Cloud Computing & Cloud Testing

SE3010

Software Engineering Process and Quality Management

Agenda

- What we covered Last Week…
- Cloud Computing
    - Cloud Computing Architecture
    - Types of Cloud Computing
    - Public Cloud Providers
    - Cloud Computing Service Models
    - On-Premise Vs IaaS Vs PaaS Vs SaaS
    - SaaS Tools
    - PaaS Examples in Cloud Computing
    - IaaS Services
    - Public Cloud Market Share
    - Key Benefits Cloud Offers
    - Biggest Challenges of Cloud Computing
- Cloud Testing
- Recap
- Next Week…

What we covered Last Week...

- **Software Engineering Process**

  - Why Software Engineering Process is required?

  - Software Development Methodologies,

  - Waterfall Methodology

  - Agile Methodology

  - DevOps Methodology
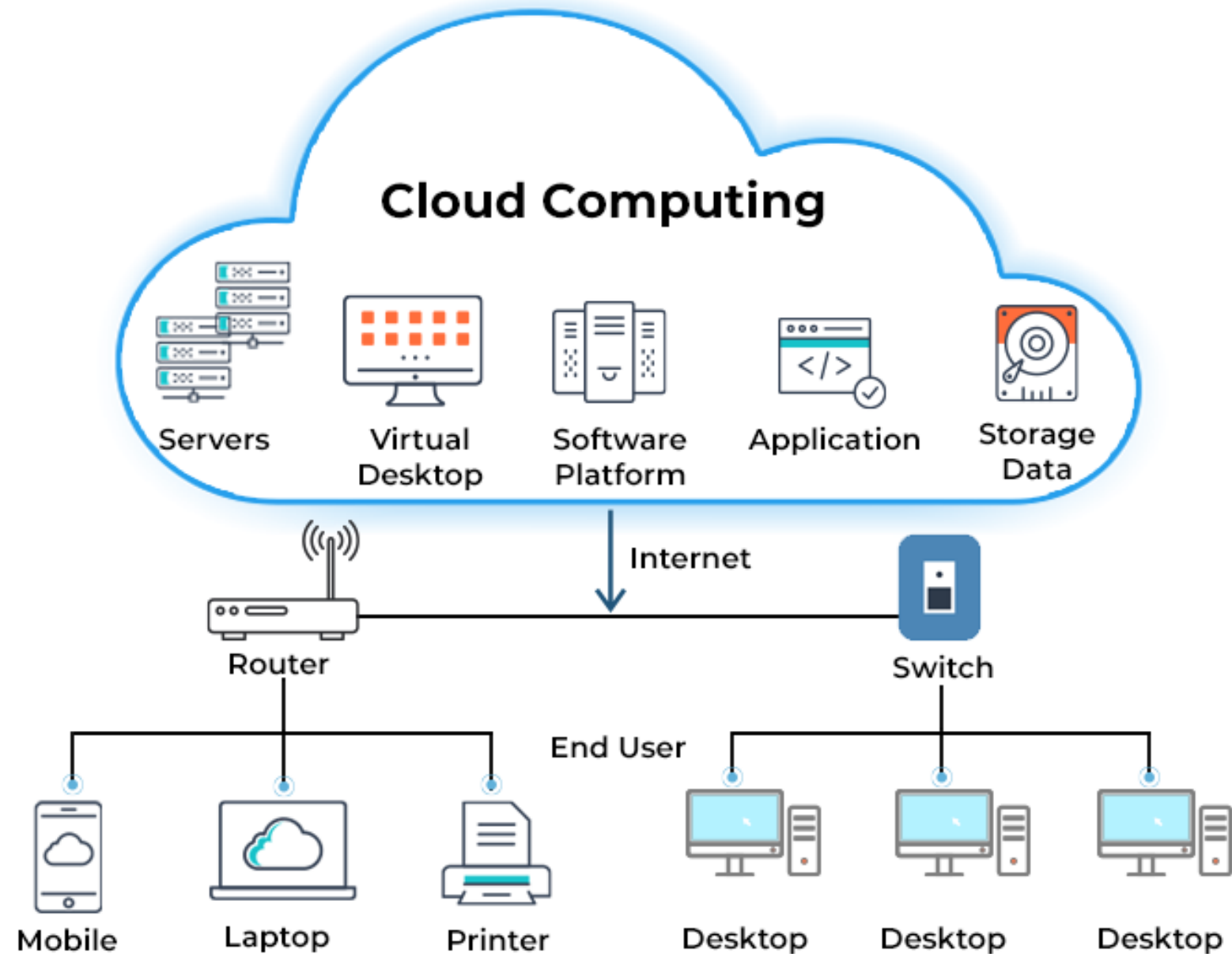
  - DevOps Vs SRE

  - Site Reliability Engineering
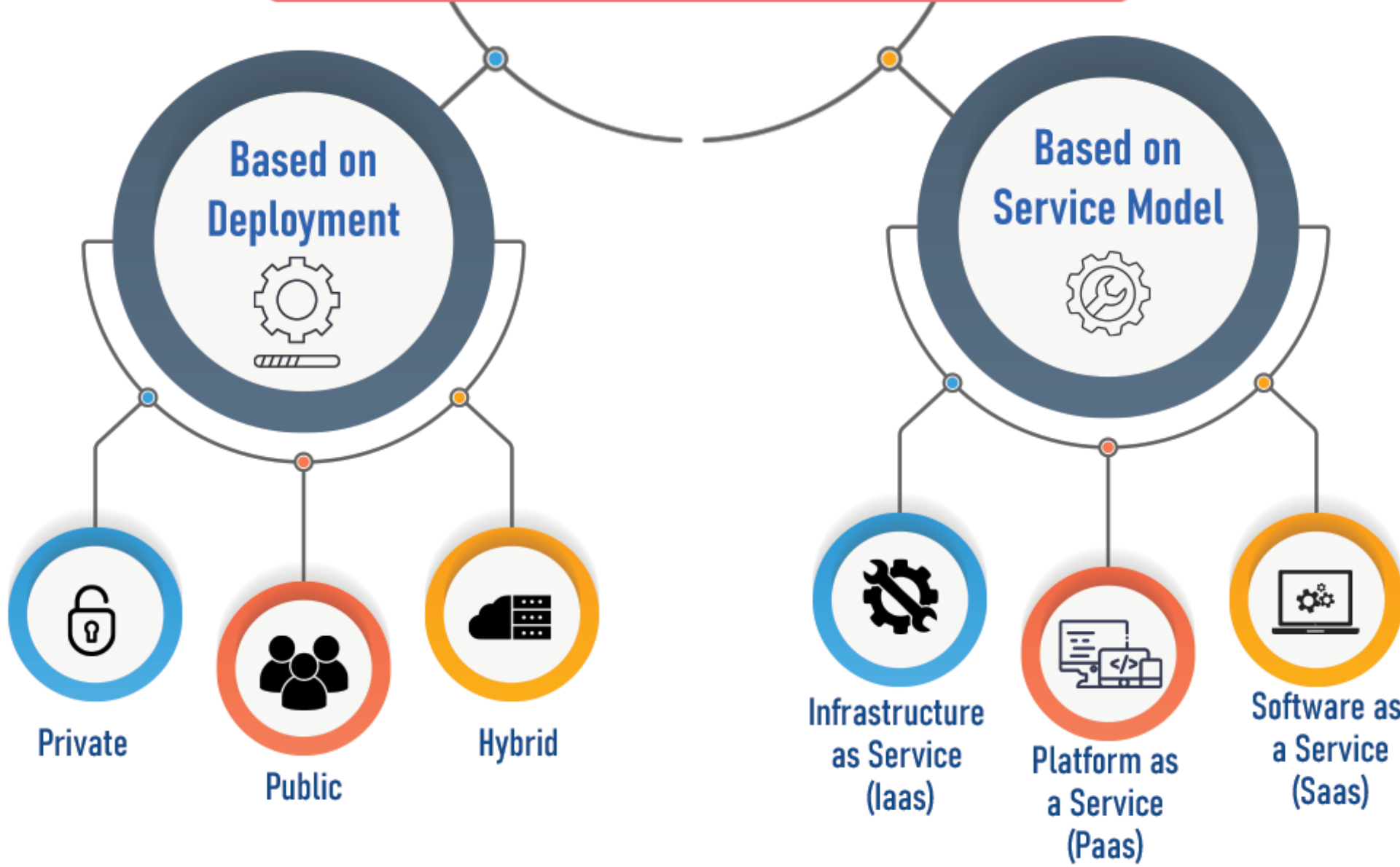
What is Cloud Computing?

Cloud Computing

- **Cloud Computing** is the delivery of computing services - including *servers, storage, databases, networking, software, analytics, and intelligence* - over the Internet ("the cloud") to offer faster *innovation, flexible resources, and economies of scale*.

- **There are four main types of Cloud Computing:** Private Clouds, Public Clouds, Hybrid Clouds, and Multiclouds.

- **There are also three main types of Cloud Computing Services:** Infrastructure-as-a-Service (IaaS), Platforms-as-a-Service (PaaS), and Software-as-a-Service (SaaS).

TYPES OF CLOUD COMPUTING

Based on Deployment

- Private
- Public
- Hybrid

Based on Service Model

- Infrastructure as Service (Iaas)
- Platform as a Service (Paas)
- Software as a Service (Saas)

Types of Cloud Computing

- **Private Cloud**

  - In a private cloud, the computing services are offered over a private IT network for the dedicated use of a single organization. Also termed internal, enterprise, or corporate cloud, a private cloud is usually managed via internal resources and is not accessible to anyone outside the organization. Private cloud computing provides all the benefits of a public cloud, such as self-service, scalability, and elasticity, along with additional control, security, and customization.

  - Private clouds provide a higher level of security through company firewalls and **internal hosting to ensure that an organization's sensitive data is not accessible to third-party providers**. **The drawback of private cloud, however, is that the organization becomes responsible for all the management and maintenance of the data centers, which can prove to be quite resource-intensive.**

- **Public Cloud**

  - Public cloud refers to computing services offered by third-party providers over the internet. Unlike private cloud, the services on public cloud are available to anyone who wants to use or purchase them. These services could be free or sold on-demand, where users only have to pay per usage for the CPU cycles, storage, or bandwidth they consume.

  - **Public clouds can help businesses save on purchasing, managing, and maintaining on-premises infrastructure since the cloud service provider is responsible for managing the system.** They also offer scalable RAM and flexible bandwidth, making it easier for businesses to scale their storage needs.

Types of Cloud Computing (Contd…)

- **Hybrid Cloud**

  ○ Hybrid cloud uses a combination of public and private cloud features. The "**best of both worlds**" cloud model allows a shift of workloads between private and public clouds as the computing and cost requirements change. **When the demand for computing and processing fluctuates, hybrid cloud allows businesses to scale their on-premises infrastructure up to the public cloud to handle the overflow while ensuring that no third-party data centers have access to their data.**

  ○ In a hybrid cloud model, companies only pay for the resources they use temporarily instead of purchasing and maintaining resources that may not be used for an extended period. **In short, a hybrid cloud offers the benefits of a public cloud without its security risks.**

  service eka scale karnwa illuma wadi weddi private cloud eke indn third party public clouds walata over flow eka handle kragnna.eth monama welwakawath third party data centered walta data access naha.

  saralawama kiwwoth mekedi krnne public cloud eke security risk eka nathuwa public cloud eke yamkisi short time period ekakta pay as you go method ekata use krna eka.
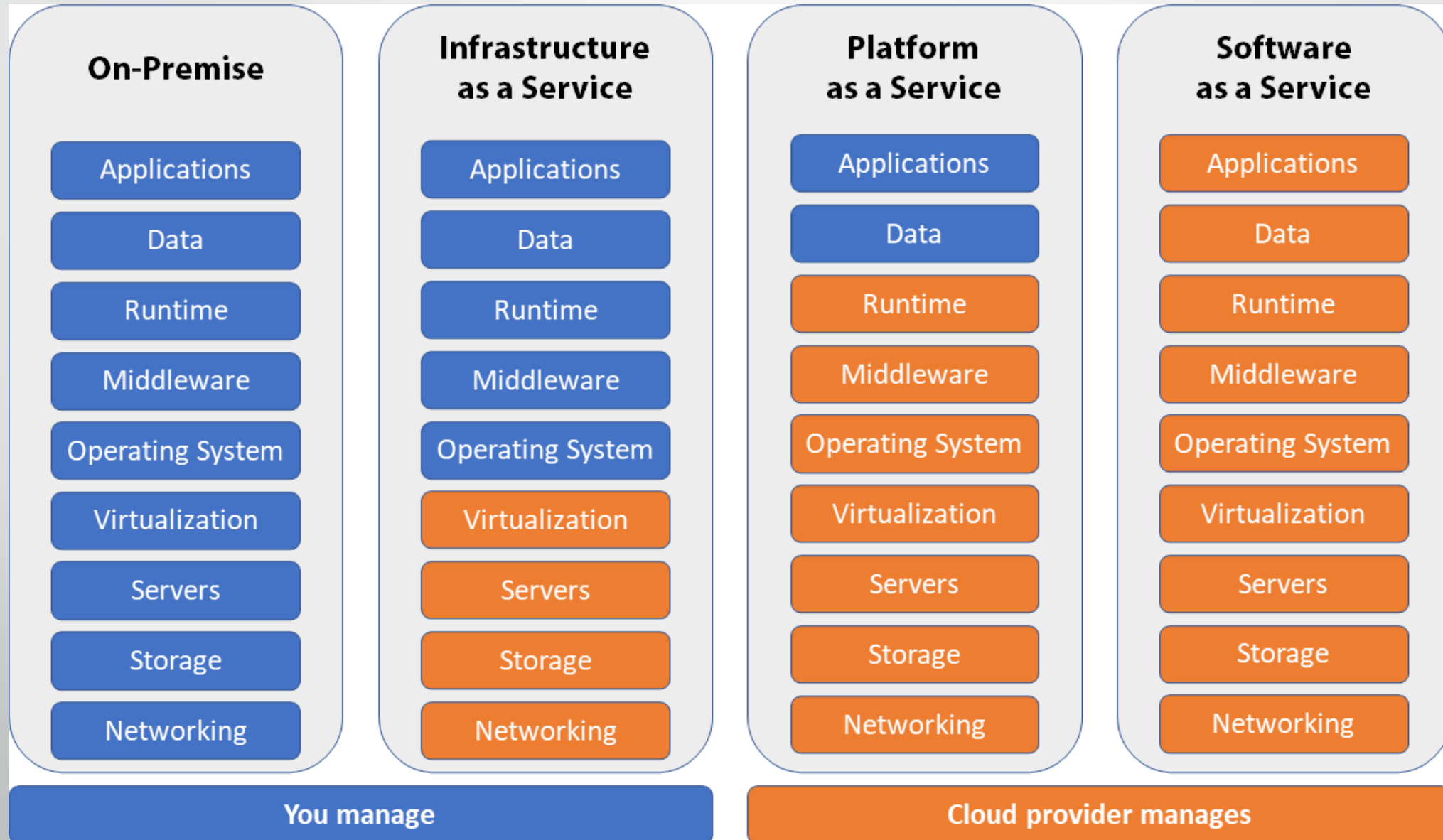
Public Cloud Providers

- **Top 7 Public Cloud Providers...**

Cloud Computing Service Models

- **Infrastructure as a service (IaaS):** Is a type of cloud computing in which a service provider is responsible for providing servers, storage, and networking over a virtual interface. In this service, the user doesn't need to manage the cloud infrastructure but has control over the storage, operating systems, and deployed applications. Instead of the user, a third-party vendor hosts the hardware, software, servers, storage, and other infrastructure components. The vendor also hosts the user's applications and maintains a backup.

- **Platform as a Service (PaaS):** Is a type of cloud computing that provides a development and deployment environment in cloud that allows users to develop and run applications without the complexity of building or maintaining the infrastructure. It provides users with resources to develop cloud-based applications. In this type of service, a user purchases the resources from a vendor on a pay-as-you-go basis and can access them over a secure connection. This allows organizations to focus on the deployment and management of their applications by freeing them of the responsibility of software maintenance, planning, and resource procurement.

- **Software as a Service (SaaS):** Allows users to access a vendor's software on cloud on a subscription basis. In this type of cloud computing, users don't need to install or download applications on their local devices. Instead, the applications are located on a remote cloud network that can be directly accessed through the web or an API. In the SaaS model, the service provider manages all the hardware, middleware, application software, and security. Also referred to as 'hosted software' or 'on-demand software', SaaS makes it easy for enterprises to streamline their maintenance and support.

office 365 wage

On-Premise Vs IaaS Vs PaaS Vs SaaS Management

On-Premise	Infrastructure as a Service	Platform as a Service	Software as a Service
Applications	Applications	Applications	Applications
Data	Data	Data	Data
Runtime	Runtime	Runtime	Runtime
Middleware	Middleware	Middleware	Middleware
Operating System	Operating System	Operating System	Operating System
Virtualization	Virtualization	Virtualization	Virtualization
Servers	Servers	Servers	Servers
Storage	Storage	Storage	Storage
Networking	Networking	Networking	Networking

You manage **Cloud provider manages**

SaaS Tools

- *Most companies nowadays use a huge range of SaaS tools. From project management to web hosting to creative suites, there is a SaaS option for just about anything.*

PaaS Examples in Cloud Computing

- **Google App Engine:** Is among the many PaaS examples that are a part of a whole suite of services. Google App Engine is a part of the Google Cloud and offers highly scalable apps and tools that can be used as a part of your service. It is compatible with many languages.

- **AWS Lambda:** Is a part of the AWS Cloud. It is completely integrable with all the different AWS services and contains a serverless architecture. AWS Lambda allows its users to build custom backend services that can be triggered on demand through the use of custom API endpoints.

- **Microsoft Azure:** Is perhaps one of the most popular PaaS examples that you will come across. It's popularity may be credited to the fact that it is so widely used across the world.

- **Salesforce Lightning:** Salesforce has always been highly preferred among platforms as a service, but Salesforce Lightning is considered the next generation of the PaaS platform.

- **Red Hat OpenShift:** Is supposed to provide users with a significantly easier platform to create and deploy applications. It is compatible with a wide range of APIs, ensuring that the user is never restricted just to what is included in the platform.

- **Oracle Cloud Platform:** Is yet another among the PaaS examples in cloud computing used primarily at the enterprise level. Oracle Cloud Platform allows you to run Oracle as well as non-Oracle applications smoothly on its servers. It is highly secure and offers great flexibility with APIs.
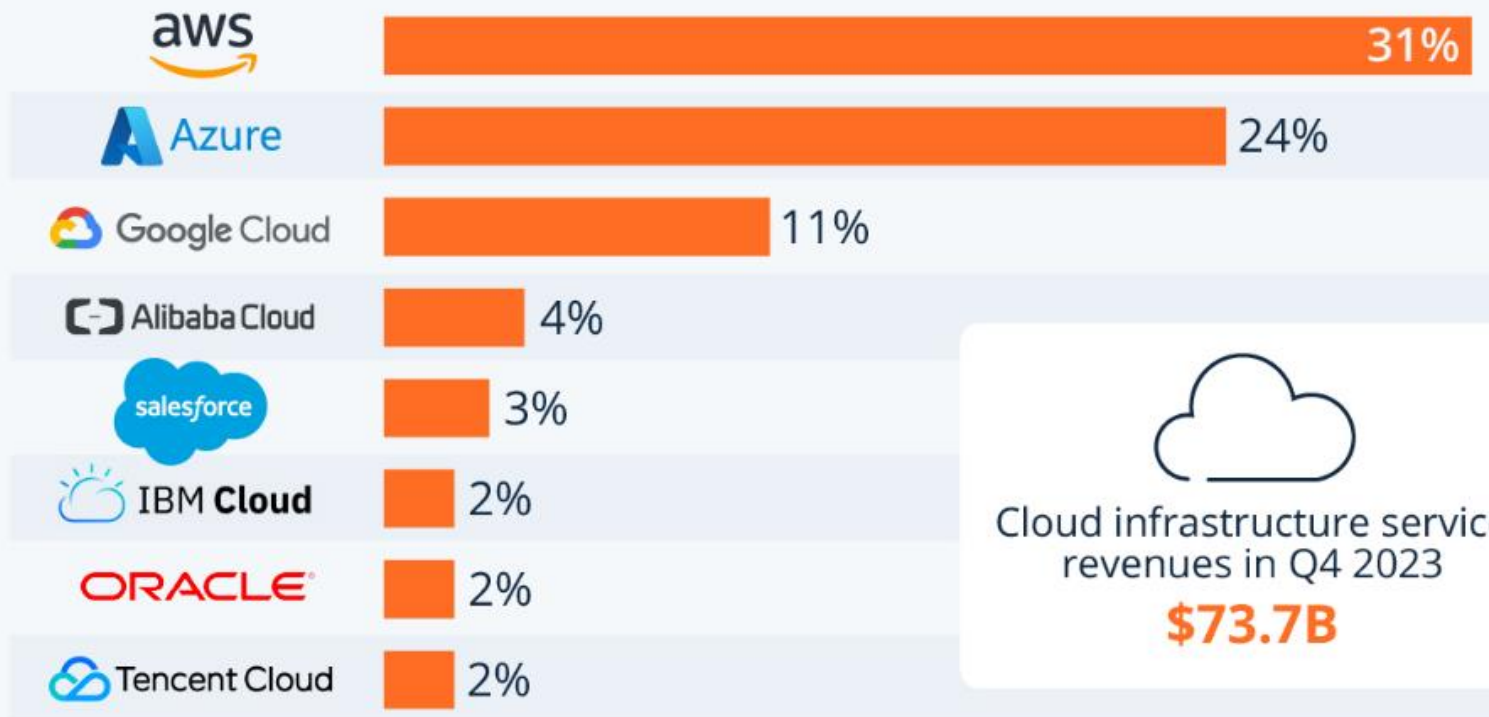
IaaS Services

- **AWS**

  - **Amazon EC2** offers the broadest and deepest compute platform, and you can choose a processor, storage, networking, operating system, and purchase model.

  - **Amazon S3** offers an industry-leading object storage service that you can use to store and protect any amount of data for virtually any use case, such as cloud-native applications, data analytics, and mobile apps.

  - **Amazon VPC** offers a logically isolated, fully customizable virtual network that you can use to define and launch AWS resources and to secure and monitor connections.

- **GCP**

  - **Compute Engine:** Infrastructure as a Service (IaaS) to run virtual machines.

  - **Cloud Storage:** Object storage with global edge-caching.

  - **Virtual Private Cloud (VPC):** Customizable network with private IPs.

Public Cloud Market Share?

Key Benefits Cloud Offers

- **Reduced Costs:** Maintaining IT systems requires big outlays of capital, something that cloud helps reduce. Cloud providers work on the pay-as-you-go model, which means businesses only pay for the services they use, further reducing costs.

- **Scalability [Elasticity]:** Cloud allows organizations to grow their users from merely a few to thousands in a very short time. Depending on the need, a business can scale their storage needs up or down, allowing organizations to be flexible.

- **Flexibility and Collaboration:** Since the data on cloud can be accessed directly via the internet, it gives employees the ability to work from anywhere, anytime. Cloud gives you the freedom to set up your virtual office anywhere you are.

- **Business Continuity:** Cloud safely stores and protects your data in the event of an outage or crisis. This makes it easier to resume work once the systems are up and running again.

- **Competitive Edge:** Cloud takes care of various business aspects, such as maintaining the IT infrastructure, licensing software, or training personnel to manage your data. The time and resources you invest are minimal.

- **Agility:** The cloud gives you easy access to a broad range of technologies so that you can innovate faster and build nearly anything that you can imagine.

- **Deploy Globally in Minutes:** With the cloud, you can expand to new geographic regions and deploy globally in minutes. Putting applications in closer proximity to end users reduces latency and improves their experience.

Biggest Challenges of Cloud Computing

- **Downtime:** Almost every cloud user will tell you that outages tops their list of cloud computing challenges.

- **Internet Connection Dependency:** A user may not be able to access the data on cloud without a good internet connection and a compatible device. Moreover, using public Wi-Fi to access your files could pose a threat if the right security measures are not taken.

- **Financial Commitment:** Cloud providers use a pay-as-you-go pricing model. However, businesses need to give a monthly or annual financial commitment for most subscription plans. This needs to be factored into their operating costs.

- **Security Risks:** Even if your cloud service provider promises you that they have the most reliable security certifications, there's always a chance of losing your data. With hackers increasingly targeting cloud storage to gain access to sensitive business data, this might be an even greater concern, for which the appropriate measures need to be taken.

- **Limited Access:** A user may have minimal control since the cloud service provider owns and manages the infrastructure. The user would only be able to manage applications and not the backend infrastructure. You always have to trust a third-party vendor to ensure security and take care of your data.

What is Cloud Testing?

Cloud Testing

- **Cloud testing** is a process of using cloud based resources to stimulate real world user traffic and environments for testing software applications. This method leverages cloud computing environments to provide more diverse testing scenarios.

  Cloud testing is a way to test software applications by using cloud computing resources.This means running tests on servers and computers over the internet instead of on local machines

- **Cloud software testing is defined** by its ability to test programs in a scalable environment that simulates real-world situations without needing costly hardware or software infrastructures.

- **Organizations can employ cloud-based testing services to verify** that their applications are resilient, reliable, and ready to meet the demands of their consumers.

Types of Cloud Testing

While cloud testing in broad terms refers to testing applications through cloud computing resources, there are three main types of cloud testing that vary by purpose:

Mekedi karanne cloud infrastructure eka hondata wada da blnwa and scalability and fault tolarance thynwada kiyla.

- **Testing of Cloud Resources.** The cloud's architecture and other resources are assessed for performance and proper functioning. This involves testing a provider's platform as a service (PaaS) or infrastructure as a service (IaaS). Common tests may assess scalability, disaster recovery (DR), and data privacy and security.

Cloud wala hadapu product ek hondta perform krnwada kiyla test krnwa

- **Testing of Cloud-native Software.** Testing of SaaS products that reside in the cloud.

online tools use krla ape software test krnewa

- **Testing of Software with Cloud-based Tools.** Using cloud-based tools and resources for QA testing.

Testing Performed within the Cloud

Testing in a cloud should not solely make sure that the functional necessities are met, but a robust emphasis needs to be set on non-functional testing also.

1. Functional Testing: Functional Testing should be performed to make sure that the offering provides the services that the user is paying for. Functional tests ensure that the business needs are being met.

- **System Verification Testing:** This testing ensures that the various modules work properly with one another.

- **Interoperability Testing:** Any application must have the flexibility to work without any problems not only on different platforms, and it should conjointly work seamlessly when moving from one cloud infrastructure to a different one.

- **Acceptance Testing:** Here the cloud-based resolution is handed over to the users to make sure it meets their expectations.

Testing Performed within the Cloud (Contd…)

focuses on aspects such as performance, security, and reliability.

- **2. Non-Functional Testing: Non-Performance Testing:** In this testing, the response time to any user request must be verified to ensure that everything is intact even when there are loads of requests to be satisfied. Network latency is additionally one of the crucial factors to evaluate performance. Also, workload balancing must be done once there's a reduction in load, by decommissioning resources.

- **Stress testing:** This testing helps to determine the ability of cloud applications to function under peak workloads while staying effective and stable.

- **Load testing:** This testing helps to measure the cloud application's response concerning user traffic loads.

- **Latency testing:** In this testing the latency time between action and responses within an application with respect to a user request.

- **Availability Testing:** This testing determines the cloud must available all the time round the clock. As there might be any mission-critical activities that can happen, the administrator i.e., cloud vendor should ensure that there's no adverse impact on the customers.

- **Multi-Tenancy Testing:** In this cloud testing, multiple users use a cloud offering as a demo. Testing is performed to confirm that there's adequate security and access control of the data when multiple users are working in a single instance.

- **Scalability Testing:** This testing is performed to make sure that the offerings provided can scale up or scale down as per the customer's need.

- **Browser Performance testing:** In this testing performance of a cloud-based application i.e., the applications deployed over the cloud is tested across different web browsers.

- **Security Testing:** As Cloud provides everything at any time, it is very important that all user-sensitive data must be secured and has no unauthorized access to maintain users' privacy.

- **Disaster Recovery Testing:** In availability testing, the cloud has to be available at all times, if there are any types of failures occur like network outages, breakdown due to high load, system failure, etc. This testing ensures how fast the failure can be captured and if any data loss occurs during this period.

Benefits of Cloud Testing
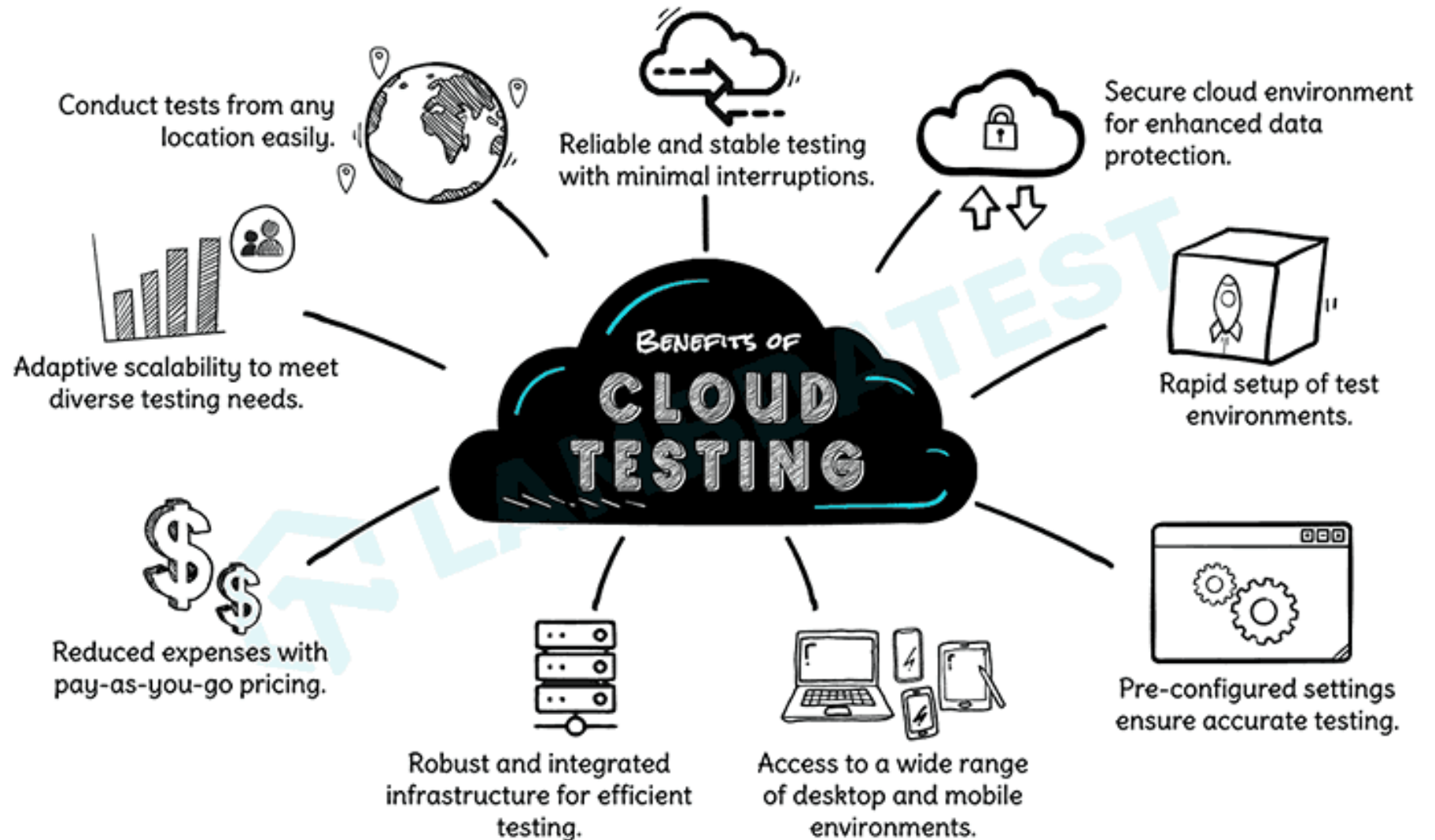
Benefits of Cloud Testing (Contd...)

- **Cost-effective:** Since consumers only pay for the resources they use, cloud testing tends to be a lot more cost-effective than traditional methods of testing apps.

- **Availability:** If there is a network connection, resources can be easily accessed anywhere and from any device. Therefore, physical restrictions like location are completely eliminated from the testing procedure. Moreover, testing teams can collaborate in real-time to work on the cloud testing process owing to the in-built tools present to facilitate collaboration.

- **Scalability:** Cloud testing has the provision to facilitate the scaling up or down of computing resources, as per the requirements of the testing procedure.

- **Quicker testing process:** Cloud testing processes are much faster than traditional testing procedures.

- **Disaster recovery is much simpler:** Disaster recovery methods are simpler for the cloud than they are for traditional procedures.

Key Cloud Testing Challenges

- **Vendor lock-in:** Cloud-based services have little interoperability because public cloud providers develop their own architectures and operating models.

- **Lack of control:** When using cloud-based services, you can't control any changes in these services, as it's the provider's responsibility to maintain and update them.

- **Security and privacy concerns:** Security in the cloud still raises many concerns, as not all cloud-based testing vendors apply reliable encryption and data protection techniques.

- **Potential availability issues:** While providers guarantee round-the-clock availability of their services, even the least bit of downtime can cause negative consequences to your testing processes.

- **Misleading service-level agreements:** Vendors of cloud-based tools provide terms and conditions for their cloud-based services that differentiate the responsibilities of the vendor and the cloud user. Though these terms are necessary, they are often written in a biased and misleading way.

- **Infrastructure issues:** Before choosing a cloud-based testing tool, make sure the provider offers you all the configurations, technologies, and storage you need.

- **Hidden costs:** Though vendors inform their clients about prices for their cloud-based services, improper use of test environments may significantly increase your costs.

- **Possible non-compliance:** If your organization has to comply with data security laws, regulations, and standards, it's your responsibility to make sure that cloud-based tools and services you use are also compliant.

Next Week…

- Security
  - Introduction to Cyber Security,
  - Security Testing,
- AI & ML → Testing
- Etc…

Thank You !!!

Tutorial – 28/04/2024

Q1: What is Cloud Computing?

Q2: What are the main types of Cloud Computing?

Q3: What are the main types of Cloud Computing Services?

Q4: Name Few Public Cloud Providers?

Q5: What is Cloud testing?

Q6: What are the types of Cloud Testing?

Q7: What are the Benefits of Cloud Testing?

Q8: What are Key Cloud Testing Challenges?

Tutorial – 28/04/2024 [Answers - I]

Q1: What is Cloud Computing?

Cloud Computing is the delivery of computing services - including servers, storage, databases, networking, software, analytics, and intelligence - over the Internet ("the cloud") to offer faster innovation, flexible resources, and economies of scale.

Q2: What are the main types of Cloud Computing?

- Private Clouds
- Public Clouds
- Hybrid Clouds
- Multiclouds

Q3: What are the main types of Cloud Computing Services?

- Infrastructure-as-a-Service (IaaS)
- Platforms-as-a-Service (PaaS)
- Software-as-a-Service (SaaS)

Tutorial – 28/04/2024 [Answers - II]

Q4: Name Few Public Cloud Providers?

- AWS

- Microsoft Azure

- GCP

- Oracle Cloud

- Salesforce

- Alibaba Cloud

- IBM Cloud

Q5: What is Cloud testing?

- Cloud Testing is a process of using cloud based resources to stimulate real world user traffic and environments for testing software applications. This method leverages cloud computing environments to provide more diverse testing scenarios.

Q6: What are the types of Cloud Testing?

- Testing of Cloud Resources. The cloud's architecture and other resources are assessed for performance and proper functioning. This involves testing a provider's platform as a service (PaaS) or infrastructure as a service (IaaS). Common tests may assess scalability, disaster recovery (DR), and data privacy and security.

- Testing of Cloud-native Software. Testing of SaaS products that reside in the cloud.

- Testing of Software with Cloud-based Tools. Using cloud-based tools and resources for QA testing.

Tutorial – 28/04/2024 [Answers - III]

Q7: What are the Benefits of Cloud Testing?

- Cost-effective

- Availability

- Scalability

- Quicker testing process

- Disaster recovery is much simpler

Q8: What are Key Cloud Testing Challenges?

- Vendor lock-in

- Lack of control

- Security and privacy concerns

- Potential availability issues

- Misleading service-level agreements

- Infrastructure issues

- Hidden costs

- Possible non-compliance

Tips to Face a Successful Interview...

- **Prerequisites : To get called for an Interview,**

  - Resume,

  - LinkedIn Profile,

  - References,

- **Preparation for the called Interview,**

  - Analyze the Job [Role & Responsibilities],

  - Research about Company,

  - Get the requested Documents ready,

  - Your Expectations,

  - Getting ready with your Introduction,

Tips to Face a Successful Interview...

- **Interview Day,**
  - ○ **Focus on creating a positive first impression,**
    - ✓ **Punctuality,**
    - ✓ **Read the job description for the interview one more time,**
  - ○ **Dress professionally to your interview,**
    - ✓ **It gives out your intentions towards this job role,**
    - ✓ **Virtual interviews required more preparation,**
  - ○ **Throughout the Interview - Have good posture. Always smile. Demonstrate good manners,**
  - ○ **Start by answer the First Question well – "*Tell me about yourself*"**
    - ✓ **Skills and Qualities,**
    - ✓ **Experience or Qualifications,**
    - ✓ **Significant achievements,**
    - ✓ **Type of person you are and what you going to do if hire you,**

Thank You Again!!!