Software Development Process

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Abstract

After the waterfall model was invented and used successfully. With the increase of the demand of people for their convenient work, more and more software development modles are proposed. The development of software process model reflects different understanding of software process, which reflects the improvement of understanding about the software development process. This essay is intended to express different modles of software development.

Keywords: Software engineering; waterfall modle, prototyping modle, iterative and incremental development, spiral development, rapid application development

1 Introduction

In software engineering, a software development methodology (also known as a system development methodology, software development life cycle, software development process, software process) is a splitting of software development work into distinct phases (or stages) containing activities with the intent of better planning and management. It is often considered a subset of the systems development life cycle. The methodology may include the pre-definition of specific deliverables and artifacts that are created and completed by a project team to develop or maintain an application.

Software design method procedure for generating a precise and complete software design solution that meets clients needs and constraints

Design method components

• Design Process
Collection of related tasks that transforms set of inputs into set of outputs

• Design Notations
Symbolic representational system

• Design Heuristics
Rules providing guidance, but no guarantee, for achieving some end

Design methods also use design principles stating characteristics of design that make them better or worse

The Software Development Process A structured set of activities required to develop a software system

• Specification
• Design
• Validation
• Evolution

Generic Software Process Models

• The waterfall model
• Prototyping modle
• Iterative and incremental development
• Spiral development
• rapid application development

Waterfall model The waterfall model is a sequential development approach, in which development is seen as flowing steadily downwards (like a waterfall) through several phases. Emphasis is on planning, time schedules, target dates, budgets and implementation of an entire system at one time. The waterfall model is also commonly taught with the mnemonic A Dance in the Dark Every Monday, representing Analysis, Design, Implementation, Testing, Documentation and Execution, and Maintenance.

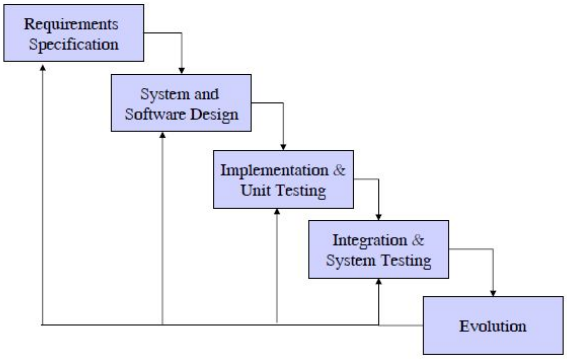

Figure 1: waterfall development

Prototyping modle Not a standalone, complete development methodology, but rather an approach to handle selected parts of a larger, more traditional development methodology. Attempts to reduce inherent project risk by breaking a project into smaller segments and providing more ease-of-change during the development process. User is involved throughout the development process, which increases the likelihood of user acceptance of the final implementation.

Iterative and incremental development Prescribes the construction of initially small but ever-larger portions of a software project to help all those involved to uncover important issues early before problems or faulty assumptions can lead to disaster.

Spiral development Focus is on risk assessment and on minimizing project risk by breaking a project into smaller segments and providing more ease-of-change during the development process, as well as providing the opportunity to evaluate risks and weigh consideration of project continuation throughout the life cycle. Each trip around the spiral traverses four basic quadrants: (1) determine objectives, alternatives, and constraints of the iteration; (2) evaluate alternatives; Identify and resolve risks; (3) develop and verify deliverables from the iteration; and (4) plan the next iteration.

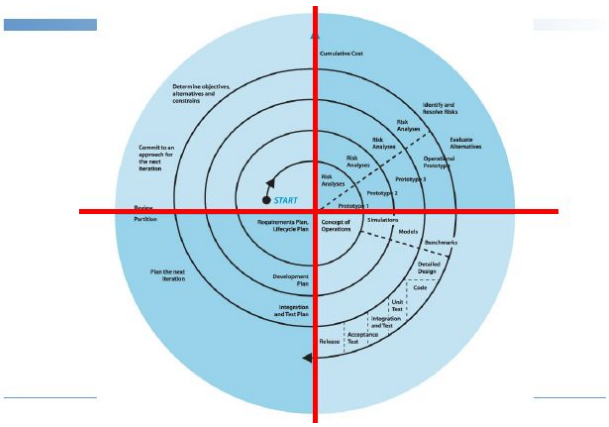

Figure 2: spiral development

Rapid application development is a software development methodology, which favors iterative development and the rapid construction of prototypes instead of large amounts of up-front planning. The lack of extensive pre-planning generally allows software to be written much faster, and makes it easier to change requirements.

- Key objective is for fast development and delivery of a high quality system at a relatively low investment cost.
- Attempts to reduce inherent project risk by breaking a project into smaller segments and providing more ease-of-change during the development process.
- Aims to produce high quality systems quickly, primarily via iterative Prototyping (at any stage of development), active user involvement, and computerized development tools. These tools may include Graphical User Interface (GUI) builders, Computer Aided Software Engineering (CASE) tools, Database Management Systems (DBMS), fourth-generation programming languages, code generators, and object-oriented techniques.
- Key emphasis is on fulfilling the business need, while technological or engineering excellence is of lesser importance.

2 Formal methods

Formal methods are mathematical approaches to solving software (and hardware) problems at the requirements, specification, and design levels. Formal methods are most likely to be applied to safety-critical or security-critical software and systems, such as avionics software. Software

safety assurance standards, such as DO-178B, DO-178C, and Common Criteria demand formal methods at the highest levels of categorization.

3 Conclusion

Software processes are the activities involved in producing and evolving a software system
• Specification
• Design and Implementation
• Validation
• Evolution

Software process models are a general way of describing specific processes
• The waterfall model
• Prototyping modle
• Iterative and incremental development
• Spiral development
• rapid application development

Iterative process models help with changing requirements
Approaches to iterative development
• Incremental delivery
• Spiral mode