Use Case Diagrams

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 describe 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 scenarios 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. "*

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 the scenario/system with this information, use this information, and remove this information?
- Does one person play several different roles?
- Do several people play the same role?

Questions for Identifying Other Actors

What other entity is interested in the scenario/system?

What other entity will supply the scenario/system with this information, use this information, and remove this information?

Does the system use an external resource?

Does the system interact with a legacy system?

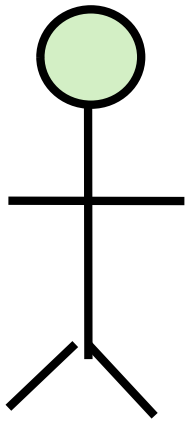
Actors

An Actor is outside or external 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.

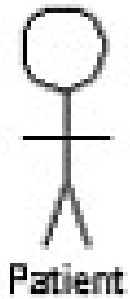
An **actor** is who or what initiates the events involved in the task of the use case. Actors are simply roles that people or objects play.

So as we read our scenario, what or who is the actor????

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

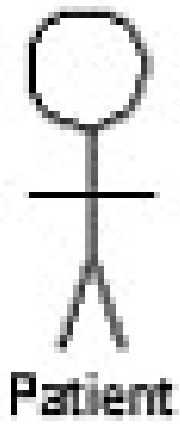
Labelled using a descriptive verb-noun phrase

Represented by an oval

Use Case - Actor

Labelled using a descriptive noun or phrase

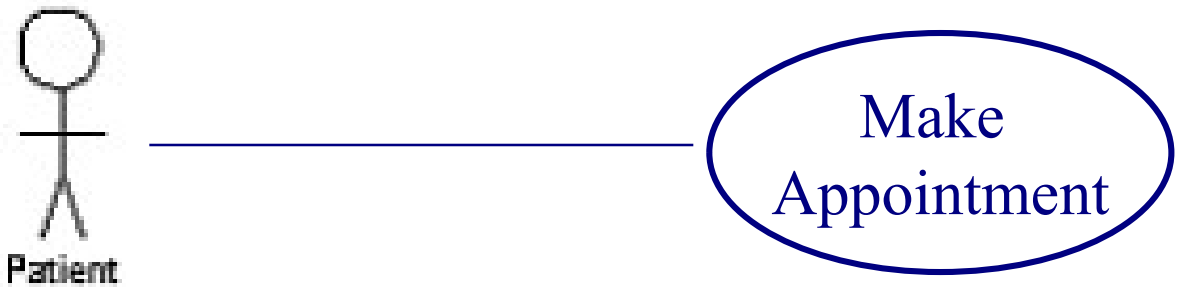
Represented by a stick character



Use Case - Relationships

Relationships

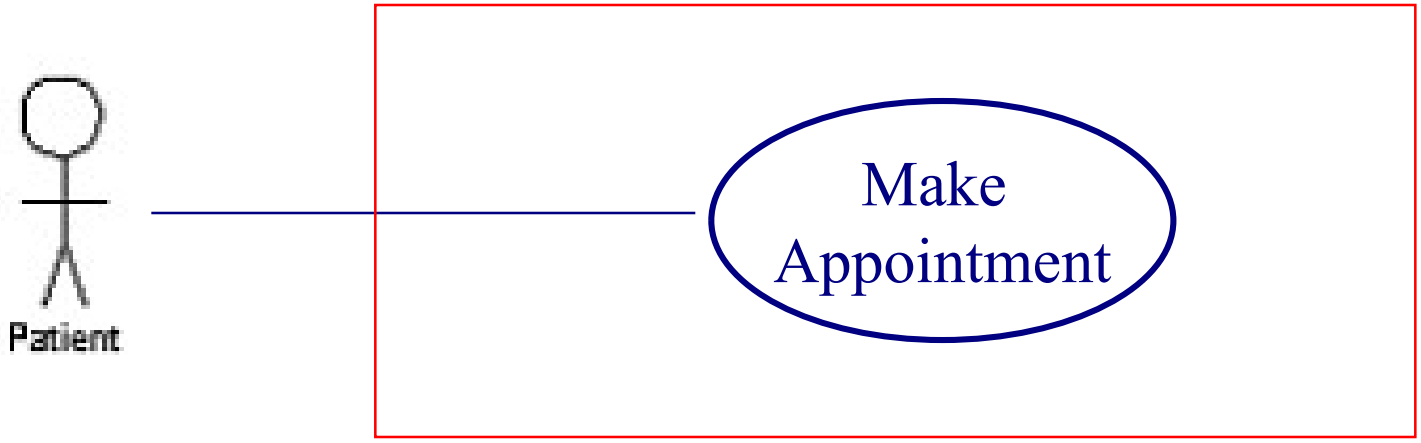
- Represent communication between actor and use case
- Depicted by line or double-headed arrow line
- Also called association relationship



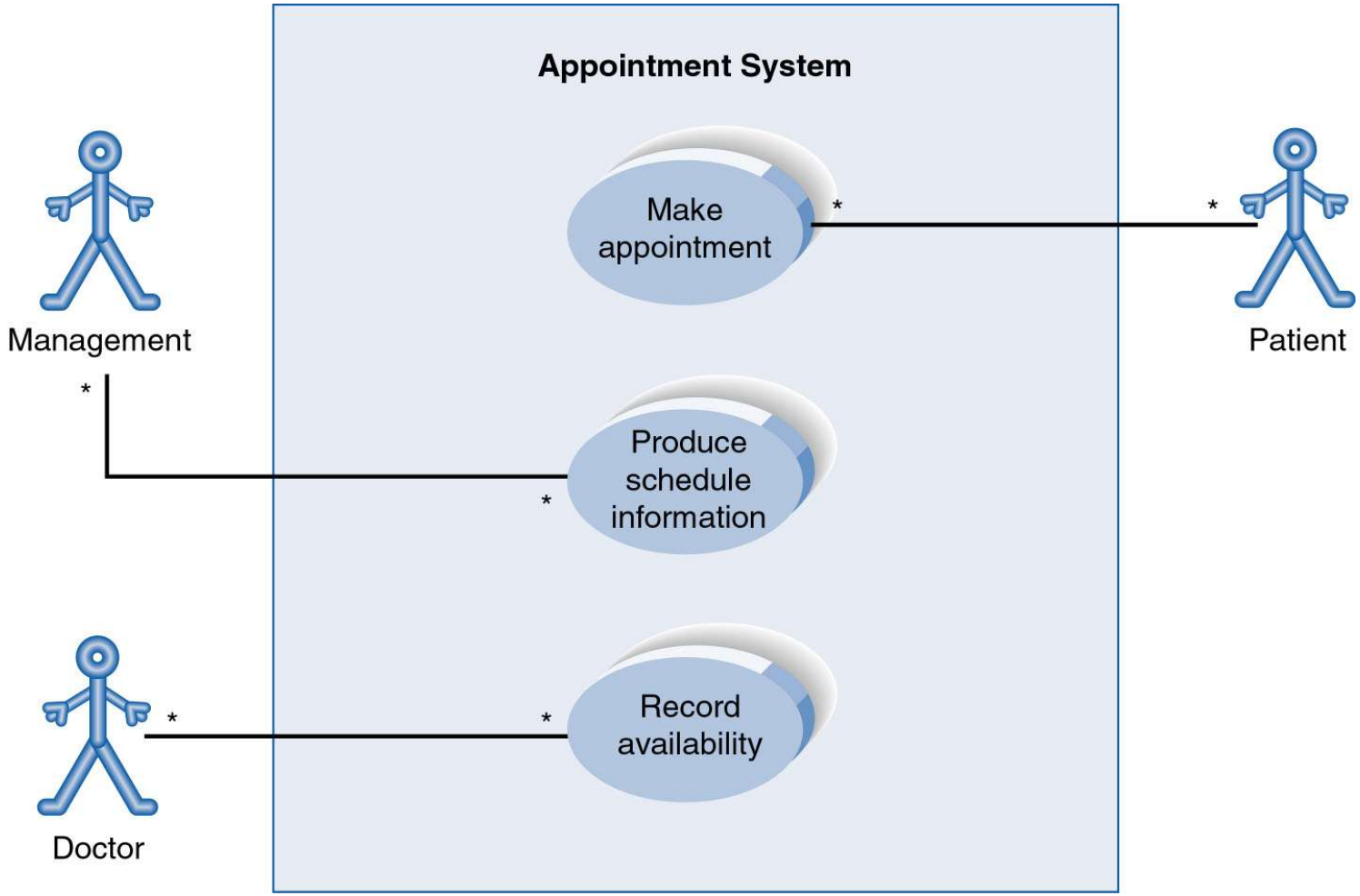
Use Case - Relationships

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

Other Types of Relationships for Use Cases

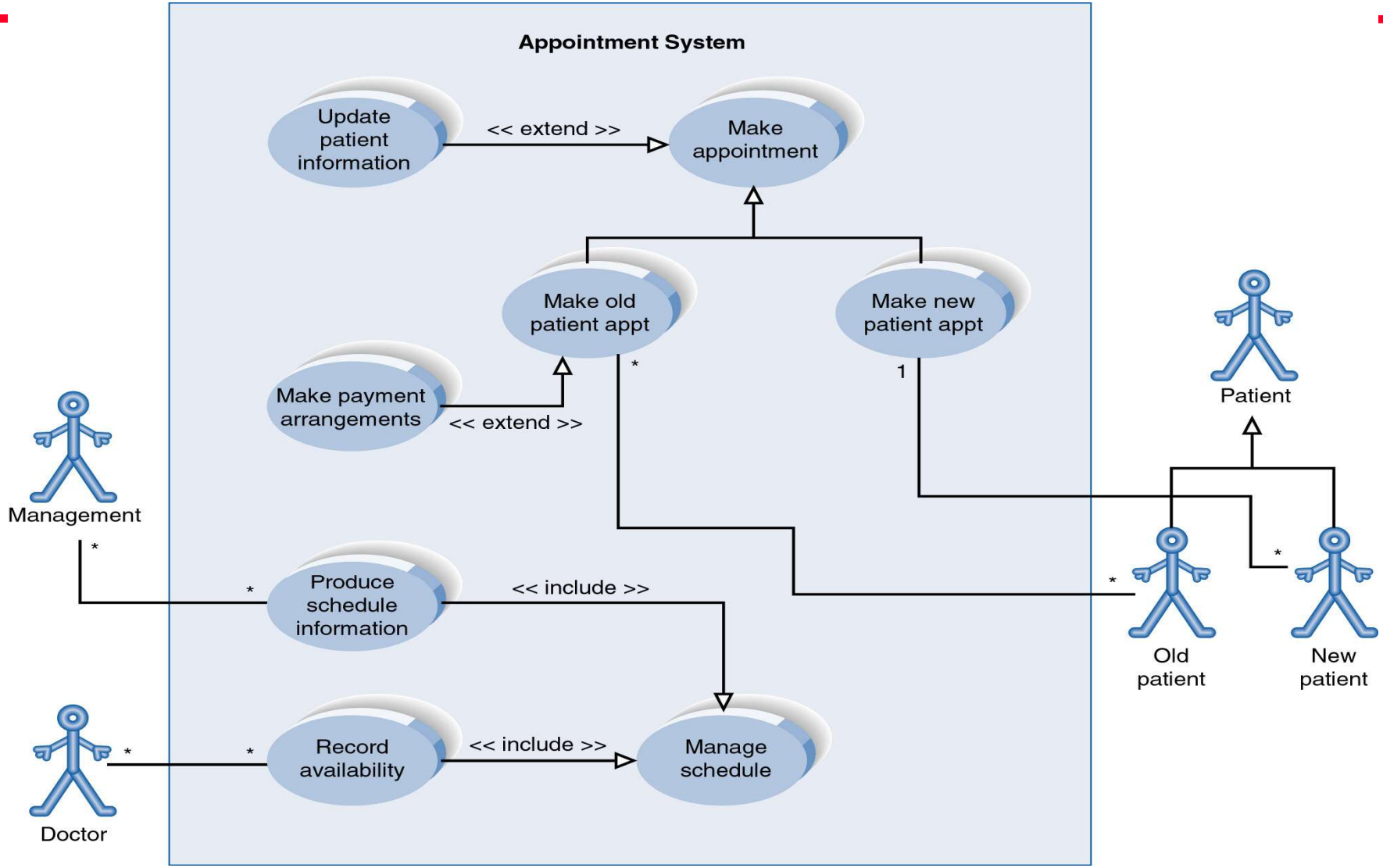
- Generalization
- Include
- Extend

Components of Use Case Diagram

Generalization Relationship

- Represented by a line and a hollow arrow
  - From child to parent

Example of Relationships



Use Case Diagram

Include Relationship

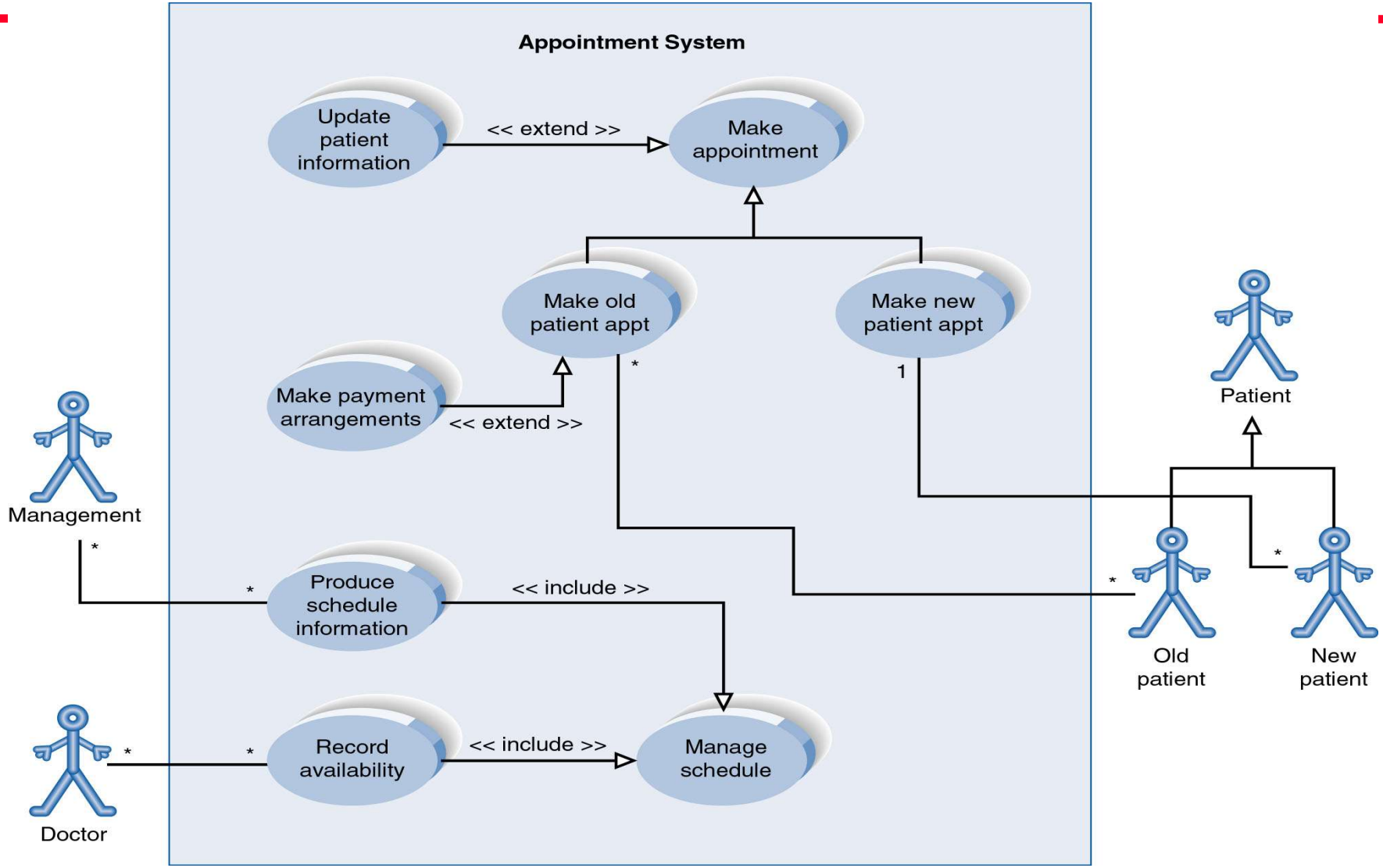
- Represents the inclusion of the functionality of one use case within another
- Arrow is drawn from the base use case to the used use case
- Write << include >> above arrowhead line

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

Example of Relationships



Use Case Relationships

Pro:

- Reduces redundancy in use cases
- Reduces complexity within a use case

Con

- May introduce complexity to use case diagram

Benefits of Use Cases

Use cases are the primary vehicle for requirements capture in RUP

Use cases are described using the language of the customer (language of the domain which is defined in the glossary)

Use cases provide a contractual delivery process (RUP is Use Case Driven)

Use cases provide an easily-understood communication mechanism

When requirements are traced, they make it difficult for requirements to fall through the cracks

Use cases provide a concise summary of what the system should do at an abstract (low modification cost) level.

Difficulties with Use Cases

As functional decompositions, it is often difficult to make the transition from functional description to object description to class design

Reuse at the class level can be hindered by each developer “taking a Use Case and running with it”. Since UCs do not talk about classes, developers often wind up in a vacuum during object analysis, and can often wind up doing things their own way, making reuse difficult

Use Cases make stating non-functional requirements difficult (where do you say that X must execute at Y/sec?)

Testing functionality is straightforward, but unit testing the particular implementations and non-functional requirements is not obvious

Use Case Model Survey

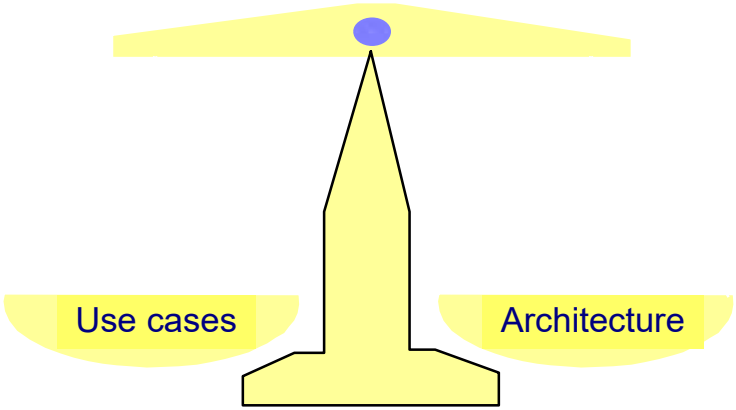
The Use Case Model Survey is to illustrate, in graphical form, the universe of Use Cases that the system is contracted to deliver.

Each Use Case in the system appears in the Survey with a short description of its main function.

Participants:

- Domain Expert
- Architect
- Analyst/Designer (Use Case author)
- Testing Engineer

Function versus Form



- Use case specify function; architecture specifies form
- Use cases and architecture must be balanced

Use Case Diagram

We will build use case diagram for a video rental system in the examples.

Look and identify potential actors and use case tasks.

Nouns and verbs may be helpful.