Software Reuse

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Resue Based Software Engineering

- It is a strategy of using already existed components, modules or softwares in the new developing software in other to gear up development process and increase software reliability.
- Application system reuse (Whole system is reused in other systems)
- Component reuse (Components of application are reused)
- Function reuse (A single function is reused)

Resue Based Software Engineering (Benefits)

- Reused software which is already tested is more reliable as their faults are already found and fixed.
- It reduces margin of error in project cost estimation.
- It helps in faster development of software with less error and early delivery of product.
- The overall development cost and effort is reduced.

Resue Based Software Engineering (Problems)

- The reused elements may be incompatible with system changes if source codes are not available resulting in increase in maintenance cost.
- It may be difficult to integrate reused elements in the system.
- It may be tedious to generate some necessary modifications.
- It is difficult to find the reusable elements and to determine whether it is suitable for the project or not.

Factors to Consider while Planning Reuse

- Development schedule for the software
- Expected lifetime of the software
- Background, skills and experience of the project team
- Criticality of software and its non-functional requirements
- Application domain and platform

Design Patterns

- Design patterns is a way of reusing abstract knowledge about a problem and its pattern.
- It is a general repeatable solution to a commonly occuring problem in software design.
- It is a description or template for how to solve a problem that can be used in many different situations.
- A pattern is a description of a problem and the essence of its solution.
- It should be abstract so that it can be reused in different implementation and setting.
- It implies concept reuse to specific problem.

Uses of Design Patterns

- Speed up development process as it provides tested and proven development paradigm.
- It helps to prevent general issues.
- It provides general solutions documented in a format that serves as a basis to solve wide range of problems.
- It allows developers to communicate with well-known names of software interactions.

Elements of Design Patterns

- Name of Description
- Problem Description
- Solution
- Consequences

Generator Based Reuse

- In generator based reuse, the reusable knowledge is captured in a program generator system that can be programmed by domain experts.
- It takes advantage of the fact that applications in the same domain have common architecture and carry out comparable functions.
- It makes use of standard programs and algorithms which are embedded in the generator and parameterized by user command to generate a program automatically.

Generator Based Reuse

- For example – application generator for business data processing, parser generator for language processing, code generator in CASE tool and so on.
- It is cost effective.
- It is applicable to small number of domains only.

Application Framework

- A framework is a subsystem design made up of a collection of abstract and concrete classes and the interface between them.
- Frameworks are the large entities that can be reused.
- In framework, subsystems are implemented by adding components and by providing implementations of abstract classes.
- The framework takes all the complexities of interfacing with OS and simplifies the functionality for the developer.

Application Framework

- The main problems are:

1. Inherent complexity (It is difficult if the current application framework is different in some logic that you expect. In that case, all the work that are hidden by the framework should be implemented, and it is tedious.)
2. It takes more time to learn how to learn a specific application framework.

Application System Reuse

- It involves reusing an entire application system either by configuring a system for specific environment or by integrating two or more systems to create a new application.
- It may be of two types :

1. COTS (Commercial off the shelf) Product Reuse
2. Software Product Lines

COTS Product Reuse

- Software system that can be used without any change by the buyer.
- Large system can be created by integrating a range of COTS systems.
- Design choices should be made :

1. Which COTS product is most suitable?
2. How will data be exchanged?
3. What features of the product is actually used?

- Example : E-procurement system

Software Product Lines

- A product line is a set of applications with common application specific architecture.
- New development involves reuse of core application families with component configuration and adaptation to meet new demands.
- Example : Enterprise Resource Planning (ERP) system ; ERP is a business process management system that allows an organization to manage business and automate many functions related to technology, human resource and service.

Thank You !