

CC Week 1

Week 1

- I. Introduction to Cloud Computing
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- VIII. Research trend in Cloud Computing, Fog Computing

QUESTION 2:

In the context of the client-server architecture: Statement (i) posits that virtualization is a fundamental principle; Statement (ii) claims that the system has limited scalability.

- a) Only Statement (i) is correct
- b) Only Statement (ii) is correct
- c) Both Statements (i) and (ii) are correct
- d) None of the statements is correct

Correct Answer: b

Detailed Solution: Detailed Solution: In the case of the client-server model: there is no concept of virtualization; the system can scale up to a certain extent

- centralized computing - computing on one a single processor
- distributed systems examples:
 - internet
 - atm machines
 - intranets/workgroups

Properties of distributed computing:

- Fault tolerance
- Resource / load sharing
- Easy to add new nodes
- Parallel computing
- No single point of failure(robustness)
- Good performance even when computing is intensive

Cloud computing is the on demand availability of computer system resources , in short we store, manage and preserve the data on a separate servers. instead of storing it in local hard disks , we store them in a remote server.

service providers:

- google cloud
- aws
- azure
- ibm cloud
- alibaba cloud

types of cloud:

1. public : eg gmail anyone can access
2. private : eg within organization accessible
3. hybrid: eg public + private cloud features
4. community accessible by group of communities

Overview of Computing (Traditional vs. Cloud) - Traditional computing involves the use of physical hardware and on-premises software, whereas cloud computing utilizes virtualized resources and services delivered over the internet.

Advantages of Cloud Computing - Scalability, flexibility, cost-effectiveness, reliability, accessibility, and rapid deployment are key advantages of cloud computing.

Challenges and Disadvantages - Security concerns, data privacy issues, potential downtime, dependency on internet connectivity, and compliance challenges are some of the disadvantages and challenges associated with cloud computing.

Trends in Computing

- Distributed Computing
- Grid Computing
- Cluster Computing
- Utility Computing
- Cloud Computing

Distributed Computing:

- In distributed computing, we break down a big task into smaller pieces and distribute them across multiple computers, which then work on these pieces simultaneously.
- Each computer in a distributed system has its own memory and processors but can communicate and share data with others.
- This approach improves fault tolerance, scalability, and performance by leveraging the collective resources of multiple machines.
- Example Distributed Systems:
 - Internet
 - ATM (bank) machines
 - Intranets/Workgroups

Properties:

- fault tolerance
- resource sharing
- load sharing
- easy to expand
- performance: parallel computing is a subset of distributed computing

Grid Computing

- Grid computing is similar to distributed computing but on a larger scale. It takes distributed computing to the next level by connecting computers from different locations or organizations to form a virtual supercomputer.
- Just like how we plug our devices into wall sockets to get electricity without knowing where it comes from, in computing, users (or client applications) access computing resources like processors, storage, and applications without needing to know where those resources are located or how they work behind the scenes.
- often used for scientific research, simulations, and data visualization , data analysis that require enormous computing power, mathematical modelling, etc.
- Involves more than just sharing information; it's about sharing data, computing power, and applications in a dynamic environment, often involving multiple institutions collaborating as virtual organizations.
- WHO uses?
 - reactor applications
 - detection and modelling natural disasters
 - physics
 - weather forecast
 - material characterization
 - crystallography

Types of Grid:

- computational
- data
- collaboration

- network
- utility

Which of the following is/are a type of Grid?

- a) Computational Grid
- b) Data Grid
- c) Edge Grid
- d) All of the above

Correct Answer: a, b

Detailed Solution: Types of grid are data grid, computational grid and collaboration grid.

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Cluster Computing

- Cluster computing focuses on local **parallel** processing within a network of interconnected **computers**, while grid computing spans across multiple locations or institutions, and cloud computing leverages internet-based resources for on-demand access.
- type of **parallel or distributed computer system**, which consists of a **collection** of inter-connected **stand-alone computers**

QUESTION 3:

A cluster is a type of _____ or distributed computing platform consisting of a collection of interconnected stand-alone computing computers working together in a _____ computing resource.

- a) computers, parallel
- b) single integrated, parallel
- c) node, parallel
- d) **parallel, single integrated**

Correct Answer: d

Detailed Solution: A cluster is a type of parallel or distributed computing platform consisting of a collection of interconnected stand-alone computing computers working together in a single integrated computing resource.

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- to improve speed , reliability
- Types of Cluster
 - High Availability** or Failover Clusters
 - Load Balancing Cluster**
 - Parallel/Distributed Processing Clusters**

Utility Computing:

- Utility Computing is purely a concept which cloud computing practically implements.
- you use what you need, when you need it, and you only pay for what you use.
- utility computing provides computing resources, like processing power and storage, as a service. You don't have to buy and manage your own servers; instead, you rent them from a service provider whenever you need them. This means you can scale up or down your computing resources according to your needs, and you only pay for what you actually use.

QUESTION 7:

Utility computing is a service-provisioning model, in which a service provider makes computing resources and infrastructure management available to the customer.

- a) True
- b) False

Correct Answer: a

Detailed Solution: Utility computing is a service-provisioning model, in which a service provider makes computing resources and infrastructure management available to the customer.

QUESTION 1:

Utility computing encapsulates the following characteristic(s)

- a) Mobility amalgamation
- b) No impact on resource utilization
- c) Pay-per-use pricing business model
- d) None of above

Correct Answer: c

Detailed Solution: Utility computing is a pay-per-use pricing business model.

- pay for use pricing business model
- data center virtualization and provisioning
- outsourcing

risks:

- data backup
- data security
- reliable and competent partners

Cloud Computing:

- Cloud computing is a model that enables
 - **Ubiquitous Access:** Cloud computing enables access to computing resources anytime, anywhere, using the internet.
 - **On-Demand Provisioning**
 - **Shared Pool:** Resources are pooled together and shared among multiple users, allowing for efficient utilization and scalability.
 - **Configurability:** Users can customize and configure resources to meet their specific requirements.
 - **Minimal Service Provider Interaction**
 - **Minimal Management Effort**

Essential Characteristics:

- **on demand self service:** Users can automatically and independently request and access computing resources without human intervention from the service provider.
- **broad network access :** Users can access cloud services over the internet using standard devices and platforms like mobile phones, tablets, laptops, and workstations, which allows for flexibility and convenience in accessing cloud resources from anywhere with an internet connection.
- **resource pooling**
- **Rapid elasticity:** Cloud services can rapidly scale up or down in response to changing demand.
- **measured service:** Users can track and control their resource usage, allowing for cost-effective management of cloud services.

cloud services model:

- **Software as a Service (SaaS):**
 - It's like renting software over the internet without needing to install. You access and use applications provided by the service provider, like Google Spreadsheet, through a web browser or program interface. You don't have to manage the underlying cloud infrastructure; everything is taken care of by the provider.
 - Gmail, Google Drive, Google Docs, Google Sheets
- **Infrastructure as a Service (IaaS):**
 - It's like renting virtual computers and storage space. You can provision and use fundamental computing resources, such as processing power

saas -> paas -> iaas

and storage, to deploy and run your own software applications. Examples include Amazon Web Services and Flexi scale.

- Amazon EC2 (Elastic Compute Cloud)
- **Platform as a Service (PaaS):**
 - It's like having a platform to build and run your applications without worrying about the underlying infrastructure.
 - You deploy your own applications using programming languages, libraries, and tools supported by the provider.
 - You have control over your applications but not the underlying infrastructure.
 - Microsoft Azure

QUESTION 4:

Dropbox is an example of:

- a) Software as a Service or SaaS
- b) Platform as a Service or PaaS
- c) Function as a Service or FaaS
- d) Infrastructure as a Service or IaaS

Correct Answer: a

Detailed Solution: Dropbox is categorized as Software as a Service (SaaS) due to the nature of the services it offers and how it delivers these services to its users.

QUESTION 9:

Which of the following is one of the characteristics of PaaS?

- a) Provides tools to deploy user applications
- b) Application is provided by the cloud provider
- c) Resources are distributed as a service
- d) None of these

Correct Answer: a

Detailed Solution: PaaS provides tools to deploy user applications.

QUESTION 9:

Which of the following is one of the characteristics of PaaS?

- a) Provides tools to deploy user applications
- b) Application is provided by the cloud provider
- c) Resources are distributed as a service
- d) None of these

Correct Answer: a

Detailed Solution: PaaS provides tools to deploy user applications.

types of cloud :

- private : solely for organization (windows server hyper v)
- community : shared among organizations
- public : google docs, spreadsheet etc. made available to public
- hybrid: cloud bursting (work on private but during high demand can access public cloud)

QUESTION 8:

Which of the following is false?

- a) Private cloud is dedicated solely to an organization.
- b) Community cloud is a composition of public and private cloud.
- c) Public cloud is available to the general public.
- d) None of these

Correct Answer: b

Detailed Solution: Community cloud is shared by several organizations and serves a specific goal.

XaaS:

saas + cloud computing = xaas

QUESTION 6:

The combination of **Service-Oriented Infrastructure** and **Cloud Computing** leads to _____.

- a) PaaS
- b) FaaS
- c) Serverless
- d) XaaS

Correct Answer: d

Detailed Solution: "Anything as a Service" is what XaaS stands for. It's a catch-all term for cloud-based services.

XaaS stands for "Anything as a Service," which is a catch-all term for cloud-based services.

Architecture for Elasticity:

- **Vertical Scale Up:**
 - It's like making a single computer more powerful by adding more resources to it, such as increasing its memory or CPU power.
 - This is done by either buying a bigger, more powerful server or by moving the workload to a server with more resources.
 - Vertical scaling is often simpler for small scenarios because you're just making one computer more powerful, and it's usually cheaper because the code doesn't need to be changed.
- **Horizontal Scale Out:**
 - It's like adding more computers to handle the workload together.
 - Instead of making one computer more powerful, you add more computers and distribute the workload across them.
 - This is done through techniques like database partitioning, where the data is split across multiple servers.
 - Horizontal scaling is typically the only solution for larger scenarios because it allows for greater scalability and can handle more workload.

QUESTION 5:

For less data-intensive applications, horizontal scale-out elasticity is the ideal solution.

- a) True
- b) False

Correct Answer: b

Detailed Solution: Horizontal scale-out means adding additional computation units and having them act in concert. It is suitable for large scale-out scenarios.

Which of the following is/are common characteristic(s) of Cloud Computing?

- a. Resilient Computing
- b. Small Scale
- c. Virtualization
- d. High Cost Software

Correct Answer: a, c

Detailed Solution:

The common characteristics of cloud computing are Massive Scale, Resilient Computing, Homogeneity, Geographic Distribution, Virtualization, Service Orientation, Low Cost Software, Advanced Security. So, the correct options are (a) and (c).
Refer slide number 50.

QUESTION 3:

Identify the TRUE statement(s)

- a. Google spread sheet is an example of PaaS
- b. Amazon Web Services(AWS) is an example of IaaS
- c. Google Cloud Platform(GCP) is an example of public cloud
- d. Window Server 'Hyper-V' is an example of community cloud

Correct Answer: b, c

Detailed Solution:

Google spread sheet is an example of SaaS. Amazon Web Services(AWS) is an example of IaaS. Google Cloud Platform(GCP) is an example of public cloud. Window Server 'Hyper-V' is an example of private cloud. So, the correct options are (b) and (c). Refer slide number 54.

QUESTION 5:

Advantage(s) of virtual machines is/are

- a. Migration of virtual machines is not easy
- ☒ b. Emulate more machines than are physically available
- ☒ c. Timeshare heavy loaded systems on one host
- ☒ d. Easier to create new machines, and backup machines

Correct Answer: b, d c as well

Detailed Solution:

Advantages of virtual machines are easier to create new machines, backup machines, timeshare lightly loaded systems on one host, emulate more machines than are physically available, easy migration of virtual machines. So, the correct options are (b) and (d).

Networking in different cloud models

OSI Layer	Example Protocols	IaaS	PaaS	SaaS
7 Application	HTTP, FTP, NFS, SMTP, SSH	Consumer	Consumer	Provider
6 Presentation	SSL, TLS	Consumer	Provider	Provider
5 Session	TCP	Consumer	Provider	Provider
4 Transport	TCP	Consumer	Provider	Provider
3 Network	IP, IPSec	Consumer	Provider	Provider
2 Data Link	Ethernet, Fibre channel	Provider	Provider	Provider
1 Physical	Copper, optic fibre	Provider	Provider	Provider

QUESTION 6:

in IaaS, physical and data -> provider
in PaaS, application -> provider
in SaaS, everything -> provider

In the context of "networking in cloud models", which of the following statement(s) is/are TRUE for IaaS model?

- a. Physical layer is accessed by service provider
- b. Data link layer is accessed by service consumer
- c. Network layer is accessed by service provider
- d. Application layer is accessed by service consumer

Correct Answer: a, d

Detailed Solution:

Physical and Data link layers are accessed by service provider. Network, Transport, Session, Presentation, and Application layers are accessed by service consumer in case of IaaS cloud model. So, correct options are (a) and (d).

Refer slide number 131

QUESTION 8:

Utility computing is a service provisioning model where -

- a. Computing resources not available to the customer when required
- b. Infrastructure management available to the customer when required
- c. Service provider charges customer with a flat rate
- d. Service provider charges customer with specific usage rate

Correct Answer: b, d

The _____ cloud scales automatically to successfully handle increased requests to the web application.

- a. SaaS
- b. PaaS**
- c. IaaS
- d. DaaS

Correct Answer: b

Detailed Solution:

The PaaS cloud scales automatically to successfully handle increased requests to the web application. So, the correct option is (b).

QUESTION 10:

Match the tables

Table – I	Table - II
1. Data Grid	i. Provides fault-tolerant and high performance communication services
2. Network Grid	ii. Provides secure access to huge pool of shared processing power
3. Computational Grid	iii. Provides an infrastructure to support data storage, data discovery, data handling, data publication

- a. 1.->(ii), 2.->(i), 3.->(iii)
- b. 1.-> (iii), 2.->(ii), 3.->(i)
- c. 1.->(ii), 2.->(iii), 3.->(i)
- d. 1.->(iii), 2.->(i), 3.->(ii)

Correct Answer: d

Detailed Solution:

Data Grid provides an infrastructure to support data storage, data discovery, data handling, data publication. Network Grid provides fault-tolerant and high performance communication services. Computational Grid provides secure access to huge pool of shared processing power. So, the correct option is (d).

Refer slide no. 25-26

QUESTION 2:

Peer-to-Peer computing resembles truly distributed applications.

- A) True**
- B) False

Correct Answer: A

Which of the following application(s) uses grid computing?

- A) Reactor Applications
- B) Air conditioning
- C) Crystallography
- D) Steganography

Correct Answer: A and C

QUESTION 4:

Which of the following is(are) a key component(s) of cluster computing?

- A) Parallel programming environment
- B) Single central processing unit
- C) Symmetric Multiprocessing (SMP)
- D) Node affinity

Correct Answer: A, and C

QUESTION 5:

Utility computing is a _____ model, in which a service provider makes computing resources and _____ available to the customer.

- A) service-provisioning, infrastructure management
- B) infrastructure management, service-provisioning
- C) cloud computing, resource management
- D) service-provisioning, resource management

Correct Answer: A

QUESTION 10:

In the case of the client-server model: Statement (i) Virtualization is a core concept; Statement (ii) system can scale infinitely

- A) Only Statement (i) is correct
- B) Only Statement (ii) is correct
- C) Both Statements (i) and (ii) are correct
- D) None of the statements is correct

Correct Answer: D

Detailed Solution: In the case of the client-server model: there is no concept of virtualization; the system can scale up to a certain extent.

QUESTION 8:

What are the different characteristic(s) of cloud computing?

- A) Virtualization
- B) Service disagreement
- C) Service orientated
- D) Scalability

Correct Answer: A, C and D

Detailed Solution: Refer to slide- "common characteristics" of week-1.

QUESTION 7:

In utility computing, the payment model differs for different customers based on scale and payment frequency alone.

- A) True
- B) False

Correct Answer: B

Detailed Solution: In utility computing, the payment model differs with the customers based on many factors like scale, payment frequency, and commitments.

Q1. Which of the following fall(s) under the "essential characteristics" of cloud computing?

- a. Resource Pooling
- b. Measured Service
- c. Rapid Elasticity
- d. Latency latency means delay/lag

Answer:- a,b,c

Q3. Which of the following is/are public cloud platform(s)?

- a. Windows Server Hyper-V
- b. Google Cloud Interconnect
- c. Amazon Virtual Private Cloud
- d. ~~Microsoft Azure~~

Q8. What is/are the main requirement(s) of a Cloud Service Provider (CSP)?

- ☒ a. Increase agility
- b. Increase cost
- ☒ c. Increase productivity
- d. Decrease cost

Answer:- a,c

Q9. PaaS (Platform as a Service) brings the benefits: (i) Creation of software (ii) Integration of web services and databases

- a. Only (1)
- b. Only (11)
- ☒ c. Both (1) and (ii)
- d. Neither (i) nor (ii)

Answer:- c

Q10. A is a distributed computer system that consists of a collection of interconnected stand-alone computers working together as an integrated computing resource.

- a. Grid
- ☒ b. Cluster
- c. Cloud
- d. Node:

Answer:- b

QUESTION 1:

What are the advantages of Cluster Computing?

- ☒ a. High Performance
- ☒ b. Hardware Fault tolerance
- c. Low cost
- ☒ d. Scalability

Correct Answer: a, b, d

Detailed Solution: Cluster computing incurs high cost.

QUESTION 2:

What of the following is/are the characteristics of Cloud Computing?

- ☒ a. Homogeneity
- ☒ b. Service Orientation
- ☒ c. Geographic Distribution
- d. None of the above

Correct Answer: a, b, c

Detailed Solution: All three are characteristics of cloud computing.

QUESTION 3:

What of the following is/are false about Virtualization?

- ☒ I. It is difficult to create backup machines.
 - II. It emulates more machines than are physically available
 - III. It allows easier timeshare lightly loaded systems on one host
- a. II and III
 - ☒ b. I only
 - c. I and III
 - d. I, II, and III

Correct Answer: b

Detailed Solution: It is easier to create backup machines.

QUESTION 4:

What of the following is/are the characteristics of SaaS?

- ☒ a. Application is accessed over the internet.
- b. Resources are distributed as a service.
- c. Provides a platform to build applications and services.
- d. None of the above

Correct Answer: a

Detailed Solution: SaaS provides software/application to users over the internet.

QUESTION 5:

In Horizontal Scale Out

- ☒ a. Workload is split across multiple computation units.
- ☒ b. Database Partitioning is needed.
- c. More resources are added to a single computation unit.
- d. All of the Above

Correct Answer: a, b

Detailed Solution: In vertical scaling, more resources are added to a single computation unit.

QUESTION 7:

Why is Cloud Sourcing important?

- a. Easier control of data.
- b. High performance and reliability.
- ☒ c. Easier remote access.
- ☒ d. Rapid Scalability.

Correct Answer: c, d

Detailed Solution: Cloud sourcing has performance and reliability issues and data control is difficult.

basically it means to say cloud computing.

QUESTION 8:

What of the following is the best use case for IaaS?

- a. Building applications with ease.
- ☒ b. Disaster recovery.
- c. Business Intelligence and Analytics
- d. None of the above

Correct Answer: b

Detailed Solution: IaaS is well used for disaster recovery.

QUESTION 9:

What of the following is false?

- a. Private cloud is used solely by an organization.
- ☒ b. Hybrid cloud is shared by several organizations and supports a specific goal.
- c. In the public cloud, the cloud infrastructure is made available to the general public.
- d. None of the above

Correct Answer: b

Detailed Solution: In hybrid cloud, the cloud infrastructure is a composition of two or more clouds.

QUESTION 2:

Which of the followings is/are type(s) of Cluster?

- (a) Load Balancing Cluster
- (b) Cost Effective Cluster
- (c) Failover Cluster
- (d) Energy Efficient Cluster

Correct Answer: a, c

Detailed Solution:

There are three types of cluster: High Availability or Failover Clusters, Load Balancing Cluster, and Parallel/Distributed Processing Clusters. So, option (a) and (c) are correct.

Refer slide number 31.

QUESTION 1:

What are the advantages of Cluster Computing?

- a. High Performance
- b. Hardware Fault tolerance
- c. Low cost
- d. Scalability

Correct Answer: a, b, d

Detailed Solution: Cluster computing incurs high cost.

QUESTION 2:

What of the following is/are the characteristics of Cloud Computing?

- a. Homogeneity
- b. Service Orientation
- c. Geographic Distribution
- d. None of the above

Correct Answer: a, b, c

Detailed Solution: All three are characteristics of cloud computing.

QUESTION 1:

A distributed system is preferred when the task is: i)Data-intensive; ii)Computing-intensive

- A. Only (i)
- B. Only (ii)
- C. Both (i) and (ii)
- D. Neither (i) nor (ii)

Correct Answer: C

Detailed Solution: A distributed system is preferred when the task is both data and computing-intensive

QUESTION 2:

The “Grid” in the distributed grid computing paradigm links together power plants of different kinds.

- A. True
- B. False

Correct Answer: B

Detailed Solution: The grid in distributed grid computing paradigm links together computing resources and provides the mechanism needed to access them.

QUESTION 3:

Which one of the following is/are the advantage(s) of cloud computing?

- A. Resource pooling
- B. It requires an always-on internet connection.
- C. Ubiquitous
- D. On-demand payment policy

Correct Answer: A, C, D

Detailed Solution: Cloud computing brings resource pooling, ensures ubiquitousness, provides an on-demand payment policy.

QUESTION 5:

What is(are) the characteristic(s) of using cluster computing?

- A. Parallel programming
- B. Faster network than a typical LAN
- C. Low-latency communication protocols
- D. None of these.

Correct Answer: A,B, C

Detailed Solution: Clusters are deployed to improve the speed over LAN-connected single standalone computers. Its key components are parallel programming and ensuring Low-latency communication protocols.

QUESTION 6:

Web access to commercial software is one of the SaaS (Software as a Service) characteristics in the cloud computing paradigm.

- A. True
- B. False

Correct Answer: A

Detailed Solution: Web access to commercial software is one of the SaaS characteristics in the cloud computing paradigm.

QUESTION 7:

Example(s) of PaaS (Platform as a Service) tool(s) is(are):

- A. Microsoft Powerpoint
- B. Microsoft Azure
- C. Google App Engine
- D. Google mail service

Correct Answer: B, C

Detailed Solution: Examples of PaaS tools are Microsoft Azure and Google app engine.

QUESTION 8:

IaaS (Infrastructure as a Service) in cloud computing delivers (i) storage; (ii) servers.

- A. Only (i)
- B. Only (ii)
- C. Both (i) and (ii)
- D. Neither (i) nor (ii)

Correct Answer: C

Detailed Solution: IaaS is a computing platform that allows developers to quickly create software or online applications by delivering storage, servers, networks, OSs and on-demand service.

1) What type of service best describes Google Kubernetes Engine?

1 point

- ☐ IAAS
- ☒ Hybrid
- ☐ PAAS
- ☐ SAAS

Yes, the answer is correct.

Score: 1

Feedback:

GKE is a hybrid service. On one hand, the infrastructure is managed for Kubernetes. But you still have to run Kubernetes to build your applications

Accepted Answers:

Hybrid