Unified Modeling Language (UML)

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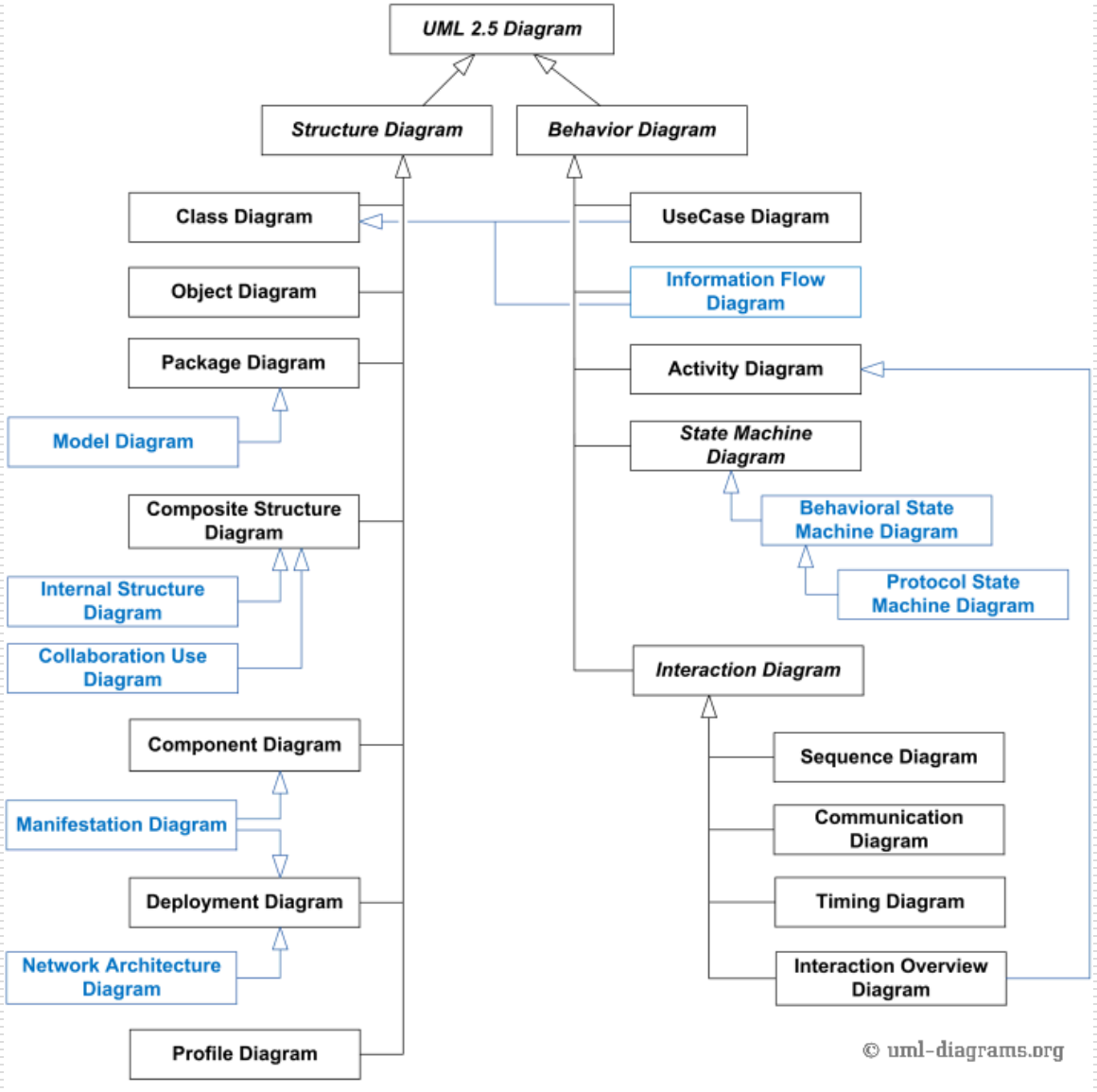
Introduction

- UML is a collection of *diagrams* for use in:
  - Modeling *business processes* and other processes
  - *Analysis, design, and implementation* of software-based systems
- Each describes a different aspect of an application's *static structure* or *dynamic behavior*
- We'll consider a subset of these diagrams

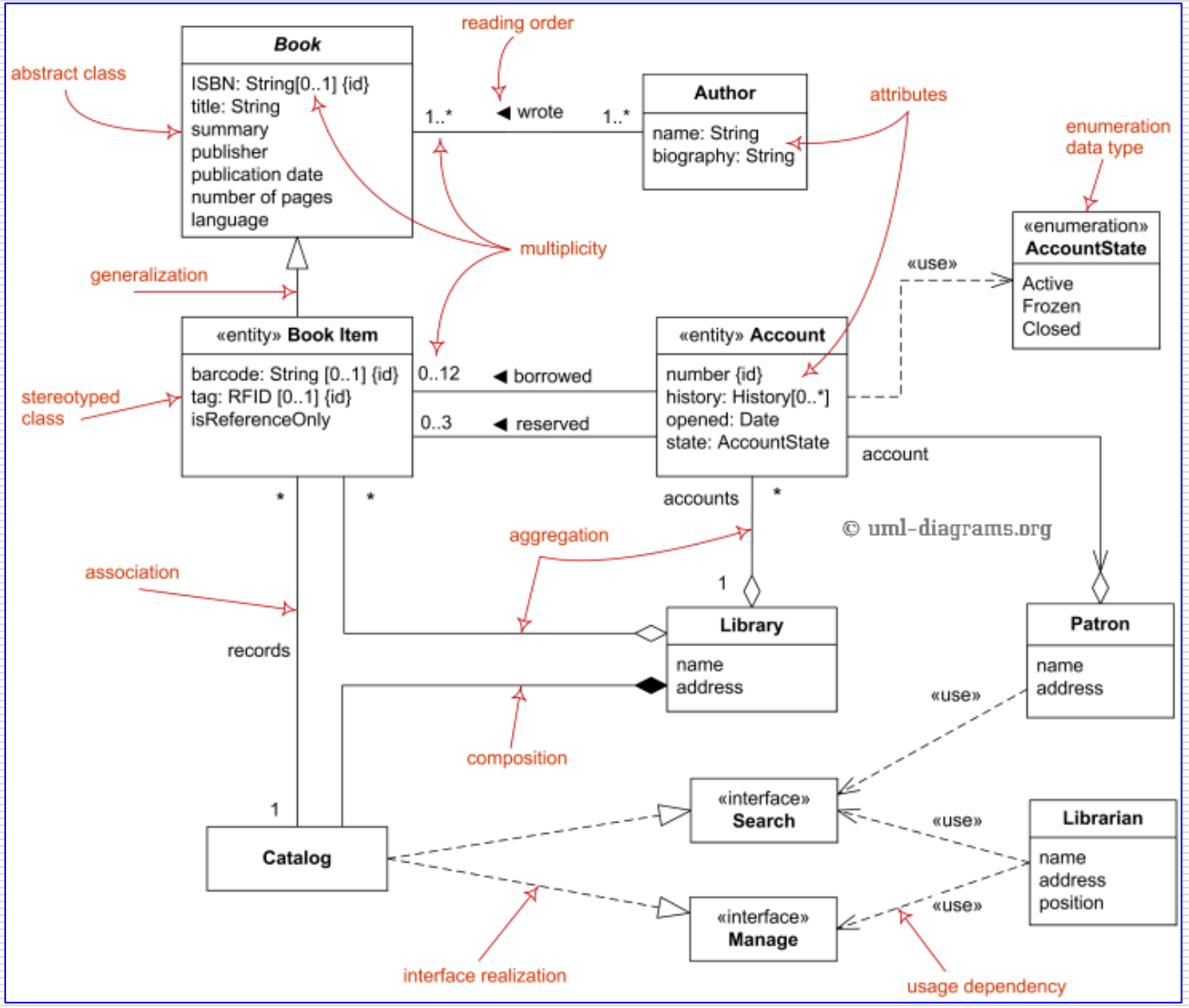
Taxonomy of UML Diagrams



Class Diagrams

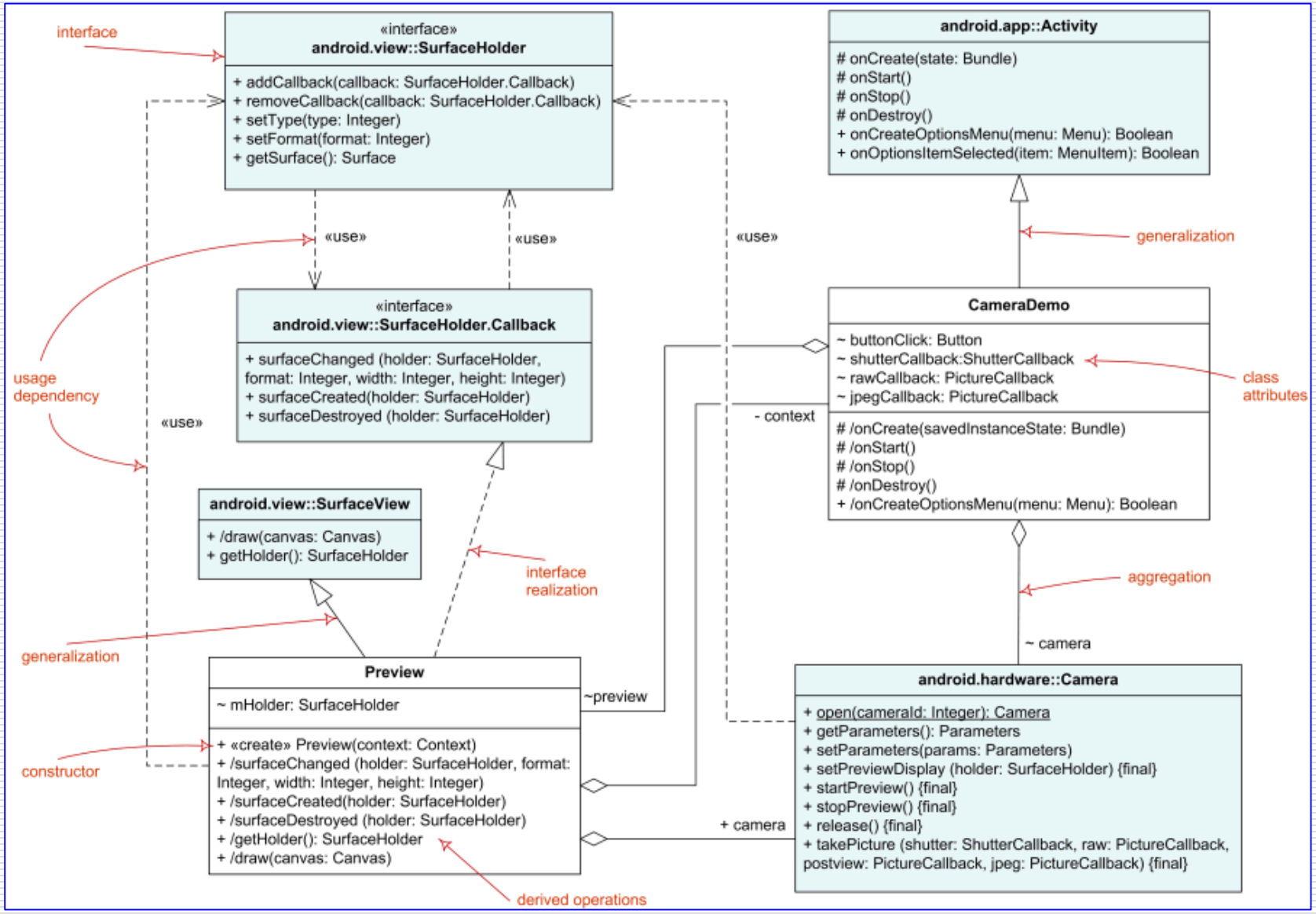
- Shows *structure* of the designed system, subsystem or component as *related classes and interfaces*, with their
  - *Attributes and operations*
  - *Constraints*
  - *Relationships*
    - *Associations*, *generalizations*, *dependencies*, etc.

Example Domain Model Diagram



Example Diagram of Implementation Classes

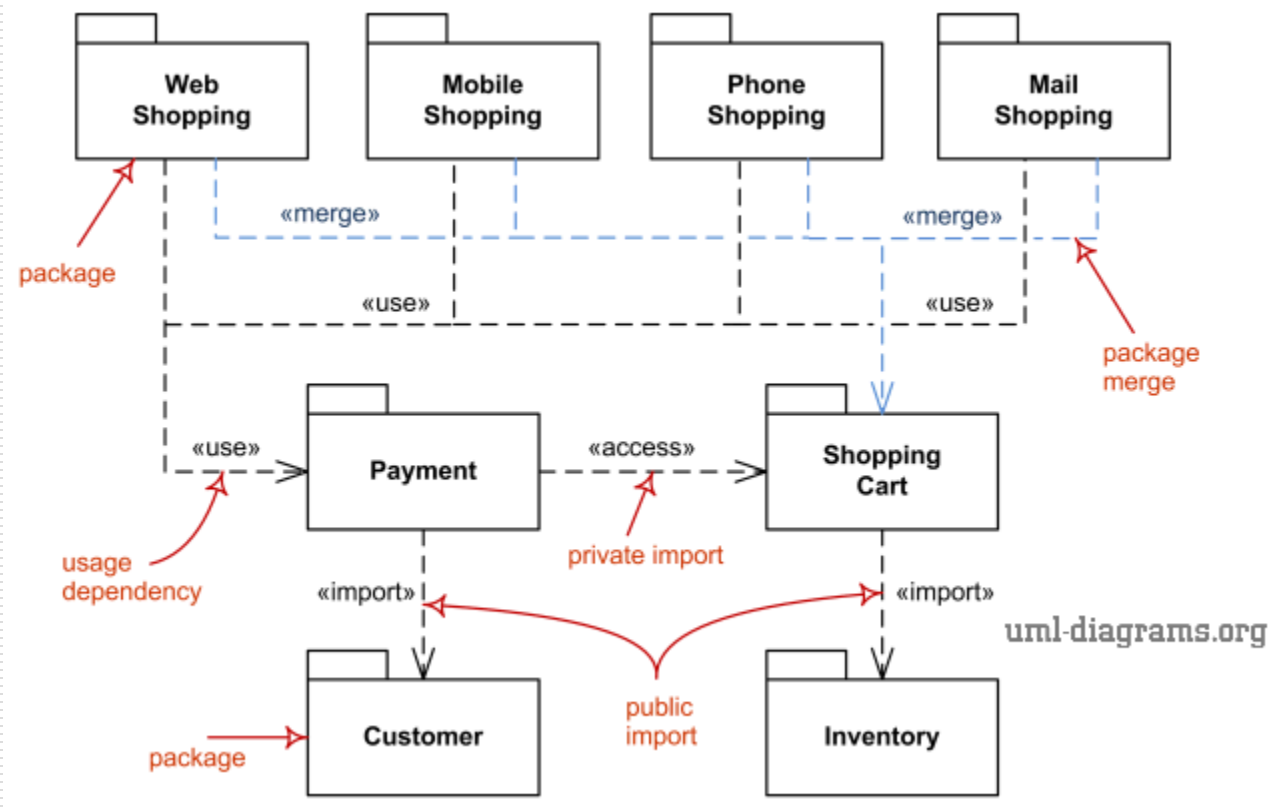
- Private
Protected
+ Public



Package Diagram

- Shows structure of designed system at level of *packages* of related elements
- A package is a *namespace*
- A package can *import* other packages
  - Adds names of members of imported package to its own namespace

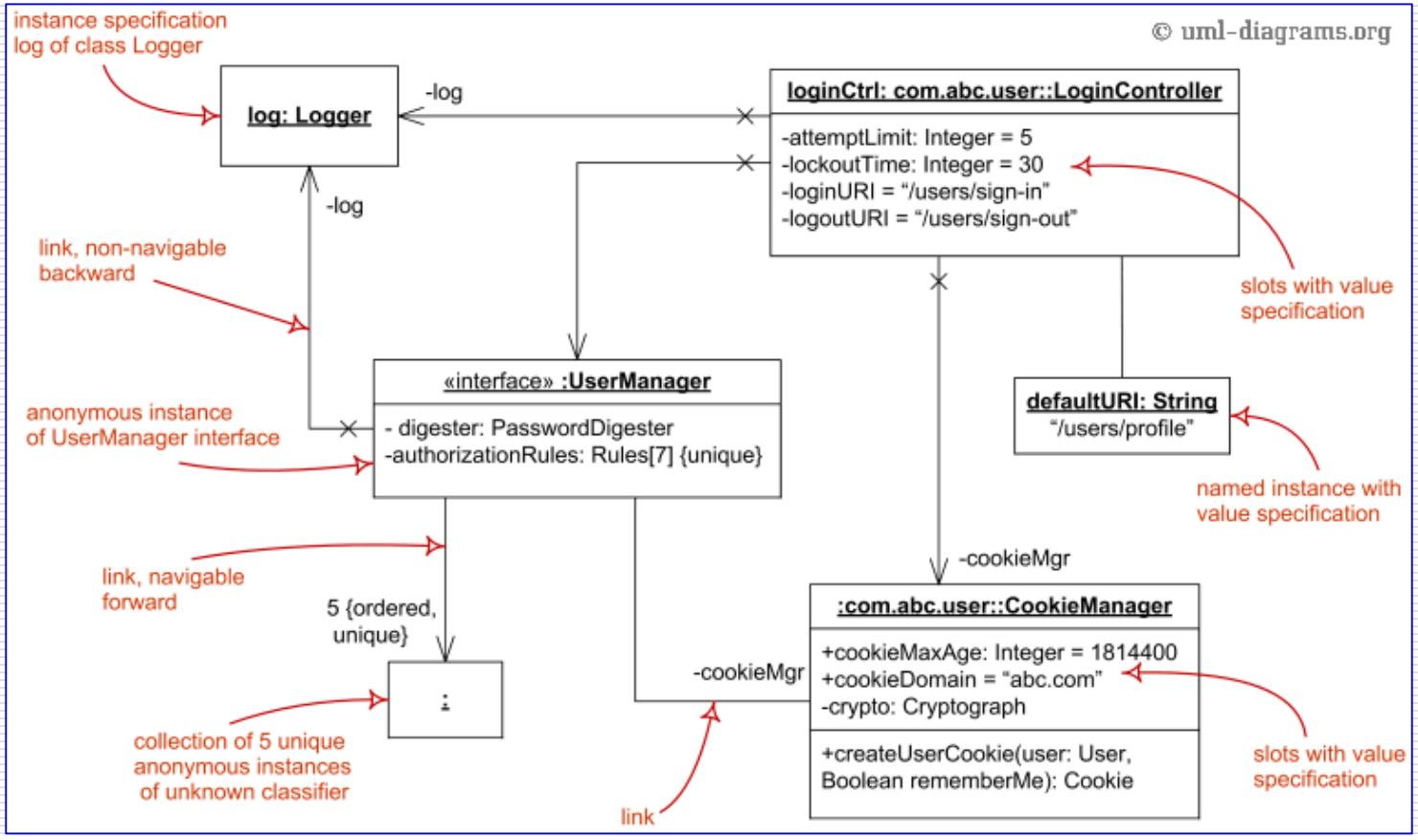
Example Package Diagram



Object Diagrams

- Depict objects and their relationships at a point in time
- Essentially an “instance” of a class diagram

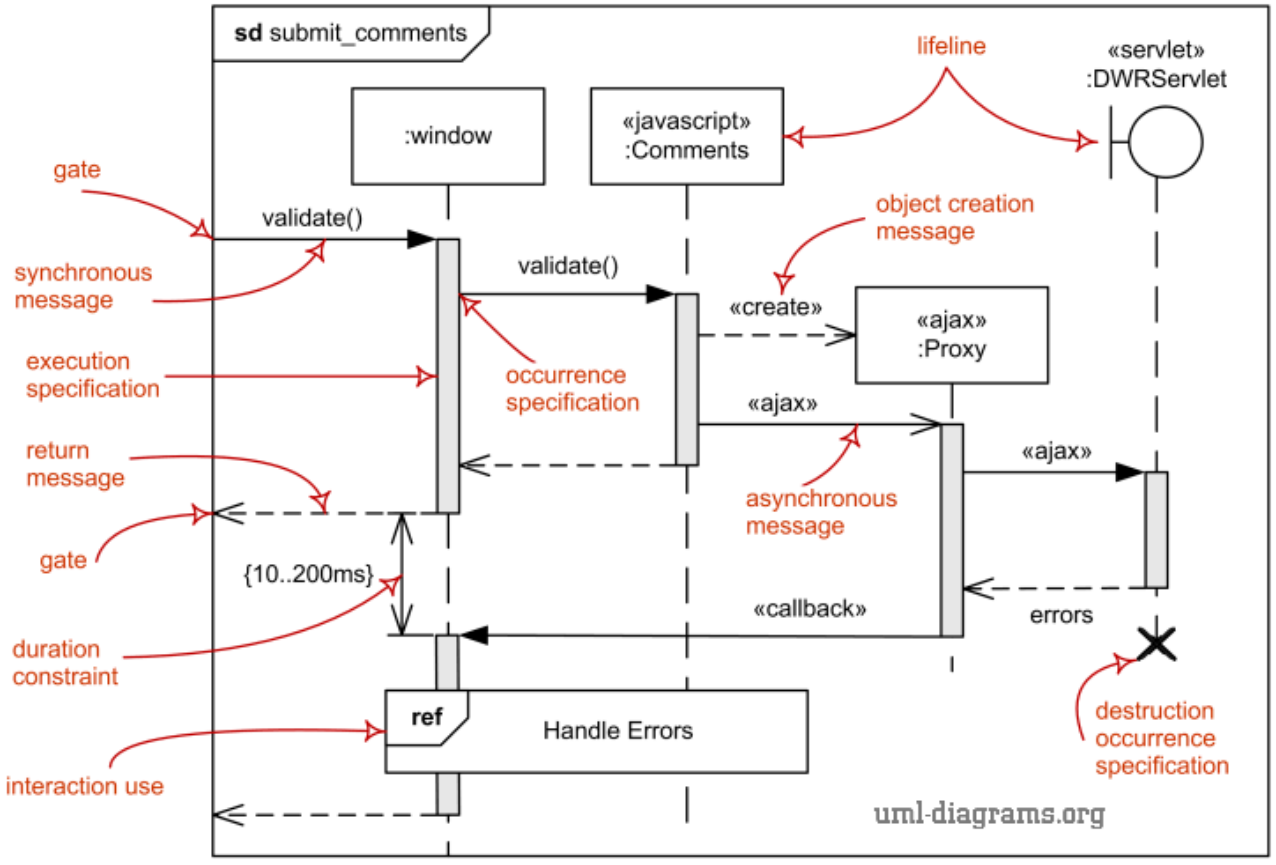
Example Object Diagram



Sequence Diagram

- A type of *interaction diagram*
- Depicts *lifelines* of objects and *sequences of messages* exchanged between objects

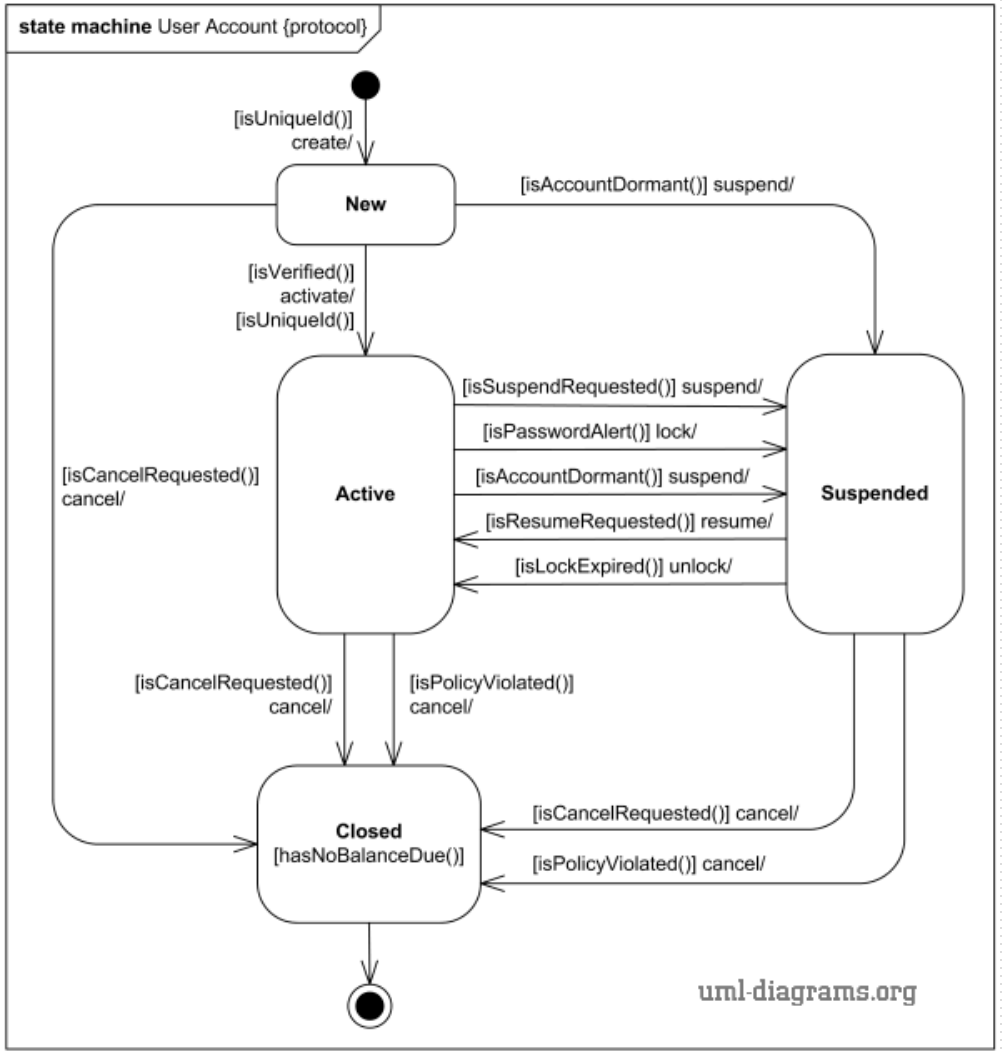
Example Sequence Diagram



State Machine Diagram

- Shows *discrete behavior* of part of designed system through *state transitions*

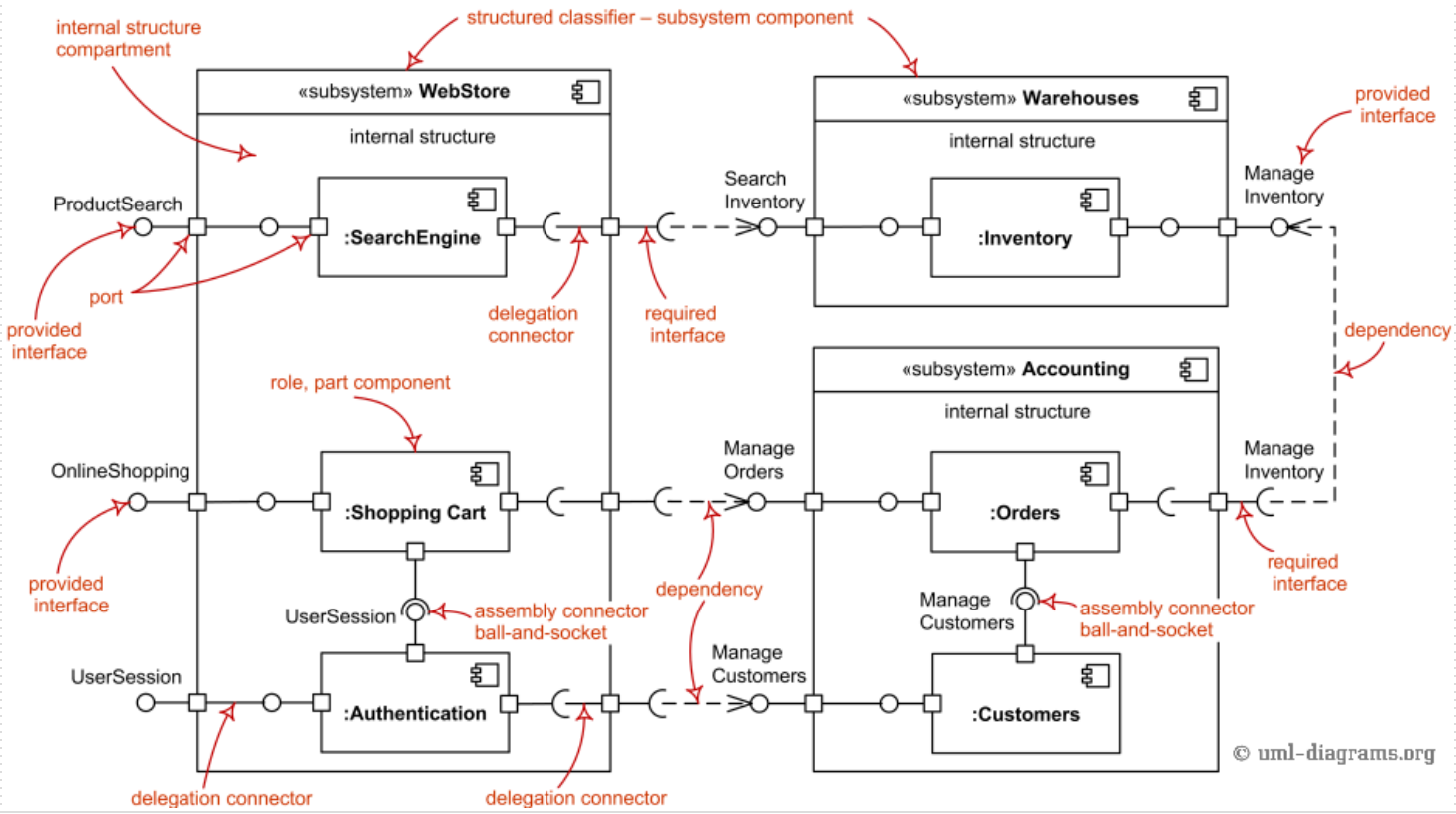
Example State Machine



Component Diagram

- Show how components are *connected* to create larger components or systems
- Depict *components*, *interfaces*, and *ports*

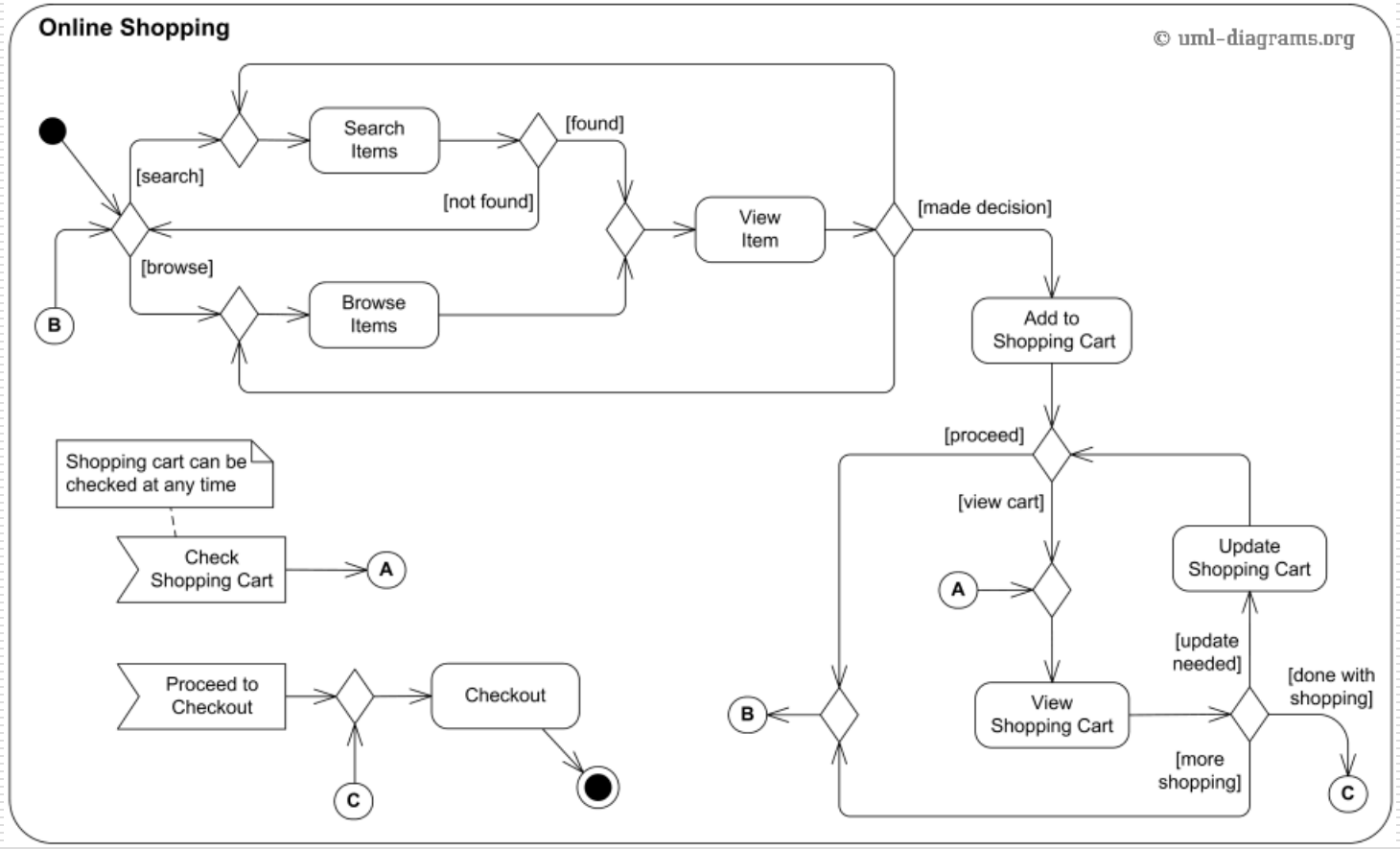
Example Component Diagram



Activity Diagram

- Behavior diagram which shows *flow of control* or *object flow*
- Emphasizes *sequence* and *conditions* of flow

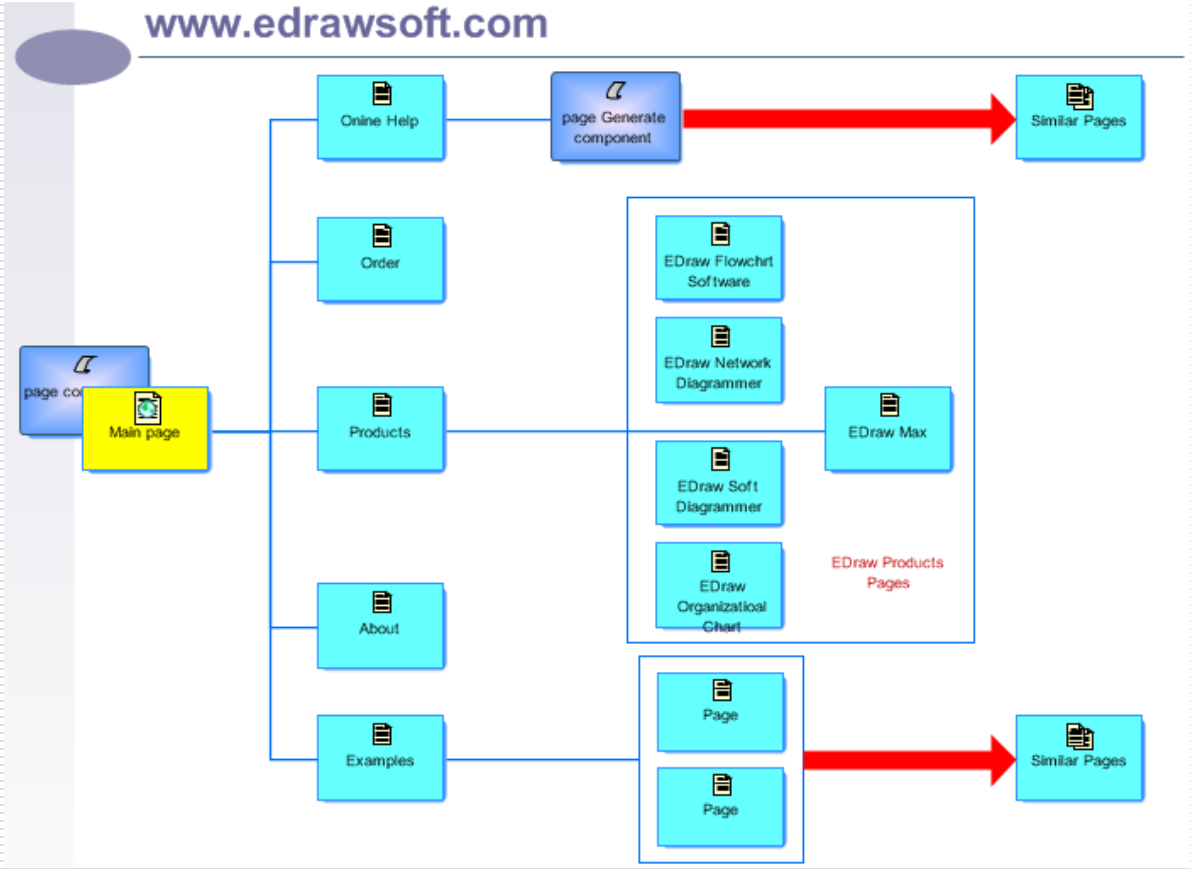
Example Activity Diagram



UML Limitations

- Despite its large collection of diagram types, UML is *not* adequate for all purposes
  - e.g., describing web site structure
- If a suitable diagram type can't be found, *create your own*
  - Be sure to *explain* what the diagram elements mean!

Example: Website Structure Diagram



Sources

- *UML in a Nutshell* by S. Alhir
- *Introduction to OMG's Unified Modeling Language*, www.omg.org/gettingstarted/what_is_uml
- *Introduction to the Diagrams of UML 2.X*, www.agilemodeling.com/essays/umlDiagrams
- www.uml-diagrams.org/
- *UML is Not Enough* by S. Ambler, http://agilemodeling.com/essays/realisticUML.htm