

Introduction to System Behavior

Use Cases and System Sequence Diagrams
System Sequence Diagrams
In Class System Sequence Diagrams
Discussion Questions

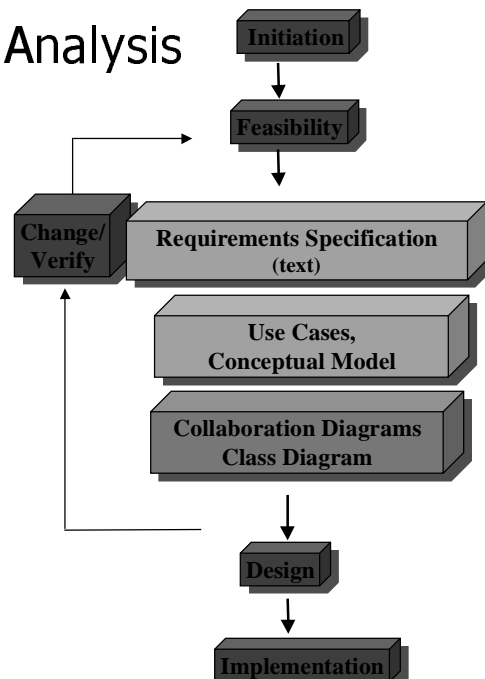
©1998 William N. Robinson

Questions Answered in This Lecture

- What is the relationship between a sequence diagram and a use case?
- What is a sequence diagram?

Object-Oriented Analysis

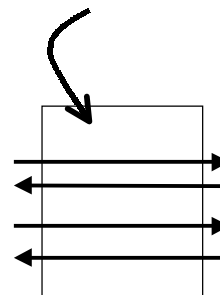
- Textual documentation
 - Describes system
 - Rationale
 - Requirements
- Multiple system models
 - Processing depicted in different views
 - Use case diagram (graph)
 - Sequence Diagram / Contracts (text)
 - Data depicted in different views
 - Conceptual model (graph)
 - Class diagram (graph)



Use Case and Sequence Diagrams

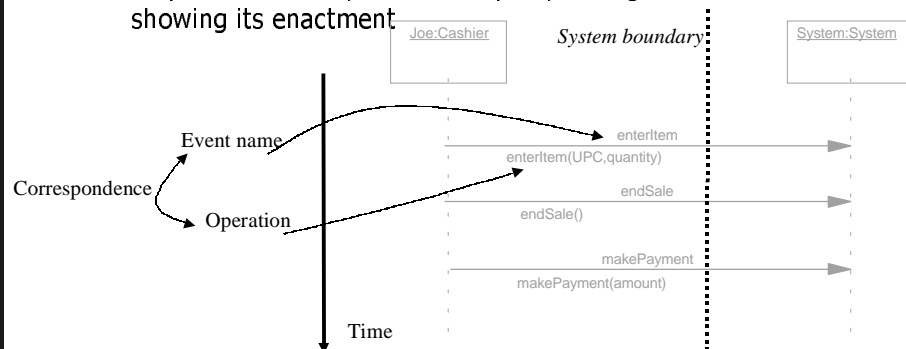
Use Case Details

- Use Case
 - A sequence of transactions in a system whose task is to yield a measurable value to an individual actor of the system
 - However, use case does not define the "sequence of transactions"
 - How does Buy Items work?
- Sequence Diagram
 - Elaborates on the operational details of a use case
 - A use case may have multiple sequence diagrams, each of which elaborates different aspects of the collaboration among agents



Sequence Diagram

- A graphic diagram used to illustrate actor interactions and the operations initiated by them
- Shows a particular scenario for a use case
 - A specific instance, or realized path, through a use case showing its enactment



Sequence Diagram Terminology

- System operation
 - an operation of the system that executes in response to a system event
- System event
 - an stimulus generated by an actor to a system
- Placement of operations
 - a stimulus event points toward an object
 - the object responds by executing an operation (of a similar or same name as the event)
 - an object receiving an event must contain corresponding operation

Building a Sequence Diagram

- From a Use Case textual description
 - Draw an object (line) representing a system (component, subsystem) as a black box
 - Draw an actor (line) for each actor that operates on the system
 - Draw the (external) events each actor generates, from the actor to the system
 - Draw any responses the system generates, from the system to an actor

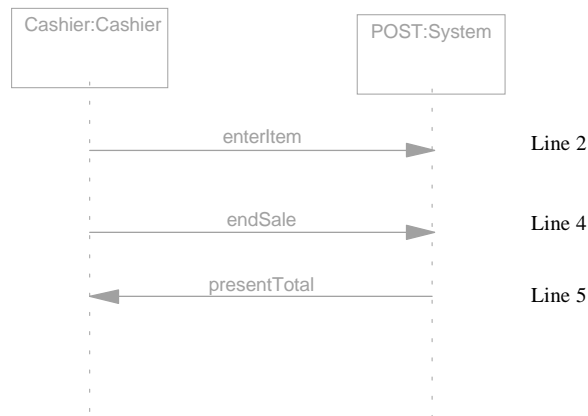
Use Case: Buy Items

Actor Action

System Response

- | | |
|---|---|
| <p>1 This use case begins when the Customer arrives at the POST checkout with items to purchase</p> | |
| <p>2 The Cashier <u>records each item</u>.
If there is more than one of an item, the Cashier can enter the quantity as well</p> | <p>3 Determines the item price and adds the item information to the running sales transaction
The description and price of the current item are presented</p> |
| <p>4 On completion of the item entry, the Cashier indicates to the POST that item <u>entry is complete</u></p> | |
| <p>6 The Cashier tells the Customer the total</p> | <p>5 Calculates and <u>presents the sale total</u></p> |

A Buy Item Sequence Diagram



Distribution of Submarine Supplies Requirements



We are losing business due to our poor order processing and delivery. We mainly serve as a distribution center that consolidates produce and meats for submarine shops. However, we are not meeting our business objectives of profit, quality, responsiveness. Moreover, we are not as efficient as we would like, as our works spend an inordinate amount of time trying to use our current system. Things are a bit chaotic now...

- Your assignment
 - Draw a System Sequence Diagram
 - Focus on a specific subsystem

**Use
System Architect**

Discussion Questions

- Can sequence diagrams describe more than just message passing?
 - Can they describe an algorithm with conditional and iterative statements?
- I would like to outline an algorithm that implements an operation
 - Do I have to use sequence diagrams?
 - Can I create a textual description?