










Software Design & Architecture

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Use Cases

What is a Use Case?

- A formal way of representing how a business system interacts with its environment
- Illustrates the activities that are performed by the users of the system
- A scenario-based technique in the UML
- A sequence of actions a system performs that yields a valuable result for a particular actor.

Use Case Analysis

- What is an Actor?
- A user or outside system that interacts with the system being designed in order to obtain some value from that interaction
- Use Cases describe scenarios that define the interaction between users of the system (the actor) and the system itself.

Use Cases

- **Use case diagrams :**
- describe what a system does from the standpoint of an external observer. The emphasis is on *what* a system does rather than *how*.
- Use case diagrams are closely connected to scenarios. A scenario is an example of what happens when someone interacts with the system.

Use Cases

- Here is a scenario for a medical clinic.
- *A patient calls the clinic to make an appointment for a yearly checkup. The receptionist finds the nearest empty time slot in the appointment book and schedules the appointment for that time slot. "*
- We want to write a use case for this scenario.
- Remember: A **use case** is a summary of for a single task or goal.

Use Cases

- Step 1 Identify the actors
- As we read the scenario, define those people or systems that are going to interact with the scenario.
- *A patient calls the clinic to make an appointment for a yearly checkup. The receptionist finds the nearest empty time slot in the appointment book and schedules the appointment for that time slot. "*

Questions for Identifying People Actors

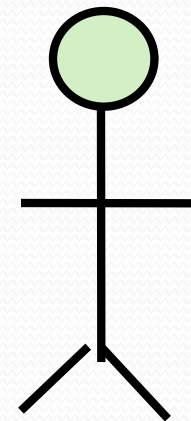
- Who is interested in the scenario/system?
- Where in the organization is the scenario/system be used?
- Who will benefit from the use of the scenario/system?
- Who will supply information to this scenario/system, use information, and remove information?
- Does one person play several different roles?
 - May have an actor for each role
- Do several people play the same role?
 - Only use one actor per role (no matter how many people play that role)

Questions for Identifying Other Actors

- What other entity is interested in the scenario/system?
- What other entity will supply info the scenario/system, use this information, and remove this information?
- Does the system use an external resource?
- Does the system interact with a legacy system?

Actors

- An Actor is outside or external to the system.
- It can be a:
 - Human
 - Peripheral device (hardware)
 - External system or subsystem
 - Time or time-based event
- Represented by stick figure



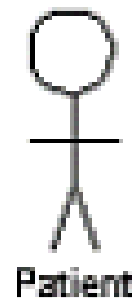
Use Cases

- A **use case** is a summary of scenarios for a single task or goal.
- An **actor** is who or what initiates the events involved in the task of the use case. Actors are simply roles that people or objects play.

Use Cases

- So as we read our scenario, what or who is the actor????
- *A patient calls the clinic to make an appointment for a yearly checkup. The receptionist finds the nearest empty time slot in the appointment book and schedules the appointment for that time slot. "*

- The actor is a **Patient**.

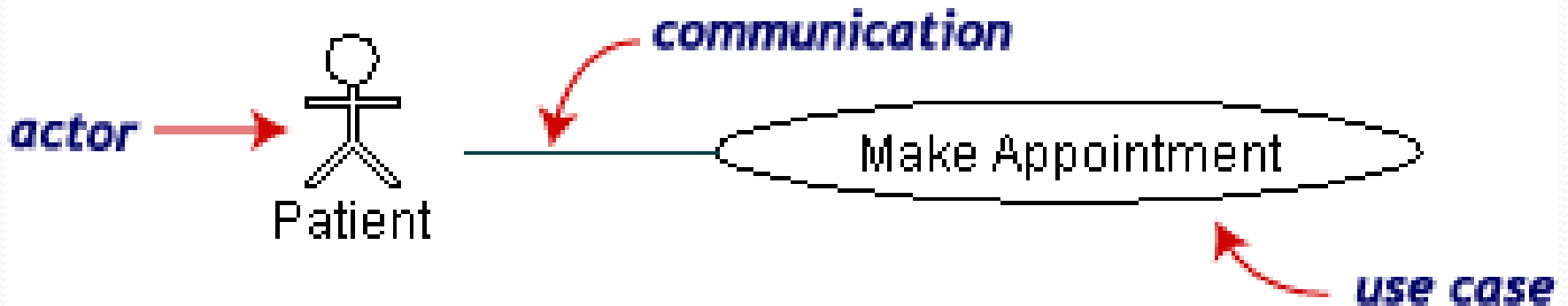


Use Cases

- The **use case** is a summary of scenarios for a single task or goal.
- So What is the Use Case????
- The Use Case is **Make Appointment**.
- It is a use case for the medical clinic.

Use Cases

- The picture below is a **Make Appointment** use case for the medical clinic.
- The actor is a **Patient**. The connection between actor and use case is a **communication association** (or **communication** for short).
- Actors are stick figures. Use cases are ovals. Communications are lines that link actors to use cases.



Use Case Componentss

- The use case has three components.
- The **use case** task referred to as the use case that represents a feature needed in a software system.
- The **actor(s)** who trigger the use case to activate.
- The **communication** line to show how the actors communicate with the use case.

Use Case Diagram - Use Case

- A major process performed by the system that benefits an actor(s) in some way
- Models a dialogue between an actor and the system
- Represents the functionality provided by the system

Use Case

- Each use case in a use case diagram describes one and only one *function* in which users interact with the system
 - May contain several “paths” that a user can take while interacting with the system
 - Each path is referred to as a scenario

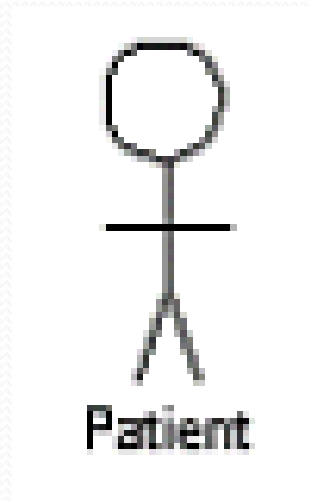
Use Case

- Labelled using a descriptive verb-noun phrase
- Represented by an oval



Use Case - Actor

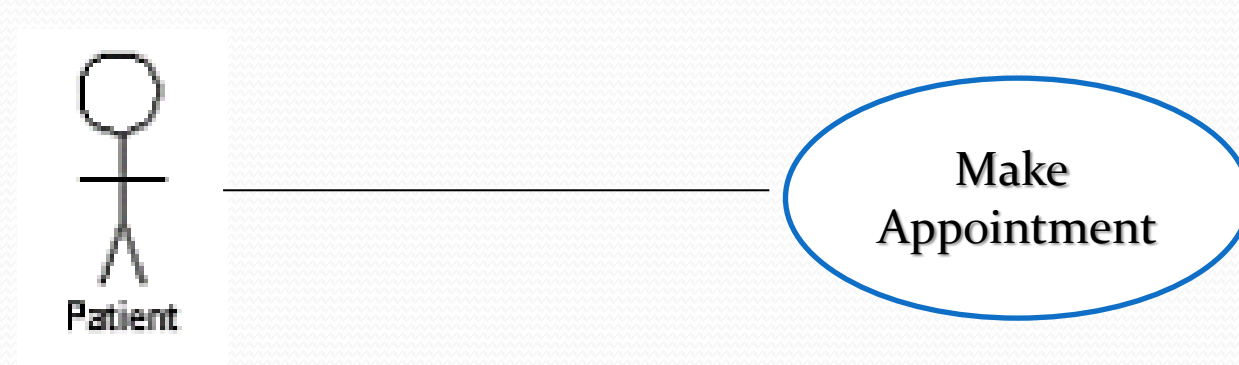
- Labelled using a descriptive noun or phrase
- Represented by a stick character



Use Case - Relationships

- Relationships

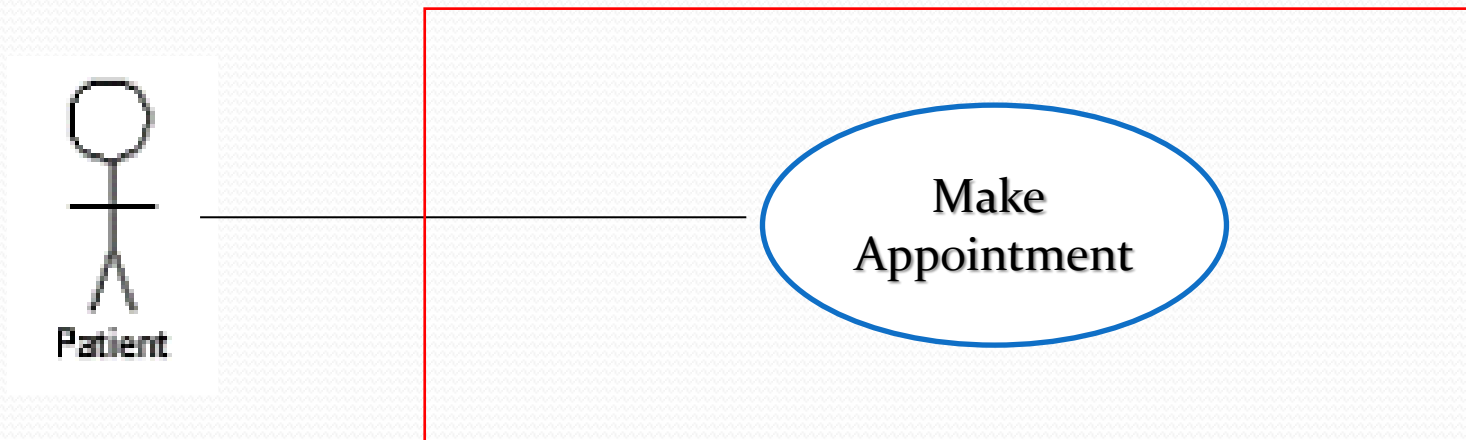
- Represent communication between actor and use case
- Depicted by line or double-headed arrow line
- Also called association relationship



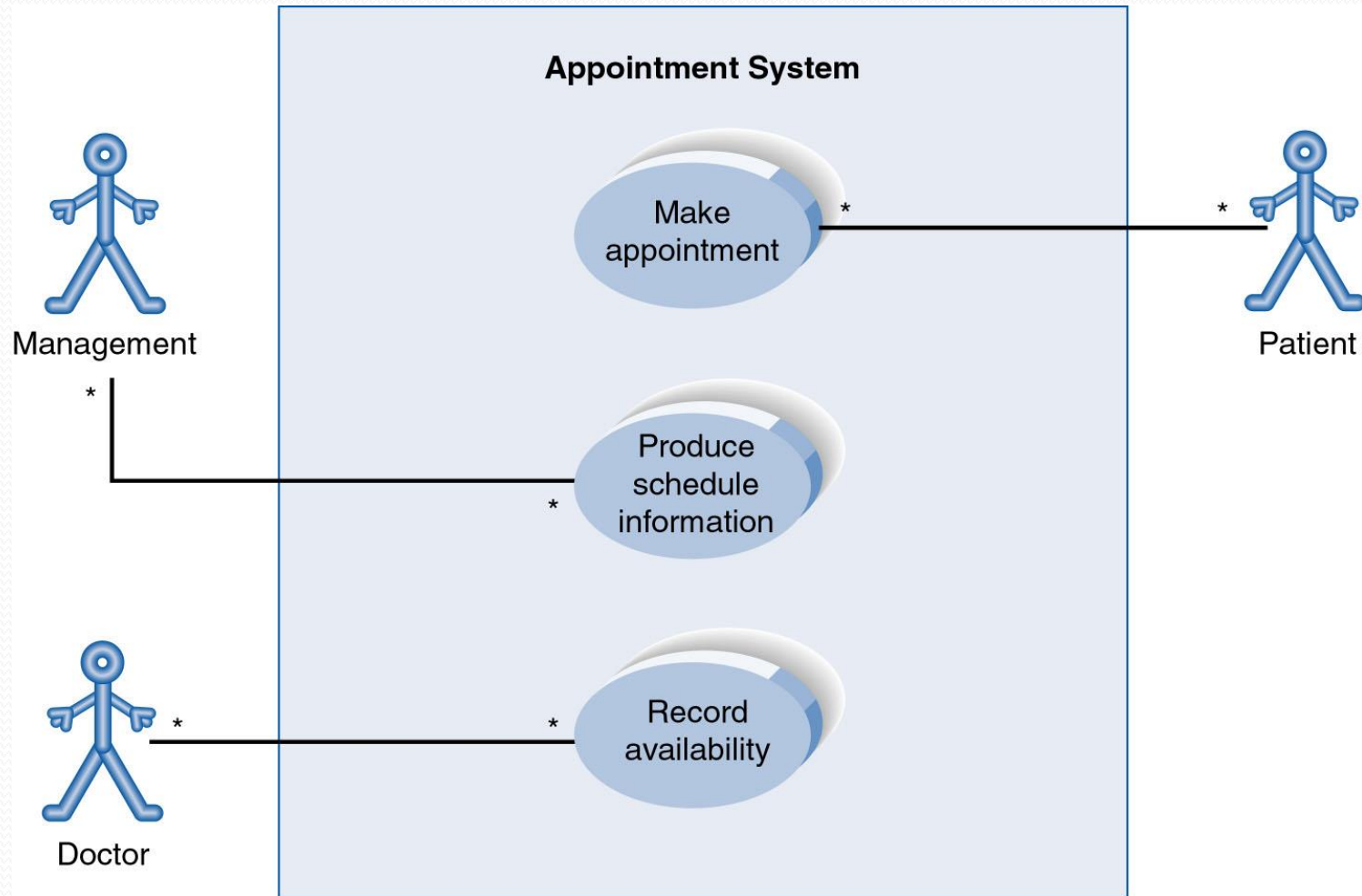
Use Case - Relationships

- Boundary

- A boundary rectangle is placed around the perimeter of the system to show how the actors communicate with the system.



Use-Case Diagram



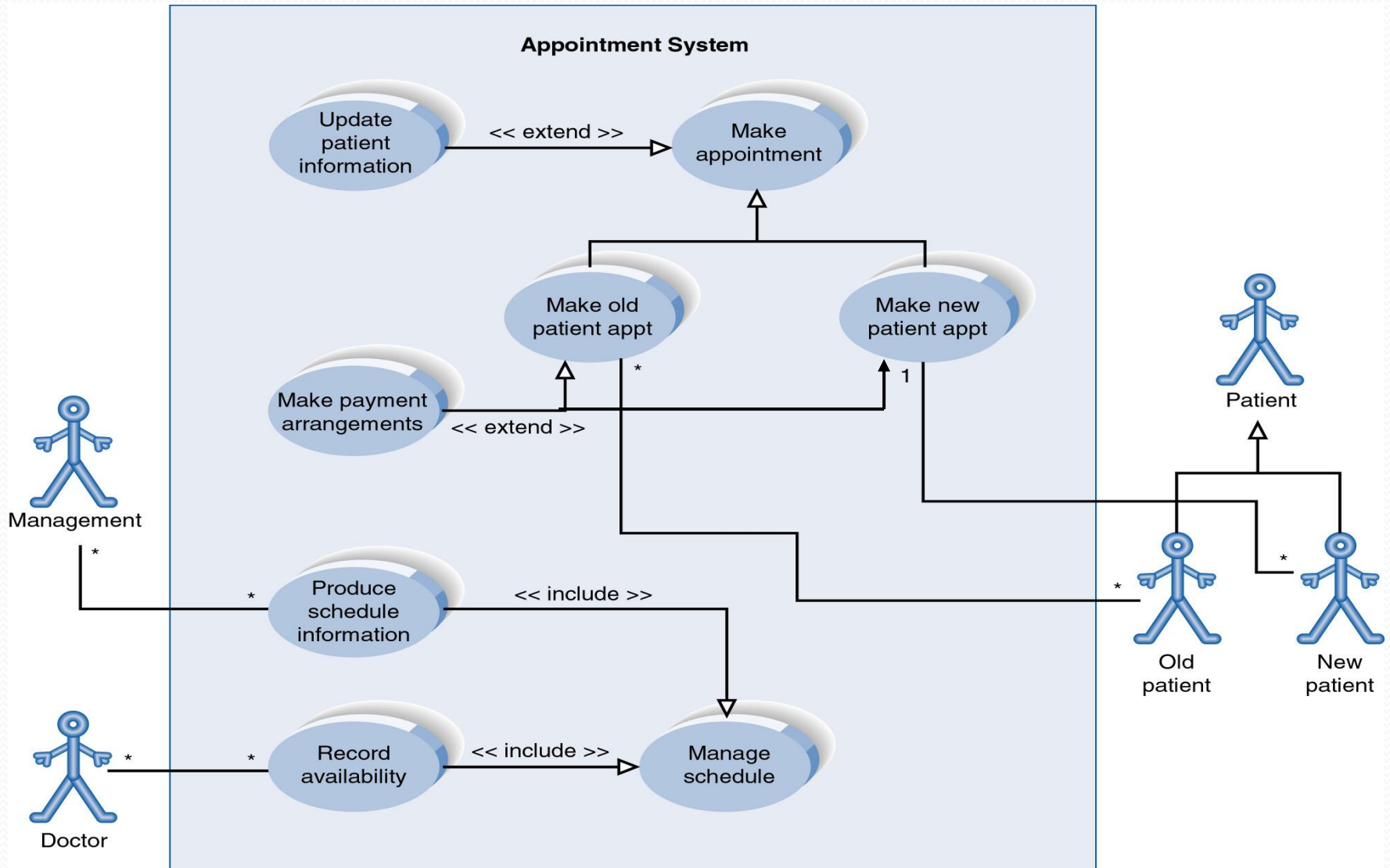
A use case diagram is a collection of actors, use cases, and their communications.

Use Case Diagram - stereotypes

- UML defines three stereotypes of association between Use Cases, «include», «extend» and generalization.
- Generalization Relationship
 - Represented by a line and a hollow arrow
 - From child to parent



Example of Relationships



Use Case Diagram

- Include Relationship
 - Represents the inclusion of the functionality of one use case within another
 - Arrow is drawn from the base use case to the used use case
 - Write << include >> above arrowhead line

Use Case Diagram

- Extend relationship
 - Represents the extension of the use case to include optional functionality
 - Arrow is drawn from the extension use case to the base use case
 - Write << extend >> above arrowhead line

Benefits of Use Cases

- RUP's primary element in requirements capture
- Described using language of customer (domain language)
- RUP is Use Case Driven
- Easily-understood communication mechanism
- Make traceability of requirements easy.
- Provide summary of what the system should do at an abstract level.
- Easy to describe functional requirements.

Difficulties with Use Cases

- Transition from functional description to object description / class design.
- Makes reuse of class difficult.
 - ‘Since UCs do not talk about classes, developers often wind up doing things their own way, making reuse difficult.
- Stating non-functional requirements are difficult (where do you say that X must execute at Y/sec?)