CSE4201: Object-Oriented Analysis & Design

Course Outline

Topic 1: Systems Development Methodologies

Topic 2: Object – Oriented Principles and Concepts

Topic 3: Object-oriented modeling:

Topic4: Requirements Engineering:

Topic 5: Structural modeling:

Topic 6: Behavioural modeling:

Topic 7: Design modeling

Topic 8: Design Patterns.

Core Textbooks

i. *Object-oriented analysis, design and implementation: an integrated approach* (2nd ed.). Cham, Switzerland: Springer. (by Dathan, B., & Ramnath, S., 2015).
ii. *Object-oriented analysis and design for information systems: modeling with UML, OCL, and IFML*. Amsterdam: Elsevier, Morgan Kaufmann. (Wazlawick, R. S. , 2014).
iii. *Object oriented analysis and design using UML*. New Delhi: McGraw Hill Education. (Mala, D. J., & Geetha, S., 2013).

Topic1: Software Development Methodologies

-what is a software development methodology?
-categories of software methodologies
-object oriented methodology
-common object oriented methods
-modern software development process models

1.1 What is software development methodology?

- A systematic approach for developing software products consisting of carefully selected:
  - Processes
  - Methods
  - Tools

1.2 Software development processes

- Patterns of organisation of software production activities depending on:
  - nature of the system being contructed
  - needs of the organisation
- Software production activities are many but can be grouped into four major tasks:
  - Specification
  - Development
  - Validation
  - Evolution

1.3 Software Process Models

- Structures that provide detailed breakdown of software processes and illustrate possible organization of software production activities.
- Process models are also known as software lifecycle models and are broadly grouped into:
  - Waterfall models
  - Evolutionary models
  - Spiral models
  - Prototyping models

1.4 Software Methods

- a set of procedures in which a specific goal is approached step by step.
- a step by step strategies or procedures for completing one or more of the software processes or production activities.
- software methods can broadly be grouped into:
  - *analysis methods*
  - *design methods*
  - *coding methods*
  - *testing methods*

1.5 Software Tools

- Instruments or devices that provide automated or semi-automated support for the software processes and methods.
- Examples of software tools:
  - *Editor*
  - *Compiler and Linker.*
  - *Graph editors for DFDs and other diagrams.*
  - *Test generators.*
  - *Graph editors for DFDs and other diagrams.*
  - *CASE tools for integrated development.*

1.6 Categories of Software Development Methodologies

- Object oriented methodologies
- Structured methodologies
- Information Engineering methodologies
- Prototyping methodologies

1.7 Object Oriented Methodology

- A methodology for viewing and modelling software system as a set of interrelated interacting objects and designing using Object-Oriented concepts.
- Consists of the following methods:
  - Object oriented analysis method
  - Object oriented design method

1.8 Object Oriented Analysis &Design

- *Object Oriented Analysis (OOA)* is concerned with developing requirements and specifications expressed as an object model (population of interacting objects) of a system, as opposed to the traditional data or functional views.
- *Object Oriented Design (OOD)* is concerned with developing object-oriented models of a software/system to implement requirements identified during OOA.

1.9 Common Object Oriented Methods

- Rambaugh method
- Booch method
- Jacobson method
- Coad & Yourdon method

1.10 Rambaugh Method

- Also known Object Modeling Technique (OMT)
- Describes a method for analysis, design, and implementation of system using OO techniques
- consists of four phases performed iteratively:
  - *Analysis –produces object, dynamic, and functional models*
  - *System design –produces structure of the architecture of the system*
  - *Object design –produces detailed object models, dynamic model, functional model*
  - *Implementation –produces reusable, extendible, and robust code*

Contd…Rambaugh Method

- OMT separates modeling into three different parts:
  - *Object model –presented using object diagram*
  - *dynamic model –presented using state and activity diagrams*
  - *functional model –presented using use case diagram*

1.11 Booch Method

- describes software development in two processes that cover both analysis and design phases of systems development:
  - *macro development process*
  - *micro development process*
- macro development process consists of 5 steps:
  - conceptualization –define core requirements
  - analysis –develop models for desired external beha
  - design –create system architecture
  - evolution –change syste thro successive refinement
  - maintenance –manage post delivery changes

Contd…Booch Method

- micro development process consists of 4 steps:
  - identify classes and objects
  - identify classes and objects semantics
  - identify classes and objects relationships
  - identify classes and objects interfaces and implementations

1.12 Modern Software Process models

- Agile software development model
- Rapid Application Development model

Assignment:

Describe the above two models noting clearly the category in which they belong, their stages, advantages and disadvantages