



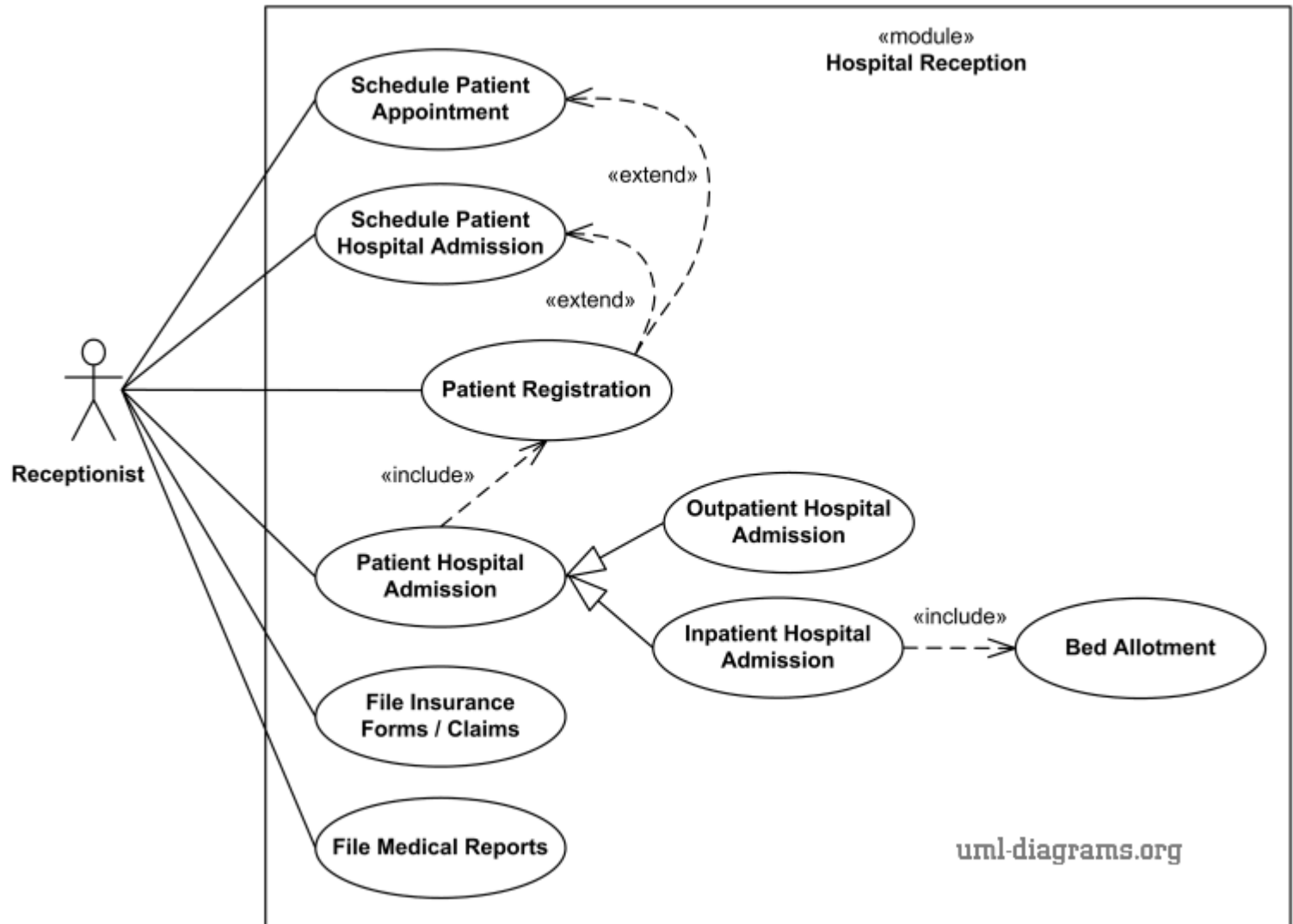
Object Oriented Analysis

Lecture 5 : Sequence Diagram

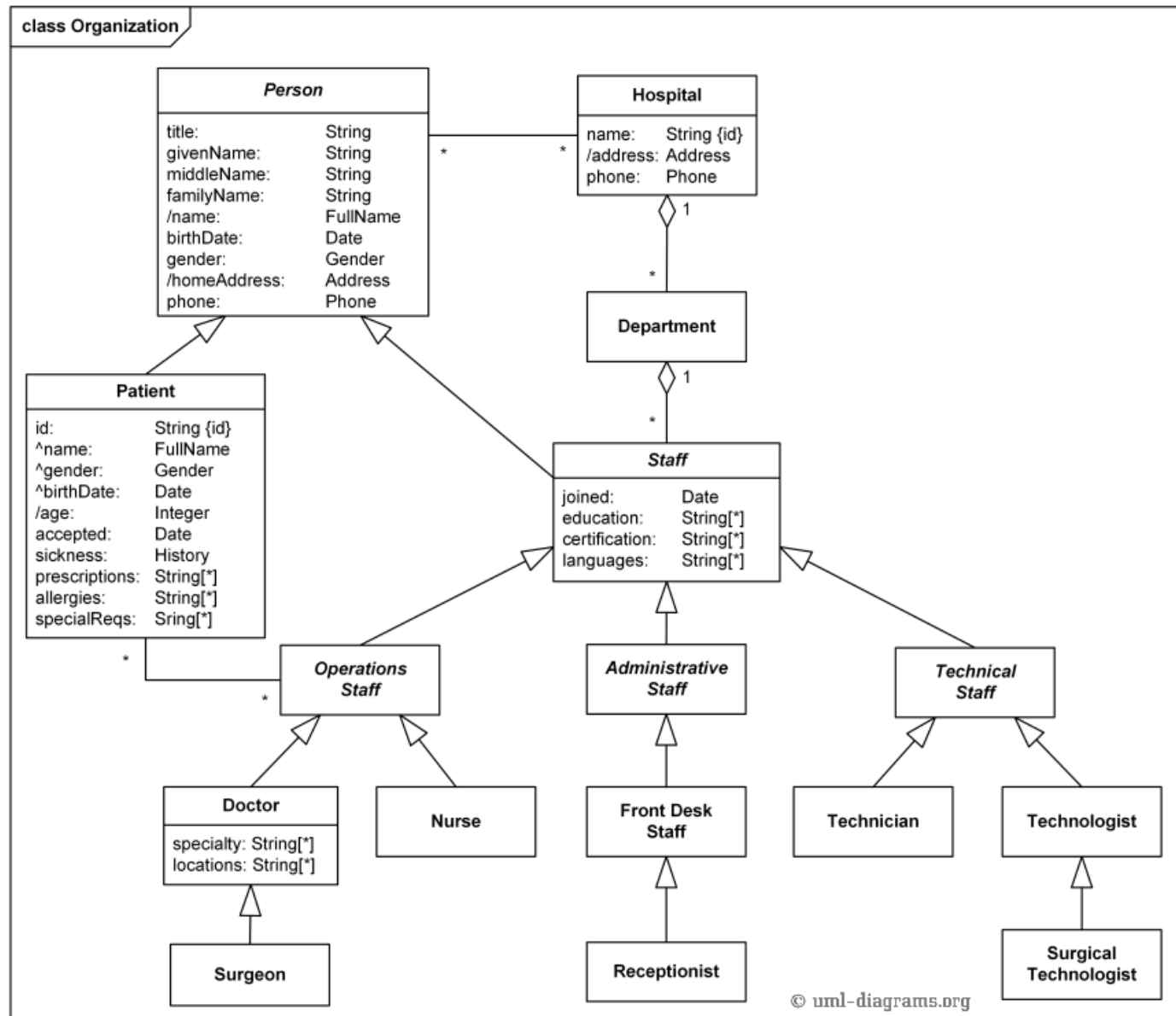
Recall

- An UML diagram represents a system aspect or a particular point of view
- Use-case diagram :
 - Objective : model the **system's functions** via the user's viewpoint
 - Specifications : actors, use-cases and their relationships
 - A use-case = a function provided by the system, in the user's viewpoint and in a particular context
 - Relationships : heritage, extension, inclusion
- Class diagram
 - Objective : model the **static structure of the system** in a spatial viewpoint
 - Specifications : class definition (attributes and operations) and the relationships between the classes
 - A class = a definition domain of a set of objects with common characteristics
 - Relationships : association, aggregation, composition, heritage

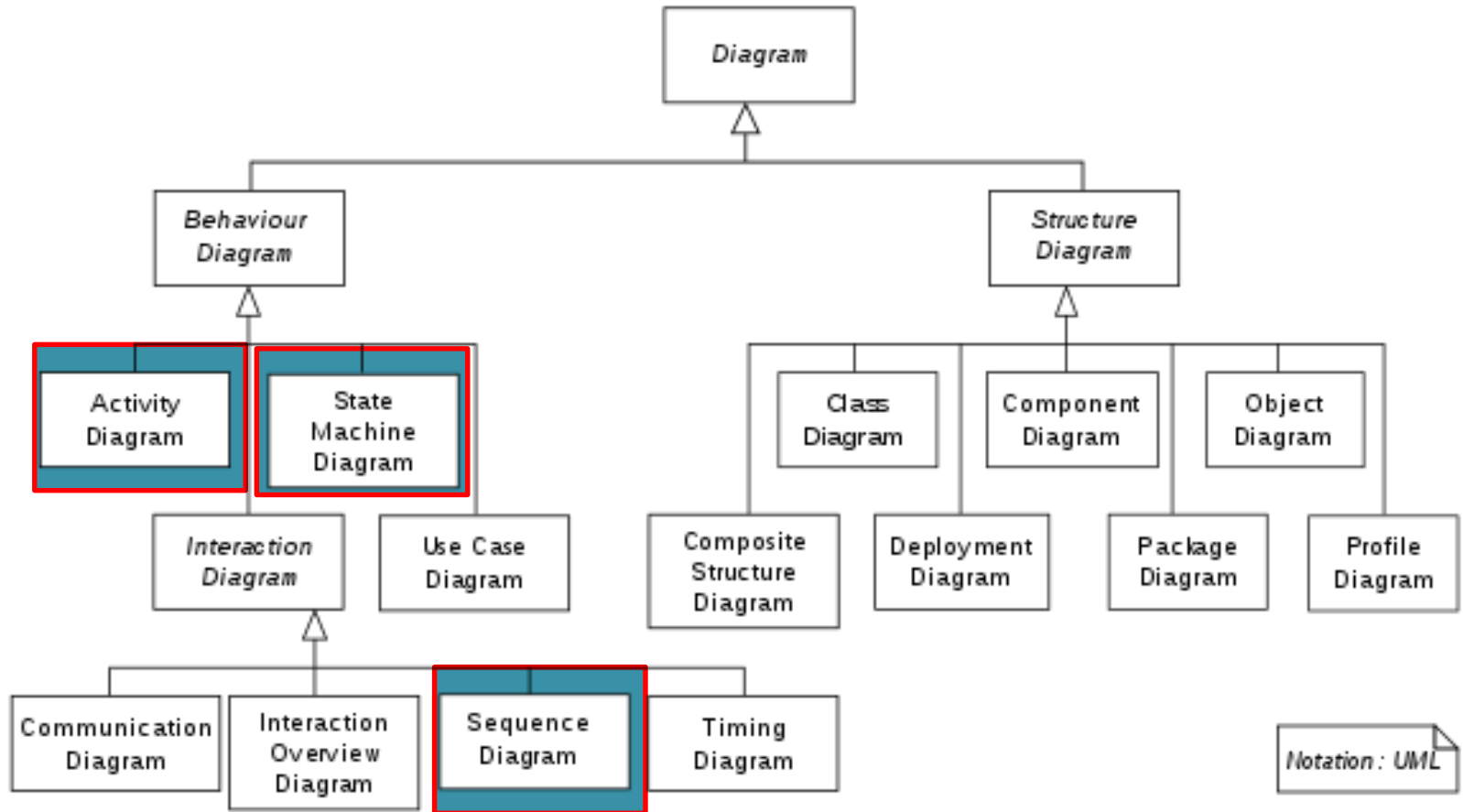
Use-case diagram



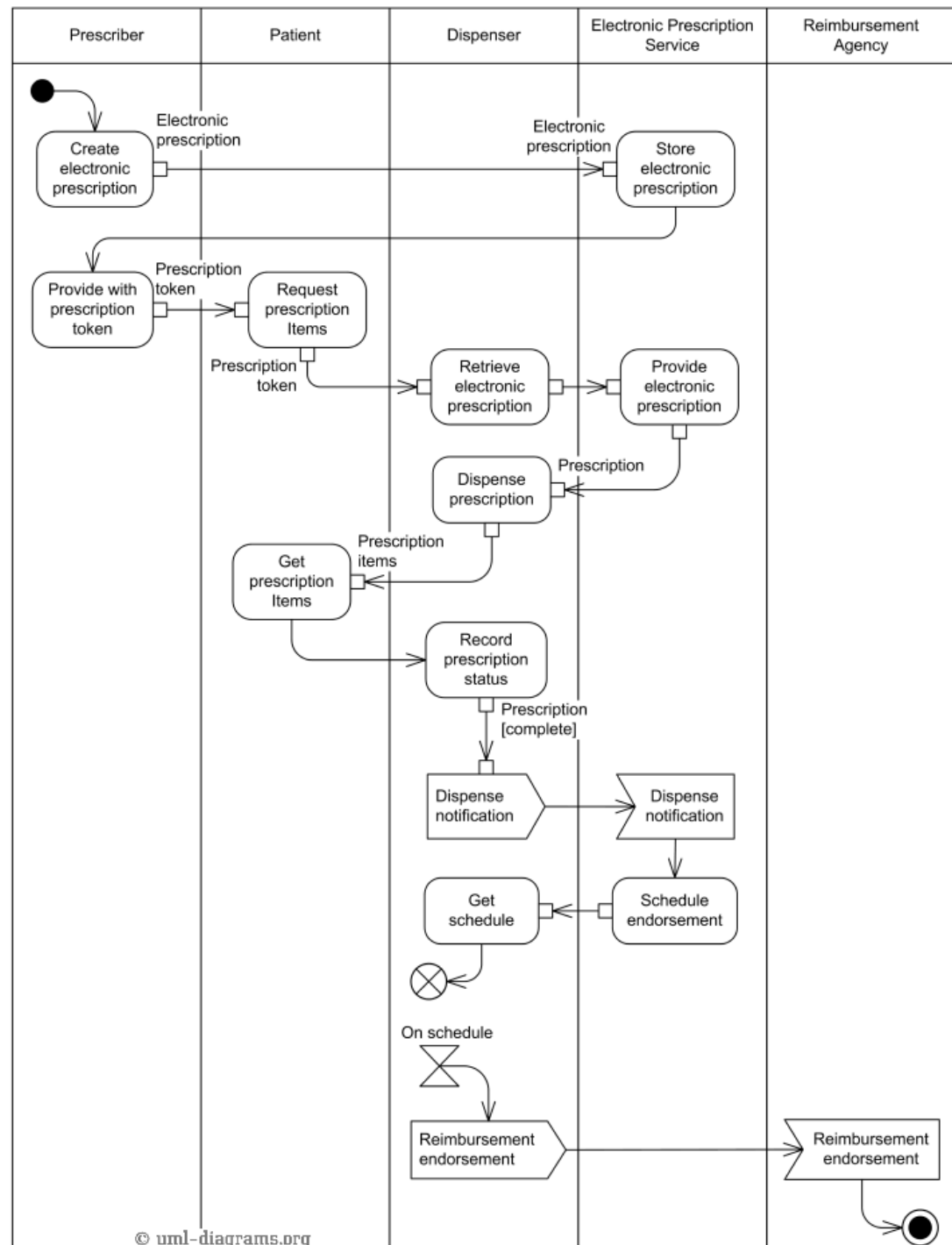
Class Diagram



Model the **behavior** of the system



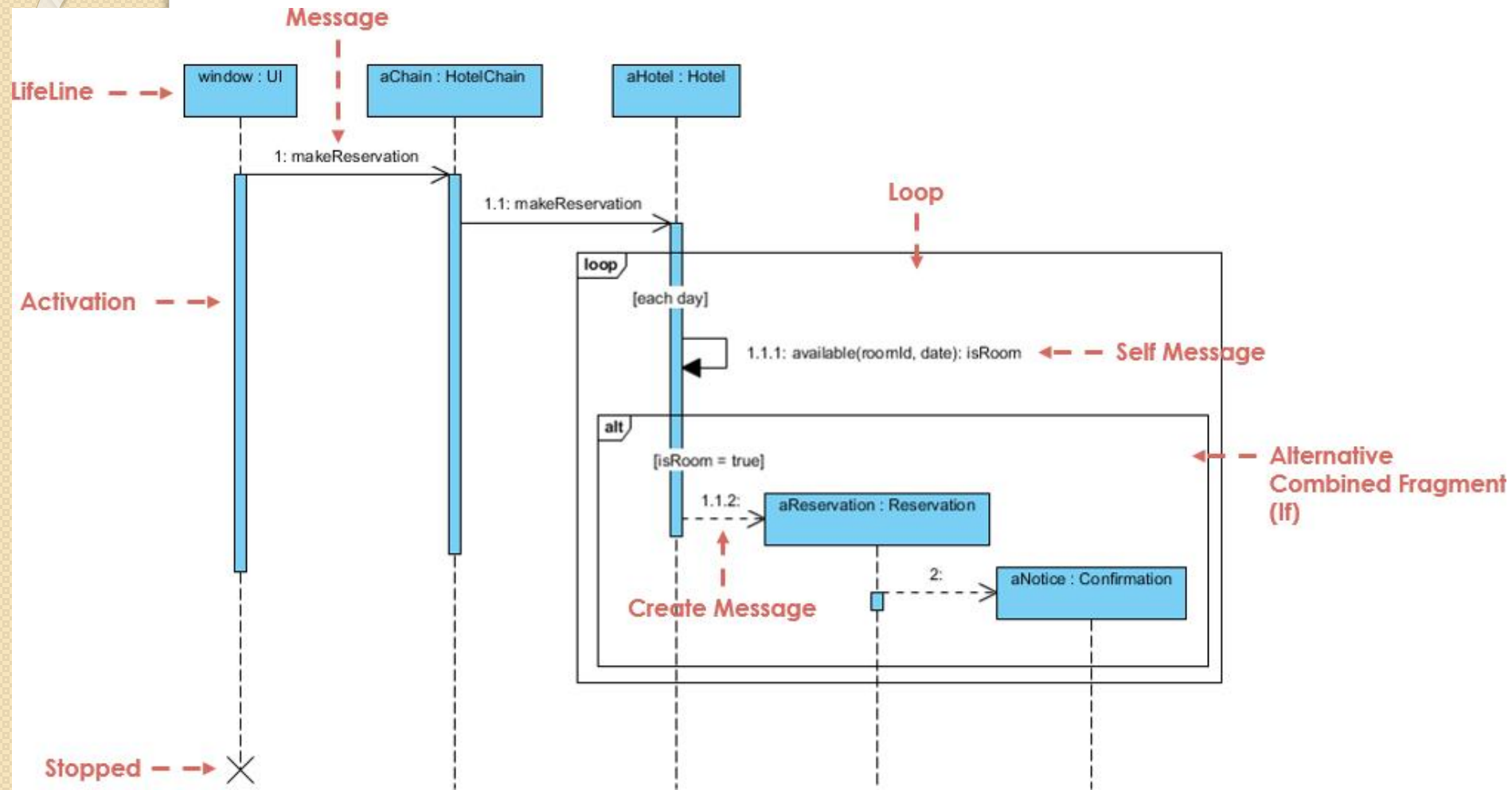
Activity Diagram



Sequence diagram

- Sequence diagrams show the interactions between objects according to a **temporal viewpoint** : the only way for an object to communicate with another object is to send it a message.
- Sequence diagrams capture:
 - interactions that take place in a collaboration that either realizes a use case or an operation
 - high-level interactions between user of the system and the system, between the system and other systems, or between subsystems

Sequence Diagram Elements

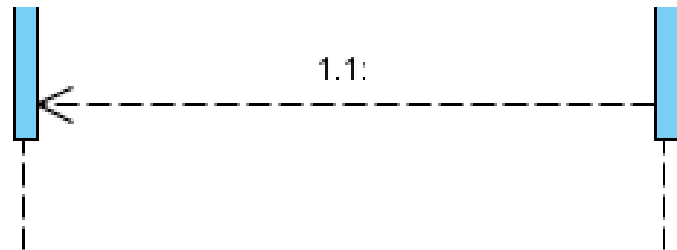


Type of messages

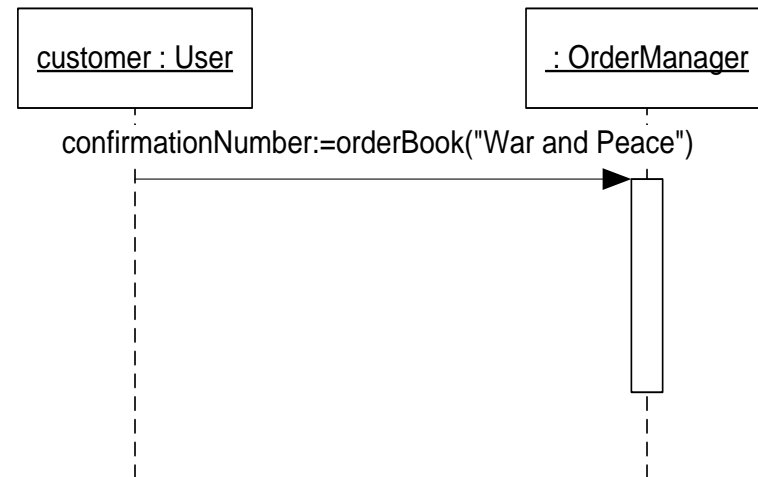
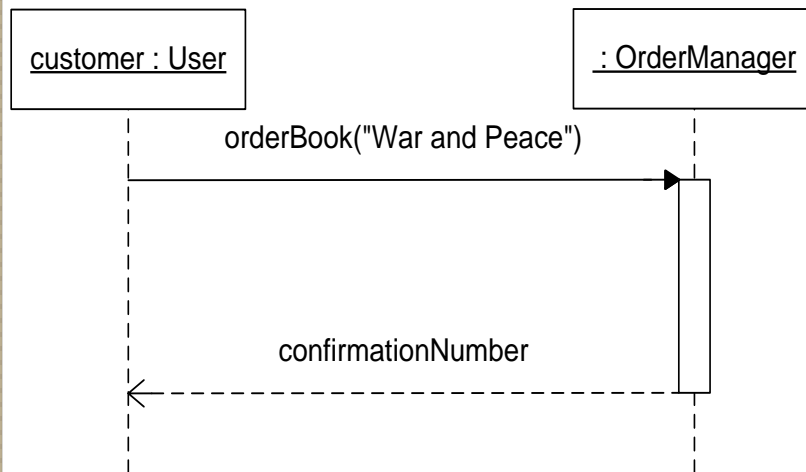
- A message defines a particular communication between Lifelines of an Interaction
- **Call message** : represents an invocation of operation of target lifeline.



- **Return message** : represents the pass of information back to the caller of a corresponded former message.

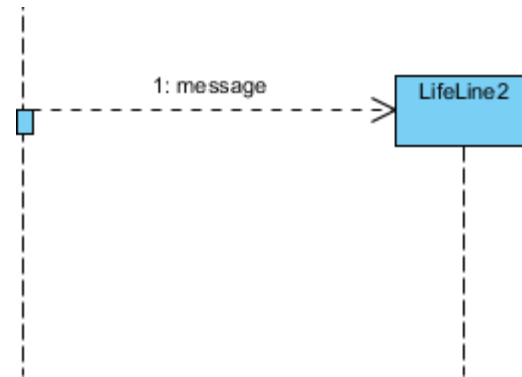


Example

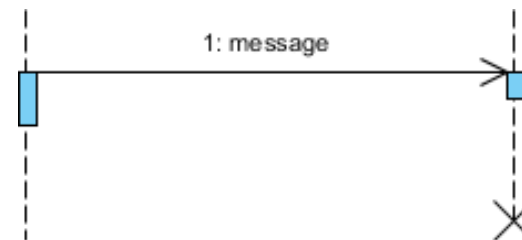


Types of messages

- **Create message** : represents the instantiation of (target) lifeline.



- **Destroy message** : represents the request of destroying the lifecycle of target lifeline.



Demo : identify

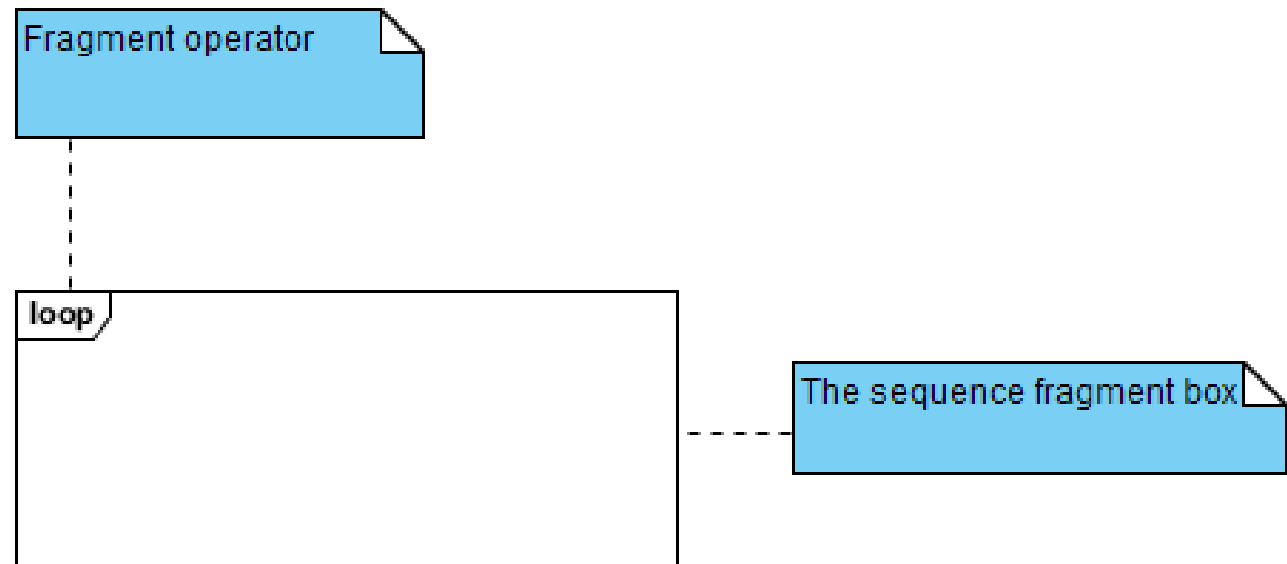
- Sequence diagram:
 1. The user enters his login in the application
 2. Then he/she enters the password
 3. The application will request the validity of this pair (login, password) to the authentication server
 4. The server returns the response to the application

Demo : identify

- Sequence diagram:
 1. The **user** enters his login in the **application**
 2. Then he/she enters the password
 3. The application will request the validity of this pair (login, password) to the **authentication server**
 4. The server returns the response to the application

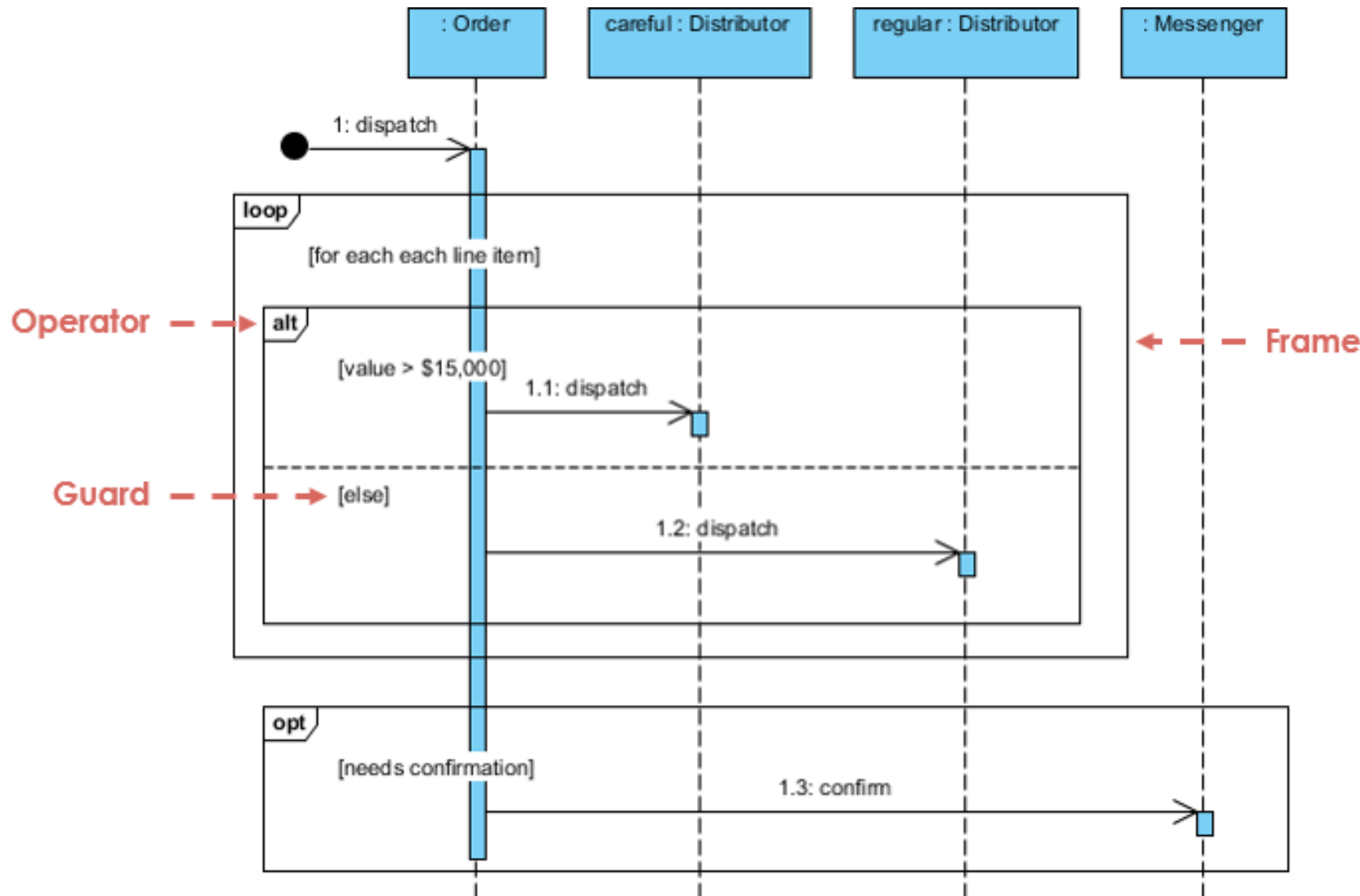
Sequence Fragments

- Combined fragment encloses a portion of the interactions within a sequence diagram
 - Fragment types: ref, assert, loop, break, alt, opt, neg, ...

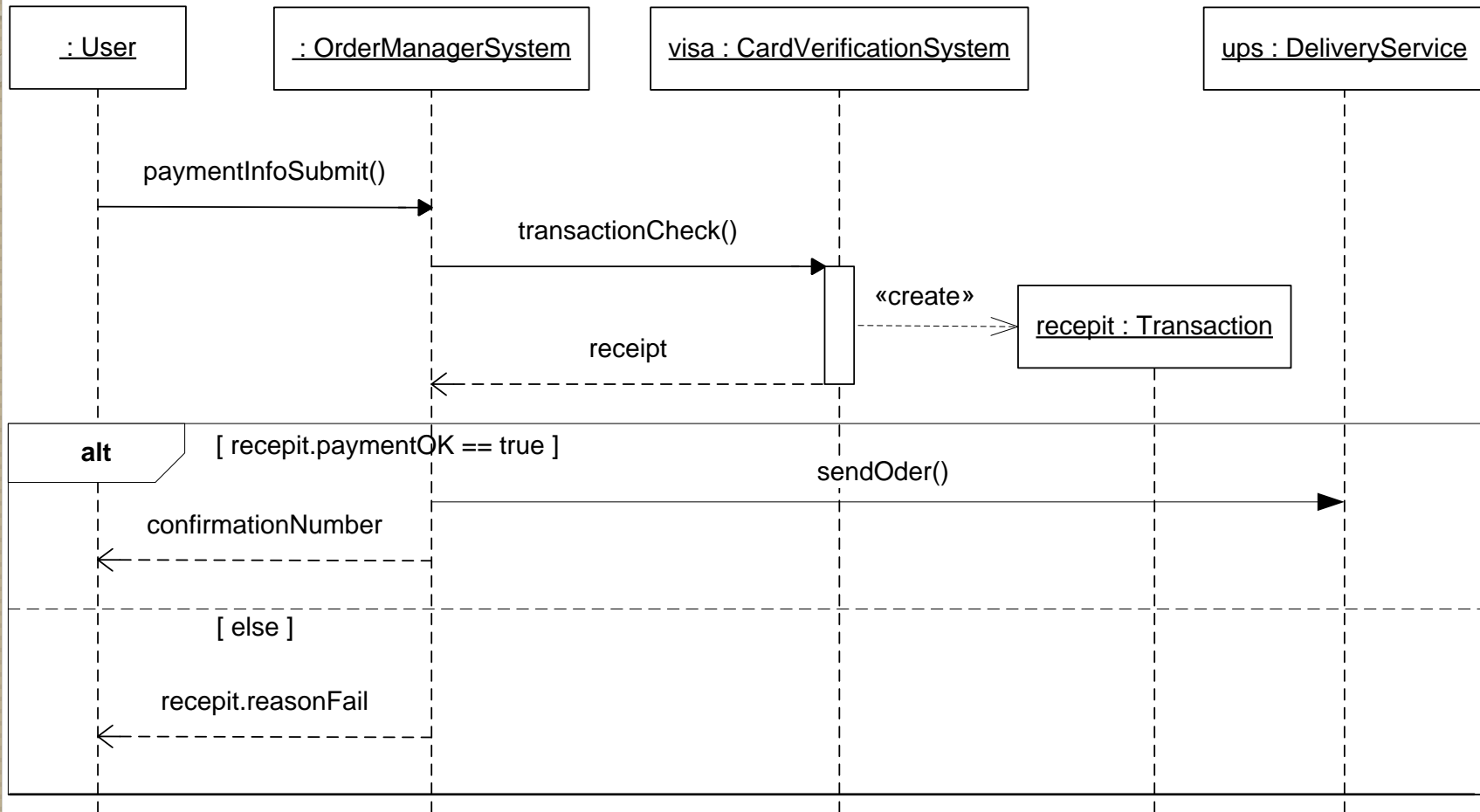


Operator	Fragment type
alt	Alternative multiple fragments: only the one whose condition is true will execute.
opt	Optional: the fragment executes only if the supplied condition is true. Equivalent to an alt only with one trace.
par	Parallel: each fragment is run in parallel.
loop	Loop: the fragment may execute multiple times, and the guard indicates the basis of iteration.
region	Critical region: the fragment can have only one thread executing it at once.
neg	Negative: the fragment shows an invalid interaction.
ref	Reference: refers to an interaction defined on another diagram. The frame is drawn to cover the lifelines involved in the interaction. You can define parameters and a return value.
sd	Sequence diagram: used to surround an entire sequence diagram.

Fragment combined example

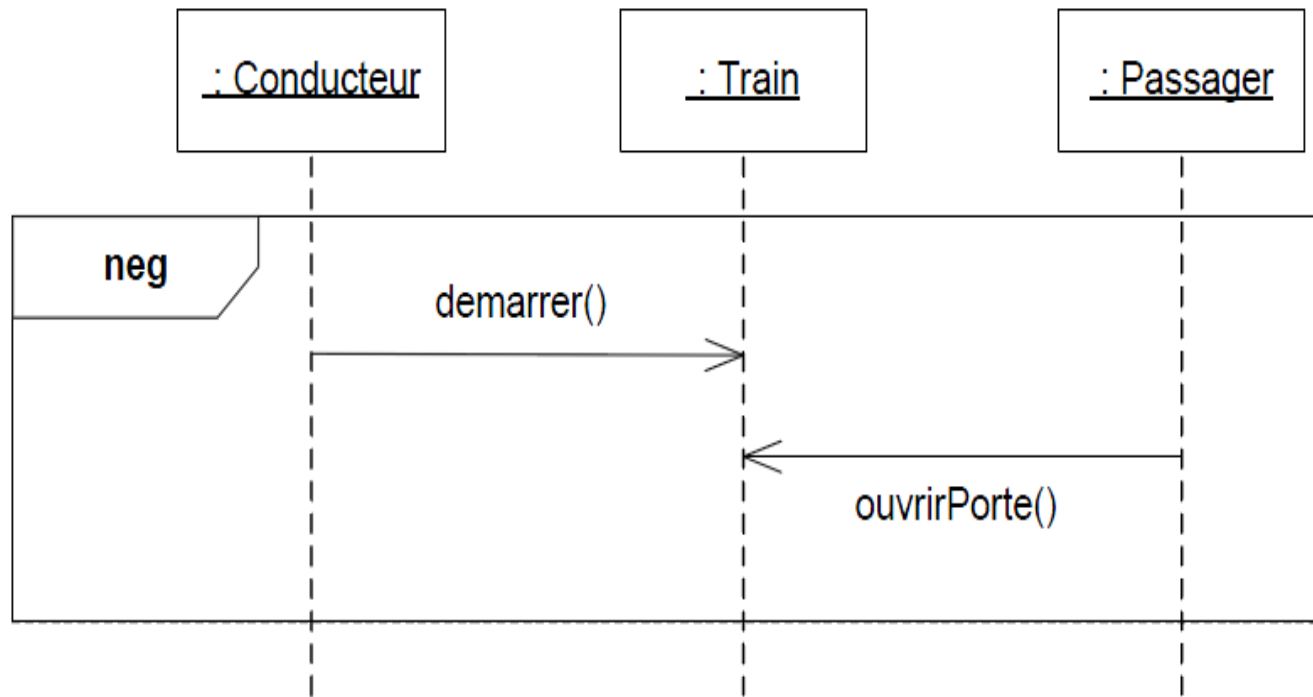


Operator ALT

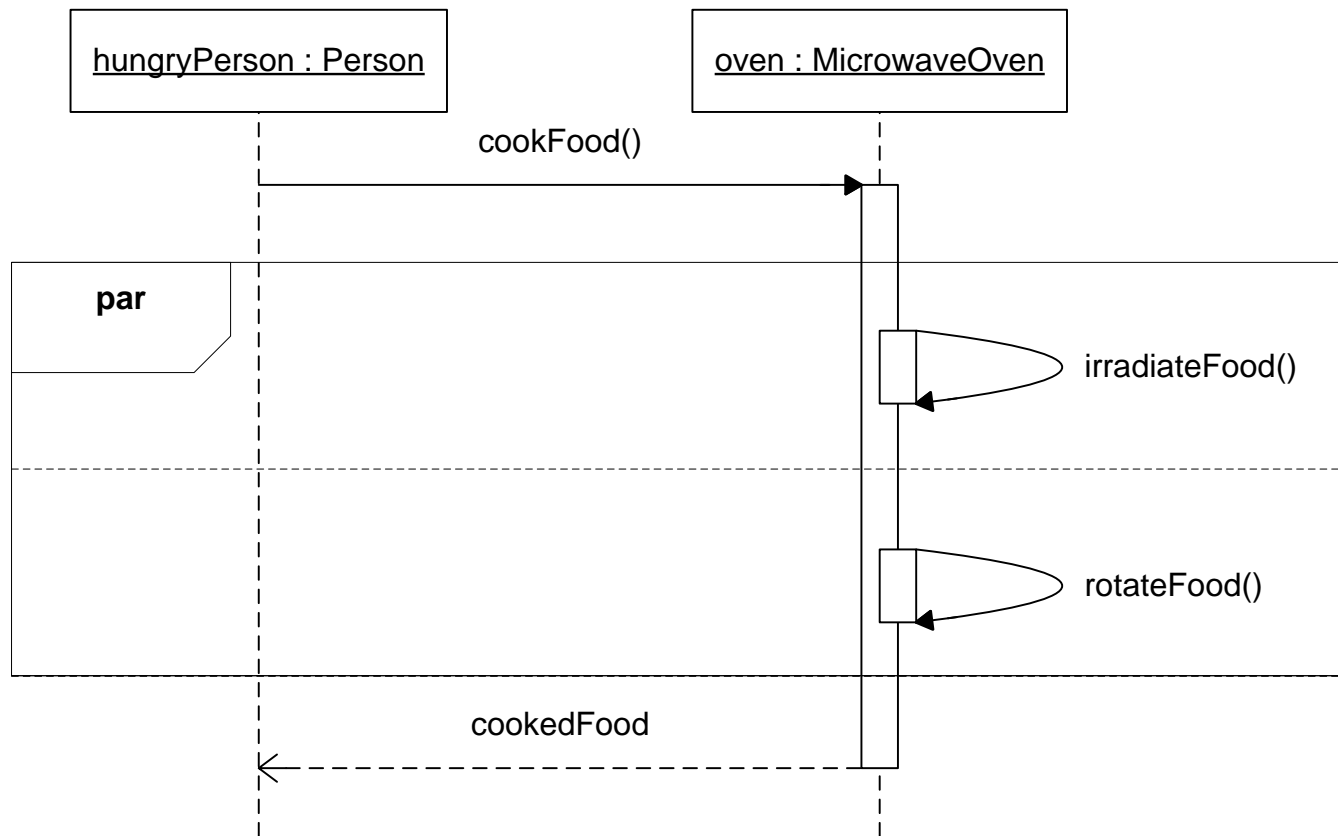


Operator **NEG**

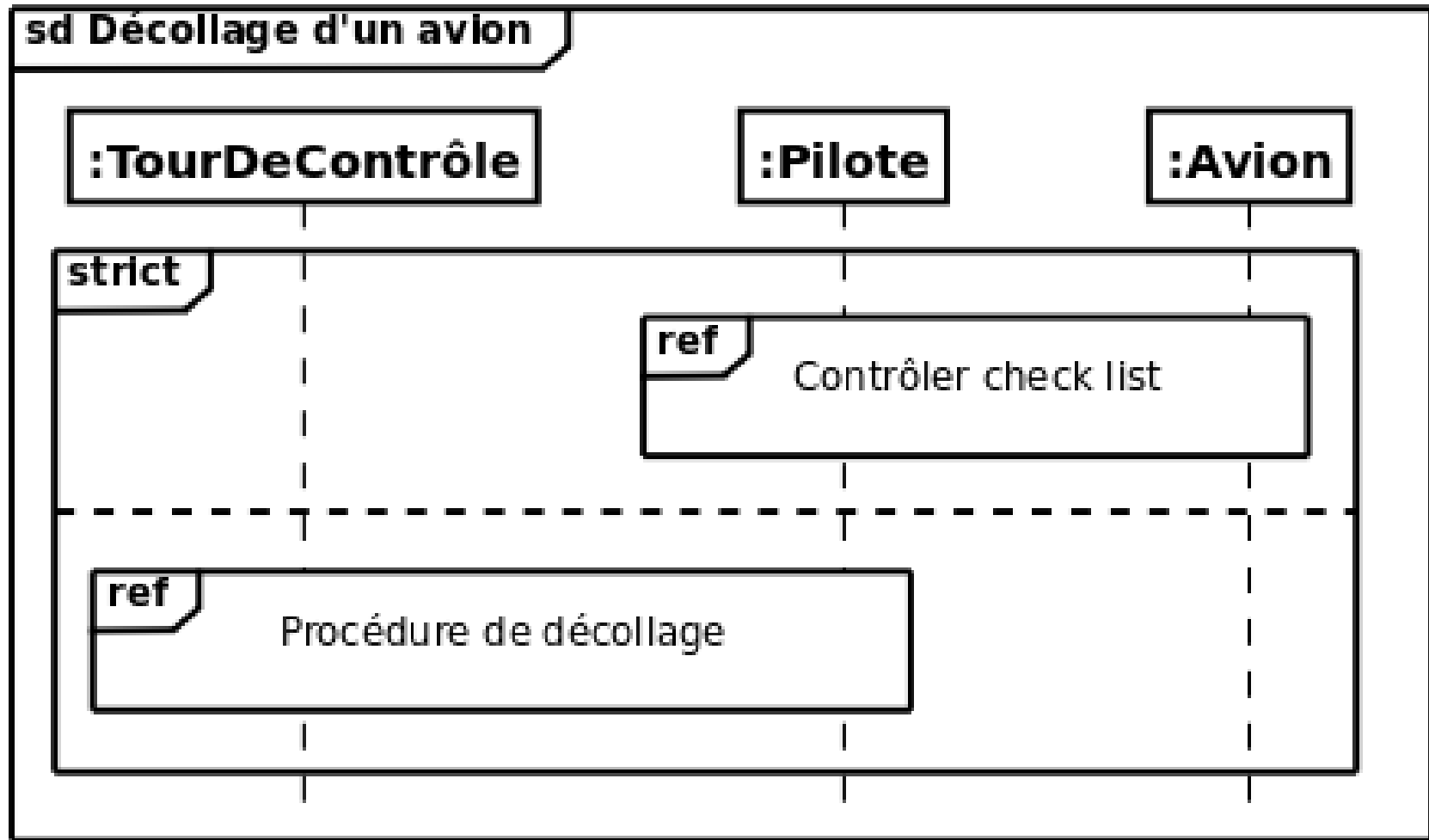
- Once the train driver has started, passengers are forbidden to open the door



Operator PAR



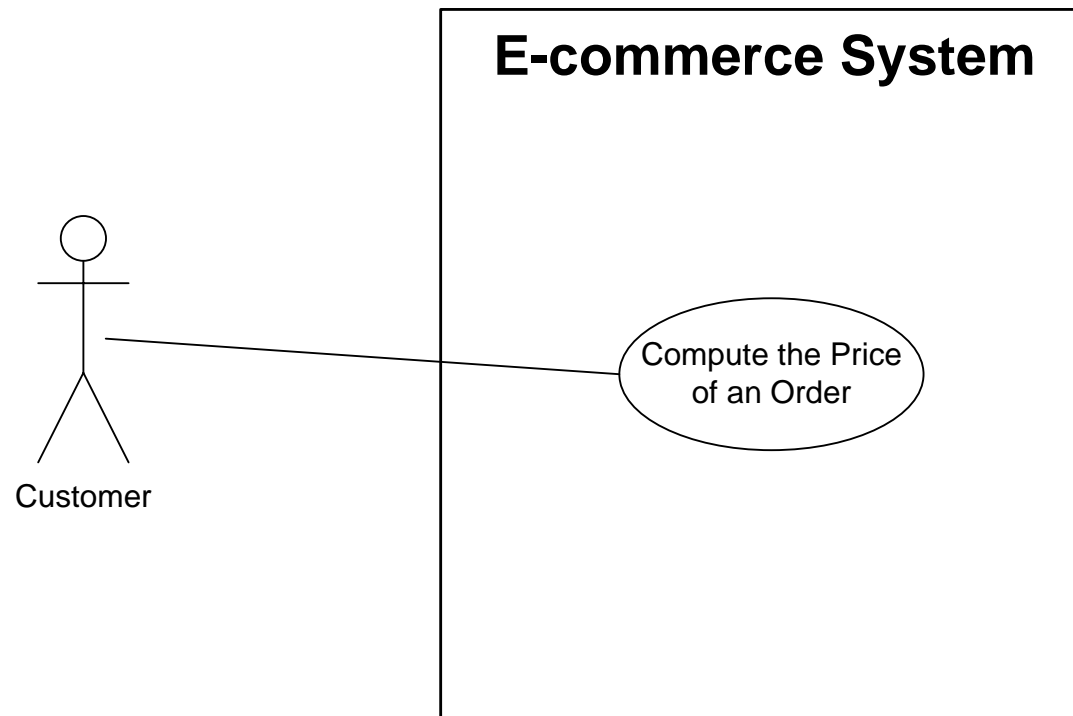
Operators SD and REF



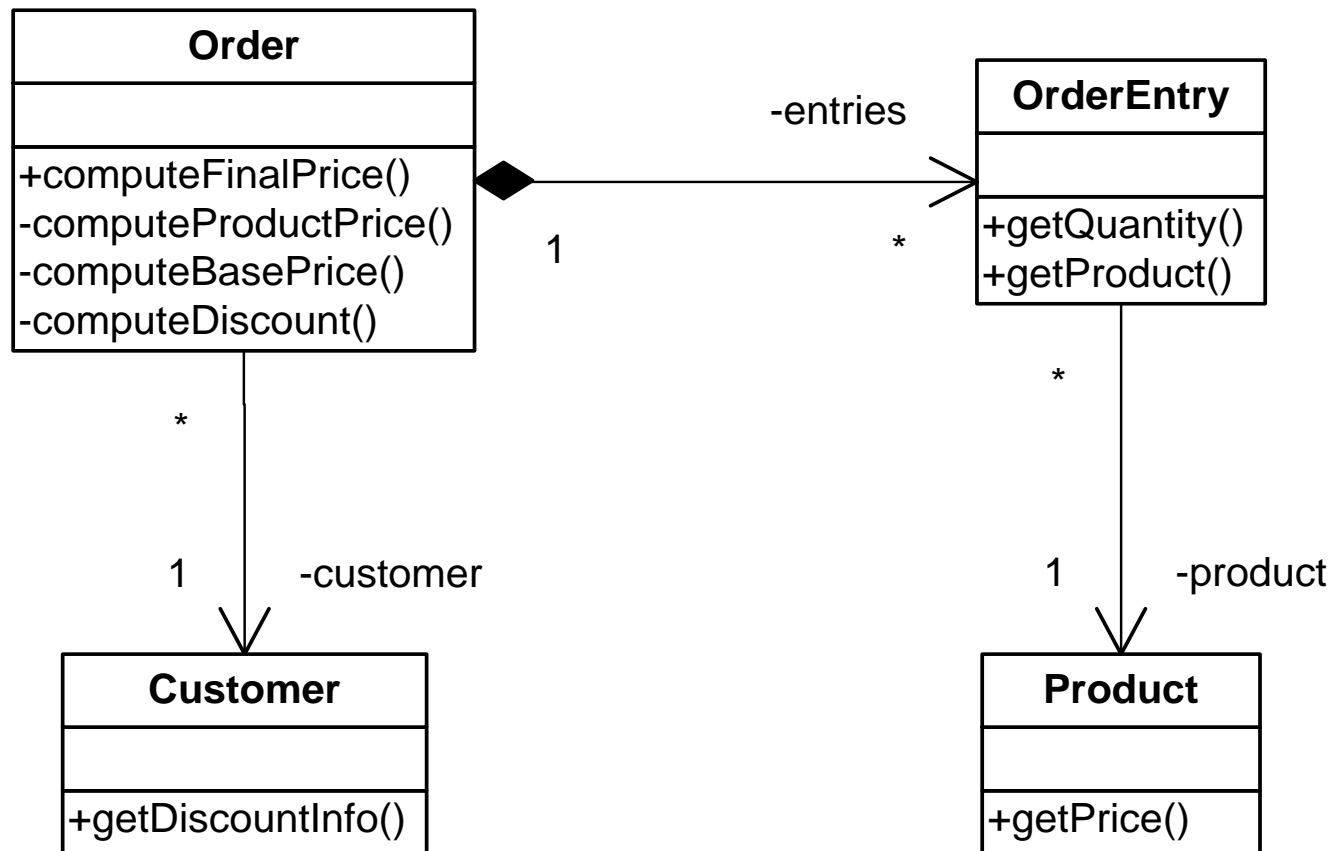
Example: total price of an order

- A software that allows clients to compute the total price of an order
- Each order is associated to one and only one client. An order is composed of several lines
- Each line is defined by :
 - A product
 - The commanded quantity
- Each product has an unit price
- The clients can have special discounts

Use case diagram



Class diagram



Sequence diagram : compute the total price of an order

