System Design & Analysis

LECTURE 07

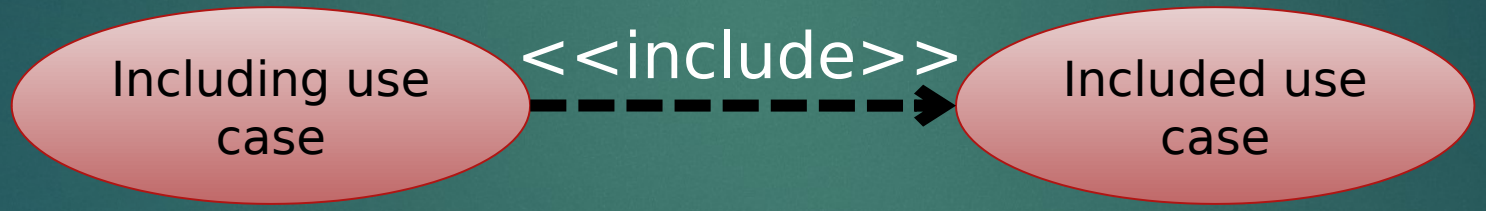
Use case Relationship

- Some use cases have similar step in their behavior
- Others may have different modes or special cases
- Describing such use cases may cause to repeat them in the diagrams
- This will lead to large and complicated diagrams
- UML provides different notations for representing these behaviors

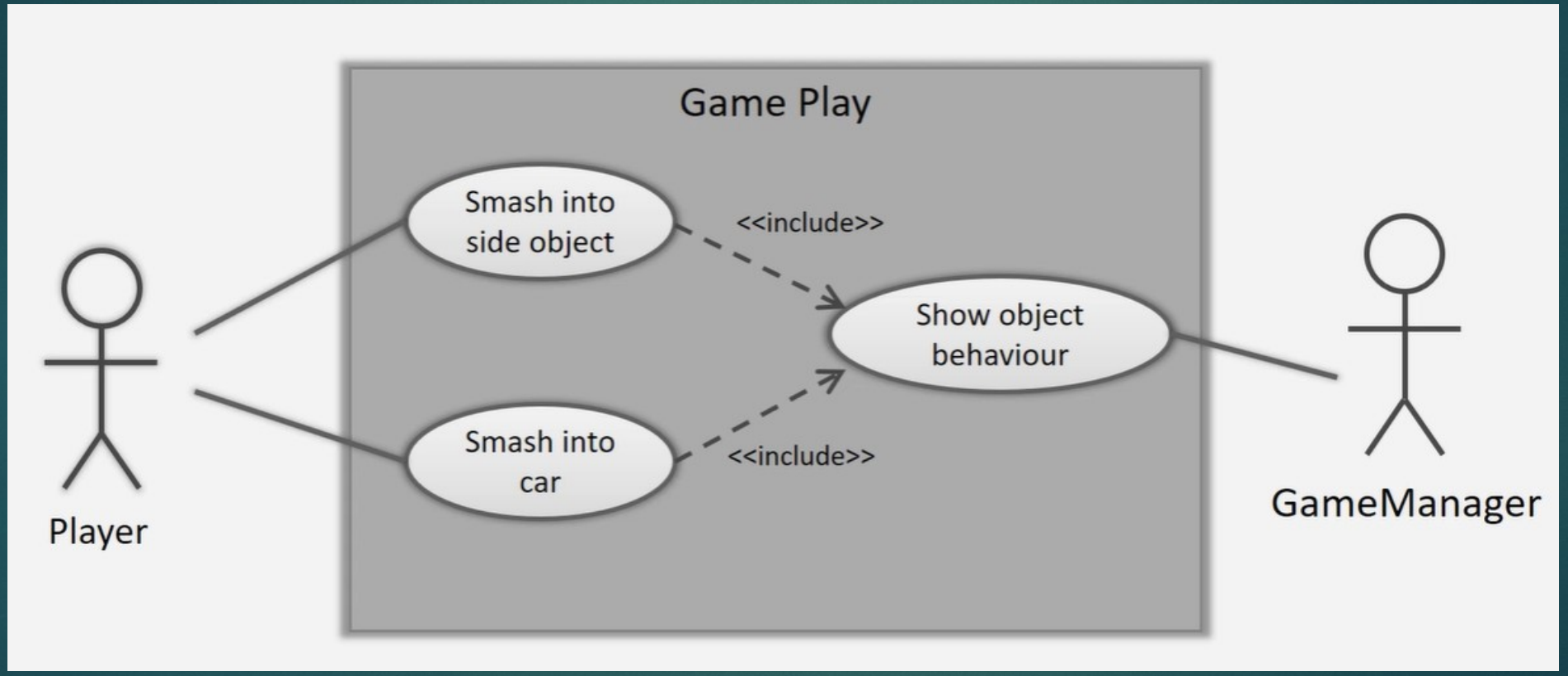
<<include>> Relationship

- A use case may reuse all the steps from another use case
  - It “includes” the steps from another use case
- This can be described through <<include>> relationship [also known as Gil maze]
- In diagram, shown as a dashed arrow between use case with <<include>> label
  - Tail end it towards the use case that reuses the steps
  - Arrow end points towards the use case that is reused
- Include use cases are mandatory and not optional

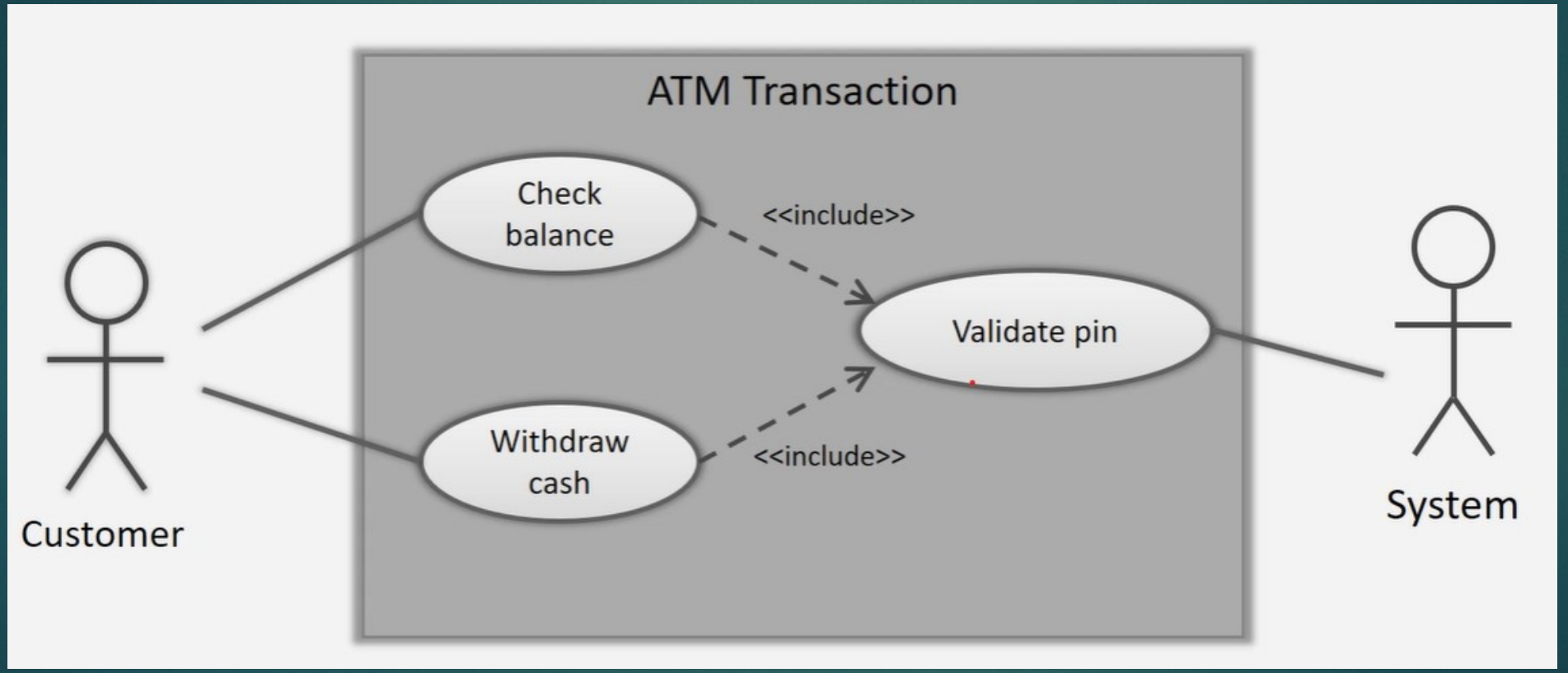
<<include>> Notation



Example: <<include>>



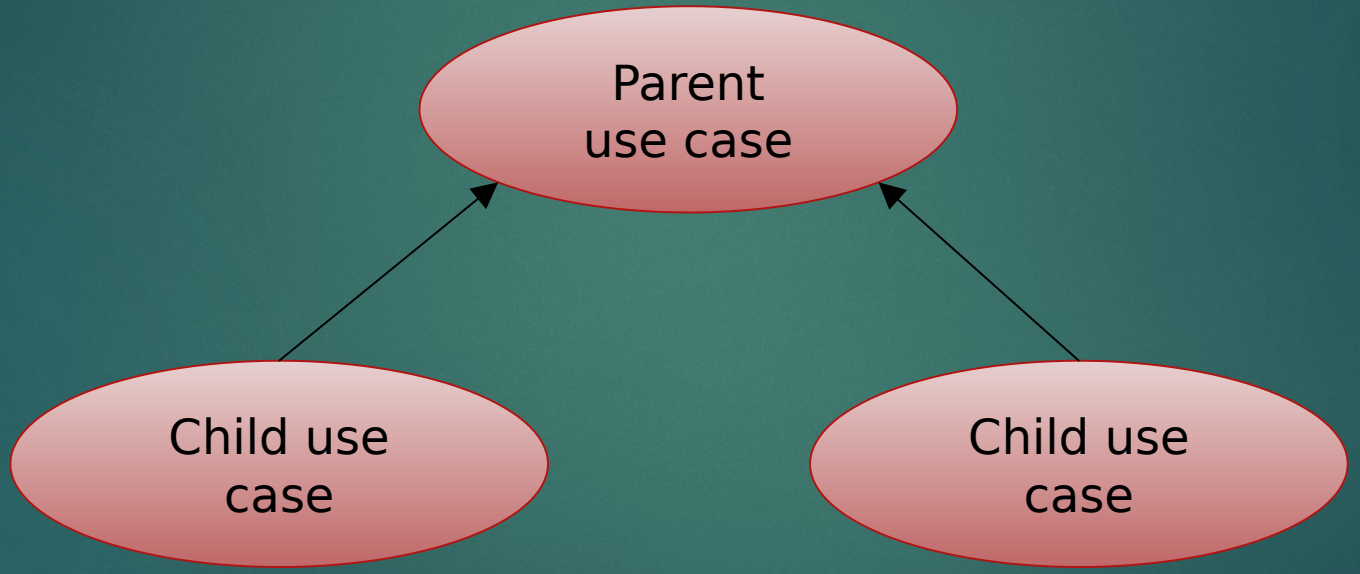
Example: <<include>>



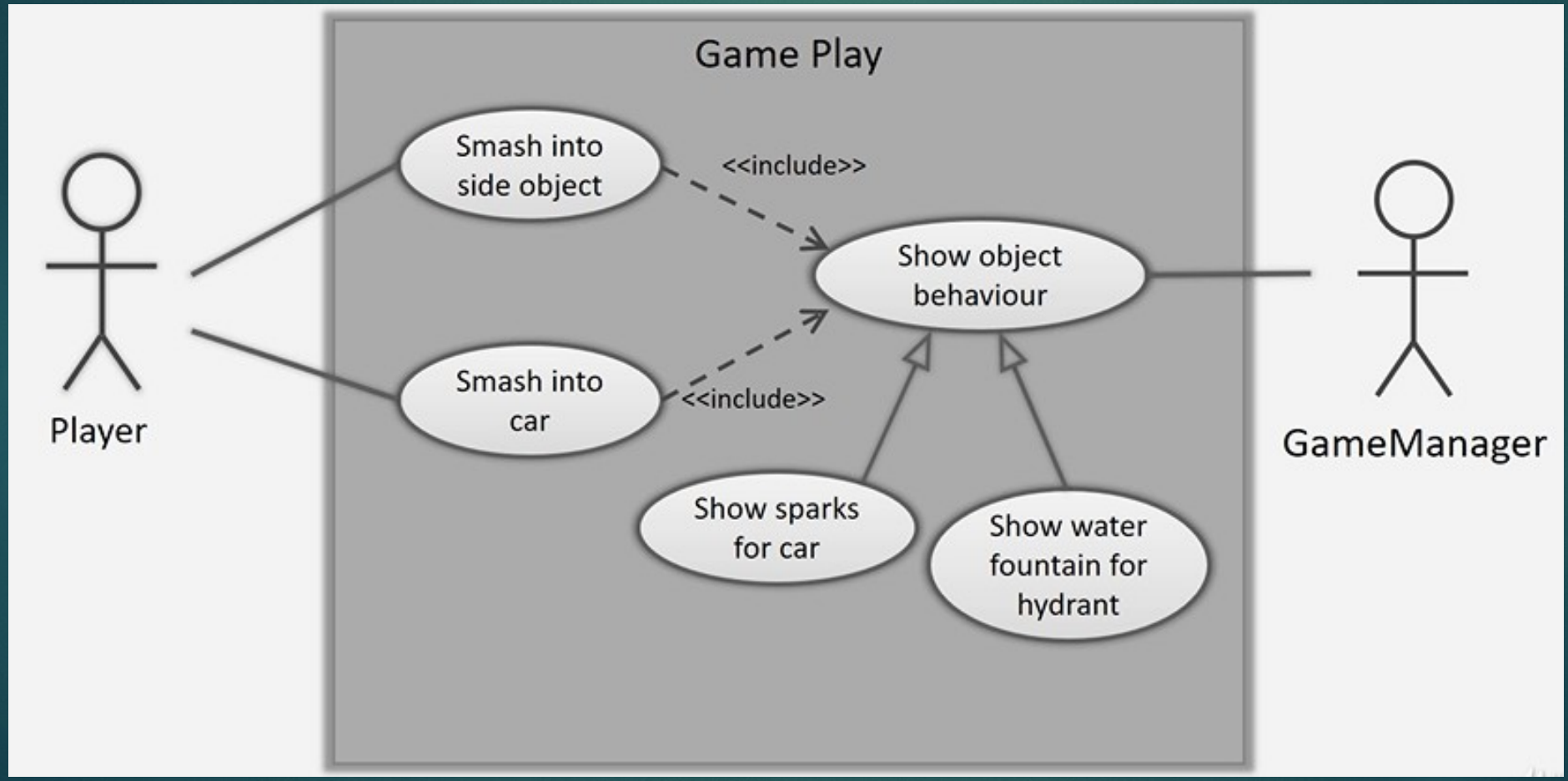
Generalization

- This is similar to inheritance in object oriented programming.
- Used to show that one use case is a type of another, but with some changes
- Depicted through the generalization arrow
- Arrow head points to generalized use case
- Tail point to specialized use case

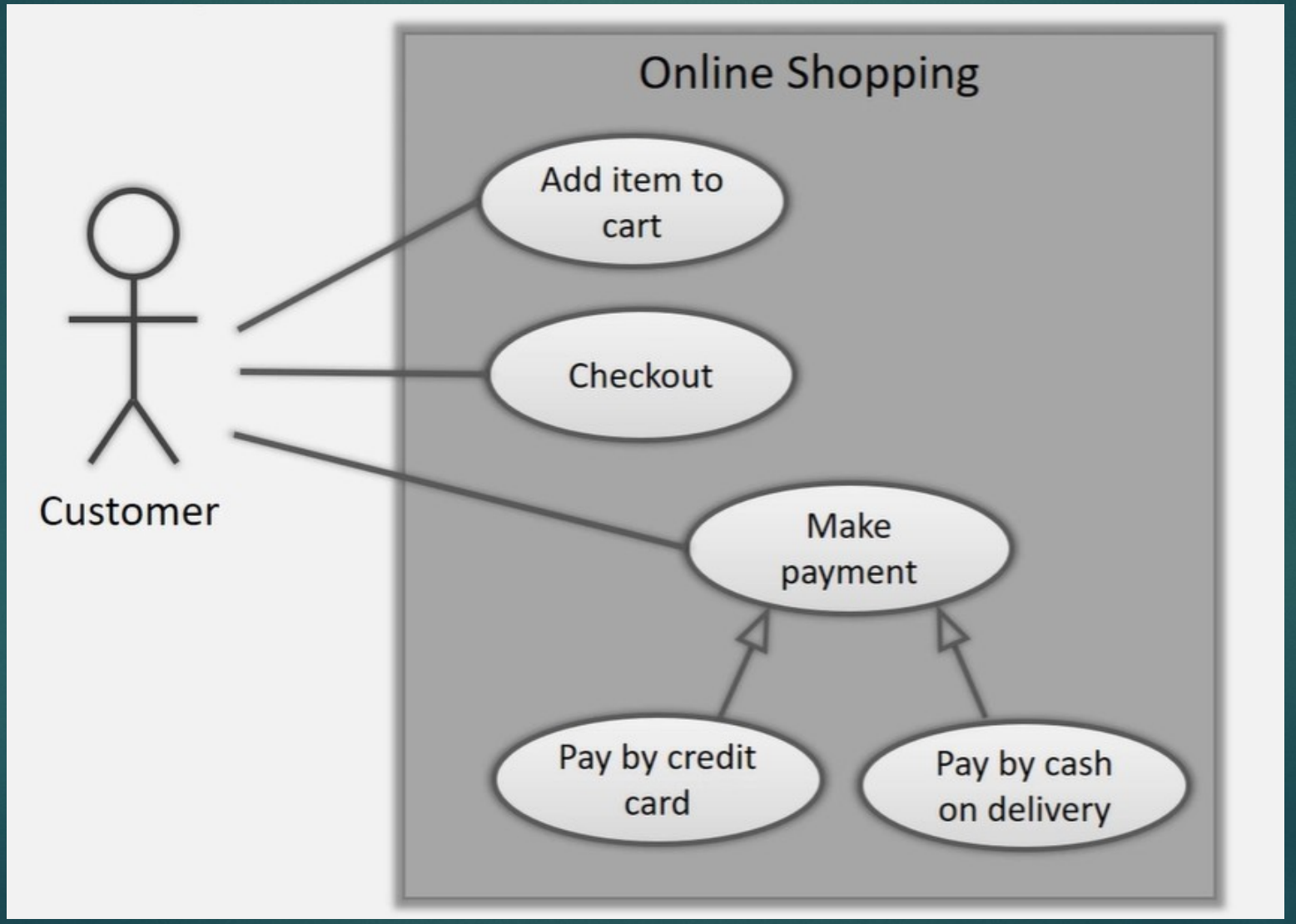
Generalization Notation



Example: Generalization



Example: Generalization

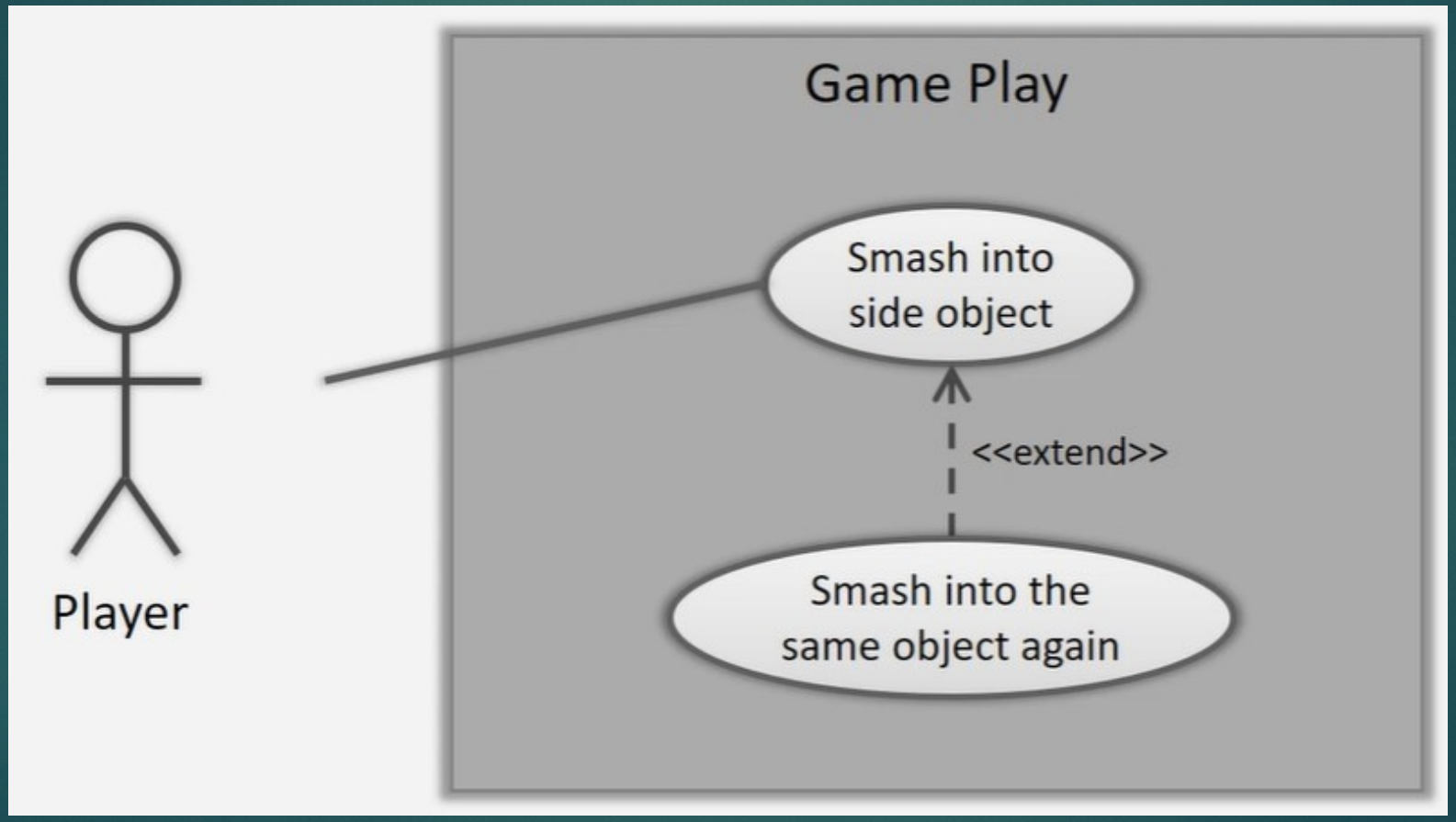


<<extend>> Relationship

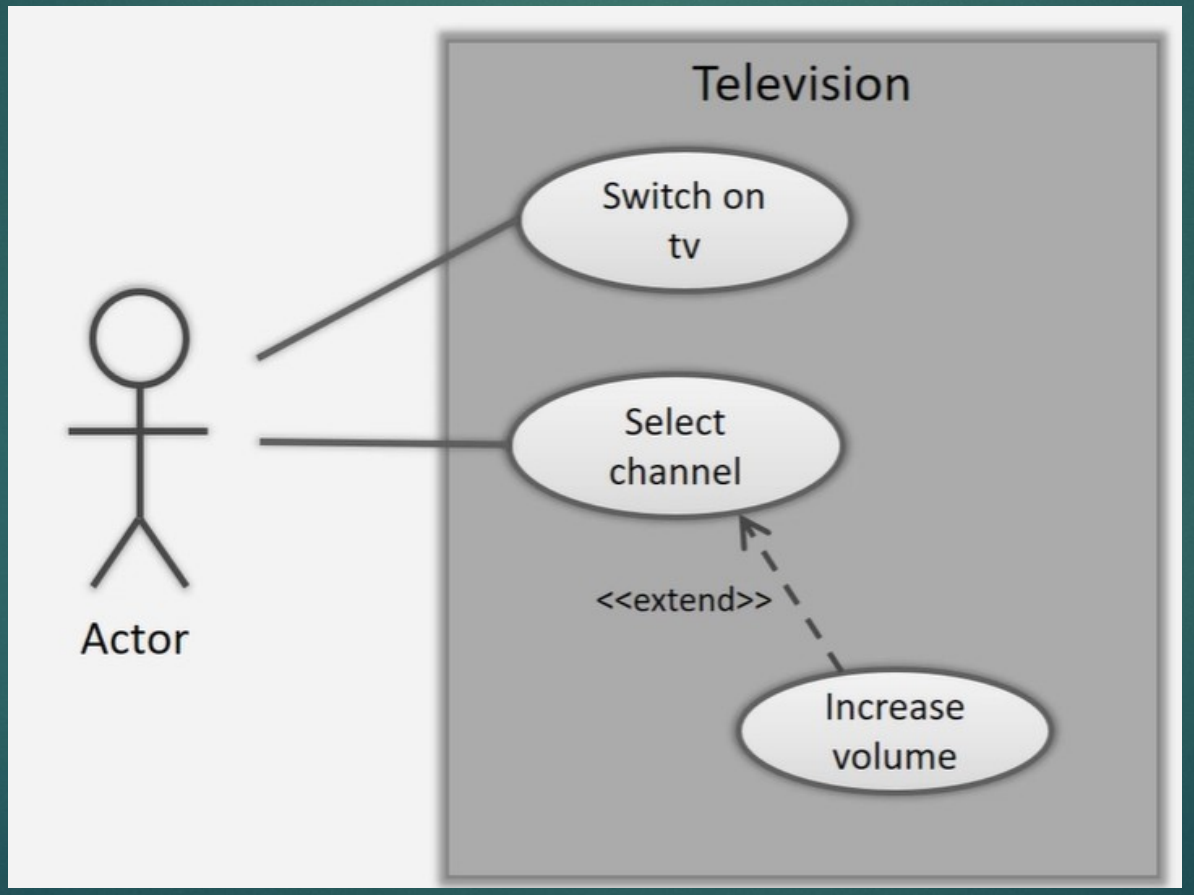
- This is used to specify an optional behaviour
- This behavior appears as an extended use case
- Independent of the main use case, but owned by it
- Shown as a dashed arrow with <<extend>> label
- This behaviour is optional [whether it executes or not depends on some factor]

<<extend>> Notation

Example: <<extend>>

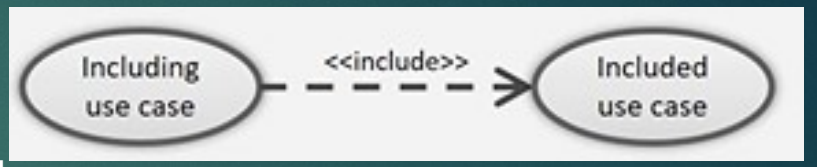


Example: <<extend>>

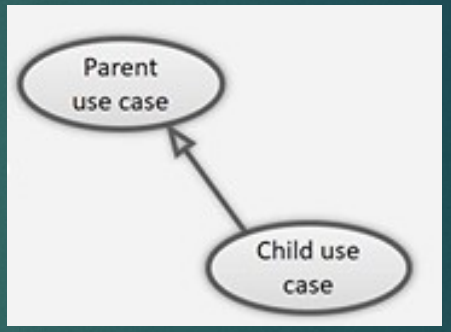


Summary

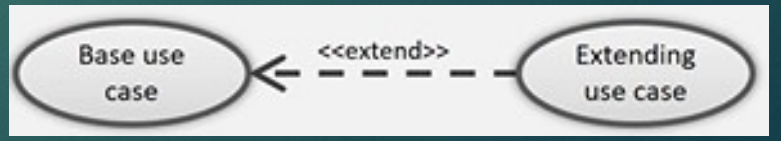
- <<include>>
  - Reuse steps from another use case mandatorily

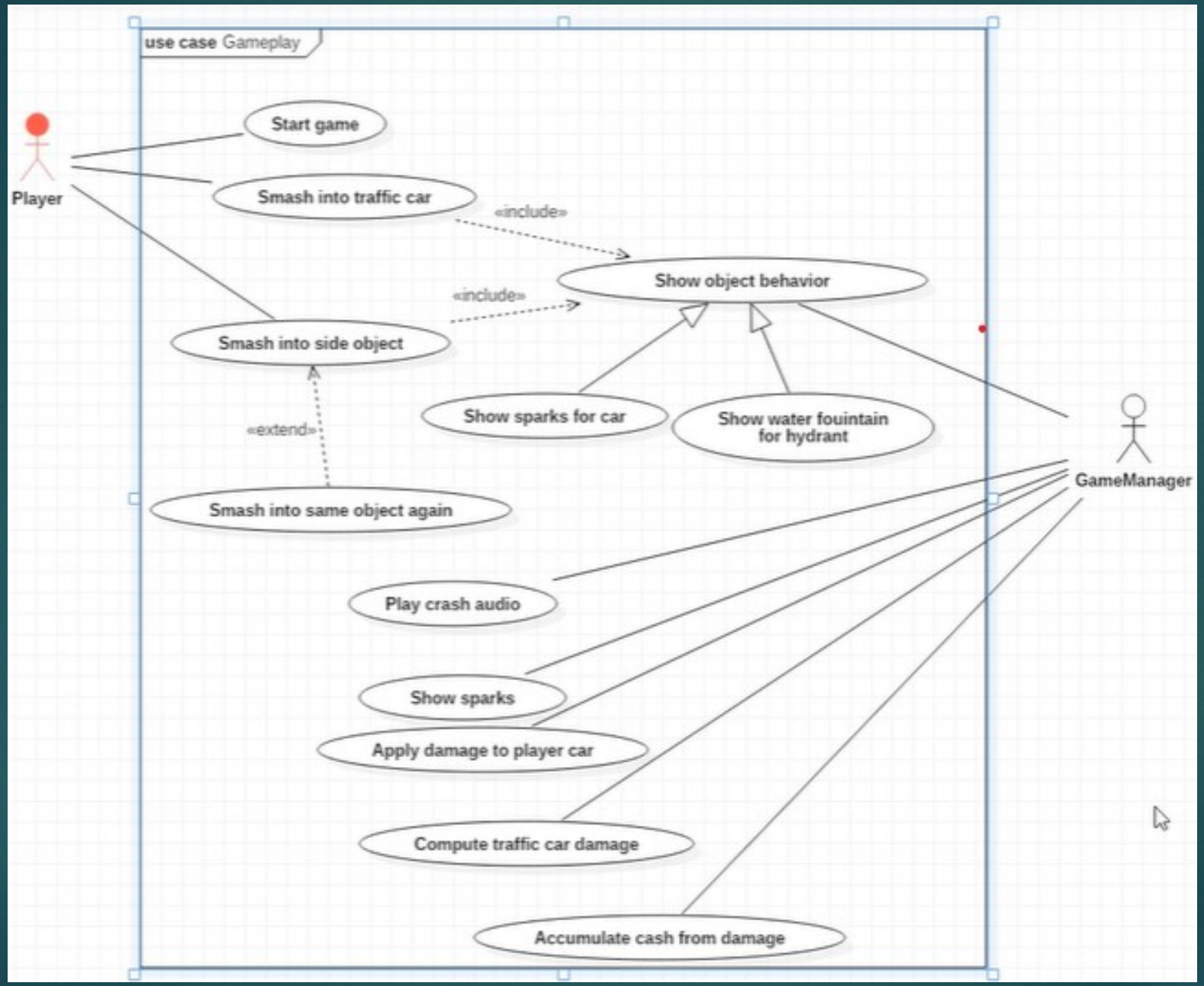


- Generalization
  - One use case is type of another with some change



- <<extend>>
  - Optional behavior of a use case




use case Gameplay
Player
Start game
Smash into traffic car
«include»
Show object behavior
«include»
Smash into side object
«extend»
Show sparks for car
Show water fountain for hydrant
GameManager
Smash into same object again
Play crash audio
Show sparks
Apply damage to player car
Compute traffic car damage
Accumulate cash from damage

Guideline: Use case Description

- Start with goal
- Write the use case as narratives[e.g like a story]
- Use simple language
- Keep the technology specific out
- Don’t include UI elements in use case
- Every use case should give one guarantee about the behavior of the system

Guideline: Use case Diagram

- Actors are the black box
- Actors don’t interact with each other
- Primary actor on left side and secondary actor on right side
- Place use case in logical order
- Place included use case to right of the invoking use case
- Place inheriting use case below parent use case

Example

- Customer types the pin number in the textbox on the screen
- Encrypt the pin and perform an exact match with the encrypted pin stored in the web server
- System will execute the sql query “insert into table records (…)” after transaction
- Customer will click the “checkout” button that will send HTTPS request to the server to prepare the system for presenting the payment options
- Customer enter the pin
- Validate pin
- System will update the database4
- Customer will checkout the item