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.”
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
A process tells us **Who** does **What** and **When**. OOAD shows us **How**

Provide a structure for design artifacts:

- Scope/vision → Use case Diagram
- Conceptual design → Uses Case
- Physical Design → Sequence and Class Diagrams
- Implementation → 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

<table>
<thead>
<tr>
<th></th>
<th>Structured</th>
<th>Object-Oriented</th>
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</thead>
<tbody>
<tr>
<td>Methodology</td>
<td>SDLC</td>
<td>Iterative/Incremental</td>
</tr>
<tr>
<td>Focus</td>
<td>Processs</td>
<td>Objects</td>
</tr>
<tr>
<td>Risk</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Reuse</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Maturity</td>
<td>Mature and widespread</td>
<td>Emerging (1997)</td>
</tr>
<tr>
<td>Suitable for</td>
<td>Well-defined projects with stable user requirements</td>
<td>Risky large projects with changing user requirements</td>
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## SAD vs OOAD

<table>
<thead>
<tr>
<th>Phase</th>
<th>Structured</th>
<th>Object-Oriented</th>
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<tbody>
<tr>
<td>Analysis</td>
<td>Structuring Requirements</td>
<td>Requirement Engineering</td>
</tr>
<tr>
<td></td>
<td>• DFDs</td>
<td>• Use Case Model (find Uses Cases,</td>
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<tr>
<td></td>
<td>• Structured English</td>
<td>Flow of Events, Activity Diagram)</td>
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<tr>
<td></td>
<td>• Decision Table / Tree</td>
<td>• Object Model</td>
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<tr>
<td></td>
<td>• ER Analysis</td>
<td>• Find Classes &amp; class relations</td>
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<tr>
<td></td>
<td></td>
<td>• Object Interaction: Sequence &amp;</td>
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<td></td>
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<td>collaboration Diagram, State</td>
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<tr>
<td></td>
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<td>Machine Diagram,</td>
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<td></td>
<td></td>
<td>• Object to ER Mapping</td>
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# SAD vs OOAD

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<tbody>
<tr>
<td>Design</td>
<td>• DB design</td>
<td>• Physical DB design</td>
</tr>
<tr>
<td></td>
<td>• (DB normalization)</td>
<td>• Design elements</td>
</tr>
<tr>
<td></td>
<td>• GUI Design</td>
<td>• Design system Architecture</td>
</tr>
<tr>
<td></td>
<td>• (forms &amp; reports)</td>
<td>• Design classes: Checking The Model, Combine Classes, Splitting Classes, Eliminate Classes</td>
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<tr>
<td></td>
<td></td>
<td>• Design components</td>
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<tr>
<td></td>
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<td>• GUI design</td>
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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!