Use-case diagram

In UML, use-case diagrams model the behavior of a system and help to capture the requirements of the system.

Use-case diagrams describe the high-level functions and scope of a system. These diagrams also identify the interactions between the system and its actors. The use cases and actors in use-case diagrams describe what the system does and how the actors use it, but not how the system operates internally.

Use-case diagrams illustrate and define the context and requirements of either an entire system or the important parts of the system. You can model a complex system with a single use-case diagram, or create many use-case diagrams to model the components of the system. You would typically develop use-case diagrams in the early phases of a project and refer to them throughout the development process.

Use-case diagrams are helpful in the following situations:

- Before starting a project, you can create use-case diagrams to model a business so that all participants in the project share an understanding of the workers, customers, and activities of the business.
- While gathering requirements, you can create use-case diagrams to capture the system requirements and to present to others what the system should do.
- During the analysis and design phases, you can use the use cases and actors from your use-case diagrams to identify the classes that the system requires.
- During the testing phase, you can use use-case diagrams to identify tests for the system.

The following topics describe model elements in use-case diagrams:

Actor

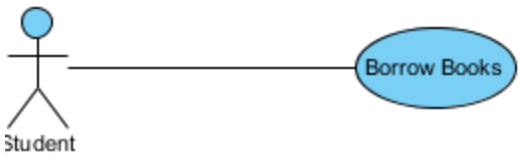
- Someone interacts with use case (system function).
- Named by noun.
- Actor plays a role in the business
- Similar to the concept of user, but a user can play different roles
- For example:
    - A prof. can be instructor and also researcher
    - plays 2 roles with two systems
- Actor triggers use case(s).
- Actor has a responsibility toward the system (inputs), and Actor has expectations from the system (outputs).

Use Case

- System function (process - automated or manual)
- Named by verb + Noun (or Noun Phrase).
- i.e. Do something
- Each Actor must be linked to a use case, while some use cases may not be linked to actors.

Communication Link

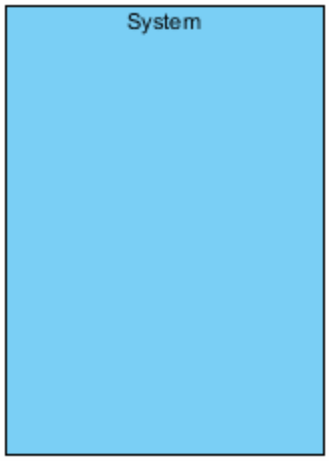
- The participation of an actor in a use case is shown by connecting an actor to a use case by a solid link.
- Actors may be connected to use cases by associations, indicating that the actor and the use case communicate with one another using messages.



Boundary of system

- The system boundary is potentially the entire system as defined in the requirements document.
- For large and complex systems, each module may be the system boundary.
- For example, for an ERP system for an organization, each of the modules such as personnel, payroll, accounting, etc.
- can form a system boundary for use cases specific to each of these business functions.

- The entire system can span all of these modules depicting the overall system boundary



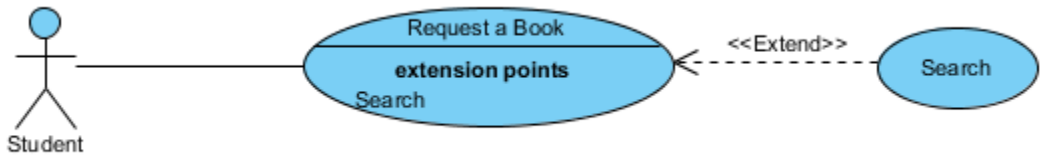
Structuring Use Case Diagram with Relationships

Use cases share different kinds of relationships. Defining the relationship between two use cases is the decision of the software analysts of the use case diagram. A relationship between two use cases is basically modeling the dependency between the two use cases. The reuse of an existing use case by using different types of relationships reduces the overall effort required in developing a system. Use case relationships are listed as the following:

Use Case Relationship

Extends

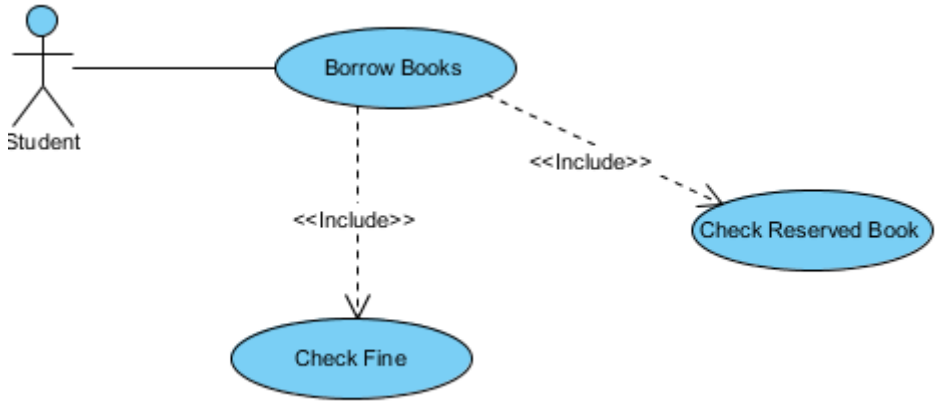
- Indicates that an "Invalid Password" use case may include (subject to specified in the extension) the behavior specified by base use case "Login Account".
- Depict with a directed arrow having a dotted line. The tip of arrowhead points to the base use case and the child use case is connected at the base of the arrow.
- The stereotype "<<extends>>" identifies as an extend relationship



Include

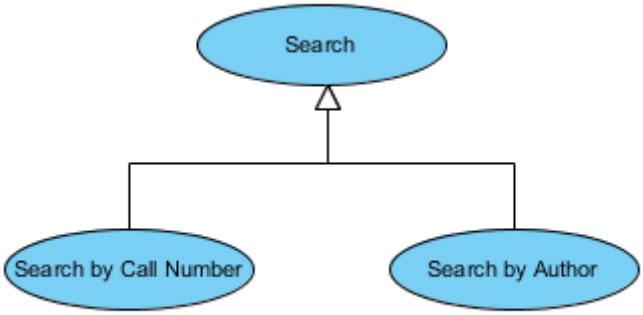
- When a use case is depicted as using the functionality of another use case, the relationship between the use cases is named as include or uses relationship.

- A use case includes the functionality described in another use case as a part of its business process flow.
- A uses relationship from base use case to child use case indicates that an instance of the base use case will include the behavior as specified in the child use case.
- An include relationship is depicted with a directed arrow having a dotted line. The tip of arrowhead points to the child use case and the parent use case connected at the base of the arrow.
- The stereotype "<<include>>" identifies the relationship as an include relationship.

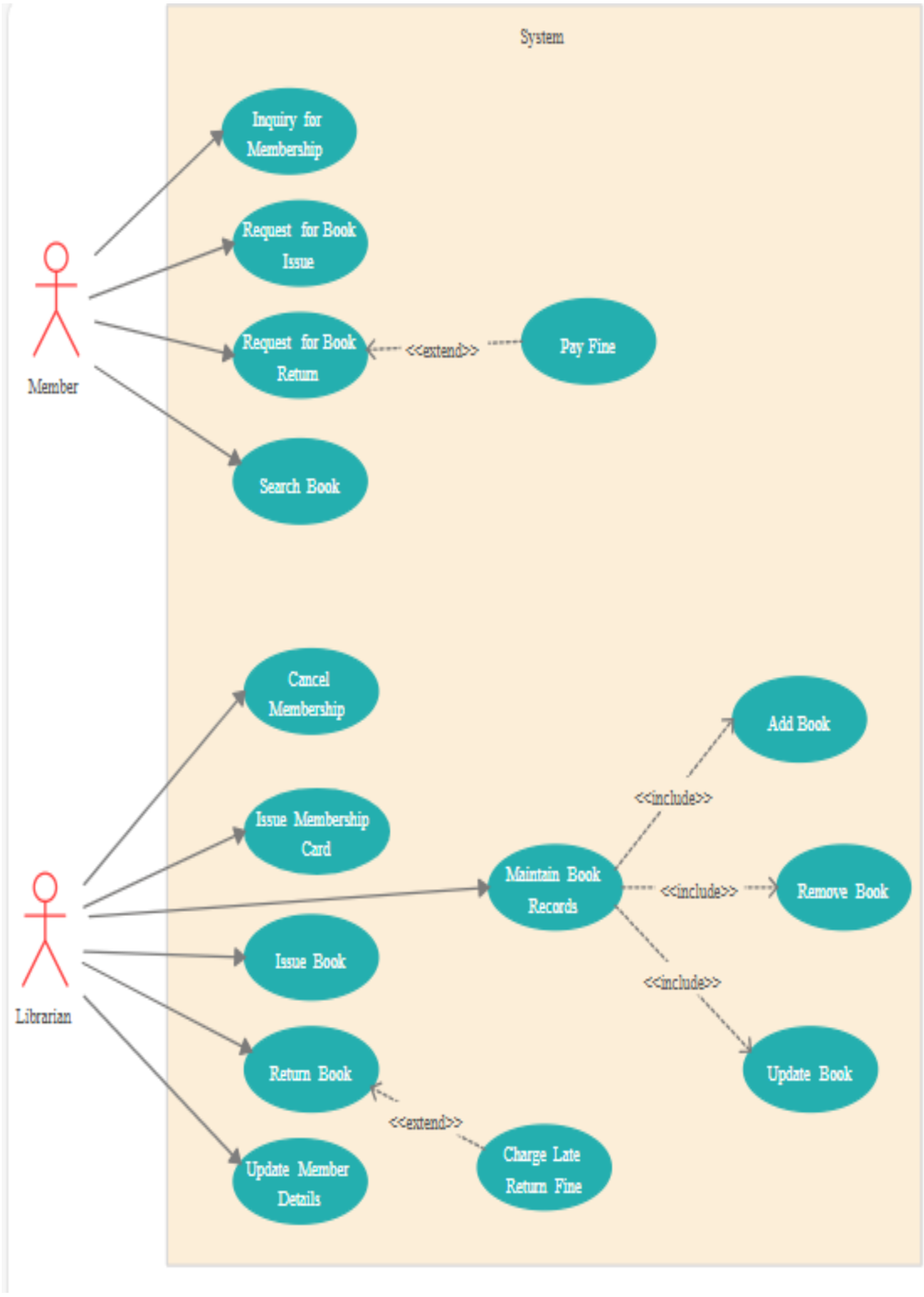


Generalization

- A generalization relationship is a parent-child relationship between use cases.
- The child use case is an enhancement of the parent use case.
- Generalization is shown as a directed arrow with a triangle arrowhead.
- The child use case is connected at the base of the arrow. The tip of the arrow is connected to the parent use case.



Use Case Diagram



FULLY DRESSED USE CASE

Use Case Section	Comment
Use Case Name	Start with a verb.
Scope	The system under design.
Level	"user-goal" or "subfunction"
Primary Actor	Calls on the system to deliver its services.
Stakeholders and Interests	Who cares about this use case, and what do they want?
Preconditions	What must be true on start, *and* worth telling the reader?
Success Guarantee	What must be true on successful completion, *and* worth telling the reader.
Main Success Scenario	A typical, unconditional happy path scenario of success.
Extensions	Alternate scenarios of success or failure.
Special Requirements	Related non-functional requirements.
Technology and Data Variations List	Varying I/O methods and data formats.
Frequency of Occurrence	Influences investigation, testing, and timing of implementation.
Miscellaneous	Such as open issues.