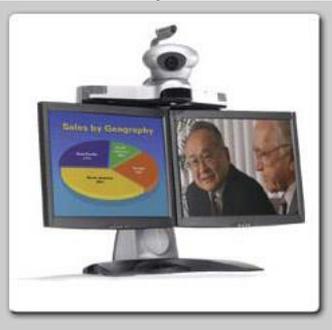# Object oriented Methodologies

Systems Analysis and Design

Key Differences Between Structured and Object-Oriented Analysis and Design

	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

Key Differences Between Structured and Object-Oriented Analysis and Design

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

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

6

Object-Oriented Analysis and Design (OOAD)

- Based on objects rather than data or processes
- **Object**: a structure encapsulating attributes and behaviors of a real-world entity

OO Analysis and Design Overview (Cont.)

▶ ## What is Object-Oriented Analysis?

 ▶ Finding and describing the concepts in the problem domain.

 ▶ For example:

  ▶ Flight Information System, some of the concepts: **Plane**, **Flight**, and **Pilot**.

  ▶ Auto Rental Company, some of the concepts: **Vehicle**, **Customer**, and **Reservation**.

  ▶ Payroll System, some of the concepts: **Employee**, **PayCheck**, and **Timecard**.

  ▶ Course Registration System, some of the concepts: **Student**, **Course**, **Registration**, and **Professor**.

Object-Oriented Analysis and Design (OOAD) (Cont.)

- **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

OOSAD textbook

A. Analysis Phase

- Structuring requirements (Use cases)
- Conceptual data modeling (class diagram)
- Object relationship modeling
  - Class diagram → ER diagram
- Analysis classes
  - Class stereotypes
  - Sequence diagram
  - Communication diagram
  - activity diagram
  - State machine diagram

OO Analysis and Design Overview (Cont.)

▸ ## What is Object Oriented Design?

  ▸ defining software objects, their responsibilities and how they collaborate to fulfill the requirements.

  ▸ For Example:

    ▸ **Plane** software object may have a **getFlightHistory** operation.

    ▸ **Vehicle** software object may have a **getStatus** operation.

    ▸ **Employee** software object may have a **payCalculate** operation.

    ▸ **Student** software object may have a **hasPrerequisites** operation.

▸ A critical ability in OO design is to skillfully assign responsibilities to software objects.

OOSAD textbook

B. Design Phase

- Physical DB design
- Design elements
  - Design classes
  - Design components
  - Design system Architecture
- GUI design

OO Analysis and Design Overview (Cont.)

▸ Analysis vs. Design

Analysis:	**Design**:
•Focuses on understanding the problem •System structure •Small model of domain concepts	•Focuses on understanding the solution •System structure •Responsibilities and attributes •A large model of system dynamic and static views

▸