Unified Modeling Language (UML)

Use Case

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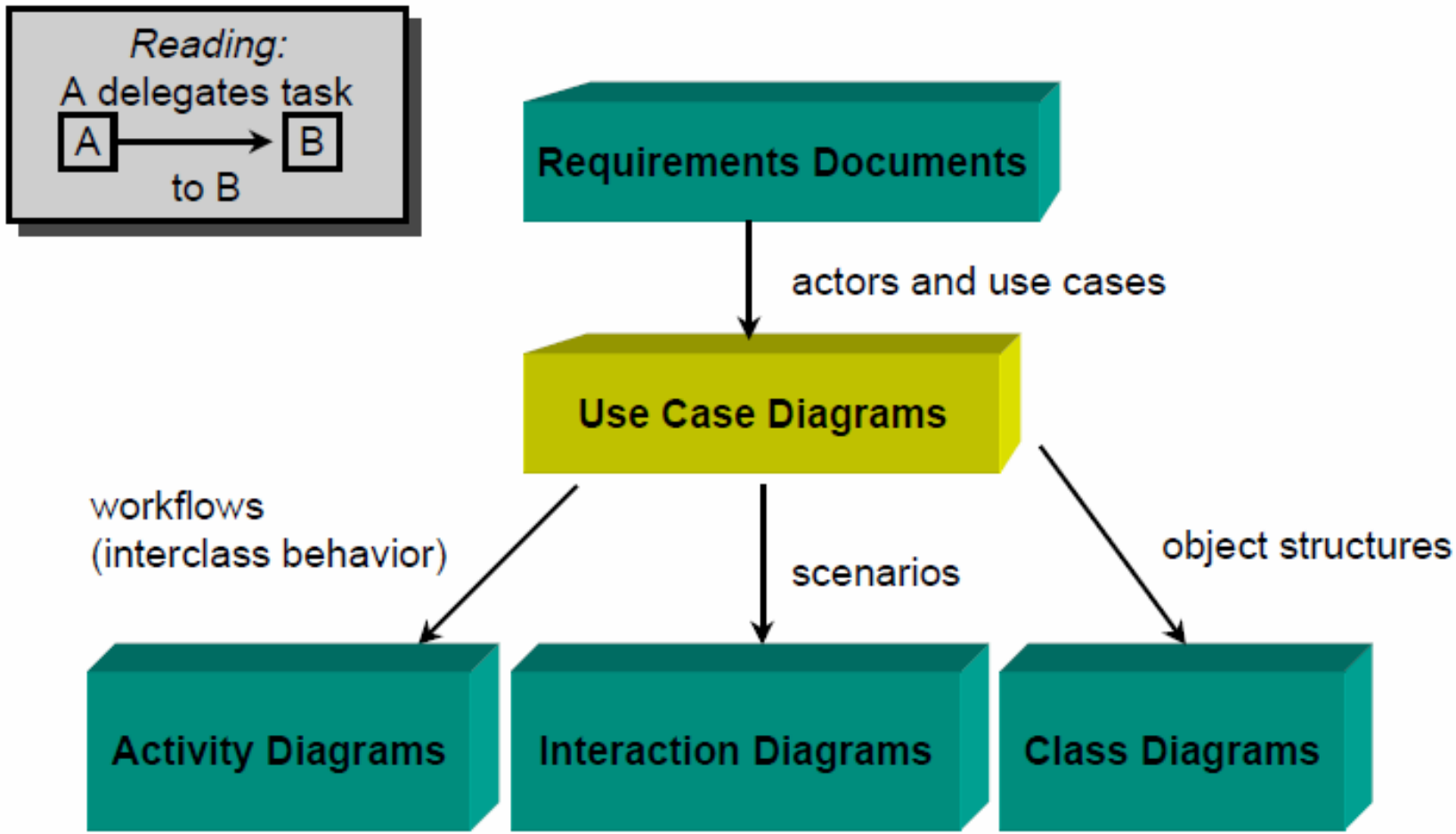
Role of Use Case Diagrams in UML



Use Cases

Use cases represent **typical** sets of **scenarios** that help to **structure**, **relate** and **understand** the essential **requirements**.

- They come from traditional development methods and are adapted to OOAD.
- A use case is a related set of **typical interactions** between a user and a computer system.
  - "Make some text bold."
  - "Create an index."
  - "List all customers of a certain purchase item."
- A use case **captures** some **action** on the application level.
- A use case **achieves** a discrete **goal** for the user.

To **obtain** use cases **interview** the users and **ask** them about the various things they want to do with the system.

Describe each use case in a **paragraph** and **annotate** it with documents, forms, ...

User Goals and System Interactions (1)

- The task of a use case can differ according to the point of view:
  - **Application domain level:** to reflect the **goal** the **user** wants to achieve.
  - **System design level:** to capture the required **system interactions**.
- Use cases may be small or large.

Application domain level	System design level
Ensure consistent formatting for a document.	Define a style, change a style and apply a style.
Format two documents in the same style.	Import a style from another, already existing document.

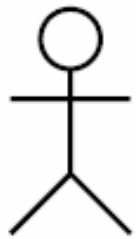
User Goals and System Interactions (2)

- This dichotomy between user goals and system interactions is present in most, but not in all situations, e.g.,
  - "Create an index."

  is the same for a user goal and a system interaction.
- Importance of **User Goals**
  - for **finding alternative** ways to satisfy goals and
  - to **capture** all the **requirements** for user interfaces.
- Importance of **System Interactions**
  - for system **structuring** purposes and
  - for system **functionality** design.

Actors

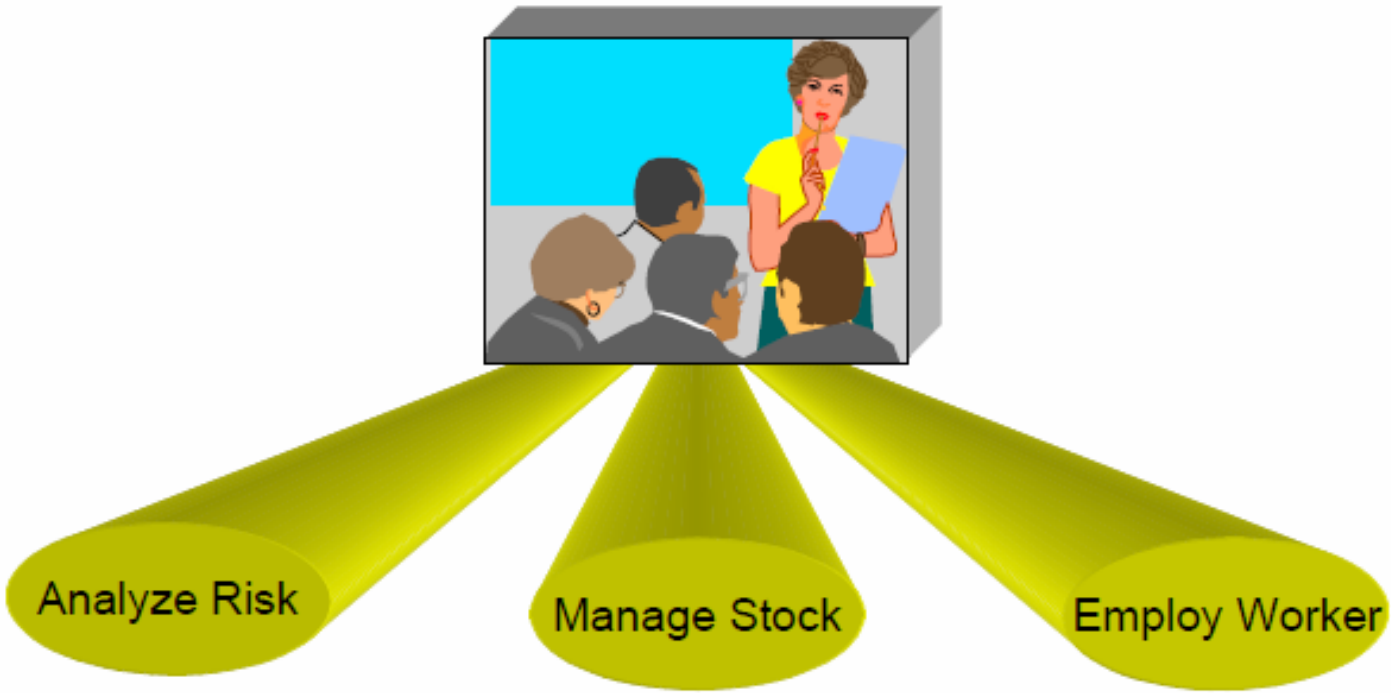
- An actor is a **role** that a user or other system plays with respect to the system to be developed.
- Typical examples for actors:
  - Trading manager
  - Trader
  - Salesperson
  - Accounting System



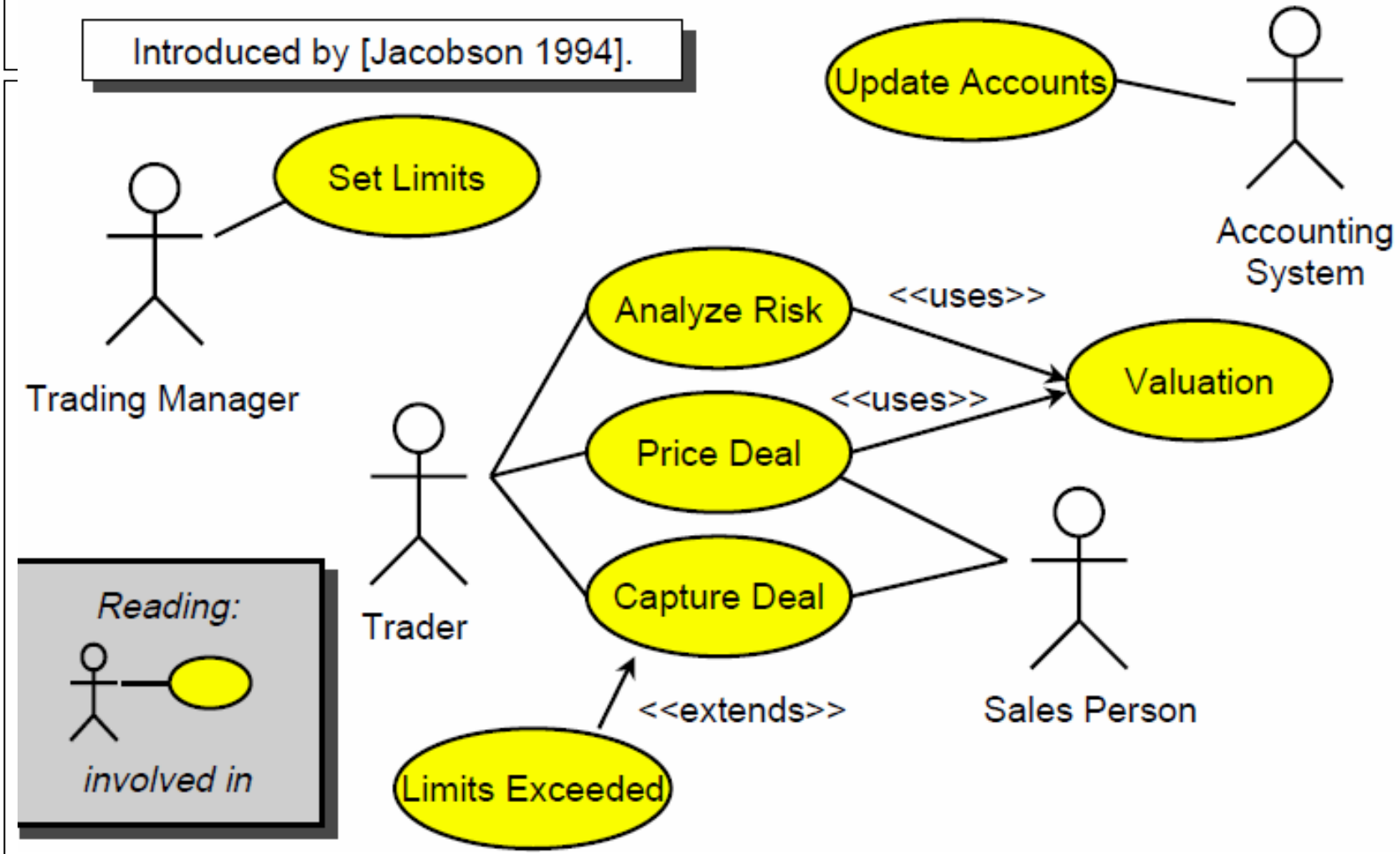
- A single actor in a use case diagram can represent **multiple users** (or systems) .
- A single user (or system) also may play **multiple roles**.
- Actors don‘t need to be human, e.g., an **external system** that needs some information from the current system is also an actor.

Cases

- The "**case** aspect" in a use case represents a high-level description of a desired action in which the actor is involved.
- It contains the information of the initial documents from which by gradual **refinement** further **diagrams**, for example, class diagrams, activity diagrams or interaction diagrams, are derived.



Actors and Cases



Interaction with External Systems

For the interaction with external systems there are four approaches:

1. Show **all** interactions with the remote system on the diagram.
2. Show external-interaction use cases only when it is the **other** system that **initiates** contact.
3. Show system actors only when they are the ones who **need** the use case.
4. Do not treat systems as actors at all but use the **user** requests instead.

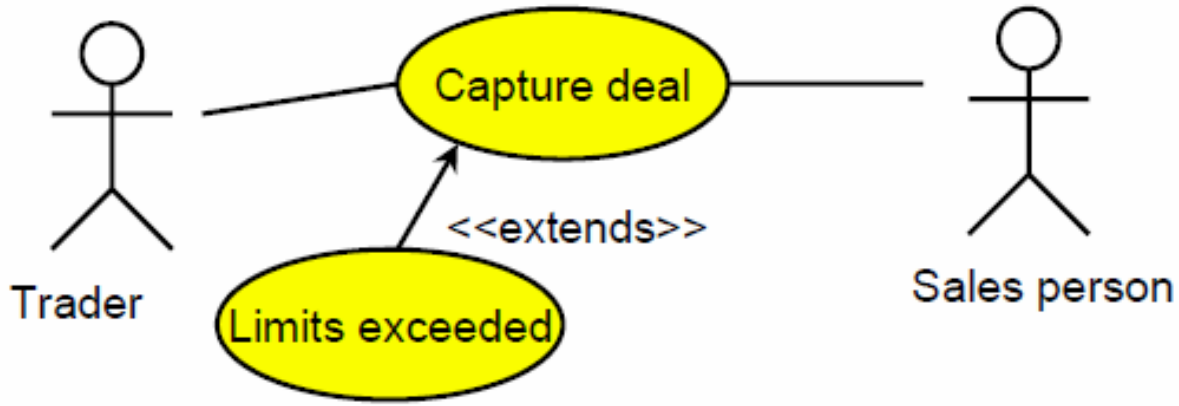
Use **external events** to identify use cases which are not captured by actors. Think about all the possible events from the outside world to which you want to **react**.

Working with Use Cases

- Use cases are all about externally-required **functionality**.
  - If the Accounting System needs a file from the system under development, this is a requirement that needs to be satisfied.
- **Discuss** use cases with system users.
  - What are the real user goals? Consider alternative ways to meet those user goals.
- Adjust the **granularity** of your use cases according to the complexity of the individual problem you are working on, bearing in mind that
  - **too many** use cases can be overwhelming while
  - **too few** use cases may hide important details.
- There are several possibilities to carry out a use case, therefore use cases can have many **realizations** (manual, semi-computerized, fully automatic; different designs, ...). This is a **design** issue!

Extends (1)

Use the **extends** relationship when you have a use case that is **similar** to another use case but does a bit more.



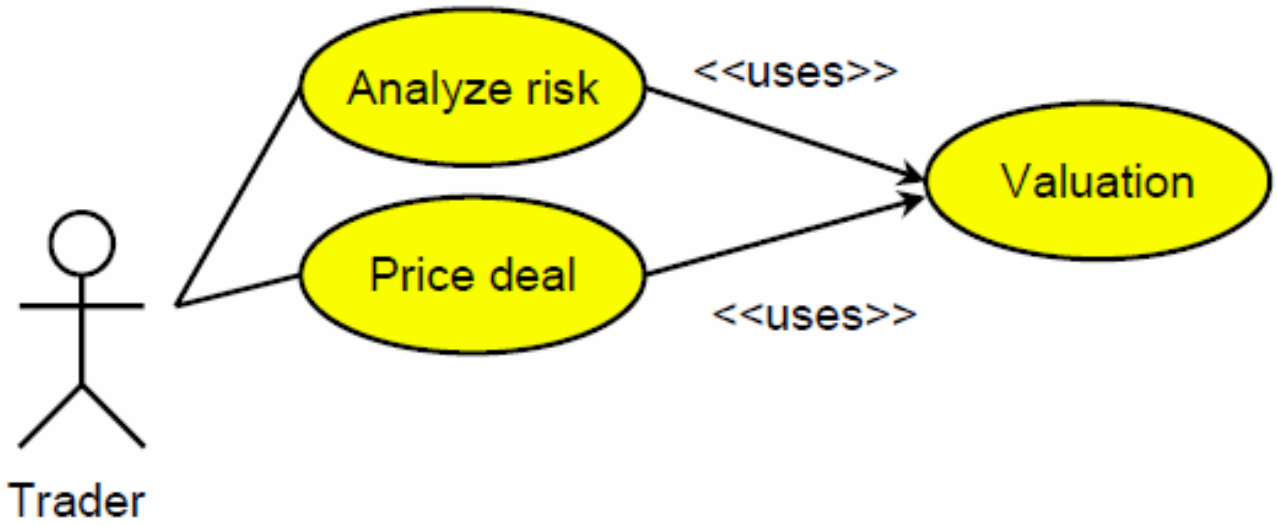
- In this example the basic use case is *Capture deal*.
- In case certain limits for a deal are exceeded the additional use case *Limits exceeded* is performed.

Extends (2)

- Extensions are used instead of modeling every **extra** case by a single **use case**.
- Extensions are used instead of creating a **complex use case** that covers all variations.
- Extensions mean “this use case is similar to that use case with the exception of ...”.
- How do you address case variation?
  - Capture the simple, **normal** use case **first**.
  - For **every step** in that use case ask: „What could go wrong here?“
  - Plot all **variations** as extensions of the given use case.
- Don‘t be surprised if there is a fairly **high number** of **extensions**.
- Listing the extensions separately makes things **easier** to **understand**.
- Splitting of use cases into extensions can be done during **elaboration** *or* **construction**.

Uses

- The **uses** relationship occurs when you have a chunk of behavior that is **similar across** several **use cases**.
- Use **uses** when you are **repeating** yourself in two or more separate use cases.
- Copying the description of that behavior introduces redundance and may lead to inconsistencies when the behavior is changed.



Uses and Extends

- The similarities between **extends** and **uses** are that they both imply **factoring out** common **behavior** from several use cases to a single use case that is
  - used by several other use cases or
  - extended by other use cases.
- From the **actor's viewpoint**
  - **extends** means, **both** the normal use case and the extension are **performed** by the actor,
  - **uses** means, there is often **no actor** associated with the common use case.
- Apply the following rules:
  - Use **extends**, when you are describing a **variation** on normal behavior.
  - Use **uses** when you want to split off **repeating** details in a use case.

Scenarios, Workflow, Object Structures

- A certain **path** through a use case is called a **scenario**. A scenario shows a particular set and combination of conditions within that use case.

  E.g., ordering some goods:

  - Scenario 1: All goes well.
  - Scenario 2: There are not enough goods.
  - Scenario 3: Our credits are insufficient.

- **Processes** involving different use cases are shown in **workflows**, e.g., from ordering to delivery and payment.

- The **structure** of the objects (and actors) that occur in use cases are described by **classes**, e.g., customers, goods, invoices.

Use Cases in Objectory

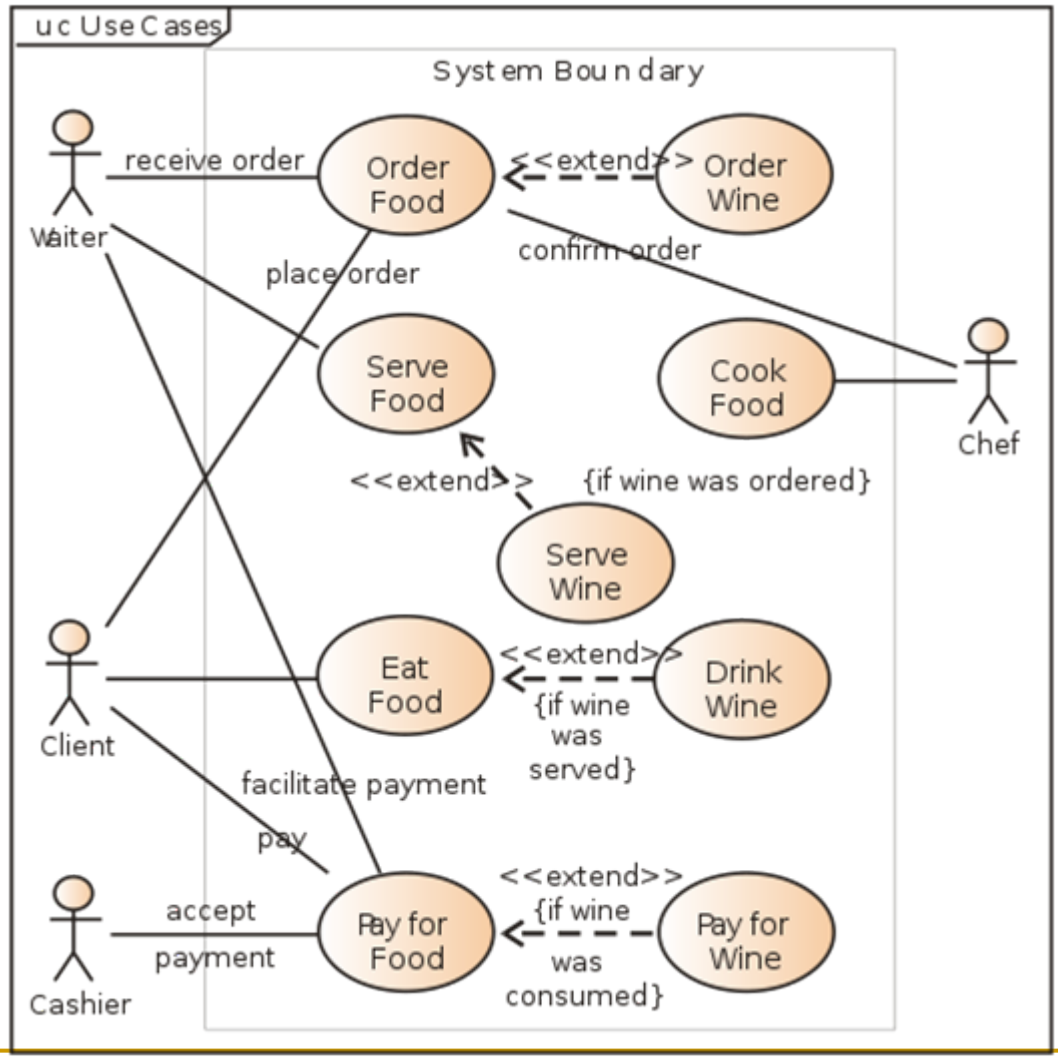
- Use cases are an essential tool in **requirements capturing** and in **planning** and **controlling** an iterative **project**.
- Capturing use cases is one of the **primary tasks** during the **elaboration** phase.
- UML delivers the **use cases** to analyze the requirements of a system.
  - Use cases are typical **interactions** a **user** has with the **system**.
  - A use case indicates a **function** that the user can **understand** and that has **value** for the user.
  - Use cases can **vary** considerably in **size**.

One of the most important things during **elaboration** is to **discover** all the potential **use cases**.

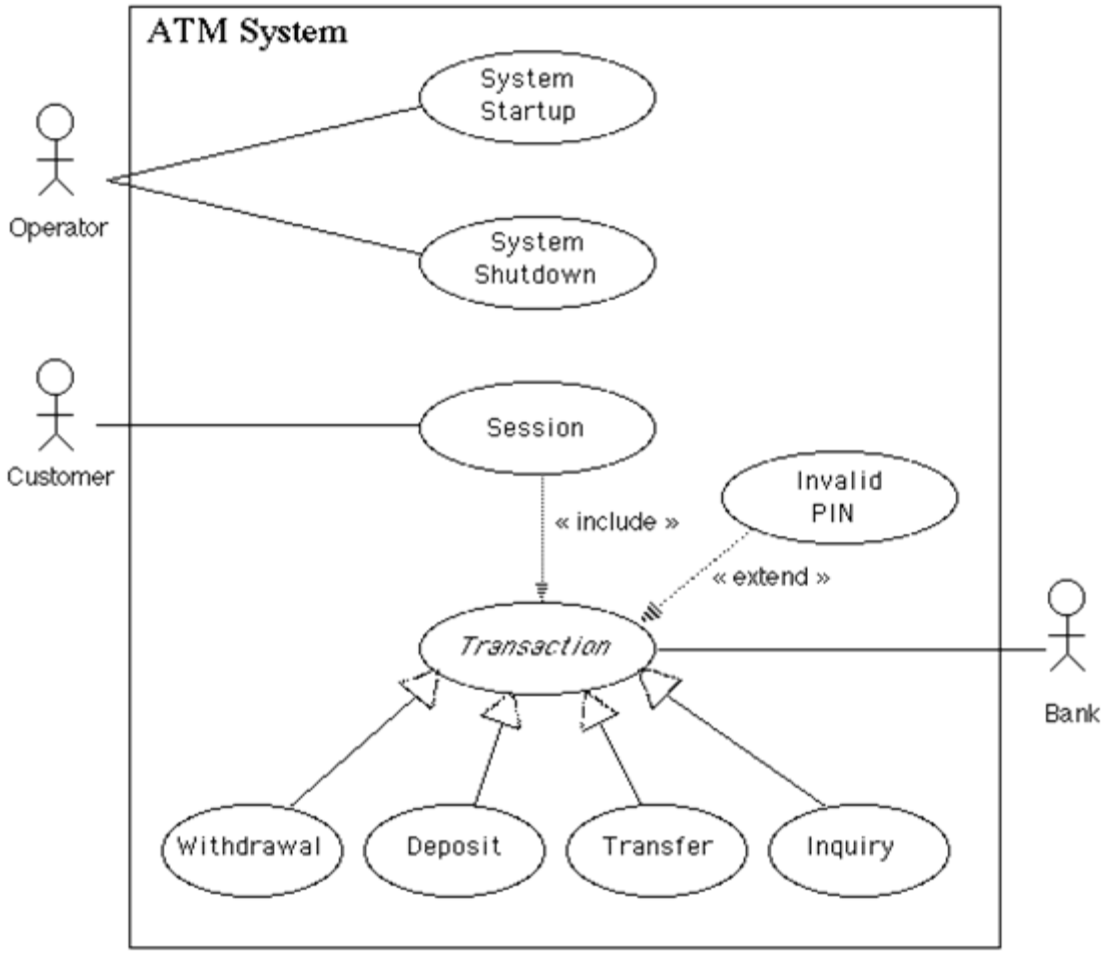
Use Cases: Examples

- For a person using a **database** a typical use case would be:
  - *"list all customers who have ordered a certain product"*
  - *"create a list with my top 10 customers"*
  - *"I want fax-letters to be sent automatically"*
- A developer responds with specific **cost estimates**:
  - *"The top 10 customer list can be developed in a week."*
  - *"Creating the auto-fax function will take two months."*
- User and developer negotiate about the **priorities**:
  - Developer: *"I could start with the sold - products list."*
  - User: *"I definitely need the top 10 customers list first."*

Example Use cases



Example Use case



Example Use Case