AUTUMN MID SEMESTER EXAMINATION-2022

School of Computer Engineering
Kalinga Institute of Industrial Technology, Deemed to be University
[Cloud Computing]
[IT 3022]

Time: 1 1/2 Hours **Full Mark: 20**

Answer any four Questions including Q.No.1 which is Compulsory.
The figures in the margin indicate full marks. Candidates are required to give their answers in their own words as far as practicable and all parts of a question should be answered at one place only.

1. Answer all the questions. [1 x 5]

a) What is a hybrid cloud? How can hybrid clouds help enterprises?
A hybrid cloud is a computing environment that combines the use of public cloud services with private cloud infrastructure, allowing organizations to take advantage of the benefits of both cloud deployment models. In a hybrid cloud, data and applications can be moved between private and public clouds as needed, providing a flexible and scalable solution for enterprises.

b) Describe the notion of elasticity within cloud computing and highlight how it differs from scalability.
A scalability is a proactive approach to resource allocation that involves adding more resources to a system in anticipation of future growth or increased demand, while elasticity is a reactive approach that automatically adjusts resources based on the current workload, ensuring efficient and cost-effective resource allocation

c) What are the main reasons for the necessity of cloud computing?
Cloud computing has become an essential technology for many individuals and organizations due to several reasons, including: Scalability, Flexibility, Reliability, Security, Cost savings

d) Briefly describe the NIST characteristics of cloud computing.
On-demand self-service.
Broad network access.
Resource pooling.
Rapid elasticity.
Measured service.

e) List out the actors of the cloud computing environment.
Cloud provider
Cloud consumer
Cloud service owner
Cloud resource administrator
Organizational boundary
Trust boundary

2. a. Compare and contrast cloud computing with traditional on-premises computing models, highlighting the key differences between the two approaches. [2.5 Marks]

Cloud computing and traditional on-premises computing models have key differences:

Infrastructure ownership: On-premises computing models are owned and managed by the organization, while cloud computing is owned and managed by a third-party provider.

Scalability: Cloud computing is more flexible and cost-effective for scaling resources up or down, while on-premises resources are fixed.

Maintenance: Cloud computing providers handle maintenance and upgrades, while on-premises computing requires organizations to handle these tasks.

Access: Cloud computing resources can be accessed from anywhere with an internet connection, while on-premises resources are only accessible from the physical location.

Cost: Cloud computing has lower upfront costs and is often pay-as-you-go, while on-premises computing requires significant upfront capital expenditures and ongoing operational costs.

Security: On-premises computing provides more control and security, but cloud computing providers have robust security measures in place.

b. What are the benefits of using cloud computing, and how has it impacted the IT industry?

[2.5 Marks]

Cloud computing provides several benefits, including:

Scalability: Cloud services can quickly and easily scale up or down to meet changing business needs.

Cost savings: Organizations can save money by paying only for the resources they use, rather than investing in costly on-premises infrastructure.

Flexibility: Cloud services allow users to access data and applications from any device and location with an internet connection.

Improved collaboration: Cloud services enable users to work together in real-time and share data easily.

The impact of cloud computing on the IT industry has been significant. It has led to the creation of new job roles, such as cloud architects and developers, and has also increased demand for cybersecurity professionals. Cloud computing has also resulted in the development of new business models, such as software-as-a-service (SaaS) and infrastructure-as-a-service (IaaS), and has enabled smaller organizations to compete with larger enterprises. Additionally, cloud computing has facilitated the adoption of emerging technologies, such as artificial intelligence and the Internet of Things, by providing a platform for these technologies to run on.

3. Explain the early technologies that played a significant role in the evolution of cloud computing and how they influenced the development of businesses over time. Give the advantages and disadvantages of each technology. [5 Marks]

There were several early technologies that influenced the evolution of cloud computing, including grid computing, utility computing, Grid computing allowed multiple computers to work together to solve complex problems, which laid the foundation for distributed computing. Utility computing allowed for the delivery of computing resources as a service, enabling businesses to pay only for what they used.

Advantages of grid computing include the ability to leverage the power of multiple computers and the potential for cost savings. However, it can be challenging to manage and can require a significant amount of coordination.

Utility computing allows businesses to pay for computing resources as they need them, leading to cost savings and greater flexibility. However, it can be difficult to predict usage, leading to potential over or underutilization.

Cluster computing, distributed computing, and mobile computing are some of the early technologies that have played a significant role in the evolution of cloud computing.

Cluster computing involves linking multiple computers together to act as a single entity, providing high availability and performance. Distributed computing, on the other hand, involves the sharing of computational tasks across a network of computers, enabling faster processing and improved scalability. Mobile computing involves the use of mobile devices to access computing resources and data remotely, allowing for greater flexibility and mobility.

Advantages of cluster computing include high availability and performance, as well as cost savings through the use of commodity hardware. However, it can be complex to manage and may require specialized skills.

Distributed computing allows for faster processing and improved scalability, as well as the ability to handle large amounts of data. However, it can be challenging to manage and can lead to issues with data consistency and security.

Mobile computing provides flexibility and mobility, enabling users to access resources and data from anywhere. However, it can also lead to security concerns, as mobile devices may be more vulnerable to attacks.

4. Explain in brief about different deployment models available in Cloud computing. Prepare a comparative analysis of different deployment models based on the metrics like cost vs Security and scalability Vs Control. [5 Marks]

There are four main deployment models in cloud computing: Public Cloud, Private Cloud, Hybrid Cloud, and community cloud.

Public Cloud:

A public cloud is a service that is offered by third-party providers over the internet, and it is available to the general public. It is managed by a third-party provider, and users can access resources on-demand and pay only for what they use. Public clouds offer a high degree of scalability, flexibility, and cost-effectiveness but can be less secure due to their open nature.

Private Cloud:

A private cloud is a cloud computing environment that is dedicated to a single organization. It can be hosted on-premises or off-premises, and it is managed by the organization itself or by a third-party provider. Private clouds offer a high degree of control, customization, and security but can be more expensive and less scalable than public clouds.

Hybrid Cloud:

A hybrid cloud is a combination of public and private clouds that are connected through technology that enables data and application portability. Organizations can leverage the scalability and cost-effectiveness of public clouds while also maintaining control over sensitive data and applications in a private cloud. Hybrid clouds offer a balance between cost-effectiveness, scalability, control, and security.

community cloud:

A community cloud is a type of cloud computing deployment model that is shared among several organizations with similar interests or requirements. In a community cloud, the computing resources, infrastructure, and services are hosted and managed by a third-party provider and are shared among a specific community of users who have common goals, such as industry standards, security requirements, or regulatory compliance.

Comparative Analysis:

When comparing the deployment models based on the metrics of cost vs. security and scalability vs. control, the following observations can be made:

Public clouds are the most cost-effective but may be less secure than private clouds.

Private clouds offer the highest level of control and security but can be more expensive and less scalable than public clouds.

Hybrid clouds provide a balance between cost-effectiveness, scalability, control, and security.

A community cloud is typically smaller than a public cloud, but larger than a private cloud, and can offer benefits such as cost savings, improved scalability, and increased collaboration among community members. The community members typically share the cost of infrastructure, hardware, and maintenance, making it more cost-effective than a private cloud.

5. Explain the different service models in cloud computing. Discuss the key features, benefits, and drawbacks of each service model, and provide examples/short case studies of popular services that fall under each category. [5 Marks]

There are three main service models in cloud computing: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS).

Infrastructure as a Service (IaaS):

IaaS is a cloud computing service model that provides users with access to computing resources such as servers, storage, and networking. Users can deploy and manage their own applications and operating systems on the cloud infrastructure provided by the IaaS provider. Key features of IaaS include scalability, flexibility, and cost-effectiveness.

Benefits of IaaS include reduced infrastructure costs, increased scalability, and improved availability of resources. Drawbacks may include the need for technical expertise to manage the infrastructure and potential security risks.

Examples of IaaS services include Amazon Web Services (AWS), Microsoft Azure, and Google Compute Engine. A case study of an organization that has leveraged IaaS is Airbnb, which uses AWS to manage its infrastructure and handle spikes in demand during peak booking seasons.

Platform as a Service (PaaS):

PaaS is a cloud computing service model that provides users with a platform for building, deploying, and managing applications. PaaS providers typically offer pre-configured development tools and services, such as databases, application servers, and web servers, that developers can use to build and deploy applications. Key features of PaaS include rapid application development, scalability, and reduced complexity.

Benefits of PaaS include reduced development costs, increased productivity, and improved collaboration among development teams. Drawbacks may include limited control over the underlying infrastructure and potential vendor lock-in.

Examples of PaaS services include Heroku, Google App Engine, and Microsoft Azure. A case study of an organization that has leveraged PaaS is the healthcare technology company Athenahealth, which uses PaaS to develop and deploy its cloud-based healthcare management platform.

Software as a Service (SaaS):

SaaS is a cloud computing service model that provides users with access to software applications over the internet. SaaS providers host and manage the software, and users can access it through a web browser or mobile app. Key features of SaaS include ease of use, scalability, and lower upfront costs.

Benefits of SaaS include reduced software licensing costs, increased flexibility, and improved accessibility. Drawbacks may include limited customization options and potential security risks.

Examples of SaaS services include Salesforce, Dropbox, and Google Workspace. A case study of an organization that has leveraged SaaS is the insurance company Allianz, which uses SaaS to manage its customer relationship management (CRM) and sales processes.

*** Best of Luck ***