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Software Engineering

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Abstract: Software engineering is a process where we use different models to produce good, reliable, efficient software with minimum time, cost and energy. In software development life cycle various steps are followed like requirement, feasibility study, system analysis, designing, coding, testing and maintenance. Here various models will be discussed like waterfall, v model, big band model, iterative etc. Now a day's software is used in every field starting from household items to flight management system at airports. That is why software engineering is used to produce software to perfection because a little mistake will take thousands of lives.

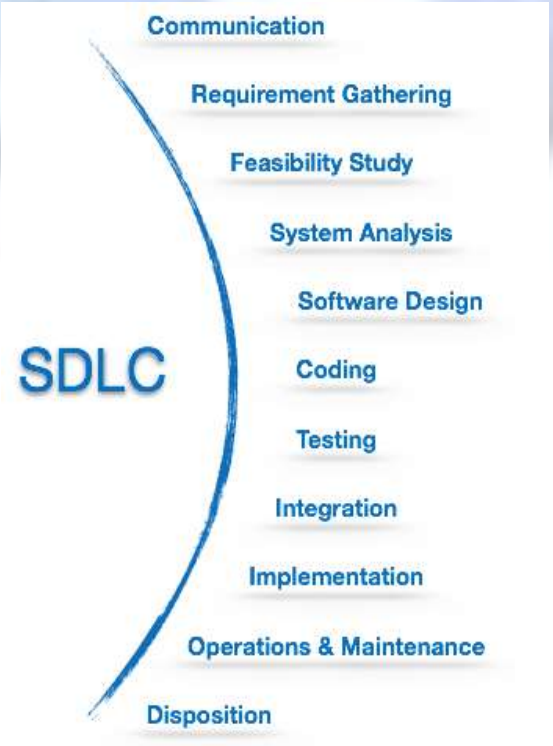
Keywords: reliable, efficient, system analysis, designing, coding.

Introduction

IEEE defines software engineering as "The application of a systematic, disciplined, quantifiable approach to the development, operation and maintenance of software." It is a process in which you develop software, and all the methods and procedures used in this process is called software engineering. The basic idea of developing software to produce such software which is efficient and reliable. Software engineering is used in both applications whether it is complex or simple because success of software depends on how the software is created.

SDLC Activities: -

SDLC is a software development life cycle it includes all the steps to develop a software product efficiently. Following are the steps it includes: -



1. **Communication**: -This is the first step here the user requests the software and tries to negotiate the terms. It submits the request to the organization in writing.
2. **Requirement Gathering**: - From this step the actual work of the organization starts. They hold discussion and try to bring out all the necessary information for the software. Then the requirement is divided into user requirements, system requirements and functional requirements. For collecting information various techniques are used like interview method, studying the system and software or collecting answers from questionnaires.
3. **Feasibility Study**: - After you have gathered information, then we analyze if the software can be made to fulfill all the requirements. At this point we also check whether the software is financially, practically and technologically possible.
4. **System Analysis**: - It includes understanding software, its limitations, learning system problems, changes to be made to the software, and the software impact on the organization. Software schedule and its scope are discussed.
5. **Software Design**: - In this step we actually design the software, here the inputs from the user and the information gathered from different sources is used as input of this step. The output can be logical design and physical design.
6. **Coding**: - Here the programming part starts, whatever the programming language we use based on the requirement as per the software.
7. **Testing**: -Every software you produce you must test it before releasing in the market or before handing over to the user. It has various types few of them are module testing, program testing, white box testing, black box testing, user testing, acceptance testing etc. If you detect errors at early stage you are able to produce reliable software.
8. **Integration:** - Software is integrated with libraries, databases and other programs.
9. **Implementation**: - After all the phases you finally implement at the user end, it is actually called installation.
10. **Operation and Maintenance**: - 50 percent of the amount is spent in the maintenance; it may take 5 to 50 years. As long as the software is working it needs maintenance.
11. **Disposition**: - As the time passes the software may decline on the performance. It may go completely obsolete. It require closing down the system

Software Paradigms

These are the steps which are performed during designing of the software. These are combined into various categories.

1) Software Development Paradigm

These are concepts which are applied during the software development. It requires various researches and requirement. It includes: -

- Requirement gathering
- Software design
- Programming

2) Software Design Paradigm

It includes –

- Design
- Maintenance
- Programming

3) Programming Paradigm

It includes –

- Coding
- Testing
- Integration

Need of Software Engineering

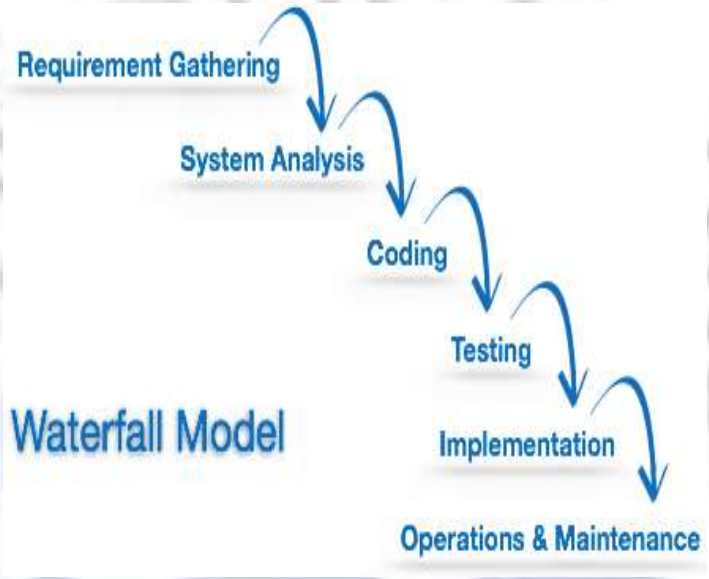
Earlier software were small involves small amount of money, which were simple etc. so to manage those software were quite easy but as the complexity increases the demand for more efficient, reliable, maintainable, functional etc. so that is why software engineering came into picture. Following features which are required for better software are as under: - Budget, Usability, Efficiency, Correctness, Functionality, Dependability, Security, Safety, Transitional, Portability, Interoperability, Reusability, Adaptability, Maintenance, Modularity, Maintainability, Flexibility and Scalability.

Software Models

There are various models in software which we follow when we create any software.

1. **Waterfall Model**

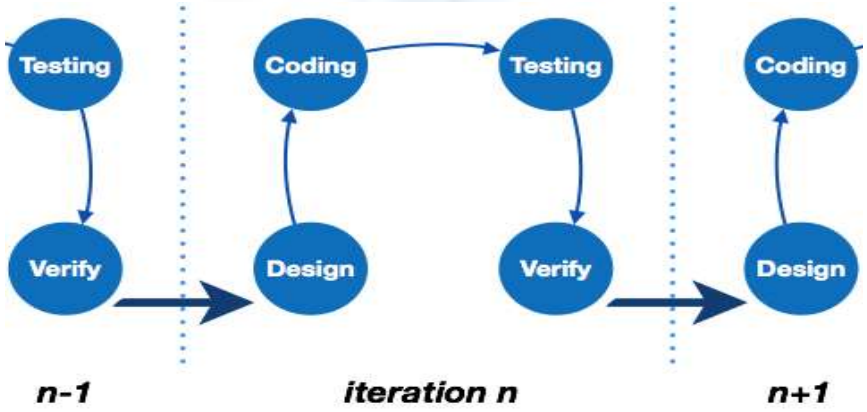
It is simplest of all the phases. It works in a linear manner. The second phase will begin when the first phase is finished.



This model does not allow us to go back and undo our actions. This works only when developers are aware of its domains.

2. **Iterative Model**

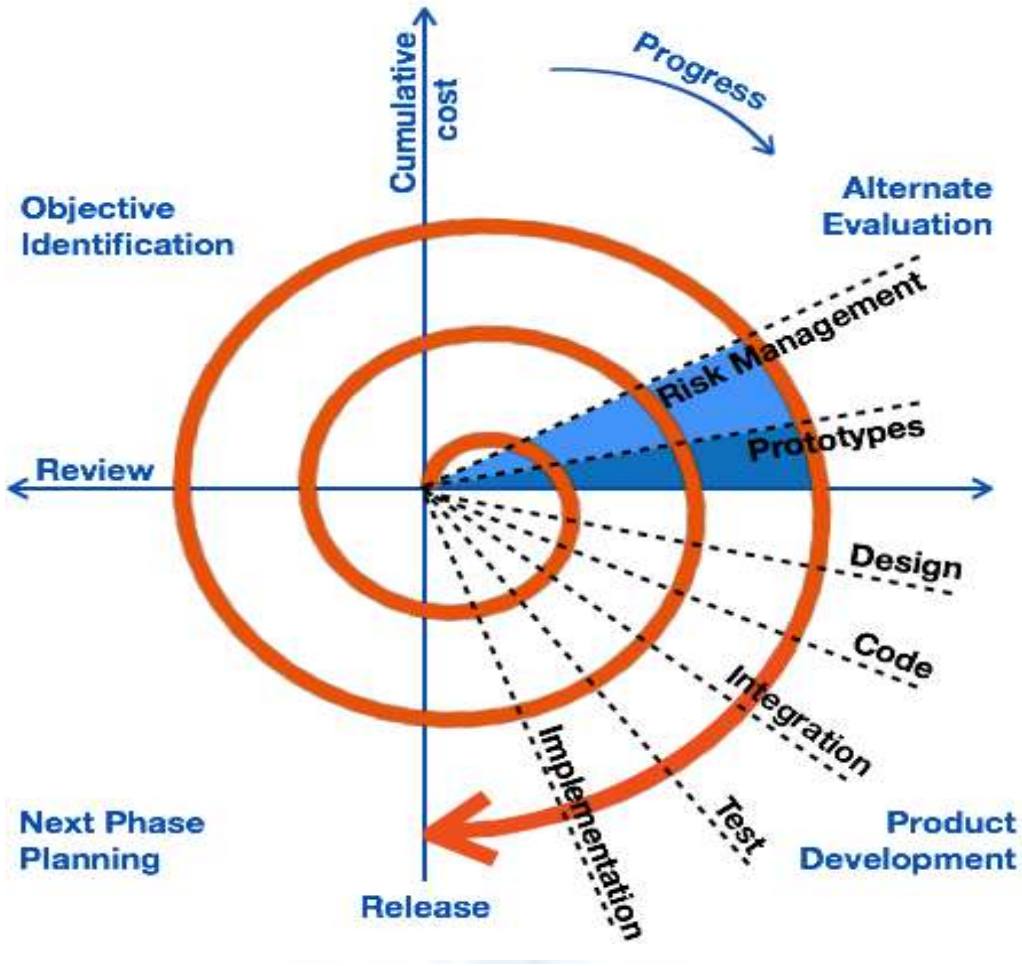
It works in iterations. In this process it repeats every step after every cycle of SDLC process.



First a module is designed, coded, tested and then with every iteration more features are added and every step produces software, which is complete in it and new features are added as per requirements. After each step risk management is done.

3. Spiral Model

It is combination of both iterative model and one of the SDLC model.



In this model in each step risk management is done which is ignored in other models. It starts with objectives and in the next step a prototype is build, so that user has basic idea, how the final software will look like, It includes risk analysis.

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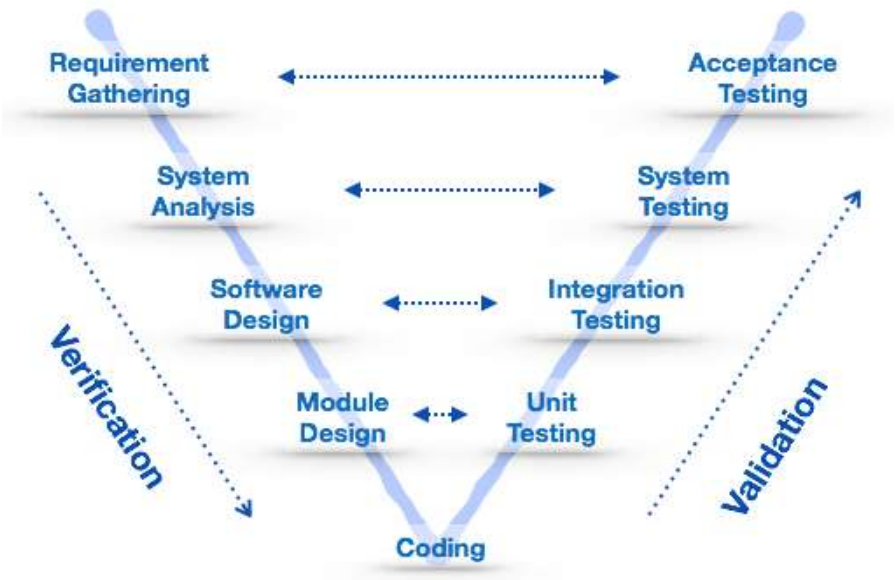
4. V – Model

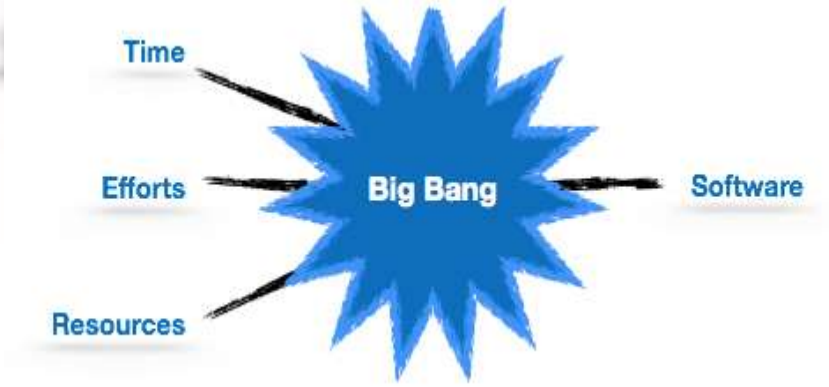
The major drawback of waterfall model and it is sequential model and you cannot go back to previous stage. In this model at each stage testing is done in reverse manner.



At each stage, cases are used to validate and verify the product. Product is developed and ready for testing, test cases are used to verify the software. Here the verification and validation are done in parallel.

5. Big Bang Model

In this model planning is required. If we use programming and funds we may able to produce best software.



In this model, it does not follow any process, and at times customer is not sure about the requirements and needs, so the inputs are arbitrary. It is a model basically used for experimenting.

Conclusion

Software engineering is a process in which we use various processes to produce good, reliable and efficient software with minimum cost and time. It is used in every field varying from complex applications to simpler ones. To perform actions more efficiently, quickly and cost effective software engineering technique is compared to traditional methods. Now a day's work is done online, all these online applications are software, which are produced using various software development life cycle using all the designing, coding, testing and maintenance phases.

Reference

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