ΕΘΝΙΚΟ ΜΕΤΣΟΒΙΟ ΠΟΛΥΤΕΧΝΕΙΟ
Σχολή Ηλεκτρολόγων Μηχανικών και Μηχανικών Υπολογιστών
Τεχνολογία Λογισμικού, 7ο/9ο εξάμηνο 2018-2019

Τεχνολογία Λογισμικού

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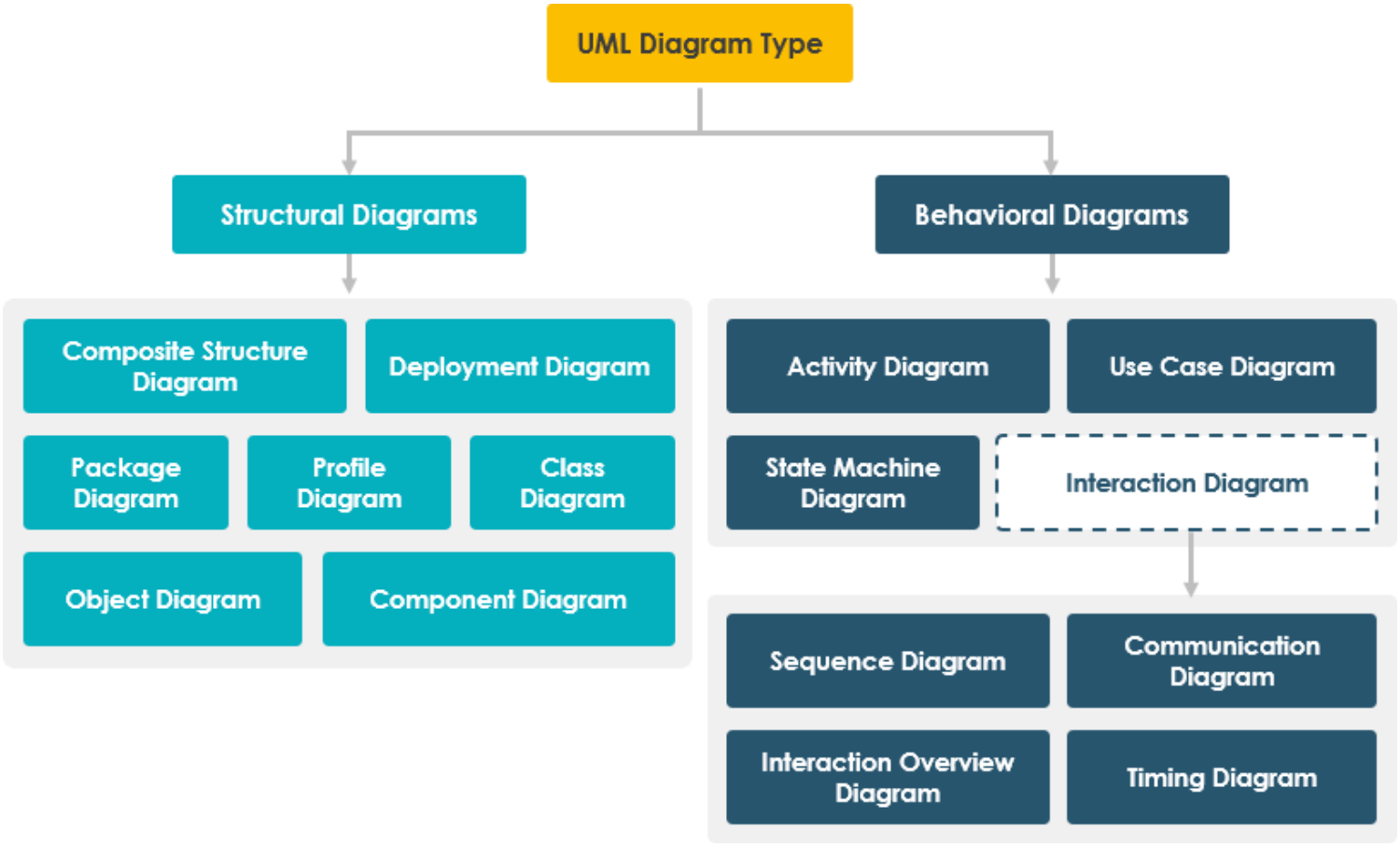
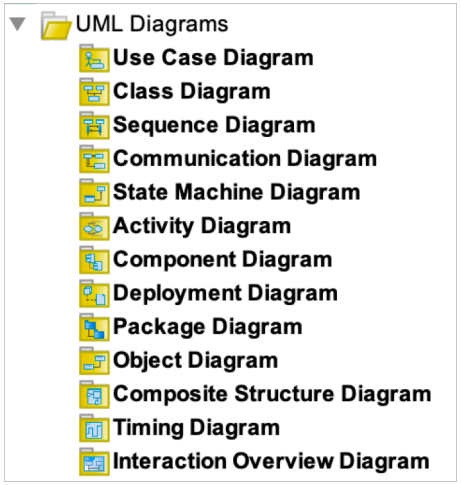
Εισαγωγή στη UML (2/2)

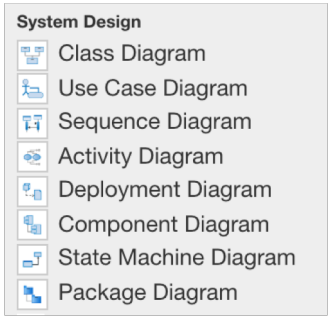
UML diagrams



Visual Paradigm CE



Visual Paradigm online



Static vs. Dynamic Design

Static design describes code structure and object relations

- Class relations
- Objects at design time
- Doesn’t change

Dynamic design shows communication between objects

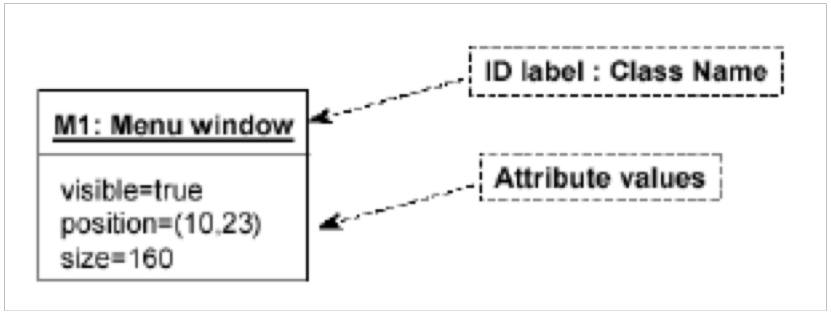
- Similarity to class relations
- Can follow sequences of events
- May change depending upon execution scenario
- Called Object Diagrams

Object diagrams

Shows instances of Class Diagrams and links among them:
An object diagram is a snapshot of the objects in a system at a point in time

Object diagrams focus on representing...

- Interactions – Sequence diagram
- Message passing – Collaboration diagram
- Operation – Deployment diagram



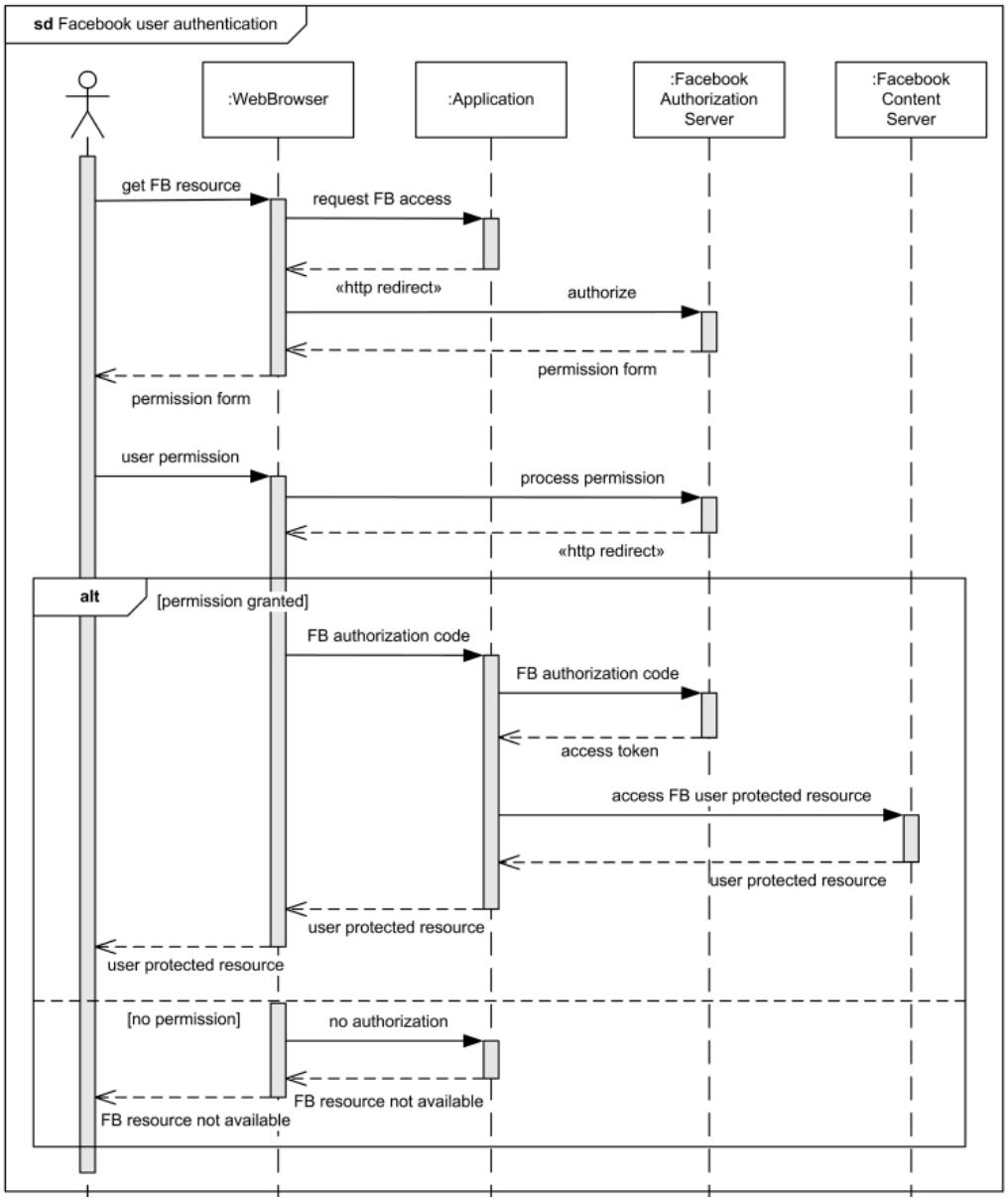
Interactions modeling: Sequence diagrams

Interaction diagrams describe how objects collaborate.

A Sequence Diagram:

- Indicates what messages are sent and when
- Time progresses from top to bottom
- Objects involved are listed left to right
- Messages are sent left to right between objects in sequence

Interactions modeling: Sequence diagrams



Interactions modeling: Sequence diagrams

Actor

Lifeline

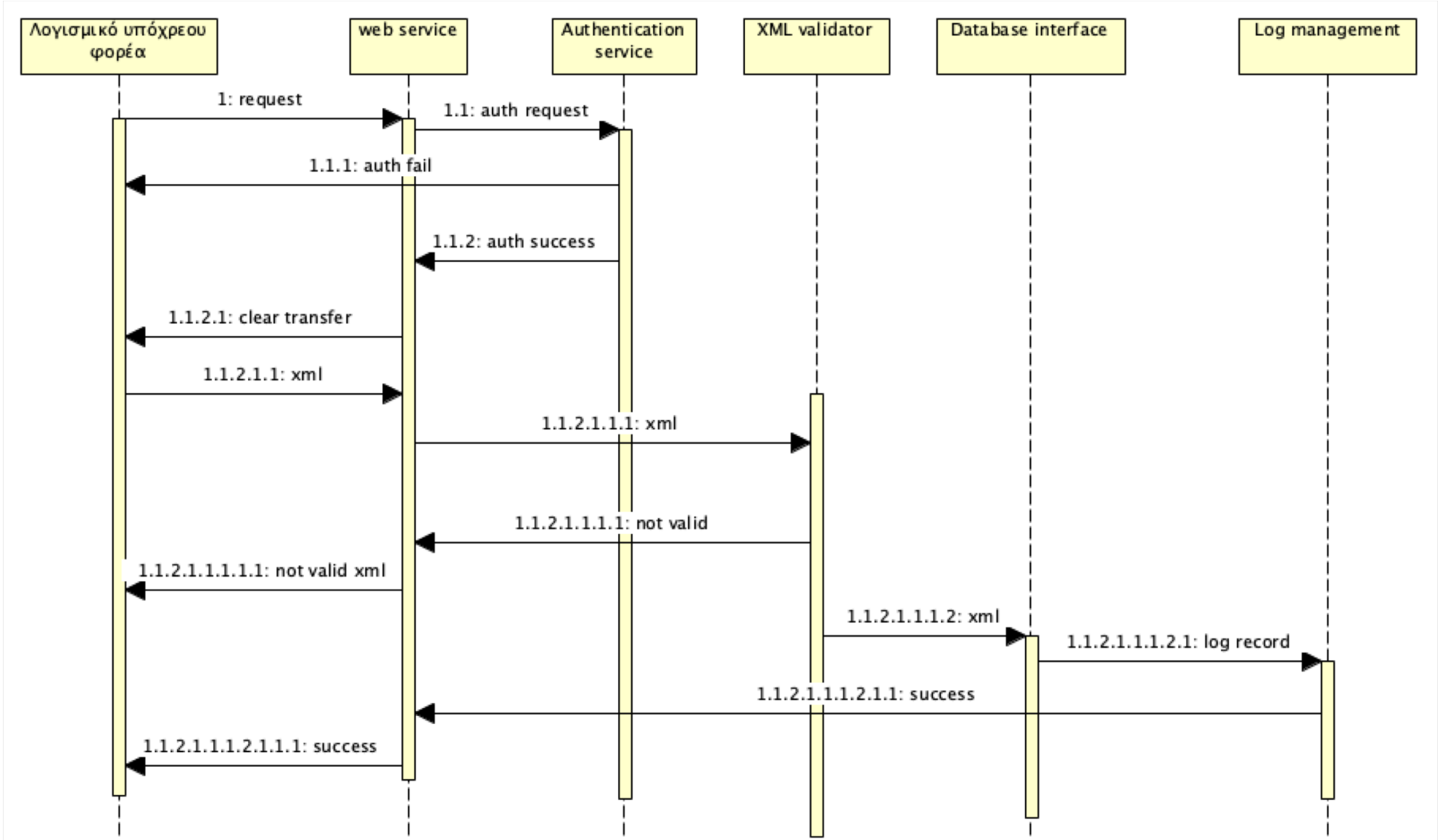
Activation

Messages: call, return, self

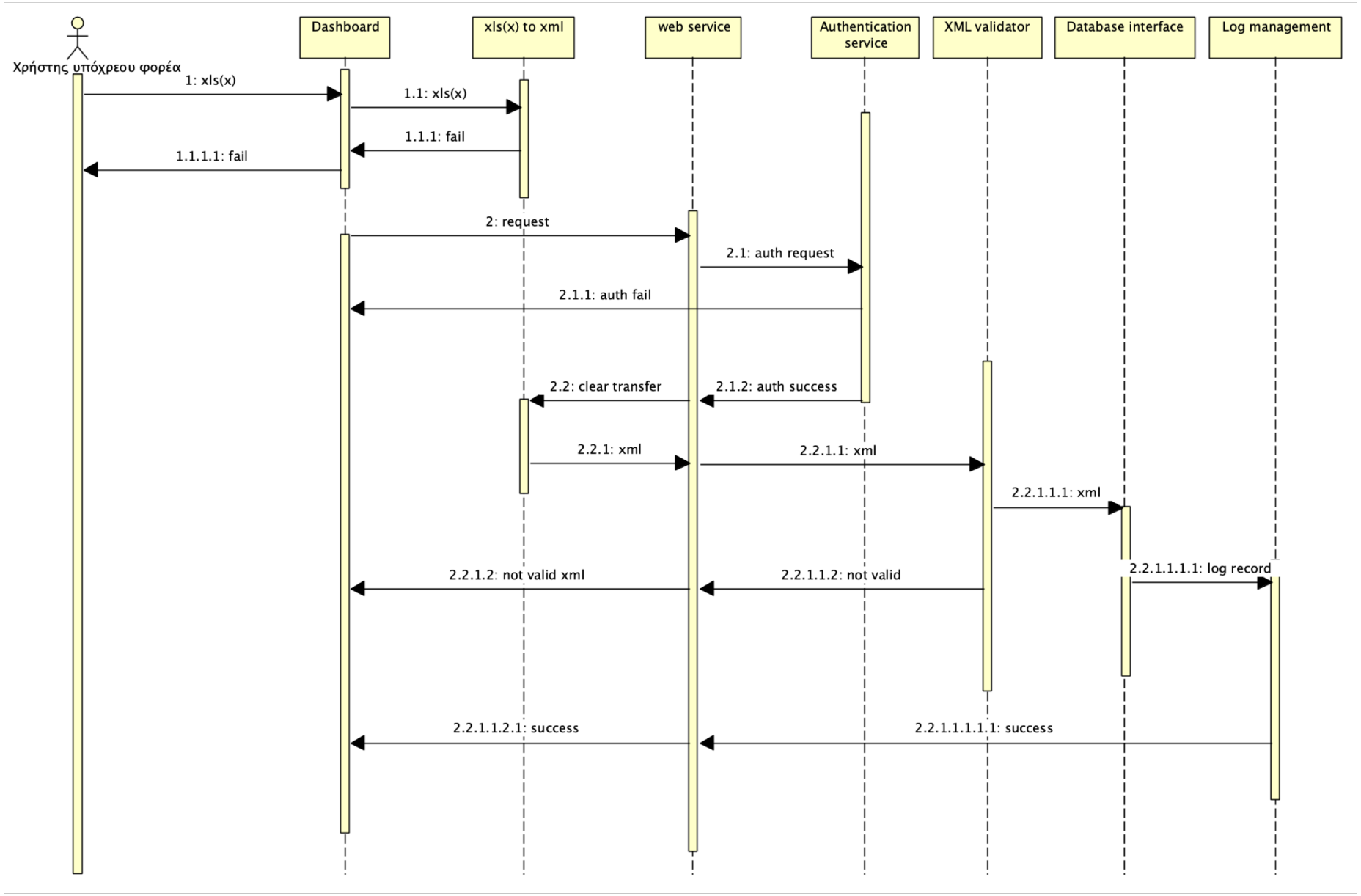
Focus of control: also called execution occurrence

- A tall, thin rectangle on a lifeline
- It represents the period during which an element is performing an operation. The top and the bottom of the rectangle are aligned with the initiation and the completion time respectively.

Interactions modeling: Sequence diagrams



Interactions modeling: Sequence diagram



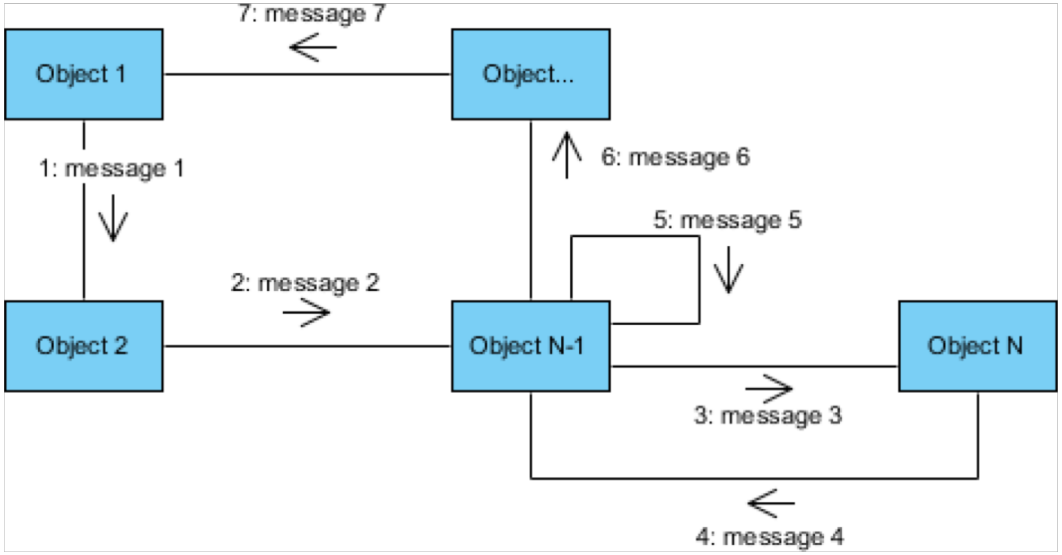
Interactions modeling: Collaboration diagrams

Collaboration Diagrams show similar information to sequence diagrams, BUT the vertical sequence is missing. Instead sequence diagrams use:

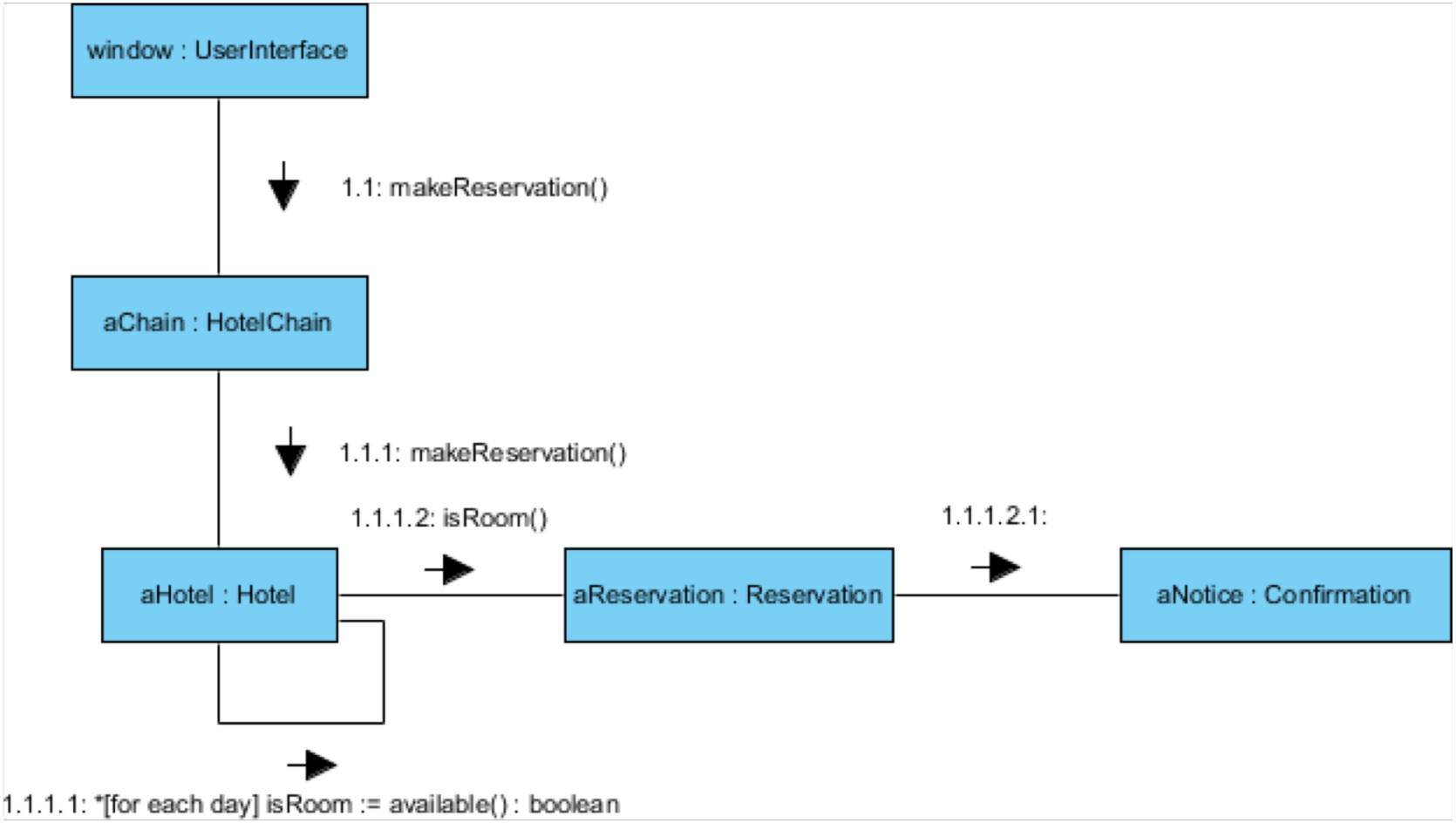
- Object Links - solid lines between the objects that interact
- On the links are Messages - arrows with one or more message name that show the direction and names of the messages sent between objects

Emphasis is on static links as opposed to sequence (= timing, order of things) in the sequence diagram

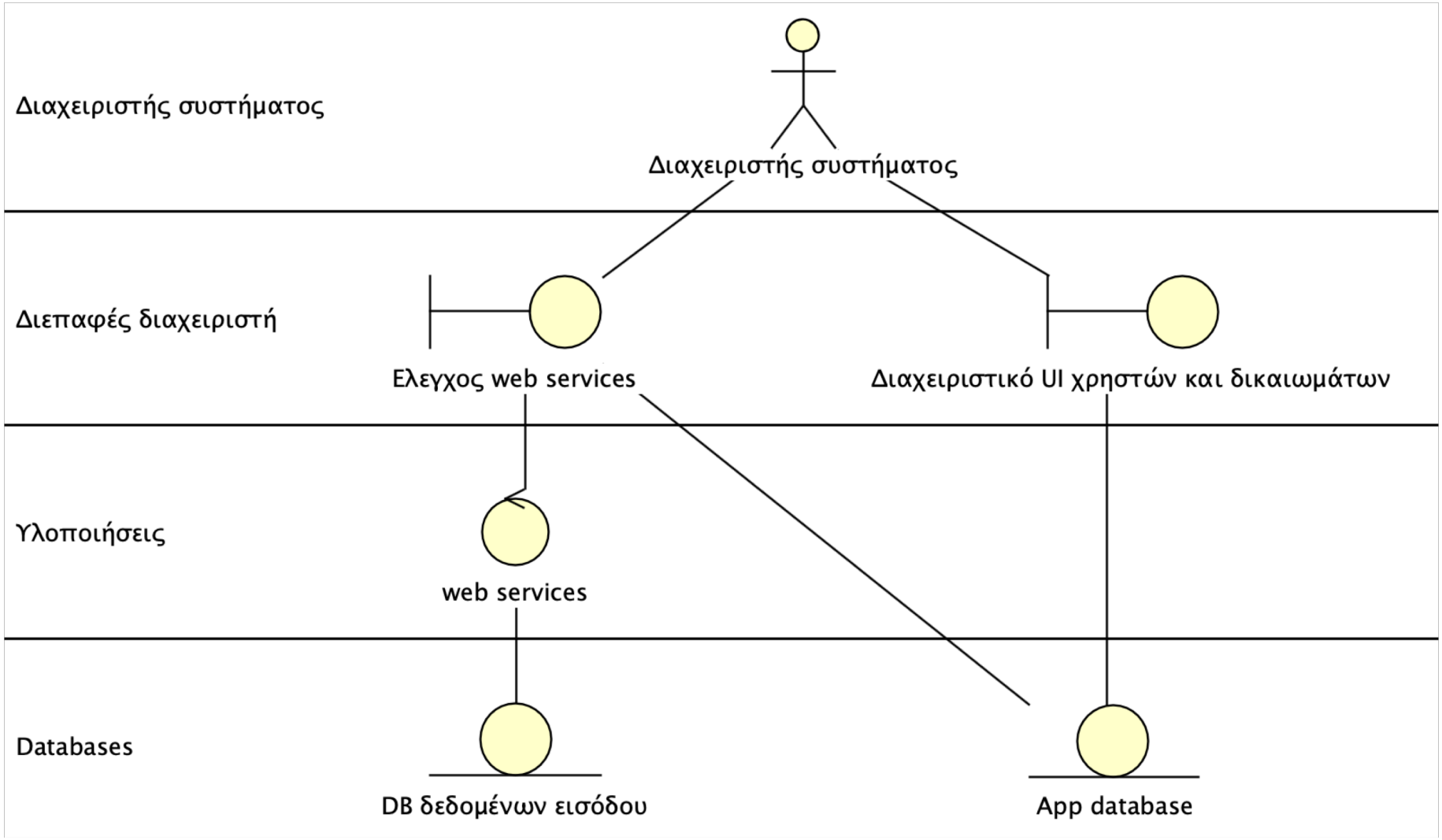
a.k.a. Communication diagrams



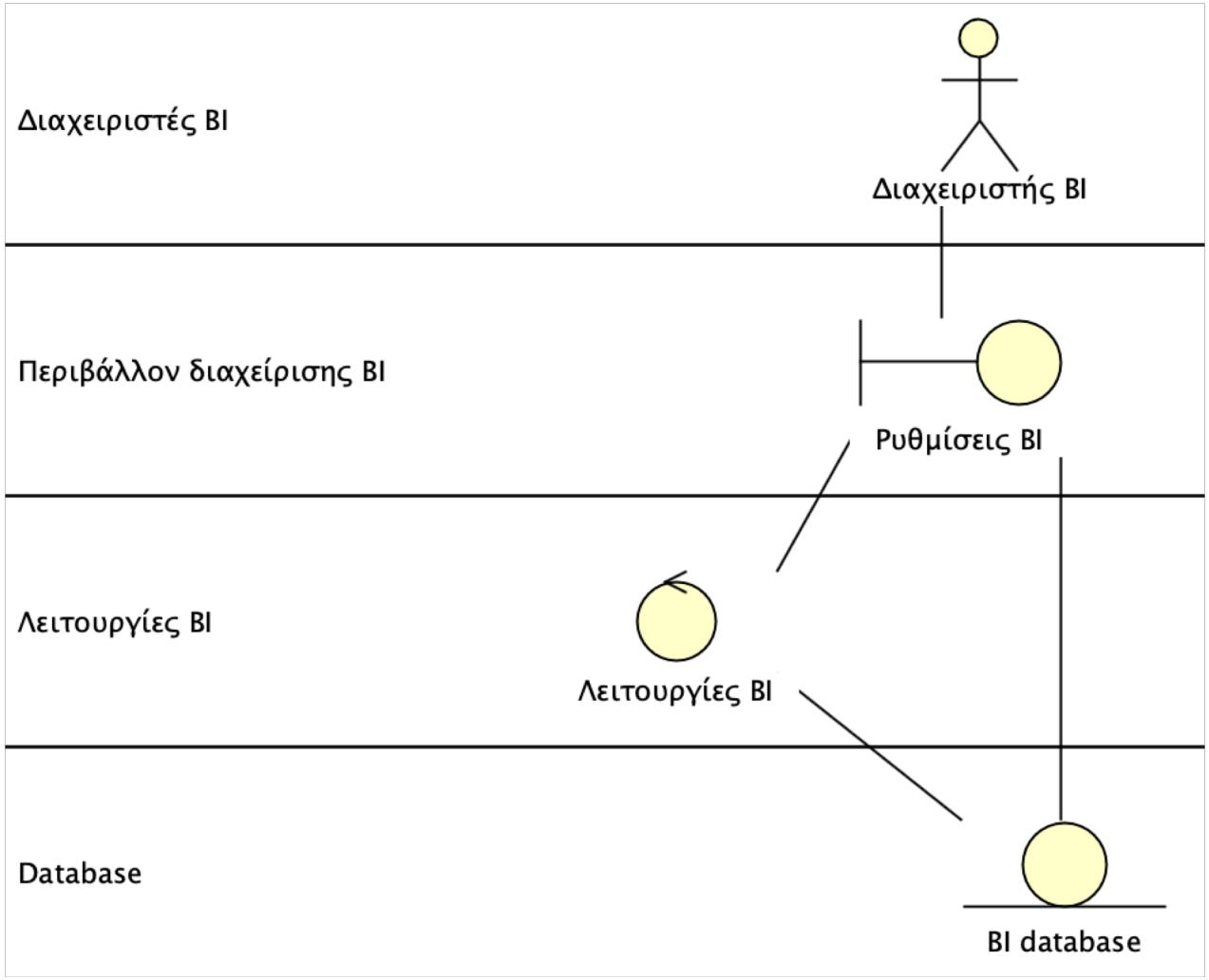
Collaboration diagram example



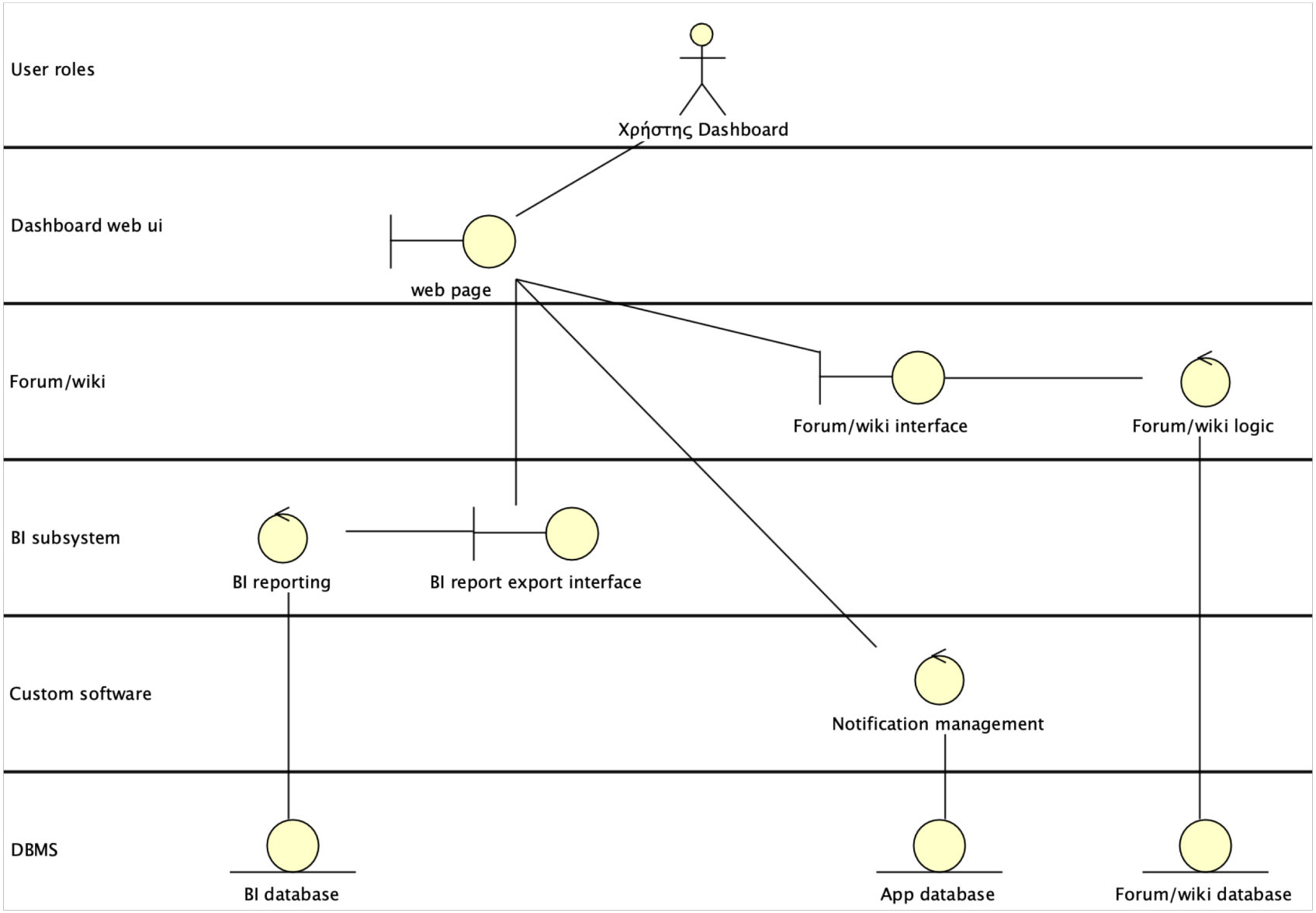
Collaboration diagram example



Collaboration diagram example



Collaboration diagram example



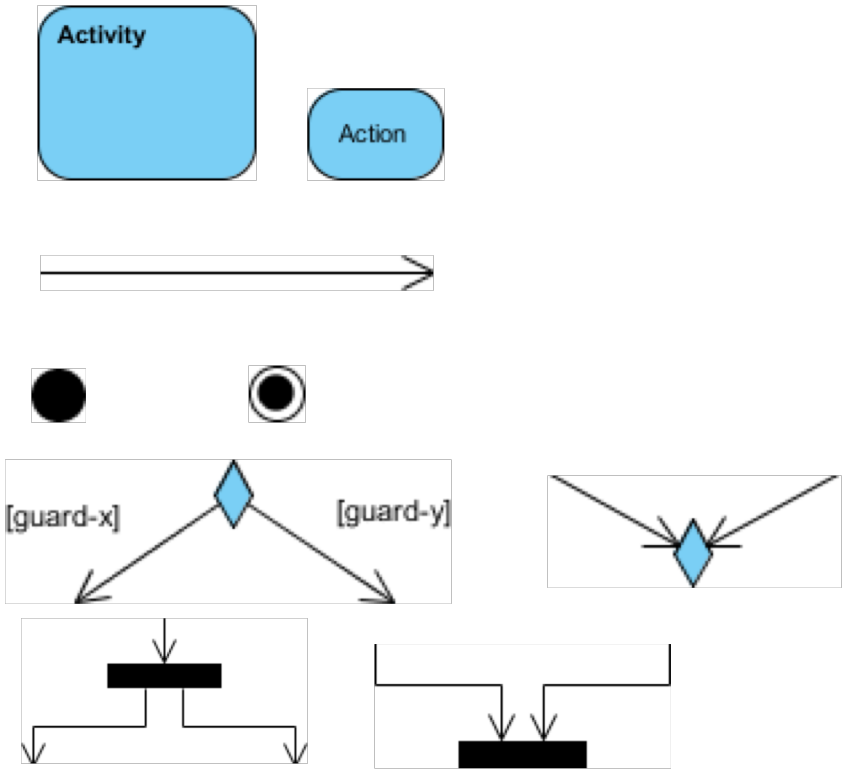
Interactions modeling: Activity diagrams

Modeling of the dynamic aspects of a system, component, etc.

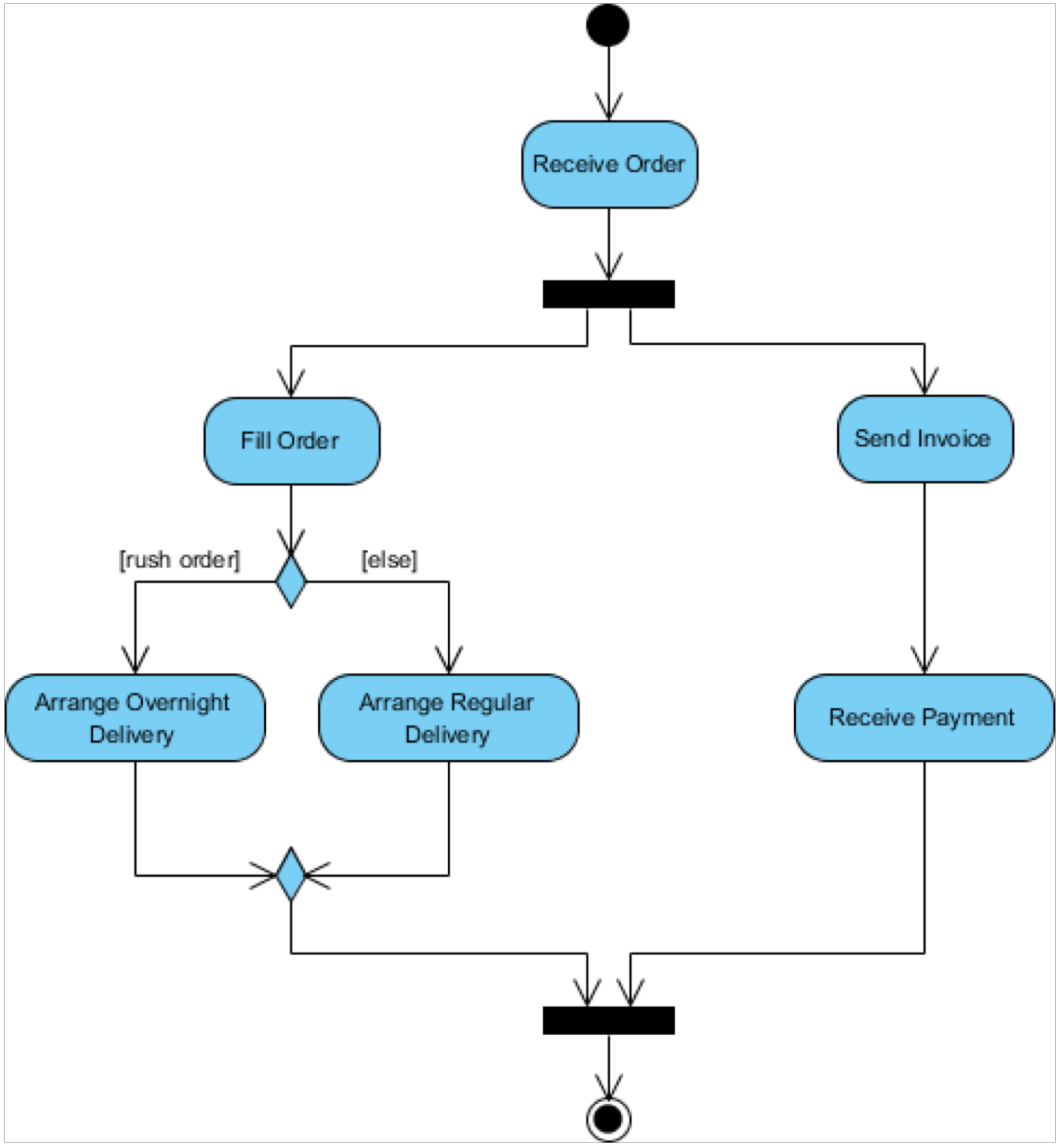
Similar to "old school" graphical representation of algorithms

Concepts

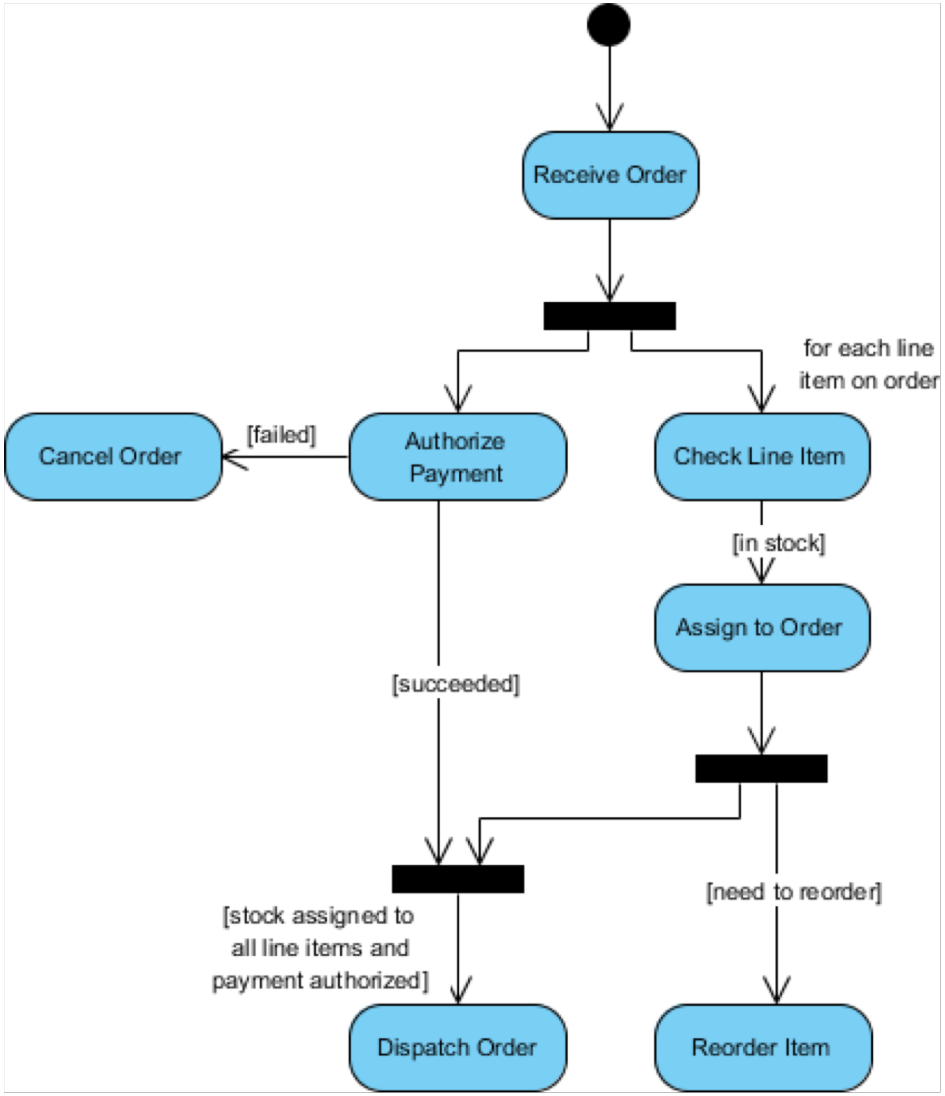
- Activity / action
- Flow (control / object)
- Initial / final node
- Decision / merge
- Fork / join



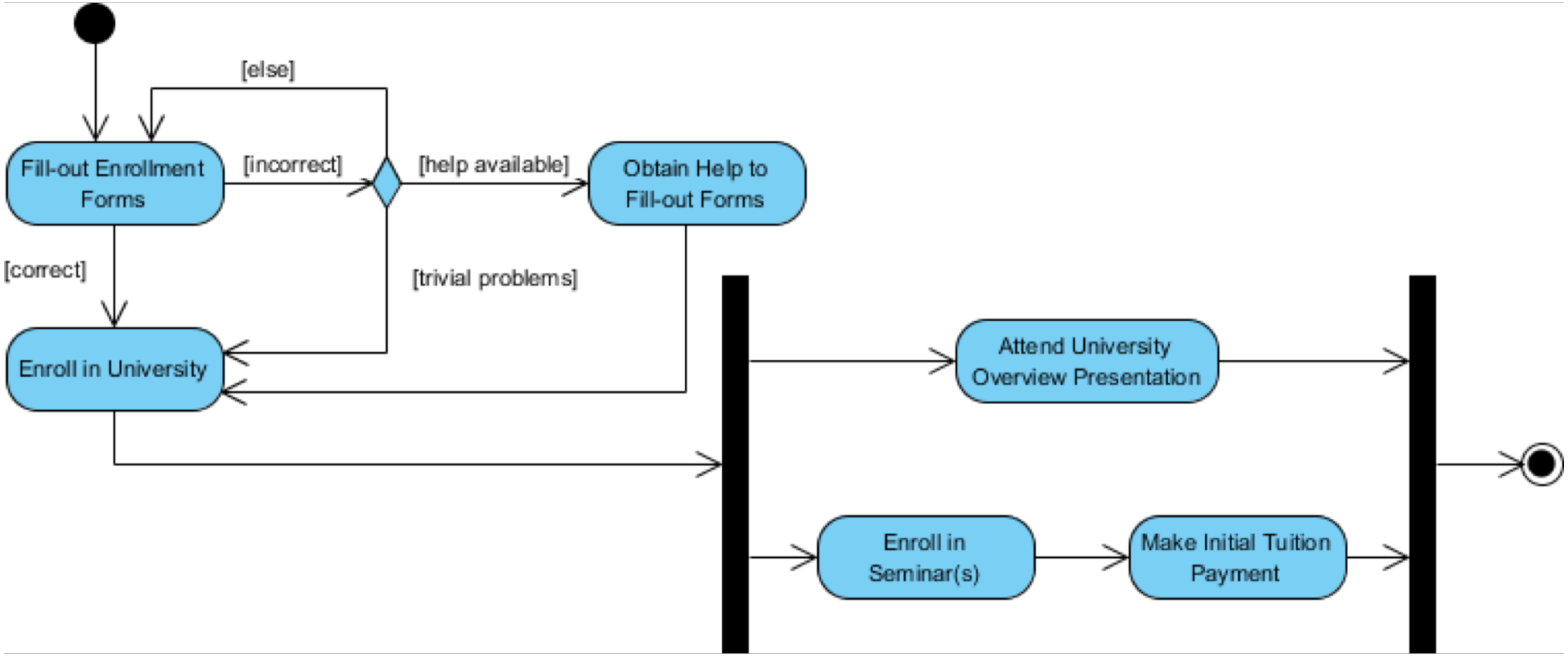
Activity diagram example



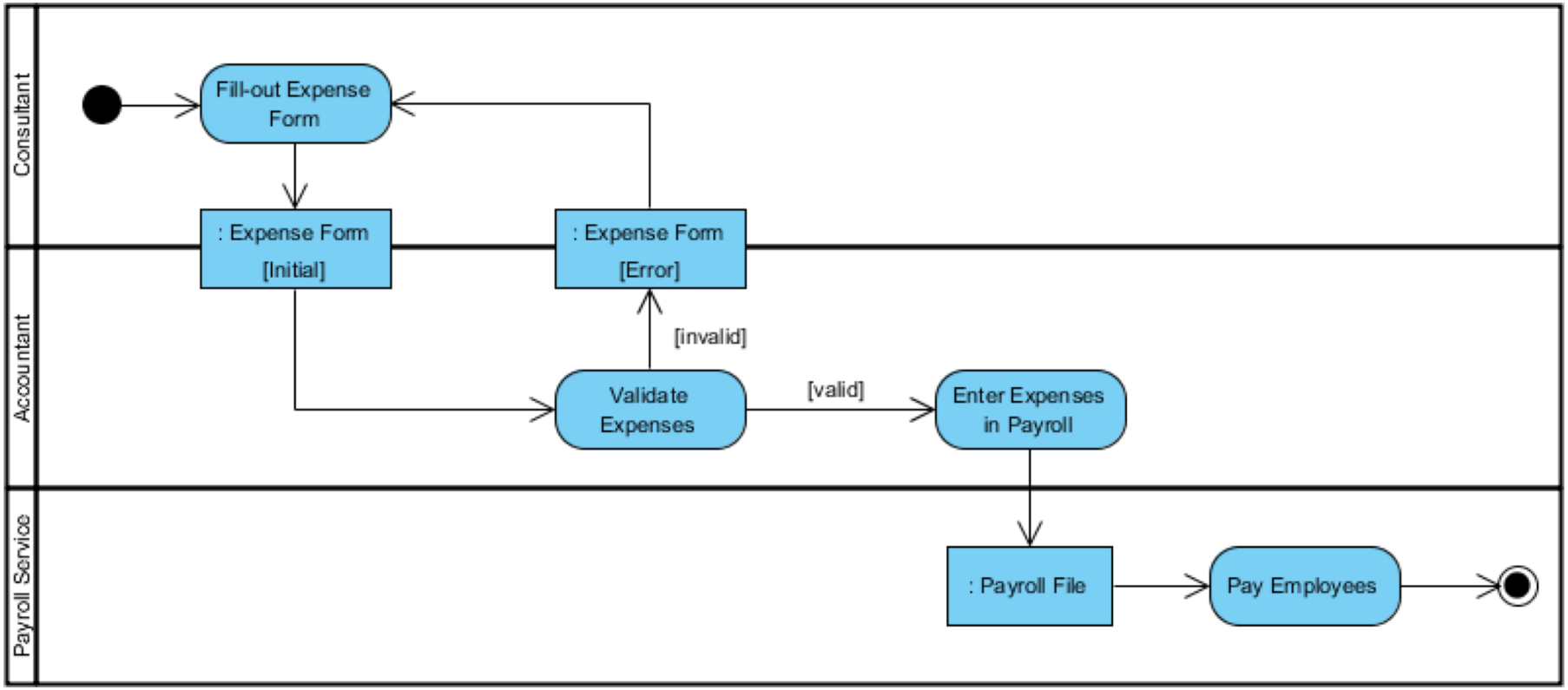
Activity diagram example



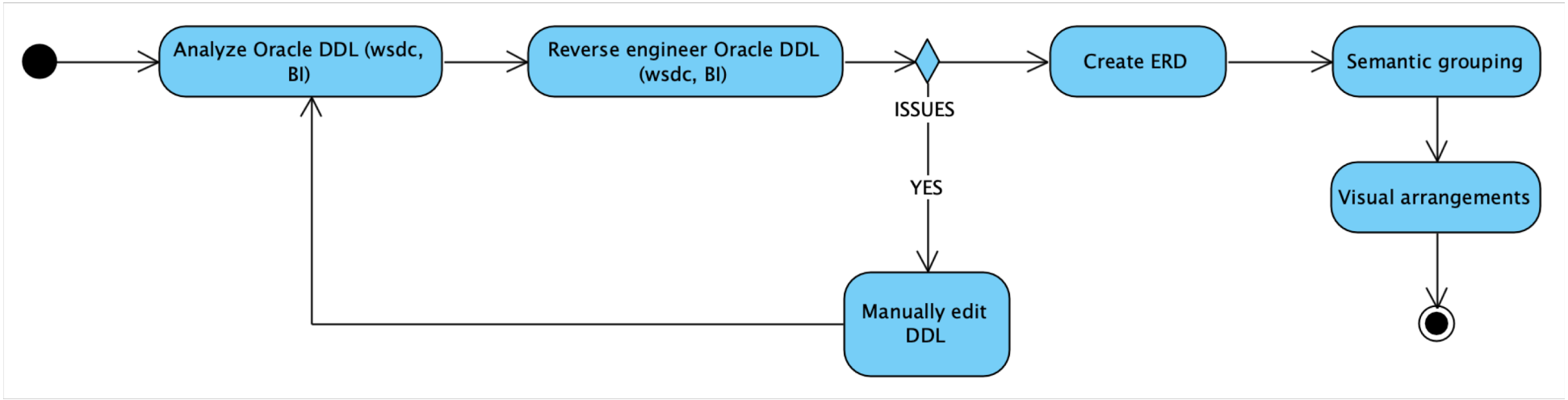
Activity diagram example



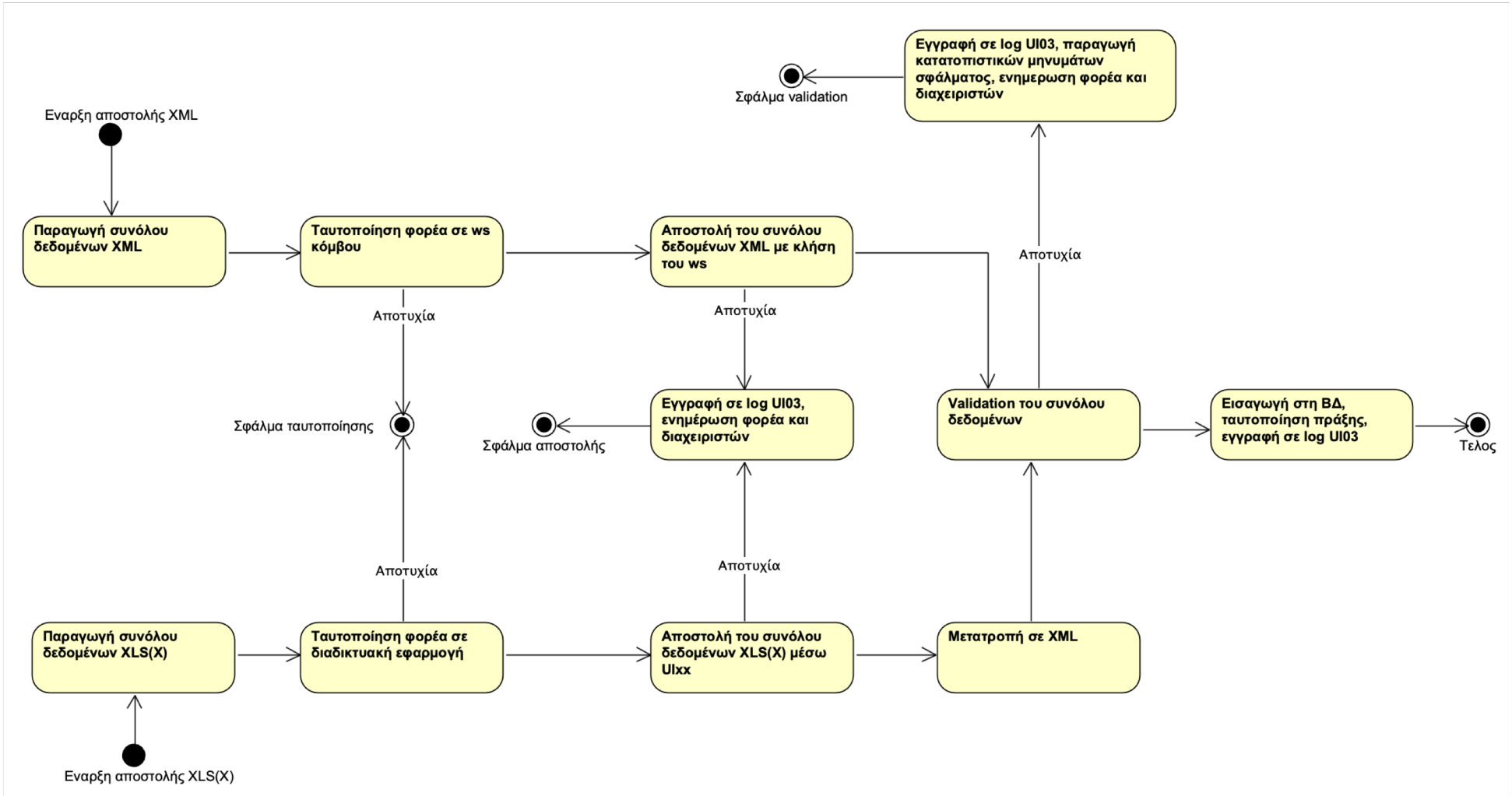
Activity diagram example



Activity diagram example



Activity diagram example

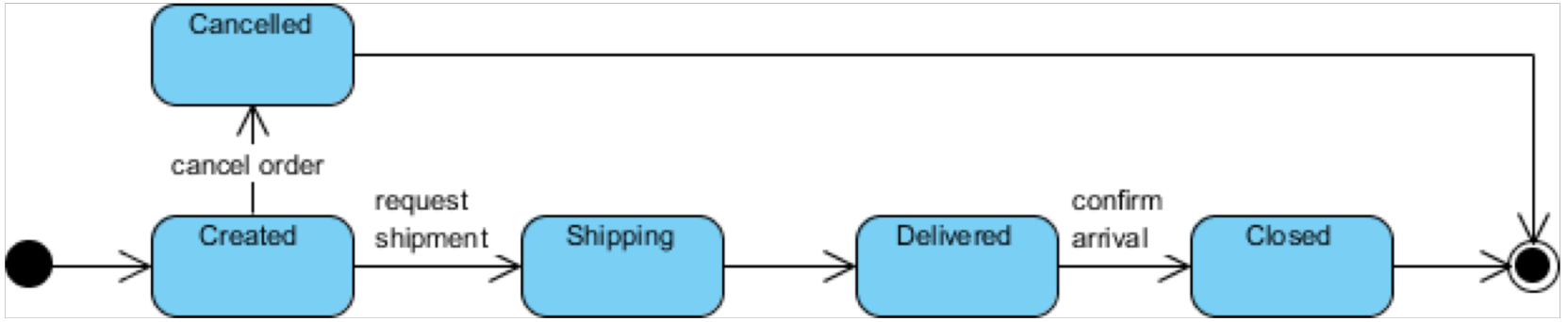


UML State diagrams

Used to model behavior diagram in UML, usually refer to a single class

- to show the lifetime behavior of a single object
- to describe all of the possible states of a particular object or the system

A state is like a 'mode of operation' for objects of a class, which behave differently depending on their state (if applicable)



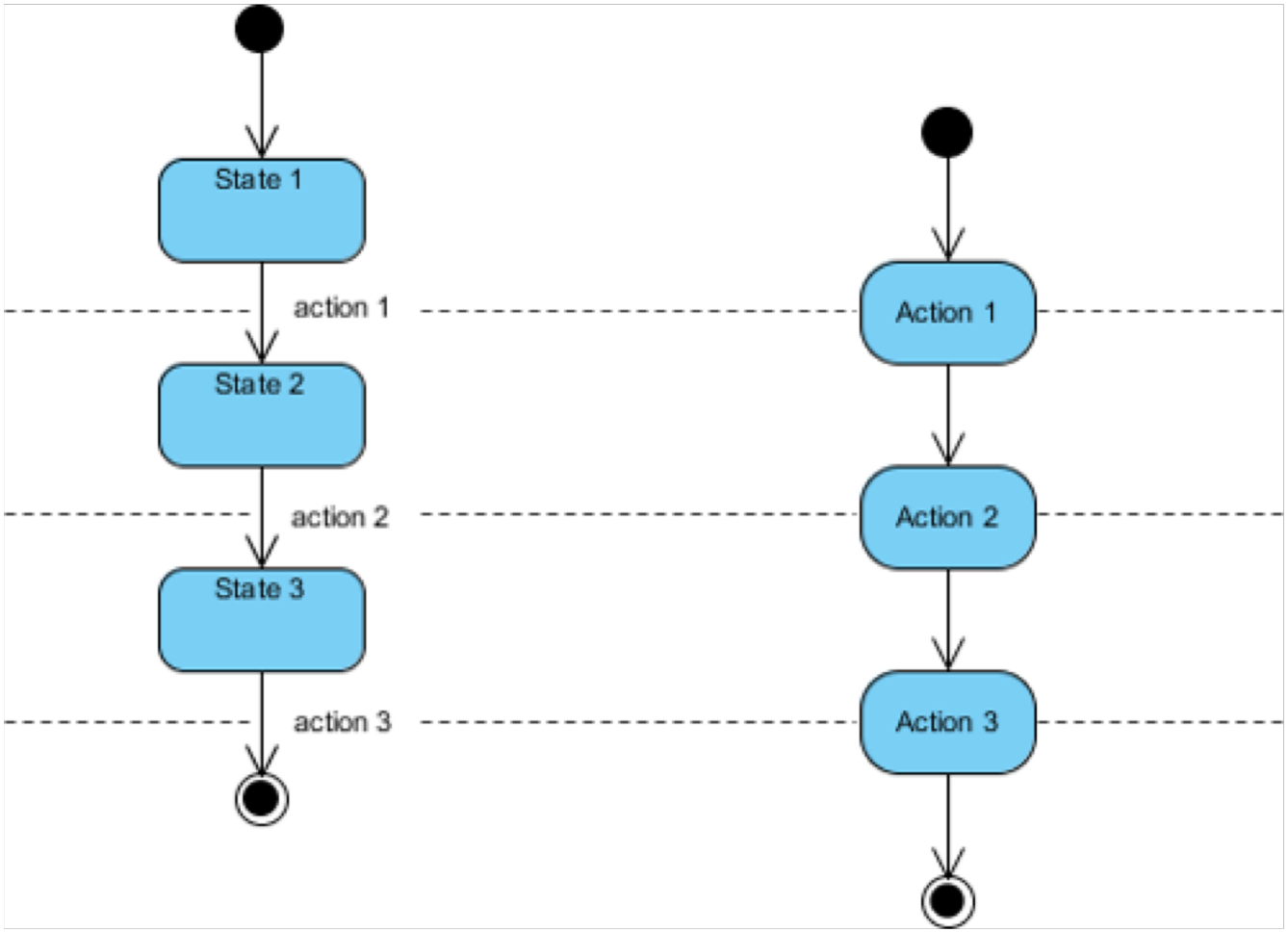
UML State diagrams

Events trigger transitions between states

- Signal event: the arrival of an asynchronous message or signal
- Call event: the arrival of a procedural call to an operation
- Time event: occurs after a specified time has elapsed
- Change event: occurs whenever a specified condition is met

Transitions between states occur as follows:

- An element is in a source state
- An event occurs
- An action is performed
- The element enters a target state


State 1
action 1
State 2
action 2
State 3
action 3
Action 1
Action 2
Action 3

Component diagrams / Package diagrams

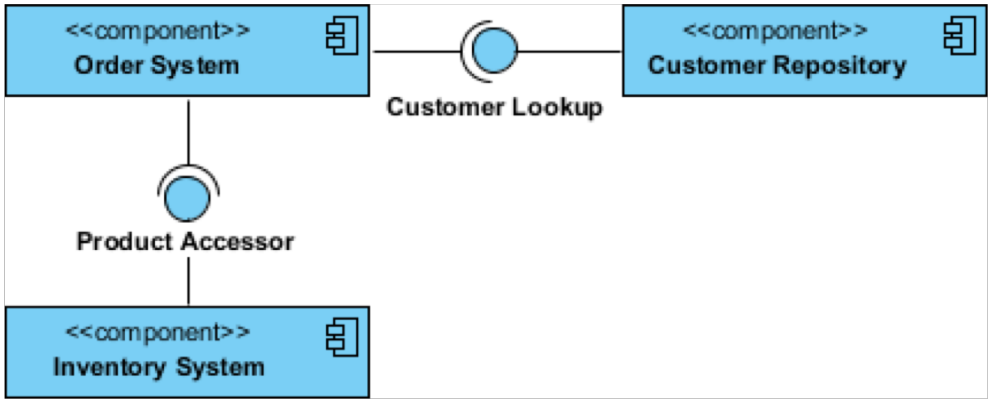
Display components in a system and their dependencies + interfaces

- Explain the structure of a system
- Usually a physical collection of classes

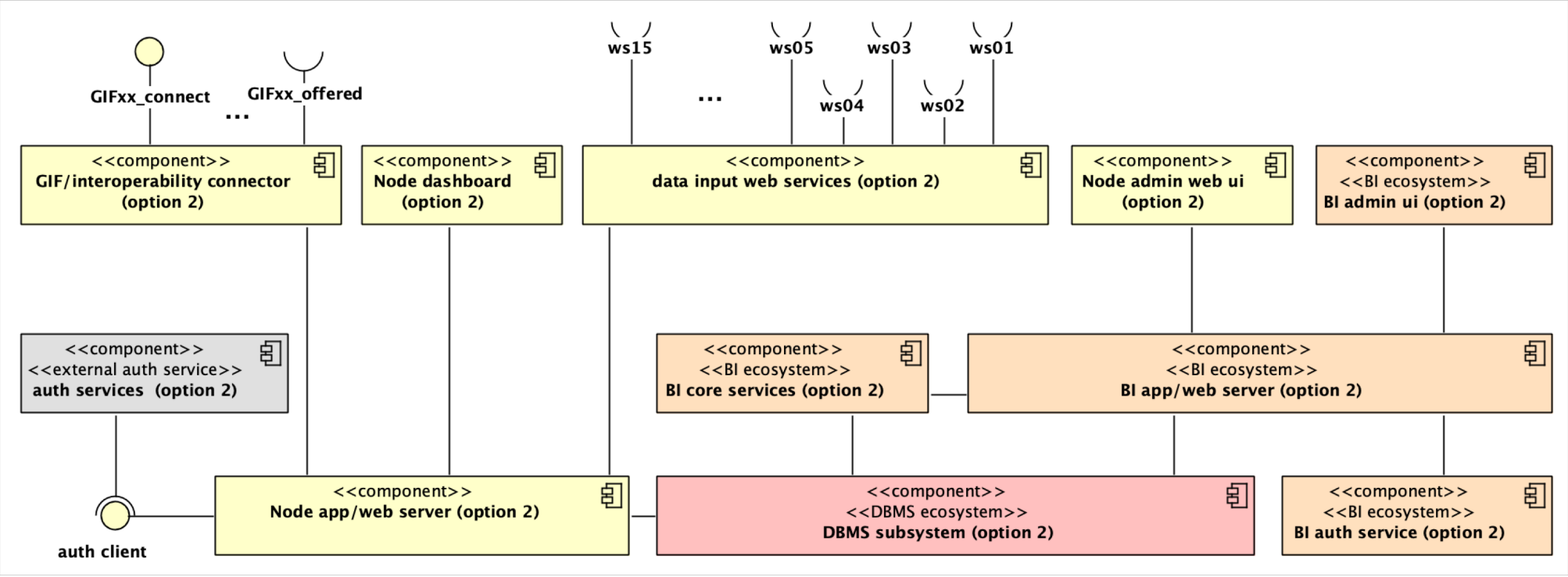
Component vs package Diagrams:

- Component: all of the model elements are private with a public interface
- Package: only display public items

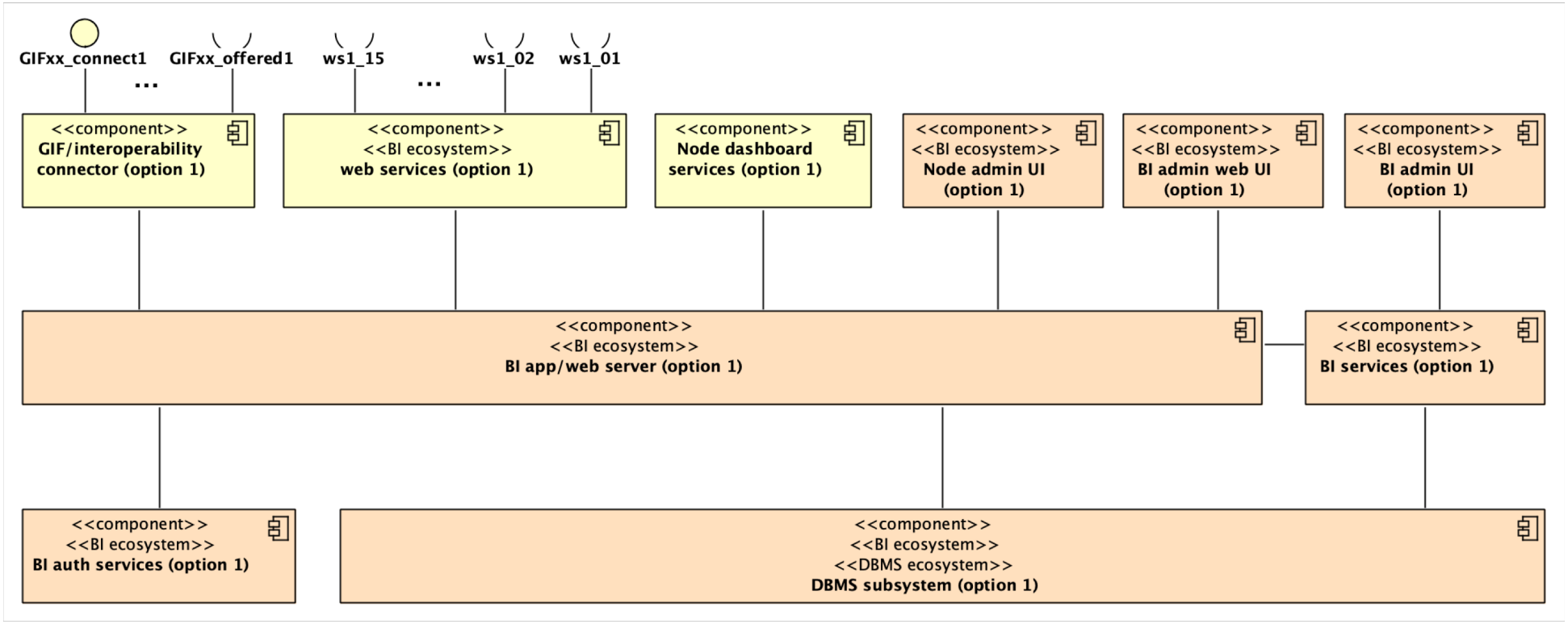
Both are used to group elements into logical structures



Component diagram examples



Component diagram examples



Deployment diagrams

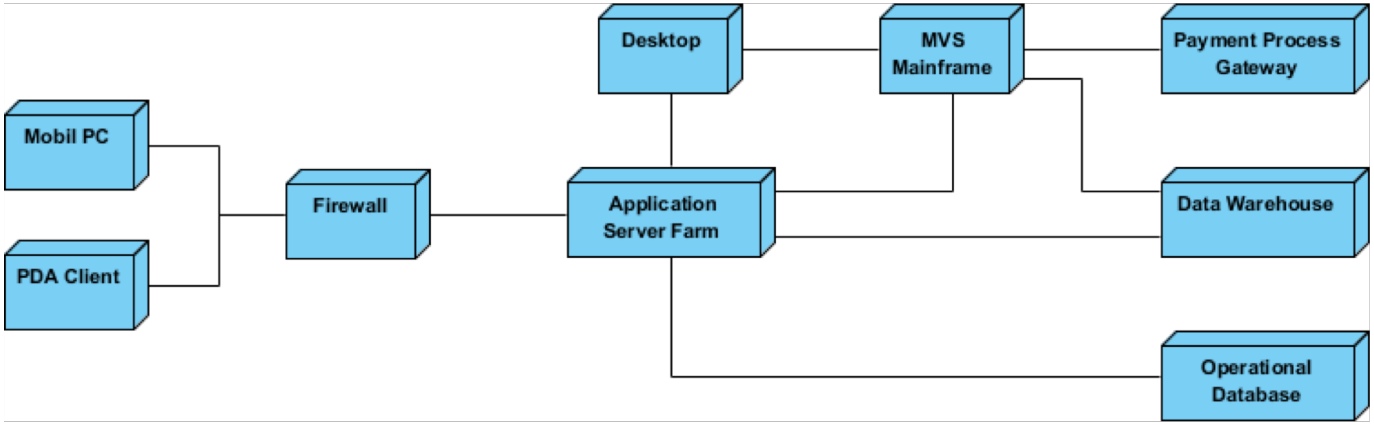
Show the physical architecture of the hardware and software of the deployed system

Nodes

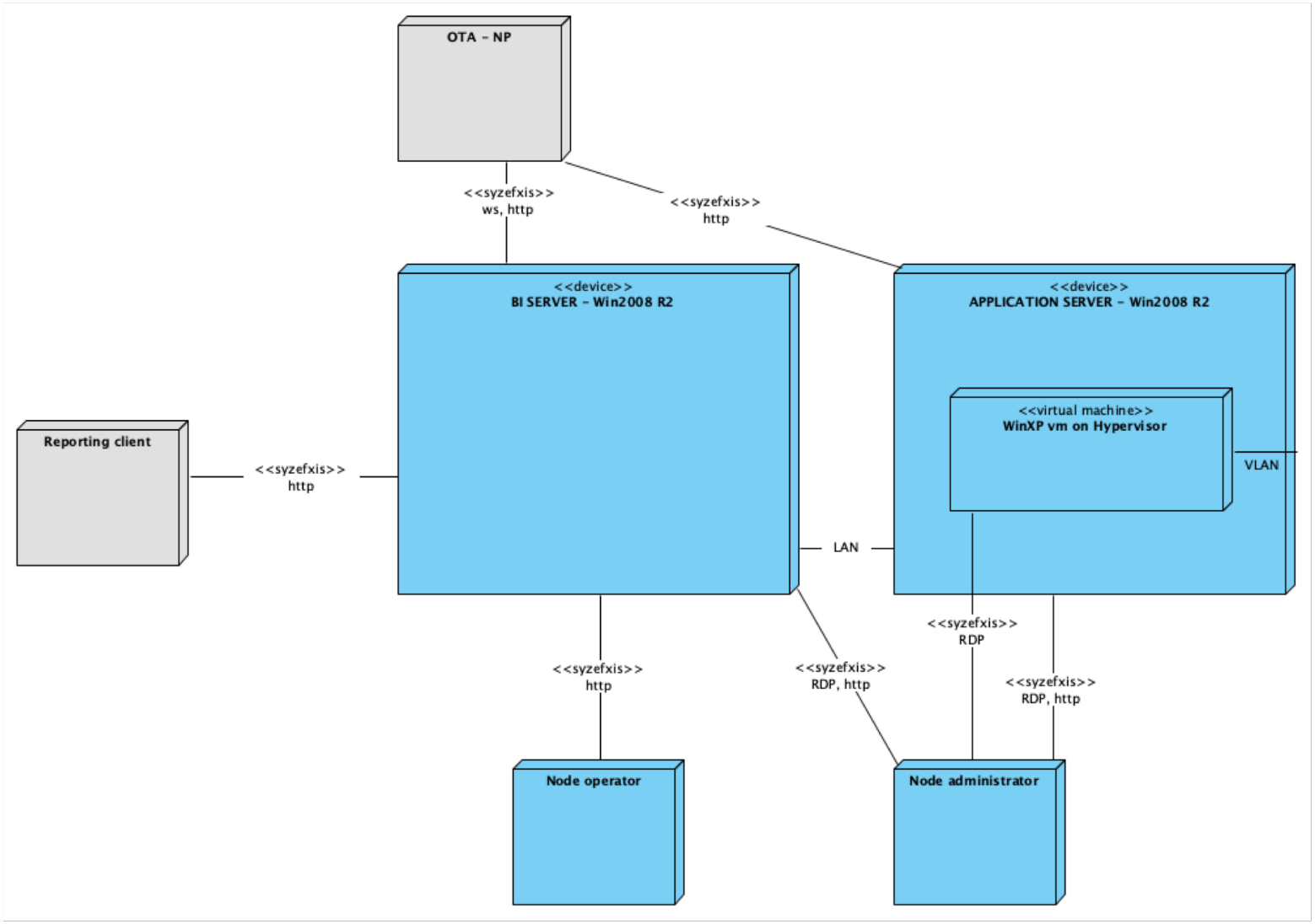
- Typically contain components or packages
- Usually some kind of computational unit; e.g. machine or device (physical or logical)

Physical relationships among software and hardware

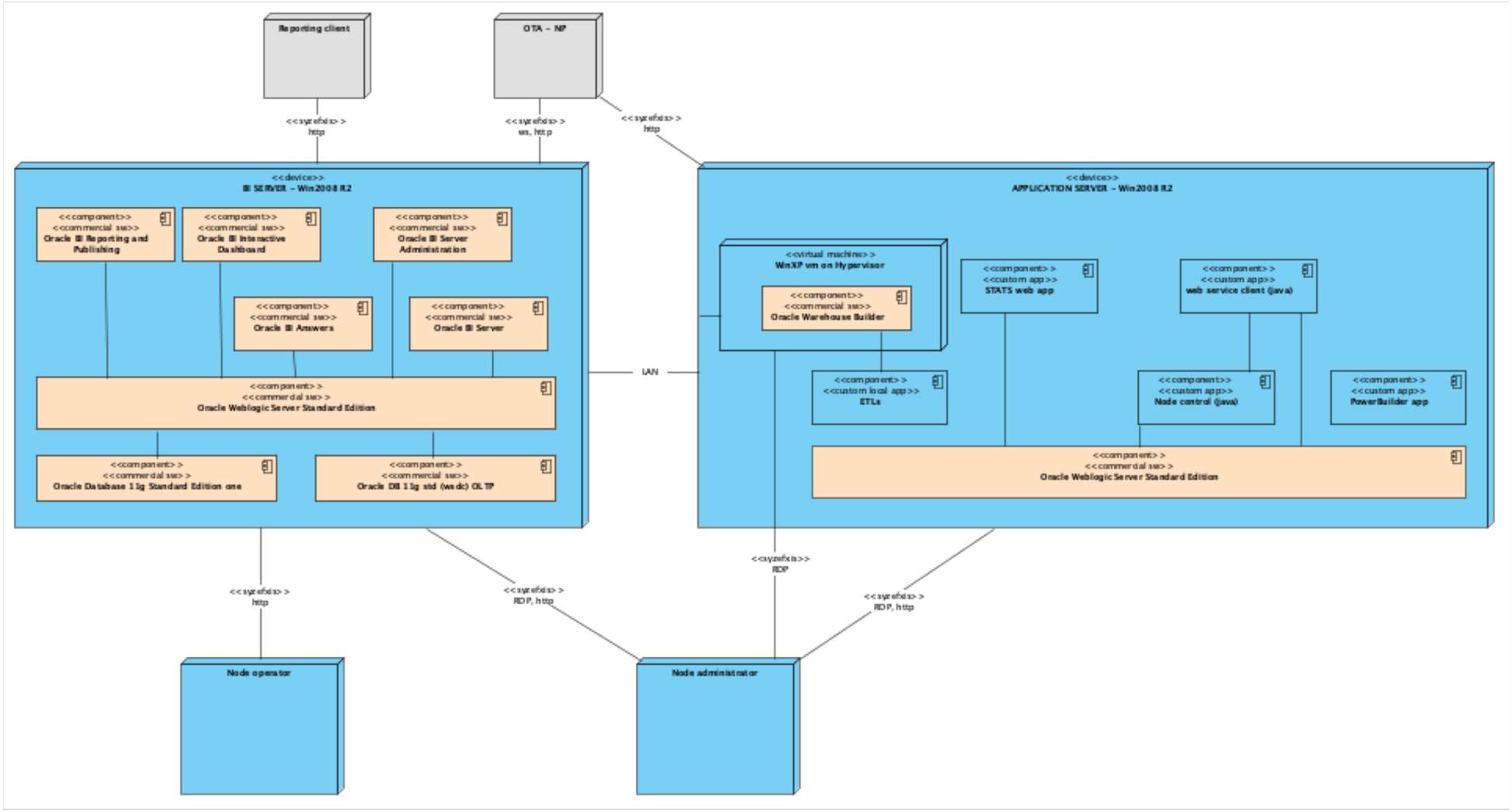
- Explain how a system interacts with the external environment



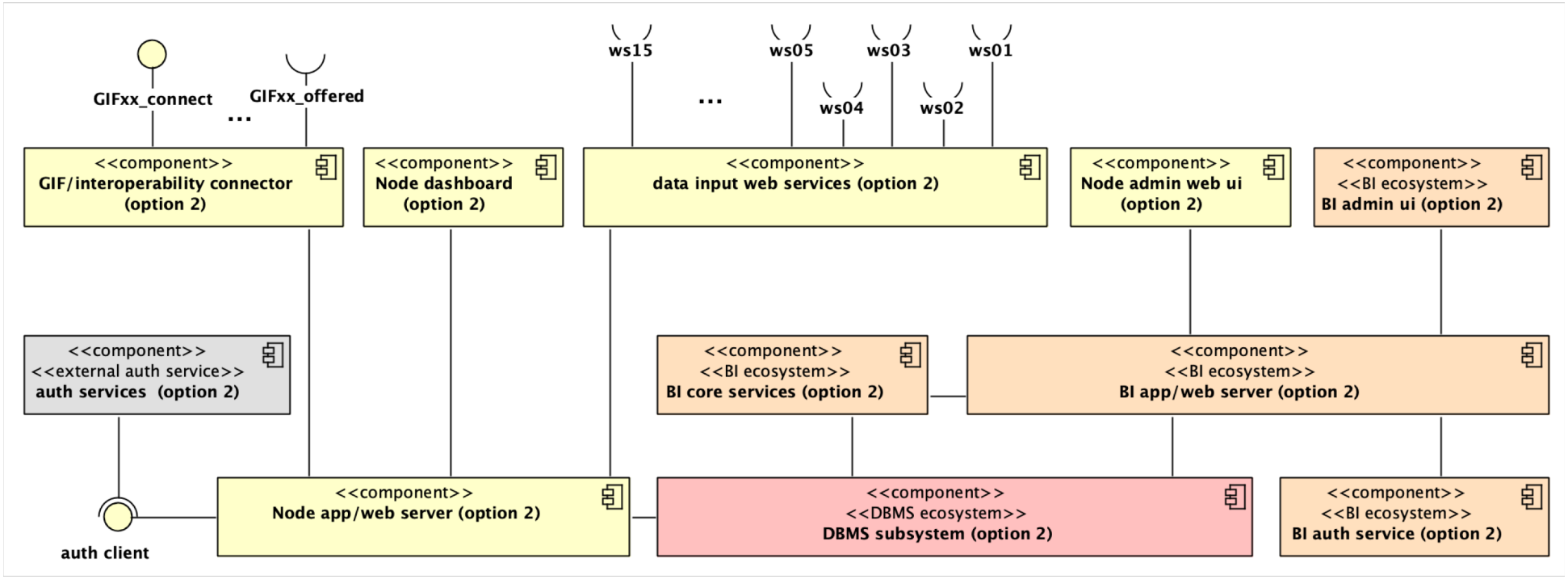
Deployment diagram example 1a



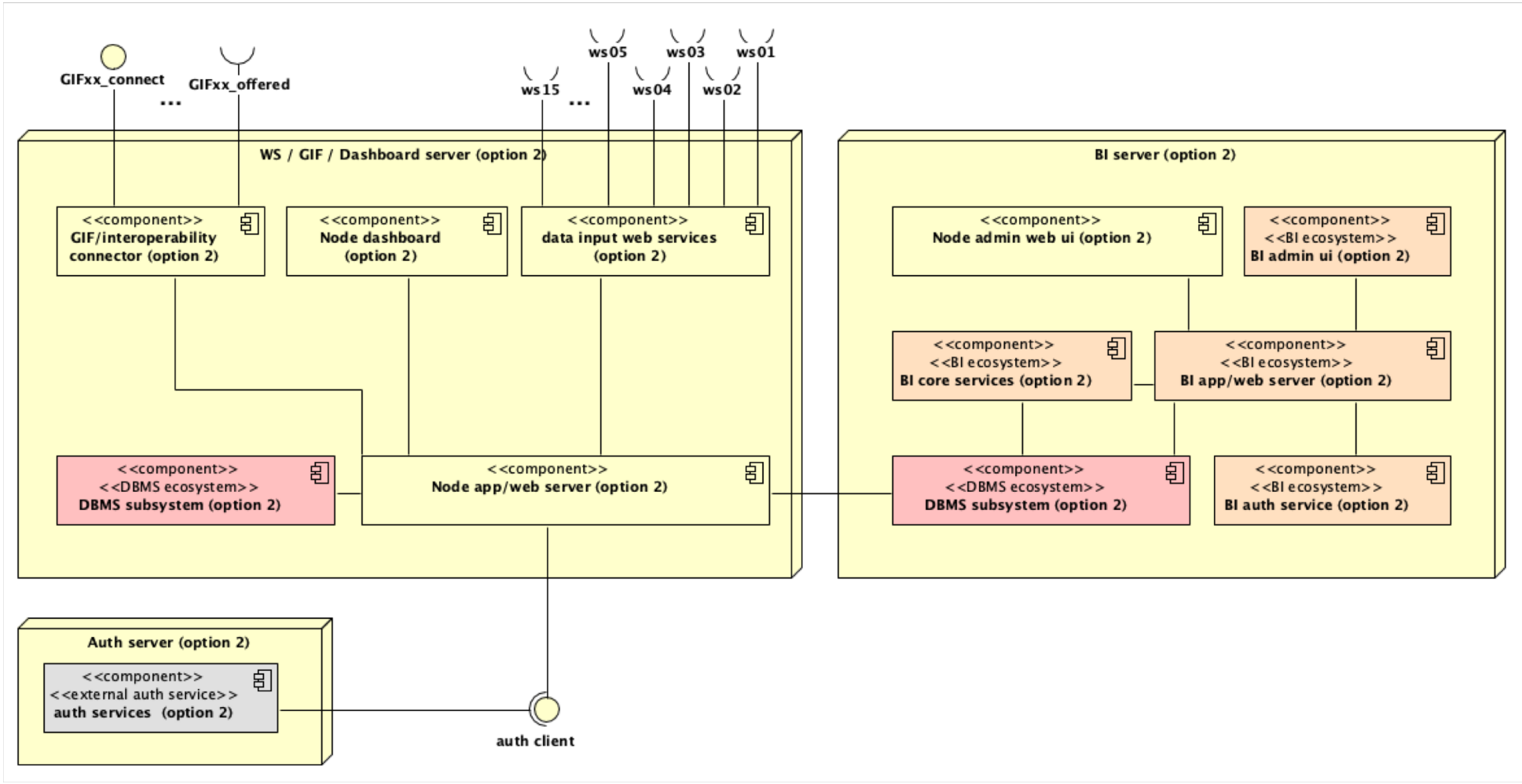
Deployment diagram example 1b



Deployment diagram example 2a



Deployment diagram example 2b



Deployment diagram example 2c