Software Engineering

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Design Concepts

Design Concepts

Software Design

Software Design is the process to transform the user requirements into some suitable form, which helps the programmer in software coding and implementation. During the software design phase, the design document is produced, based on the customer requirements.

Design Concepts

- **designed and documented items during the design phase:**
  - ✓ Different modules required.
  - ✓ Control relationships among modules.
  - ✓ Interface among different modules.
  - ✓ Data structure among the different modules.
  - ✓ Algorithms required to implement among the individual modules.

Design Concepts

Objectives of Software Design:

1. **Correctness**:
   A good design should be correct i.e. it should correctly implement all the functionalities of the system.
2. **Efficiency**:
   A good software design should address the resources, time, and cost optimization issues.
3. **Understandability**:
   A good design should be easily understandable, for which it should be modular and all the modules are arranged in layers.
4. **Completeness**:
   The design should have all the components like data structures, modules, and external interfaces, etc.
5. **Maintainability**:
   A good software design should be easily amenable to change whenever a change request is made from the customer side.

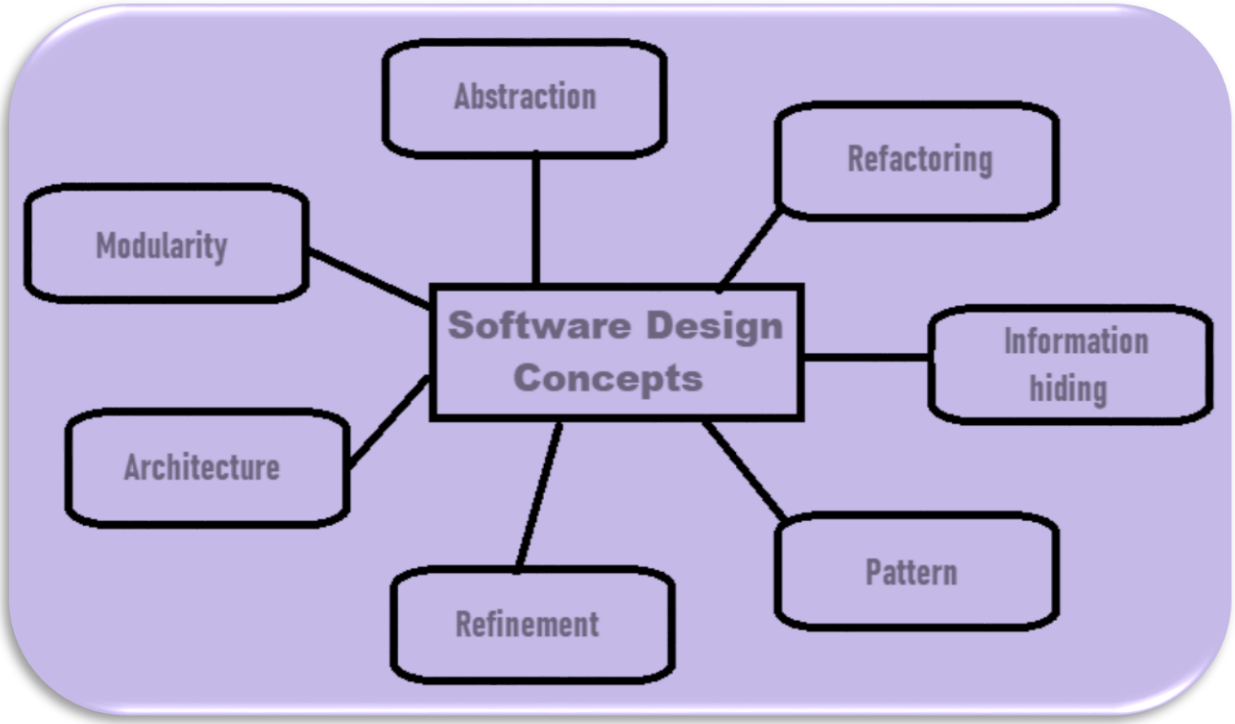
Design Concepts

Software Design Concepts:

- The **software design concept** simply means the idea or principle behind the design. It describes how you plan to solve the problem of designing software, the logic, or thinking behind how you will design software.
- It allows the software engineer to create the model of the system or software or product that is to be developed or built.
- The software design concept provides a supporting and essential structure or model for developing the right software.

Design Concepts

- **Main Concepts of software design:**



Design Concepts

1. Abstraction- hide Irrelevant data

- **Abstraction** means to hide the details to reduce complexity and increases efficiency or quality.
- Different levels of Abstraction are necessary and must be applied at each stage of the design process so that any error that is present can be removed to increase the efficiency of the software solution and to refine the software solution.
- The solution should be described in broad ways that cover a wide range of different things at a higher level of abstraction and a more detailed description of a solution of software should be given at the lower level of abstraction.

Design Concepts

2. Modularity- subdivide the system

- **Modularity** means dividing the system or project into smaller parts to reduce the complexity of the system or project.
- Modularity in design means subdividing a system into smaller parts so that these parts can be created independently and then use these parts in different systems to perform different functions.
- If the system contains fewer components then it would mean the system is complex which requires a lot of effort (cost) but if we are able to divide the system into components then the cost would be small.

Design Concepts

3. Architecture- design a structure of something

- **Architecture** simply means a technique to design a structure of something.
- Architecture in designing software is a concept that focuses on various elements and the data of the structure.
- These components interact with each other and use the data of the structure in architecture.

Design Concepts

4. Refinement- removes impurities

- **Refinement** means to refine something to remove any impurities if present and increase the quality.
- The refinement concept of software design is actually a process of developing or presenting the software or system in a detailed manner that means to elaborate a system or software.
- Refinement is very necessary to find out any error if present and then to reduce it.

Design Concepts

5. Pattern- a repeated form

- **Pattern** means a repeated form or design in which the same shape is repeated several times to form a pattern.
- The pattern in the design process means the repetition of a solution to a common recurring problem within a certain context.

Design Concepts

6. Information Hiding- hide the information

- **Information hiding** simply means to hide the information so that it cannot be accessed by an unwanted party.
- In software design, information hiding is achieved by designing the modules in a manner that the information gathered or contained in one module is hidden and can't be accessed by any other modules.

Design Concepts

7. Refactoring- reconstruct something

- **Refactoring** means reconstructing something in such a way that it does not affect the behavior of any other features.
- Refactoring in software design means reconstructing the design to reduce complexity and simplify it without affecting the behavior or its functions.
- Refactoring improves the internal structure.

Umbrella Activities

Umbrella Activities

Umbrella Activities

Software engineering is a collection of interconnected phases. These steps are expressed or available in different ways in different software process models.

Umbrella activities are a series of steps or procedures followed by a software development team to maintain the progress, quality, changes, and risks of complete development tasks.

Umbrella Activities

- Software Project Tracking and Control
- Formal Technical Reviews
- Software Quality Assurance
- Software Configuration Management
- Document Preparation and Production
- Re-usability Management
- Measurement and Metrics
- Risk Management