**Training Document**

**Topic:** Software Development Life Cycle Models & cloud computing

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**Software Development Life Cycle (SDLC):** The Software Development Life Cycle (SDLC) is a structured process that defines the stages involved in developing software. It ensures that the software is of high quality, meets customer requirements, and is delivered within time and cost constraints.

**1. Waterfall Model and Phases**  
The Waterfall Model is a sequential software development methodology where each phase must be completed before moving to the next. It follows a structured approach, making it suitable for projects with well-defined requirements.

* **Requirement Gathering**: Collecting all requirements before development begins.

Requirements are collected, documented, and finalized before

* **System Design**: Planning the architecture and technical design.

The overall system architecture and technical design are planned based on requirements.

* **Implementation**: Writing and integrating the code.

Developers write and integrate the code based on the design.

* **Testing**: Verifying that the system meets the requirements.

The system is tested for bugs, errors, and performance issues.

* **Deployment**: Releasing the system for use.

The software is deployed to production for end users.

* **Maintenance**: Handling updates and bug fixes post-deployment.

Bug fixes, updates, and improvements are made post-deployment.

**Advantages:**

* Clear structure and documentation.
* Easy to manage due to its linear approach.

**Disadvantages:**

* Not flexible for changes once development starts.
* Late discovery of issues since testing happens at the end.

**2. Agile Model and Phases**  
Agile is an iterative and incremental software development approach that emphasizes flexibility, customer collaboration, and continuous improvement.

**Key Features of Agile:**

* Development is broken into small iterations (Sprints).
* Continuous feedback from stakeholders.
* Frequent testing and integration.
* Prioritization of working software over documentation.

**Agile Process:**

1. **Concept & Planning** : Understanding the requirements and defining objectives.
2. **Design & Development** :Creating the initial design and starting implementation.
3. **Testing & Feedback** : Regular testing and incorporating stakeholder feedback.
4. **Release & Review** : Delivering the working product in increments.
5. **Maintenance & Improvement** : Continuous updates and optimizations.

**Advantages:**

* Adapts to changing requirements.
* Continuous collaboration ensures a better end product.

**Disadvantages:**

* Requires active involvement from stakeholders.
* Less structured compared to the Waterfall model.

**4. What is Cloud Computing?**

Cloud computing is a technology that delivers computing services (storage, databases, servers, networking, etc.) over the internet instead of using local infrastructure. It allows businesses to access IT resources on demand.

* **Scalability** :Resources can be increased or decreased as needed.
* **Cost-Effectiveness** :Reduces the need for expensive hardware.
* **Accessibility** :Available from anywhere with an internet connection.
* **Security** : Managed by cloud providers with built-in security measures.

**5. Top Cloud Providers**  
The leading cloud computing providers include:

1. **Amazon Web Services (AWS)** – The most widely used cloud platform.
2. **Microsoft Azure** – Strong enterprise cloud solutions.
3. **Google Cloud Platform (GCP)** – Known for AI and data analytics capabilities.
4. **IBM Cloud** – Focuses on hybrid cloud solutions.
5. **Oracle Cloud** – Specialized in enterprise applications and databases.m
6. **Types of Cloud Computing**

**Service Cloud:** A cloud service refers to the delivery of computing resources like storage, processing power, software, and applications over the internet. Instead of maintaining and managing physical hardware or software, users can access these services via the web, which are provided and managed by cloud service providers.

Cloud services are categorized into three primary types:

**(1)Infrastructure as a Service (IaaS)**:

* + Provides virtualized computing resources over the internet, such as servers, storage, and networking. It allows businesses to rent infrastructure rather than buy and maintain it.
  + Example: AWS EC2, Microsoft Azure Virtual Machines.

**(2)Platform as a Service (PaaS)**:

* + Offers a platform that allows developers to build, deploy, and manage applications without worrying about the underlying hardware or software layers. It provides the tools, frameworks, and services needed for app development.
  + Example: Google App Engine, Heroku.

**(3)Software as a Service (SaaS)**:

* + Delivers software applications over the internet on a subscription basis. Users can access software via a browser without installing or maintaining it on their own devices.
  + Example: Google Workspace (Docs, Gmail), Microsoft Office 365, Dropbox.

**Deployment Cloud:** Deployment Cloud refers to the method or environment used to deploy and host applications, services, and resources on the cloud. It defines how and where the cloud resources are made available to users or systems after development.

There are several cloud deployment models that determine how resources are deployed and who has access to them. These models help businesses decide the best way to set up and manage their cloud-based infrastructure based on their needs for security, control, and cost.

**Public Cloud** – Services provided by third-party vendors (e.g., AWS, Azure, GCP).

**Private Cloud** – Dedicated infrastructure for a single organization.

**Hybrid Cloud** – A combination of public and private clouds for better flexibility.

**Multi-Cloud** – Using multiple cloud providers for different services.