Chapter 10

Object- Oriented Software Engineering

Review

- Implementation is a very important phase of SDLC.
- There are no standard methodologies for implementation.
- The important activities of the implementation phase are:
  - Drawing up an Installation Plan
  - Implementing of Physical Procedures
  - Data Preparation and Conversion
  - Conducting User Training
  - Parallel run of the system
  - Seeking Implementation Approval
- The choice of an appropriate implementation strategy is critical to the successful implementation of any project.

Review Contd…

- The implementation is usually followed by post-implementation maintenance phase.
- CASE automates the process of software development.
- The essential components of a CASE are tools, toolkits, methodology companions and workbenches.
- The important toolkits being commonly used today are:
  - Analysis toolkits
  - Design toolkits
  - Programming toolkits
  - Project Management toolkits
  - Maintenance toolkits
- CASE is in the process of becoming an integral part of every software organization.

Objectives

- *Define the common process framework for Object-oriented (OO) design*
- *Describe object-oriented project metrics*
- *Estimate an OO based project*
- *Schedule an OO based project*
- *Track an OO based project*

Object-oriented Analysis & Design – The Basics

- Class is a template of an entity.
- Object is an instance of the class.

Person

Name
Age
Height
ColorofHair
ColorofEyes

Name = Wizard of Oz
Age = 100
Height = 6 ft
ColorofHair = White
ColorofEyes = Green

Class

- Attributes store information about the characteristics of an object.
- Functions are the operations that can be performed on the entity.

Managing Object-oriented Projects

- Establish a common process framework
- Use the framework and metrics to develop effort and time estimates
- Specify work products and milestones that will enable progress to be measured
- Define checkpoints for quality assurance and control
- Manage the changes that occur as the project progresses
- Track, monitor and control progress

Common Process Framework

- **Definition:** A common process framework (CPF) describes an organization’s approach to software development and maintenance.

- Example: **Component process assembly** process model that incorporates many features of another model called **spiral model**.

Some Activities in Spiral Model

- Customer communication
- Planning
- Risk analysis
- Engineering
- Construction and release
- Customer evaluation

Object-oriented Metrics

- Weighted methods per class
- Depth of inheritance tree
- Number of children
- Coupling between object classes
- Response for a class
- Lack of cohesion in methods

As identified by ***Shyam Chidamer*** *and* ***Chris Kemerer***.

Estimating an OO Project

- Develop estimates
- Develop and count scenario scripts or use cases
- Determine the number of key classes
- Categorize the type of interface for the application and develop a multiplier for support classes
- Calculate and verify class-based estimate

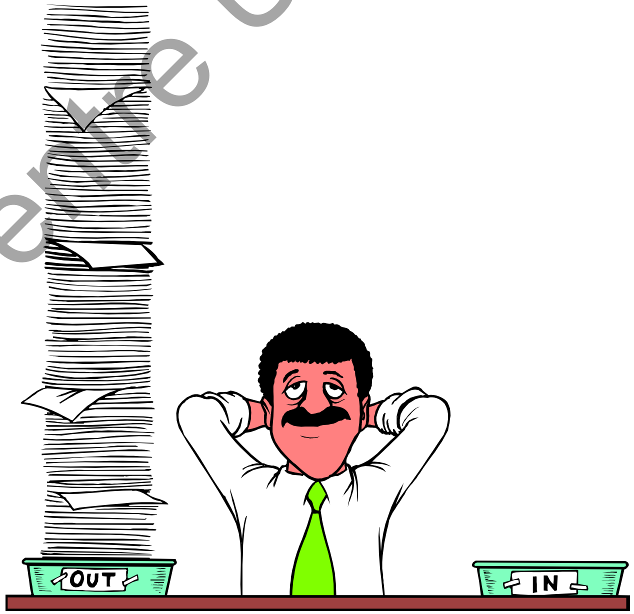
*As recommended by **Lorenz** and **Kidd**.*

Scheduling an OO Project

- OO Projects are iterative.
- Scheduling must consider:
  - Number of major iterations
  - Number of completed contracts

Milestones for Tracking an OO Project

- Completion of:
  - Analysis
  - Design
  - Programming
  - Testing



Summary

- Object-oriented design is based on data abstraction and every basic system component is a module supporting data abstraction.
- A class defines a possible set of objects.
- An object-oriented life-cycle approach applies object-oriented principles to every phase of the development life cycle.
- A common process framework (CPF) characterizes an organization’s approach to software development and maintenance.
- The component process assembly process model is commonly used as an OO process model.
- Object-oriented metrics are different due to factors such as localization, encapsulation, information hiding, inheritance, and object abstraction.
- Metrics used for object-oriented projects are:
  - Number of scenario scripts
  - Number of key classes
  - Number of support classes
  - Average number of support classes
  - Number of subsystems