

# What is UML?

- An international industry standard graphical notation for describing software analysis and design.
  - pictures or views of an OO system
  - helps better understanding
  - a picture is worth a thousand words



# UML diagrams

- UML = Unified Modeling Language
  - Use case diagrams
  - Class diagrams
  - Sequence diagrams
  - Collaboration diagrams
  - Statechart diagrams
  - Object diagrams
  - Activity diagrams
  - Component diagrams
  - Deployment 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.

# Actors and stakeholders

- What is an actor? A primary actor?
  - **actor**: anything with behavior that acts on the system
  - **primary actor**: initiates interaction to achieve goal  
(when system is a software product, primary actor is often the computer user)
  - **supporting actor**: performs sub-goals to help use case
- What is the difference between an actor and a stakeholder?
  - **stakeholder**: anyone interested in the system
    - examples: supplier, stock agency, vendor
  - the difference: stakeholder might not "act" in any scenario

# How to identify actors?

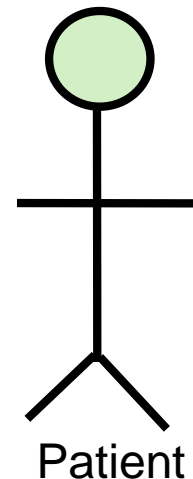
- **Who is interested** in the scenario/system?
- **Where** in the organization is the scenario/system be used?
- **Who will benefit** from the use of the scenario/system?
- **Who will supply** the scenario/system with this information, use this information, and remove this information?
- **Does one person** play several different roles?
- **Do several people** play the same role?

# Use Case Diagrams

- 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.

# 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 with name below



# Use Cases

- 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
- Represents an activity of an actor
- Use cases as ellipses with their names below or inside

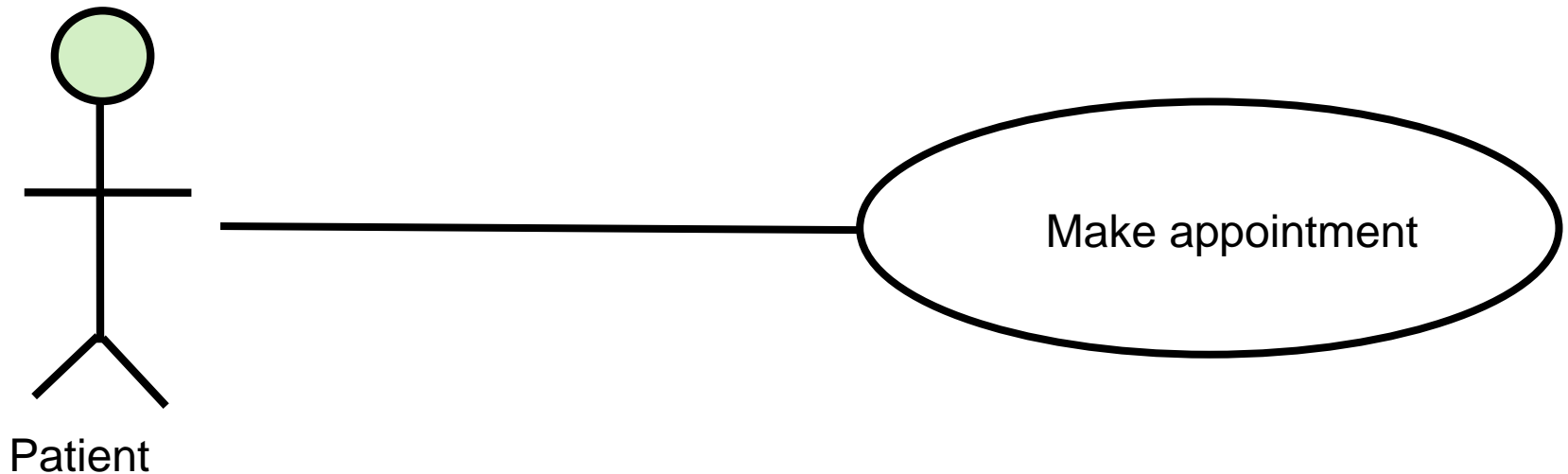




# Use Case - Relationships

- Relationships

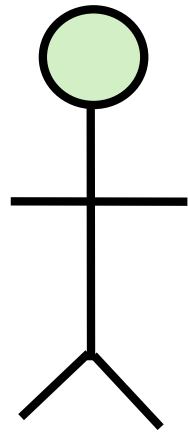
- Represent communication between actor and use case
- Depicted by line or double-headed arrow line
- Also called association relationship



# Use Case - Relationships

- Boundary

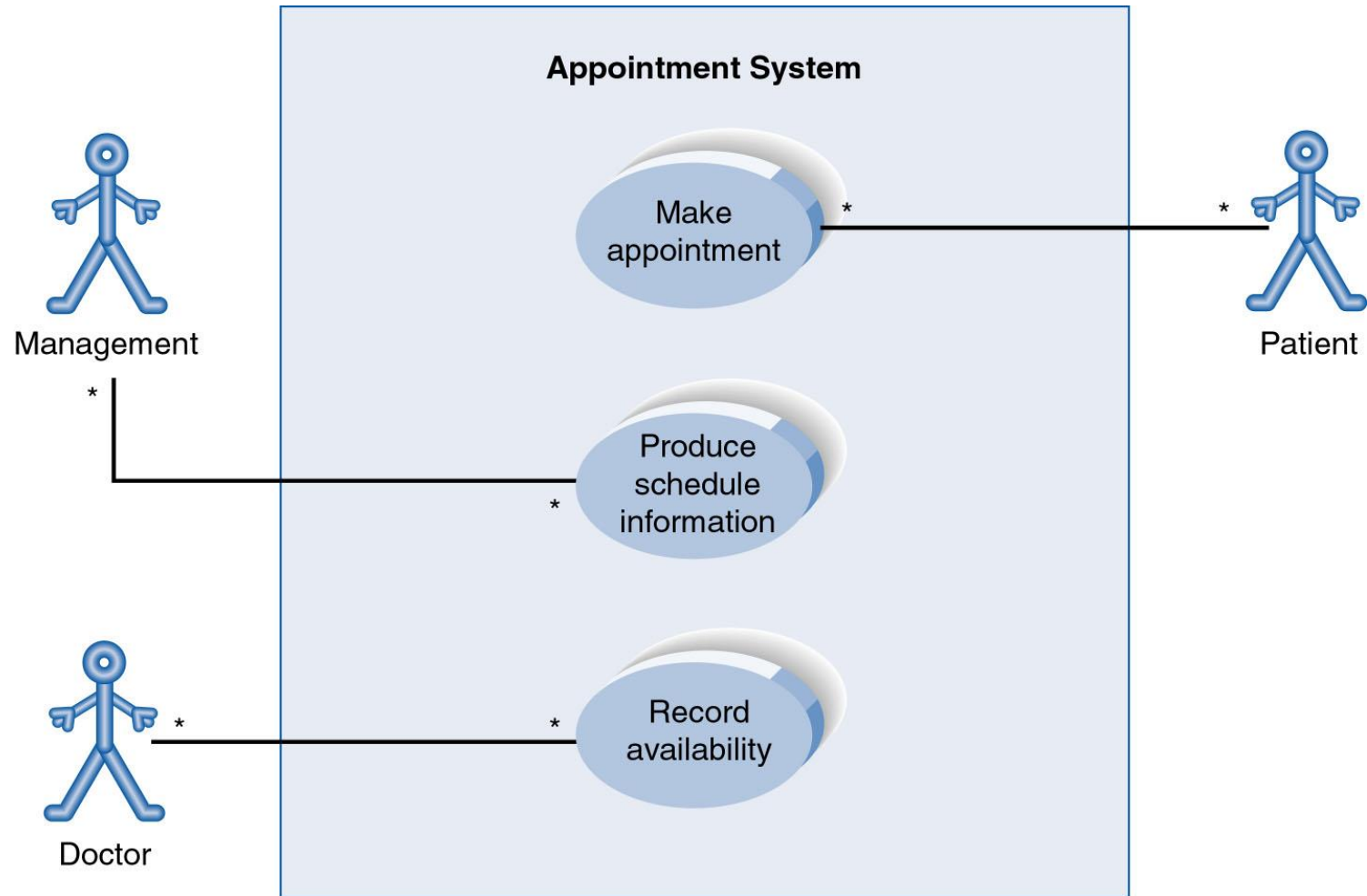
- A boundary rectangle is placed around the perimeter of the system to show how the actors communicate with the system.



Patient



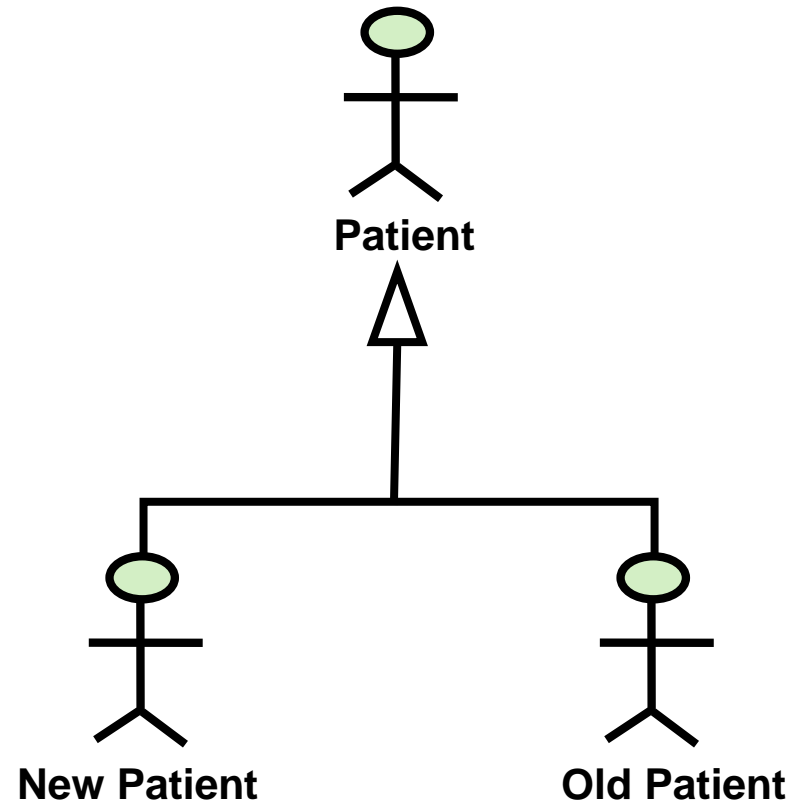
# Sample use case diagram: Hospital



# Use Case relationship: Generalization

- Generalization

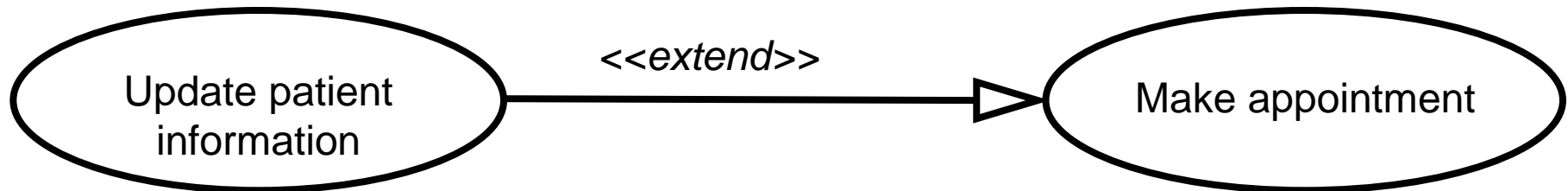
- From child to parent
- Represented by a line and a hollow arrow



# Use case relationships: Extend

- Extend

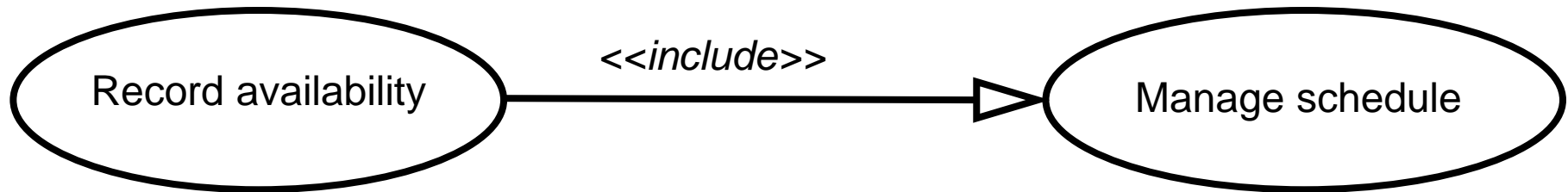
- Represents the extension of the use case to include optional functionality
- Arrow is drawn from the extension use case to the base use case
- Write << extend >> above arrowhead line



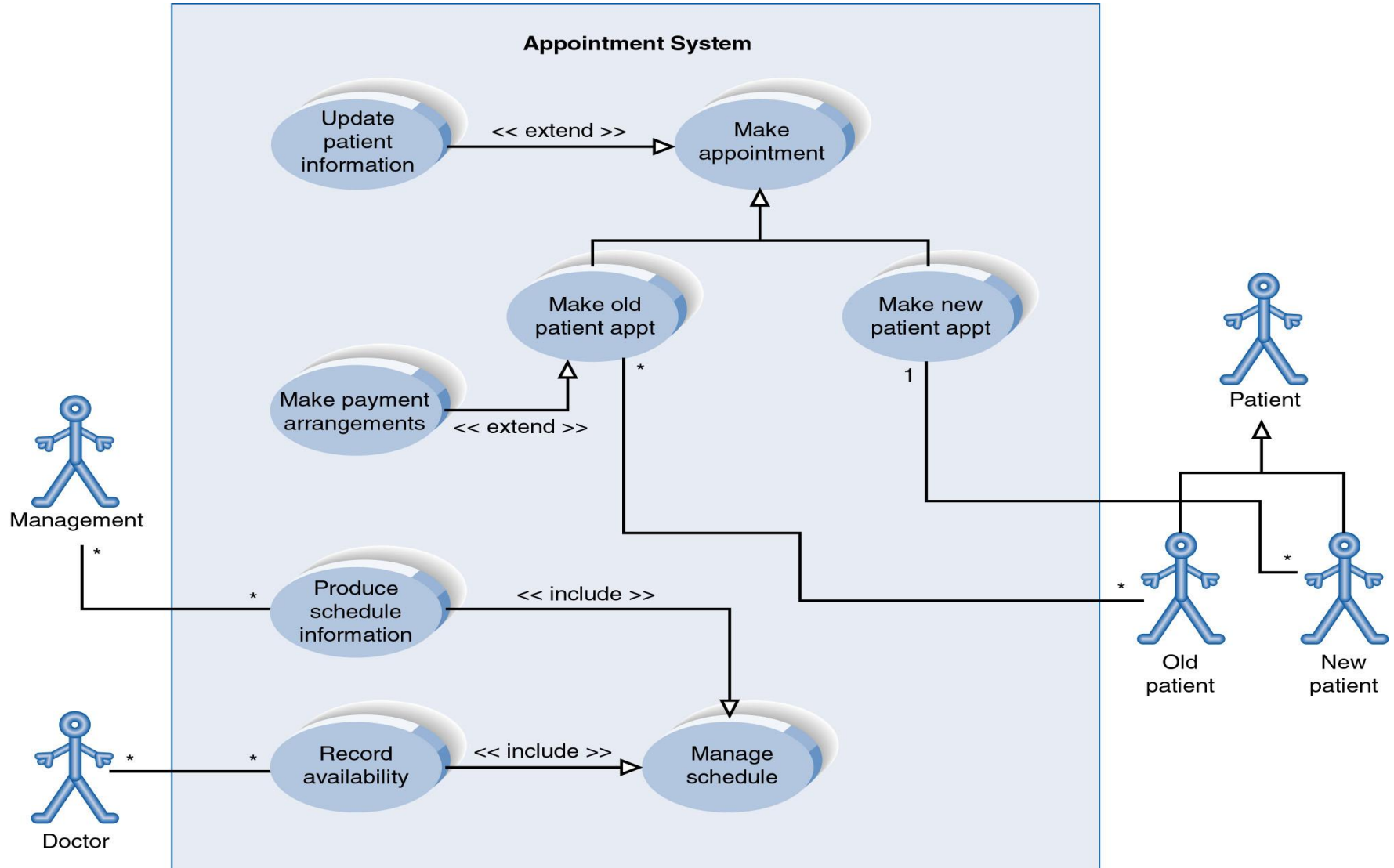
# Use case relationship: Include

- Include

- 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 with relationships



# UML editors

- Rational Rose (commercial): <http://www-03.ibm.com/software/products/en/ratirosefam>
- ArgoUML: <http://argouml.tigris.org/>
- Violet: <http://alexdp.free.fr/violetumleditor/page.php>
- Visual Pardigm (commercial): <http://www.visual-paradigm.com/solution/freeumltool/>
- StarUML: <http://staruml.io/>
- UMLet: <http://www.umlet.com/>