible language, then - this is your, in a sense, a working platform on the Internet, or rather on a remote server. This paper looks at how Cloud Computing can be applied in the study of ICT and also focuses on the role of cloud computing on the study of ICT in the Uzbek educational system. It also looks at how one can provide quality and affordable ICT education by using cloud-computing technology. A study of the previous system without cloud computing technology was considered and a new model of teaching ICT with help of cloud computing technology has been proposed. An extensive review and analysis of the existing literature and models were considered and a new model was designed and piloted. Our research shows that for the past decades, most public religions educational institutions in Uzbekistan are making grant strides in the development of curriculum for teaching ICT. The model designed was found to be effective and useful for the teaching and learning of ICT and its related subjects. Our research also shows that a good number of tertiary institution both private and public now offer various IT and its related degree and diploma programs. The Islamic Education Service now runs ICT at basic and second cycle levels as subjects.

**KEYWORDS:** Islam, lan, tas-ix, ip, tsp, internet exchange point, ats, adsl, uznet, internet fisteval, information and communication technology education, saas, paas, iaas, cct4ict, moodle, e-learning, virtual method, learning management system.

### INTRODUCTION

Now there are practically no such families in which there is no computer. IT technologies appeared in our life not so long ago, but a modern person at the moment cannot live without them. Now it is impossible to imagine how we would live without a phone or computer. But technology cannot work forever. There are situations when it fails.

On a computer, we store important files that we need for work, study, and also in other areas of activity. One can easily imagine how enraged people are when the operating system "flies" on the computer, and not all files can be subsequently restored. It should be borne in mind that the operating system runs on average one to three years, and we are not always ready to lose the documents we need so much.

It's not always convenient to carry a flash card between work and home, and every day, constantly "flipping" files back and forth, carrying a laptop or tablet computer all the time is also not a convenient option, but you unconsciously want these files always were close at hand.

In recent years, this topic has become one of the most popular in the field of IT in Uzbekistan, many articles have been written about this, more conferences have been held, and how many solutions already exist on the market cannot be counted at all. Actually, all the difference lies solely in the method of data storage and processing. If all operations take place on your computer (using its capacities), then this is not a "cloud", but if the process takes place on a server on the network, then this is exactly the trendy thing that is commonly called "cloud technology". However, as always, there is one "but", namely, most of the users still do not know what kind of "know-how" is cloud technology and why it generally surrendered. Well, we will correct the situation and we will begin, as expected, with theory. Cloud computing is a distributed data processing technology in which computer resources and capacities are provided to the user as an Internet service. In other words, cloud technologies are various hardware, software, methodologies and tools that are provided to the user, like Internet services, for the realization of their goals, tasks, and projects. Now day's Educational institutions to develop and run ICT and its related programs. Parents are encouraged to send their wards to academy, institute and university that run ICT and its related programs. There have been various models to promote ICT education in Uzbekistan. One of the biggest challenges that the government faces in providing education is the lack of infrastructure and if available then maintenance of that infrastructure and other issues in procuring and maintaining a wide range of hardware and software[3].

With this challenge, IT education would be one of the most affected as it is purely practically oriented. Cloud computing can provide solutions to these challenges and reduce it to some extent. Thus by implementing cloud computing technology, Islamic educational process can overcome most of these challenges and also maintain a centralized system where all stakeholders can check the ICT education system from each and every aspect and continue to monitor and guide the system. They can not only check the needs of the ICT institutions, but also ensure that quality IT education is provided to every student and also his attendance, class performance and others attributes can be effectively monitored. The Cloud Computing Technology (CCT) helps to ensure that students, faculty, parents and other staff have on-demand access to critical information using any device from anywhere, at any time.

## LITERATURE REVIEW

The strategy we used to create the search strings was as follows [4] [19]:

- Finding papers about cloud computing in education sector.
- Listing keywords mentioned in primary studies which we knew about.
- Use synonyms word (usage) and sub subjects of cloud computing in education such as (E-learning, management systems in education).
- Use the Boolean OR to incorporate alternative spellings and synonyms.
- Use the Boolean AND to link the major terms from population, intervention, and outcome.

The complete search string initially used for the searching of the literature was as follows: Cloud computing AND education. It has been highlighted in [5] [20] that there are two main issues on conducting an SLR search which are the sensitivity and specificity of the search. In our preliminary search, when we used the complete search string defined above we retrieved a very high number of articles. For instance, Google scholar, Scopus, ProQuest education, IEEE Xplore, Science Direct, Springer Link retrieved more than two hundred results. Therefore, we have deepened our search and used this search string: (Adoption OR Usage) AND (Cloud OR "cloud computing") AND (Education OR E-learning). The revised search string has given us a reasonable number of studies and we finally selected relevant empirical studies

## ANALYSIS AND RESULTS

The word cloud was used in the 1990s to metaphorically denote the Internet: then the Global Network appeared to be something mysterious, indefinite in its spatial boundaries, indistinguishable from its internal elements and rapidly changing. The definition of "cloud computing" recorded in the article under the heading "ORGs for Scalable, Robust, Privacy-Friendly Client Cloud Computing" reads as follows: "This is the case when information is permanently stored on servers on the Web and temporarily stored on the client side - for example, on desktop computers, tablets, laptops, mini-computers and so on"[1].

Education is one of the instruments used to measure a progress of a nation. Therefore, the education aspect should be given a certain attention; in the aspect of equity, facilities, qualities, and outcomes. In some previous decades, the discrepancy in education was a public spotlight. The concerns were about the insufficient facilities, unqualified human resources and disintegrated education system.

It is believed that the development of the ICT-based education for Islamic Study should be adjusted to the identity of Quran and hadiths. The orientation should be formed in a 3-way relationship, they are God oriented, human relationship oriented, and human-environment oriented.

For the first time the idea of "cloud computing" was voiced by D. Liklider in 1960. His idea was that every person on the planet would be connected to a network from which he would receive not only data, but also programs. Another scientist, John Mc Carthy, expressed the idea that computing power will be provided to users as a service (service) [2].

There are so many "secret" terms in the Internet. One of them is Tas-IX. The abbreviation Tas-IX in the Uzbek phrase "Tas" is "Tashkent". Place of agreement on creation of Internet traffic exchange point - Tashkent city. "IX" is derived from the English word "Internet exchange Point" - "Internet exchange point". We can describe the Internet as an information exchange point in Tashkent. The point of Tas-IX is located at ATS 244. There are only 4 employees working there. [4]. The term also ICT includes computers, computer networking (the Internet and intranet), peripheral devices and multimedia, and the range of assistive technologies available for children with Special Educational Needs[5].

Information and communications technology is a broad term that includes any communication device or application, encompassing: radio, television, cellular phones, computer and network hardware and software, satellite systems and so on [6]–[7].

Islamic education therefore decide for the one or the other or both in their subject packages, depending on their country's needs. With IT been an applied field of study, CS has scientific, mathematical and practical dimensions. The use of ICT to improve productivity at work has increased over the years, and as such it is paramount that every students attains a higher level in computer literacy. Part of the task of Islamic educational institutions is to produce workforce-ready graduates who can, among other things, manipulate and analyze raw data, critically evaluate information, and operate hardware and software [8]. In Uzbekistan, ICT as a core subject is normally taught at all levels of the bacheloreducational system. Some institutions, offer ICT as well as its-related courses to their students at the bachelors' level, masters' level, and also PhD level. For example, International Islamic Academy of Uzbekistan and Kokaldosh special institute of Islamic education, Toshkent Islaminstitute, Mir Arab madrasa also offer ICT and its related programs etc.

ICT education in Islamic academy and institutions is not without issues. Some of these issues are Lack of access to appropriate technologies. In most places in Uzbekistan, teachers teach students ICT without having access to any technology for proper demonstration. This is mostly due to cost constraints, Lack of technical knowledge, Lack of adequate time for planning lessons. Policy efforts should therefore be directed at using cheap ICTs to facilitate teaching and learning within the educational system and to promote e-learning as well as life-long learning within the population at large. Now days in international Islamic academy of Uzbekistan setup a new server and used Moodle. Its arable on <http://estudy.iiiau.uz/>[9].

For examples, some Islamic institutions used Moodle - Open-source learning platform. Moodle is a learning platform designed to provide educators, administrators and learners with a single robust, secure and integrated system to create personalized learning environments. You can download the software onto your own web server or ask one of our knowledgeable Moodle Partners to assist you. Moodle is built by the Moodle project, which is led and coordinated by Moodle HQ, which is financially supported by a network of over 80 Moodle Partner service companies worldwide [20]. All these activities are aimed at introduction of new pedagogical and information technologies in the education system of the republic, particularly in the field of religious studies and Islamic studies, including electronic education, conducting of electronic forums, video conferences, creation of electronic textbooks and manuals and their use in educational process. The basis of application of information and communication technologies in the educational process is virtualization of the educational process in the disciplines, organization of multimedia and network systems. Currently, a large number of e-learning resources are created on the subjects taught in many educational institutions. [10].

The main directions of development of cloud technologies: Four main areas of cloud computing development are IaaS; PaaS; SaaS; \*aaS. Some products directly provide users with Internet services such as storage systems, middleware, collaboration support, and databases. Infrastructure as a service (IaaS, English Infrastructure-as-a-Service) is provided as the ability to use the cloud infrastructure to independently manage processing, storage, networks and other fundamental computing resources, for example, a consumer can install and run arbitrary software that can include operating systems, platform and application software. The consumer can control operating systems, virtual storage systems and installed applications, as well as have limited control over the set of available network services (for example, firewall, DNS). The control and management of the cloud's physical and virtual infrastructure, including the network, servers, types of operating systems and storage systems used by the cloud provider. Examples of users (system developers, administrators, IT managers).

Platform as a service (PaaS, Platform-as-a-Service) - a model where the consumer is given the opportunity to use the cloud infrastructure to host the basic software for subsequent placement on it of new or existing applications (proprietary, custom-developed or purchased replicated applications) The composition of such platforms includes tools for creating, testing and executing application software - database management systems, middleware, and runtimes of programming languages - provided by the cloud provider. Monitoring and control of the cloud's main physical and virtual infrastructure, including network, servers, operating systems, storage, is carried out by the cloud provider, with the exception of developed or installed applications, as well as, if possible, configuration parameters of the environment (platform). User examples (application developers, testers, administrators)

Software as a service (SaaS, English Software-as-a-Service) - a model in which the consumer is given the opportunity to use the application software of the provider operating in the cloud infrastructure and accessible from various client devices or through a thin client, for example, from a browser (e.g. webmail) or through the program interface. The cloud provider carries out the control and management of the cloud's physical and virtual infrastructure, including the network, servers, operating systems, storage, or even individual features of the application (with the exception of a limited set of user application configuration settings). User examples (business users, application administrators).

**Others** \*aaS: for example: DaaS (Desktop-as-a-Service) offers each user a standardized virtual workstation, with the ability to configure and install other programs. Access is via the network through a thin client, which can be anything from a typical PC to a smartphone (Google Chrome OS) [20].

CaaS (Communications-as-a-Service) - a combination of software and hardware for organizing all types of communication (voice, mail) between employees of the same enterprise through third-party solutions.

Cloud computing is receiving a great deal of attention, both in publications and among users, from individuals at home to the government. Cloud computing is a subscription-based service where one can obtain networked storage space and computer resources [4]. Cloud computing is a distributed data processing technology in which computer resources and capacities are provided to the user as an Internet service. If you explain in an accessible language, then - this is your, in a sense, a working platform on the Internet, or rather on a remote server.

Let's look at an example to make sure that almost all of us, one way or another, have already come across this solution.

Do you have an e-mail? Of course, have. So, if you work with mail on some website service (for example, gmail) that allows you to use this mail, then this is nothing more than a cloud service, which is part of such a thing as cloud technology. For example, image processing. If you reduce the size, turn your photo over in Photoshop or another special program, then you have nothing to do with cloud technology - everything happens and is processed locally on your computer. But if, after downloading the image, for example, through the Picasa service, you process it on the other side, tobish in the browser, then this is the same "cloud". When one save pictures, CVs, copies of assignment in emails and even use google classroom platform instead of home computer, then —cloud computing technology (CCT) service is been offered. If a lecturer want to use for example, an online learning tutorials to reach out to students instead of using a computer presentation in the classroom, then that online presentation service is a - CCT service. Cloud Computing Technology, CCT refers to the carriage of computing resources and services over the global internationally recognized network popularly known as internet. Instead of keeping data on one's own

storage device or installing an application on one's own home computer, you use an infrastructure /service over the Internet, at another locality, to store your information or use its applications[12]–[16].

**Advantages of cloud computing:** In contrast to general reasoning, the following 3 questions are significant. The first question is: will the cost of moving to the “cloud” be low enough so that the expected outcome is already apparent in the medium term? The second question can be formulated as follows: are cloud technologies the basis for the growth and development of the company? The third question will be related to security - will the transition to cloud technologies provide a level of security that is sufficient to consider the risks that distinguish it at a new level of development of the company?

The table below presents 4 different approaches to implementing cloud technologies. The application is developed from scratch according to the traditional model in the first case. In the second case, the creation is initially carried out on the basis of cloud services. In the third case, the commercial organization already has a ready-made application and implements its complete migration to the clouds. Finally, the fourth case is the continuation of the application of the cloudless application, which is available, without modification.

In each case, there are one-time and recurring expenses: the former have to be dealt with only at the step of creating and implementing the application, and the latter - regularly, until the application is denied use.

Table 1.

Types of expenses	Creating a new application (traditional model)	Creating a new application in the cloud	Full transition of the application to the "cloud"	Continued use of the application, which was created according to the traditional model
One-time costs				
Equipment	high	-	-	-
Creation / improvement of service	high	high	medium	-
Disposal of equipment	-	-	medium	-
Employee training	low to medium	medium	medium	-
Recurring costs				
Cloud Rental	-	medium	medium	-
Technical support	-	medium	medium	-
Salaries to employees	high	medium	medium	high
Rental of infrastructure and premises	high	-	-	high

Table 1. One-time and recurring costs for different approaches to the implementation of cloud technologies

- Increased performance of user computers. Since most programs and services run remotely on the Internet, user computers with fewer programs start and work faster.
- Inexpensive computers for users. Users do not need to buy expensive computers with a large amount of memory and disks in order to use the programs through the web interface.
- Reduced costs and increased efficiency of IT infrastructure. Regular servers of an average company are 10-15% loaded. In some periods of time there is a need for additional computing resources, in others, these expensive resources are idle. Using the required amount of computing resources in the cloud at any given time, companies reduce equipment and maintenance costs by up to 50%.
- Constantly updating programs.
- Less maintenance problems. As there are fewer physical servers with Cloud Computing, they are easier and faster to maintain.
- Lower software purchase costs. Instead of acquiring software packages for each local user, companies buy the right software in the cloud.
- Increase in available computing power. Users can run more complex tasks, with a large amount of necessary memory, space for data storage, when necessary.
- Unlimited amount of data stored.

- Compatible with most operating systems. Access to programs and virtual computers is via a web browser or other means of access installed on any personal computer with any operating system.
- Improved compatibility of document formats.
- Easy collaboration between user groups.
- Widespread access to documents.
- Availability from various devices.
- Friendliness to nature, economical use of its resources. Cloud Computing can not only save on electricity, computing resources, physical space occupied by servers, but also a reasonable approach to the consumption of natural resources.
- Data resilience to loss or theft of equipment.

Disadvantages of cloud computing:

- Permanent connection to the Internet.
- It works poorly with slow Internet access. Many cloud-based programs require a good Internet connection with high bandwidth.
- Programs may run slower than on the local computer.
- Not all programs or their properties are accessible remotely. If we compare programs for local use and their "cloud" counterparts, the latter so far lose in functionality.
- Data security may be at risk. The key word here is "can." It all depends on who provides the cloud services. If this someone reliably encrypts data, constantly makes backup copies of it, has been working on the market for such services for more than a year and has a good reputation, then data security threats may never happen.

If data in the "cloud" is lost, then it is lost forever. It is a fact. But losing data in the "cloud" is much more difficult than on the local computer. Despite the fact that the number of pluses exceeds the minuses, in each specific situation they are of great importance or vice versa, they do not matter. Cloud data storage is a model of online storage in which data is stored on numerous servers distributed on the network and provided for use by customers, mainly by a third party. In contrast to the model for storing data on its own dedicated servers purchased or leased specifically for such purposes, the number or any internal structure of the servers is generally not visible to the client. Data is stored, as well as processed, in the so-called cloud, which represents, from the point of view of the client, one large virtual server. Physically, such servers can be located remotely from each other geographically, up to a location on different continents. [11]

In other words, this is a kind of online service that provides the ability to store files on a remote server. That is, the user can upload the document to any online storage and in the future use it directly from the server. From the client's point of view, all operations take place in one place, the so-called "cloud". However, in fact, the remote server is most often located in different places, and sometimes on different continents. But this does not complicate the work of cloud services, since the speed of work depends on the client. More precisely, from the speed of the Internet connection at the client, which should preferably not be lower than 600 Kbps. That is why cloud services appeared not long ago due to the fact that high-speed Internet with a provided speed of at least 10 Mb / s. appeared in our academy. [12]

Cloud Storage Overview. There are quite a lot of cloud storages, and all of them provide various opportunities. They are paid and free, designed for a large amount of information and for a small amount, support for various operating systems, etc. The only thing that is similar to each other is in the method of processing information.

This section covers some of the most popular cloud storages. Such as:

Cloud computing has been widely used by the scientific community and in industry as users can benefit from computing infrastructures at low costs. Cloud computing's adoption by industrial enterprises is increasing; however there are critical issues which require attention, such as security and trust, to ensure data integrity and confidentiality. There are also important issues that must be addressed in cloud computing, such as resource allocation and scheduling, performance, energy conservation, and reliability, protection of sensitive data, cost, availability, and quality of service. Effective management of cloud resources to balance power efficiency against system performance [9].

Cloud computing provides environments to enable resource sharing in terms of scalable infrastructures, middleware and application development platforms, and value-added business applications. These

resources include the following; Infrastructure resources, Software resources, Application resources, Business processes[13].

With the cloud computing technology, users use a variety of devices, including PCs, laptops, smartphones, and PDA's to access programs, storage and application-development platforms over the internet, via services offered by cloud computing providers. Cloud Computing has become a significant technology trend, and many experts expect the cloud computing will reshape Information Technology processes and the IT marketplace. Advantages of the cloud computing technology include cost savings, high availability and easy scalability. Cloud options range from everyday services, such as email, calendaring and collaboration tools that members can collaborate online [14].

System Administrators can bring new services and computing capacity online quickly while managing costs as operational expenses. Cloud computing is a computing model based on networks, especially based on the Internet, whose task is to ensure that users can simply use the computing resources on demand and pay money according to their usage by a metering pattern[19].

(CCT) Service Models Cloud computing Technology services are generally regarded as falling into three separate categories, Infrastructure as a Service (IaaS)-The IT infrastructures like processing, storage, networks and other fundamental computing resources can be used by the consumers as a service. In order to integrate/decompose physical resources IaaS uses Virtualization extensively. Platform as a Service (PaaS)-To develop cloud services and applications PaaS provides a development platform supporting the full-Software Lifecycle. PaaS requires programming environment, tools, configuration management etc., to support the application hosting environment and Software as a Service (SaaS)-The Software usage is provided to a consumer as a Service. Based on the demand the consumer can choose his software to use. Cloud providers release their applications on a hosting environment, which can be accessed through networks from various clients like web browser, PDA, etc., by the application users[15].

CCT4ICT) model in Educational system 3.2 Cloud Computing Technology for ICT (CCT4ICT) model in Educational system Most educational institutions have become highly dependent on information and communication technology tools to provide solutions and also service their requirements. These services and solutions are progressively provided using Internet Services to both teaching non-teaching staff and students and accessed using web browsers. The services are presented are not cheaply or not freely to education, often with most of these educational institutions spend a lot on the various resources in order to provide quality services to their users The society are most likely to face a future where the majority of educational services will be hosted in the cloud and institutions no longer host their own data centers with expensive hardware, power bills, staff salaries and computing resources [17].

This paper brief has analyzed some of the emerging benefits and challenges of Cloud Computing Technology (CCT) for the study of IT in the educational sector. In most of the government schools and colleges in Islamic institutions, IT plays very small role in the teaching and learning of ICT. Most of the work is done manually from attendance to classroom teaching and even to examination system. Cloud Computing Technology for ICT education model (CCT4ICT) can provide solutions for the above mentioned problems in the study of ICT in our educational system[18].

CCT4ICT enables users to control and access data via the Internet. The main users of a typical CCT4ICT include ICT students, ICT Faculty members, administrative staff, Examination Branch and Admission Branch. All the main users of the institution are connected to the CCT. Separate logins are provided for all the users for their respective work. ICT lecturers can upload their class Tutorials, assignments, and tests on the CCT server which students will be able to access all the teaching material provided by the teachers via Internet using computers and other electronic devices both at home and in schools irrespective of their location college. The CCT4ICT will make it possible for lecturers to identify problem areas in which students tend to make mistakes, by analyzing students' study records. In doing so, it will also allow lecturers/teachers to improve teaching materials and methodologies [4].

This will not only make it possible for students to use online teaching materials during class but they will also be able to access these materials at home, using them to prepare for and review lessons. Utilization of CCT4ICT will reduce the cost of operation because servers and learning materials are shared with other colleges. Lecturers who normally travel outside for seminars, conferences and other academic programs can still get in touch with their students at very affordable price using CCT4ICT education model.

In the traditional deployment model, all Information Technology resources are housed and managed in-house normally by ICT experts. Many aspects of these services, solutions and tools can be migrated to the cloud and consumed directly over the internet either as fully functional applications (SaaS), development platforms (PaaS) or raw computing resources (IaaS). Figure 3 shows how CCT can be integrated with the different learning approaches of ICT education [9].

This model was adopted from NCCA: 2004a but has now be incorporated with CCT.

- **Independent Learning style:** The CCT4ICT model Independent Learning style: The CCT4ICT model will affords student greater opportunity to choice the best learning style and also at their own pace. Using an ICT device, students can access a wide array of resources and software tools that suit their learning styles and interests.
- **No Extra Infrastructure:** Colleges and governments are now free to focus on their goals that is making more research facilities available to the students and making the environment global inspire wasting time on worrying about the buildings, labs, teachers etc.
- **No more expensive textbooks and Infrastructure.** This is not secret that higher education-level textbooks and other materials are expensive. Even in some cases they are not easily to come by .The cost of textbooks and other ICT learning materials has outpaced the cost of virtually everything else in education, including tuition. As a result, many students cannot afford them. Cloud Computing Technology-based textbooks can solve this problem as digital content is significantly less expensive than printed content and most of them are free. This situation therefore gives a level playing field all ICT students in both developing and developed countries.
- **No expensive software required.** One of the main advantages of CCT-based computing is the software-as-a-service (SaaS) model. Many software programs are now open source and readily available either free or on a low-cost subscription basis, which substantially lowers the cost of essential applications for students. For instance, instead of purchasing a single Microsoft Office application student license for GH800, students and their families can purchase a CCT-based subscription for five laptops and five smartphones devices for only GH 50 per month. Some of them such as Google Docs are even free. Institutions can also store big data by using SaaS applications—traditional Education management systems can cost upwards of Gh200, 000 or even more, but CCT-based learning management systems such as Google Classroom are less or free.
- **No boundaries to students learning environment.** CCT opens up a world of new options for students, especially those who are not assisted well by traditional education systems. For instance until the inception of online education, the options for the old who didn't have formal education were very limited but now they can earn their diploma or degree online at any institution so far as they offer that service. In these and other things, CCT is not only reducing costs, but also creating an environment where ICT students can have access to high-quality education and resources. Whether you are an administrator, a teacher, a student, or the parent of a student, now is a great time to explore how CCT-based applications can benefit you, you're children, and your school. How cloud technologies can help promote the efficiency, productivity and innovation in Islamic education in Uzbekistan. Cloud computing, which included telecommunications, private, and public cloud systems, are seen as revolutionary technologies capable of shaping business telecommunications, the internet, and most of industry markets. CCT challenges have always been there. Companies and institutions are gradually aware of the business value that CCT brings and are taking steps towards conversion to the cloud. A smooth conversion involves an exhaustive understanding of the benefits as well as challenges involved. It should be noted that to date "Big Data" is the most important trend that spreads to the most diverse areas of business and technology [16]. Like any new technology, the adoption of CCT4ICT model is not free from issues. Some of the most important challenges are as follows.
- **These risks can be lessened by using advance security applications, high quality encrypted file systems, data loss software, and buying security hardware to track unusual behavior across servers.**
- **Security and Privacy:** The main challenge to cloud computing is how it addresses the security and privacy concerns of institutions adopting it. The fact that the valuable instructions data such as students examination results will reside outside the corporate firewall raises serious security concerns. Hacking

and various attacks to CCT infrastructure would affect multiple clients even if only one site is compromise.

- **Service Delivery and Billing:** It is not simple to assess the costs involved due to the on-demand nature of the services. Accounting and valuation of the cost will be very difficult unless the provider has some decent and equivalent benchmarks to offer.
  - **Interoperability and Portability:** Institutions should have the control of migrating in and out of the CCT and switching providers whenever the need arises. CCT services should have the capability to integrate smoothly with the existing ICT tools in the Islamic institutions.
  - **Reliability and Availability:** CCT service providers still lack round-the-clock service; this results in frequent outages. It is important to monitor the service being provided using internal or third party tools. It is vital to have plans to supervise usage, SLAs, performance, robustness, and business dependency of these services.
  - **Performance and Bandwidth Cost:** Islamic academy and other Islamic Institutions can save money on hardware and other software but they have to spend more for the bandwidth. This can be a lower cost for smaller applications but can be expressively high for the data-intensive applications.
- No challenges should be considered as roadblocks in the pursuit of CCT. It is rather important to give serious attention to these issues and the possible ways out before adopting the technology.

## CONCLUSIONS

It is worth saying that at the moment there is an active development and improvement of cloud computing technology. But we are talking about development, and not about use. At the moment, many are afraid of the very fact that information will be stored by outsiders. And although the almost impossibility of losing or stealing data has already been proven, few are willing to trust such services. The lack of quality, stability and speed of Internet connections for the given period of time also affects, which creates significant difficulties for developers. However, despite these significant shortcomings, the advantages of introducing this technology are clear to everyone at the Islamic International Academy of Uzbekistan. Cloud data storage is very necessary nowadays. This can be confirmed by a number of reasons: lack of hard drive space, not OS durability, "running around with a flash card" and so on.

The work speaks of the most famous "clouds." These are: Dropbox (In particular, Dropbox does not have the ability to edit documents, but there are no restrictions on the format and size of multimedia files), Yandex. Disk (It has the highest speed (2-3 megabytes per second) and the ability to connect a disk via WebDav. These are pretty big advantages), Google Drive (Google's main advantages are the low cost of additional gigabytes and tight integration with Google Docs, which allows you to edit files online)

In conclusion, cloud computing is recently new technological development that has the potential to have a great impact on the Islamic educations. It has many benefits that it provides to its users and businesses. For example, some of the benefits that it provides to Islamic education is that it reduces operating cost by spending less on maintenance and software upgrades and focus more on the education process itself. The CCT allows one to access work anywhere, anytime and share. It helps one from needing a particular machine to access a file or an application like a word processor or spreadsheet program. In this paper a cloud education model called CCT4ICT was introduced and how it is beneficial for students, faculty and the educational Islamic institutes for providing quality ICT education. Challenges such as cost, security and other issues were also considered. Future assessment of the model would also be considered. But there are other challenges the cloud computing must overcome. People are very skeptical about whether their data is secure and private. Users also worry about who can disclose their data and have ownership of their data.

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