Lecture # 25

Use Case Modeling - I

Introduction - 1

- No system exists in isolation. Every interesting system interacts with human or automated actors that use that system for some purpose, and those actors expect that system to behave in predictable ways

Introduction - 2

- A use case specifies the behavior of a system or part of a system
- It is a description of a set of sequences of actions, including variants, that a system performs to yield an observable result of value to an actor

Introduction - 3

- They are used in requirements elicitation process
- Use cases are applied to capture the intended behavior of the system under development, without having to specify how the behavior is implemented
- They provide a way for developers, end users, and domain experts to come to a common understanding

Introduction - 4

- Use cases serve to help validate the architecture and to verify the system as it evolves during development
- Use cases are realized by collaborations whose elements work together to carry out each use case

Introduction - 5

- Well-structured use cases denote essential system or subsystem behaviors only
- They are neither overly general nor too specific

How Things Are Used in Real World?

- A house is built around the needs of occupants
  - How they will use their house?
- A car is built around the needs of drivers and passengers
  - How will they use that car?
- This is en example of use case-based analysis

Use Cases - 1

- Use case is a description of a set of sequences of actions, including variants, that a system performs to yield an observable result of value to an actor
- There are a number of important parts to this definition

Use Cases - 2

- A use case describes a set of sequences, in which each sequence represents the interaction of the things outside the system (its actors) with the system itself
- A use case represents a functional requirement of the system as a whole

Use Cases - 3

- An actor represents a coherent set of roles that users of use cases play when interacting with these use cases
- Actors can be human or they can be automated systems

Use Cases - 4

- One central use case of a bank is to process loans
- In modeling a bank, processing a loan involves, among other things, the interaction between a customer and a loan officer

Use Cases - 5

- A use case may have variants
- In all interesting systems, you will find use cases that are specialized versions of other use cases, use cases that are included as part of other use cases, and use cases that extend the behavior of other core use cases

Use Cases - 6

- You can factor the common, reusable behavior of a set of use cases by organizing them according to these three kinds of relationships

Use Cases - 7

- A use case carries out some tangible amount of work
- From the perspective of a given actor, a use case does something that's of value to an actor
- In modeling a bank, a processing of loan results in the delivery of an approved loan

Use Cases - 8

- Use cases can be applied to the whole system, part of a system (including subsystems), and even individual classes and interface
- Use cases not only represent the desired behavior, but can also be used as the basis of test cases for these elements as they evolve during development

Use Cases - 9

- Use cases applied to whole system are excellent sources of integration and system tests
- Use cases applied to subsystems are excellent sources of regression tests
- The UML provides a graphical representation of a use case (an eclipse) and an actor (a stick figure)

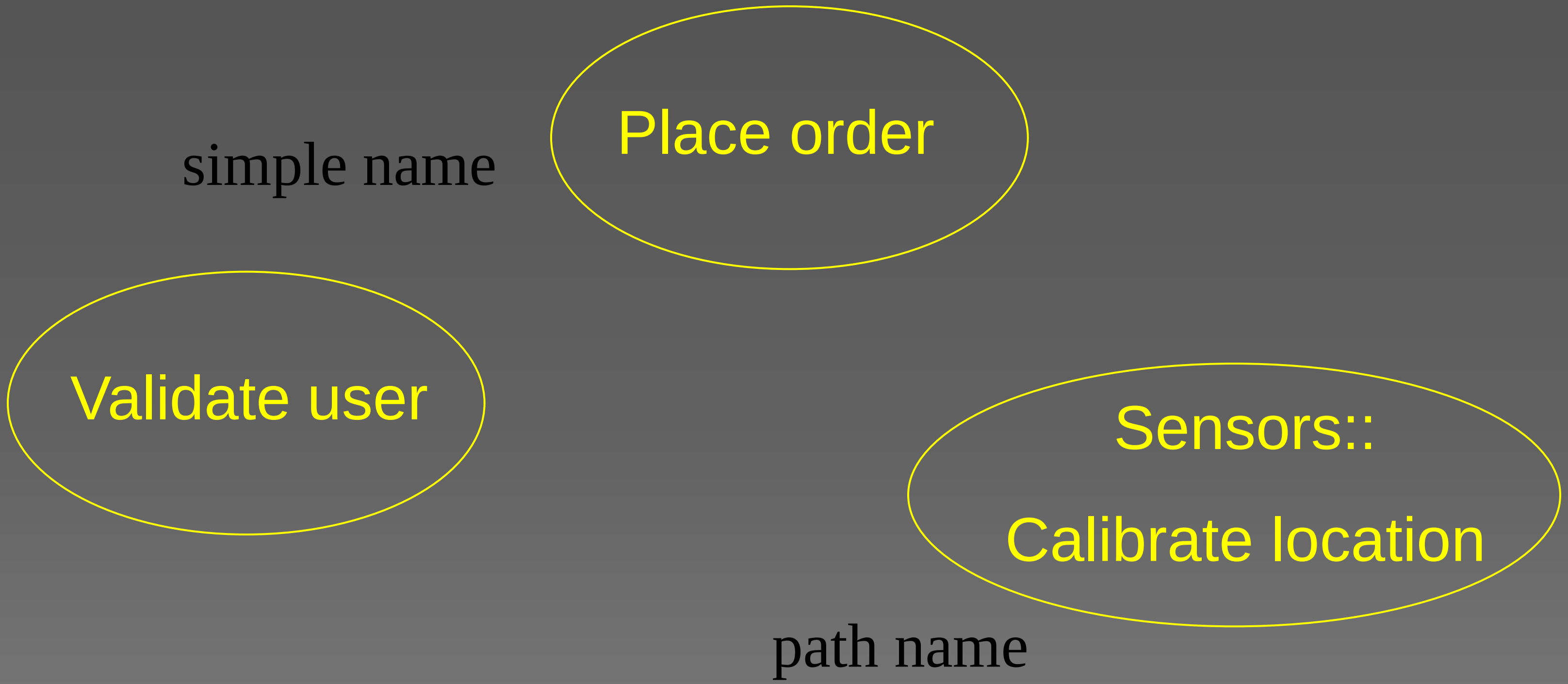
Use Case Names - 1

- Every use case must have a name that distinguishes it from other use cases
- A name is a textual string, consisting of any number of letters, numbers, and most punctuation marks
- In practice, use case names are short active verb phrases naming some behavior found in the vocabulary of the system being modeled

Use Case Names - 2

- A name alone is known as simple name
- A path name is the use case name prefixed by the name of the package in which that use case lives
- It must be unique within its enclosing package

Use Cases



simple name

Place order

Validate user

Sensors::

Calibrate location

path name

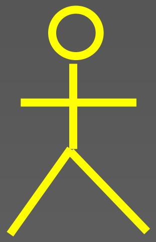
Actors - 1

- An actor represents a coherent set of roles that users of use cases play when interacting with the use cases
- Typically, an actor represents a role that a human, a hardware device, or even another system plays with a system

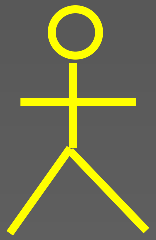
Actors - 2

- Actors can be of general kind
- They can also be specialized using generalization relationship

Actors

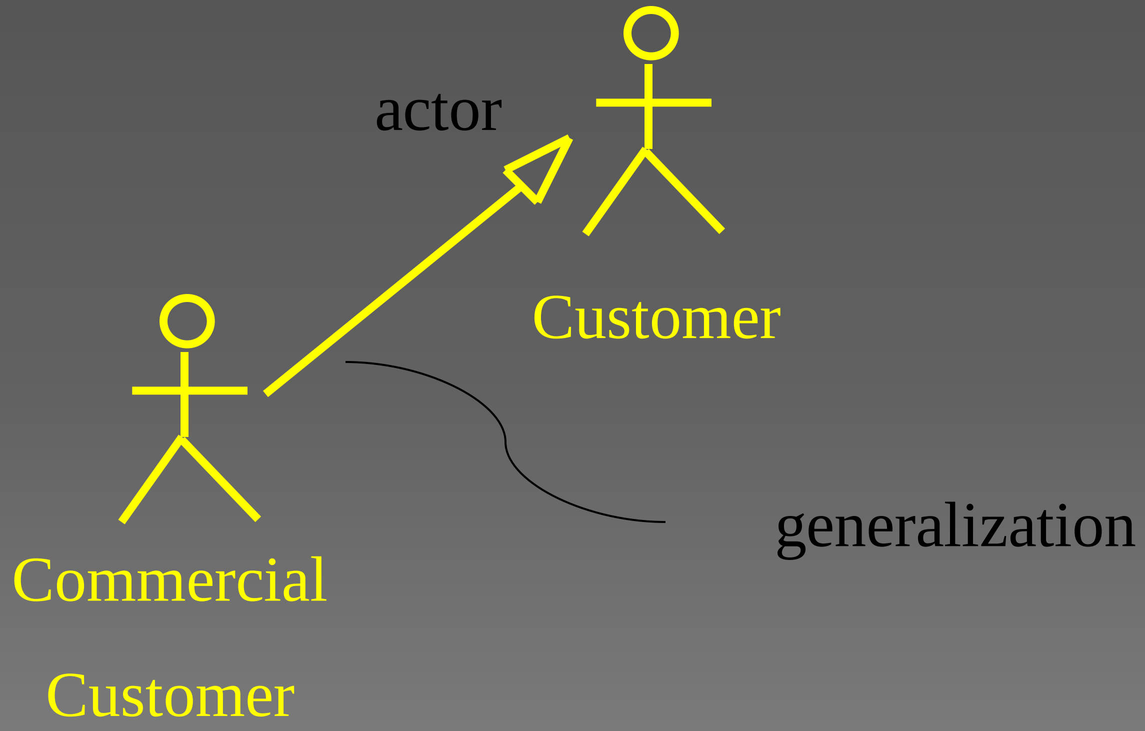


ATM User



Customer

Specialized Actors



Use Case Diagrams - 1

- A use case diagram is the diagram that shows a set of use cases and actors and their relationships
- It has a name and graphical contents that are a projection into a model

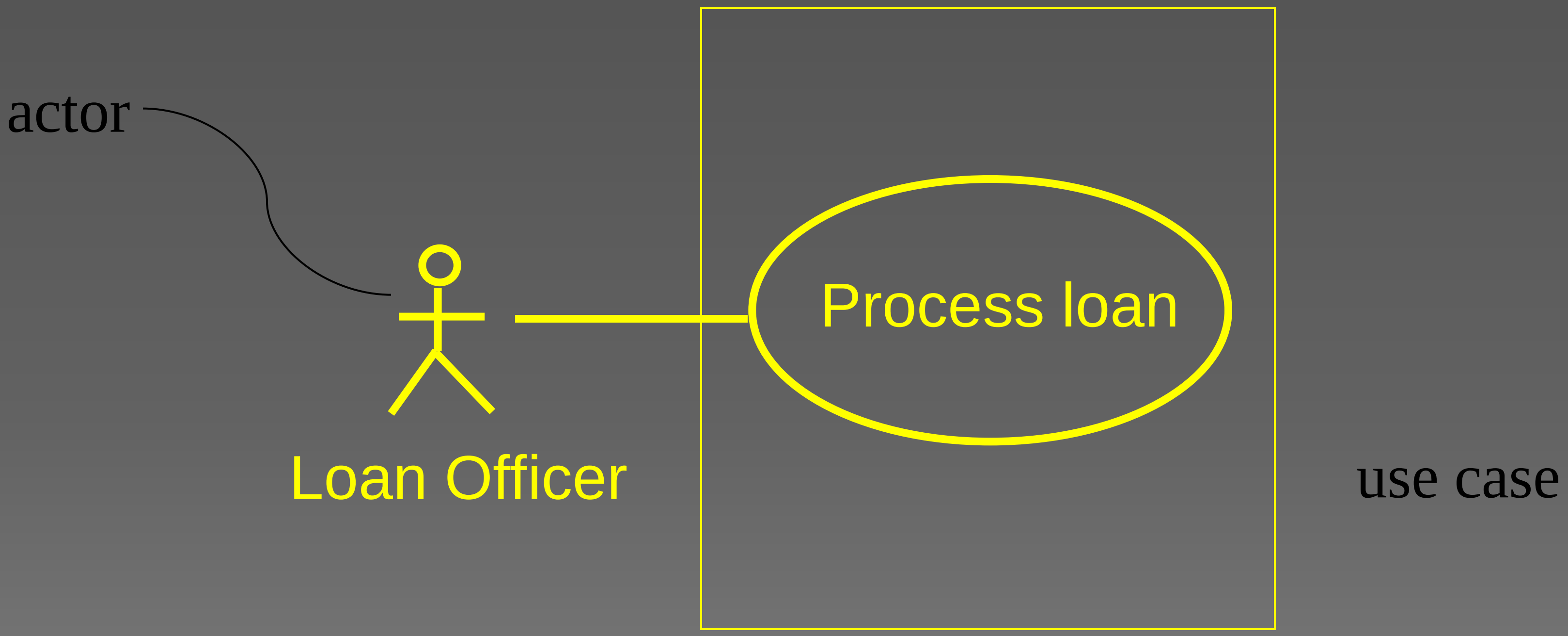
Contents of Use Case Diagrams

- Use cases
- Actors
- Dependency, generalization, and association relationships

Use Case Diagrams - 2

- Actors may be connected to use cases only by association
- An association between an actor and a use case indicates that the actor and the use case communicate with one another, each one possibly sending and receiving messages

A Use Case Diagram



Use Case Diagrams - 3

- Use case diagrams are used to model the use case view of the system being modeled
- This involves modeling the context of a system, subsystem, or class, or modeling requirements of the behavior of these elements

Identifying Use Cases - 1

- What functions will the actor want from the system?
- Does the system store information? What actors will create, read, update, or delete that information?
- Does the system need to notify an actor about changes in its internal state?

Identifying Use Cases - 2

- Are there any external events that the system must know about? What actor informs the system about those events?
- Startup, shutdown, diagnostics, installation, training, changing a business process

Documenting Use Cases - 1

- Includes basic functionality, alternatives, error conditions, preconditions, post-conditions
- Preconditions - the state the system must be in at the start of the use case
- Post-conditions - the state the system must be in at the end of the use case

Documenting Use Cases - 2

- Flow of events - a series of declarative statements listing the steps of a use case from the actor’s point of view
- Alternatives - allows a different sequence of events than what was used for the basic path

Summary

- Introduced the concept of Use Case Modeling
- Use case diagram contains Use Case, Actors and their Relationships
- The Use Case is documented by stating the flow of events from the actor’s point of view