



中国科学技术大学软件学院
SCHOOL OF SOFTWARE ENGINEERING OF USTC

Use Case Modeling

中国科学技术大学软件学院

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What Is a Use Case

- ◆ *The key concept: A use case is a business process --- an abstraction of a business process*
- ◆ A use case is initiated by (or begins with) an actor.
- ◆ A use case must accomplish a business task (for the actor).
- ◆ A use case must end with an actor --- the actor explicitly or implicitly acknowledges the accomplishment of the business task.





What Is an Actor

- ◆ An actor denotes a business *role* played by (and on behalf of) a set of business entities or stakeholders.
- ◆ Actors are not part of the system.
- ◆ Actors interact with the system.
- ◆ Actors are often human beings but can also be a piece of hardware, a system, or another component of the system.
- ◆ Actors initiate use cases, which accomplish business tasks for the respective actors.





Use Case Specification: 3 Levels of Abstraction

- ◆ We specify use cases at three levels of abstraction:
 - 1) Abstract use case: using *a verb and a noun* phrase
 - 2) High level use case: stating exactly *when and where* the use case begins and *when* it ends using TUCBW/ TUCEW (This use case begins with/This use case ends with)
 - 3) Expanded use case: describing *step by step how the actor and the system interact* to accomplish the business task using a *two column table*





Use Case Specification: 3 Levels of Abstraction

- ◆ Use Cases are classified into:
 - Abstract use case, e.g.:
 - Use Case: Initiate a call
 - High level use cases, e.g.:
 - This use case begins with (TUCBW) the caller picks up the phone and dials a number.
 - This use case ends with (TUCEW) the caller hears the ring tone.
 - Expanded Use Cases:
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Expanded Use Case

Actor: Caller	System: Telco
1. TUCBW the caller picks up the handset from the phone base.	2. The system generates a dial tone.
3. The caller dials each digit of the phone number.	4. The system responds with a DTMF tone for each digit dialed.
5. The caller finishes dialing.	6. The system produces the ring tone.
7. TUCEW the caller hears the ring tone.	

actor input and
actor action

system
response





Use Case Modeling

planning phase

incremental phase

requirements



Deriving use cases from requirements

abstract use cases (e.g., Initiate a Call)

Defining use case scope

abstract & high level use cases

Example high level use case:
TUCBW caller picks handset from base
TUCEW caller hears the ring tone.



Depicting use case contexts



Specifying actor-system interaction
(expanded use cases)





Steps for Use Case Modeling

- Step 1) Deriving (abstract) use cases from requirements
 - Step 2) Describing when and where each use case begins and when it ends (high level use cases).
 - Step 3) Depicting use case contexts according to subsystems/aspects using *Use Case Diagrams*.
 - Step 4) Relating use cases, and actors if desired.
 - Step 5) Specifying step by step how actor and system interact to accomplish the business task (for the actor) (expanded use cases).
- Steps 1)-4) are performed during the planning phase. Step 5 is performed during each increment.
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Deriving Use Cases from Requirements

- ◆ In the requirements specification, look for verb noun phrases or verb-nouns that indicate
 - “do something”
 - “something must be done” or
 - “perform some task”in the business domain.
- ◆ Verify the verb noun phrases using use case definition (next slide)





Verify the Use Cases Identified

- ◆ Verify the use cases identified using use case definition:
 - (1) Is it a business process? y/n
 - (2) Is it initiated by an actor? y/n
 - (3) Does it end with an actor? y/n
 - (4) Does it accomplish something useful for the actor? y/n
- ◆ All of the answers to the above questions must be “y”.





Identify Actor, System, & Subsystem

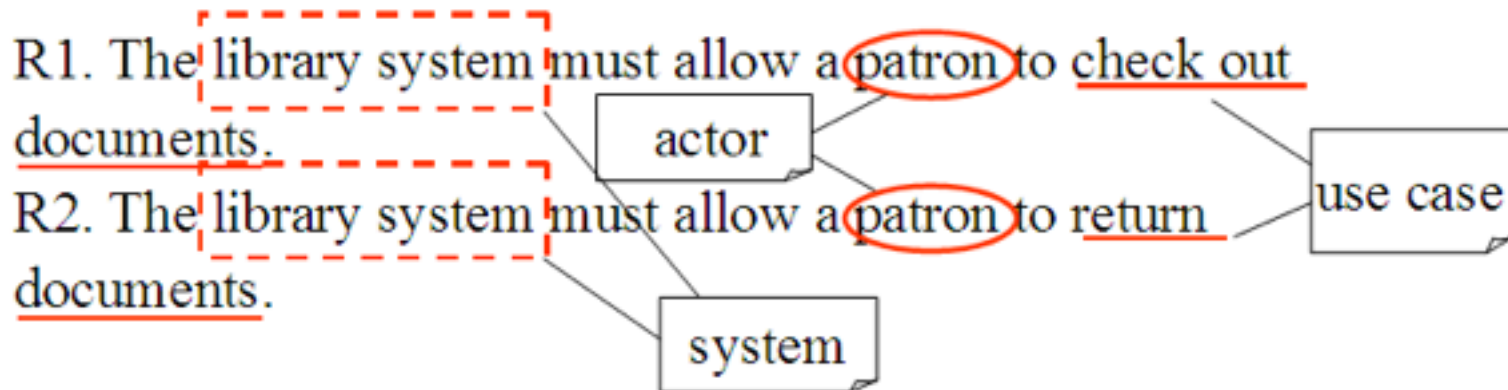
- ◆ From the requirements, identify also
 - the actors, who initiate the tasks, or for whom the tasks are performed
 - the system or subsystem that the use case belongs to





Example: Library System

◆ Requirements of a library system:



System: Library System

Actor: Patron

Use Cases:

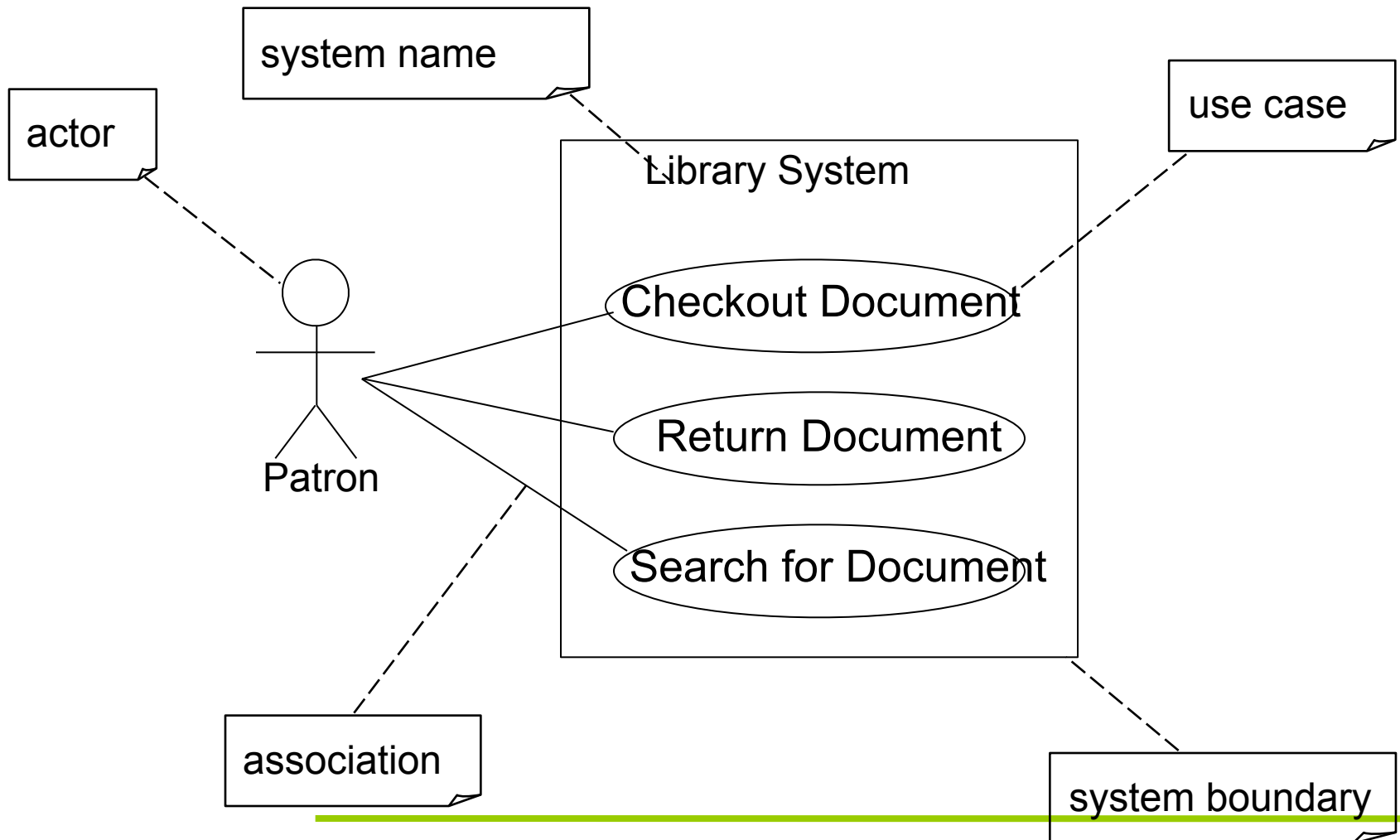
UC1: Checkout Document

UC2: Return Document





Use Case Diagram: Library Example





Class Exercises

Ex 1. What are the use cases for the Vending Machine?

Ex 2. Banking system.

- State two requirements for a banking system.
- Derive use cases from the requirements.

Ex 3. 您的工程实践项目.

- State 3-5 requirements for your team project.
- Derive use cases from these requirements.
- Finish Requirements Analysis Document





High Level Use Case

- ◆ Definition: A high level use case specification is a description of when and where the use case begins and when it ends.
- ◆ It is formulated using third person, simple present tense:
 - This Use Case Begins with (TUCBW) <when and where it begins>.
 - This Use Case Ends with (TUCEW) <when it ends>.





High Level Use Case Example

Use Case: *Withdraw Money* (from an ATM)

TUCBW the ATM user inserts an ATM card into the card slot.

TUCEW the ATM user receives the correct amount of cash and a withdraw slip.

Use Case: *Search for Programs*

TUCBW a SAMS user clicks the "Search for Programs" link on any of the SAMS pages.

TUCEW the user sees a list of programs satisfying the search criteria.





Expanded Use Case

- ◆ describing *step by step how the actor and the system interact* to accomplish the business task using a *two column table*





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谢谢大家！

References

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