# Use Cases

Software Requirements and Design
T-216-GHOH

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# Use Cases

- What is a use case?
- Finding use cases
- Contents & format of a use case
- Helpful guidelines
- Use case diagrams

# What is a use case?

# What is a use case?

- *A use case is a written description of some system functionality that creates value for a user of the system.*
- Unlike most of UML notation, **use cases are written** and not necessarily drawn.
- The focus should be on **user goals**, and they should describe the interaction of users with the system.
- **What the user needs to do**, not how the user does it.

# What is a use case? (cont.)

**What the user needs to do**

- The user needs to authenticate themselves

**How the user does it**

- The user enters their email and password
- The user clicks on Facebook logo to login using their Facebook account

**What the user needs to do**

- The user needs to buy a product

**How the user does it**

- The user looks up the product on the website.
- The user adds the product to the cart.
- The user clicks checkout and pays for the product.

# What is a use case? (cont.)

- A use case is a set of one or more *scenarios* tied together by a common user goal.
- A scenario represents one path through a use case.
- A scenario is a sequence of steps describing an interaction between a user and the system.

# Use cases should be

- High level
  - Capture the requirements, not the design or implementation
- Easily understood
  - Avoid technical terms
  - Think of the audience
- Name should represent value created to the user
- Named with a verb followed by a noun
  - “Account” ⃠
  - “Close Account” ✅

# Finding use cases

# Finding use cases

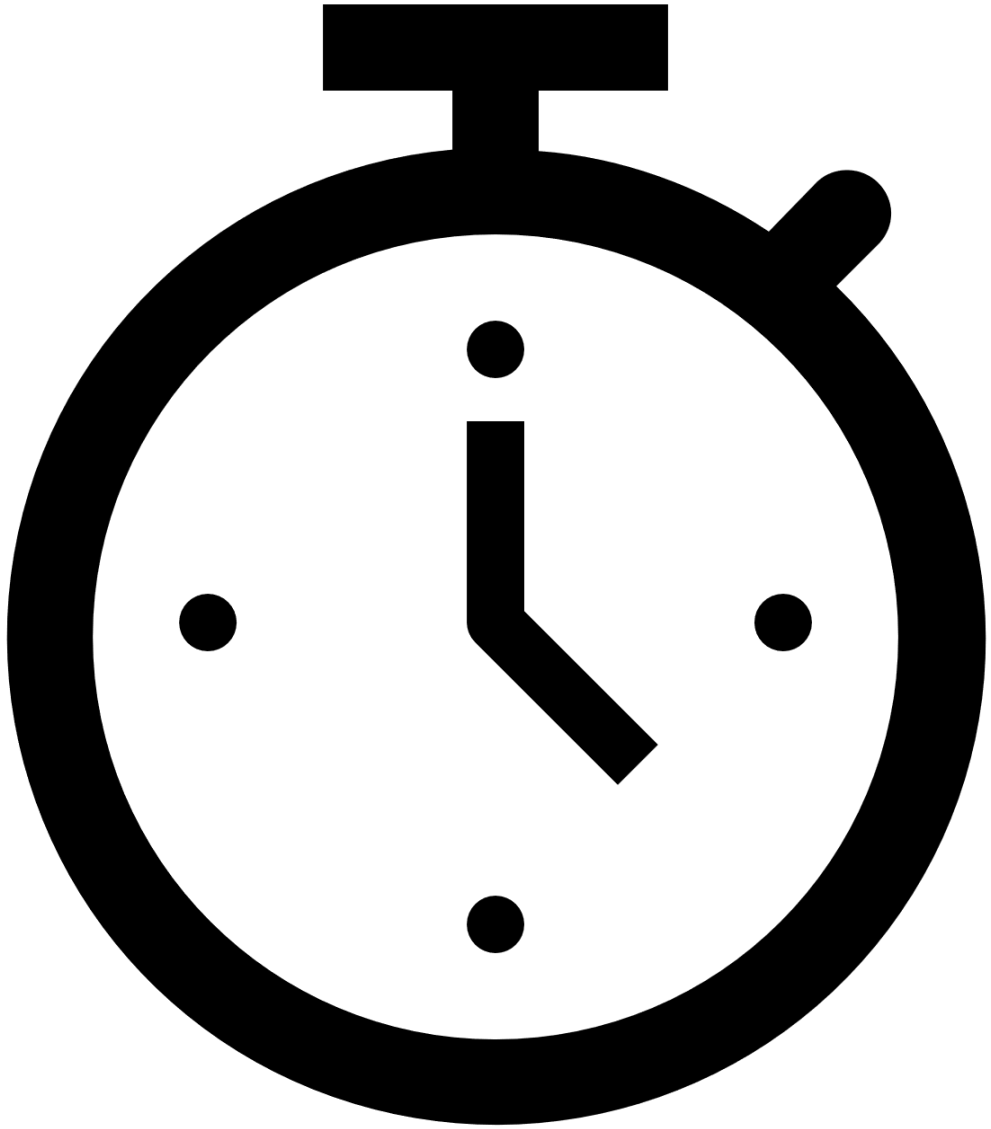
- Taking a list of features and creating the use cases from it
- “Brain-dumping” ideas from the user’s perspective

# Finding use cases - exercise

The objective of this exercise is to create a list of use cases for a system for bike sharing.

The system should connect users with bikes that they can use temporarily.

- What are some of the use cases?
- What could the user want to do?
- What would create value for the user?
- How would the user use the system?



# Contents & format of use cases

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- UML doesn’t describe a standard format

# Examples

| Use Case | Draw Image |
|---|---|
| Pre-condition | • Frame buffer must be cleared<br>• Reset must switch off |
| Post-condition | • Image data output to VRAM |
| Basic path | 1. This use case starts while Host CPU has already prepared the display list for drawing image.<br>2. Host CPU writes display list system's FIFO.<br>3. 2D/3D Graphics reads display list from FIFO and starts drawing image according to commands of display list.<br>4. 2D/3D Graphics outputs image data to VRAM. |
| Alternative path | At step 2 of the basic path, Host CPU writes display list that includes SYNC command to system's FIFO.<br>At step 3 of the basic path, 2D/3D Graphics stops after reading SYNC command, and then 2D/3D graphics restarts drawing image after receiving a blank pulse from LCDC. |
| Exceptional path | At step 2 of the basic path, Host CPU writes display list includes undefined commands.<br>At step 3 of basic path, 2D/3D graphics raises an error interrupt to Host CPU and clears system's FIFO. |

**Scenario**:
A Candy Store sells candies. Based on the information in Table 1, draw a **use case diagram** and a **class diagram**. If you discover while drawing the diagram that the scenario is incomplete, make up reasonable explanations to complete the story. Supply your explanations along with the diagram.

Table 1. Information for Candy Store

| | |
|---|---|
| *Name:* | *Purchase Candies* |
| *Actor:* | *Customer/Employee* |
| *Description:* | *This describes the process used to purchase candies at Morehead Candy Store* |
| *Successful Completion:* | *1. Customer requests candies*<br>*2. Employee checks on availability of candies*<br>*3. Candies are available and customer pays*<br>*4. Customer receives candies and stock is updated* |
| *Alternative:* | *1. Customer requests candies*<br>*2. Employee checks on availability of candies*<br>*3. Candies are not available and customer selects alternate candies or no candies*<br>*4. Customer receives candies and stock is updated (if alternate candies selected) or customer leaves with no candies* |
| *Pre-Condition:* | *Customer wants to purchase candies* |

| Use Case | Details |
|---|---|
| Number | UC – 1 |
| Application | PCM System |
| Description | This use case consists of a user (actor), four direct activities (Login System, Open Document, Print Request and Printed Document) and two indirect associated activities (Printer/Plotter and Print Information). |
| Primary Actor | User (Actor) |
| Precondition | Software application successfully running. |
| Trigger / Events | Login into System<br>Open Document<br>Send Print Request |
| Basic Flow | Basic flow consists of following steps:<br>Start software application using Administrator rights.<br>User login successfully.<br>Open any text or graphic document (e.g. word application)<br>Send print request to the print server for printing.<br>In case of successful printing, get printed document.<br>Print information saved by system. |
| Alternate Flows | Exception will be notified to the user. |

# Contents & format of use cases

- Use cases should only contain information that is relevant and important.
- A use case could be described with the following:

# Use case contents (name + actor)

**Name** (use case name)

- Short name that describes the user goal that creates value
  - Example: “Buy product”
  - What about: “Log in”? Or “Fill in home address”?

**Actors** (sometimes roles)

- What users are included in the use case
- Not only human users, other systems for example, or time
- Outside of the system, we are not in control of the actors
- Primary and secondary actors

# Use case contents (success + extensions)

**Main success scenario** (sometimes base flow, basic path, success)

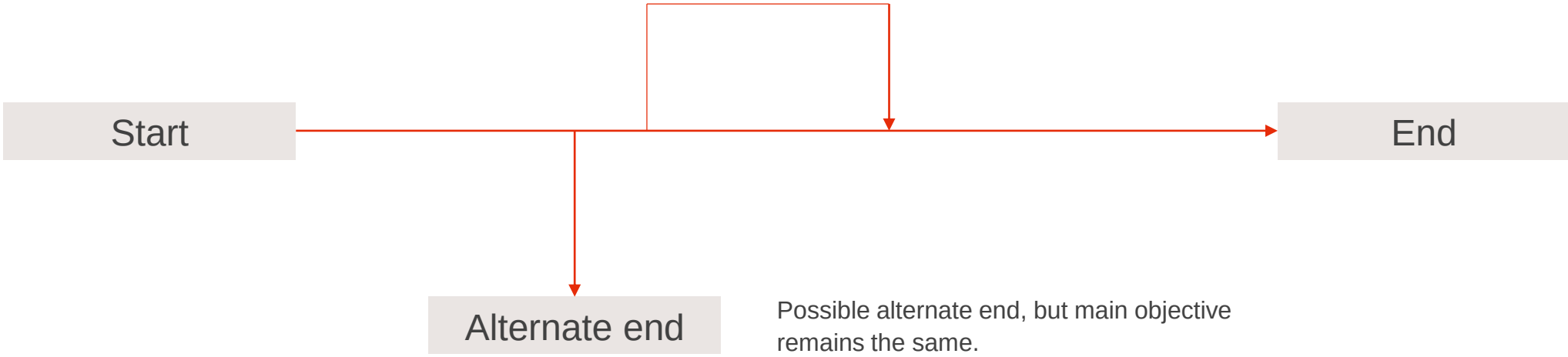
- Describes what the user needs to do to achieve the goal
- Step by step (numbered)

**Extensions** (sometimes alternate flow, exceptions)

- Handle differences in the use case
- All steps taken in the scenario that aren’t a part of the main success scenario
- Can be used to handle expected events
- Not a catch-all for everything that can go wrong

Main success scenario

## Main success scenario with extensions




Possible alternate end, but main objective remains the same.

# Use case contents (conditions)

**Precondition**

- What needs to be true before the use case can be started
- Should not cover things that are irrelevant
  - The user is conscious ⃠
  - The electricity is on and the computer is turned on ⃠
  - The user is authenticated ✅
  - The funds in the user’s bank account exceed the amount to be transferred ✅

**Postcondition** (sometimes guarantee)

- What will have happened after the main success scenario has completed
- Should not cover things that are irrelevant

# Use case contents (other)

- **Number**
  - Used as a reference
  - Organizational metadata
- **Source**
  - What requirement is this use case addressing
  - Not necessarily a 1:1 mapping between requirements and use cases
- **Priority**
  - Low to High, 1-n, A-C
- **Author**
  - Who wrote the use case specification
  - For reference if needed
- **Trigger**
  - What causes the use case to start
  - Only if needed
- **Description**
  - 1-2 sentences to describe the use case without detailed steps.
- **Goal level (use case level)**
  - Fish level, Sea level, Kite level
  - We won’t focus on these in this class

# Use case format (empty)

| | |
|---|---|
| **Name** | |
| **Number** | |
| **Description** | |
| **Priority** | |
| **Author** | |
| **Source** | |
| **Actors** | |
| **Precondition** | |
| **Postcondition** | |
| **Main success scenario** | |
| **Extensions** | |

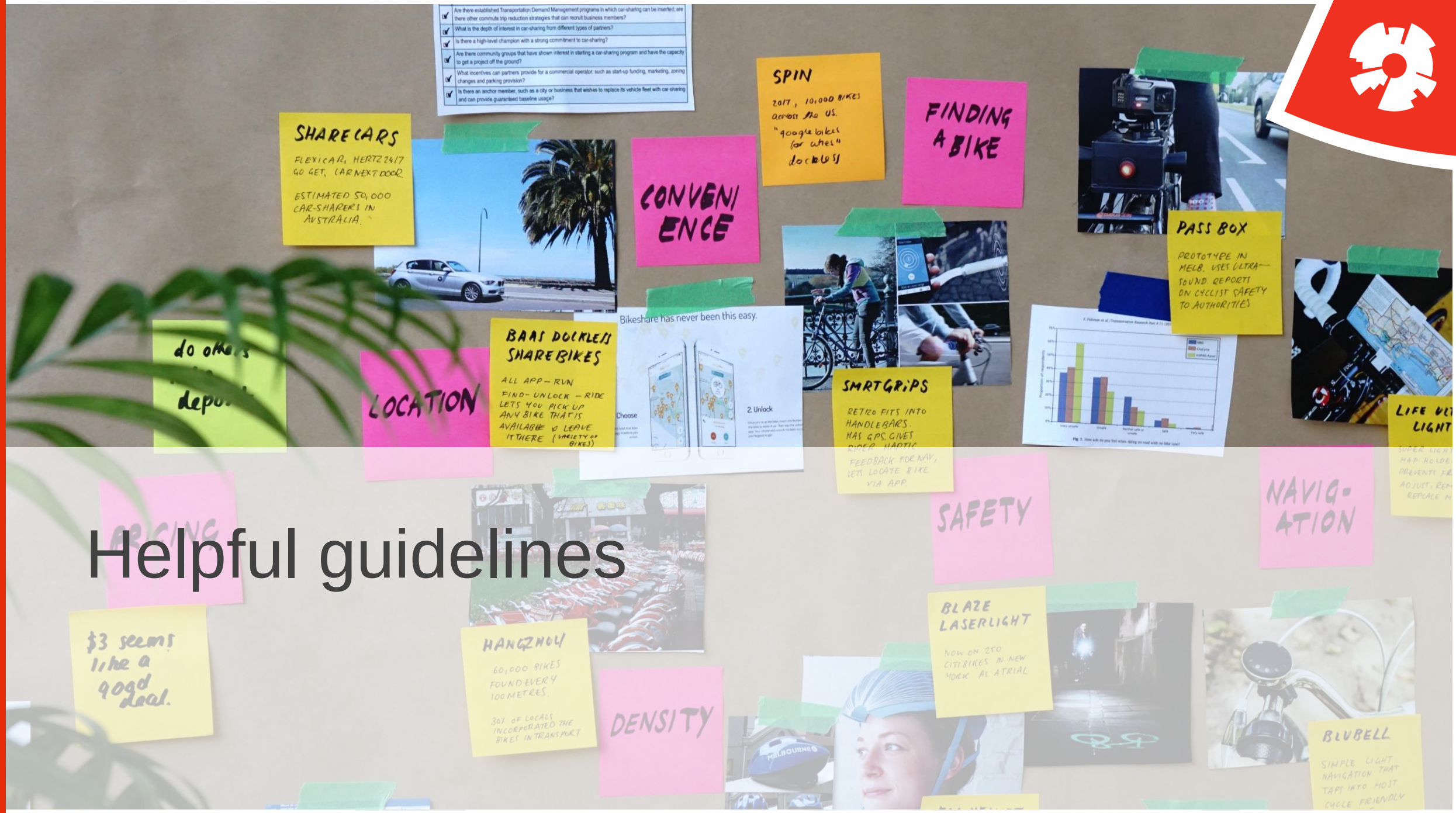
# Use case format (example)

| | |
|---|---|
| **Name** | Buy Product |
| **Number** | 1 |
| **Description** | The customer searches for a product, finds it, and buys it. |
| **Priority** | High |
| **Author** | Skúli Arnlaugsson |
| **Source** | 1 (in requirements) |
| **Actors** | Online customer, warehouse |
| **Precondition** | The customer has a user in the system, product is in warehouse stock |
| **Postcondition** | An order is ready to be handled by the warehouse, and the purchase has been credited to the customer’s credit card. |

# Use case format (example cont.)

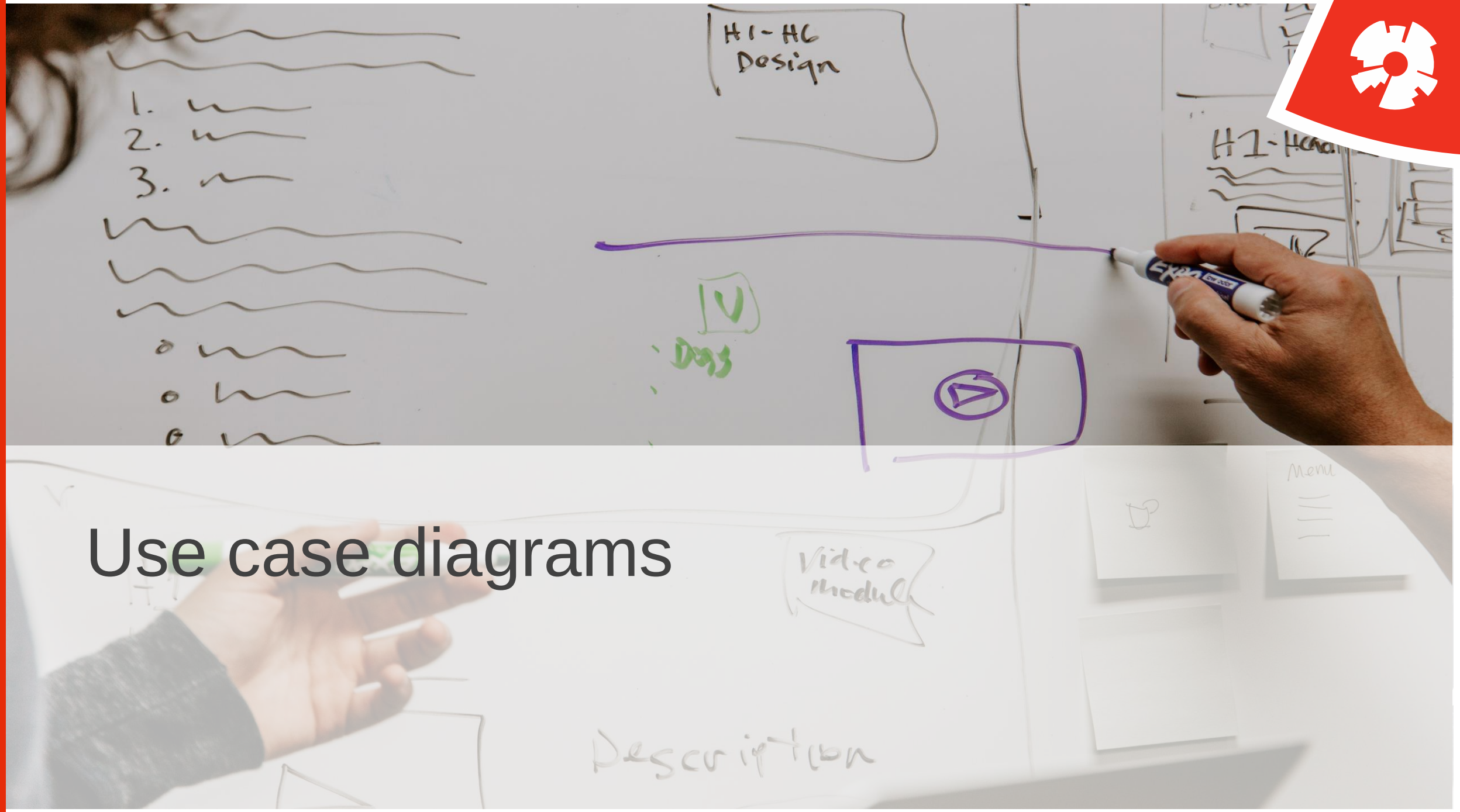
| | |
|---|---|
| **Main success scenario** | 1. Customer browses through the site<br>2. User finds the product to buy, and adds to the cart<br>3. Customer opens the cart and indicates they want to do a checkout<br>4. Customer selects a payment method<br>5. Customer enters shipping address<br>6. Customer reviews payment, shipping information<br>7. Customer accepts<br>8. System authorizes the purchase<br>9. System confirms sale and sends an order to the warehouse<br>10. System sends a confirmation email to customer |
| **Extensions** | 1a) The customer uses the site's search functionality<br>4a) The customer can choose to add/update their credit card, see use case 2.<br>8a) System fails to authorize the credit card purchase, allow customer to go to step 4 and retry. |

# Helpful guidelines



# Helpful guidelines

- Remember the purpose
- Focus on what matters
  - The main success scenario in most cases
- Be as clear as possible, think of the audience
- Skip irrelevant information
  - even entire rows if not needed
- Once you have several use cases
  - Review list of actors, do all of them have use cases? If not, chances are there is a use case you haven’t created.
  - Review list of use cases, do all of them have the needed actors? If not, chances are you are missing actors.

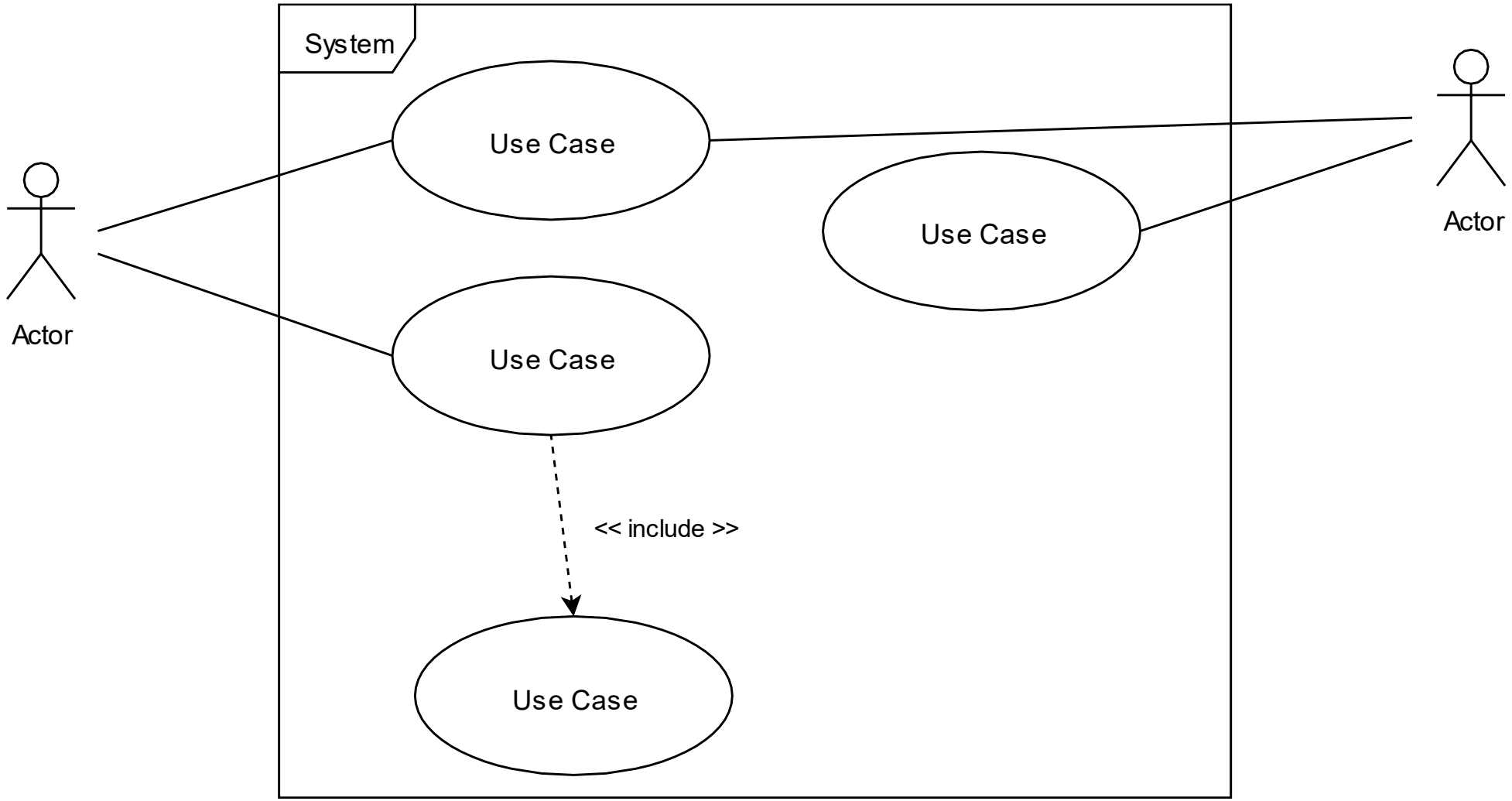



# Use case diagrams

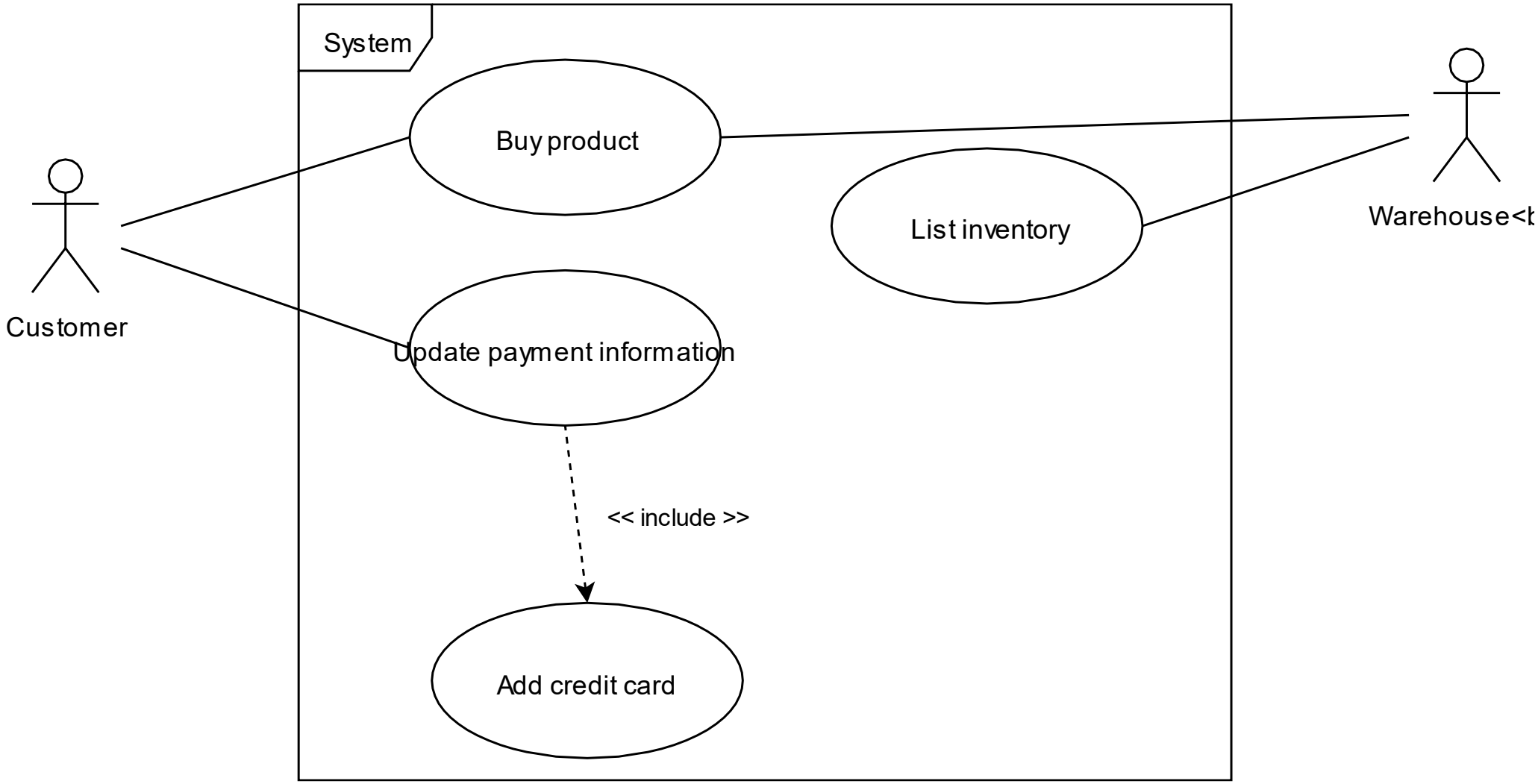
# Use case diagrams

- UML standard
- Show actors, system boundaries, use cases, and relationships between.
- Include (and extend) relationships
- Most value in the use case written description, less so in the diagrams

# Use case diagrams



# Use case diagrams

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