Information Systems – Analysis and Design relations(part-2).

Relevant chapter in the core text:
Chapter 11

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Topics to be covered

- Introduction to Use Case diagrams
- Key Points
- Functionality
- Graphical Representation
- Findings, Conditions and Guidelines
- Relationships

Introduction

Use Case diagram is a system modelling diagram that sets out all the actors

use cases

the relationships between them

And setting the boundaries of the system to be built.

Use Case Diagrams – The Key Points

Basis of a user–orientated approach to system development

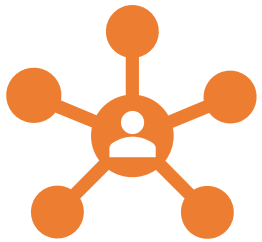
- Identify the users of the system - Actors
- Identify the tasks they must undertake with the system & prioritise - Use Cases
- Relate users & tasks - Relationships

Use case models therefore contain actors, use cases & relationships

Use case modelling is user centred

Can help identify the system boundary

Use Case Functionality



Use case diagram

Describes the functionality of the system from the user's perspective

Describes the functional behavior of the system (as seen by the users)

Defines the boundaries of the system

Displays the relationships between actors and use cases

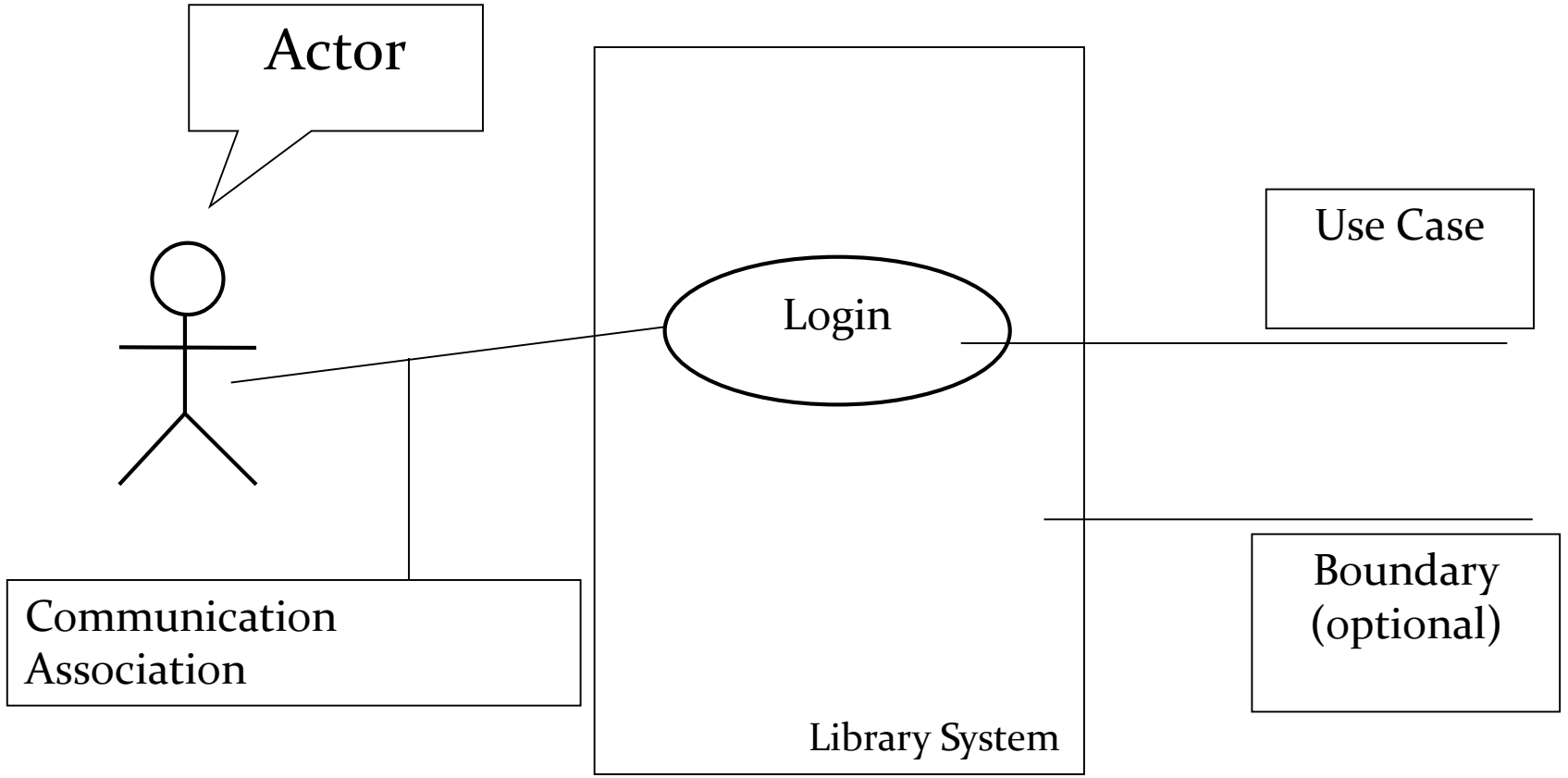
Main components are:

Actor, Use Case & System Boundary

Use Case Functionality

- **Actor**
  - A user or another system that will interact with the system under development. May be humans ,physical devices or information systems.
- **Use Case**
  - An external view of the system that represents some functionality of the system (an action the user might perform)
- **System Boundary**
  - Defines the scope of the system

Graphical Representation



Use Case Descriptions

- Use case models document requirements in a complementary way to traditional requirements documents
- BUT – document one individual piece of the system *(in OOD not the overall model)*

- Items in these requirements documents should be linked to items in the use case models to:
  - Ensure coverage
  - Help assess completeness of the requirements
  - Ensure consistency

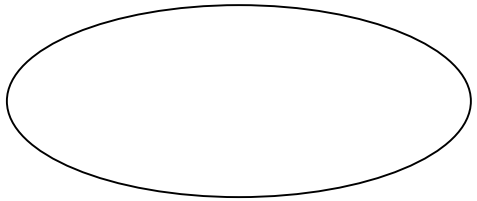
- Establishing Use Case Descriptions requires through information gathering (fact finding techniques)

What are Use Cases

- An external view of the system that represents some functionality of the system (an action the user might perform)

- Things actors do with the system hence use case names verb - noun
  - A task which an actor needs to perform with the help of the system (e.g. borrow book)

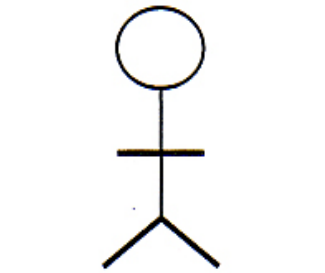
- Describes the behaviour of a system from a users standpoint by using actions & reactions



Borrow Book

Who Are The Actors

- It is not easy, especially in early stages
- Who or What uses the system
- Depicted as a stick person
- Actors trigger use cases



How to Find Actors ?

- A user or another system that will interact with the system under development may be humans, physical devices, or information systems.

- Observe direct users of the system – those people or systems responsible for its installation, use or maintenance

    - What roles do these user play in the interaction
    - Who provides information to the system
    - Who receives information from the system

- Same physical person may play the role of a number of actors
- Many people may play the same role so act as the same actor
- Becomes clearer as the use cases are developed

Finding Use Cases

- Start with the list of actors and consider
  - What they need from the system (i.e. what use cases there are which have value for them)
  - Any other interactions they expect to have with the system (i.e. which use cases they might take part in for someone else's benefit)

- How do you know what is a use case
  - Estimate frequency of use, examine difference between cases, distinguish between ‘basic’ & ‘alternative’ course of events & create new use cases where necessary
- Leads to identification of new actors

Pre and Post Conditions

- We can set conditions to clarify our use cases – things that must be true before and afterwards

- In a hotel check-in use case we could say - the hotel must have at least one free room for the period requested = Pre-Condition {before}

- The room would have been allocated to the guest for the period requested and is no longer vacant = Post-Condition {after}

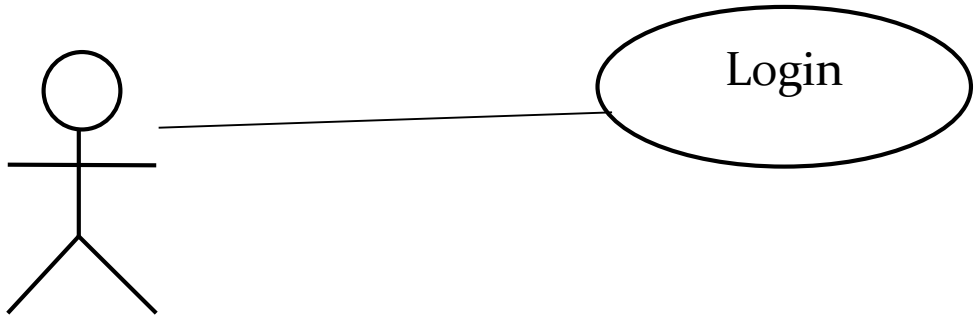
Use Case Descriptions - Guidelines

- The Use Case is *a flow of events*

1. *Write each step in the form Subject – Verb – Object*
2. *Identify the Initiator of each step*
3. *Write steps from view point of independent observer*
4. *Each step to have same level of abstraction (steps produce equal system progress)*
5. *Each Use Case to have a sensible number of steps*
6. *Apply KISS liberally*

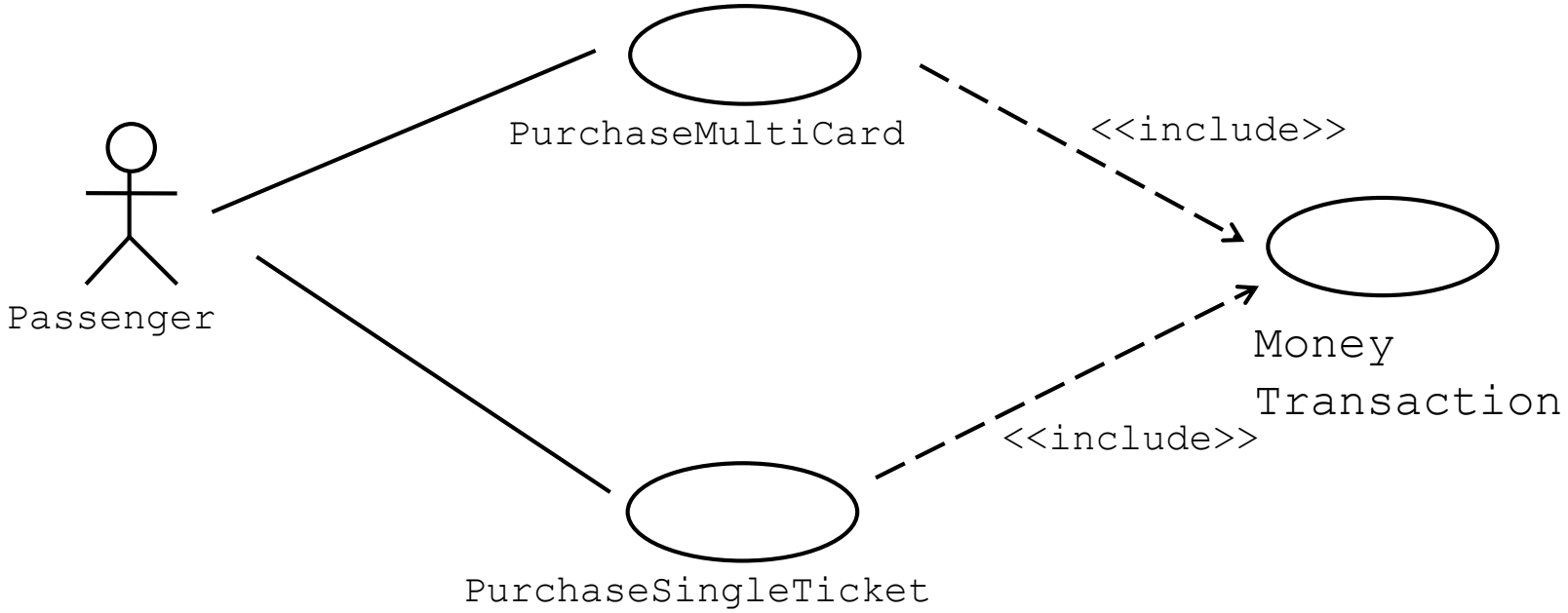
Use Case Relationships - Stereotypes

- Communication
  - Denote access to functionality
  - Only relationship between actors and use cases
  - Depicted by solid line between actor and use case



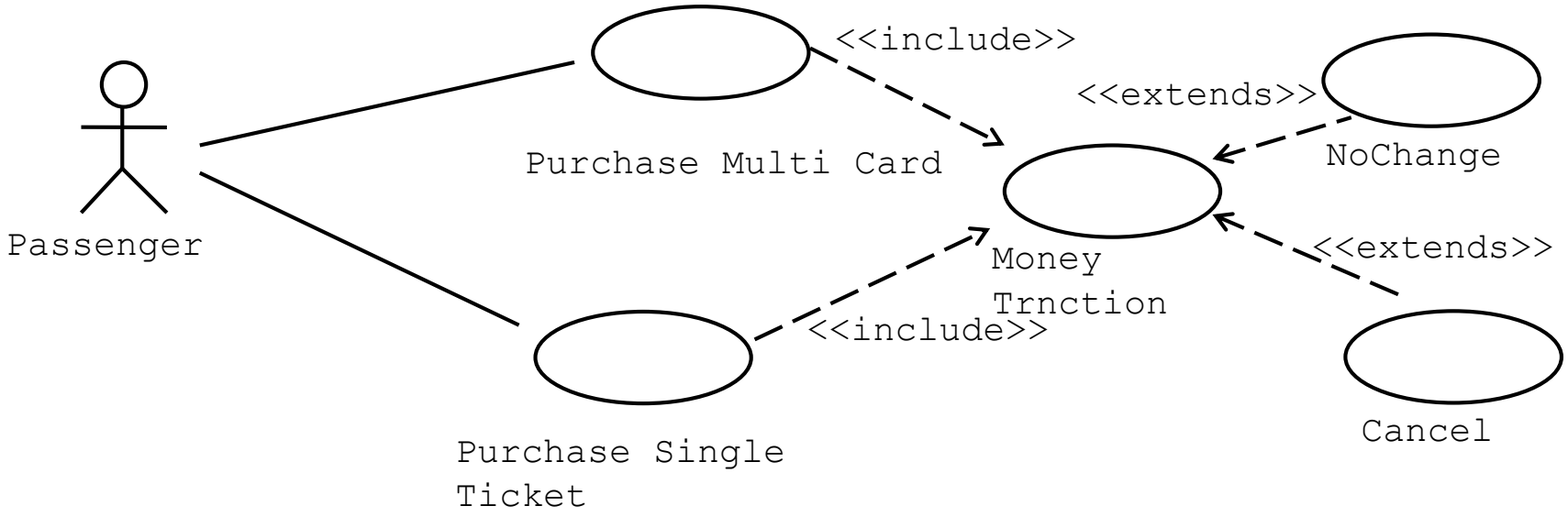
Include Relationship

- in an *include* relationship, a use case includes the functionality described in another use case as a part of its process
- Adds extra behaviour into a base use case
- Include reduces complexity
- Depicted by a dashed open arrow originating from the base use case and labelled with the stereotype “<<include>>”

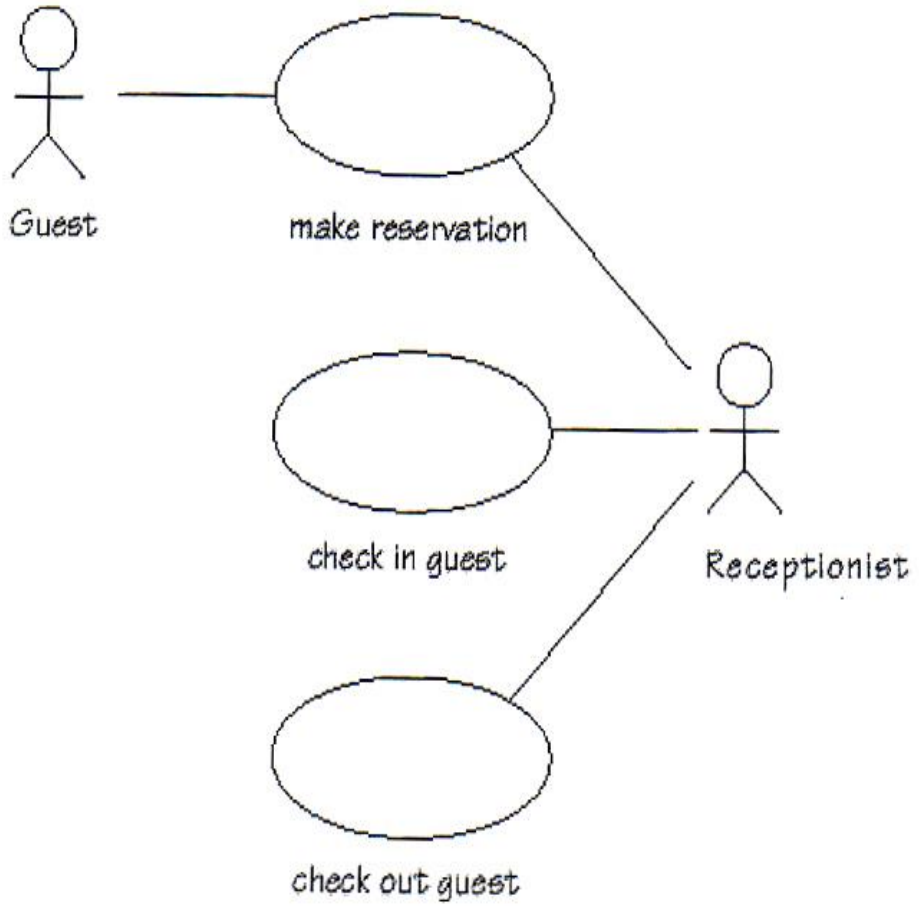


Extend Relationship

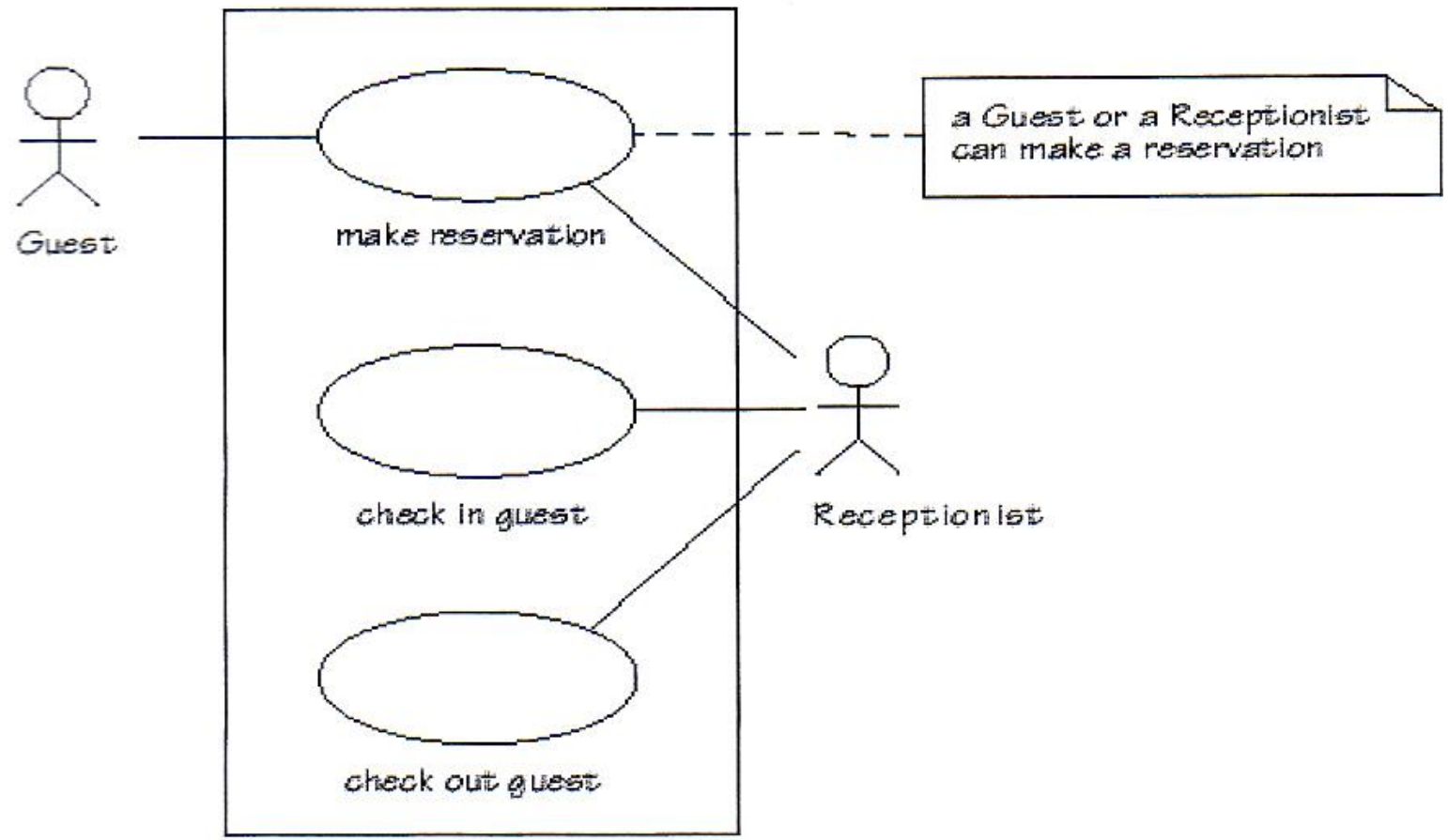
- Provides additional functionality that may be required in another Use Case
- A use case extends another use case by adding events
- Extend is also used to model exception cases, helps, errors, and other unexpected conditions
- Depicted by a dashed arrow (similar to the include), originating from the child (extend) use case and labelled with the stereotype "<<extend>>"



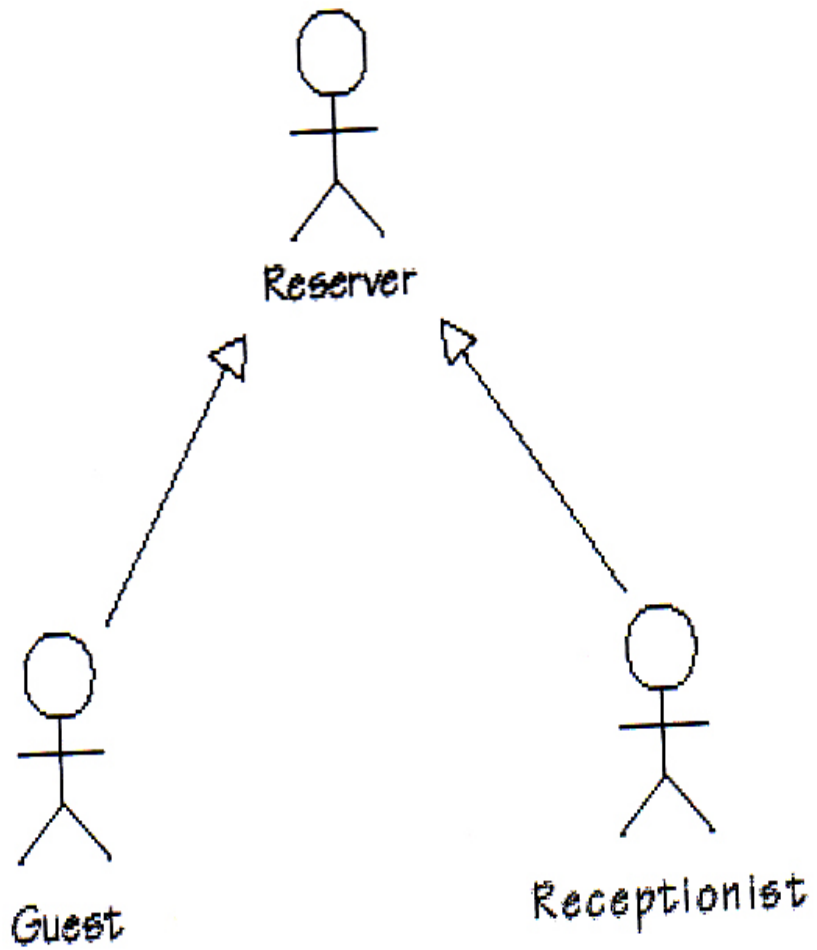
Emphasis in on the User



Defining the System Boundary



Using Inheritance



Use Case Description I

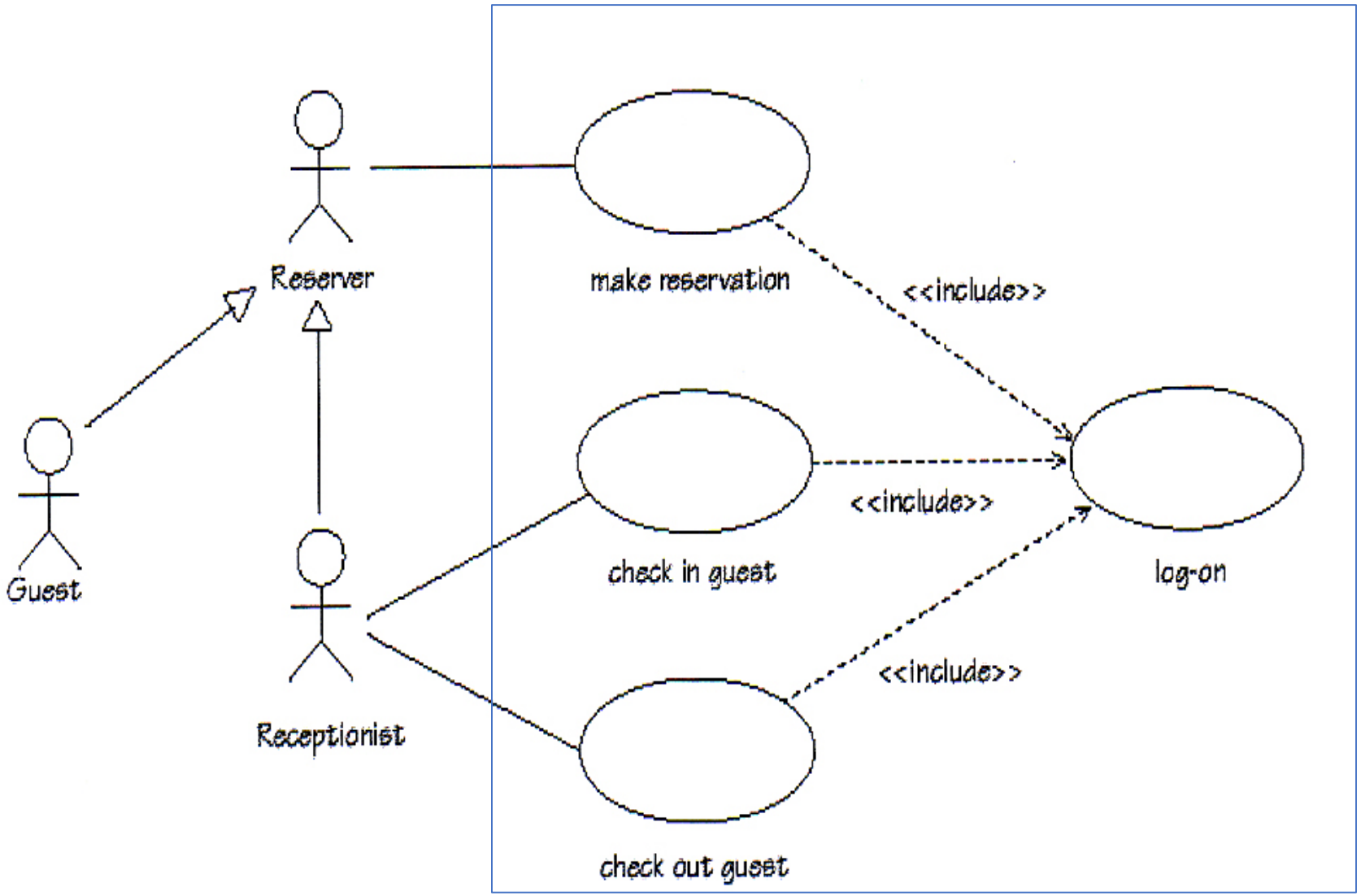
Identifier and Name	UC_2 Check in guest
Initiator	Receptionist
Goal	A guest takes up reservation and occupies a room at the desired hotel
Pre-condition	There is a reservation for the guest and there is at least one room available (of the desired type) and the guest can pay for the room
Post-condition	The guest will have been allocated to a room for the period identified in the reservation and a bill will have been opened for the duration of the stay
Assumptions	The hotel is confident that the guest can pay. For example, the guest has a valid credit card

Use Case Description II

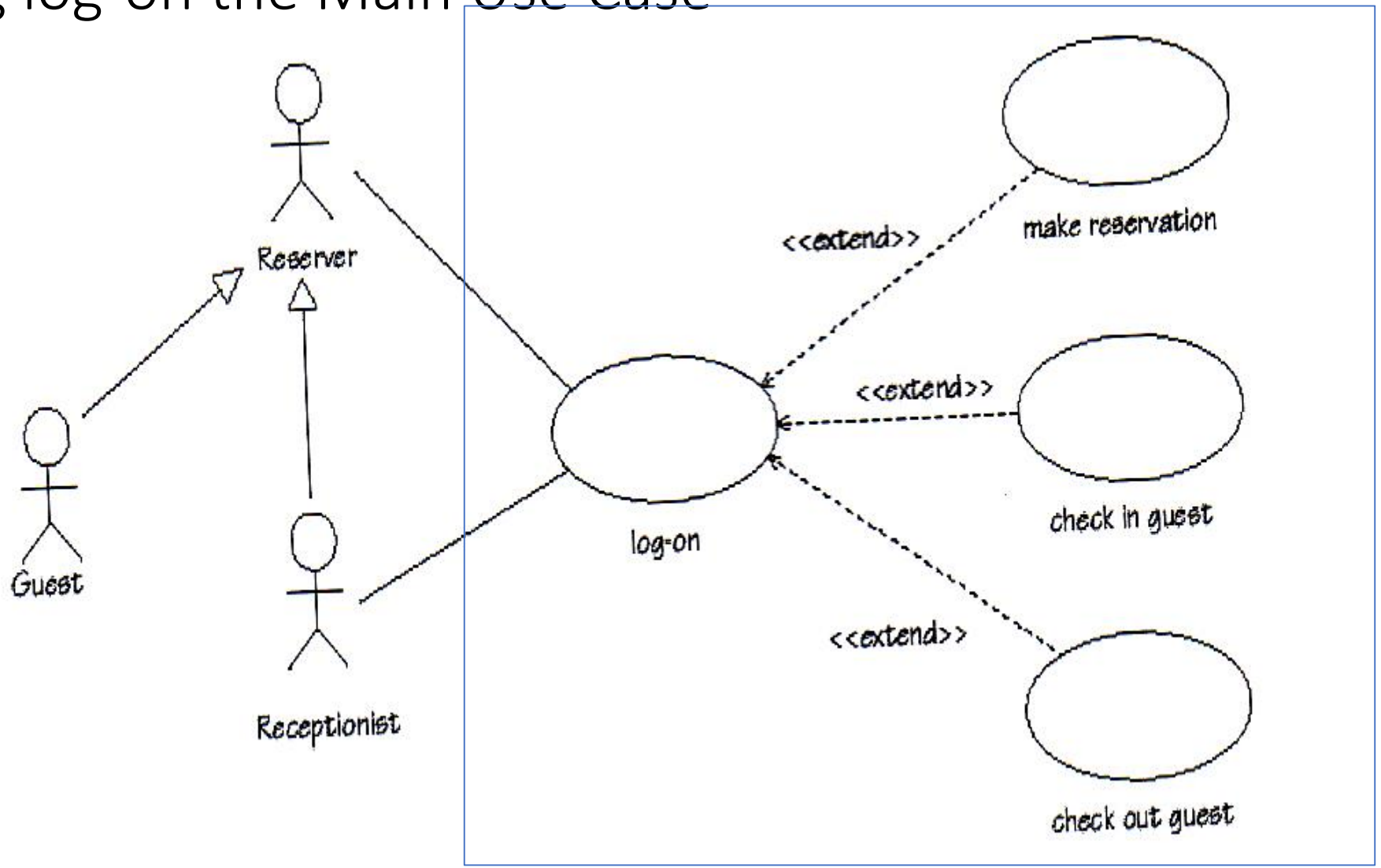
- Main success scenario

1. The guest provides a reservation reference number to the receptionist
2. The receptionist enters the reference number to find the reservation
3. The hotel system provides the details of the requested reservation
4. The receptionist confirms the details of the room type and duration of the stay with the guest
5. The hotel system allocates a room to the guest
6. the hotel system opens a bill for the guest (it could be that there is a separate billing package, which must be notified upon check in)
7. The receptionists issues the key to the guest

Including a log-on Use Case



Making log-on the Main Use Case



Example of Library System

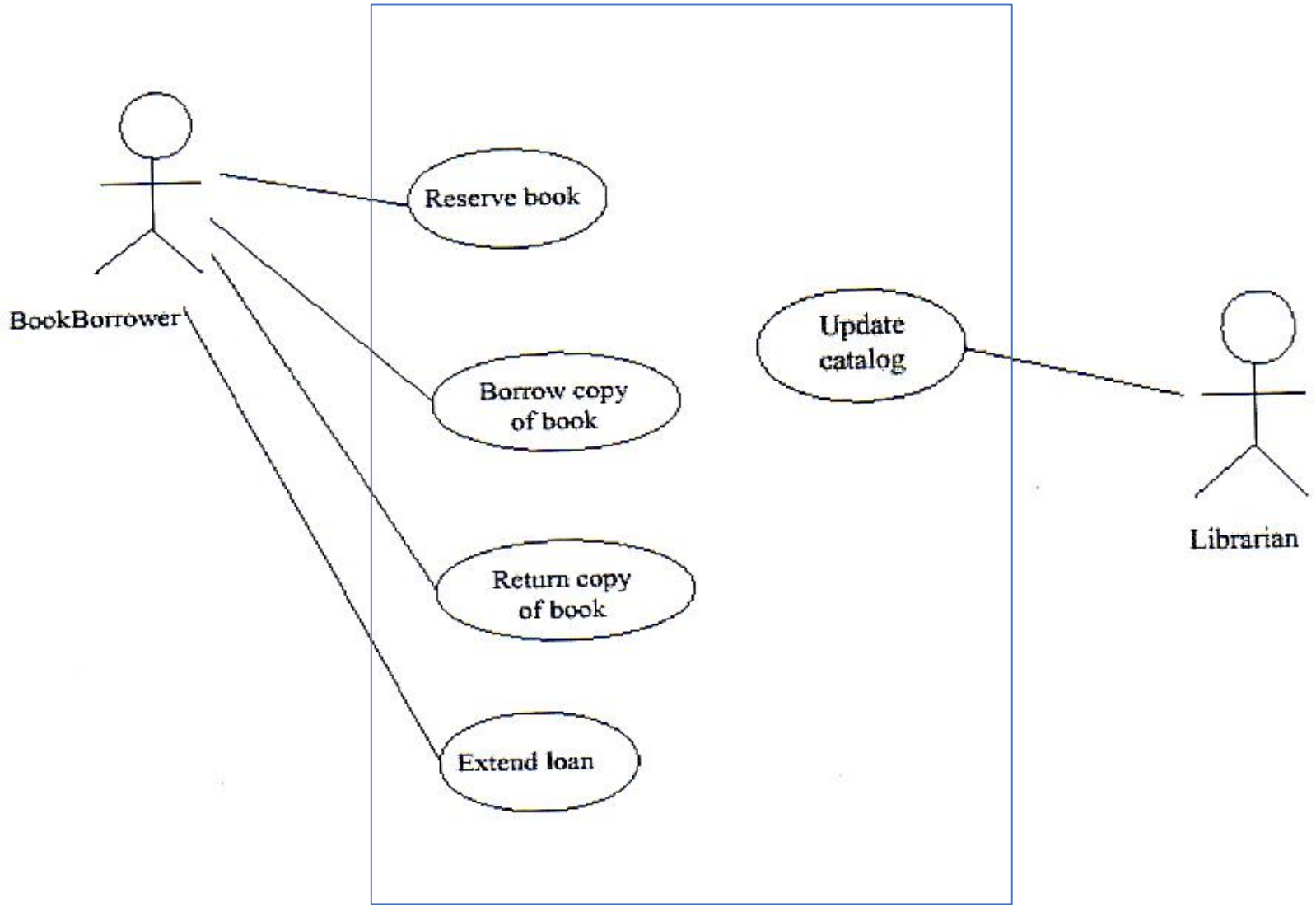
Books and journals

- The library contains books and journals. It may have several copies of a given book. Some of the books are for short term loans only. All other books may be borrowed by any library member for three week. Members of the library can normally borrow up to six items at a time, but members of staff may borrow up to 12 items at one time. Only members of staff may borrow journals.

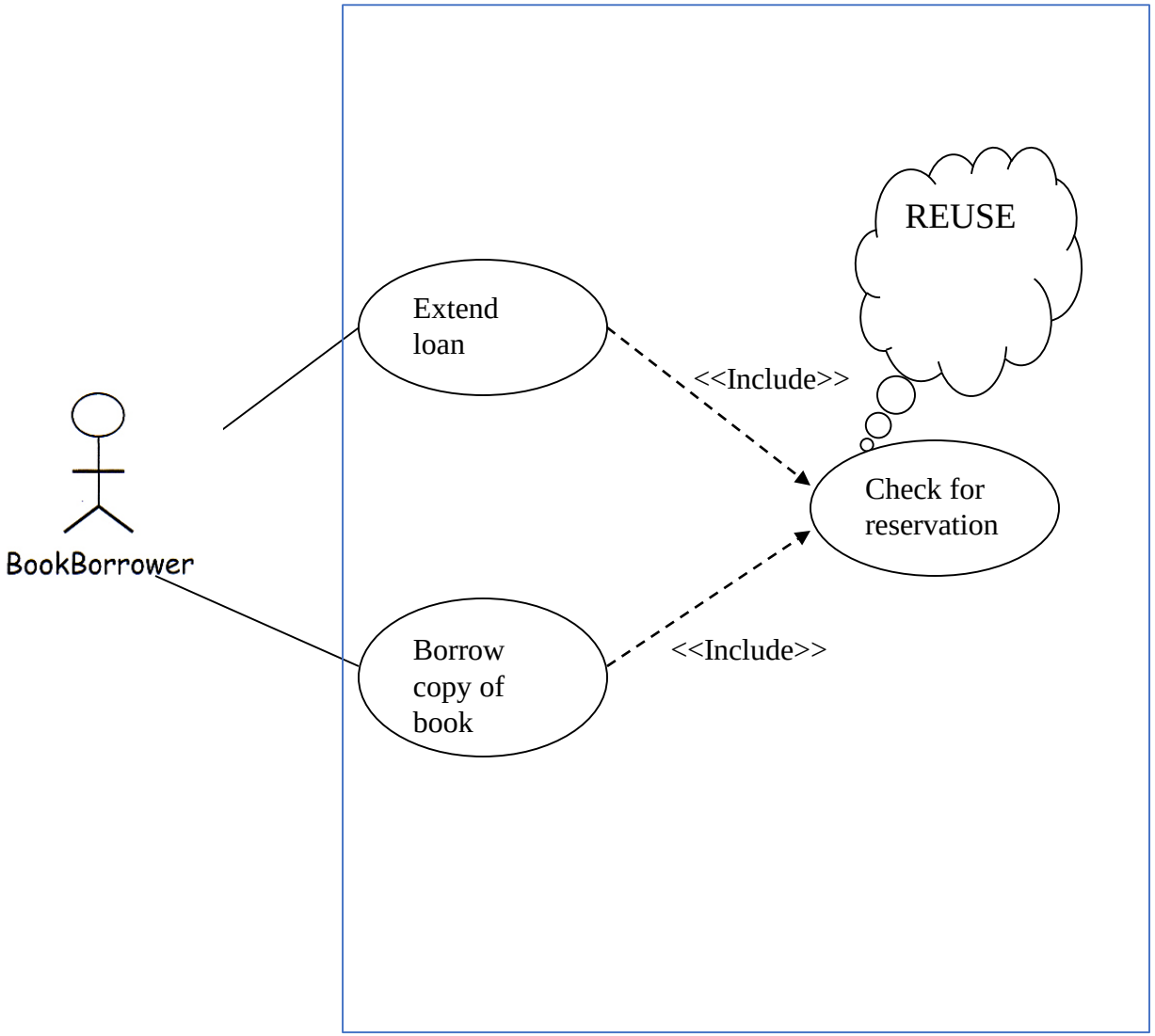
Borrowing

- The system must keep track of when books and journals are borrowed and returned

Library System



Library System



To Sum Up...

- Use case modelling sets out all the actors, use cases and the relationships between them, setting the boundaries of the system to be built
- An actor is a role that interacts directly with the system by exchanging information
- A use case is a coherent unit of functionality that the system can perform by interacting with outside actors
- A use case diagram captures all the top-level functionality of the system as seen by its users (i.e. the key use cases)

- Questions ?