

# How to find Use Cases?

## Scenario-based analysis

Write system processes (or services) as scenarios. Identify interactions with the system, each interaction is a potential use case!

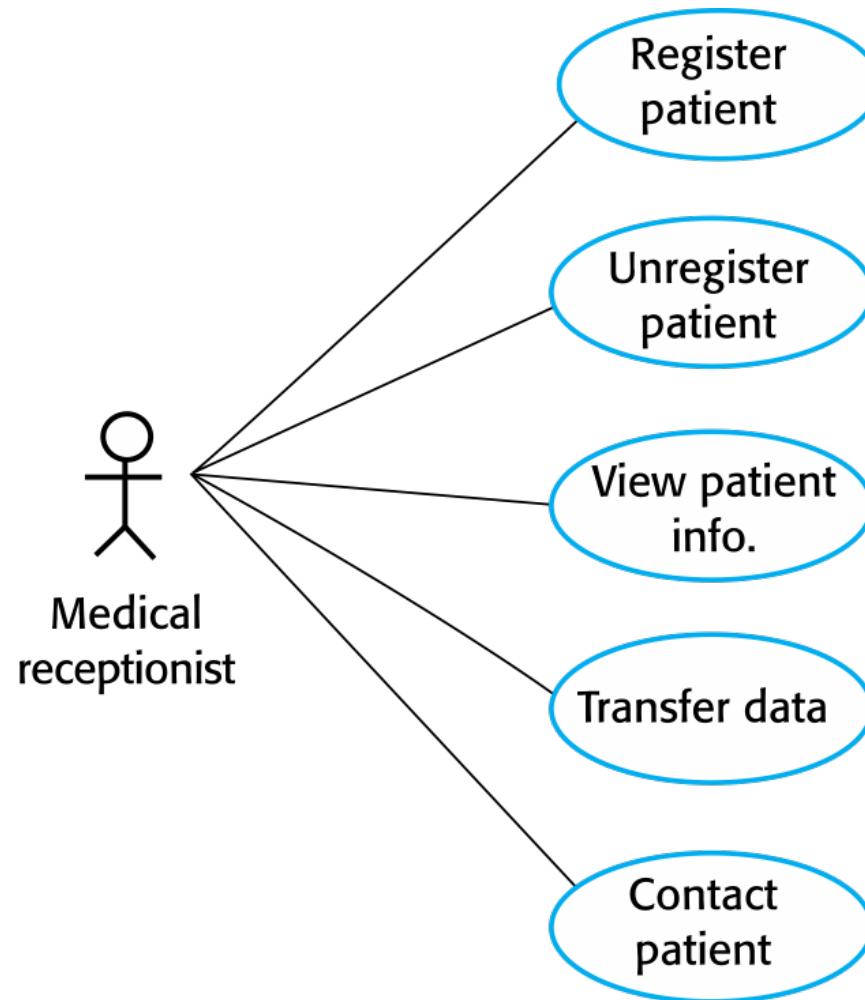
## Actor-based analysis

Identify actors, based on system users (and/or stakeholders).  
Then start with the list of actors and consider  
What they **need** from the system (i.e. what use cases that have value for each actor)  
Any **other interactions** they expect to interact with the system (i.e. which use cases they might take part in for **someone's else benefit**)

## How do you know what is a use case?

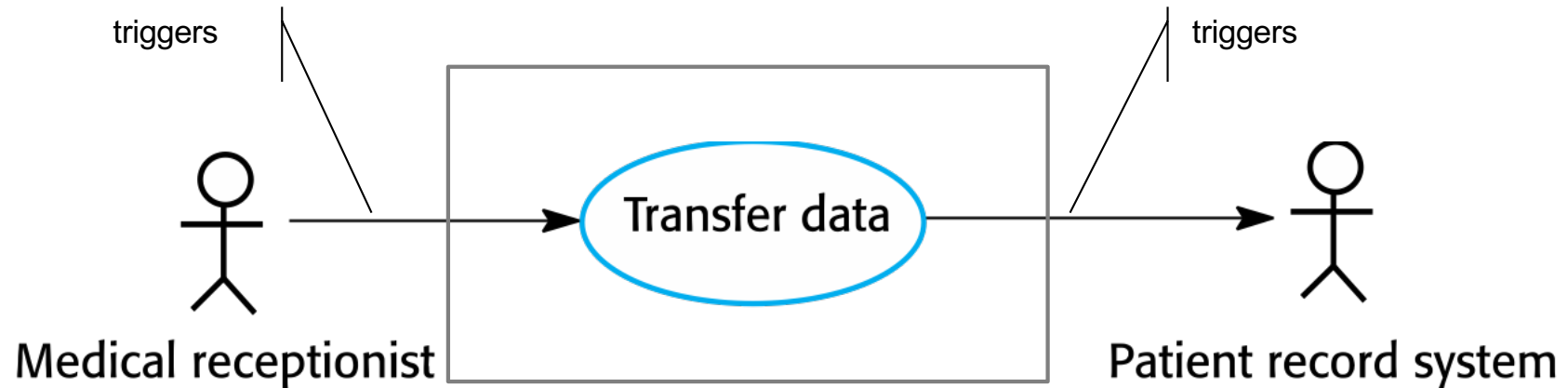
Estimate frequency of use, examine differences between use cases, distinguish between “normal” and “alternative” course of events & create new uses when necessary

# Use cases in the MHC-PMS Actor: 'Medical Receptionist'

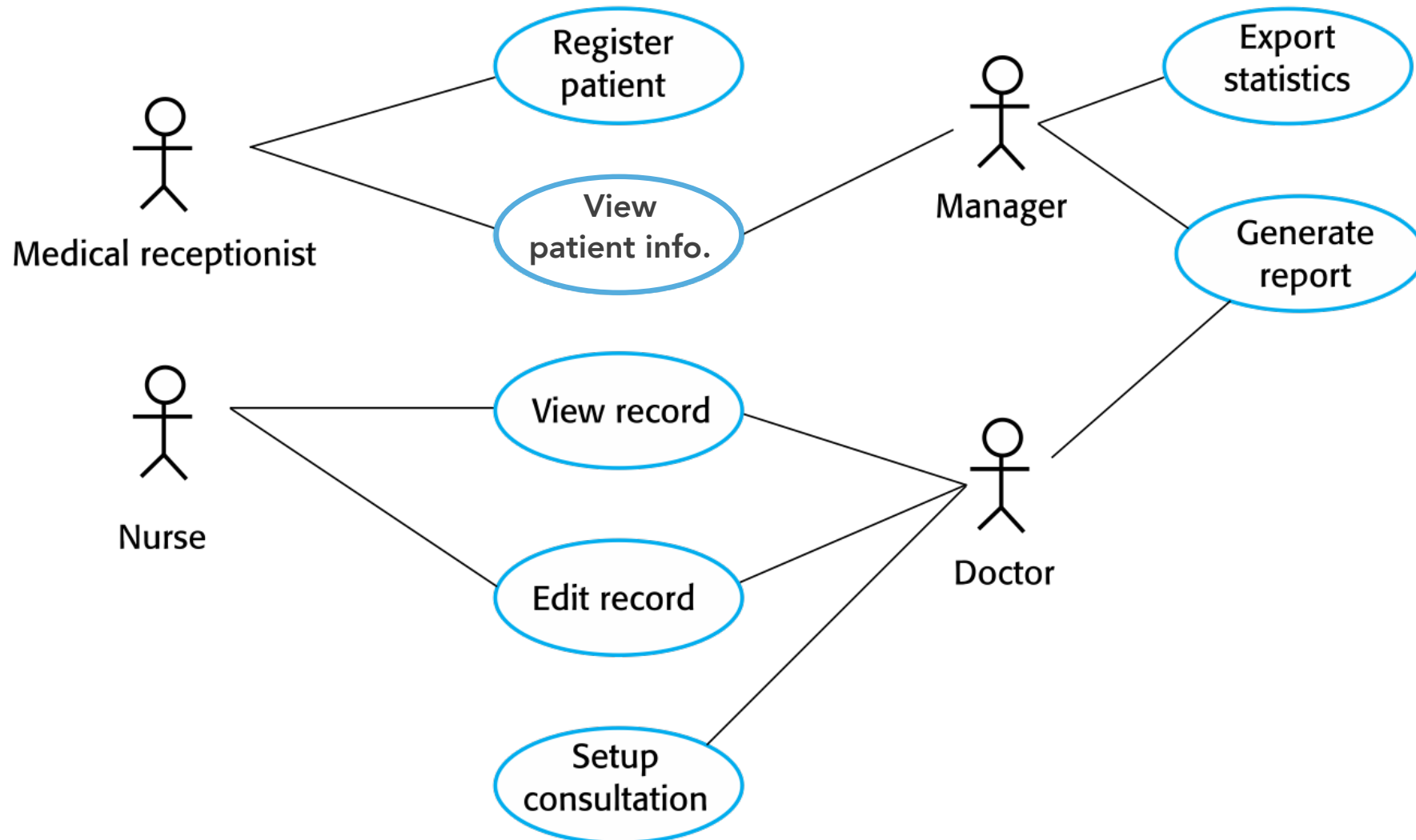


# Example: PMS

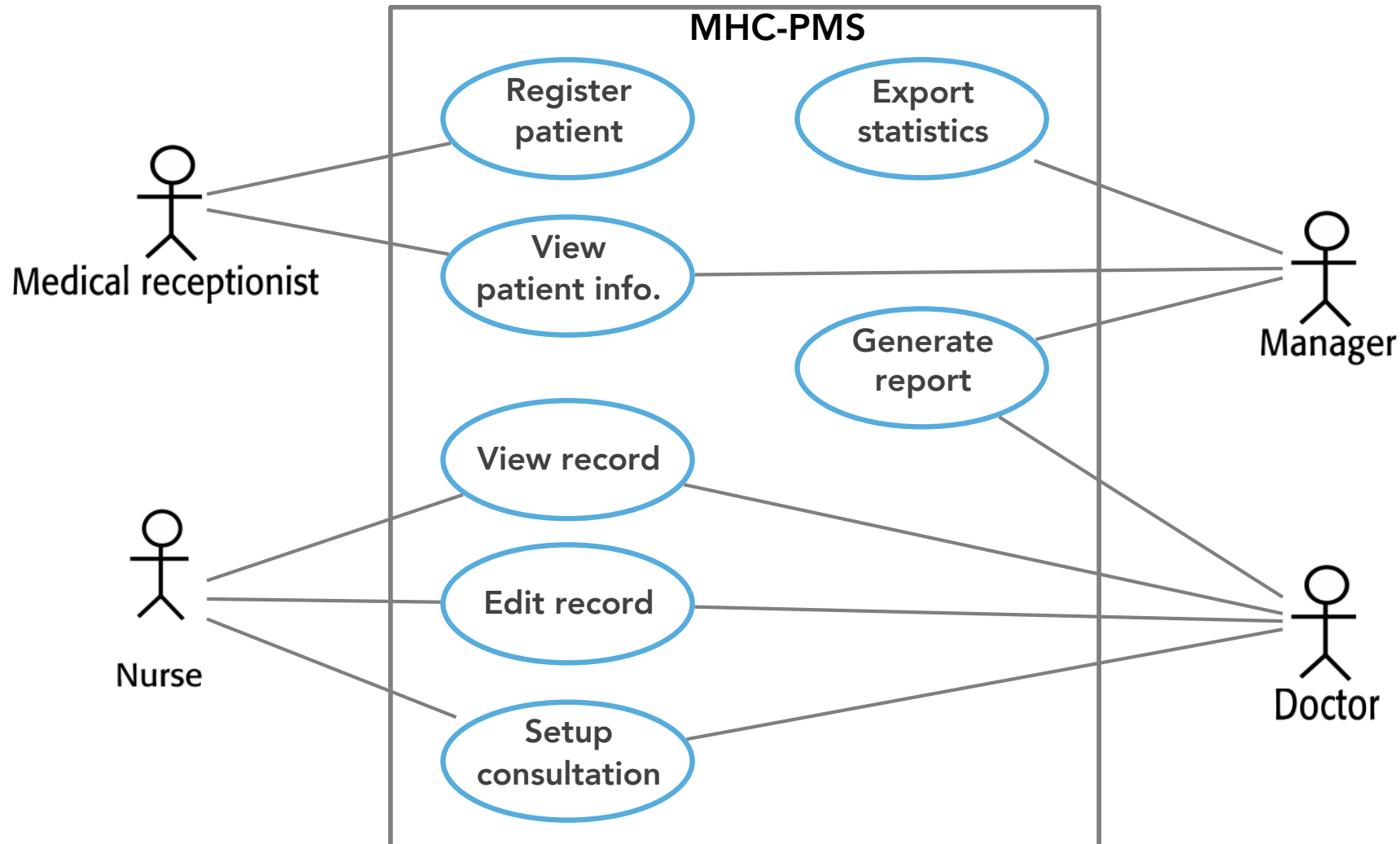
## Transfer-data use case in the MHC-PMS



# Use cases for the MHC-PMS

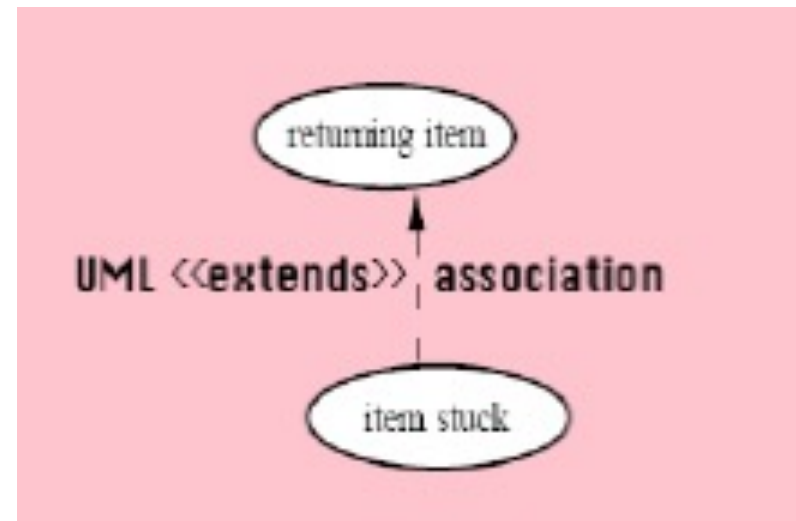


# Use cases for the MHC-PMS-System Boundary

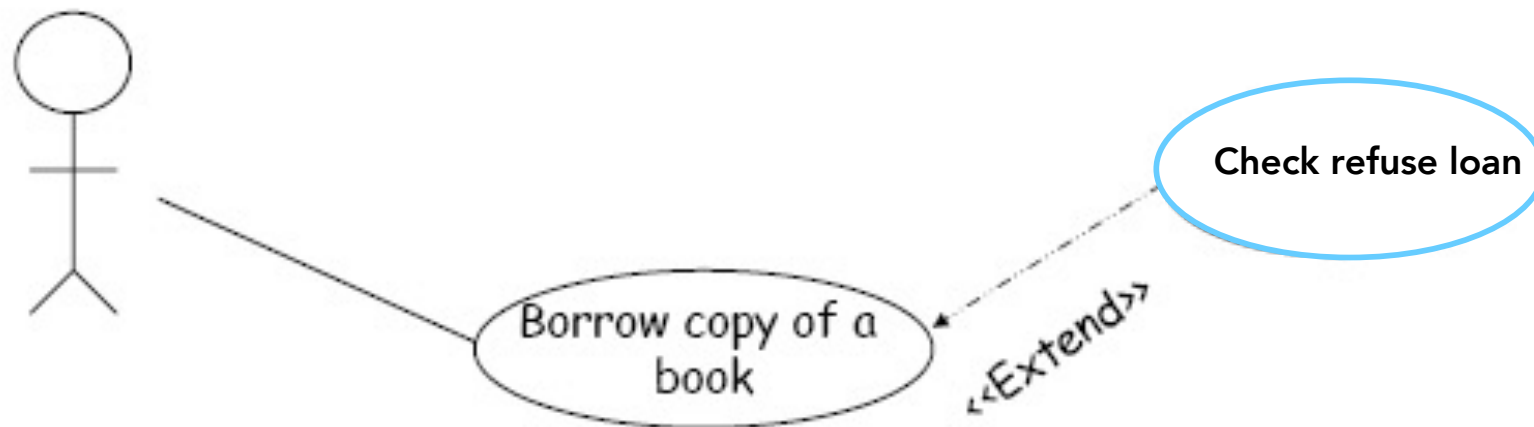


# Extensions

Extensions provide opportunities for :  
*optional parts*  
*alternative complex cases*  
*separate sub-cases*  
*insertion of use cases*



# Refinement - <<extend>>

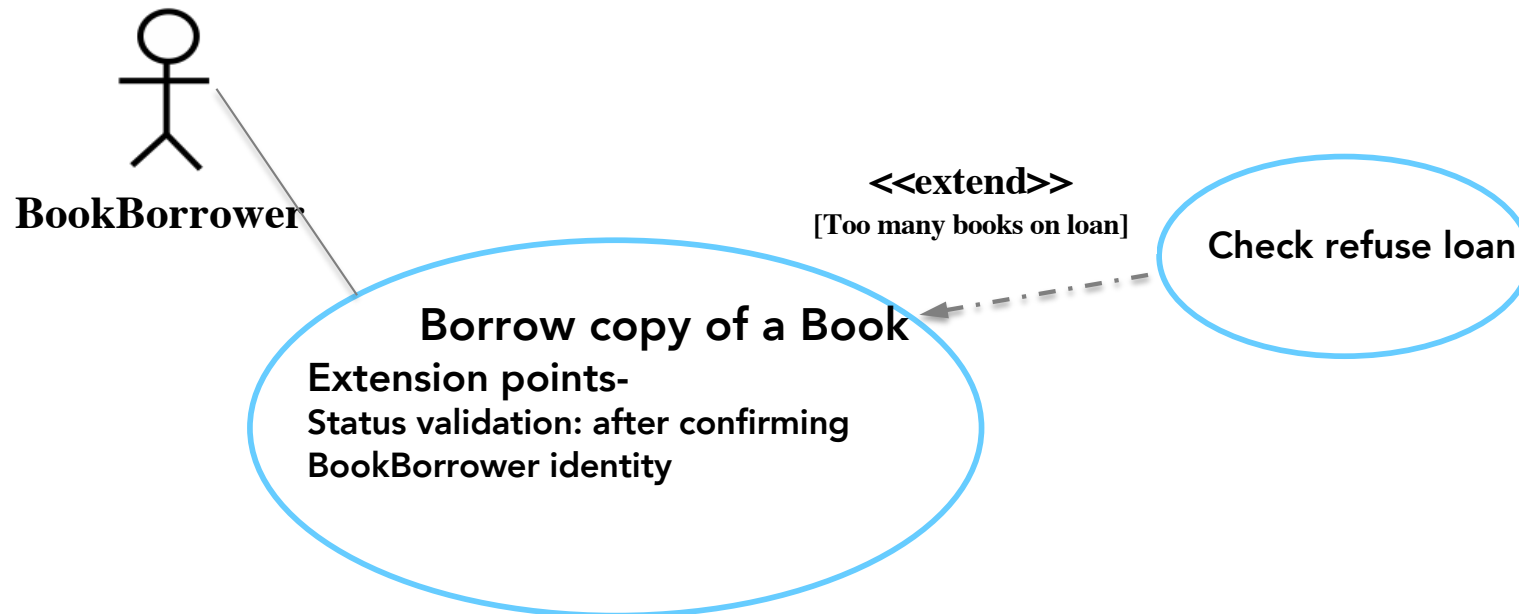


Note: the direction of the arrow from the less central case to the central one!

Refuse loan and borrow copy of a book two different scenarios

<<extend>>

# Refinement - <<extend>>





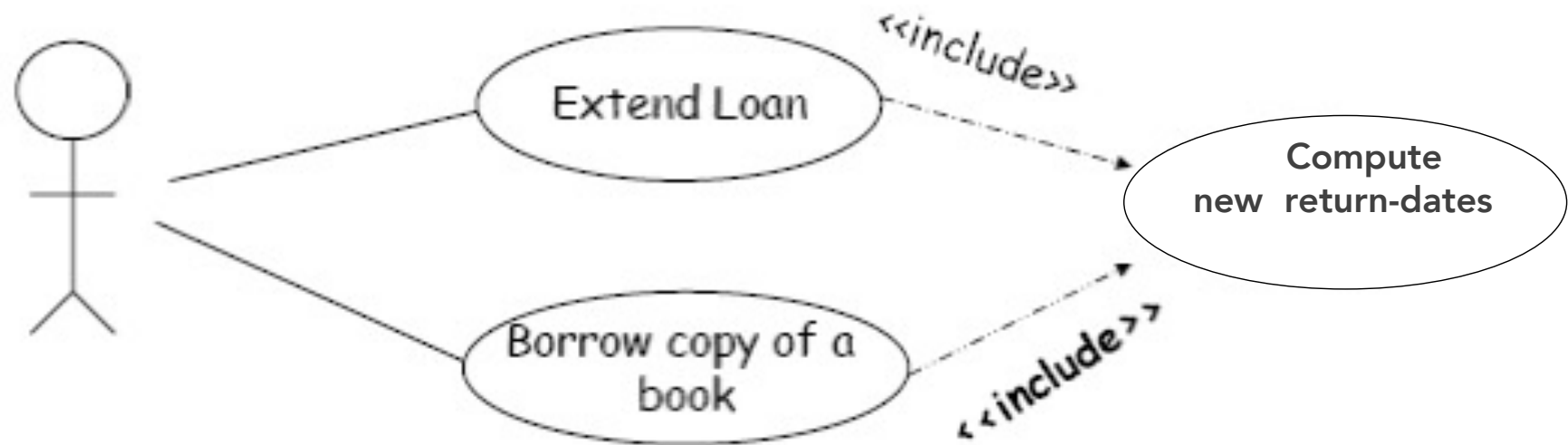
# Use <<include>>

## Use <<include>>

- How the system can reuse pre-existing component
- To show common functionality between use cases
- To develop the fact that project from existing components!

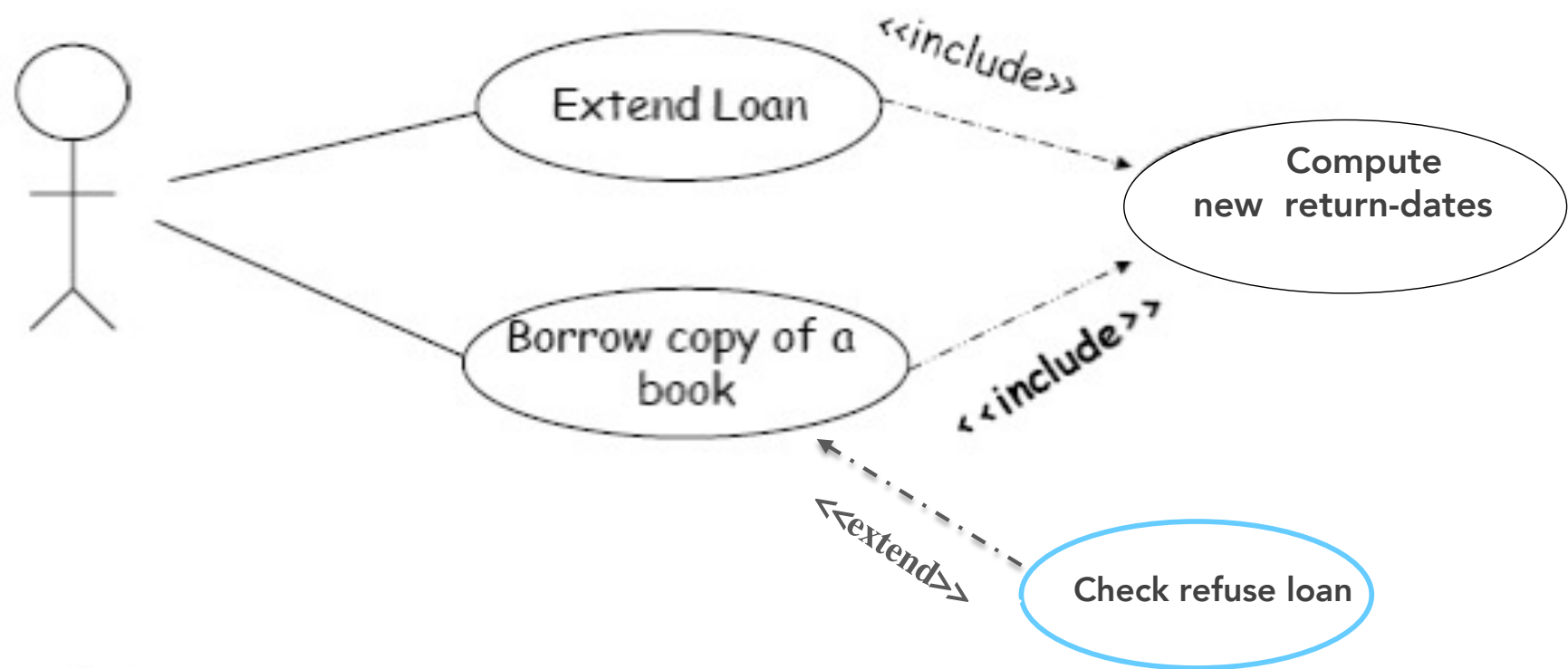
Note: <<include>> and <<extend>>: are UML stereotypes used to attach additional classification

# Refinement - <<include>>



<<include>>

# Refinement - <<include>> & <<extend>>



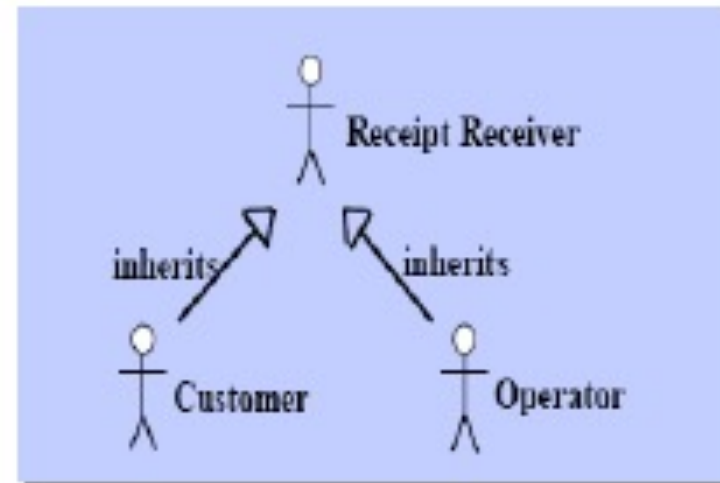
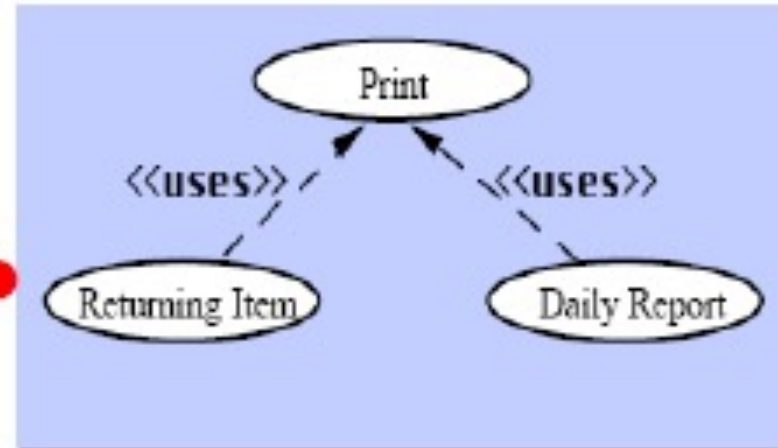
# Refinement

*Abstract use case*

*Concrete use case*

*Abstract actors*

*Concrete actors*



# Detailing a use case

Writing a specification for the use case

Good Practice

**Preconditions:** the system state before the case begin (i.e., facts, things that must be true)

**Flow of events;** the steps in the use case (i.e. actions...)

**Postconditions:** the system state after the case has been completed

# Detailing a use case: Example

## **Borrow copy of a book**

### Precondition

1. the BookBorrower is a member of the library
2. the BookBorrower has not got more than the permitted number of books on loan

### Flow of events

1. the use case starts when the BookBorrower attempts to borrow a book
2. the librarian checks if it is ok to borrow a book
3. If Yes..... (Normal path of action)
  - 3.1...
  - 3.2...
- If No.... (an alternative path of action)
  - 3.1...
  - 3.2

### Post-conditions

1. the system has updated the number of books the BookBorrower has on loan

Borrow Copy  
of a book

# Use Case Description: Example 1

## Library System: Borrow Copy of a Book

Actors	BookBorrower, Librarian
Description	A <u>BookBorrower</u> may borrow a copy of a book from the library. A book must exist in the library and available to borrow and will be issued by <u>Librarian</u> . The status of the copy of the book will change to <on-loan> and the loan period of the copy book will be decided by the type of the book: ShortLoan: 2 days, MediumLoan: 2 weeks, LongLoan: 3 months.
Pre-conditions	<ol style="list-style-type: none"><li>1. the BookBorrower is a member of the library</li><li>2. the BookBorrower has not already borrowed more than the permitted number of books on loan</li></ol>
Sequence/Flow of Events	<ol style="list-style-type: none"><li>1. the BookBorrower asks librarian to borrow a book</li><li>2. the librarian checks if BookBorrow is allowed to borrow a book</li><li>3. If Yes....., if No.... (indicates an alternative path of action)</li></ol>
Data	Book information, Borrow information, Book status information
Stimulus/Trigger	User command issued by Librarian on behalf of BookBorrower
Post-conditions/Response	<ol style="list-style-type: none"><li>1.the system has updated the number of books the BookBorrower has on loan, if successful</li><li>2.Copy of book loan status updated – to &lt;on-loan&gt;, if successful</li></ol>
Comments	The librarian must have appropriate security permissions to access BookBorrow information

# Use Case Description: Example 2

## Medical System: TRANSFER PATIENT DATA

Actors	Medical receptionist, patient records system (PRS)
Description	A receptionist may transfer data from the MHC-PMS to a general patient record database that is maintained by a health authority. The information transferred may either be updated personal information (address, phone number, etc.) or a summary of the patient's diagnosis and treatment.
Pre-conditions	<ol style="list-style-type: none"><li>1. Patient is a member of the clinic</li><li>2. Patient information is access-able</li></ol>
Sequence/Flow of Events	<ol style="list-style-type: none"><li>1. the Medical receptionist select patient records to transfer</li><li>2. Medical receptionist transfers selected patient records to authority</li><li>3. If successful....., if not successful.... (indicates an alternative path of action)</li></ol>
Data	Patient's personal information, treatment summary
Stimulus/Trigger	User command issued by medical receptionist
Post-conditions/Response	Confirmation that PRS has been updated
Comments	The receptionist must have appropriate security permissions to access the patient information and the PRS.



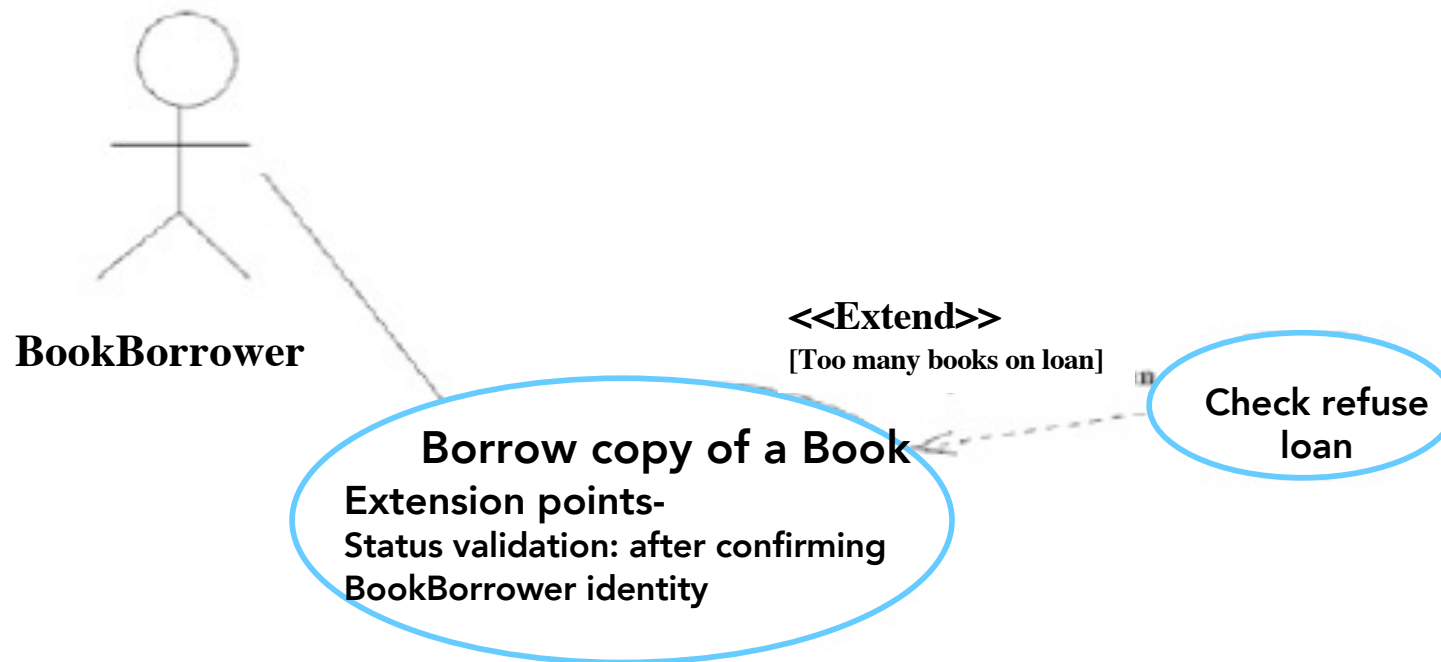
# Scenarios

Each time an actor interacts with a system, the triggered use cases instantiate a scenario

Each case corresponds to a specific path through a use case with no branching

Scenarios are typically documented as text alongside the use case and activity diagrams

# Write the scenarios for this diagram



# Example: Borrow copy of a book

## Scenario 1

BookBorrower Joe borrows the library's only copy of "Using UML", when he has no other book on loan. The system is updated accordingly.

## Scenario 2

BookBorrower Ann tries to borrow the library's second copy of "Software Engineering", but is refused because she has six books out on loan, which is her maximum allowance.

# Scenario Example: Borrow copy of a book

## **Normal** (~successful outcome)

BookBorrower Joe borrows from the library a copy of “Using UML”. Joe has no other books on loan, takes the copy of the book to the the librarian, who checks Joe’ allowance, scans the copy’s barcode and issues the book to Joe. The system is updated accordingly.

## **Alternative** (~successful outcome)

BookBorrower Joe borrows from the library a copy of “Using UML”. Joe has no other books on loan, Joe takes the copy of the book to auto-librarian, auto-librarian scans Joe’s library ID and the barcode on the copy of the book. It checks Joe’s borrowing allowance, and it automatically issues the book to Joe. The system is updated accordingly.

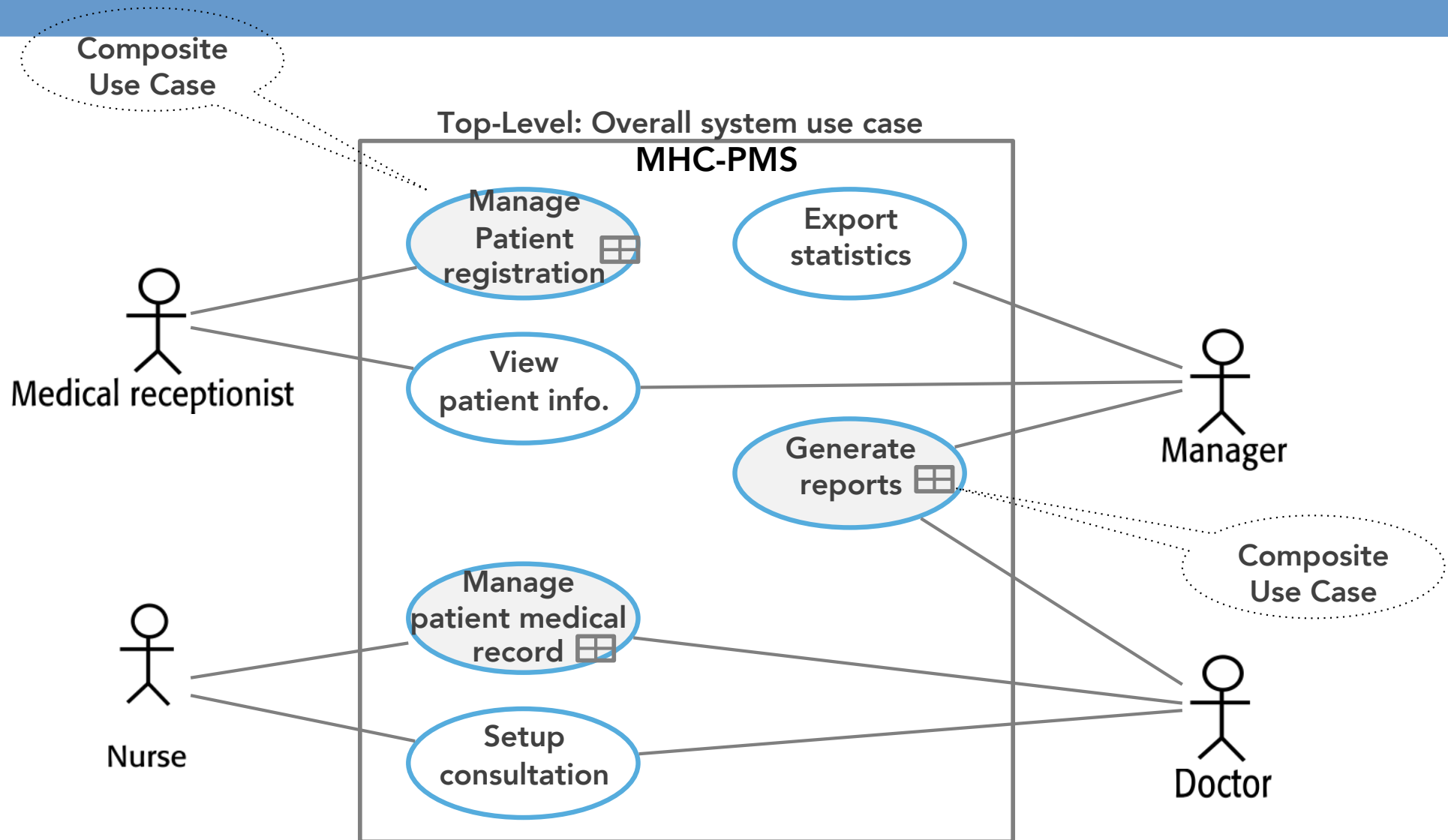
## **Error** (~unsuccessful outcome)

BookBorrower Joe borrows from the library a copy of “Using UML”. Joe takes the book to the the librarian, who checks Joe’ allowance, scans the copy’s barcode, but Joe is refused because he has six books out on loan, which is his maximum allowance.

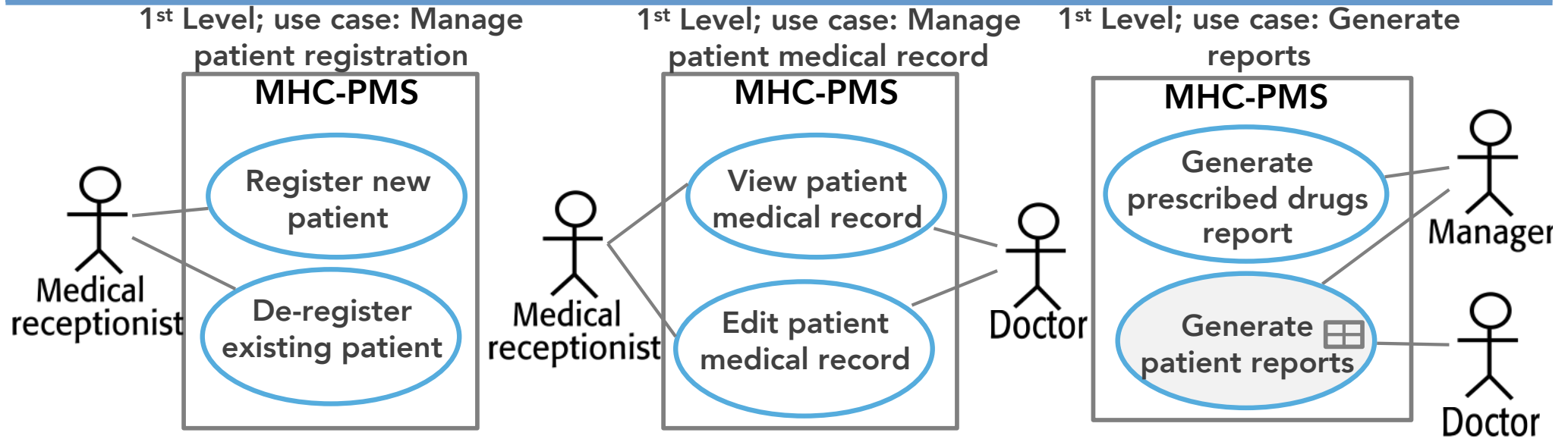
## **Error** (~unsuccessful outcome)

BookBorrower Joe borrows from the library a copy of “Using UML”. Joe takes the book to the the librarian, who checks Joe’ allowance, scans the copy’s barcode, but barcode is damaged, the copy was not issued.

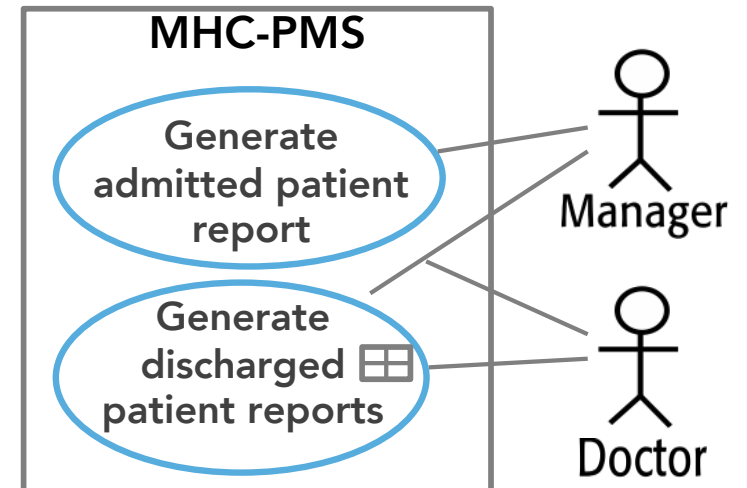
# Multi-level use cases



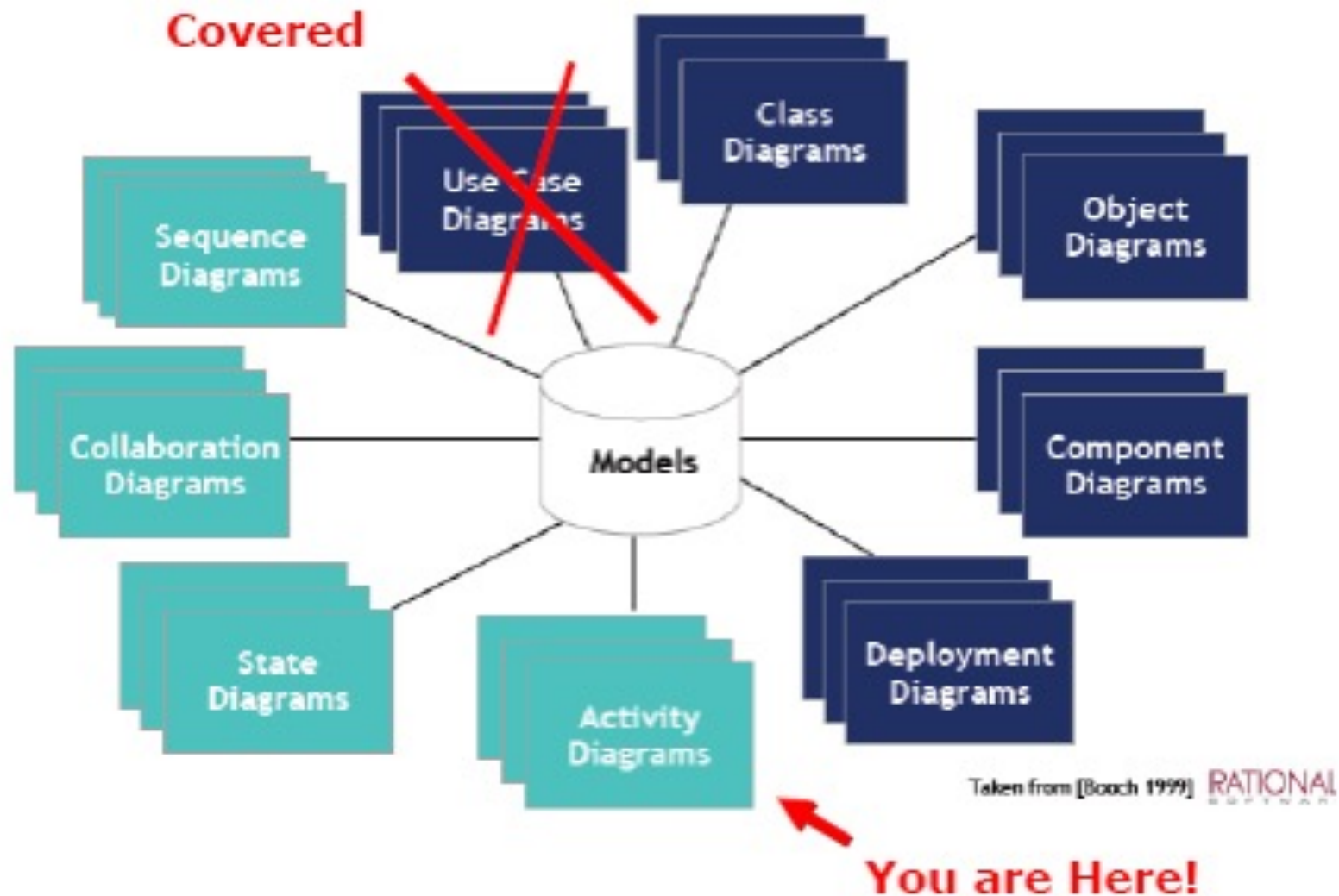
# Multi-level Use cases



2<sup>nd</sup> Level; use case: Generate patient reports



# UML Diagrams



# Activity Diagram

Activity diagrams helps to represent Workflows and business processes

They model the **behaviours** (activities) of the system

They show the dependencies and coordination between activities within a system

the activity flow should not get “stuck”

they can be used during the requirements elicitation process ...

-to help identify how use cases interact to achieve business processes

-to help in identifying use cases of a system and operations involved in the realization of a use case

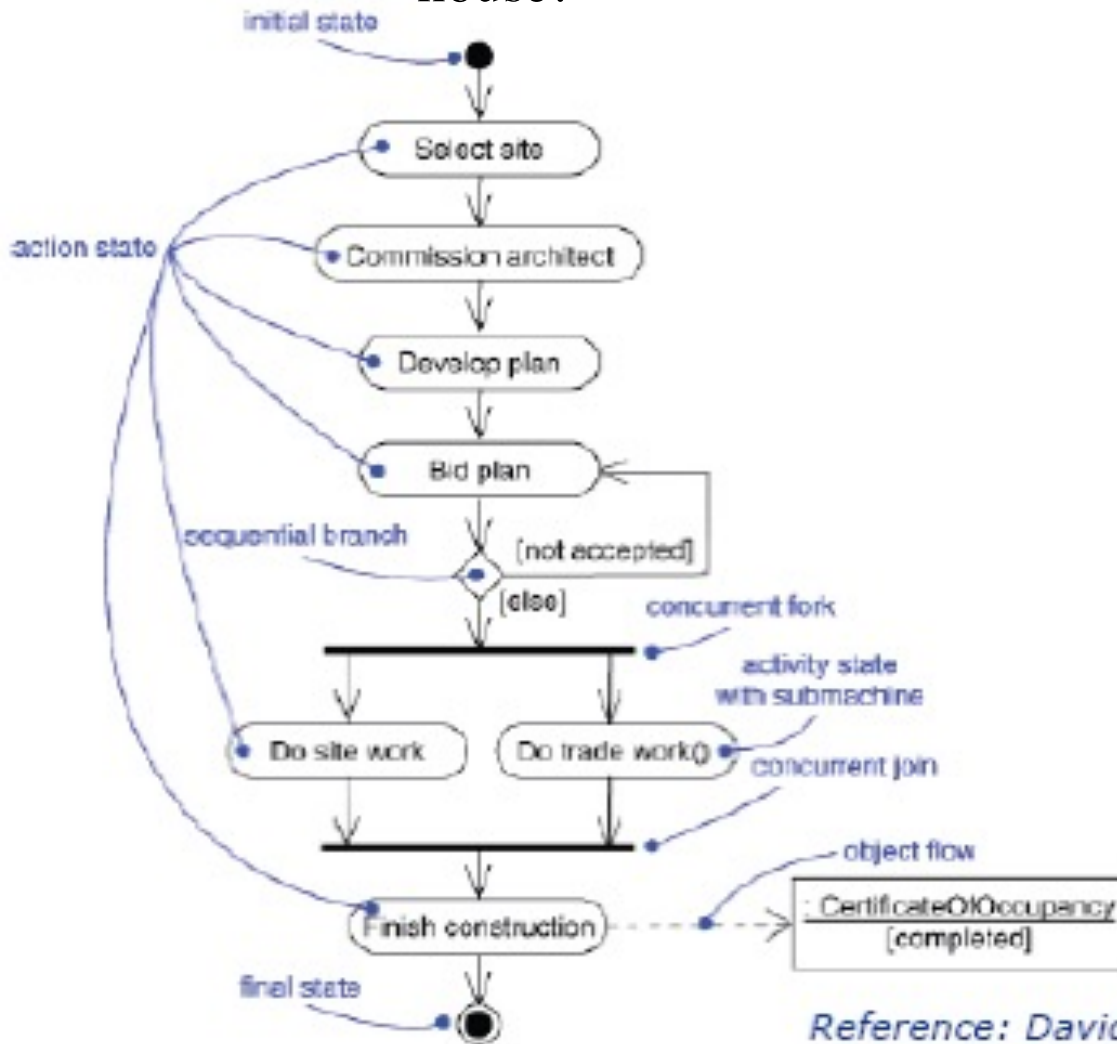
But, generally, they can be attached to any model element to model its **dynamic behaviour**



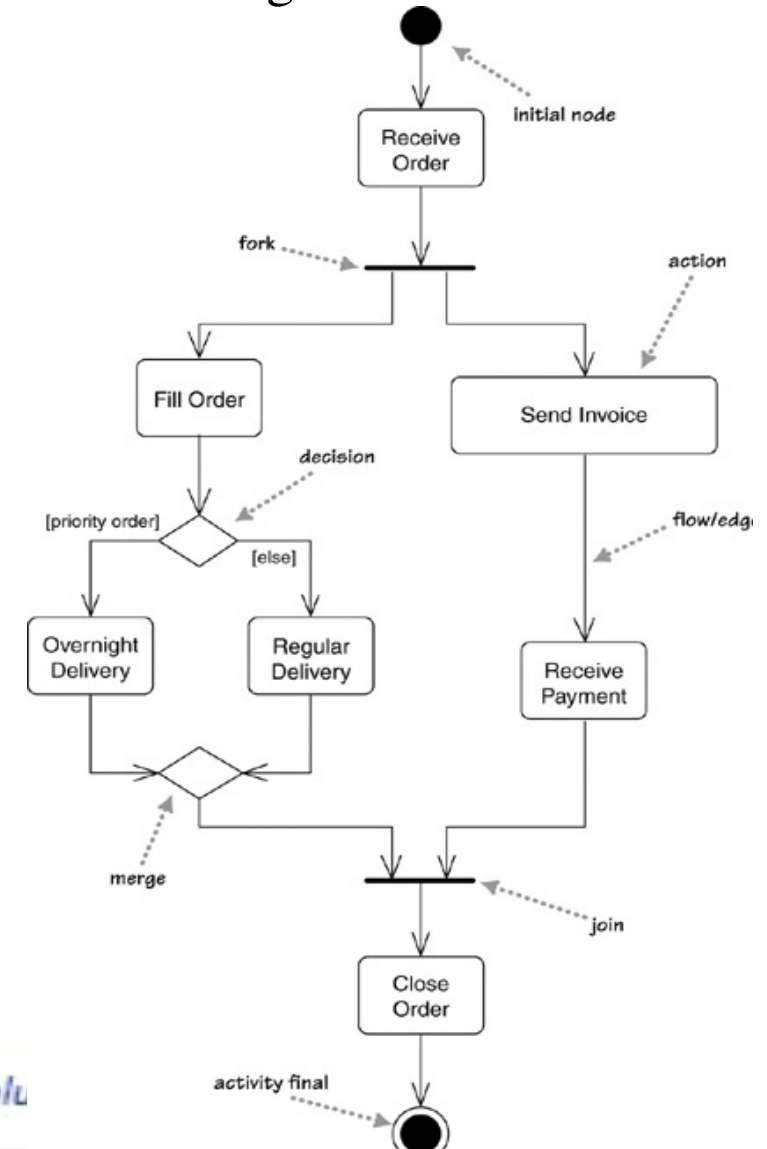
# Activity Diagram: Example

Capture the **Overall Process**: e.g. Build a house!

Business **scenario**: e.g. Place an order



Reference: David Rosenblu



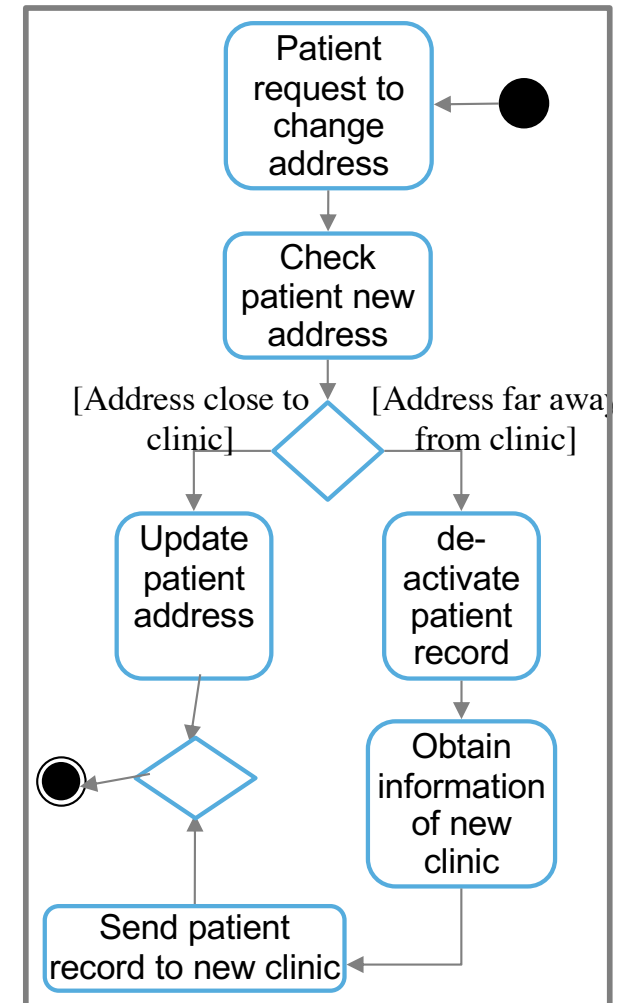
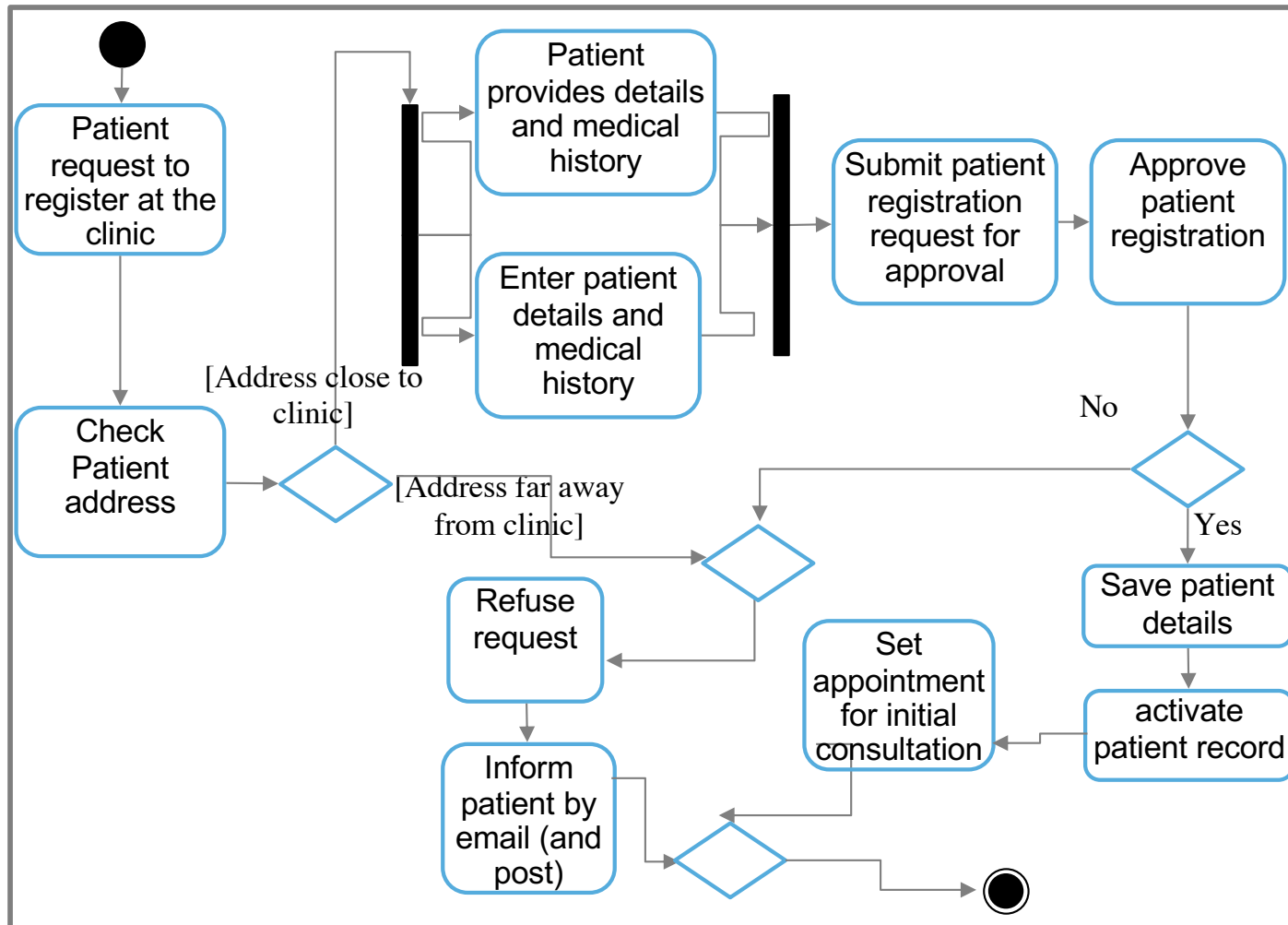
# Activity Diagram: Examples

Capture behaviour of use cases

use case: register patient – **business process view**

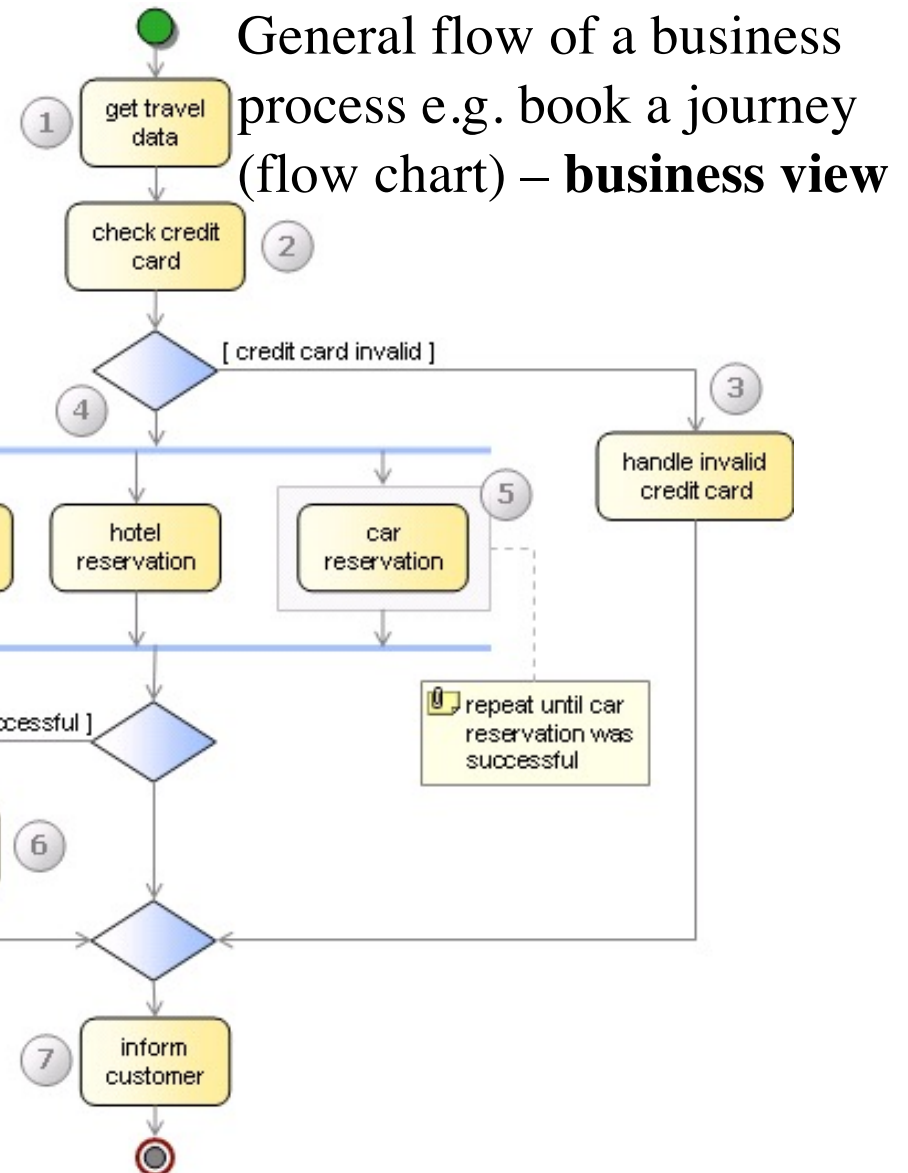
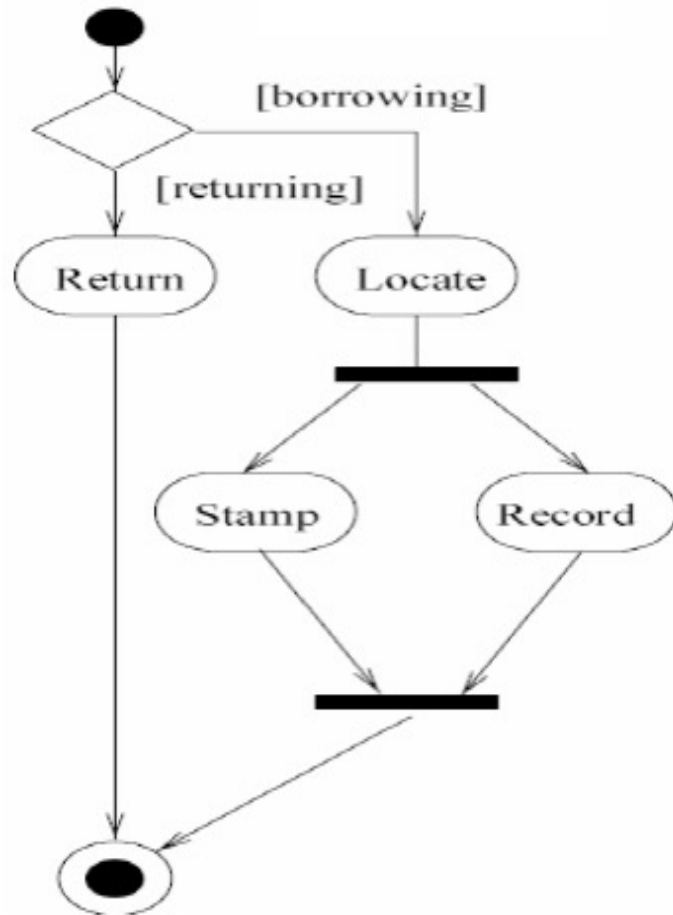
use case: Change patient

address (or de-register patient)



# Activity Diagram: Examples

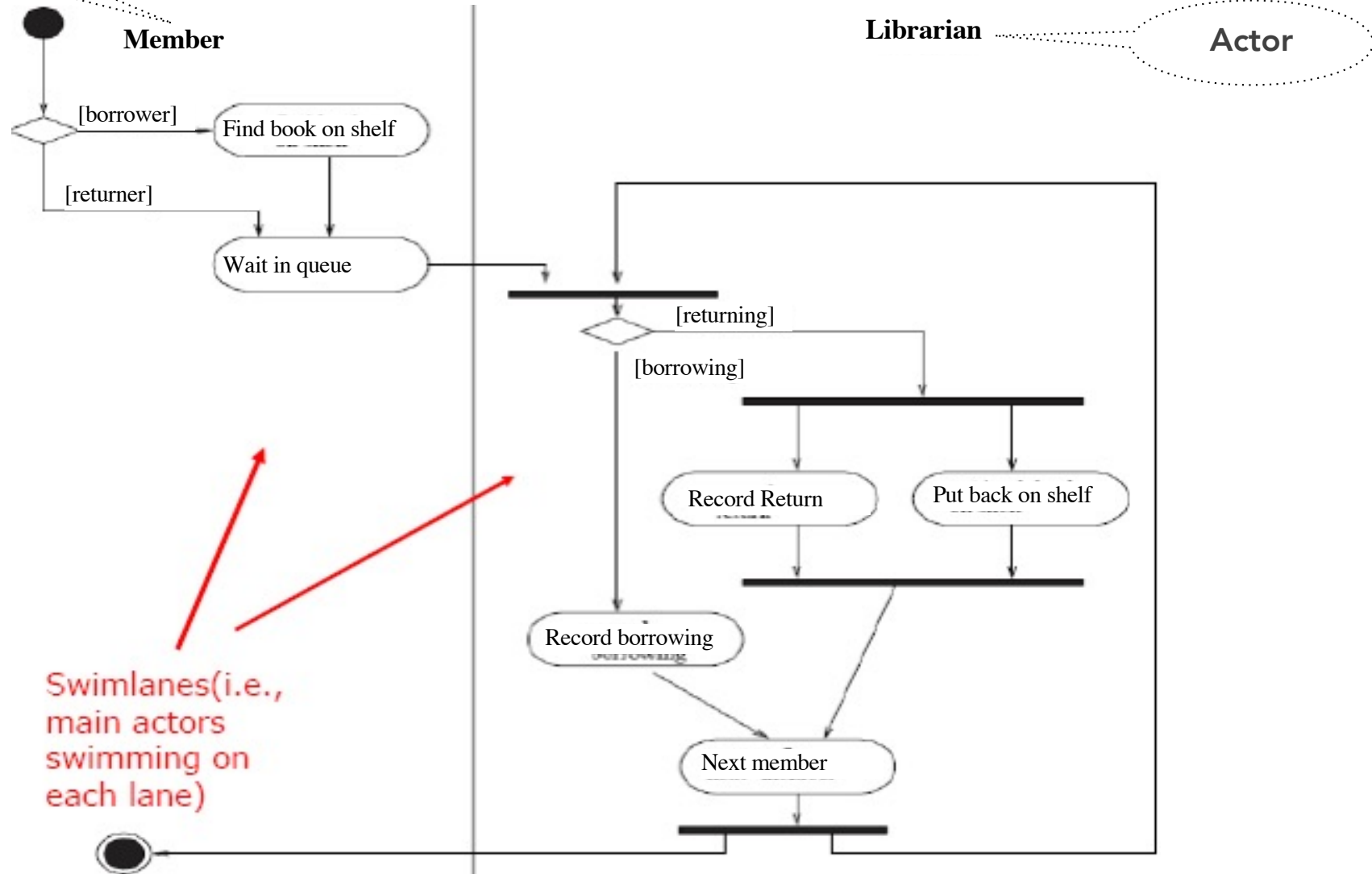
Specific flow of a use case: e.g. “Borrow copy of a book”-**business process view**



# Activity Diagram-swim lanes: Example of two use cases

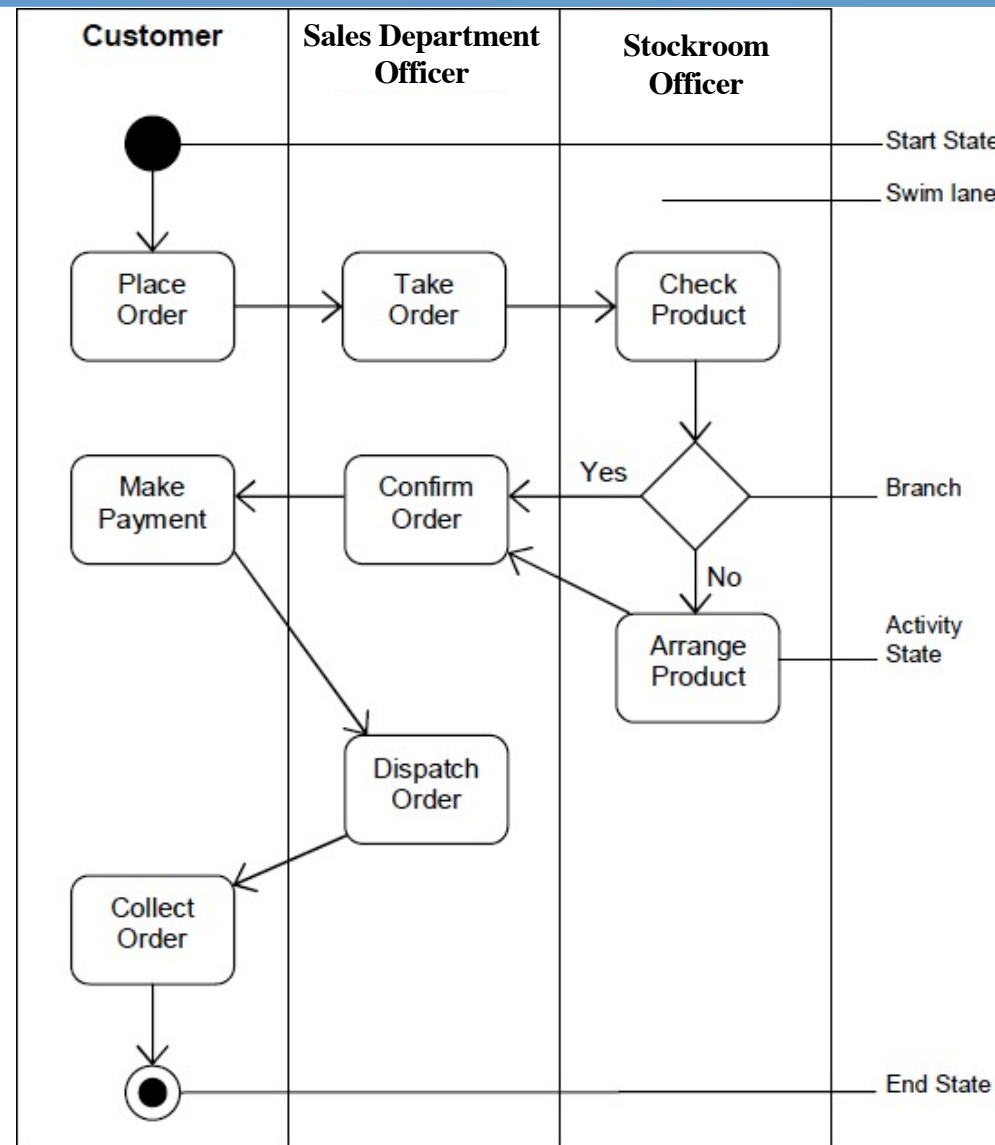
Actor

use cases: Borrow copy of a book /Return copy of a book



# Activity Diagram-swim lanes : Example

General Scenario  
or business  
process: e.g. Sell  
a product –  
**Business view**



Activity Diagram for Product Sale