USN | | | | | | | | | | |

Internal Assessment Test 3 – December 2024

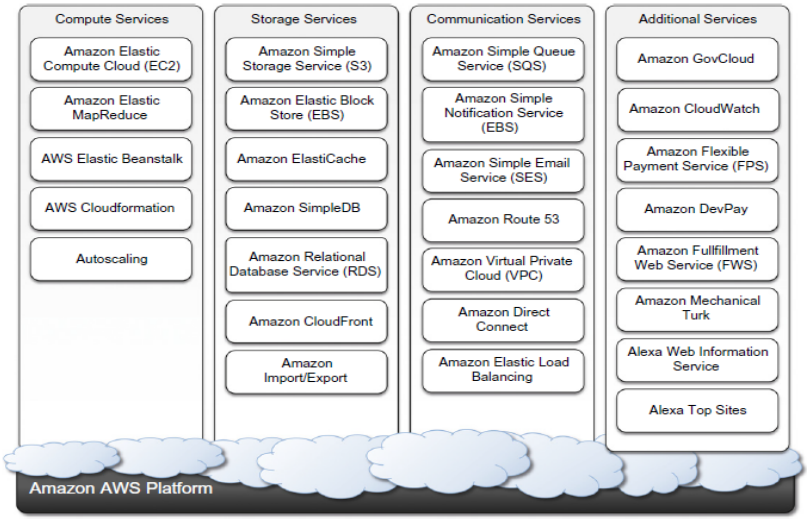
Sub:	CLOUD COMPUTING					Sub Code:	21CS72	Branch:	ISE
Date:	16/12/2024	Duration:	90 min's	Max Marks:	50	Sem/Sec:	VII / A, B, C		OBE

	Answer any FIVE FULL Questions	MARKS	CO	RBT
1.	Discuss the role of Amazon Machine Images (AMIs) in the AWS compute ecosystem, explain how EC2 instances are launched and managed within an EC2 environment, and analyze the features of advanced compute services offered by Amazon Web Services.	10M	CO5	L2
2.	Discuss the key concepts of Amazon S3, describe the functionality of Amazon Elastic Block Store (EBS) and Amazon ElastiCache, and evaluate how structured storage solutions and Amazon CloudFront contribute to efficient data management and content delivery in AWS.	10M	CO5	L2
3.	Explain how cloud computing is used in the below Scientific applications a. ECG analysis in healthcare b. Biology: protein structure prediction c. Biology: gene expression data analysis for cancer diagnosis d. Geoscience: satellite image processing	10M	CO5	L2
4.	Identify the role of cloud-based media applications in content creation and processing. Compare Animoto, Maya rendering with Aneka, and Video encoding on the cloud via Encoding.com in terms of their functionality, performance, and use cases for media professionals.	10M	CO5	L3
5. a	Discuss the application lifecycle with a focus on application development and testing, deployment strategies, and management practices.	5M	CO5	L2
5. b	Explain the architecture and key components of multiplayer online gaming systems.	5M	CO5	L2
6. a	Explain various computing platforms and technologies, including Amazon Web Services (AWS), Google App Engine, Microsoft Azure, Hadoop, Force.com, Salesforce.com, and Manjrasoft Aneka. How do these platforms cater to different computational needs, and what are their key use cases in modern cloud computing environments?	6M	CO1	L2
6. b	Illustrate the bird's-eye view of cloud computing providing practical examples and Include a detailed diagram showcasing the key components and interactions within a cloud computing environment.	4M	CO1	L2

CI's Signature CCI Signature HOD Signature

Internal Assessment Test 3 – December 2024

Sub:	CLOUD COMPUTING					Sub Code:	21CS72	Branch:	ISE
Date:	16/12/2024	Duration:	90 min's	Max Marks:	50	Sem/Sec:	VII / A, B, C		OBE

	Scheme	MARKS	CO	RBT
1.	Discuss the role of Amazon Machine Images (AMIs) in the AWS compute ecosystem, explain how EC2 instances are launched and managed within an EC2 environment, and analyze the features of advanced compute services offered by Amazon Web Services. Compute services constitute the fundamental element of cloud computing systems. The fundamen- tal service in this space is Amazon EC2, which delivers an IaaS solution that has served as a refer- ence model for several offerings from other vendors in the same market segment. Amazon machine images They are stored in Amazon S3 and identified by a unique identifier in the form of ami-xxxxxx and a manifest XML file. An AMI contains a physical file system layout with a predefined operating system installed.  **FIGURE 9.1** Amazon Web Services ecosystem. EC2 instances: We can identify six major categories: Standard instance High-memory instances High-CPU instances Cluster GPU instances EC2 environment	5+ 5 M 10M	CO5	L2

	EC2 instances are executed within a virtual environment, which provides them with the services they require to host applications. The EC2 environment is in charge of allocating addresses, attaching storage volumes, and configuring security in terms of access control and network connectivity. A key pair allows the owner to remotely connect to the instance once this is running and gain root access to it. Amazon EC2 controls the accessibility of a virtual instance with basic firewall configuration, allowing the specification of source address, port, and protocols (TCP, UDP, ICMP). Rules can also be attached to security groups, and instances can be made part of one or more groups before their deployment. Security groups and firewall rules constitute a flexible way of providing basic security for EC2 instances, which has to be complemented by appropriate security configuration within the instance itself. Advanced compute services AWS CloudFormation AWS elastic beanstalk Amazon elastic MapReduce			
2.	Discuss the key concepts of Amazon S3, describe the functionality of Amazon Elastic Block Store (EBS) and Amazon ElastiCache, and evaluate how structured storage solutions and Amazon CloudFront contribute to efficient data management and content delivery in AWS. AWS provides a collection of services for data storage and information management. The core service in this area is represented by Amazon Simple Storage Service(S3). The core components of S3 are two buckets and objects. Buckets represent virtual containers in which to store objects; objects represent the content that is stored. Objects can also be enriched with metadata that can be used to tag the stored content with additional information. S3 key concepts The storage is organized in a two-level hierarchy. Stored objects cannot be manipulated like standard files. Content is not immediately available to users Requests will occasionally fail Resource naming Canonical form: http://s3.amazonaws.com/bukect_name/. Subdomain form: http://bucketname.s3.amazon.com/. Virtual hosting form: http://bucket-name.com/. Since a bucket can be expressed in three different ways, objects indirectly inherit this flexibility: Canonical form: http://s3.amazonaws.com/bukect_name/object_name Subdomain form: http://bucket-name/s3.amzonaws.com/object_name Virtual hosting form: http://bucket-name.com/object_name Object ACL: http://s3.amazonaws.com/bukect_name/object_name?acl Bucket server logging: http://s3.amzonaws.com/bucket_name?logging Buckets	10M (5M+5M)	CO5	L2

A bucket is a container of objects. It can be thought of as a virtual drive hosted on the S3 distributed storage, which provides users with a flat store to which they can add objects. Buckets are top-level elements of the S3 storage architecture and do not support nesting.
Objects and metadata
Objects constitute the content elements stored in S3. Users either store files or push to the S3 text stream representing the object's content. An object is identified by a name that needs to be unique within the bucket in which the content is stored.
Access control and security

Amazon elastic block store :
The Amazon Elastic Block Store (EBS) allows AWS users to provide EC2 instances with persistent storage in the form of volumes that can be mounted at instance startup. They accommodate up to 1 TB of space and are accessed through a block device interface, thus allowing users to format them according to the needs of the instance they are connected to (raw storage, file system, or other). The content of an EBS volume survives the instance life cycle and is persisted into S3.

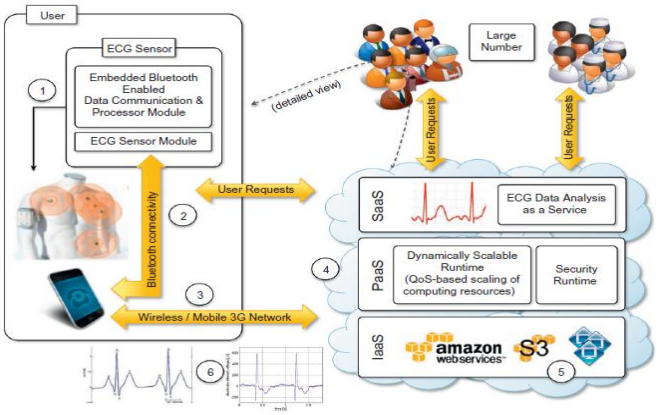
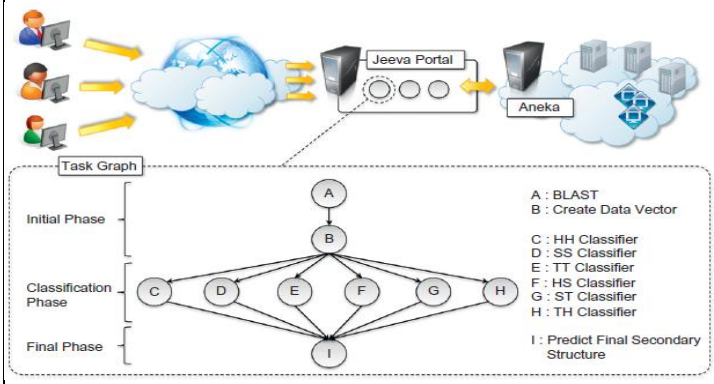
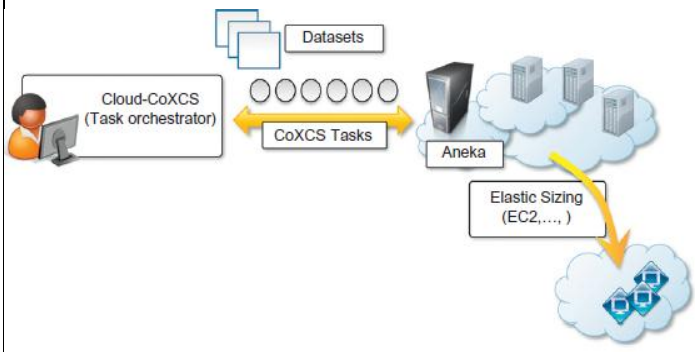
Amazon ElastiCache
ElastiCache is an implementation of an elastic in-memory cache based on a cluster of EC2 instances. It provides fast data access from other EC2 instances through a Memcached-compatible protocol so that existing applications based on such technology do not need to be modified and can transparently migrate to ElastiCache.

Structured storage solutions
Amazon Relational DataStorage (RDS), and Amazon Simple DB

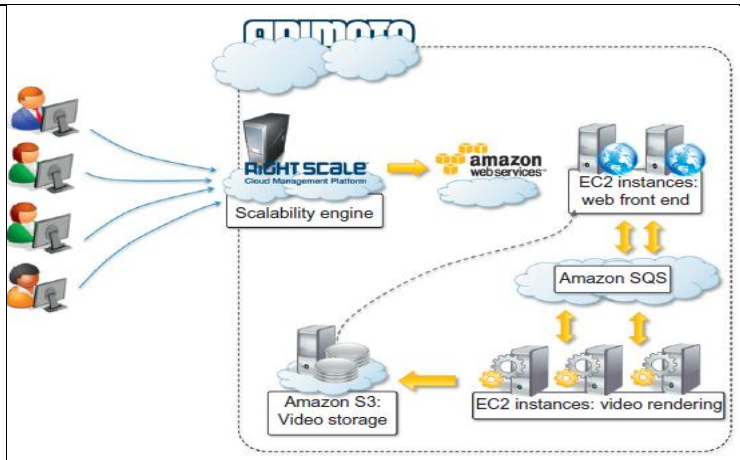
Two key advanced features of RDS are multi-AZ deployment and read replicas. The high-availability solution is implemented by keeping in standby synchronized copies of the services in different avail- ability zones that are activated if the primary service goes down. The second option provides users with increased performance for applications that are heavily based on database reads.

Amazon SimpleDB
Amazon SimpleDB is a lightweight, highly scalable, and flexible data storage solution for applications that do not require a fully relational model for their data.

Amazon CloudFront
CloudFront is an implementation of a content delivery network on top of the Amazon distributed storage infrastructure. It leverages a collection of edge servers strategically located around the globe to better serve requests for static and streaming Web content so that the transfer time is reduced as much as possible.

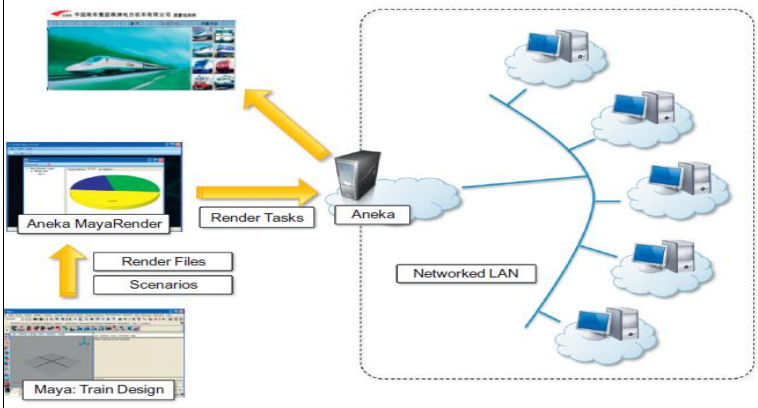
3.	Explain how cloud computing is used in the below Scientific applications a. ECG analysis in healthcare Healthcare is a domain in which computer technology has found several and diverse applications: from supporting the business functions to assisting scientists in developing solutions to cure diseases  b. Biology: protein structure prediction Applications in biology often require high computing capabilities and often operate on large data- sets that cause extensive I/O operations. Because of these requirements, biology applications have often made extensive use of supercomputing and cluster computing infrastructures. Similar capabil- ities can be leveraged on demand using cloud computing technologies in a more dynamic fashion, thus opening new opportunities for bioinformatics applications   c. Biology: gene expression data analysis for cancer diagnosis	10M(4M + 3M +3M)	CO5	L2

	Gene expression profiling is the measurement of the expression levels of thousands of genes at once. It is used to understand the biological processes that are triggered by medical treatment at a cellular level. Together with protein structure prediction, this activity is a fundamental component of drug design, since it allows scientists to identify the effects of a specific treatment. Another important application of gene expression profiling is cancer diagnosis and treatment. Cancer is a disease characterized by uncontrolled cell growth and proliferation. This behavior occurs because genes regulating the cell growth mutate. This means that all the cancerous cells contain mutated genes. d. Geoscience: satellite image processing Geoscience applications collect, produce, and analyze massive amounts of geospatial and nonspatial data. As the technology progresses and our planet becomes more instrumented (i.e., through the deployment of sensors and satellites for monitoring), the volume of data that needs to be processed increases significantly. In particular, the geographic information system (GIS) is a major element of geoscience applications. GIS applications capture, store, manipulate, analyze, manage, and present all types of geographically referenced data.			
4.	Identify the role of cloud-based media applications in content creation and processing. Compare Animoto, Maya rendering with Aneka, and Video encoding on the cloud via Encoding.com in terms of their functionality, performance, and use cases for media professionals. Media applications are a niche that has taken a considerable advantage from leveraging cloud computing technologies. In particular, video-processing operations, such as encoding, transcoding, com- position, and rendering, are good candidates for a cloud-based environment. These are computationally intensive tasks that can be easily offloaded to cloud computing infrastructures. Animoto : Animoto is perhaps the most popular example of media applications on the cloud. The Website provides users with a very straightforward interface for quickly creating videos out of images, music, and video fragments submitted by users. Users select a specific theme for a video, upload the photos and videos and order them in the sequence they want to appear, select the song for the music, and render the video. The process is executed in the background and the user is notified via email once the video is rendered.	10M(5M+5 M)	CO5	L3



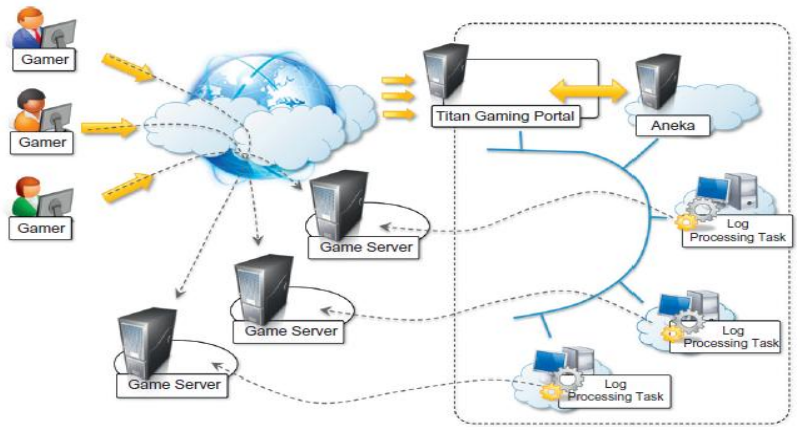
Maya rendering with Aneka

Interesting applications of media processing are found in the engineering disciplines and the movie production industry. Operations such as rendering of models are now an integral part of the design workflow, which has become computationally demanding. The visualization of mechanical models is not only used at the end of the design process, it is iteratively used to improve the design. It is then fundamental to perform such tasks as fast as possible. Cloud computing provides engineers with the necessary computing power to make this happen.

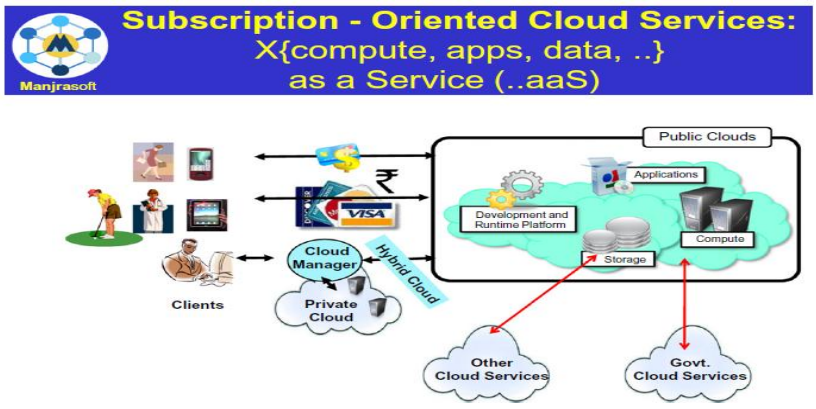


Video encoding on the cloud: Encoding.com

Video encoding and transcoding are operations that can greatly benefit from using cloud technologies: They are computationally intensive and potentially require considerable amounts of storage. Moreover, with the continuous improvement of mobile devices as well as the diffusion of the Internet, requests for video content have significantly increased. The variety of devices with video playback capabilities has led to an explosion of formats through which a video can be delivered. Software and hardware for video encoding and transcoding often have prohibitive costs or are not flexible enough to support conversion from any format to any format. Cloud technologies present an opportunity for turning these tedious and often demanding tasks into services that can be easily integrated into a variety of workflows or made available to everyone according to their needs.

5. a	Discuss the application lifecycle with a focus on application development and testing, deployment strategies, and management practices. Application development and testing Java SDK Python SDK Application deployment and management	5M	CO5	L2
5. b	Explain the architecture and key components of multiplayer online gaming systems. Online multiplayer gaming attracts millions of gamers around the world who share a common experience by playing together in a virtual environment that extends beyond the boundaries of a normal LAN. Online games support hundreds of players in the same session, made possible by the specific architecture used to forward interactions, which is based on game log processing. Players update the game server hosting the game session, and the server integrates all the updates into a log that is made available to all the players through a TCP port. The client software used for the game connects to the log port and, by reading the log, updates the local user interface with the actions of other players.  Game log processing is also utilized to build statistics on players and rank them. These features constitute the additional value of online gaming portals that attract more and more gamers. The processing of game logs is a potentially compute-intensive operation that strongly depends on the number of players online and the number of games monitored. Moreover, gaming portals are Web applications and therefore might suffer from the spiky behaviour of users that can randomly generate large amounts of volatile workloads that do not justify capacity planning. The use of cloud computing technologies can provide the required elasticity for seamlessly pro- cessing these workloads and scale as required when the number of users increases.	5M	CO5	L2

6. a	Explain various computing platforms and technologies, including Amazon Web Services (AWS), Google App Engine, Microsoft Azure, Hadoop, Force.com, Salesforce.com, and Manjrasoft Aneka. How do these platforms cater to different computational needs, and what are their key use cases in modern cloud computing environments? Development of a cloud computing application happens by leveraging platforms and frameworks that provide different types of services, from the bare-metal infrastructure to customizable applications serving specific purposes. Amazon web services (AWS) AWS offers comprehensive cloud IaaS services ranging from virtual compute, storage, and networking to complete computing stacks. AWS is mostly known for its compute and storage-on- demand services, namely Elastic Compute Cloud(EC2) and Simple Storage Service(S3). Google AppEngine Google AppEngine is a scalable runtime environment mostly devoted to executing Web applications. These take advantage of the large computing infrastructure of Google to dynamically scale as the demand varies over time. AppEngine provides both a secure execution environment and a col- lection of services that simplify the development of scalable and high-performance Web applications. Microsoft Azure Microsoft Azure is a cloud operating system and a platform for developing applications in the cloud. It provides a scalable runtime environment for Web applications and distributed applications in general. Applications in Azure are organized around the concept of roles, which identify a distribution unit for applications and embody the application's logic. Currently, there are three types of role: Web role, worker role, and virtual machine role. Hadoop Apache Hadoop is an open-source framework that is suited for processing large data sets on commodity hardware. Hadoop is an implementation of MapReduce, an application programming model developed by Google, which provides two fundamental operations for data processing map and reduce. Force.com and Salesforce.com Force.com is a cloud computing platform for developing social enterprise applications. The plat- form is the basis for SalesForce.com, a Software-as-a-Service solution for customer relationship management. Force.com allows developers to create applications by composing ready-to-use	6M	CO1	L2

	blocks; a complete set of components supporting all the activities of an enterprise are available. Manjrasoft Aneka Manjrasoft Aneka [165] is a cloud application platform for rapid creation of scalable applications and their deployment on various types of clouds in a seamless and elastic manner. It supports a col- lection of programming abstractions for developing applications and a distributed runtime environ- ment that can be deployed on heterogeneous hardware (clusters, networked desktop computers, and cloud resources). Developers can choose different abstractions to design their application: tasks, distributed threads, and map-reduce.			
6. b	Illustrate the bird's-eye view of cloud computing providing practical examples and Include a detailed diagram showcasing the key components and interactions within a cloud computing environment. Cloud computing is helping enterprises, governments, public and private institutions, and research organizations shape more effective and demand-driven computing systems Large enterprises can offload some of their activities to cloud-based systems. Small enterprises and start-ups can afford to translate their ideas into business results more quickly, without excessive up-front costs. System developers can concentrate on the business logic rather than dealing with the complexity of infrastructure management and scalability. End users can have their documents accessible from everywhere and any device. The three major models for deploying and accessing cloud computing environments are public clouds, private/enterprise clouds, and hybrid clouds 	4M	CO1	L2

CI's Signature CCI Signature HOD Signature