**03-02-2025**

**Testing**- It is done to check whether the developed software is bug free and suitable to the requirements or not.

Testing is divided into two steps-Verification and validation.

**Verification**: Verifying that the product which are building is right or not!

**Validation**: Verifying that the right product is been built or not!

The main objective of the testing is to release a quality product to the customer.

Quality product is nothing but a bug free application to the client. This Bugs or errors can be rectified and modified by testing only.

Why testing is important?

Let us take a example a banking application is built and without testing released to production, due to some errors in code clients cant do a transaction online or not showing available balance. This is called errors in application to overcome this testing is done before sent to production.

**Error**: When developer fails to understand the logic or requirement of client. A mistake made in the code .That might be a syntax error, logical error, runtime error, etc..

**Bug:** System failed to perform the required tasks is called as a bug.

**Failure**: If there is a multiple defects that lead to a software failure.

Bugs occur due to lack of communication, specification, code, design.

Software testing is majorly of two types:

1- Manual testing

2-Automation testing.

**Manual Testing**-Here do not use any testing tools, test cases are prepared by humans and test the software manually. This testing works well for Functionalities, user Interface, website behaviour, user acceptance.

**Automation Testing**- Here we use pre-scripted tools to test the software. It finds more bugs compared manual testing, it allows of reuse of tests.

**Software Testing:** It is a part of SDLC(software development lifecycle)

It is done to detect and identify the defects present in the developed software. To check whether it is satisfying the end user needs or not.

**Project:** If a software is build for specific customers it is called project.

**Product:** If a software is build for multiple users it is called product.

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**Advantages of manual testing:**

*Flexibility and Adaptability:* If any changes are made then that changes can be easily adaptable by humans Testers.

*Cost effectiveness:* As we are not using any test tools or machines to test the code.

*Immediate feedback:*  Here we humans test the code they identify the mistakes in the development itself.

*User Interference:* Tester usually interacting with software application user interface to check the issues with functionality, visual appearance.

**Disadvantages of manual testing:**

*Human Error:* Human error can happen by making mistakes while by executing the code.

*Expensive:* It will be expensive when end user requirements are changed or required frequent releases.

*Time consuming:* Test cases need to be executed manually so it takes more time compared to automation.

Techniques of Testing:

* Static Testing
* Dynamic Testing

**Static Testing:** This testing is used to check defects in the software without actually executing the code. Here programmer checks every line of code and handover to the tester. This type of testing uses both manual and automation testing. It is done while running the test process.

**Dynamic Testing:** It confirms that the software product works according to the clients requirements or not. This dynamic testing is broadly divided into two groups white box testing and black box testing.

***Black Box Testing:*** Checks functionality of the product. Looks only at whether the product functions as expected. It is a high level testing.

***White Box Testing:*** Focus on internal structure of the code. Developers check each line of code.

Levels of testing:

***Unit Testing:*** Individual modules of code is their. This modules of code is tested by QA engineers.

***Integration Testing:*** Individual modules are grouped together and tested while they are working properly or not.

***System Testing:*** Checking entire software system by verifying the app with software requirements listed in specifications.

***Acceptance Testing:*** Testing the software in real- world from users end and getting the feedback from the customer. This acceptance testing is of two types:

* Alpha Testing: Software is tested by internal development team in the presence of customer.
* Beta Testing: Testing is done by customers to check whether software is working properly or not.

***Smoke Testing:*** Testing done only on the newly released software application.

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**SDLC**- Software Development Life Cycle

Phases involved in SDLC are:

* Requirement gathering-Business Analyst & Project Manager
* Analysis- SRS[software requirement specification] document
* Designing-Architects are involved
* Development-Coding
* Testing-Testers
* Deployment-DevOps
* Maintenance-monitoring

Models of SDLC are:

1. Waterfall model
2. Agile methodology
3. Spiral model
4. Incremental model
5. Prototype model

**Waterfall Model:** It involves 6 stages. This is a sequential approach and linear process. This model is used when projects requirements and goals are very clear.

Because can’t modify in the middle of process. Six stages are:

Requiremen analysis Design Implementation Testing Deployment Maintenance

In this every stage involves a documentation. One stage can be started after the completion of before stage. It is not suitable for changing requirements after process is started. Once one stage is completed it is difficult to modify.

It is suitable for smaller projects only. Client involvement is very less.

Advantages of waterfall model:

* Requirements remains unchanged during the entire project
* The final cost can be determined before developed
* Early detection of issues
* Easy to manage as development is done in step by step.

Disadvantages of waterfall model:

* Not suitable for large projects
* High risk of failures if requirements is not fulfilled.
* Difficult to make changes
* Required more time for delivery.

**Agile methodology:** In this model client requirements can be changed at any phase. It is mostly used to develop large projects. Here testing is done on every piece of software that is developed. It focuses on continuous feedback and adaptability from end users.

Principles of agile methodology is:

* Customer need not to wait until the whole software is developed.
* Delivering the piece of software which contains some functionalities which is developed & testing
* We can adopt the requirements changes from the customer at any point of process

Advantages:

* It allows changes at any stage of development
* Early identification of errors which reduces costs.
* Suitable for large projects.
* Reduces the total development time of a project.
* Releases will be fast

Disadvantages:

* If customer is not clear about project/update then developers will be lead in a wrong direction.
* More customer involvement is required.
* Not suitable for fixed budget projects.
* Requires more customer involvement.

**Agile scrum:** Scrum is a framework which is used to develop, deliver products through iterative progress. It divides the large task into smaller chunks of tasks.

It works like here client deploys the required features or updates . Then developers take that tasks individually and develop it.

**Agile sprint:**

**Sprial Model**

**It is an Iterative model**

**It overcomes the drawback of waterfall model**

**1 cycle means 1 new release of software**

**Here softwares will release as versions**

**Here each cycle follows sdlc**

**1.Planning:**

**Requirement Analysis**

**2.Risk Analysis:**

**Plans the requirements of manpower to develop the software**

**Develop an prototype**

**Prototype means blueprint**

**3.Enginnering & Execution**

**Development**

**Testing: unit,integration,system**

**4.Evaluation:**

**Testing: Software testing, UAT**

**Advanatages:**

**Frequent releases will there**

**Requiment changes are allowed**

**Testing will be done in every cycle**

**Disadvanatges :**

**Requirement changes are not allowed between the cycles.**

**4.Incremental Model:**

**Also an Agile model**

**Requirement will be divided into modules**

**Modules will go through all phases of sdlc**

**Req analysis**

**Design**

**Development**

**Testing**

**Deployment**

**Maintenance**

**Advantages :**

**We can use it for lengthy projects**

**When the requirements are changing frequently**

**Disadvantages:**

**Cost is very high**

**No proper planning**

**5.Prototype model:**

**Cloud:**

**It is a huge space with all the services to use and rent it**

**Or**

**Servers that accessed over the internet**

**Cloud Computing:**

**The delivery of computing servers like servers,database,storage,networking,software,analystics over the interent**

**Types of cloud computing**

**1.service mode**

**a.saas: Software as a service**

**b.paas: Platform as a service**

**c.Iaas: Infrastructure as a service**

**d.faas: Function as a service**

**2.Deployment mode**

**a.Public cloud**

**b.private cloud**

**c.Hybrid cloud**

**d.community cloud**

**a.Public cloud: on-premises**

**it delivers the resources such as compute, storage, networking, development, deployment over the internet.**

**they are owned and run by the third party cloud providers like google cloud.**

**b.private cloud:**

**it is on/off premises**

**we can built, run even we can excess the services only when we belongs to a single org.**

**offer the limited services to a limited no of people.**

**They will give companies direct control over the data**

**c.Hybrid cloud:**

**it is combination of both public as well as private cloud**

**combine 1 public cloud & 2 private cloud**

**d. Community cloud:**

**it is nothing but sharing**

**we can access the cloud by sharing**