Use Case Diagrams-Relationships

Use Case Diagrams - Relationships

There can be 5 relationship types in a use case diagram.

- Association between actor and use case
- Generalization of an actor
- Generalization of a use case
- Extend between two use cases
- Include between two use cases

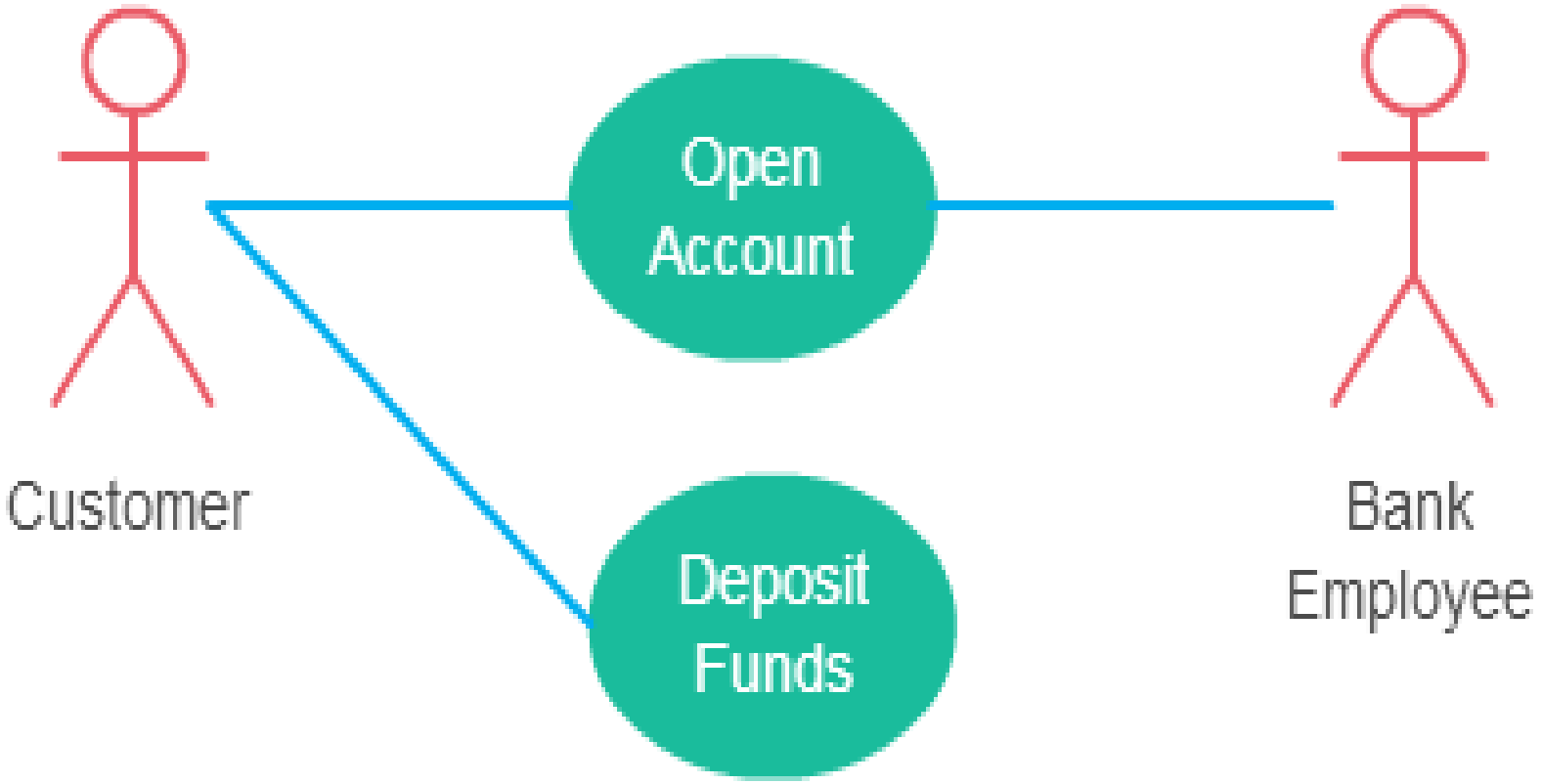
Use Case Diagrams - Relationships

- Inclusion
  - *Inclusion enables to reuse one use case's steps inside another use case.*
- Extension
  - *Allows creating a new use case by adding steps to existing use cases*
- Generalization
  - *Allows child use cases to inherit behavior from parent use cases*

Association Between Actor and Use Case

- An actor must be associated with at least one use case.
- An actor can be associated with multiple use cases.
- Multiple actors can be associated with a single use case.

Association Between Actor and Use Case

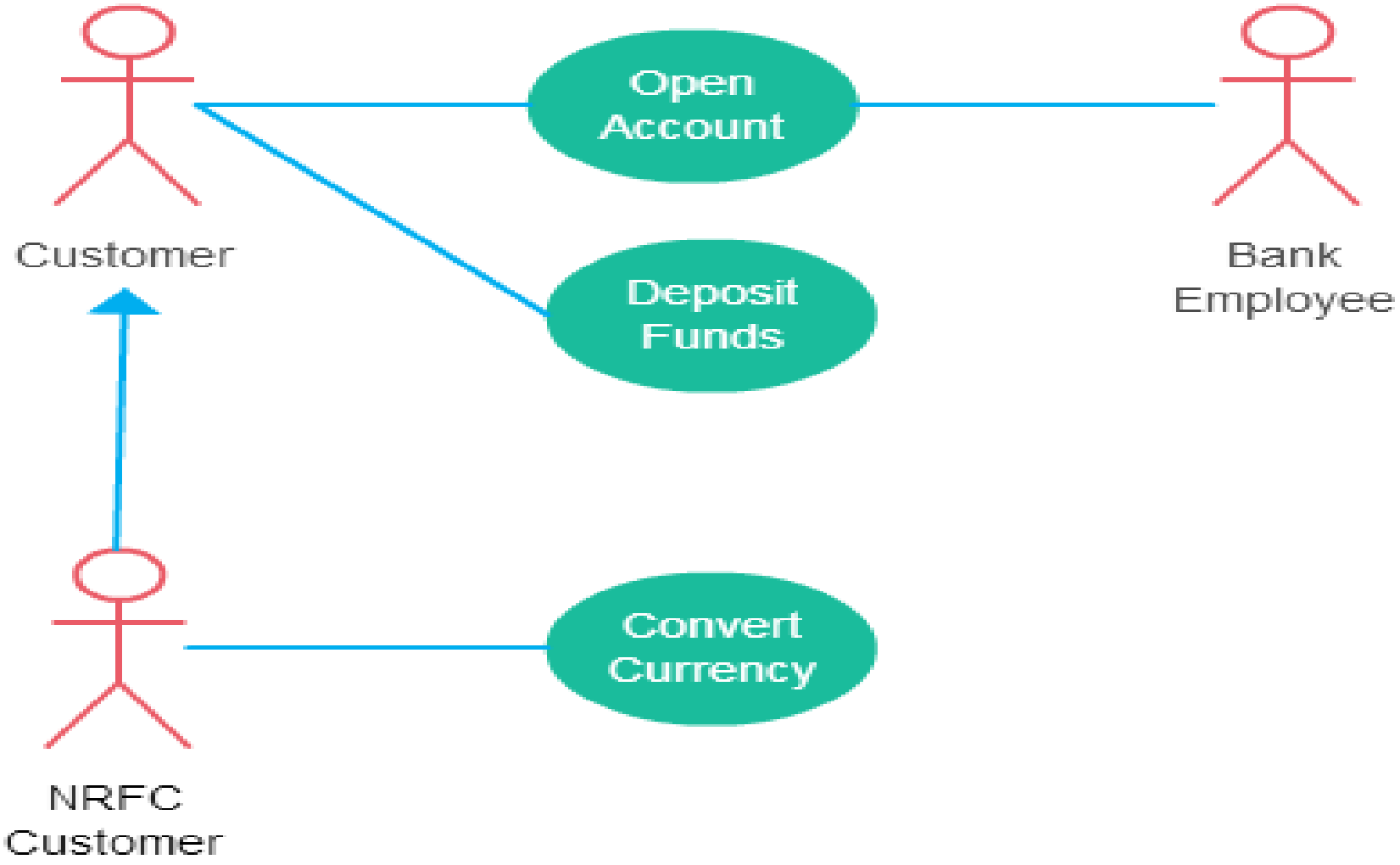


Generalization of an Actor

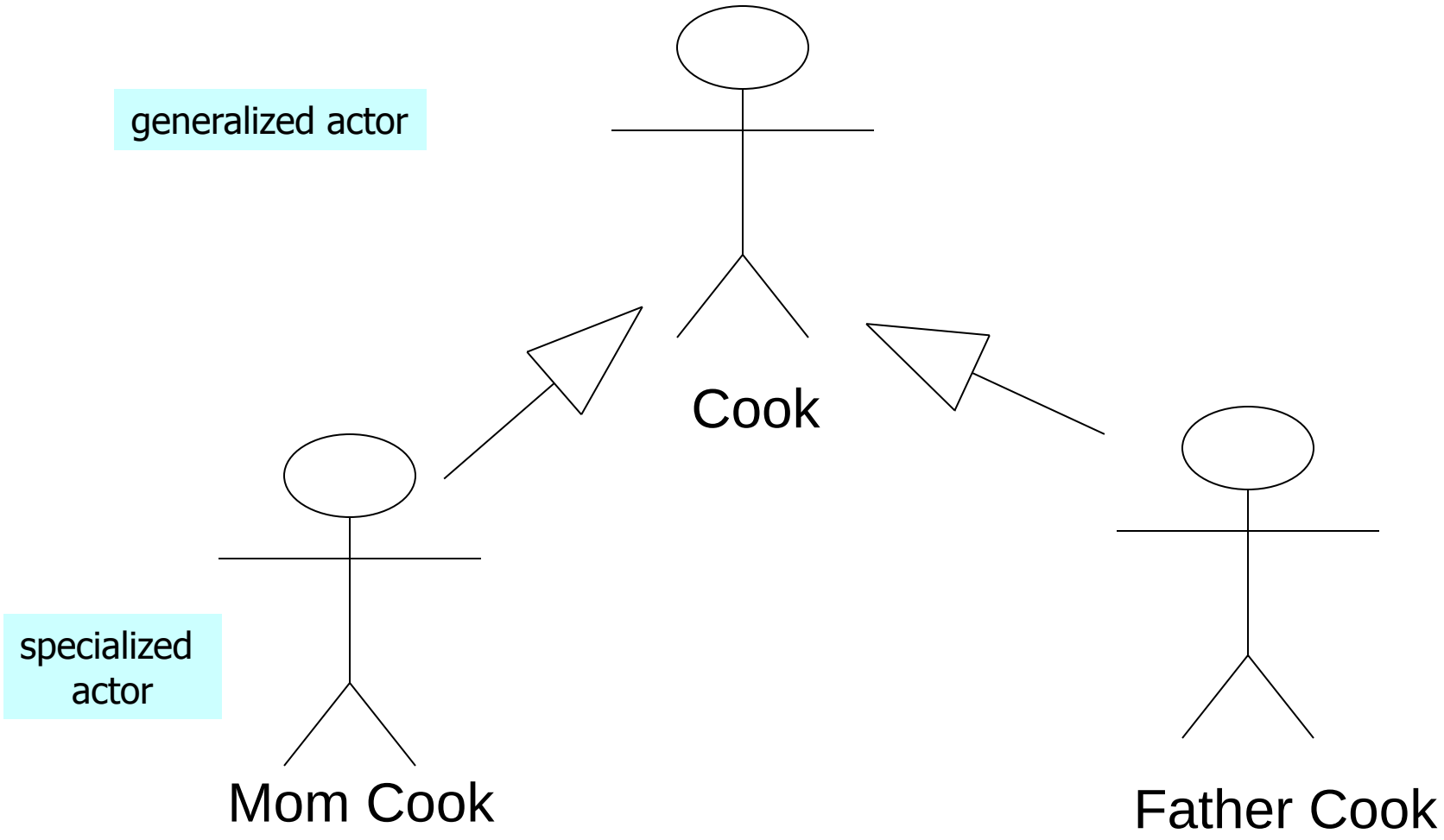
- Generalization of an actor means that one actor can inherit the role of an other actor.

- The descendant inherits all the use cases of the ancestor.

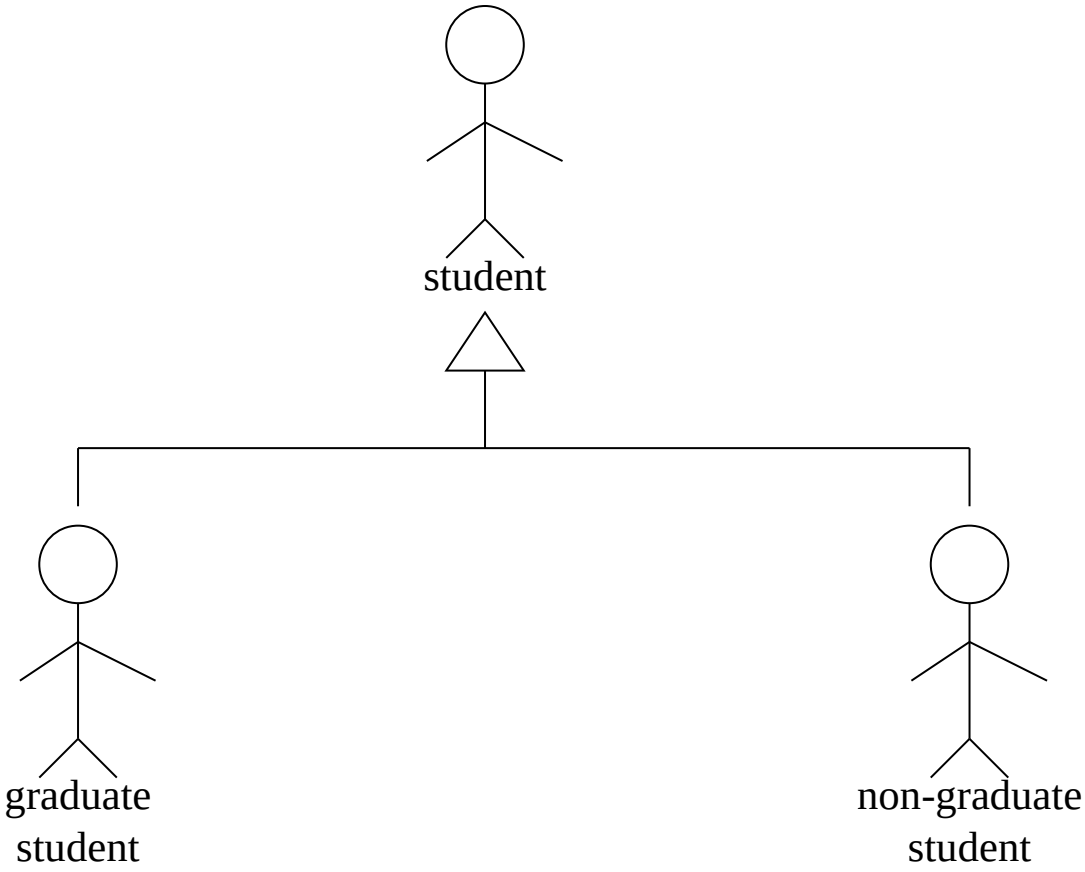
Generalization of an Actor



Use Case Example (Actor-to-Actor relationship)

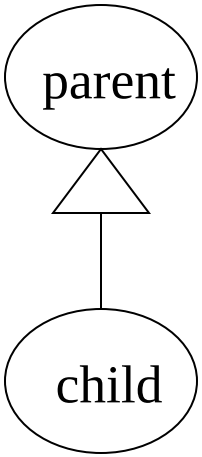


Use Case Example (Actor-to-Actor relationship)

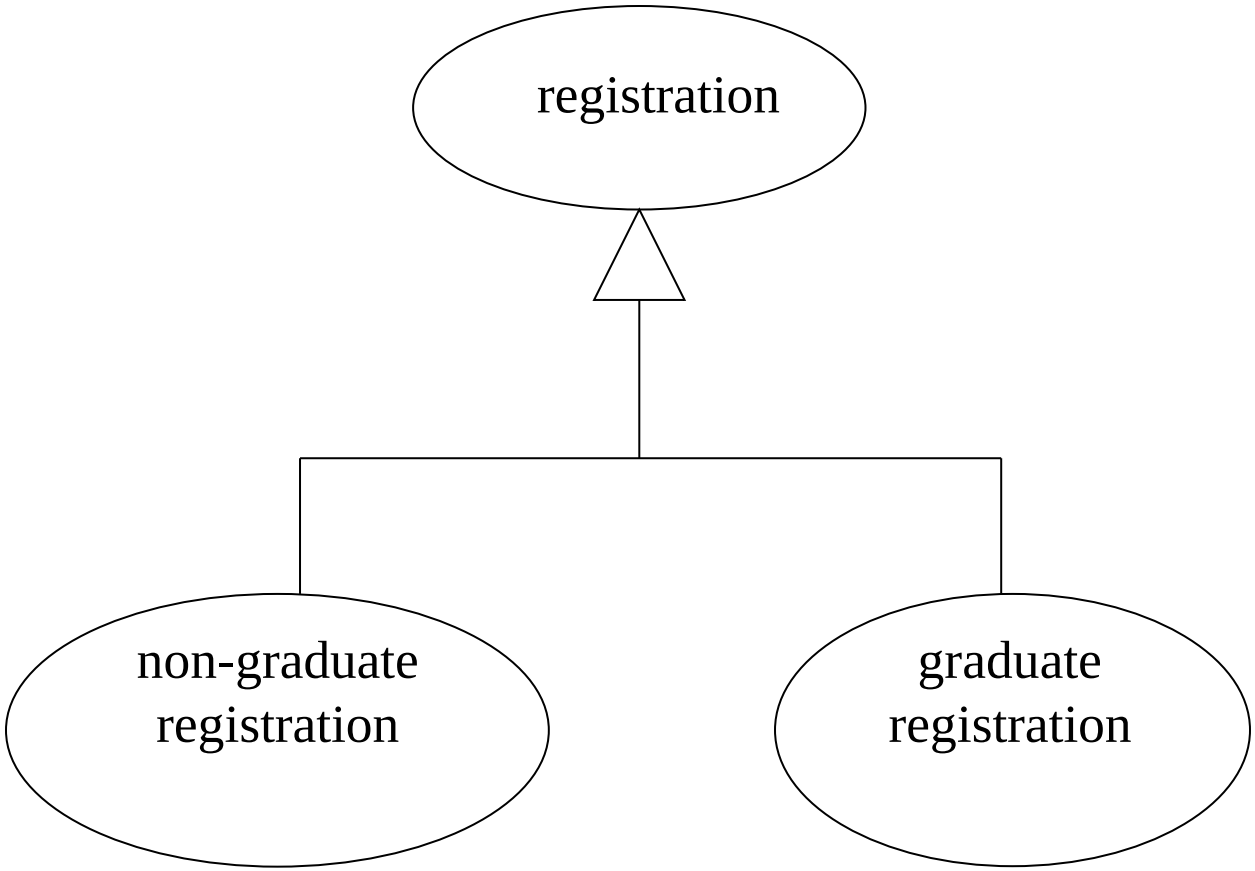


Generalization of a Use Case

- This is similar to the generalization of an actor.
- The behavior of the ancestor is inherited by the descendant.
- This is used when there are common behavior between two use cases and also specialized behavior specific to each use case.
- For example in the previous banking example there might be an use case called “Pay Bills”. This can be generalized to “Pay by Credit Card”, “Pay by Bank Balance” etc.



Generalization of a use case Example



Extend Relationship Between Two Use Cases

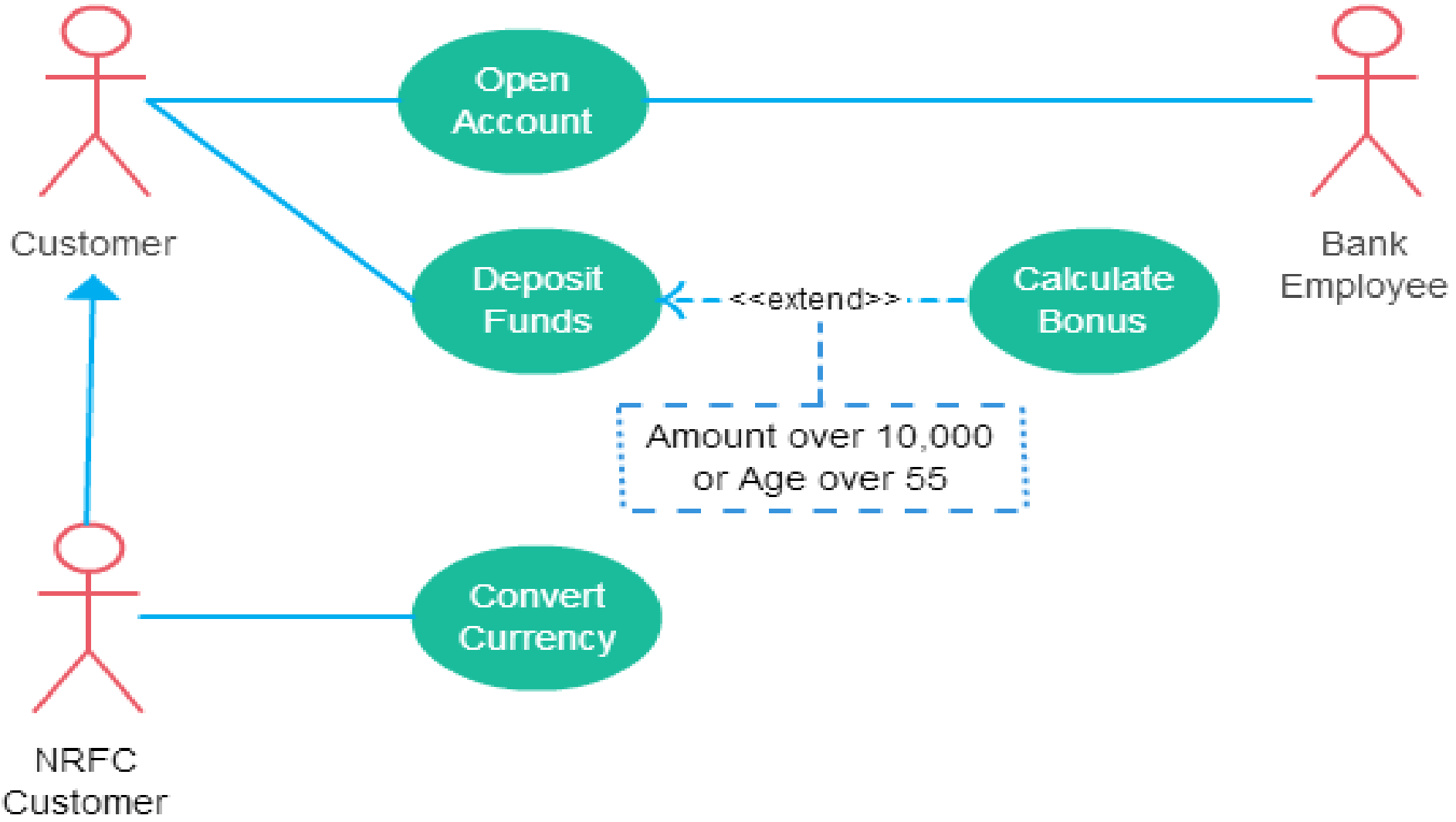
- As the name implies it extends the base use case and adds more functionality to the system. Here are few things to consider when using the <<**extend**>> relationship.

- The base use case may stand alone.

- **The extending use case is dependent on the base use case**. In the next diagram the “Calculate Bonus” use case doesn’t make much sense without the “Deposit Funds” use case.

- **The extending use case is usually optional** and can be triggered conditionally. In the diagram you can see that the extending use case is triggered only for deposits over 10,000 or when the age is over 55.

Extend Relationship Between Two Use Cases

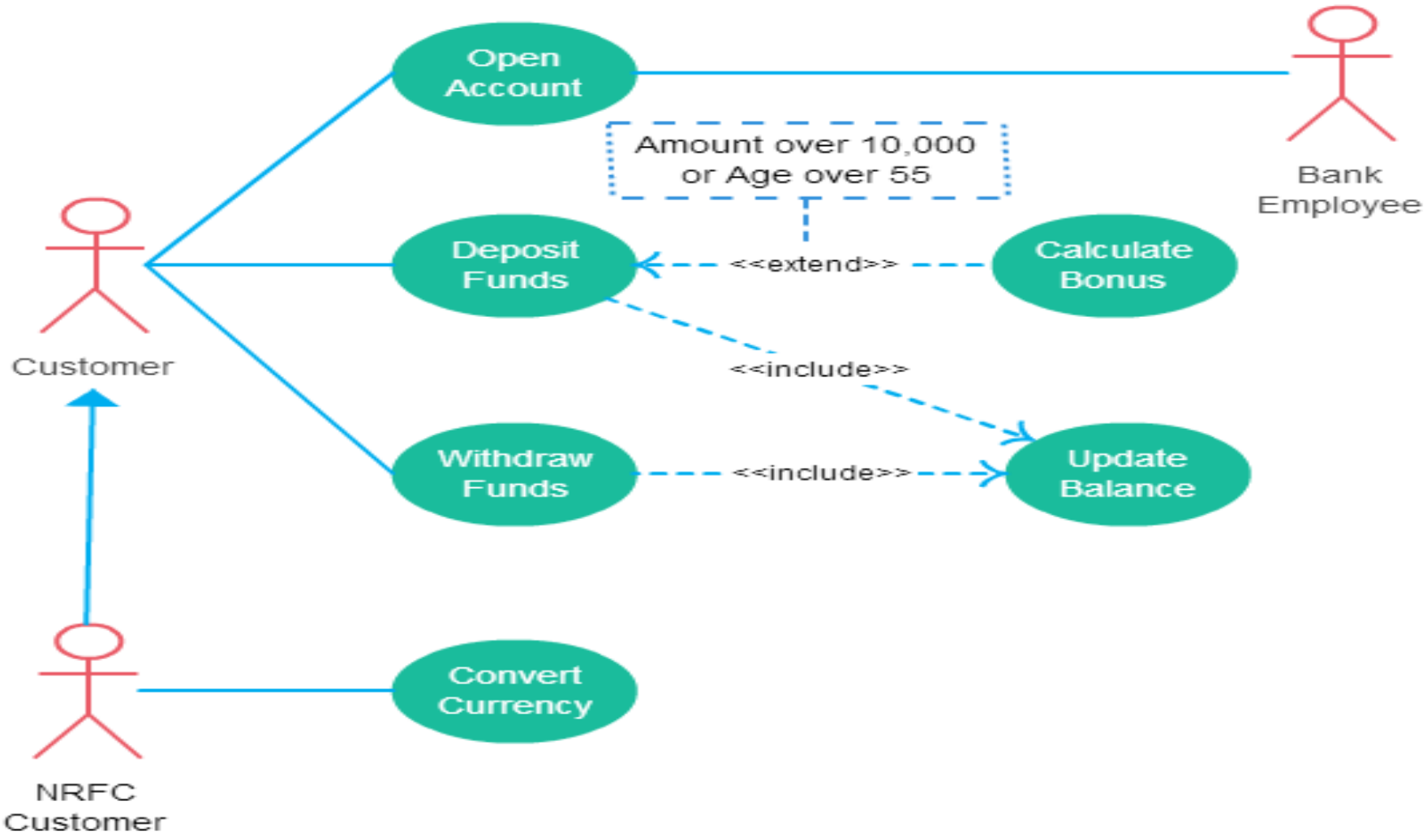


Include Relationship Between Two Use Cases

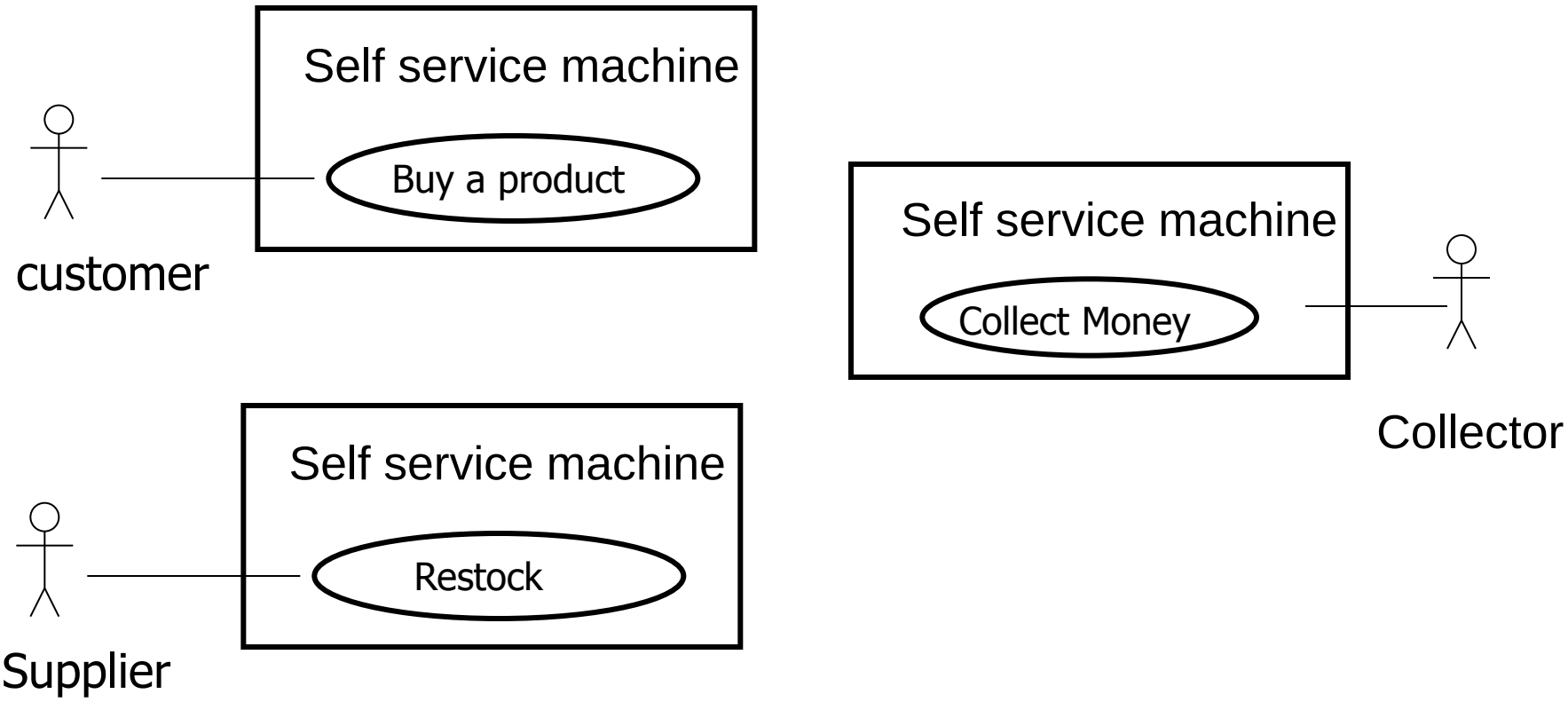
- Include relationship show that the behavior of the included use case is part of the including (base) use case.
- The included use case never stands alone.
- In some situations this is done to simplify complex behaviors.

  Few things to consider when using the <<include>> relationship.
- The base use case is incomplete without the included use case.
- The included use case is mandatory and not optional.

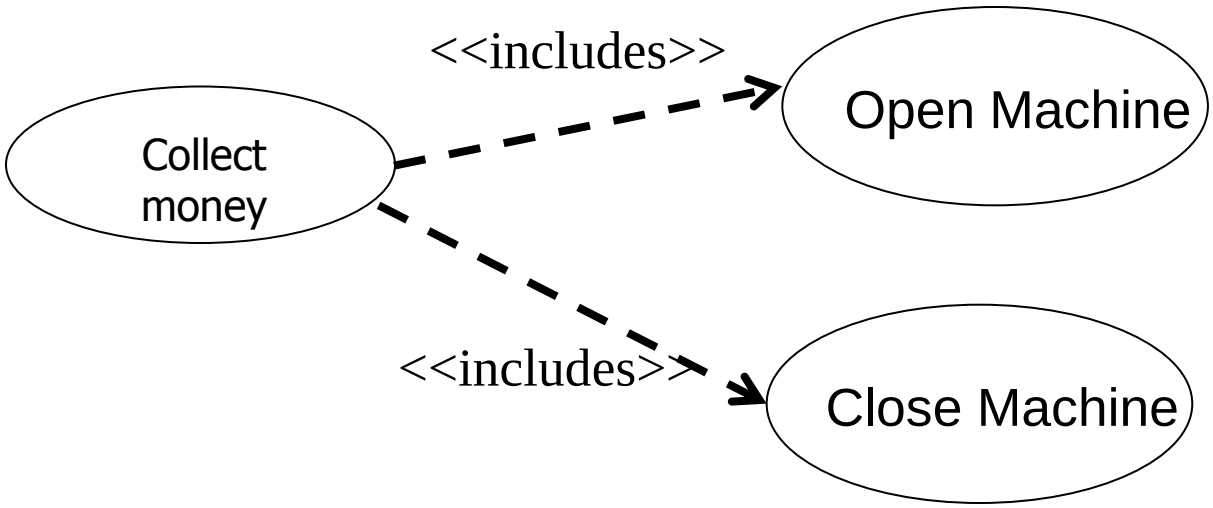
Include Relationship Between Two Use Cases



Use Case – Example (self service machine)



Use Case – Example (self service machine – includes relationship)



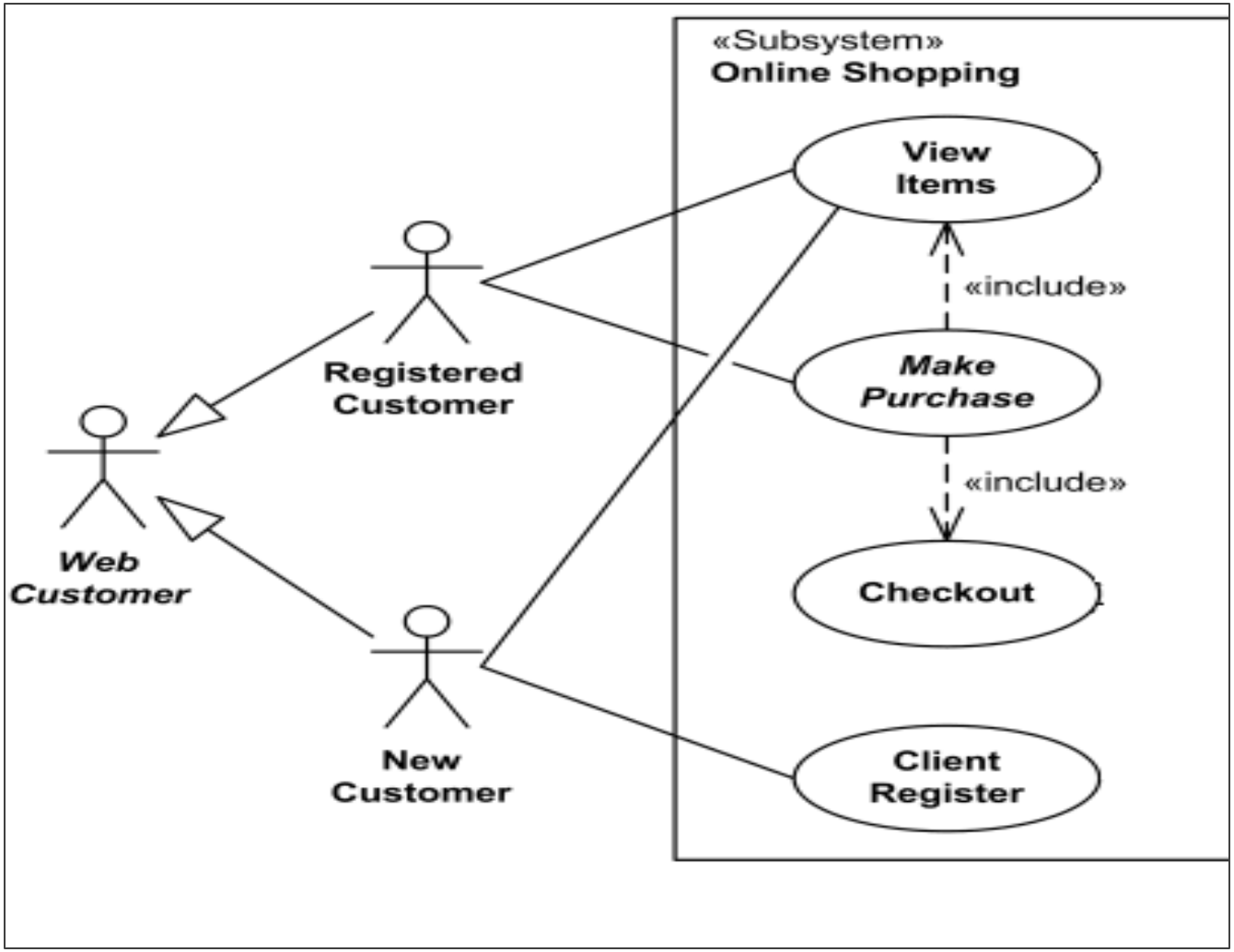
Case Study 1

Consider the online shopping case. The system provides the following functions:

Registered Customers uses some web site to make purchases online. Top level use cases are View Items, Make Purchase and Client Register. View Items use case could be used by new customers if they wants to find and see some products. This use case could also be used as a part of Make Purchase use case. Client Register use case allows customer to register on the web site, for example to get some coupons or be invited to private sales. Note, that Checkout use case is included use case not available by itself - checkout is part of making purchase.

Draw its use case diagram.

Solution


«Subsystem»
Online Shopping
View Items
«include»
Make Purchase
«include»
Checkout
Client Register
Registered Customer
Web Customer
New Customer

Case Study 2

Consider the Airport Check-In and Security Screening. The system provides the following functions:

Actors are Passenger, Tour Guides, Minor (Child), Passenger with Special Needs (e.g. with disabilities), all playing external roles in relation to airport business.

Business use cases are Individual Check-In, Group Check-In (for groups of tourists), Security Screening, etc. - representing business functions or processes taking place in airport and serving the needs of passengers. Business use cases Baggage Check-in and Baggage Handling extend Check-In use cases, because passenger might have no luggage, so baggage check-in and handling are optional.