

Course Coordinator:

Dr. Afaf Alsalmi

Names of Students:

Ghadah Aldubayan	371201914
Bushra Almohimeed	371204585
Hessah Alharbi	371205468
Ruba Alharbi	362216679
Khuzama Alsalem	362206020

Contents

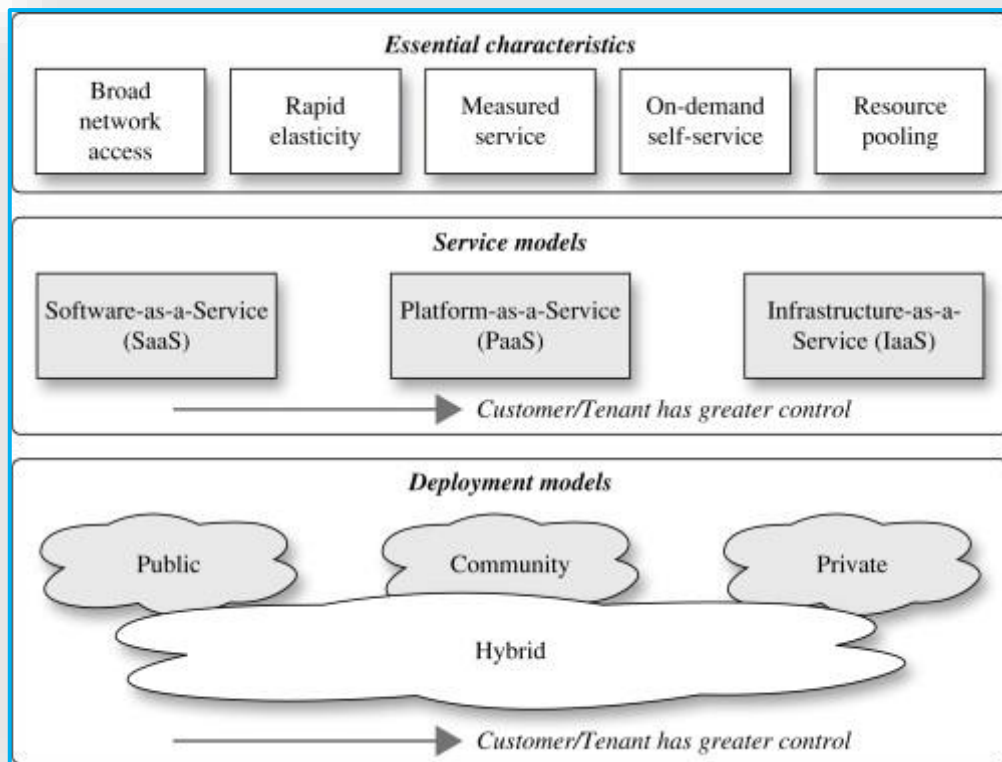
Introduction	3
Cloud Service Models	4-5
Cloud deployment model	6-8
Advantages and disadvantages of cloud computing	9-11
Computing in universities	11
King Abdul-Aziz University (Example)	11-12
How using cloud computing in universities?	12-16
Conclusion	16
References	17

- **Introduction**

Cloud computing is the provision of computing resources such as software, hardware, infrastructure, and platform to users over the Internet on a pay as you go basis. Cloud computing increases the flexibility and access of educational users to a wide range of educational resources. This includes accessing the infrastructure, software, hardware, and platform anytime, anywhere, provided there is an internet connection. Users of cloud computing in universities include students, lecturers, administrative staff, faculty, developers, programmers, and researchers.

Computing resources are provided by the service provider who assumes full responsibility for owning, servicing and maintaining the infrastructure as necessary thus relieving the burden of purchasing and maintaining their infrastructure for the users. As a result, users are able to focus on their core business activities and be able to perform better.

Cloud computing features include on-demand self-service that allows users to access and use the required resources without any interaction with the service provider; Broad network access enables users to access resources from a wide range of resources such as desktop computers, laptops, phones, iPads, etc. Resource pooling that allows a service provider to allocate and reallocate resources such as storage, processing, and bandwidth to a large number of clients based on demand. Fast elasticity that allows users to increase or decrease their demand for resources based on their needs. A computed service that gives service providers the ability to monitor customer use of resources and the ability to collect fees based on usage.



- **Cloud Service Models**

In University Cloud the Students using a cloud model and applications based on cloud, and they get the advantage of the ability of working and communicating in the educational environment anytime and everywhere

Service models describe what kind of services can be obtain from the cloud.

Cloud service delivery is divided to three typical models, and often referred to as the "SPI Model", where 'SPI' refers to Software, Platform or Infrastructure (as a Service).

Depending on the model selected, the cloud provider delivers Premium services. These services are classified according to the level of the IT architecture they reside on.

➤ **Software as a Service (SaaS):**

In the SaaS model, users get access to applications remotely that are provided and managed by the service provider to be available on demand for customers.

Like the Student Information, Applications and Collaboration .

➤ **Platform as a Service (PaaS):**

Providers are opening up application platforms to allow customers to build their own application without the cost and complexity of buying and managing the underlying hardware and software layers.

The PaaS provides the entire infrastructure needed to run applications over the Internet, and it is based on subscription model so users only pay for what they use.

Such as the databases, Execution environment and Programming environment.

➤ **Infrastructure as a Service (IaaS):**

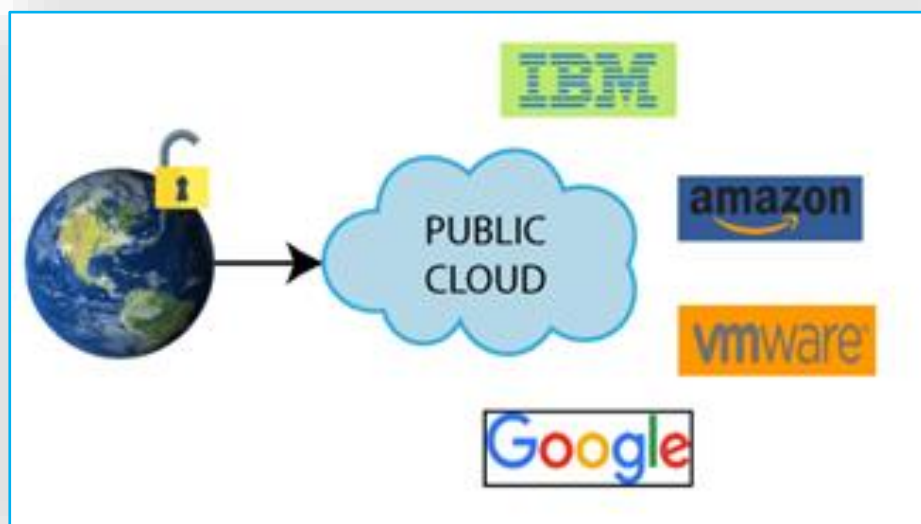
Is a self-service model, so the cloud vendor allows to access, and manage infrastructures in the data center, such as Servers, storage, networking services and Operating systems.

It provides a remote virtual hosting server for file storage, so it enables a user to save all of their file types in a virtual host and regain them from anywhere with an internet connection.

- **Cloud deployment model**

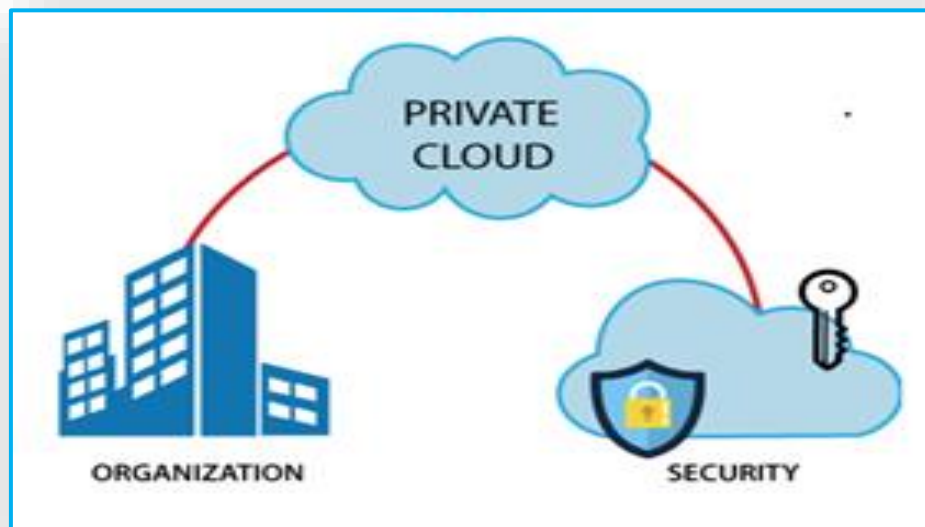
The cloud deployment model is a specific configuration of environmental parameters such as accessibility, ownership of the deployment infrastructure, storage size, and controls that infrastructure. Four deployment types differ depending on who controls the infrastructure and where it is located. Each cloud deployment model meets different needs. We have four cloud deployment models : public clouds, private clouds, community clouds, and hybrid clouds.

- **Public cloud:**



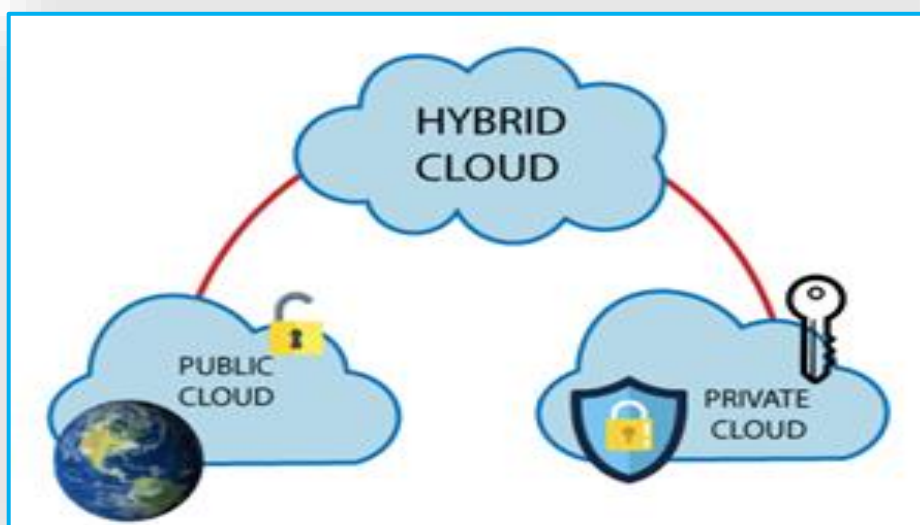
Universal fasteners are available for general use before everyone else. It may be owned, managed and operated by a company, academic or governmental institution, and the data is created and stored for third-party servers. There is no need for user companies to purchase and maintain their own devices. Provider companies offer the resources as a free service or on a pay-per-use basis over the Internet. Users can expand the range of resources as required.

➤ Private cloud:



A private cloud is typically an infrastructure used by a single organization. This infrastructure may be managed by the organization itself to support different user groups, and it is more expensive than public clouds due to the capital expenditures involved in obtaining and maintaining it, and also managed by a service provider who takes care of it either on site or off site. Private withdrawals are more expensive than public clouds due to capital expenditures in obtaining and maintaining them and their ability to better address organizations' security and privacy concerns.

➤ Hybrid cloud:



An organization makes use of interconnected private and public cloud infrastructure. Many organizations make use of this model when they need to scale up their IT infrastructure rapidly, such as when leveraging public clouds to supplement the capacity available within a private cloud. For example, if an online retailer needs more computing resources to run its Web applications during the holiday season it may attain those resources via public clouds.

➤ **Community cloud:**



Cloud infrastructure for exclusive use by a specific community and is similar to a private cloud, for example, if one company has a private cloud server, many organizations share infrastructure and resources, one of its advantages facilitates the development, management, and implementation of projects.

- **Advantages and disadvantages of cloud computing**

- **Advantage**

- **Long-term cost saving**

It is one of the cloud-based e-learning programs most used for it
Uses minimal data center maintenance: Less money is spent on replacing old, physical IT hardware.

This method is useful for improving the learning environment

This increases the productivity of the organization and makes the academic process more efficient by reducing data costs: The University only pays for the services it uses and the storage it needs.

The technical and engineering software team can focus on the quality of university services by working on the efficiency of cloud operations at the university and coordinating Internet services.

- **Better Collaboration**

Students, teachers, and administrators can access information from their computers without installing specific software. Forms and text files can be edited. This makes access flexible, facilitates collaboration between departments and fosters collaborative work, helping to effectively distribute assignments, support student communications, and improve the quality of information.

- **Ease of access and availability of resources**

People from different universities can access the same materials online

This leads to increased access to information, which led to a significant increase in access to the online repository of academic texts and materials, ease of connection to cloud learning platforms.

It provides continuous educational opportunities.

➤ Scalability

Cloud-based software helps reduce costs so it is scalable
No matter how many people use it, the cloud system can grow with ease.

• Disadvantages

➤ Security

Cloud-based education technology is safe when set up properly, but there are inherent security risks when hosting all assets online. Cloud systems that are not properly secured can be vulnerable to cyber attacks.

Data security becomes a greater concern when someone uses them to enter confidential information into a computer that another person can use or if a device with data is stolen, access to the cloud platform becomes unauthorized to the user.

To avoid these issues, you'll need to make safety a priority. By increasing the security of information preservation, this begins with proper preparation of the cloud infrastructure and ensuring that all users are trained in cloud security best practices.

➤ Lack of control

The organization may have become embedded in a complex web of services that will be closed or whose costs could rise dramatically. It is very important for organizations to diversify the number of program suppliers to reduce risk of loss or create lack of control.

➤ Dependence on network performance

These platforms rely excessively on educational cloud computing. The more information in the cloud, the more this field is used.

The business can be complicated as an organization suddenly becomes offline and its programs overly dependent on an internet connection that may cause business downtime.

➤ Up-Front Costs

Whereas, cost reduction is one of the primary benefits of cloud computing in education. However, there are also some upfront costs:

Migration can be expensive, depending on the number of applications or services that you transfer to the cloud.

Cost to train staff on the new system and best security practices.

• Computing in universities:

There are many benefits of cloud computing for universities, and some of them are listed below:

Using cloud computing, universities can open their technological infrastructure to companies and industries for research advancement.

- Cloud computing efficiencies can help universities keep pace with ever-increasing resource requirements and energy costs.
- The wide scope of cloud computing allows universities to educate students in new and different ways and help them manage massive projects and workloads.
- Cloud computing allows students and teachers to use applications without installing them on their computers, and it also allows access to saved files from any computer connected to the Internet.

• Example of using cloud computing in universities:

King Abdul-Aziz University

▪ University information system

used by many users such as students, lecturer, administrative staff, and faculty members.

it provides many services such as, students can register at the university, also add, modify and delete courses, enter and amend student information, see course results, know the study plan and other services. For lecturers, they can add and modify students' grades, knowing the course schedule. There are public services that are provide to all users of the system, such as e-mail and access to the electronic library.

▪ Type of cloud

King Abdul-Aziz University decided to adopt the private cloud, where the data will be kept within the borders of the Kingdom of Saudi Arabia. They also used all three-service models (IAAS, PAAS, and SAAS).

The university contracted with HP to provide and build a private cloud in two data centers located on campus.

Type of database: The cloud supports SQL Database.

➤ Virtual machines

Virtualization technologies provide the opportunity to contain the entire software package, and the operating system for applications, in a package that can be call a Virtual Machine. VMware vSphere Metro-Cluster is a key component of the private cloud built crosswise 1 and 2 data centers. VMware High (HA), which is implement to provide virtual machine recovery in the event an ESXi host fails, is another essential component of a private cloud.

• How using cloud computing in universities?

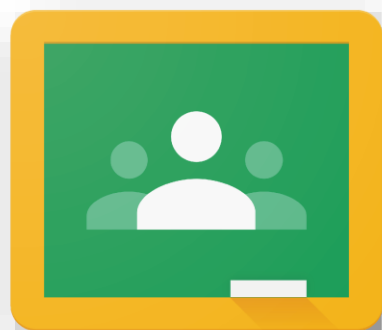
Specialized companies help universities move to the cloud and benefit from services. Some of them are list below:

➤ Google Workspace

Formerly known as G Suite, is a collection of cloud computing, productivity, and collaboration tools, software, and products developed and marketed by Google. It consists include Gmail, Hangouts, Calendar, Google Drive, and Google Docs. The G Suite apps all live on the cloud.

Google Classroom, links Google's online cloud applications (like Calendar or Docs) so it's easier to complete or schedule assignments using a central hub.

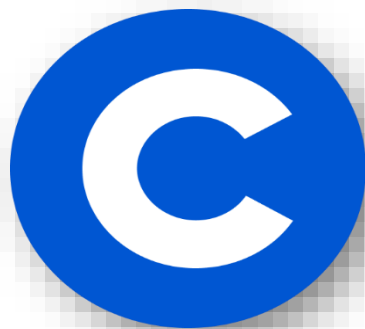
G Suite Productivity tools help you and your employees to collaborate seamlessly and engage actively in all projects even when you are working remotely. It stores all your data safely and allows you to access it easily from all devices you are using. G Suite tools save your time by reducing the time spent on endless back and forth communication through emails. G Suite includes intelligent tools to schedule meeting quickly and helps everyone to join meetings effortlessly. You can hold a meeting in a chatroom or make a video call to explain things and resolve issues immediately.



Google Classroom

➤ Coursera

is an educational platform that offers a variety of online courses in different majors from established universities and instructors through its cloud platform. It also offers lessons on specific career skills and grants university-recognized degrees. For example, Coursera students can take online computer science classes offered by the University of Pennsylvania to get a master's degree in computer and information technology. Flexible, affordable options and 100% online.



➤ Blackboard

provides cloud-based learning software. Its products include services such as Blackboard Classroom, which provides virtual classroom video conferencing, assignment management, classroom analytics, and more. Using the company's cloud-based software, students and educators can access Blackboard's tools from any computer, smartphone, or tablet.



➤ CLASSFLOW

is cloud-based lesson delivery and completely online teaching software. Designed for connected whiteboards and displays, helps teachers create interactive lessons, quizzes and activities, and then display them or hand them out to students. Since ClassFlow lessons are cloud-based, they can be accessed by the teachers' connected displays or by the students' own devices, making it easy for both parties to access course material. The registration for a ClassFlow teaching account is free and simple.



➤ D2L

makes a learning management system called Brightspace. The Brightspace platform lets teachers create and distribute lessons, while students can complete assignments from their portfolio app. There's also a dashboard display that lets teachers track student progress.

D2L | Brightspace

➤ Evernote

app designed for note taking, organizing, task management, and archiving. It useful for students take notes on their phones, then saves everything to the cloud. Because it syncs notes across all devices, there is no need to handle around multiple notebooks. Evernote also lets users save audio files, photos and hyperlinks.



• Conclusion

In this paper, we discussed the use of cloud computing in universities and its types in terms of service and deployment models. The advantages and disadvantages of cloud computing are also discussed. Advantages include cost savings, accessibility, and improved connectivity. An example of the use of cloud computing in universities in the Kingdom of Saudi Arabia has also been cited. Finally, some examples that help to apply cloud computing in universities are presented.

- **Reference**

- The Impact and Challenges of Cloud Computing Adoption on Public Universities in Southwestern Nigeria – paper
- The use of Cloud Computing by Students from Technical University – the Current State and Perspectives – paper
- Cloud computing in higher education: A snapshot of software as a service –paper
- Using Cloud Computing in Higher Education: A Strategy to Improve Agility in the Current Financial Crisis – paper
- A Technical Feasibility for Adoption of Cloud Computing in King Abdulaziz University, Saudi Arabia - paper