

Software Development Concepts

Error, Bug/Defect, and Failure:

Error:

Human action that produces an incorrect result.

Bug/Defect:

Flaw in the software that causes it to behave unexpectedly.

Failure:

Occurs when the software does not perform as expected in a specific environment or situation.

Error Example:

A developer writes incorrect code in the payment processing system. Instead of multiplying the quantity of an item by its price, they accidentally add them together. Code Example: Instead of `totalPrice = quantity * price`, they write `totalPrice = quantity + price`.

Bug Example:

Due to this error, when a customer tries to buy 3 items priced at \$20 each, the website calculates the total price as \$23 instead of \$60.

Failure Example:

The customer gets an incorrect total price and either pays too little or too much. This incorrect calculation can lead to financial discrepancies and loss of trust in the website.

Reasons for Software Bugs:

- Miscommunication.

- Software complexity.
- Programming errors.
- Changing requirements.
- Lack of skilled testers.

Why do we need testing?

- Ensure that software is bug-free.
- Ensure that the system meets customer requirements and software specifications.
- Ensure that the system meets end-user expectations.

The software development life cycle: what exactly does this mean?

Let's take any company, not just an IT company. Normally, what do companies do? They take some raw material, perform some processes, and finally release a product to the market. This could be a financial company, a pharmaceutical company, or an IT company. For an IT company, the process involves taking some input, performing certain processes, and then, based on the requirements, designing the software. After the design, they will implement or develop the code. Following that, they will test and finally deliver the software to the customer. If you don't have a proper process, it is very difficult to achieve the desired results. So, we need to have a structured process in place. In any company, there are three P's that are very important. The first P is people, the second P is process, and the third P is product. These three are the main pillars of any company.

The three P's:

- People: The employees and stakeholders involved in the development.
- Process: The methodologies and procedures we follow in the company.
- Product: The final software delivered to the customer.

SDLC Phases:

- **Requirement Gathering and Analysis:** During this phase, all the relevant information is collected from the customer to develop a product as per their expectation. Any ambiguities must be resolved in this phase only.
- **Design:** In this phase, the requirement gathered in the SRS document is used as an input and software architecture that is used for implementing system development is derived.
- **Implementation or Coding:** Implementation/Coding starts once the developer gets the Design document. The Software design is translated into source code. All the components of the software are implemented in this phase.
- **Testing:** Testing starts once the coding is complete and the modules are released for testing. In this phase, the developed software is tested thoroughly and any defects found are assigned to developers to get them fixed.
- **Deployment:** Once the product is tested, it is deployed in the production environment or first UAT (User Acceptance testing) is done depending on the customer expectation.
- **Maintenance:** After the deployment of a product on the production environment, maintenance of the product i.e. if any issue comes up and needs to be fixed or any enhancement is to be done is taken care by the developers.

Pre-SDLC Planning Phase:

- **Company Decision to Develop Software:** The company identifies a need or opportunity that can be addressed with software. They perform an initial feasibility study to ensure the project is viable. They define the high-level goals and objectives of the software.
- **Engaging an IT Company:** The company decides to engage an IT company to develop the software. They prepare a business case or project proposal, including initial requirements and objectives. They contact potential IT companies, evaluate them, and select one based on their capabilities and fit for the project.

SDLC Planning Phase (Within the Chosen IT Company):

- **Detailed Project Planning:** The IT company works closely with the client to understand detailed requirements. They develop a comprehensive project plan, including timelines, resources, budget, and deliverables. They perform a detailed risk assessment and develop a risk management plan.

- **Team Formation:** The IT company assembles a project team, defining roles and responsibilities. They ensure that the necessary skills and resources are available for the project.
- **Kickoff Meeting:** A kickoff meeting is held with all stakeholders to ensure everyone understands the project scope, plan, and their roles.