

COMP6115

Object Oriented Analysis and Design

INTRODUCTION

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Introduction



Teaching Information

Lecturer at Computer Science Department
Bina Nusantara University



Work Position

Data Analytics & Business Process Manager
President's Office, BINUS University



Education Background



Bachelor



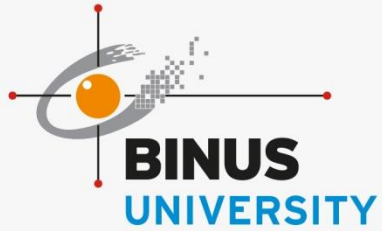
Master

Introduction to Object Oriented System Analysis and Design

- Course Object Oriented System Analysis and Design includes the advanced concepts of software development approach using design visual tool Unified Modelling Language.
- This course will be the foundation and prerequisite for computer science faculty student who specifies in software engineering subject.

Learning Outcome

- **L01** Conceive the basics concepts of object oriented analysis and design.
- **L02** Use the knowledge to develop documentation for object oriented software analysis and design using Unified Modelling Language
- **L03** Analyze any problem in any software application and find out the alternative solutions using object oriented analysis and design approach
- **L04** Manage the software process and build software development teams based on object oriented analysis and design approach



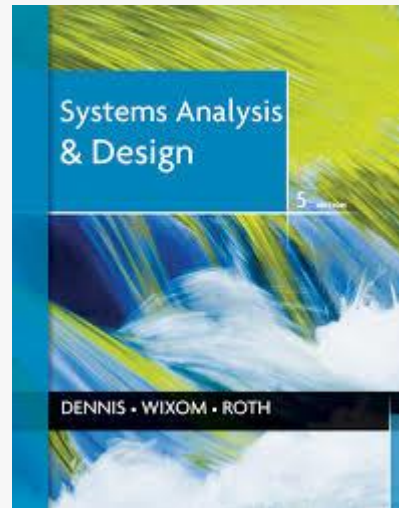
People
Innovation
Excellence

ESSENTIAL INFORMATION

CLASS_TYPE	COMPONENT	WEIGHT
THEORY	Assignment	10%
THEORY	Mid Exam	20%
THEORY	Final Exam	30%
LAB	Assignment	12%
LAB	Project	18%
THEORY	Case Study	10%

- **Note:** Kelas Praktikum diselenggarakan secara online

Textbooks



Alan Dennis, Barbara Haley Wixom. (2015). Systems Analysisi
& Design, An Object-Oriented Approach with UML. 5. John
Wiley & Sons. Hoboken, New Jersey. ISBN: 9781118804674.

Learning Activities & Attendances

Session 3 08 Mar 2021	VC	Topic Cognitive Aspects	
Session 4 15 Mar 2021	GSLC	Topic Social Interaction	GSLC LOG

•Mahasiswa :

- Video Conference** : login dengan account **binus.ac.id** dan akumulasi durasi join minimal **70%** dari total durasi Vicon
- GSLC** : Wajib melakukan **posting minimal 1x** pada periode GSLC

IMPORTANT NOTE

FAILED TO MEET CERTAIN NUMBER OF ATTENDANCE WILL CAUSE YOU **CANNOT** JOIN THE EXAMS

Download Recorded Video Conference (VC)

[Evaluation](#) | [Resources](#) | [All Resources](#) | [Video Learning](#) | **Video Conference** | [Assessment Rubric](#)

Video Conference

Video Conference Link Will Be Available 30 Minutes Before Your Class Schedule

NO.	WEEK	SESSION	DATE	TIME	LINK
1	1	1	Feb 22, 2021	13:20:00 - 14:50:00	

*TBA - To be Announced

Session 1 24 Feb 2021	VC	Topic Introduction to Systems Analysis and Design	
Session 2 03 Mar 2021	VC	Topic Project Management	
Session 3 10 Mar 2021	VC	Topic Requirements Determination	
Session 4 17 Mar 2021	GSLC	Topic Business Process and Functional Modeling	GSLC LOG
Session 5 24 Mar 2021	VC	Topic Structural Modeling	
Session 6 31 Mar 2021	VC	Topic Behavioral Modeling	
Session 7 07 Apr 2021	VC	Topic Moving on to Design	
Session 8 05 May 2021	VC	Topic Class and Method Design	
Session 9 22 May 2021	GSLC	Topic Data Management Layer Design	GSLC LOG
Session 10 02 Jun 2021	VC	Topic Human-Computer Interaction Layer Design	
Session 11 09 Jun 2021	VC	Topic Physical Architecture Layer Design	
Session 12 16 Jun 2021	GSLC	Topic Construction	GSLC LOG
Session 13 23 Jun 2021	VC	Topic Installation and Operations	

COMP6115

Object Oriented Analysis and Design

The background is a solid blue color. On the left side, there are two overlapping circles of a lighter blue shade. One circle is positioned higher and further to the left, while the other is lower and further to the right, creating a lens-like intersection in the center-left area.

Introduction to Object Databases

Learning Outcomes

LO1:

Identify the basic concept of advance topic in
Object Oriented Analysis and Design

Chapter 1: Introduction to Systems Analysis and Design

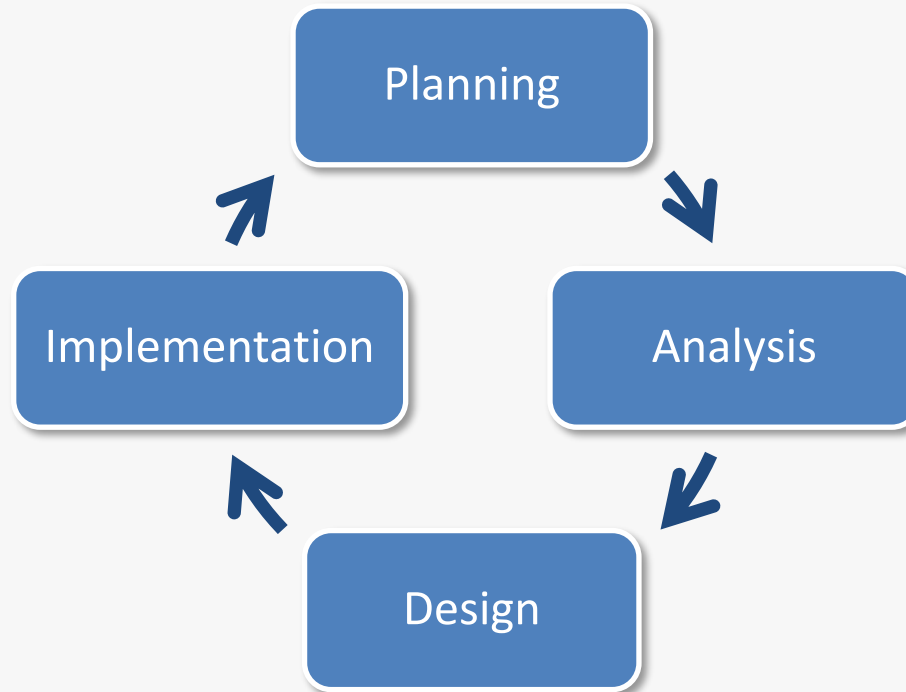
Learning Objectives

- Systems development life cycle
 - Identify the four phases
 - How it came about
 - Methodology alternatives
- Team roles & skill sets
- Object-oriented systems characteristics
- Object-oriented systems analysis & design
- The Unified Process & its extensions
- The Unified Modeling Language (UML)

Introduction

- Why do we need a formal process?
 - Failures occur (too) often
 - Creating systems is not intuitive
 - Projects are late, over budget or delivered with fewer features than planned
- The System Analyst is the key person
 - Designs a system to add value
 - Must understand the business processes
 - Job is rewarding, yet challenging
 - Requires specific skill sets

Systems Development Life Cycle (SDLC)



The SDLC Process

- The process consists of four phases
- Each phase consists of a series of steps
- Each phase is documented (deliverables)
- Phases are executed sequentially, incrementally, iteratively or in some other pattern

Questions to be Answered

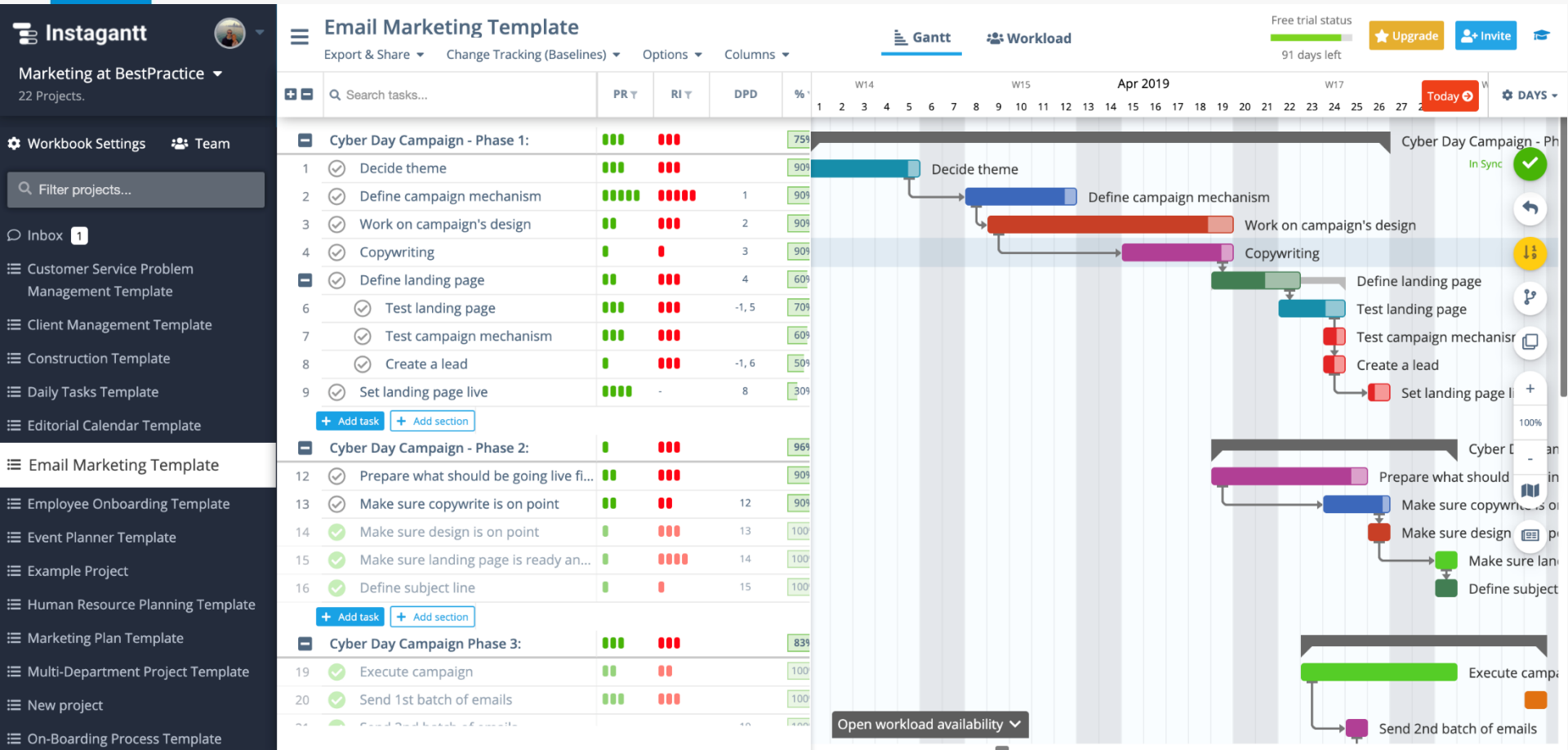
- Planning phase
 - Why should we build this system?
 - What value does it provide?
 - How long will it take to build?
- Analysis phase
 - Who will use it?
 - What should the system do for us?
 - Where & when will it be used?
- Design phase
 - How should we build it?

Planning phase

Why should we build this system?

What value does it provide?

How long will it take to build?



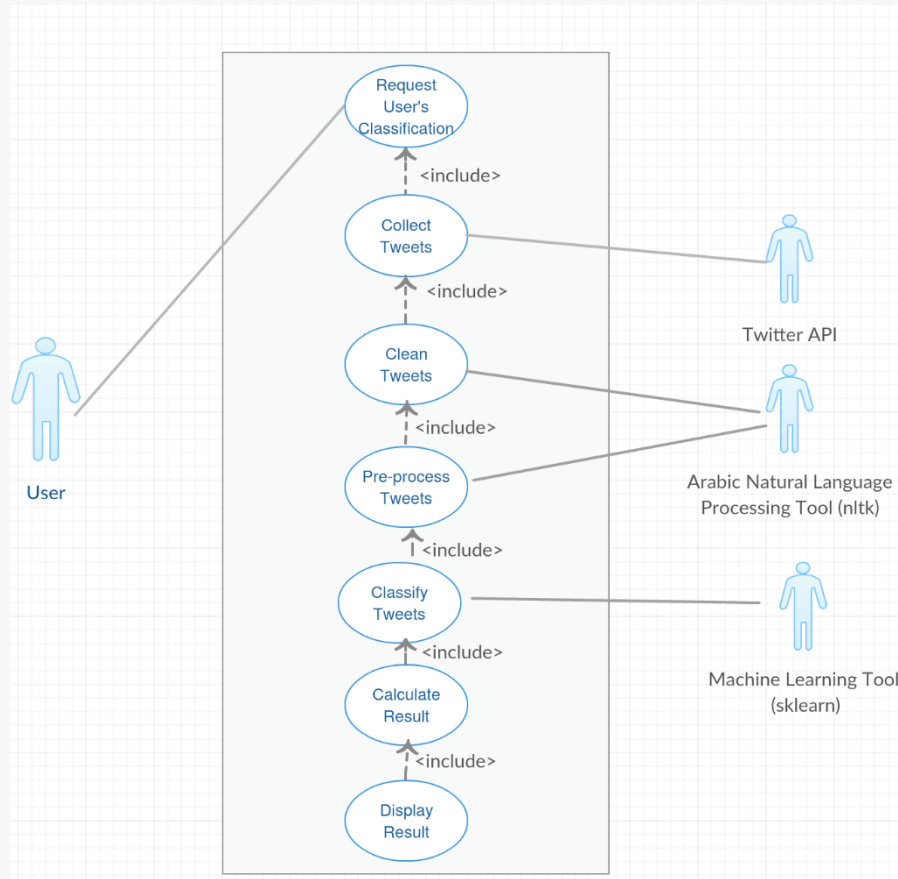
Analysis phase

Who will use it?

What should the system do for us?

Where & when will it be used?

USE CASE



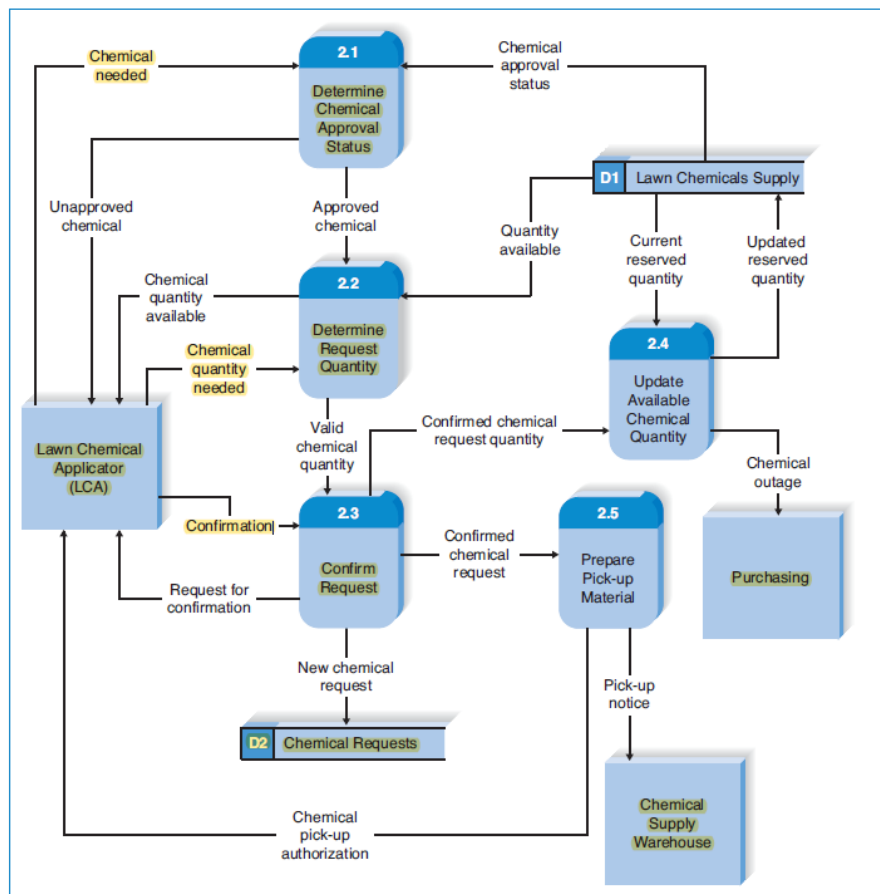
Analysis phase

Who will use it?

What should the system do for us?

Where & when will it be used?

Data Flow Diagrams



Analysis phase

Who will use it?

What should the system do for us?

Where & when will it be used?

ENTITY RELATIONSHIP DIAGRAM

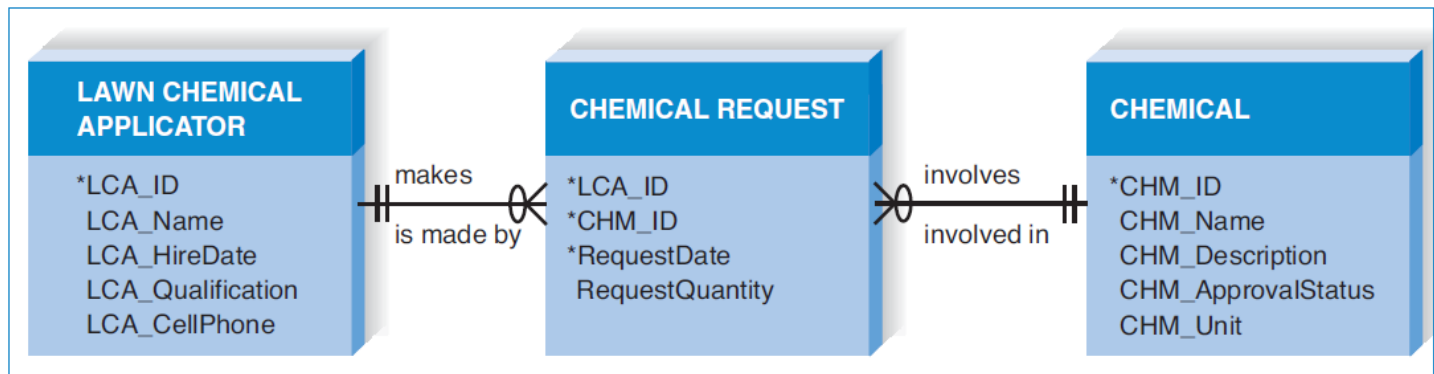


FIGURE 6-1
Chemical Request ERD

SDLC: The Planning Phase

1. Project Initiation
 - Develop/receive a system request
 - Conduct a feasibility analysis
2. Project Management
 - Develop the work plan
 - Staff the project
 - Monitor & control the project

SDLC: The Analysis Phase

1. Develop an analysis strategy
 - Model the current system
 - Formulate the new system
2. Gather the requirements
 - Develop a system concept
 - Create a business model to represent:
 - Business data
 - Business processes
3. Develop a system proposal

SDLC: The Design Phase

1. Develop a design strategy
2. Design architecture and interfaces
3. Develop databases and file specifications
4. Develop the program design to specify:
 - What programs to write
 - What each program will do

SDLC: The Implementation Phase

1. Construct the system
 - Build it (write the programming code)
 - Test it
2. Install system
 - Train the users
3. Support the system
(maintenance)

SDLC: Methodologies

- **Methodology**: a formalized approach to implementing the SDLC
- Categories
 - Process oriented
 - Data centered
 - **Object-oriented**
 - Structured
 - Rapid action development
 - Agile development

Classes of Methodologies

- **Structured Development**
 - **Waterfall Development**
 - Parallel Development
- Rapid Application Development
 - Phased
 - Prototyping
- **Agile Development**
 - eXtreme Programming
 - SCRUM

Which Methodology to Use?

Ability to Develop Systems	Structured Methodologies		RAD Methodologies			Agile Methodologies	
	Waterfall	Parallel	Phased	Prototyping	Throwaway Prototyping	XP	SCRUM
With Unclear User Requirements	Poor	Poor	Good	Excellent	Excellent	Excellent	Excellent
With Unfamiliar Technology	Poor	Poor	Good	Poor	Excellent	Good	Good
That Are Complex	Good	Good	Good	Poor	Excellent	Good	Good
That Are Reliable	Good	Good	Good	Poor	Excellent	Excellent	Excellent
With a Short Time Schedule	Poor	Good	Excellent	Excellent	Good	Excellent	Excellent
With Schedule Visibility	Poor	Poor	Excellent	Excellent	Good	Excellent	Excellent

The Systems Analyst: Skills

- **Agents of change**
 - Identify ways to improve the organization
 - Motivate & train others
- **Skills needed:**
 - **Technical:** must understand the technology
 - **Business:** must know the business processes
 - **Analytical:** must be able to solve problems
 - **Communications: technical & non-technical audiences**
 - **Interpersonal:** leadership & management
 - **Ethics:** deal fairly and protect confidential information

The Systems Analyst: Roles

- Business Analyst
 - Focuses on the business issues
- Systems Analyst
 - Focuses on the IS issues
- Infrastructure Analyst
 - Focuses on the technical issues
- Change Management Analyst
 - Focuses on the people and management issues
- Project Manager
 - Ensures that the project is completed on time and within budget

Object-Oriented Systems Analysis & Design

- Attempts to balance data and process
- Utilizes the Unified Modeling Language (UML) and the Unified Process
- Characteristics of OOAD:
 - Use-case Driven
 - Architecture Centric
 - Iterative and Incremental

Characteristics of Object-Oriented Systems

- **Classes & Objects**
 - Object (instance): instantiation of a class
 - Attributes: information that describes the class
 - State: describes its values and relationships at a point in time
- **Methods & Messages**
 - Methods: the behavior of a class
 - Messages: information sent to an object to trigger a method (procedure call)

Characteristics of Object-Oriented Systems (cont.)

- Encapsulation & information hiding
 - Encapsulation: combination of process & data
 - Information hiding: functionality is hidden
- Inheritance
 - General classes are created (superclasses)
 - Subclasses can inherit data and methods from a superclass

Characteristics of Object-Oriented Systems (cont.)

- **Polymorphism & dynamic binding**
 - Polymorphism: the same message can have different meanings
 - Dynamic binding: type of object is not determined until run-time
 - Contrast with static binding

Object-Oriented Systems Analysis & Design

- **Use-case driven**
 - Use-cases define the behavior of a system
 - Each use-case focuses on one business process
- **Architecture centric**
 - Functional (external) view: focuses on the user's perspective
 - Static (structural) view: focuses on attributes, methods, classes & relationships
 - Dynamic (behavioral) view: focuses on messages between classes and resulting behaviors

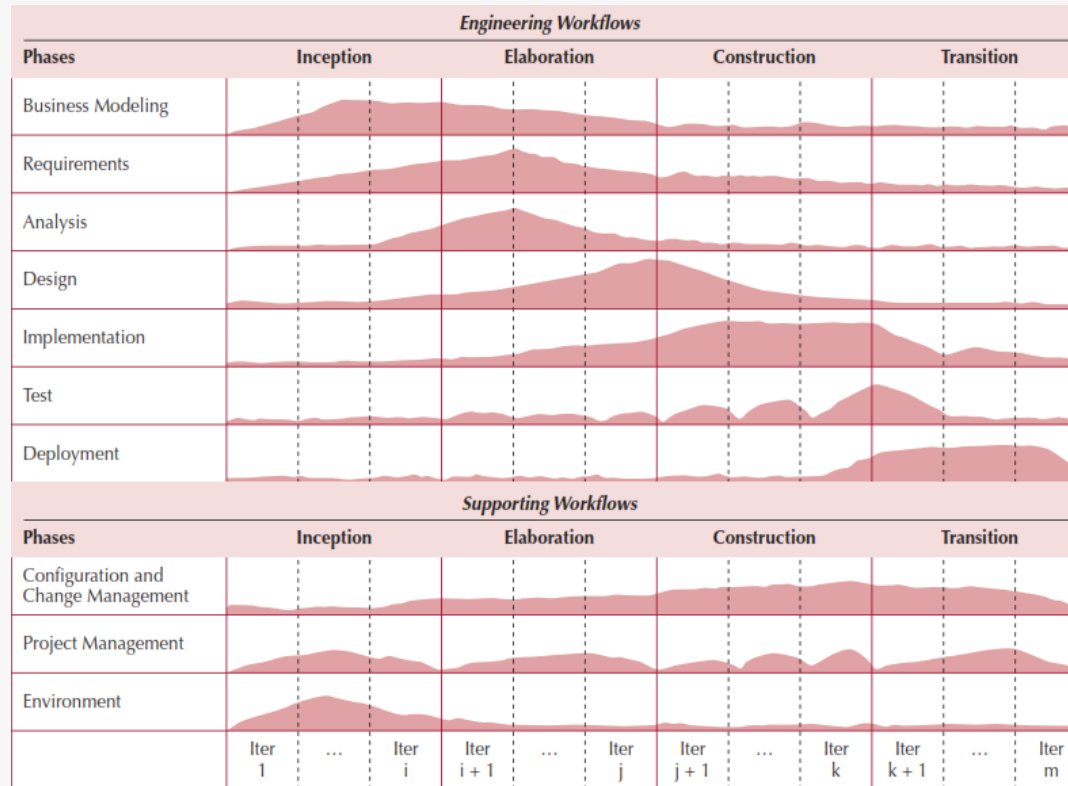
Object-Oriented Systems Analysis & Design (cont.)

- Iterative & incremental
 - Undergoes continuous testing & refinement
 - The analyst understands the system better over time
- Benefits of OOSAD
 - Break a complex system into smaller, more manageable modules
 - Work on modules individually

The Unified Process

- A specific methodology that maps out when and how to use the various UML techniques for object-oriented analysis and design
- A two-dimensional process consisting of phases and workflows
 - Phases are time periods in development
 - Workflows are the tasks that occur in each phase
 - Activities in both phases & workflows will overlap

The Unified Process



Unified Process Phases

- Inception
 - Feasibility analyses performed
 - Workflows vary but focus is on business modeling & requirements gathering
- Elaboration
 - Heavy focus on analysis & design
 - Other workflows may be included
- Construction: Focus on programming (implementation)
- Transition--Focus on testing & deployment

Engineering Workflows

- Business modeling
- Requirements
- Analysis
- Design
- Implementation
- Testing
- Deployment

Supporting Workflows

- Project management
- Configuration and change management
- Environment
- Operations and support*
- Infrastructure management*

* Part of the *enhanced* unified process

Extensions to the Unified Process

- The Unified Process does not include:
 - Staffing
 - Budgeting
 - Contract management
 - Maintenance
 - Operations
 - Support
 - Cross- or inter-project issues

Extensions to the Unified Process (cont.)

- Add a Production Phase to address issues after the product has been deployed
- New Workflows:
 - Operations & Support
 - Infrastructure management
- Modifications to existing workflows:
 - Test workflow
 - Deployment workflow
 - Environment workflow
 - Project Management workflow
 - Configuration & change management workflow

Unified Modeling Language

- Provides a common vocabulary of object-oriented terms and diagramming techniques rich enough to model any systems development project from analysis through implementation
- Version 2.5 has 15 diagrams in 2 major groups:
 - Structure diagrams
 - Behavior diagrams

UML Structure Diagrams

- Represent the data and static relationships in an information system
 - Class
 - Object
 - Package
 - Deployment
 - Component
 - Composite structure

UML Behavior Diagrams

- Depict the dynamic relationships among the instances or objects that represent the business information system
 - Activity machine
 - Sequence
 - Communication
 - Interaction overview
 - Timing
 - Behavior state
 - Protocol state machine,
 - Use-case diagrams

Summary

- All systems development projects follow essentially the same process, called the system development life cycle (SDLC)
- System development methodologies are formalized approaches to implementing SDLCs
- The systems analyst needs a variety of skills and plays a number of different roles
- Object-oriented systems differ from traditional systems

Summary (cont'd)

- Object-Oriented Systems Analysis and Design (OOSAD) uses a use-case-driven, architecture-centric, iterative, and incremental information systems development approach
- The Unified Process is a two-dimensional systems development process described with a set of phases and workflows
- The Unified Modeling Language, or UML, is a standard set of diagramming techniques

References

Denis, Wixom, Tegarden. (2015). Systems Analysis and Design: An Object-Oriented Approach with UML. 5th edition. ISBN: 978-1-118-80467-4, John Wiley & Sons, Inc, Denver (USA)

Important Notes

Some important notes in developing presentation file for online resources:

- Please complete each presentation files with Learning Objectives information.
- Please make sure to make Acknowledgement slide if you are using PowerPoint slides from textbook or the content of the slides are mainly adopted from the textbook.
- If you are adding picture or information from other sources, please give reference footnote on the slide.
- URL of the reference must be written in complete format, e.g.
<http://www.cocktailsoftheworld.com/uploads/pics/Jtho.jpeg>
- References slide must contain all references that have been used in the slides.