Modeling and 4+1

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COMPUTER SCIENCE 323 – SOFTWARE DESIGN

Software as a Model

Code is probably the worst thing about software.

- It's often difficult to understand how the code is structured and how it behaves with various inputs.

Modeling is the first step in software design.

Graphical representation can be made to describe software to help us better map out what the software should look like and do.

Formal modeling is actually transferrable into code.

Goal of Modeling

The goal of modeling is to actually capture two things:

- Structure – the relationship of objects, procedures, and their interfaces
- Behavior – how these objects interacts, the messages the might send, errors, and exceptions that may result.

A standard in industry is the Unified Modeling Language (UML)

UML is managed by the Object Modeling Group

It acts as a way to standardized modeling and provide description to software.

UML Structure Diagrams

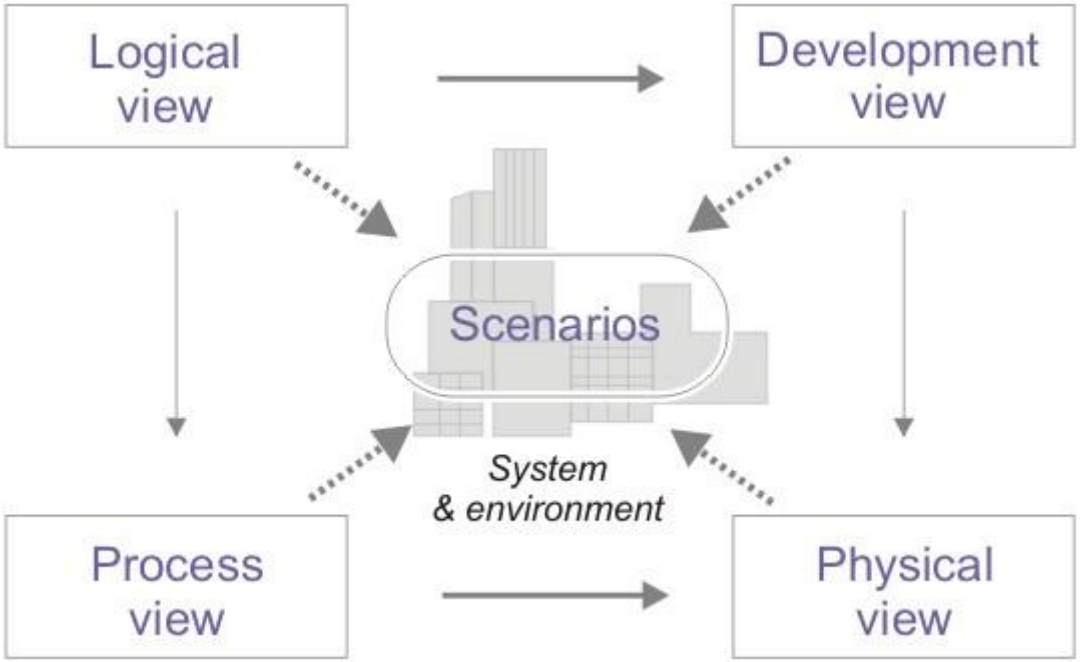
- 6 types
  - Class
    - Describe objects, their methods, and their attributes
  - Component
    - Describe components, subsystems and their interfaces
  - Object
    - Describe a time slice of software for a given set of object instances)
  - Deployment
    - Describe where systems will live
  - Package – modules
    - Describes modules / frameworks and their organization

UML Behaivoral Diagrams

- Activity
  - Describe workflow pinpointing choice, iteration, concurrency.
- Use Case
  - Diagram behavior in terms of actors
- Sequence
  - Describes how processes interact with each other and in what order
- Communication
  - Similar to sequence diagrams but show which objects other objects communicate with in some order.
- Timing
  - Like the sequence diagram – turned on its side.
- Interaction Overview
  - Combination of sequence/communication and timing diagrams. Show complexity of system at a higher level.
- State Machine
  - Similar to finite automata, with a OMG twist.

The 4+1 View Model

The 4+1 Architecture* is a architecture view model pattern designed to capture 5 major parts of a design.



Kruchten, Philippe (1995, November). Architectural Blueprints — The “4+1” View Model of Software Architecture. IEEE Software 12 (6), pp. 42-50.

4 + 1 = 5…

Logical – Focuses on functionality and structure

Development – Focuses components and packages

Process – Focuses on activities, how data flows, and complex system behavior

Physical – Focuses on deployment

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Scenarios – Focuses on user interaction, and how the system behaves