Object Oriented System Development

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About This Course

- It shows how to apply OOAD technique to analyze and develop systems..

- It gives you an overview of the Rational Unify Process

- It's not make you an experts in OOAD

Course Contact Point

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Outline

- Introduction to Object Oriented Analysis and Design (OOAD)
  - Concept
  - Methods
  - OOAD in Software Engineering
- Rational Unified Process
- SAD vs OOAD
- Discussion

Concept: What is OOAD

- Based on objects rather than data or processes.

- **Object: a structure encapsulating** attributes and behaviors of a real world entity

Concept: What is OOAD

- **Object class: a logical grouping of** objects sharing the same attributes and behaviors.

- **Inheritance: hierarchical** arrangement of classes enable subclasses to inherit properties of superclasses.

What is "Object Oriented"

- Simplicity thru self-contained objects
- Complexity thru integration
- Interchangeability thru frameworks
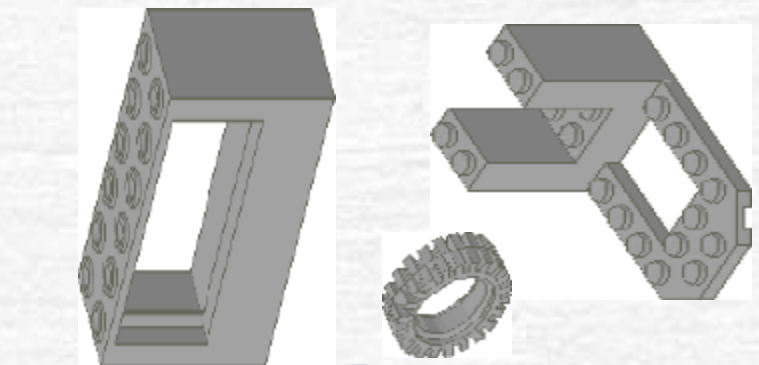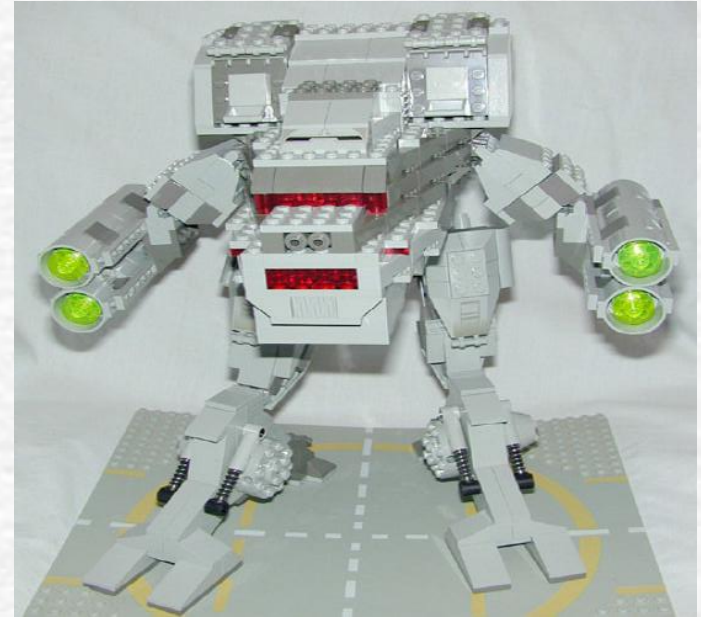
Object Oriented Method

- A technique for system modeling
- A technique to manage complexity inherent in analysis, design, and implementation
- For the analysis and design of system
- Provide integrated view of hardware and software
- Provide a methodology for system development

Object Oriented Method : How

- "Using object-orientation as a base, we model a system as a number of objects that interacts."

OO Method : The Benefits

A system which is designed and modelled using an object-oriented technology is:
- Easy to understand
- Directly related to reality - semantic gap
- Natural partitioning of the problem
- More flexible and resilient to change
- Systems can be developed more rapidly and at a lower cost

Object Oriented Method

- **Object-Oriented Design (OOD) - Booch (1983),** pioneering but not quite scalable
- **Object-Oriented System Analysis (OOSA) -** Shlaer & Mellor (1988), essentially information analysis based on data modelling
- **Object-Oriented Analysis (OOA) - Coad & Yourdon** (1991), a method for developing OO system model

Object Oriented Method

- **Object Modelling Technique (OMT) -** Rumbaugh et al. (1991), entity/relationship modeling with extension to model classes, inheritance and behavior

- **Hierarchical Object-Oriented Design (HOOD) - ESA (1989), architectural design** for Ada code

Object Oriented Method

- **Jacobson Use Case - Jacobson et al.** (1992), requirement modeling, analysis and design; also known as OOSE

- **Unified Modelling Language (UML) -** Booch, Rumbaugh, Jacobson (1997/2000), a method that provides a united OO approach to system development

OOAD in SE Process

- A process tells us <u>Who</u> does <u>What</u> and <u>When</u>.. OOAD shows us <u>How</u>
- Provide a structure for design artifacts:
  - Scope/vision $\rightarrow$ Use case Diagram
  - Conceptual design $\rightarrow$ Uses Case
  - Phisycal Design $\rightarrow$ Sequence and Class Diagrams
  - Implementation $\rightarrow$ Component/Deployment Diagrams

Rational Unified Process (RUP)

- An object oriented systems development methodology.

- RUP establishes four phase of development: inception, elaboration, construction, and transition.

- Each phase is organized into a number of separate iterations.

Rational Unified Process (RUP)
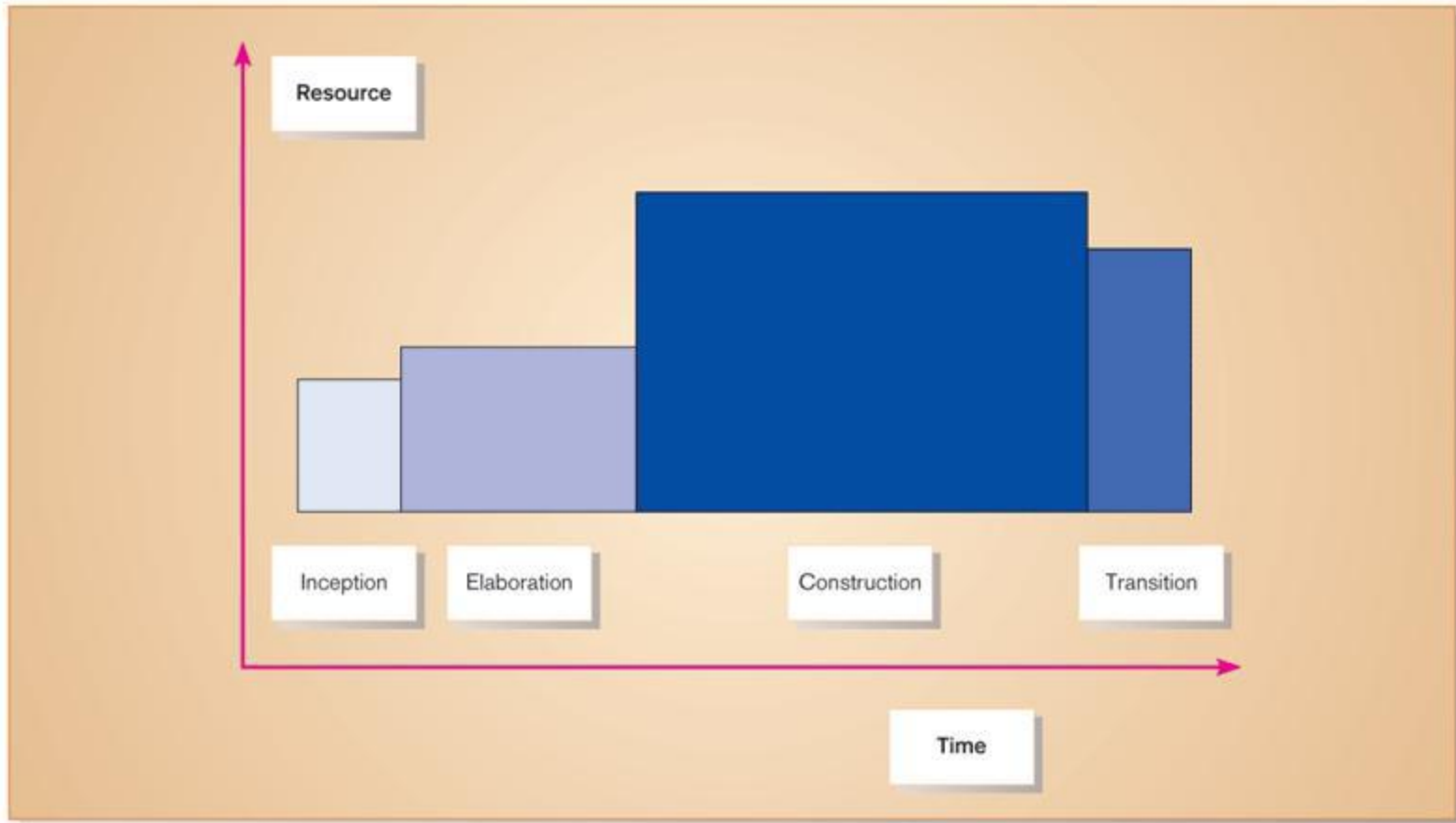
Rational Unified Process (RUP)

- Inception → establish the business case for the system and delimit the project scope
  - identify all external entities with which the system will interact (actors) and define the nature of this interaction at a high-level.
- Elaboration → to analyze the problem domain, establish a sound architectural foundation, develop the project plan, and eliminate the highest risk elements of the project

Rational Unified Process (RUP)

- Construction → all remaining components and application features are developed and integrated into the product, and all features are thoroughly tested

- Transition → transition the software product to the user community
  - develop new releases
  - correct some problems,
  - finish the features that were postponed.

SAD vs OOAD

	Structured	Object-Oriented
Methodology	SDLC	Iterative/Incremental
Focus	Processs	Objects
Risk	High	Low
Reuse	Low	High
Maturity	Mature and widespread	Emerging (1997)
Suitable for	Well-defined projects with stable user requirements	Risky large projects with changing user requirements

SAD vs OOAD

Phase	Structured	Object-Oriented

Analysis	**Structuring Requirements**
	• DFDs
	• Structured English
	• Decision Table / Tree
	• ER Analysis
		Requirement Engineering
		• **Use Case Model** (find Uses Cases, Flow of Events, Activity Diagram)
		• **Object Model**
		    • Find Classes & class relations
		    • Object Interaction: Sequence & collaboration Diagram, State Machine Diagram,
		    • Object to ER Mapping

SAD vs OOAD

Phase	Structured	Object-Oriented

Design	• **DB design**
	   • (DB normalization)
	• **GUI Design**
	   • (forms & reports)
		• **Physical DB design**
		• **Design elements**
		   • **Design system Architecture**
		   • **Design classes:** Checking The Model, Combine Classes, Splitting Classes, Eliminate Classes
		   • **Design components**
		• GUI design

Discussion

- Explore what is the different between SAD and OOAD. Give your explanation..!
- OOAD is (relatively) new in system development. Give a brief history of system development !