1. To review the services of cloud provider and to list example for each of the cloud delivery models. Also, which will be the favorite model of cloud? (10 Points)

Services Offered by the Cloud Provider Amazon Web Services(AWS):

1. Amazon S3(Simple Storage Service):
   1.1. S3 is a sort of object storage service that offers availability, scalable, performance, and security for data.
   1.2. Amazon S3 automatically produces and keeps copies of all S3 items across different platforms, it is built for data durability. This ensures that the data is available when the customer needs it and is safe from failures, errors, and threats.

2. AWS Lambda:
   2.1. AWS Lambda is a computing service(wireless) that enables users to run code without having to maintain servers, or runtimes.
   2.2. One can upload the code as container image or as a ZIP file while, Lambda will assign compute execution power and run the code based upon the incoming request or event, at any scale.

3. Amazon Aurora:
   3.1. Amazon Aurora is a database cloud service that supports MySQL and PostgreSQL as well. It combines the performance of standard corporate databases.
   3.2. It combines the performance and availability of databases with the ease of use and low cost of open source databases.

4. Amazon EC2:
   4.1. EC2 is a computing service that delivers scalable compute capacity and is designed to make cloud computing more accessible to programmers and developers.
   4.2. The easy web interface of Amazon Elastic Cloud Compute allows customer to quickly configure and obtain capacity. It provides the customer with total control of computer resources, allowing them to run on Amazon's computing infrastructure.

5. Amazon VPC:
   5.1. With Amazon VPC customer has complete control over virtual networking environment, including resource placement, connectivity, and security, with an Amazon Virtual Private Cloud (VPC).
   5.2. Resources like Amazon’s Elastic Cloud Compute and Amazon’s Relational Database Service instances.

6. AWS Amplify:

6.1. AWS Amplify will be a set of tools and services that can be used together or separately to help mobile developers and web developers build scalable full stack apps which are powered by AWS.
6.2. It enables customers to construct an app backend and link the app in minutes, deploy static web apps in a few clicks, and manage app content outside of the AWS interface.

7. Amazon API:
   7.1. Amazon API Gateway is a service that allows programmers to create, publish, and defend APIs of any scale.
   7.2. API Gateway allows the user to develop Restful APIs for real time communication between applications.

8. AWS Identity and Access Management (IAM):
   8.1. Provides consumers with the ability to securely access the control to AWS services and resources. It may be used to create and manage AWS users and groups, as well as give and deny them access to AWS resources using permissions to the users.

9. Amazon DynamoDB:
   9.1. DynamoDB is a document and key value pair document database that provides performance in few seconds at any size. It's a completely managed, active and long-lasting database with backup, security and restore.

10. AWS RoboMaker:
    10.1. Robots are increasingly being utilized in society for more specialized tasks such as complicated assembly, selecting and packaging, end-to-end delivery, monitoring,and search. With Robomaker, it is easy to enable a robot running to perform functionalities like navigation, communication, comprehending data, streaming the data, and learning about it.

Cloud delivery models as covered in first Lecture with one example in each; Favorite cloud delivery model and why is it?

1. IaaS(Infrastructure As A Service):
   1.1. IaaS refers to fundamental blocks of the cloud computing. Networkingcapabilities, computers (virtual or dedicated hardware), and storage capacity are all components.
   1.2. In an IaaS service model, a cloud provider hosts the infrastructure components that would typically be found in an on-premises data center.
   1.3. Examples include: Amazon EC2 and S3, Google Compute Engine, Microsoft Azure, Rackspace

2. PaaS(Platform as a Service):
   2.1. Provides computing platform which includes programming language, Operating systems, execution environment, web servers and databases;
   2.2. Because most small businesses have never been able to construct efficient development environments on their own, PaaS offers a way to accelerate software development. Second, it

enables businesses to concentrate on their core competencies rather than worrying about basic infrastructure maintenance.

2.3. Examples: Azure, Heroku, AWS Elastic Beanstalk

3. SaaS(Software as a Service):
   3.1. Provides access to application software also known as "software on-demand". No Setup, installation and running of software is required. Can access using a client machine.
   3.2. The cloud service consumer is given access to the cloud services, while access for the underlying IT resources or implementation details are not revealed.
   3.3. Examples include: Google Apps (Docs), Microsoft Office 365.

Favorite Cloud Delivery Model will be Infrastructure as a Service, reasons include:

1. One of the major benefits of IaaS is cost reduction due to low infrastructure expenditures. Companies are not compelled to make financial investments to guarantee that their hardware and networking equipment are in good operating condition. They are also free from paying monthly or annual fees for benefits they do not use.

2. Companies using IaaS may scale up and down based on their needs, which is seen as one of the most significant advantages of IaaS. This scaling flexibility enables businesses to adapt to any change in opportunities or requirements, such as when the firm's size changes or when the organization builds and dismantles development facilities.

3. Most catastrophe recovery strategies are costly and burdensome. When a firm has several sites, it frequently needs separate disaster recovery and business continuity strategies. IaaS offers integratedDisaster Recovery and Business Continuity service options.

4. Companies that use IaaS may spend more time expanding their business rather than making minor technological decisions. With greater time and resources, they can concentrate on creating their apps and solutions.

2. Give a summary of the growth of cloud computing, as well as your point of view or knowledge on why it has become an important subject in today's IT business? (20 Points)

Timeline for the Cloud Computing Evolution.

History of Cloud Computing:

The growth of cloud computing technology was a gradual process:

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1. Distributed Systems came into picture in 1950s:

1.1. It is made up of numerous different systems, yet to customers, they all appear to be a single entity. The goal of distributed systems is to share the resources while remaining effective and efficient in their utilization.

2. Mainframe computing (In the year 1951):
   2.1. Mainframes, which first appeared in 1951, are extremely powerful and dependable computer devices. These are in charge of managing enormous amounts of data, such as massive input-output processes.
   2.2. These systems have very little downtime and have a high fault tolerance. These, however, were too expensive. Cluster computing arose as a low-cost alternative to mainframe technology.

3. Cluster Computing (established in 1980s):
   3.1. A high-bandwidth network connects each computer in the cluster to the others. They were far less expensive than mainframe systems. These could also do complicated calculations. Furthermore, if more nodes are required, they may be easily added to the cluster.
   3.2. Thus, the cost issue was addressed to some extent, but the issue of geographical constraints remained. Grid computing was proposed as a solution to this problem.

4. Grid computing (In the year 1990s):
   4.1. In grid computing distinct systems were deployed in geographically disparate regions and were alllinked together with the internet. Because these systems have belonged to different companies, thegrid had a diverse set of nodes.

5. Virtualization:
   5.1. Virtualization refers to the technique of constructing a virtual layer over hardware that allows the user to run numerous instances on the hardware at the same time. It is a critical technology in cloud computing.
   5.2. It serves as the foundation for key cloud computing services such as Amazon Elastic Cloud Compute, VMware, and others. One of the most prevalent forms of virtualization is still hardware virtualization.

6. Cloud Computing/Service orientation:
   6.1. Cloud computing makes it possible to develop flexible, and evolvable apps. Cloud computing was able to use the concepts of virtualization and distributed systems efficiently and paved a way to provide services for the businesses. Two critical principles that were introduced by this computer model include Quality of the Service, which comprises the Service Level Agreements, and Software as a Services along with Platform as a Service and Infrastructure as a Service (as delivery models for the cloud).

7. Utility computing:
   7.1. Specifies service provisioning strategies for implementing technological as well as other important services such as storage, infrastructure, and so on that are supplied on a pay-per-use basis.

Why according to me it is important:

1. The concept of cloud computing came into picture, when renting of computing resources became a necessity. It was a long process that began with mainframe computing. Because of the high expense of purchasing and maintaining mainframe computers, it was not feasible for the companies to purchase and maintain one for each of their employee.
2. With so much of advancement in computing technologies cloud was able to provide various deployment and delivery models to the clients, with business needs changing over time the right set of tools for the dynamically changing environment came into practice.
3. The usage of cloud computing was able help businesses by providing them with features which include:
    3.1.1. Accessibility: Cloud computing will allow users to access the application and data from anywhere in the globe using any device with an active connection of internet.
    3.1.2. Cost savings: Cloud computing can provide organizations with scalable computing resources, allowing them to save money on the acquisition and maintenance of these resources.
    3.1.3. Security: Cloud service providers have worked hard to adopt the finest security standards and processes in order to secure their clients' data stored in the cloud. This reemphasizes consumers' faith in cloud technology.
    3.1.4. Disaster recovery: Cloud computing is one of the most efficient way for small, medium, and large companies as well to backup and restore data and applications in a fast and trustworthy manner.

4. Moreover, Cloud technologies made sure to provide flexibility to the Users in ways possible which include:
    4.1. Scalability: Cloud infrastructure adapts to the demands of the company, cloud computing is a great choice for companies with changing workloads.
    4.2. Tools selection: Cloud computing enables organizations to pick certain prebuilt tools and features to derive solutions customized to their individual needs.
    4.3. Various Delivery Methods: Cloud computing provides private cloud, public cloud, and hybrid cloud solutions, each comes with its own set of characteristics. Organizations can then select one of these choices based on what best meets their needs.
    4.4. Control possibilities: Businesses may choose their level of control using the cloud provider's as-a-service alternatives, which include SaaS, PaaS, and IaaS.
    4.5. Organizational Agility: Speed with which organization can achieve the set targets considering the usage of cloud computing technologies and delivery models used.

5. Cloud computing is aiding society in addressing future challenges such as big data management, cyber-security, and quality control. Furthermore, new technologies such as artificial intelligence, distributed ledger technology, and many other capabilities are becoming available as cloud computing services.

6. Cloud Computing is thereby a transformative technology that has assisted companies in many jurisdictions in delivering their products and services in a much more efficient manner than ever before.