

CS3773 Software Engineering

Lecture 07 UML Interaction Diagrams

Interaction Diagram

- Models how objects collaborate to achieve results
- Is a holistic view of behavior across many objects
- Includes four kinds of diagrams
 - Sequence diagram
 - Communication diagram (collaboration diagram in UML 1.*)
 - Interaction overview diagram
 - Timing diagram

2

UTSA CS3773

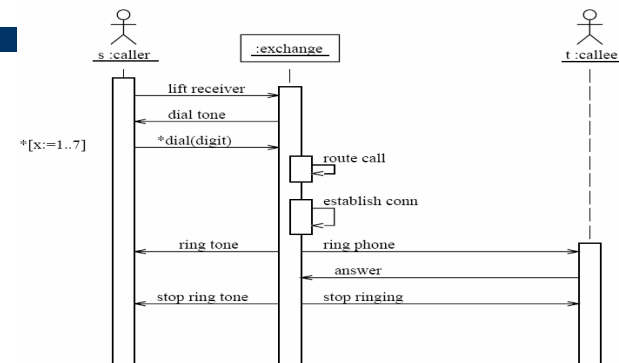
Sequence Diagram

- Sequence diagram captures the behavior of the system in a easy to understand way
- Sequence diagram describes top-level view of system interacting with environment
- Sequence show the reaction of the system to external events
- Sequence diagram emphasize the time-ordered sequence of messages sent and received

3

UTSA CS3773

Sequence Diagram - An Example



4

UTSA CS3773

Sequence Diagram - Syntax

- Column is an instance of the class
 - Name of the instance
 - Name of the class that the instance belongs to
- Vertical dashed line is lifeline of the instance
- Rectangle on life line is the focus of control (or activation), i.e., the period during which the instance is involved in the activity initiated at the top of the focus

5

UTSA CS3773

Sequence Diagram - Syntax

- Horizontal arrow expresses messages conveyed by source instance to target instance
- Messages may be conditional: [cond] msg ()
- Looping arrow shows self-delegation: a lifeline sends a message to itself

6

UTSA CS3773

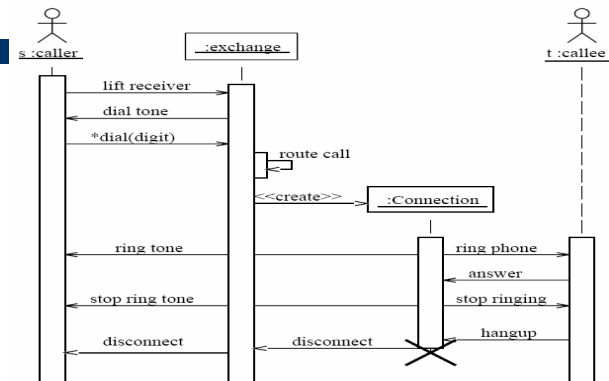
Use Case Realization

- Analysis classes realize the behavior specified in a use case
- Sequence diagrams realize the interaction of analysis classes in a use case
 - Demonstrate how the behavior is realized by passing messages among objects
- One sequence diagram depicts one scenario of a use case
 - Shows interactions between objects
 - Represents a snapshots of the running system

7

UTSA CS3773

Sequence Diagram - An Example



8

UTSA CS3773

Sequence Diagram - Advanced Features I

- As you elaborate the problem domain and specify in more detail the entities that the system senses and controls, some self-delegations become messages to these other entities
 - Create transient instances in response to a <<create>>
 - Destroy transient instances either because it receives a <<destroy>> message or because it destroys itself

9

UTSA CS3773

Sequence Diagram - Advanced Features II

- Shows states of an instance on the lifeline by using state invariants
- Expresses duration constraints on the lifeline
- Distinguishes between synchronous and asynchronous messages
 - Syntax for synchronous messages: filled arrowheads
 - Syntax for asynchronous messages: stick arrowheads

10

UTSA CS3773

Sequence Diagram - Advanced Features III

- Use combined fragments, which consists of a region of a sequence diagram, to represent
 - Loop: operator "loop"
 - Conditional: operator "opt"
 - Branching: operator "alt"
 - Interrupt: operator "break"
 - Reference: operator "ref"
 - Parallel: operator "par"
 - Atomicity: operator "critical"

11

UTSA CS3773

Reading Assignments

- UML Distilled
 - Chapter 12, "Use case realization"

12

UTSA CS3773