Development Models

Software Development Models are various processes or methods that are chosen for project development depending on the objectives and goals of the project. Many development life cycle models have been developed to achieve various essential objectives. Models specify the various steps of the process of development and the order in which they are executed.

Choosing the right model is very important for the development of an application. Development and testing processes are carried out based on the model.

Types of Developoment Models

1. Waterfall Model

Waterfall model is a famous and good version of Software Development Model for software engineering. The waterfall model is a linear and sequential model, which means that a development phase cannot begin until the previous phase is completed. We cannot overlap phases in waterfall model.

Advantages of Waterfall Model

- The model is simple and easy to understand.
- Is very useful for small projects.
- The model is easy to manage.

Disadvantages of Waterfall Model

- complete and accurate requirements are expected at the beginning of the development process.
- We cannot go back to the previous phase due to which it is very difficult to change the requirements.
- in this the testing period comes very late.

2. V-Model

V-Model is also called Verification and Validation Model. V-Model is widely used in the software development process, and it is considered a disciplined model. In V-Model, the execution of each process is sequential, that is, the new phase starts only after the previous phase ends. testing phase of V-Model is in a V-shape in other words both software development and testing activities take place at the same time.

Advantages of V-Model

- Is a simple and easy to use model.
- Planning, testing and designing tests can be done even before coding.
- Small and medium scale developments can be easily completed using it.

Disadvantages of V-Model

- The model is not suitable for any complex projects.
- Is not a suitable model for an ongoing project.
- The model is not suitable for a project which is unclear and in which there are changes in the requirement.

3. Incremental Model

In Incremental Model, the Software Development Process is divided into several increments and the same phases are followed in each increment. In simple language, under this model a complex project is developed in many modules or builds.

Advantages of Incremental Model

- Important modules/functions are developed first and then the rest are added in after.
- The model is flexible and less expensive to change requirements and scope.
- It is easier to test and debug during a short iteration.

Disadvantages of Incremental Model

- Management is a continuous activity that must be handled.
- The complete requirements of the software should be clear.
- The total cost of this model is higher.

4. RAD Model

RAD model stands for rapid application development model. The methodology of RAD model is similar to that of incremental or waterfall model. It is used for small projects.

If the project is large then it is divided into many small projects and these small projects are planned one by one and completed. In this way, by completing small projects, the large project gets ready quickly.

Advantage of RAD Model

- It reduces the time taken in development.
- In this the components are reused.
- It is suitable for small projects.

Disadvantages of RAD Model

- In this we need highly skilled developers and designers.
- It is very difficult to manage.
- It is not suitable for project that are complex and takes long time.

5. Iterative Model

In Iterative model we start developing the software with some requirements and when it is developed, it is reviewed. If there are requirements for changes in it, then we develop a new version of the software based on those requirements. This process repeats itself many times until we get our final product.

Advantage of Iterative model

- In iterative models, bugs and errors can be identified quickly.

- Under this model, software is prepared quickly with some specifications.
- Testing and debugging the software becomes easier during each iteration.

Disadvantage of Iterative model

- Iterative model is not suitable for small projects.
- Since we have to repeat iterations many times in the software development process due to which we require more resources.
- Due to constantly changing requirements, the budget of the project also increases and it takes more time to complete it.

6. Spiral Model

Spiral model is Software Development Process model. This model has characteristics of both iterative and waterfall models. This model is used in projects which are large and complex. This model was named spiral because if we look at its figure, it looks like a spiral, in which a long curved line starts from the center point and makes many loops around it. The number of loops in the spiral is not decided in advance but it depends on the size of the project and the changing requirements of the user. We also call each loop of the spiral a phase of the software development process.

Advantages of Spiral Model

- Spiral model is suitable for large and complex projects.
- It is easy to estimate how much the project will cost.
- Risk analysis is done in each phase of this model.

Disadvantage of Spiral Model

- This is the most complex model of SDLC, due to which it is quite difficult to manage.
- The model is not suitable for small projects.

- It requires more documentation than other models.

7. Prototype model

Prototype model is an activity in which prototypes of software applications are created. First a prototype is created and then the final product is manufactured based on that prototype. One problem in this model is that if the end users are not satisfied with the prototype model, then a new prototype model is created again, due to which this model consumes a lot of money and time.

Advantages of Prototype model

- Prototype Model is suggested to create applications whose prototype is very easy and which always includes human machine interaction within it.
- When we know only the general objective of creating software, but we do not know anything in detail about input, processing and output. Then in such a situation we make it a Prototype Model.
- When a software developer is not very sure about the capability of an algorithm or its adaptability to an operating system, then in this situation, using a prototype model can be a better option.

Disadvantages of Prototype model

- When the first version of the prototype model is ready, the customer himself often wants small fixes and changes in it rather than rebuilding the system. Whereas if the system is redesigned then more quality will be maintained in it.
- Many compromises can be seen in the first version of the Prototype Model.
- Sometimes a software developer may make compromises in his implementation, just to get the prototype model up and running quickly,

and after some time he may become comfortable with making such compromises and may forget that it is completely inappropriate to do so.

8. Agile Model

Agile model is a combination of iterative and incremental models, that is, it is made up of iterative and incremental models. In Agile model, focus is given to process adaptability and customer satisfaction.

In earlier times, iterative waterfall model was used to create software. But in today's time developers have to face many problems. The biggest problem is that in the middle of software development, the customer asks to make changes in the software. It takes a lot of time and money to make these changes.

The agile model was created mainly to make changes in the middle of Software Development so that the software project can be completed quickly. So to overcome all these shortcomings, the agile model was proposed in the 1990s.

Advantages of Agile Model

- In this, two programmers work together due to which the code is error free and there are very few mistakes in it.
- In this the software project is completed in a very short time.
- This is a very realistic approach to software development.

Disadvantages of Agile Model

- It cannot handle complex dependencies.
- Due to lack of formal documentation in this, there is confusion in development.
- In the beginning of software development, it is not known how much effort and time will be required to create the software.