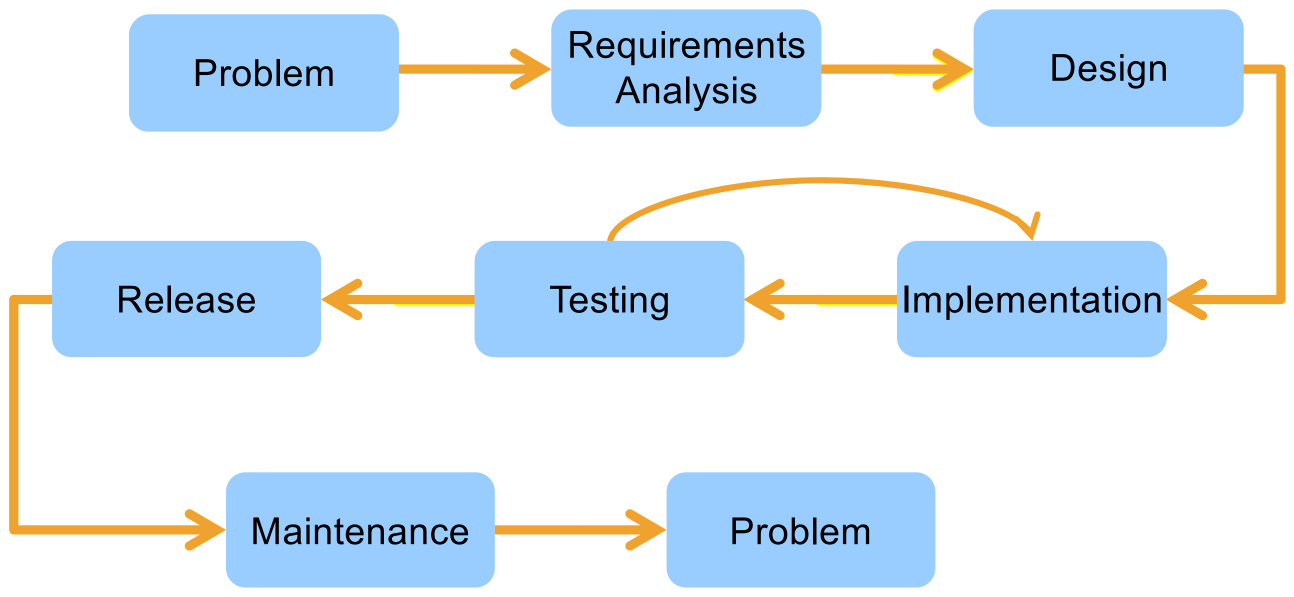
CS 4320 / 7320 Software Engineering

Module 2 - Models and Methods:

MODELS

What is the SDLC?



Modeling…

… is an organized and systematic approach for representing significant aspects of the software under consideration.

…facilitates decision-making about the software

…communicates those decisions to *various stakeholders*

Modeling Principles: Abstraction

Model the **essentials…**

Modeling Principles: Restricted Views

- Provide specific (rule-based) views
  - Views: Structural view, behavioral view, temporal view, organizational view, etc…
  - Rules: notation, vocabulary, methods, tools

Modeling Principles: Communication

- Modeling enables effective communication
  - Application domain vocabulary
  - Modeling language
  - Semantic expression (meaning within context)

Caution...

False confidence

Be aware a model or models do not yield complete understanding

Models are abstractions (stuff is missing)

Syntax

Understand and adhere to the precise meanings of syntax

Changes

Be aware of changing context and assumptions (more on that later)

Beware Assumptions

“Abstraction leads to a set of assumptions
about the context in which the model is placed
that should also be captured in the model.”

SWEBOK 9-3

Preconditions

Postconditions

Invariants

Beware Assumptions

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about the context in which the model is placed
that should also be captured in the model.”

SWEBOK 9-3

Unified Modeling Language (UML)

1994-1995

Developed by Grady Booch, Ivar Jacobson, and James Rumbaugh at Rational Software to **standardize notation** in Software Engineering

1997

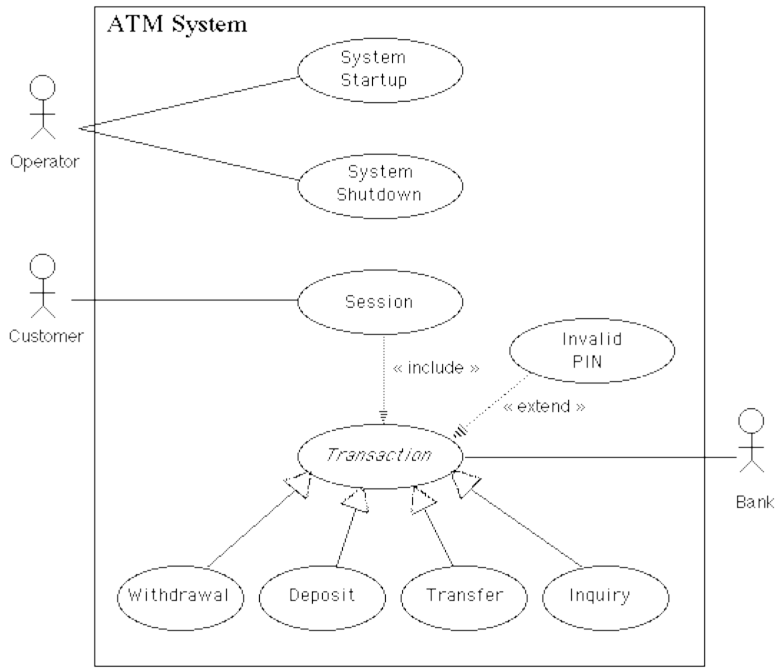
Adopted by Object Management Group (OMG)

2005

Adopted by International Organization for Standardization (ISO)

A Special Case: Use Cases

For Modeling Requirements



Types of Models

Information Modeling

Conceptual, logical, and physical data models

Behavioral Modeling

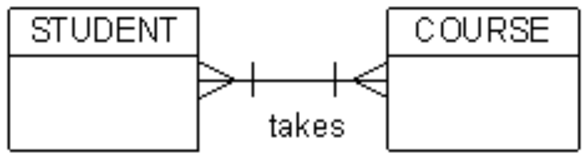
State machine, control-flow, and data-flow models

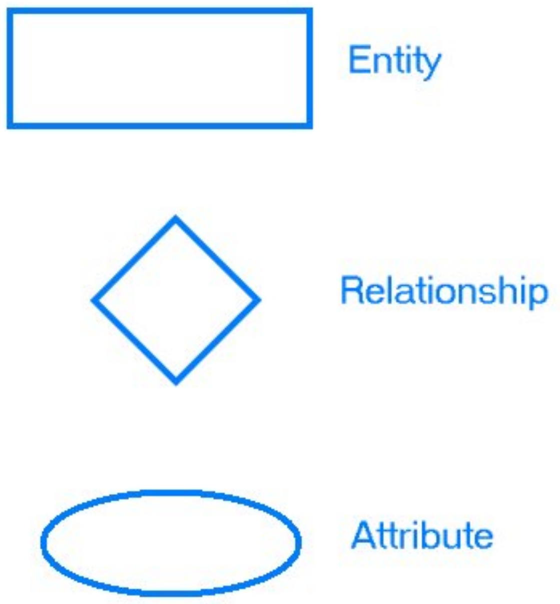
Structure Modeling

Class, component, object, deployment, and packaging models

Informational Modeling

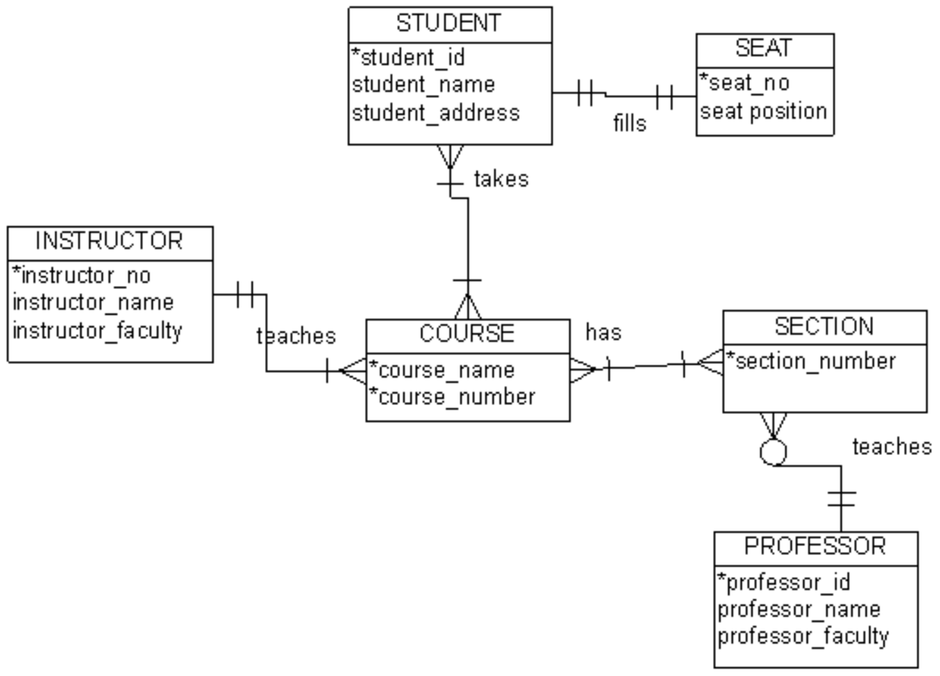
- Entity
- Relationship
- Attribute



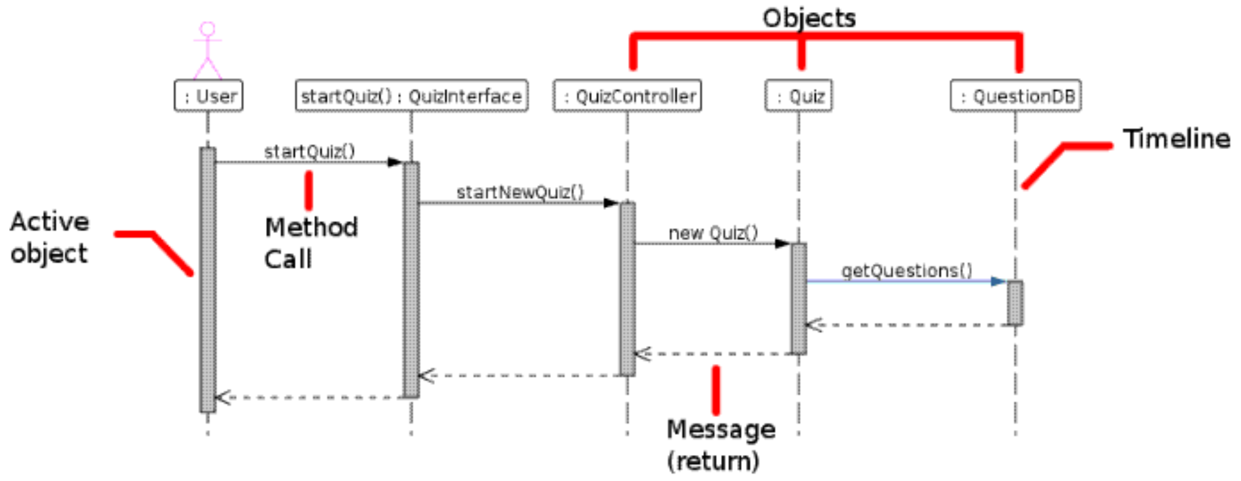


Informational Modeling

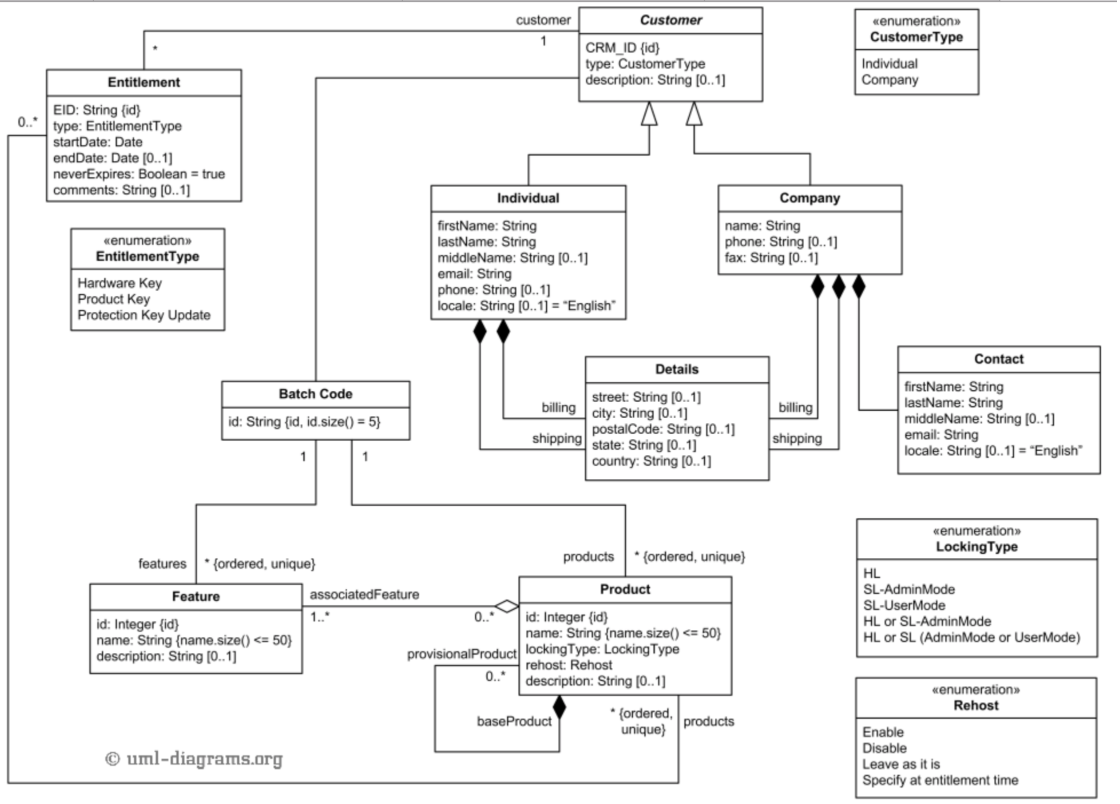
- Entity
- Relationship
- Attribute



Behavioral Modeling



Structure Modeling



Analysis of Models

Analyzing for Completeness

Are all requirements implemented and verified?

Analyzing for Consistency

Do the models conflict?

Analyzing for Correctness

Is the model syntactically and semantically correct?

Analysis of Models

Traceability

Can the requirements, models, and code be connected up?

Can changes be traced?

Interaction Analysis

Does the control flow between parts of the system work as intended?

Done!