Software Design
System Modeling

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- System modeling is the process of developing abstract models of a system

- Each model presents a different view or perspective of that system

- Uses some kind of graphical notation

- Primarily based on notations in the Unified Modeling Language (UML)

- Models help explain the proposed requirements to other system stakeholders

- Engineers use these models to discuss design proposals and to document the system for implementation

- In a model-driven engineering process, it is possible to generate a complete or partial system implementation from the system model

Model vs. Representation

- A model is an abstraction of the system being studied rather than an alternative representation of that system

- A representation of a system should maintain all the information about the entity being represented

- An abstraction deliberately simplifies and picks out the most salient characteristics

- Example: Book Review vs translation

Static Vs. Dynamic Models

- **Static models:** Show the structure of the system design

- **Dynamic models:** Show the organization of the system when it is executing

- The dynamic organization of a system as a set of interacting threads may be very different from a static model of the system components

Popular UML Diagrams

- **Use case diagrams:** Shows the interactions between a system and its environment
  - Used as part of requirement engineering

- **Class diagrams:** Shows the object classes in the system and the associations between these classes
  - used as static model

- **Sequence diagrams:** Shows interactions between actors and the system and between system components
  - used as dynamic model

- **State diagrams:** Shows how the system reacts to internal and external events
  - used as dynamic model

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