

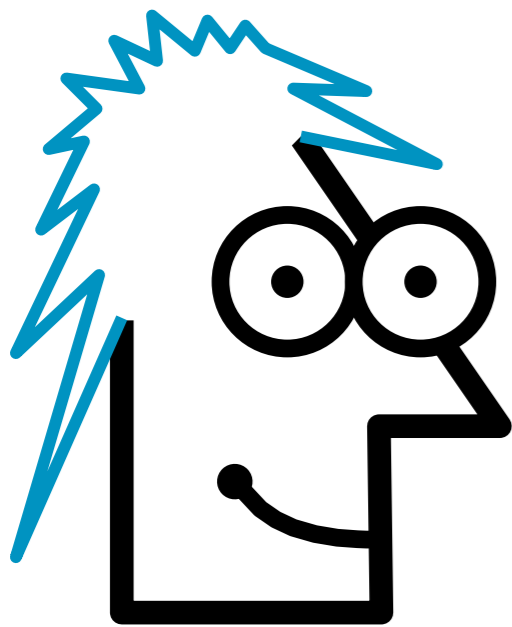
Foundations of Software Engineering

# Introduction to Use Cases

Dr. Petru Florin Mihancea

# Why **Requirements** Engineering ?

# Why **Requirements** Engineering ?

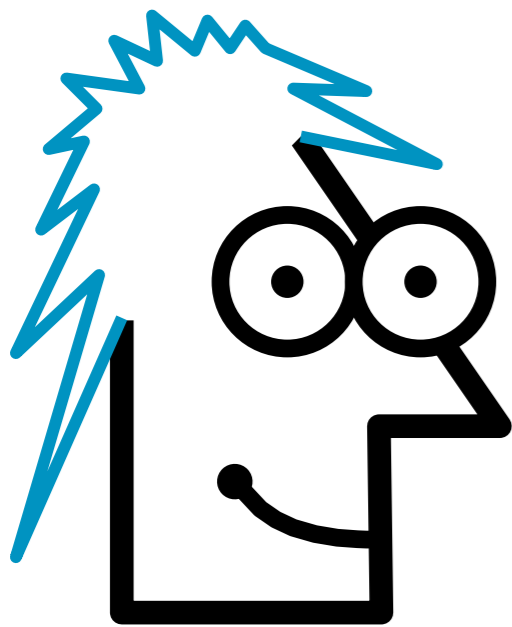


Developer



Customer

# Why **Requirements** Engineering ?

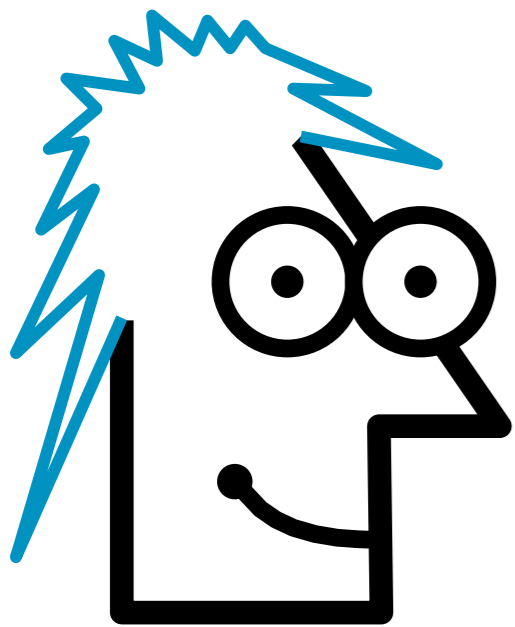


Developer

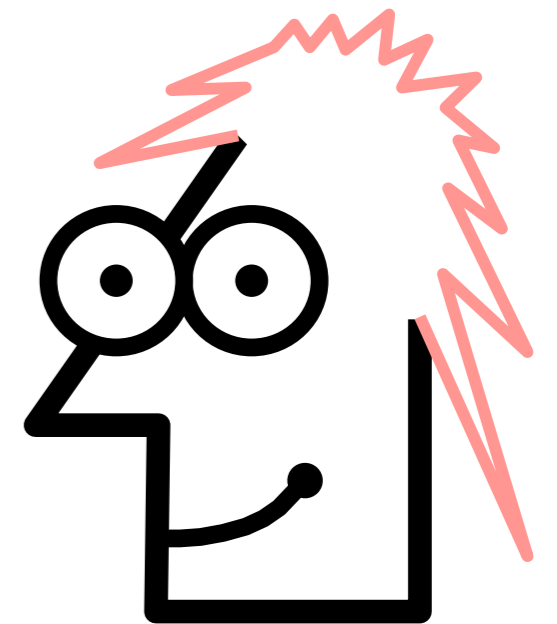


Customer

# Why **Requirements** Engineering ?

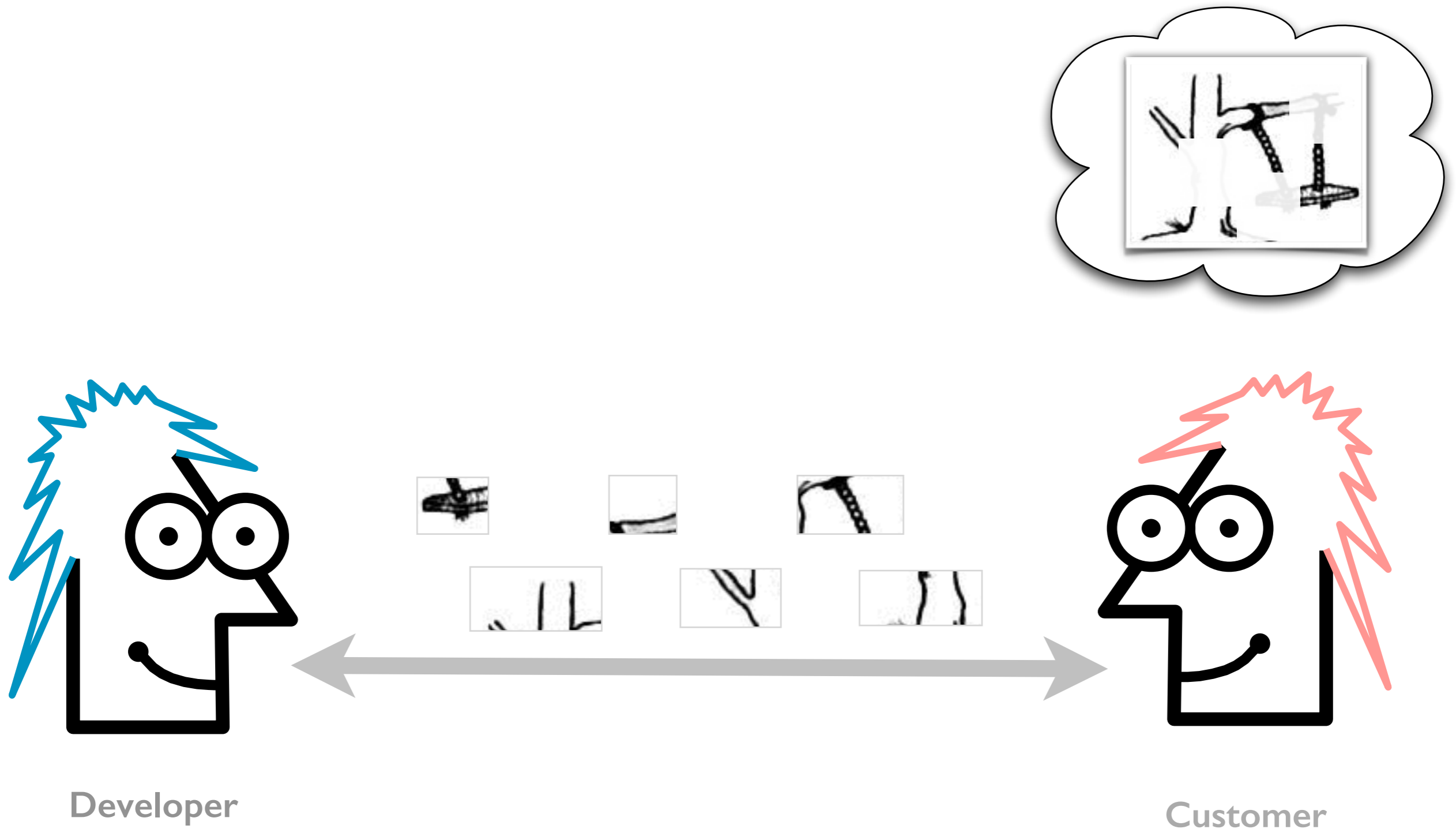


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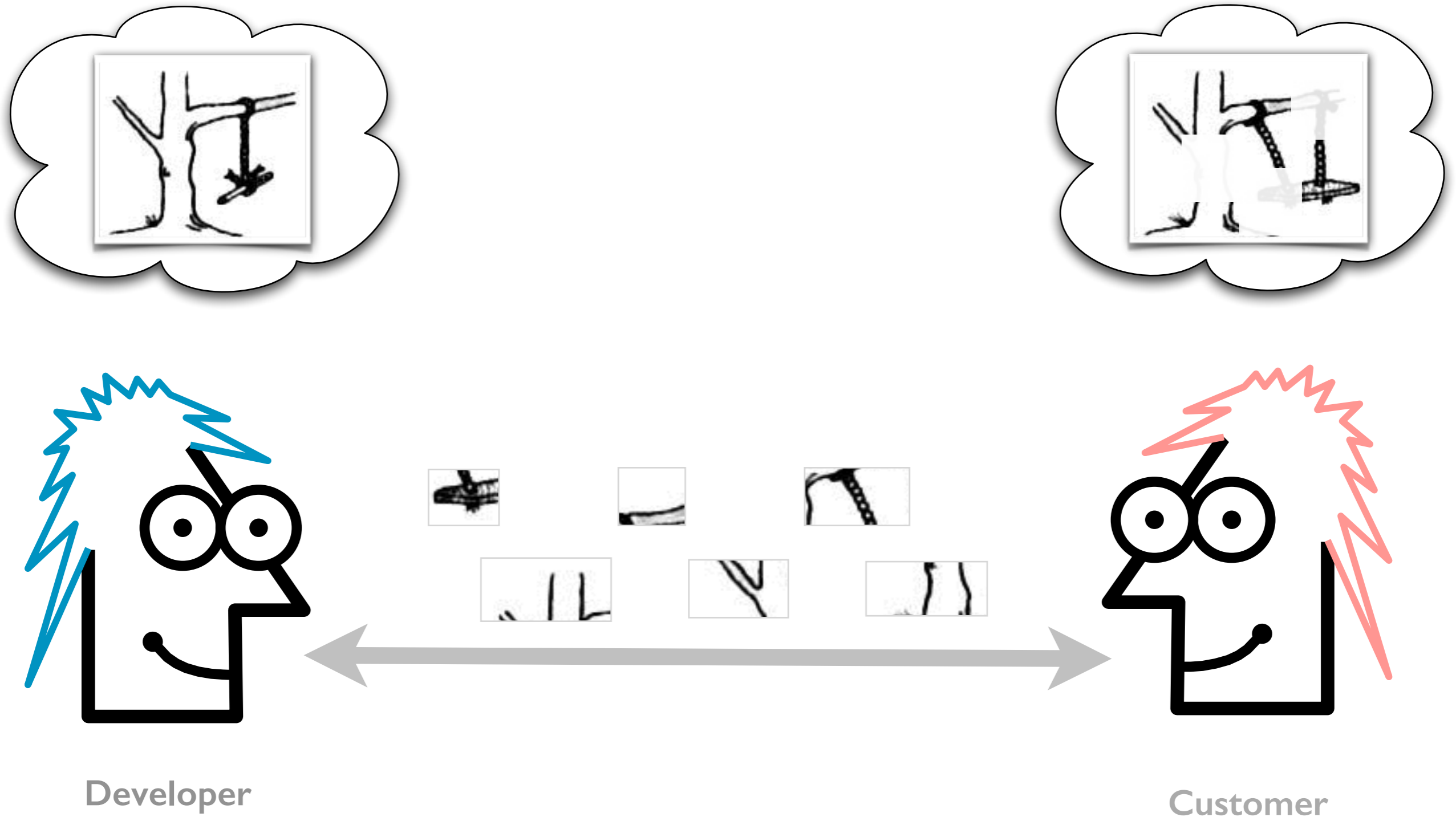


Customer

# Why **Requirements** Engineering ?



# Why **Requirements** Engineering ?



# Use Cases



# Use Cases

Capture

**functional requirements**

by describing **users**

**interactions** with the system

# Concepts

**Actor**

# Concepts

## Actor

A **role** played by a user  
with respect to the system

# Concepts

**Actor**

A **role** played by a user  
with respect to the system

**Same** actor  
**different** persons



# Concepts

## Actor

A **role** played by a user  
with respect to the system

**Same** person  
**different** actors



# Concepts

## Actor

A **role** played by a user  
with respect to the system

**External** to the system



# Concepts

## Actor

A **role** played by a user  
with respect to the system

**Interacts** with  
the system



# Concepts

## Actor

A **role** played by a user  
with respect to the system

It can be an **external  
system**





# Concepts

**Scenario**

# Concepts

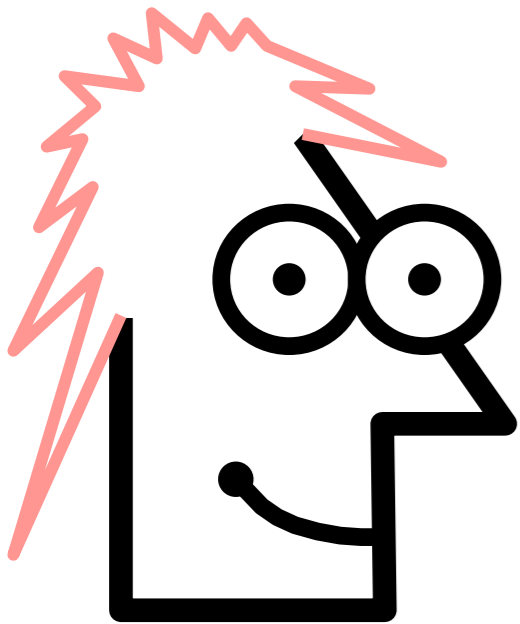
## Scenario

A **sequence of interactions** between  
an actor and the system

# Concepts

## Scenario

A **sequence of interactions** between  
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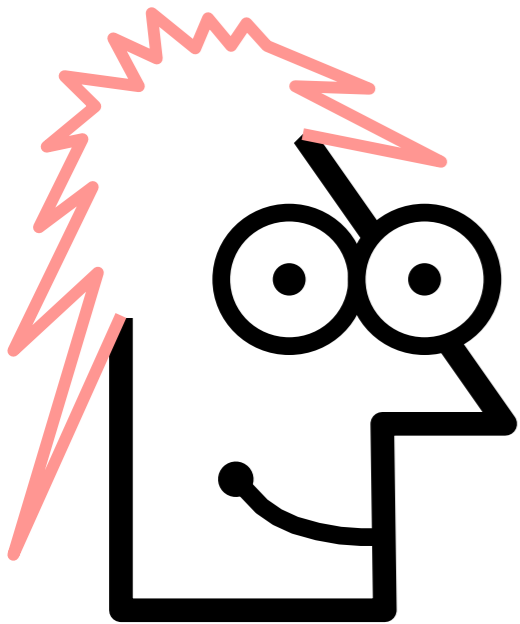


Customer

# Concepts

## Scenario

A **sequence of interactions** between  
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Customer

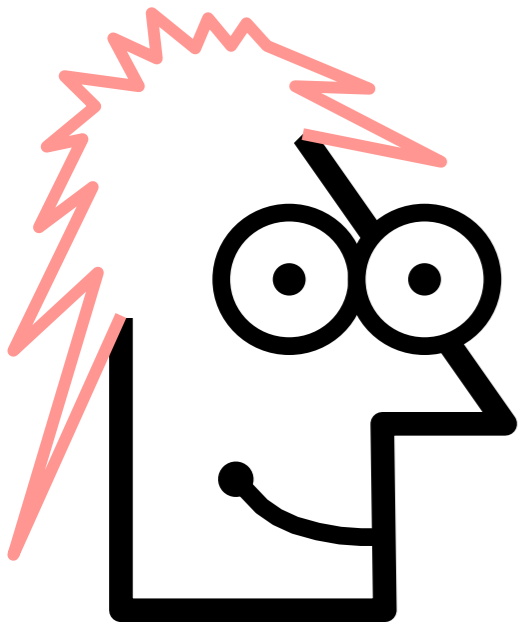
Online  
Book  
Store

# Concepts

## Scenario

A **sequence of interactions** between  
an actor and the system

I. Customer selects the books



Customer

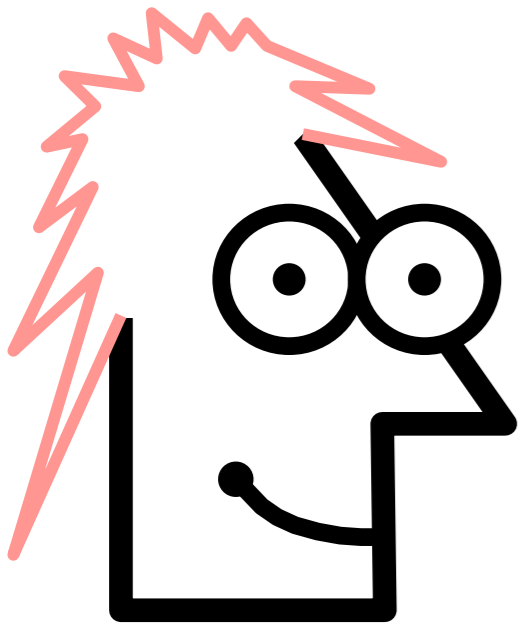


# Concepts

## Scenario

A **sequence of interactions** between an actor and the system

1. Customer selects the books
2. System asks for delivery address



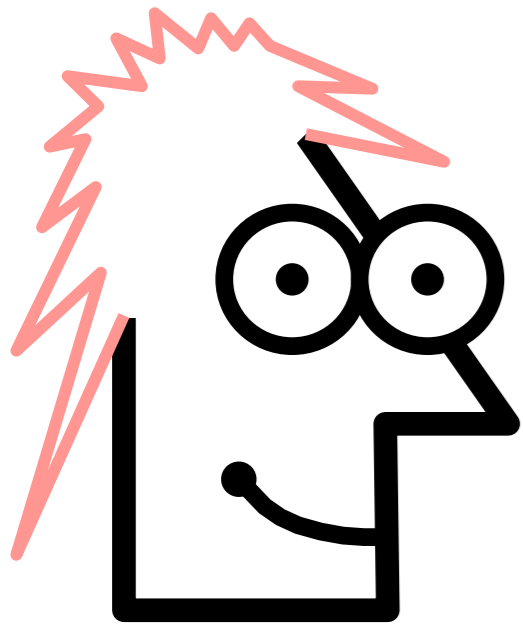
Customer

Online  
Book  
Store

# Concepts

## Scenario

A **sequence of interactions** between an actor and the system



Customer

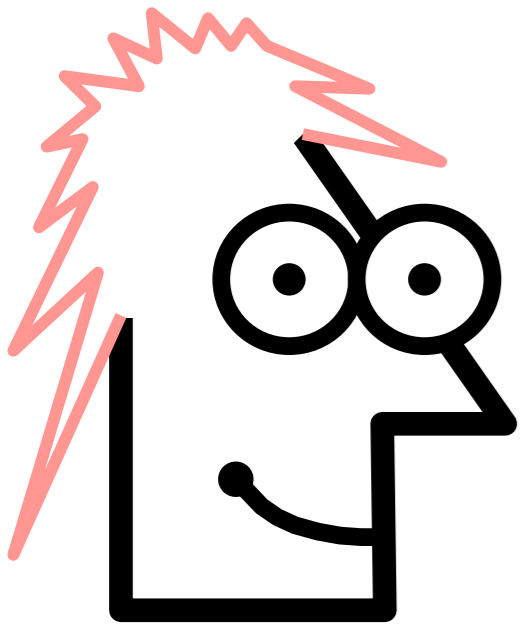
1. Customer selects the books
2. System asks for delivery address
3. Customer provides this information

Online  
Book  
Store

# Concepts

## Scenario

A **sequence of interactions** between an actor and the system



Customer

1. Customer selects the books
2. System asks for delivery address
3. Customer provides this information
4. Systems asks for credit card data

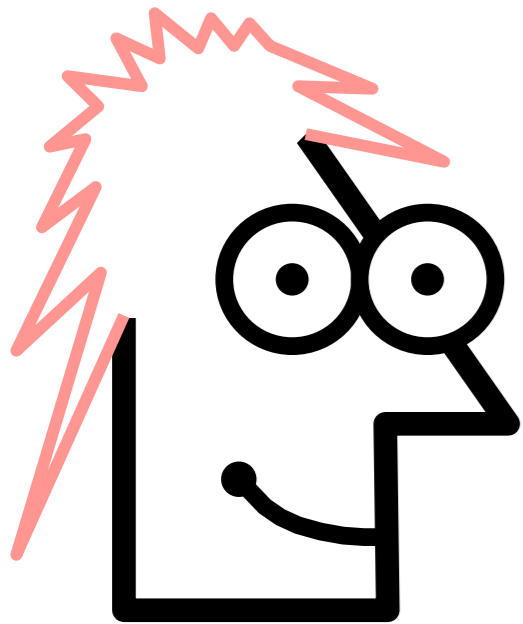
Online  
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# Concepts

## Scenario

A **sequence of interactions** between an actor and the system



Customer

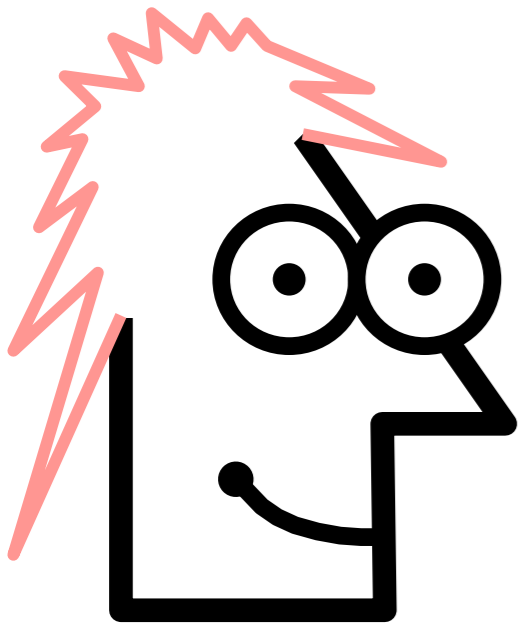
1. Customer selects the books
2. System asks for delivery address
3. Customer provides this information
4. Systems asks for credit card data
5. Customer gives this information

Online  
Book  
Store

# Concepts

## Scenario

A **sequence of interactions** between an actor and the system



Customer

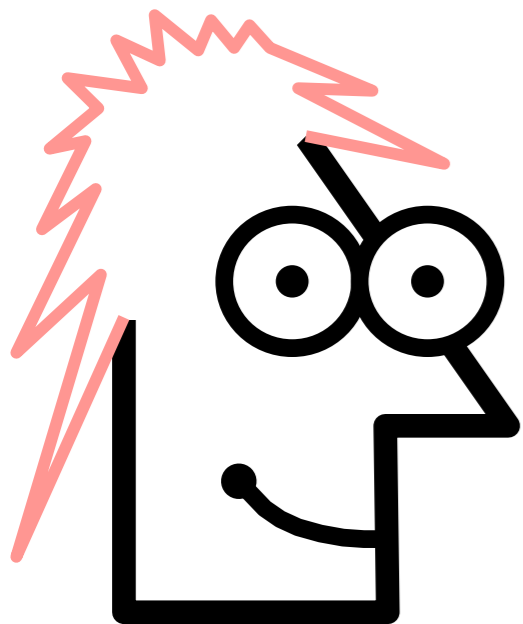
1. Customer selects the books
2. System asks for delivery address
3. Customer provides this information
4. Systems asks for credit card data
5. Customer gives this information
6. System validates the credit card via VISA services

Online  
Book  
Store

# Concepts

## Scenario

A **sequence of interactions** between an actor and the system



Customer

1. Customer selects the books
2. System asks for delivery address
3. Customer provides this information
4. Systems asks for credit card data
5. Customer gives this information
6. System validates the credit card via VISA services
7. System informs delivery department

Online  
Book  
Store

# Concepts

## Use Case

1. Customer selects the books
2. System asks for delivery address
3. Customer provides this information
4. System asks for credit card data
5. Customer gives this information
6. System validates the credit card via VISA services
7. System informs delivery department

# Concepts

## Use Case

### Main success scenario

1. Customer selects the books
2. System asks for delivery address
3. Customer provides this information
4. System asks for credit card data
5. Customer gives this information
6. System validates the credit card via VISA services
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# Concepts

## Use Case

### Main success scenario

1. Customer selects the books
2. System asks for delivery address
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### Extension

# Concepts

## Use Case

### Main success scenario

1. Customer selects the books
2. System asks for delivery address
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5. Customer gives this information
6. System validates the credit card via VISA services
7. System informs delivery department

### Extension

In 6 validation fails

1. Customer reenters card infos (then back to 6)  
or cancels

# Concepts

## Use Case

**set of scenarios**

**tied together by a common**

**goal of an actor**

### Main success scenario

1. Customer selects the books
2. System asks for delivery address
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6. System validates the credit card via VISA services
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### Extension

In 6 validation fails

1. Customer reenters card infos (then back to 6) or cancels



# Concepts

## Use Case

**set of scenarios**

**tied together by a common**

**goal of an actor**

**A use case is not an  
interaction step !**

### Main success scenario

1. Customer selects the books
2. System asks for delivery address
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5. Customer gives this information
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7. System informs delivery department

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In 6 validation fails

1. Customer reenters card infos (then back to 6)  
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# Concepts

**set of scenarios**

**tied together by a common**

**goal of an actor**

## Use Case

**Buy books**

Primary actor: Customer

Secondary actors: Delivery department, VISA validation system

...

**Main success scenario**

1. Customer selects the books
2. System asks for delivery address
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7. System informs delivery department

**Extension**

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# Concepts

**set of scenarios**

**tied together by a common**

**goal of an actor**

Use case description



## Use Case

**Buy books**

Primary actor: Customer

Secondary actors: Delivery department, VISA validation system

...

**Main success scenario**

1. Customer selects the books
2. System asks for delivery address
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**Extension**

In 6 validation fails

1. Customer reenters card infos (then back to 6) or cancels

# UML

## Use Case **Diagram**

# UML

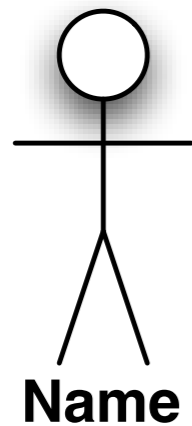
## Use Case **Diagram**

A model of the system capturing  
its **external behavior**

# UML

## Use Case Diagram

A model of the system capturing  
its **external behavior**

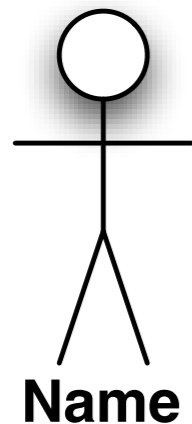


Usually a noun

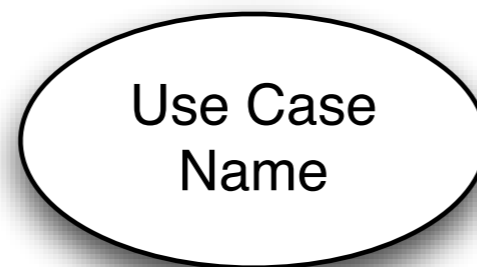
# UML

## Use Case Diagram

A model of the system capturing  
its **external behavior**



Usually a noun

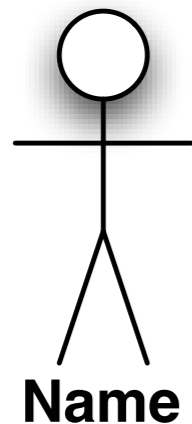


Usually a verb + noun

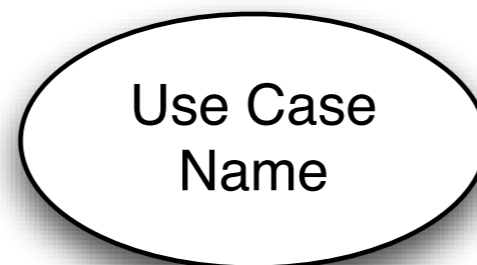
# UML

## Use Case Diagram

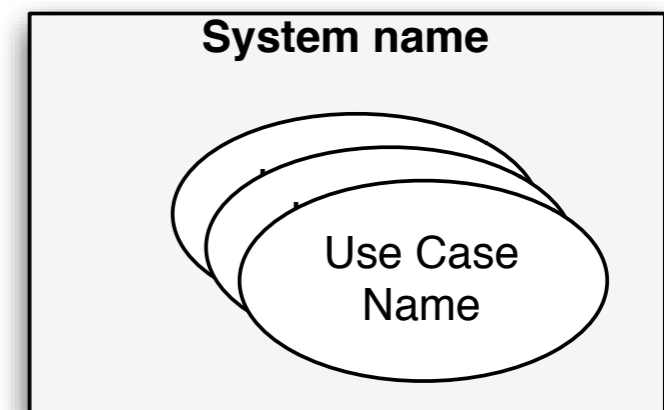
A model of the system capturing  
its **external behavior**



Usually a noun



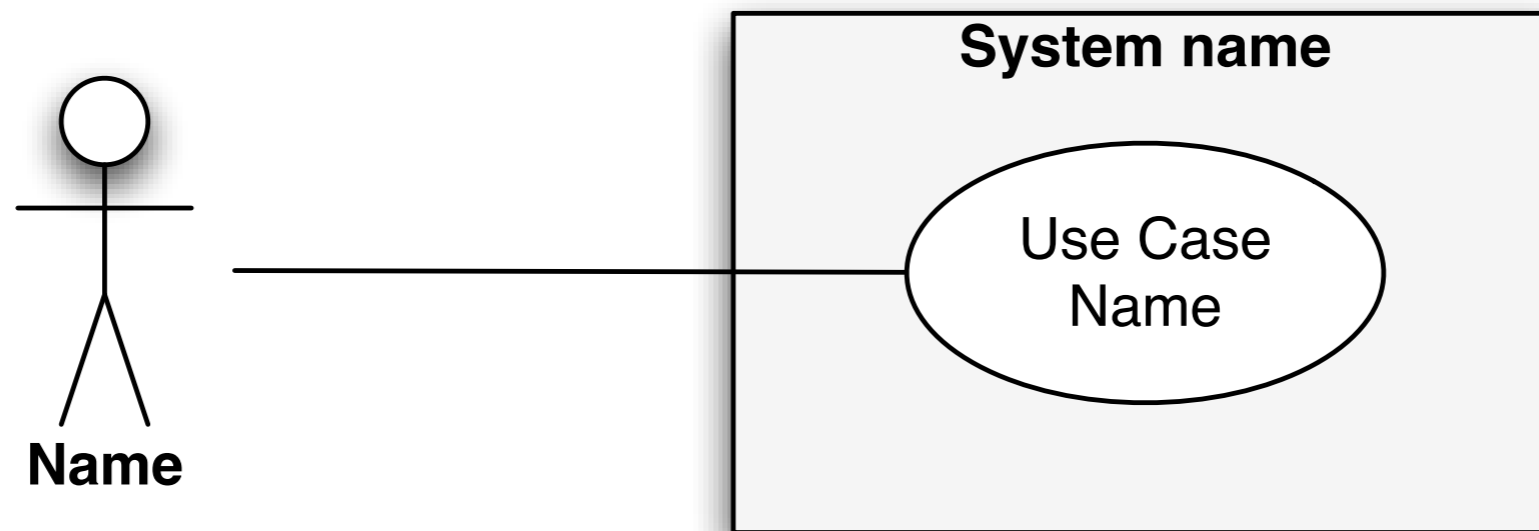
Usually a verb + noun





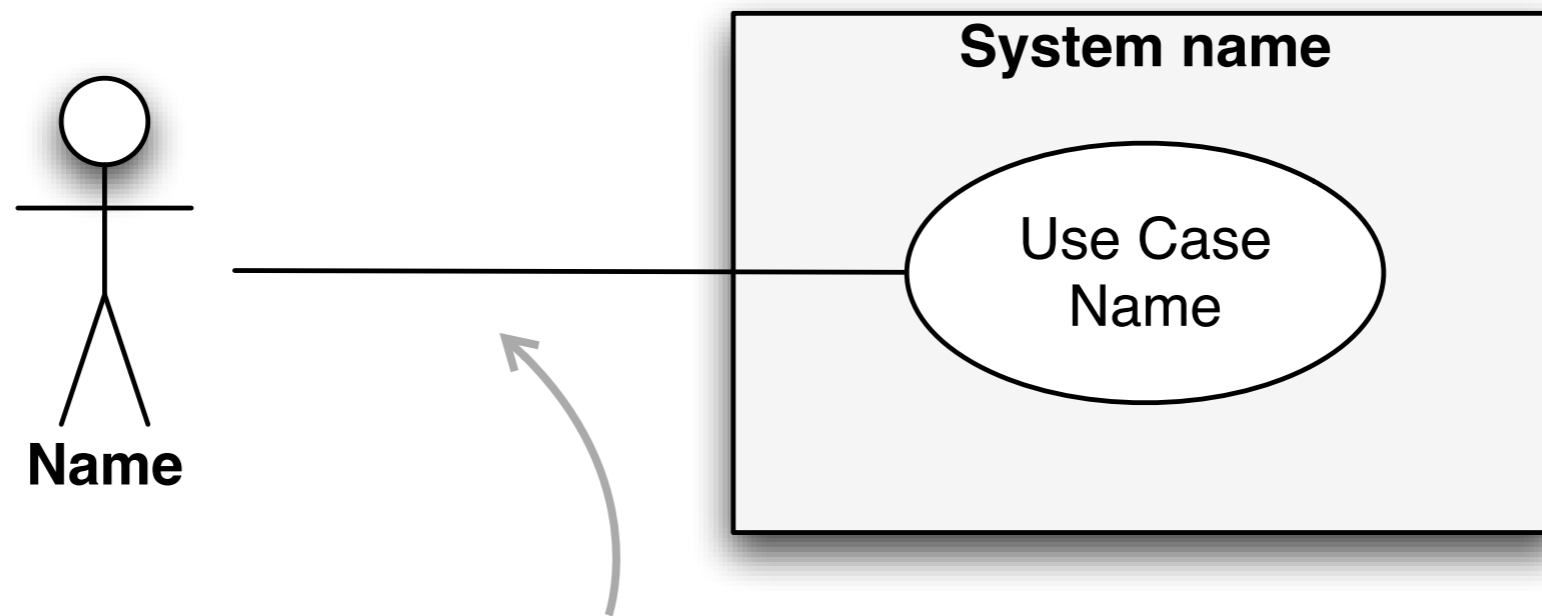
# UML

## Use Case Diagram Association



# UML

## Use Case Diagram Association

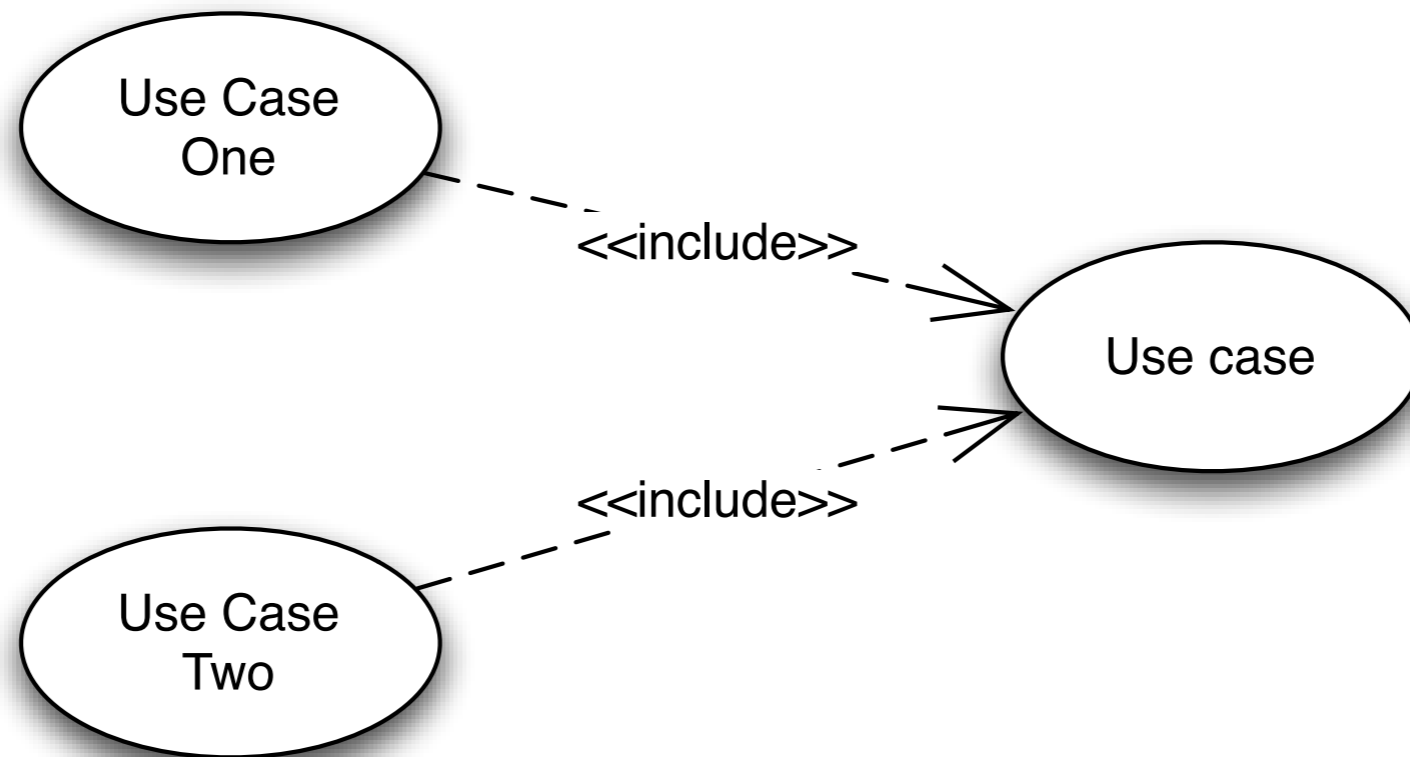


The actor is involved in the use  
case

# UML

## Use Case Diagram

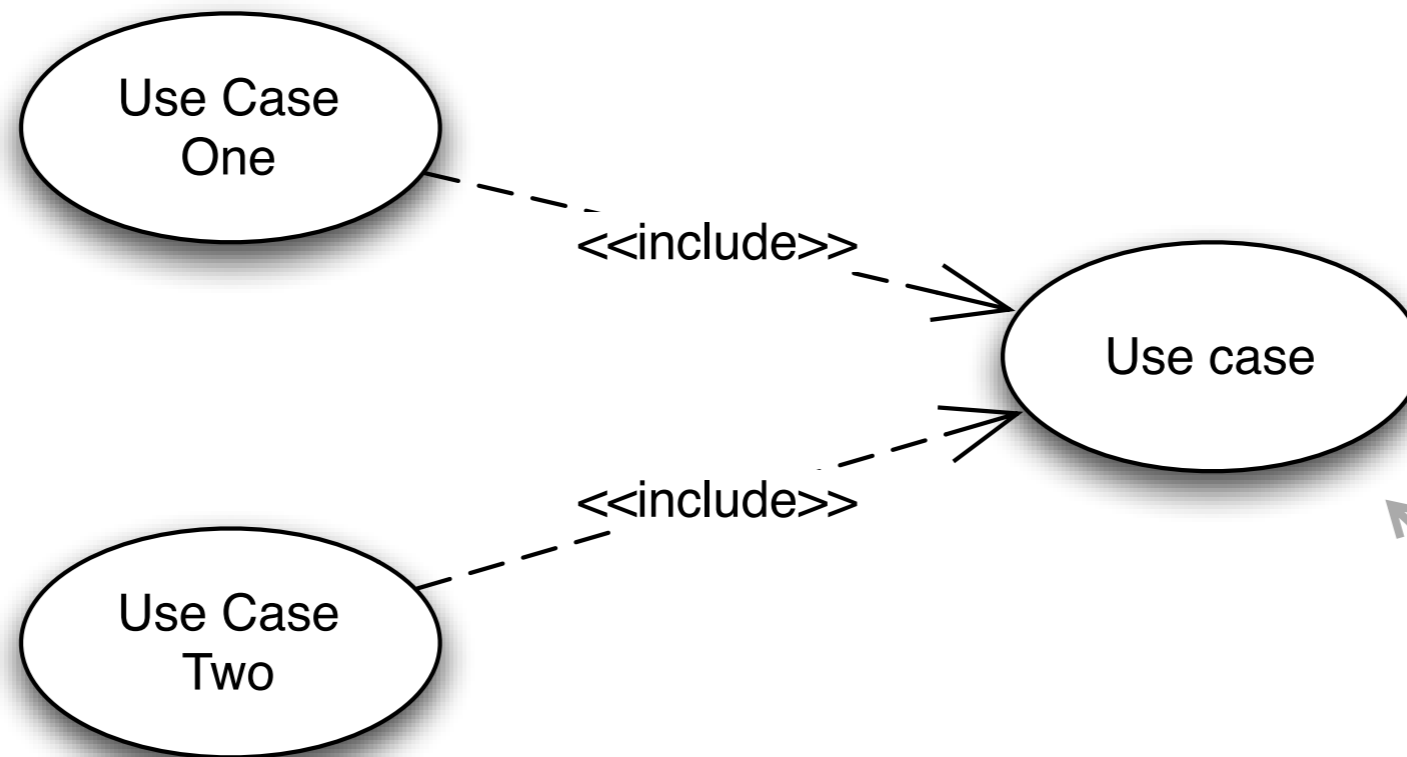
### Include



# UML

## Use Case **Diagram**

### Include

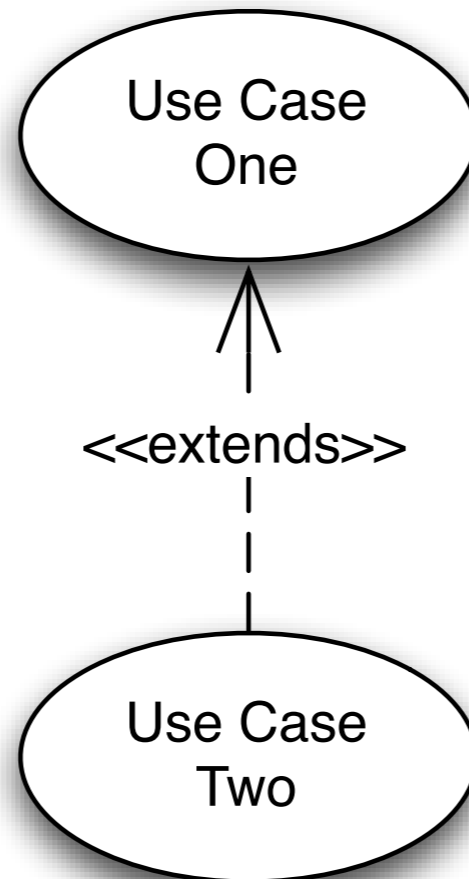


Factors out common  
interaction steps

# UML

## Use Case Diagram

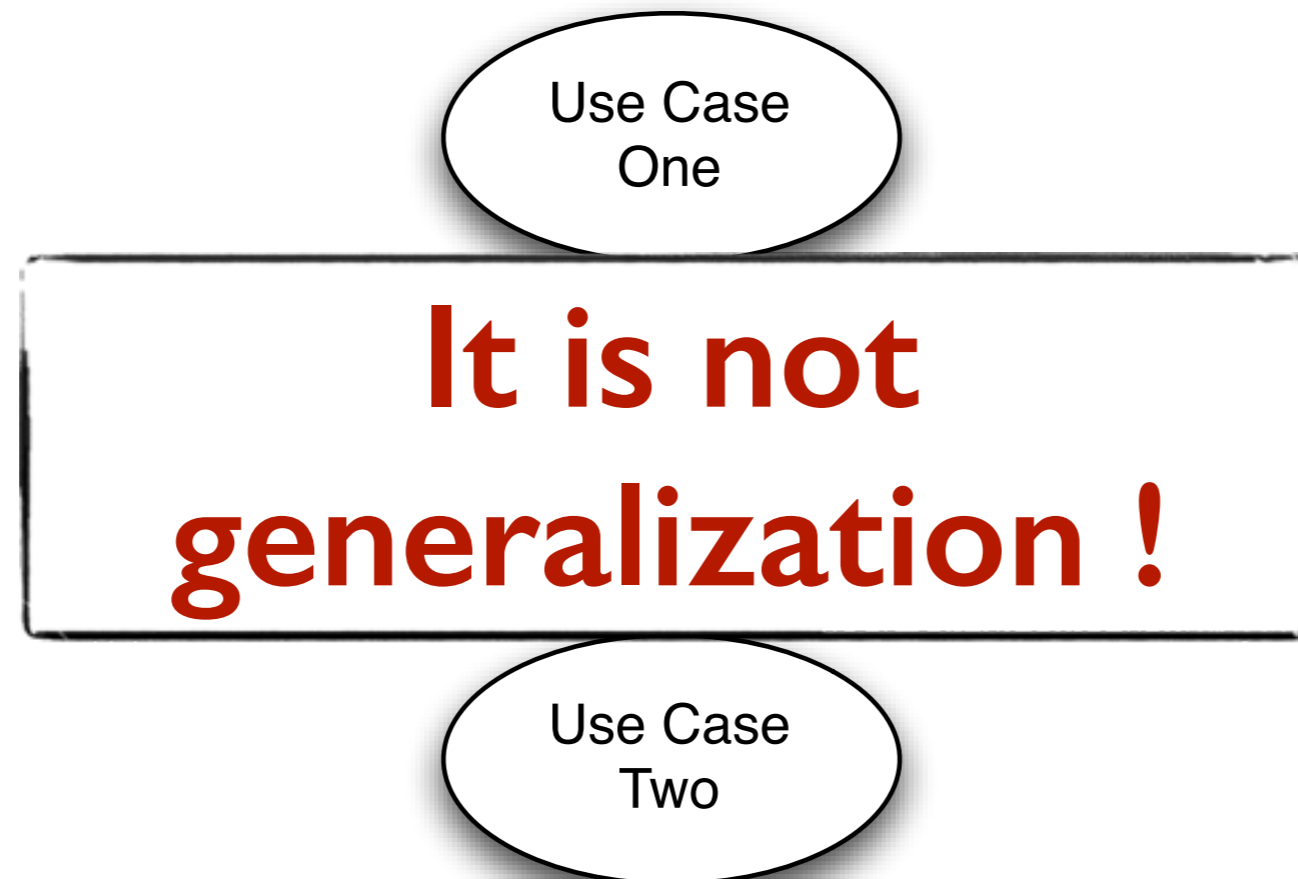
### Extends



# UML

## Use Case Diagram

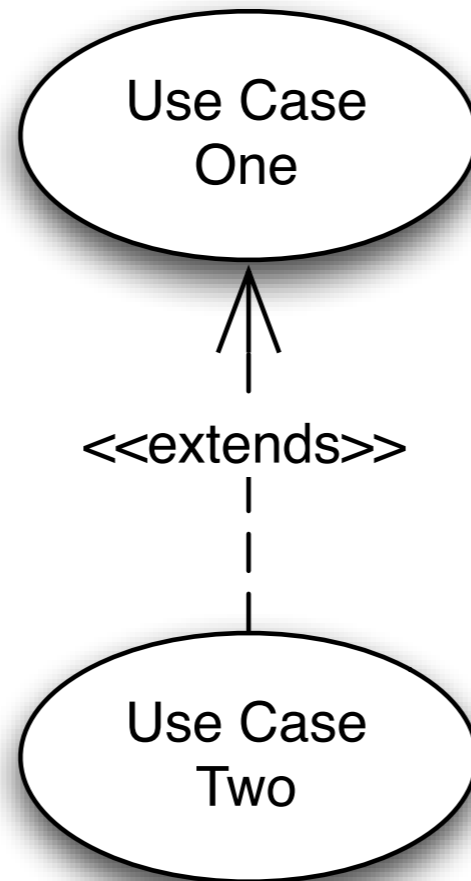
### Extends



# UML

## Use Case Diagram

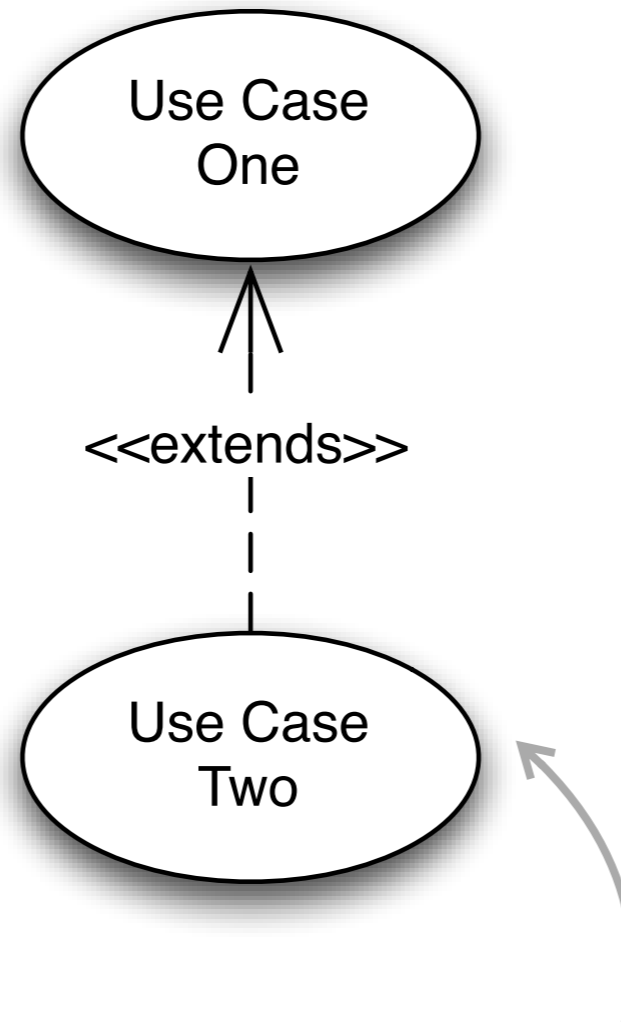
### Extends



# UML

## Use Case Diagram

### Extends



Steps inserted in the extended scenario in some circumstances



# Tips

# Tips

Identifying **actors**

# Tips

Identifying **actors**

**NOT** part of the system

# Tips

## Identifying **actors**

**NOT** part of the system

Good questions

- **Who obtains information from this system ?**

# Tips

# Tips

Identifying **use cases**

# Tips

Identifying **use cases**

satisfy a **goal** of an actor

# Tips

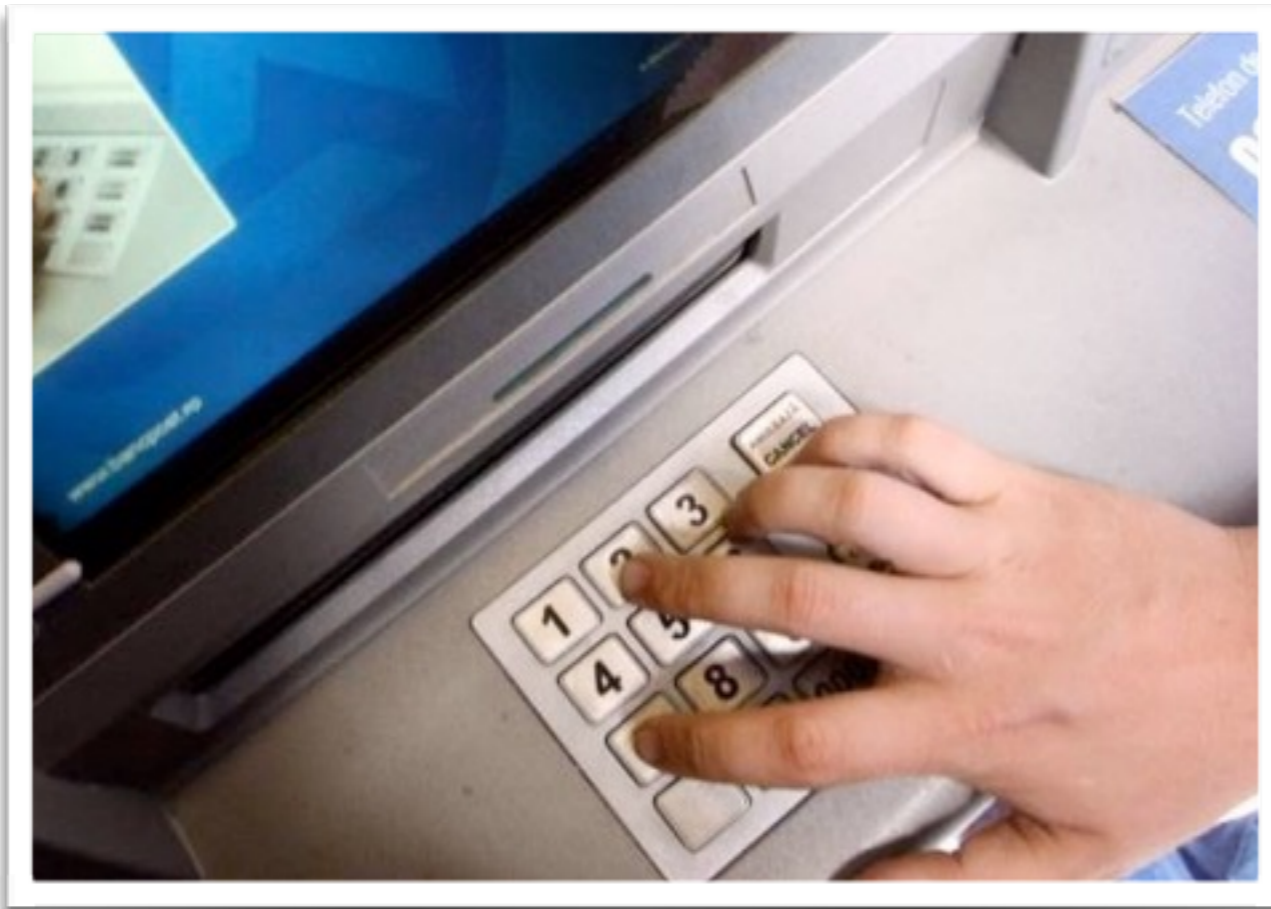
Identifying **use cases**

satisfy a **goal** of an actor

Good questions

- **What are users in this role trying to accomplish ?**





Let us model an **ATM**