

A COMPARATIVE STUDY AND ANALYSIS OF THREE SDLC MODELS WITH REAL TIME APPLICATIONS

¹Valarmathi.V, ²Swathika.A

¹Assistant Professor, ²Student B.Sc IT
Department of Information Technology
Sri Krishna Arts and Science College, Coimbatore, Tamil Nadu, India.

Abstract - To development a reliable high quality software system any person must be aware of Software Development Life Cycle (SDLC). It is a well-defined and systematic approach. It describes the levels involved in an information system development mission, from an initial feasibility till maintenance of the completed application. This paper deal with three SDLC models, namely; Waterfall model, v-model, spiral model among the available different types of SDLCmodels. The main aim of this research paper is to study different aspects of these models.

Keywords: SDLC, waterfall model, v-model, spiral model, comparison of models.

1. INTRODUCTION

Software Development Life Cycle (SDLC) is a procedure utilized by the software program industry to design, develop and take a look at excessive pleasant software. The SDLC goals to provide a notable software program that meets or exceeds patron expectations, reaches completion within times and value estimates.SDLC is the acronym of Software Development Life Cycle.It is also known as software development system.SDLC is a framework defining obligations completed at every step inside the software improvement procedure.ISO/IEC 12207 is a global general for software program lifestyles-cycle approaches. It ambitions to be the standard that defines all the obligations required for developing and preserving software. SDLC is a manner that includes a chain of planned activities to broaden or alter the software program merchandise. SDLC is important for the software mission success, the good software engineer should have the enough revel in and understanding to pick a select one model than another based totally on the undertaking context.SDLC is a manner observed for a software program project, within a software corporation. It includes a detailed plan describing a way to develop, preserve, replace and adjust or enhance specific software program [1].[2] [4].The life cycle defines a method for enhancing the exceptional of software and the overall improvement method.

Following are the maximum crucial and famous SDLC models:

- Waterfall Model
- Iterative Model
- Spiral Model
- V-Model
- Big Bang Model
- Evolutionary development model
- Synchronize and stabilize model

Different associated methodologies are agile model, RAD model, rapid application development and prototyping models.

The following figure is a graphical illustration of SDLC tiers.

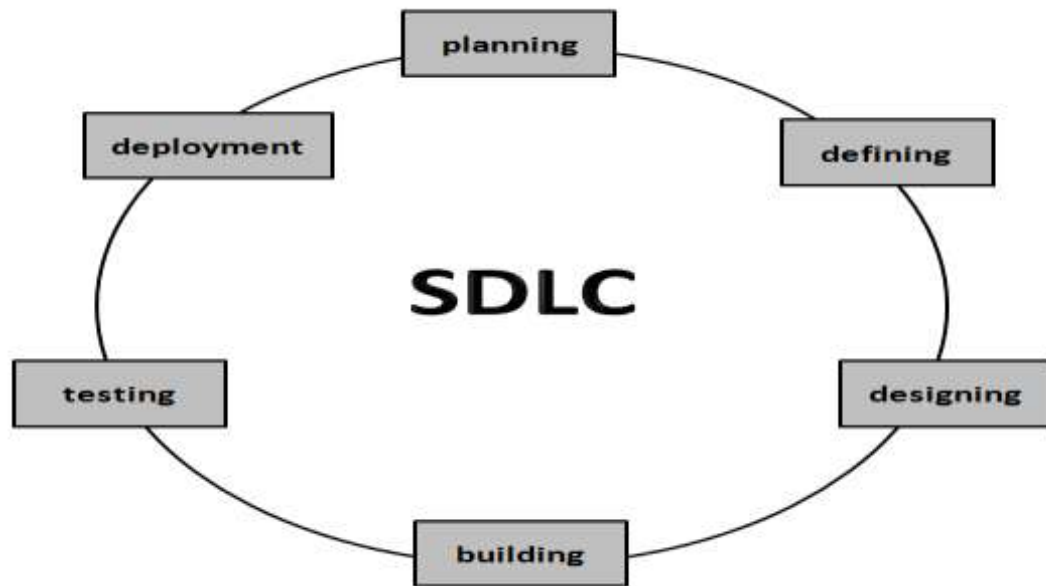


Fig 1: SDLC Tiers

2. WATERFALL MODEL

The waterfall version changed into the first method model to be added. It's also referred to as a linear-sequential life cycle model. It's far quite simple to apprehend and use. In a waterfall model, every segment should be completed earlier than the subsequent phase can start and there may be no overlapping in the stages. The waterfall model is the earliest sdhc technique that became used for software development. The waterfall version illustrates the software development system in a linear sequential glide. This means that any section in the improvement system starts most effective if the previous section is whole. In this waterfall model, the phases do no longer overlap. In waterfall, improvement of 1 section begins most effective while the previous segment is whole. Because of this nature, every phase of waterfall version is pretty specific well defined. Because the phases fall from better stage to decrease level, like a waterfall, it's named as waterfall version.

The sequential phases in Waterfall model are –

- Requirement Gathering and analysis
- System Design
- Implementation
- Integration and Testing
- Deployment of system
- Maintenance

Application:

- Each software developed is exceptional and requires an appropriate SDLC method to be observed based on the inner and external elements.
- Requirements are thoroughly documented, clear and fixed.
- Product definition is stable.
- Technology is understood and is not dynamic.
- There are no ambiguous requirements.
- Ample resources with required information are to be had to assist the product.
- The project is short.

Real time Application: Waterfall model is like a making of TEA where all the above specified phase is same like

- Requirement gathering and analysis: Find out the want of preparing tea
- System design: Making of tea in numerous phases, following the sequential order.
- Implementation: Here the execution is finished, ultimately how we are making tea which may be in units like Boiling of water, setting sugar and tea after which milk one at a time
- Integration and testing: Right here all the elements are prepare which can be in above segment are in units and the eventually testing of tea is executed
- Deployment of system: Here the tea is served to the unique customers
- Maintenance: Tea is preserved, for the similarly makes use of.

Waterfall model is same as making of tea as once the manner of creating tea is carried out can't be reverting lower back.[9]

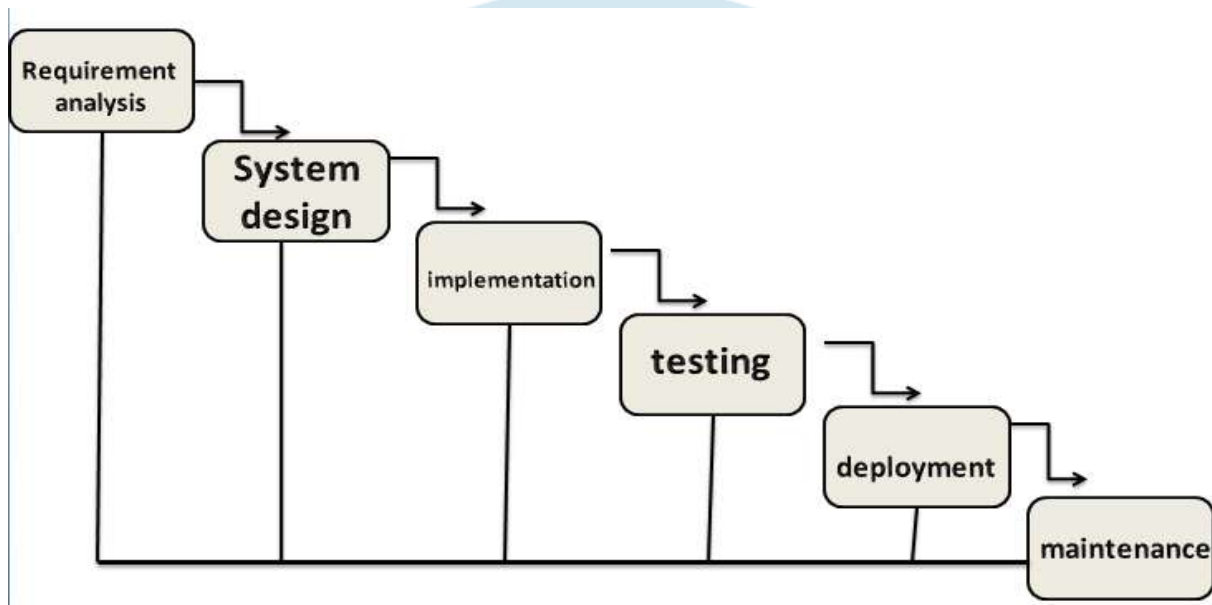


Fig 2: Waterfall model

3.V MODEL

The V-version is an SDLC model where execution of methods occurs in a sequential way in a V-form. It's also known as Verification and Validation version. The V-version is an extension of the waterfall version and is based totally on the affiliation of a trying out section for every corresponding improvement level. This means that for every single segment inside the development cycle, there may be a without delay related testing segment. This is a relatively-disciplined version and the next section starts handiest after finishing touch of the preceding segment.

V-Model - Verification Phases

- Business Requirement Analysis
- System Design
- Architectural Design
- Module Design
- Coding Phase

V-Model - Validation Phases

- Unit Testing
- Integration Testing
- System Testing
- Acceptance Testing

V-Model— Application

- Requirements are well defined, sincerely documented and stuck.
- Product definition is strong.
- Generation isn't dynamic and is well understood through the task group.

- There are not any ambiguous or undefined requirements.

Real time Application:

EXAMPLE 1:

In some organisation this v-model represented as "V- cycle" and it's manually used in automotive projects. Its major objective is to begin exclusive activities in parallel with one-of-a-kind team participants. As an instance our undertaking concept is "Vehicle Door Window Controller". So what we've got most effective is the "Software program Requirement Specification (SRS)"

The mission is brief.

The steps might be as the subsequent

- Generate validation plan and design plan "towards SRS"
- Generate detailed layout and integration testing plan in opposition to "layout plan and validation plan"

Three coding degree in opposition to exact layout, unit trying out plan against "precise layout and verification plan"

EXAMPLE 2:

1. Verification: It is conducted from starting to give up of the mission, to make sure are we developing proper product or now not.
Ex: Evaluations, Stroll-via...
2. Static checking out: Trying out the without executing this system.
3. Validation: It is carried out on advanced product, to ensure is developed product right or now not.
Ex: machine testing, at...
4. Dynamic testing: checking out the executing this system, deliver i/p and validate o/p.

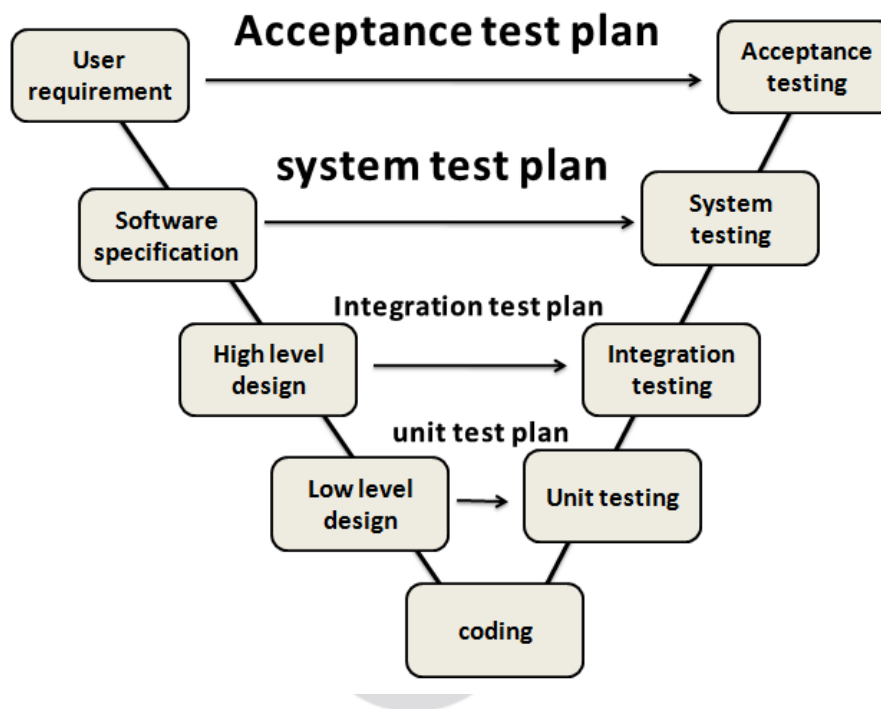


Fig 3: V-model

4.SPIRAL MODEL

The Spiral Model combines the idea of iterative development with the systematic, managed components of the waterfall model. This Spiral model is an aggregate of iterative development method version and sequential linear development model, the waterfall version with a totally high emphasis on threat evaluation. It lets in incremental releases of the product or incremental refinement via every new release around the spiral [8].

Spiral Model - Design

The spiral model has four phases. A software project repeatedly passes through these phases in iterations called Spirals.

- Identification
- Design
- Construct or Build
- Evaluation and Risk Analysis

Spiral Model Application

- Whilst there is a finances constraint and risk assessment is important.
- For medium to high-chance projects.
- Lengthy-time period venture commitment because of capacity changes to monetary priorities because the requirements change with time.
- Consumer isn't certain of their requirements that are typically the case.
- Requirements are complicated and want evaluation to get clarity.
- New product line which need to be released in stages to get sufficient consumer remarks.
- Big adjustments are anticipated inside the product for the duration of the improvement cycle.

Real time Application of Spiral model:

Working at the missiles or satellites is the actual time example of a spiral model. The hazard associated and Cumulative fees both are the very essential thing of the missiles [9].

- Knowledge the basic necessities, want and purpose is step one of the spiral version.
- Estimate the time table, time, price and the diverse assets to make the additives or the part of a missile Is comes underneath the class of planning that's the second one generation of spiral version.
- Figuring out, estimating, and tracking various dangers associated included beneath chance affiliation. Growing the final version primarily based upon the approved requirements is the growing iteration of the spiral version that is called engineering which includes requirement amassing and design of the software Device.
- Consist of coding and testing and launch of a missile is the most important new release of spiral version which is called production and release final iteration is the assessment, comments or the predicament or the achievement tale of launching of missile



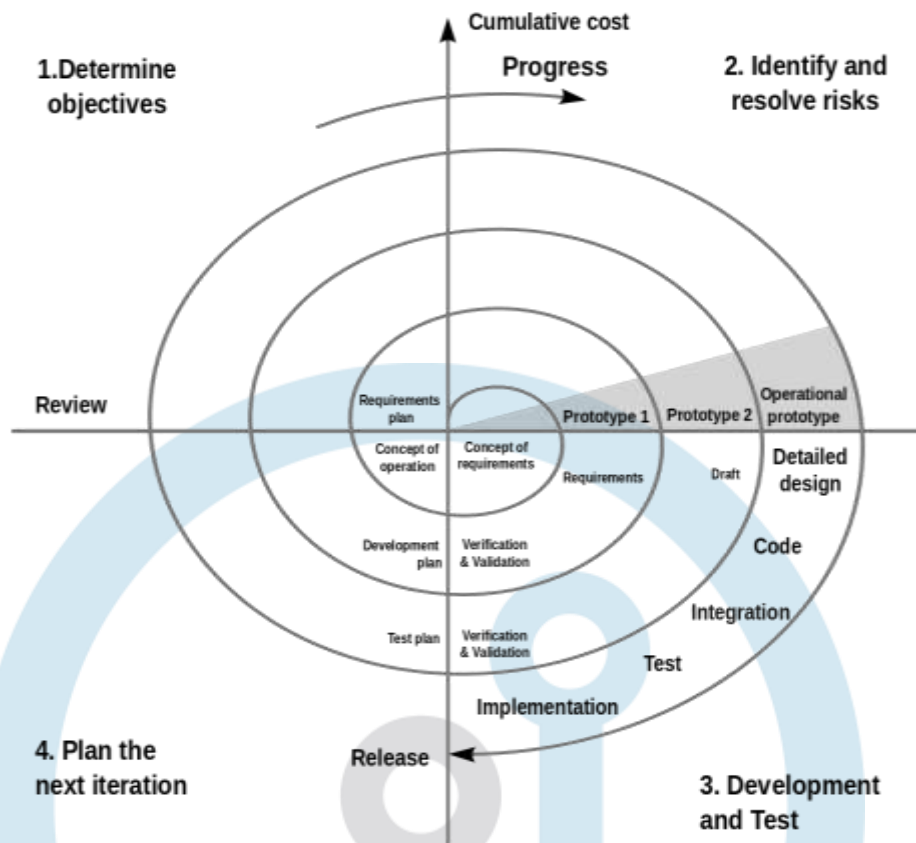


Fig 4: Spiral model

5. COMPARISON OF DIFFERENT SDLC MODELS

The above explained 3 SDLC models namely, Waterfall Model, V- Model and Spiral Models were compared with its feature in Table 1, Advantages and Disadvantages of those SDLC models were analysed in Table 2 and Table 3.

Table 1: Comparison of Different Features of SDLC Models

FEATURES	WATERFALL MODEL	V-MODEL	SPIRAL MODEL
REQUIREMENT SPECIFICATIONS	Startingstage	Startingstage	Starting stage
COST	Cheap	Expensive	Expensive
RISK FACTOR	Excessive	Excessive	Excessive
SUCCESS RATE	Poor	Excellent	Excellent
USER INVOLVEMENT	Low (only at starting stage z)	Average	Low(after each cycle)

ADVANTAGES AND DISADVANTAGES OF SDLC MODELS

Table 2: Comparison of Advantages

S.NO	WATERFALL MODEL	V-MODEL	SPIRAL MODEL
1	Simple and easy to use	Simple and easy to use	Excessive quantity of danger analysis
2	Easy to control due to the rigidity of the model	Specific deliverables for each phase.	Accurate for big and mission critical projects
3	Phases are processed and completed at one time	Higher possibilities of achievement over the waterfall version because of the development of test plans early on at some point of the life cycle	Software is produced early in the software life cycle
4	Works properly for smaller initiatives wherein requirements are very well understood	Works properly for small tasks in which requirements are without difficulty understood	Works hazard analysis contains higher priority

Table 3: Comparison of Disadvantages

S.NO	WATERFALL MODEL	V-MODEL	SPIRAL MODEL
1	Adjusting scope at some point of the life cycle can destroy a project	Very rigid, like waterfall version	May be a luxurious model to apply
2	No operating software program is produced until overdue at some stage in the life cycle	Little flexibility and adjusting scope is hard and steeply-priced	Risk analysis calls for highly specific expertise
3	Excessive amounts of chance and uncertainty	Software is evolved for the duration of the implementation segment, so no early prototypes of the software program are produced	Mission's achievement is distinctly dependent on the risk evaluation phase
4	Negative model for complicated and object oriented projects	Model does no longer provide a clean course for troubles determined throughout trying out levels	Does not work well for smaller tasks

CONCLUSION

This paper mainly focus on Waterfall model,V-model and Spiral model's comparative analysis based on the features: Requirement specification,cost,risk factor,user involvement,success rate and simplicity.From the analysis as shown in above tables,the developer can choose the appropriate Software Development Life Cycle model according to the requirements.The most important component is to understand their real time application with their core capabilities because the original water fall version is utilized by numerous huge groups for his or her internal initiatives in which their specification is nicely described. Spiral model is used for improvement of big, complex and expensive tasks like scientific projects, considering spiral version method allows the challenge term to address the highest hazard at the lowest total fee. This paper helps to understand the working of SDLC models and provides deep insights.Choosing a right model for a project is a crucial step of system development.

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