

Software analysis and design

Module 4: Interaction Diagrams

Objectives

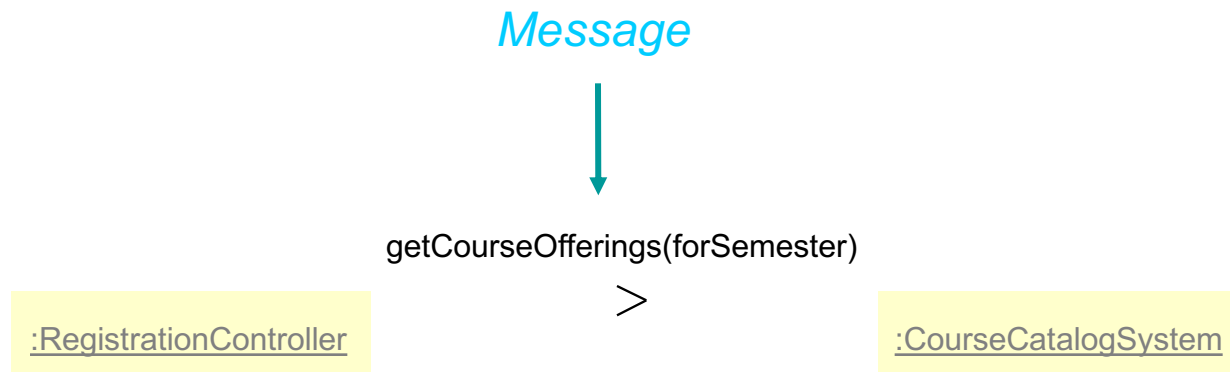
- Describe dynamic behavior and show how to capture it in a model.
- Demonstrate how to read and interpret:
 - A sequence diagram
 - A communication diagram
- Explain the similarities and differences between communication and sequence diagrams.

Objects Need to Collaborate

- Objects are useless unless they can collaborate to solve a problem.
 - Each object is responsible for its own behavior and status.
 - No one object can carry out every responsibility on its own.
- How do objects interact with each other?
 - They interact through messages.

Objects Interact with Messages

- A message shows how one object asks another object to perform some activity.

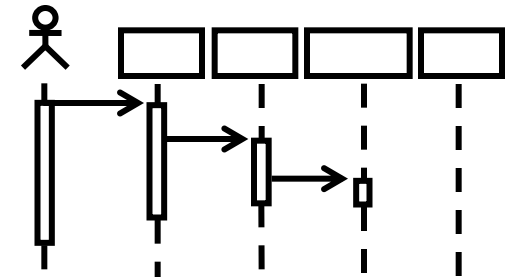


What is an Interaction Diagram?

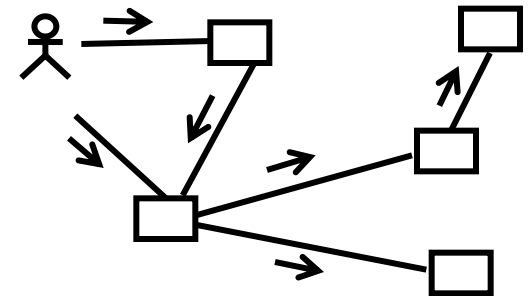
- Generic term that applies to several diagrams that emphasize object interactions
 - Sequence Diagram
 - Communication Diagram
- Specialized Variants
 - Timing Diagram
 - Interaction Overview Diagram

Interaction Diagrams

- Sequence Diagram
 - Time oriented view of object interaction
- Communication Diagram
 - Structural view of messaging objects



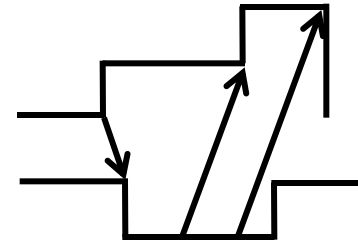
Sequence Diagrams



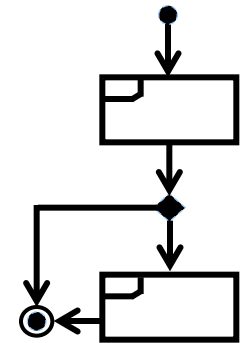
Communication Diagrams

Interaction Diagrams

- Timing Diagram
 - Time constraint view of messages involved in an interaction
- Interaction Overview Diagram
 - High level view of interaction sets combined into logic sequence



Timing Diagrams



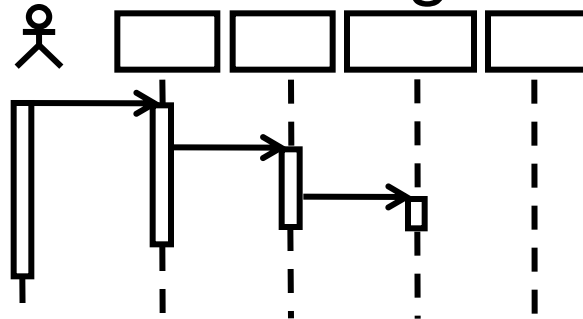
Interaction Overview Diagrams

Where Are We?

- ◆ Sequence diagrams
- ◆ Communication diagrams
- ◆ Interaction diagram comparison

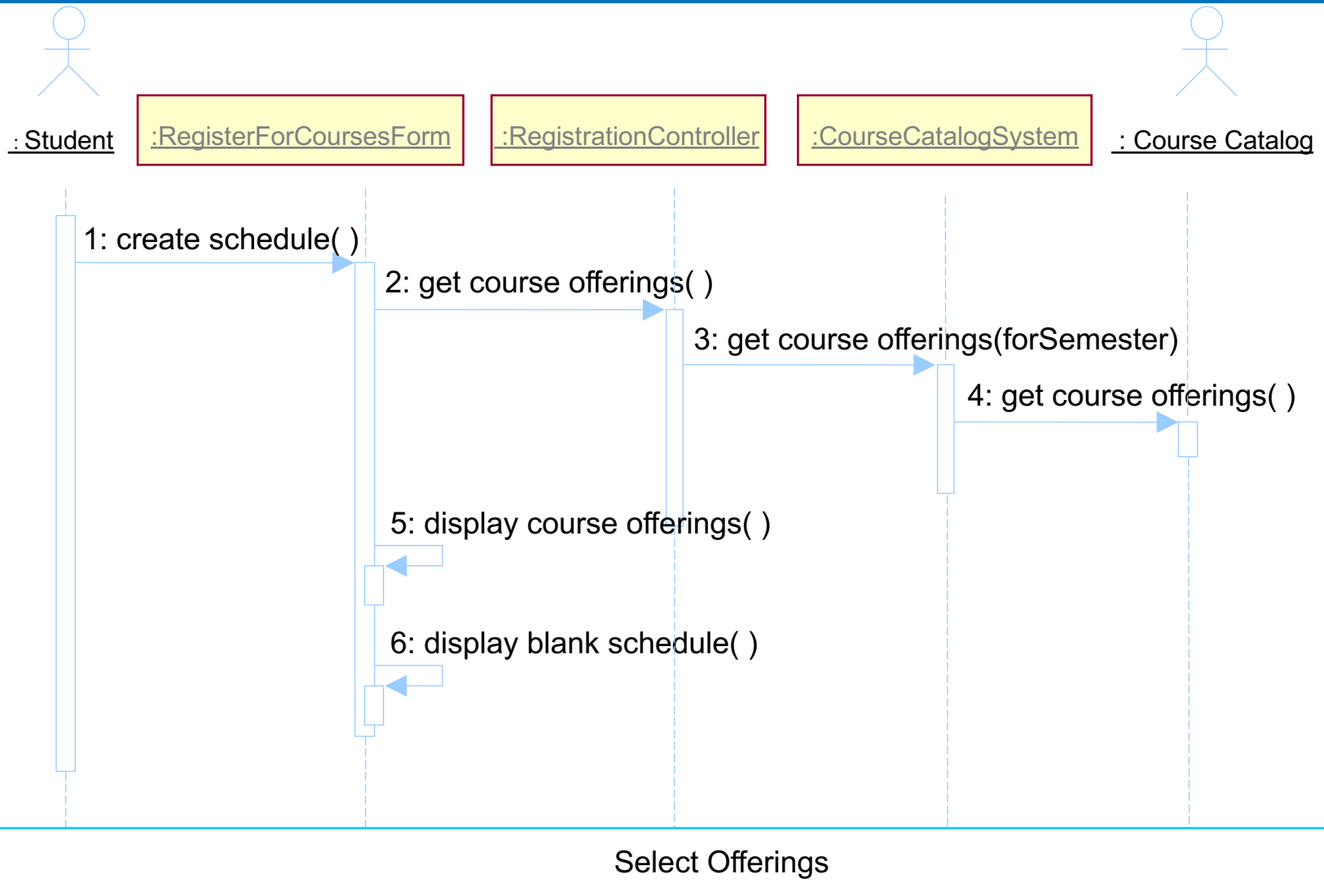
What Is a Sequence Diagram?

- A sequence diagram is an interaction diagram that emphasizes the time ordering of messages.
- The diagram shows:
 - The objects participating in the interaction.
 - The sequence of messages exchanged.

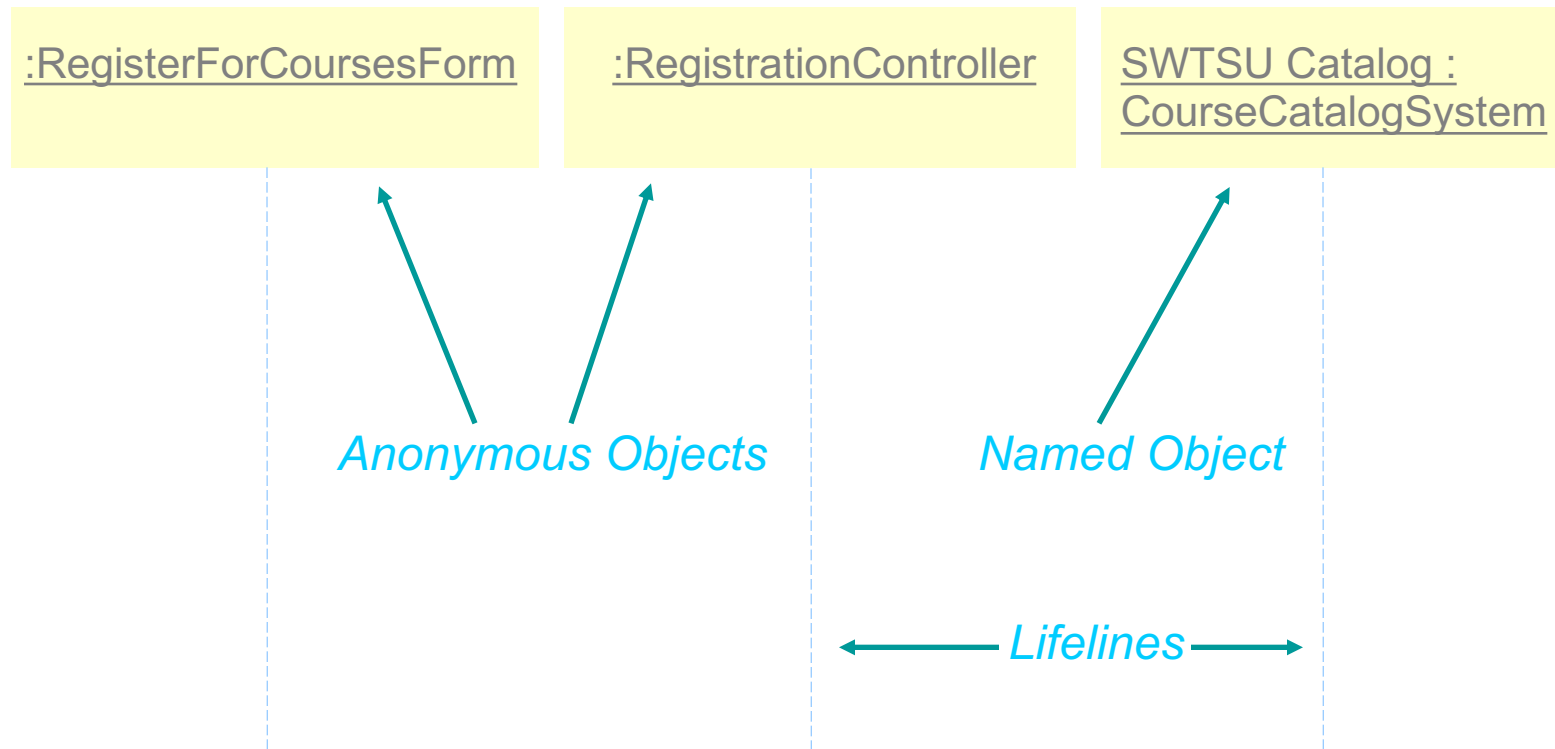


Sequence Diagram

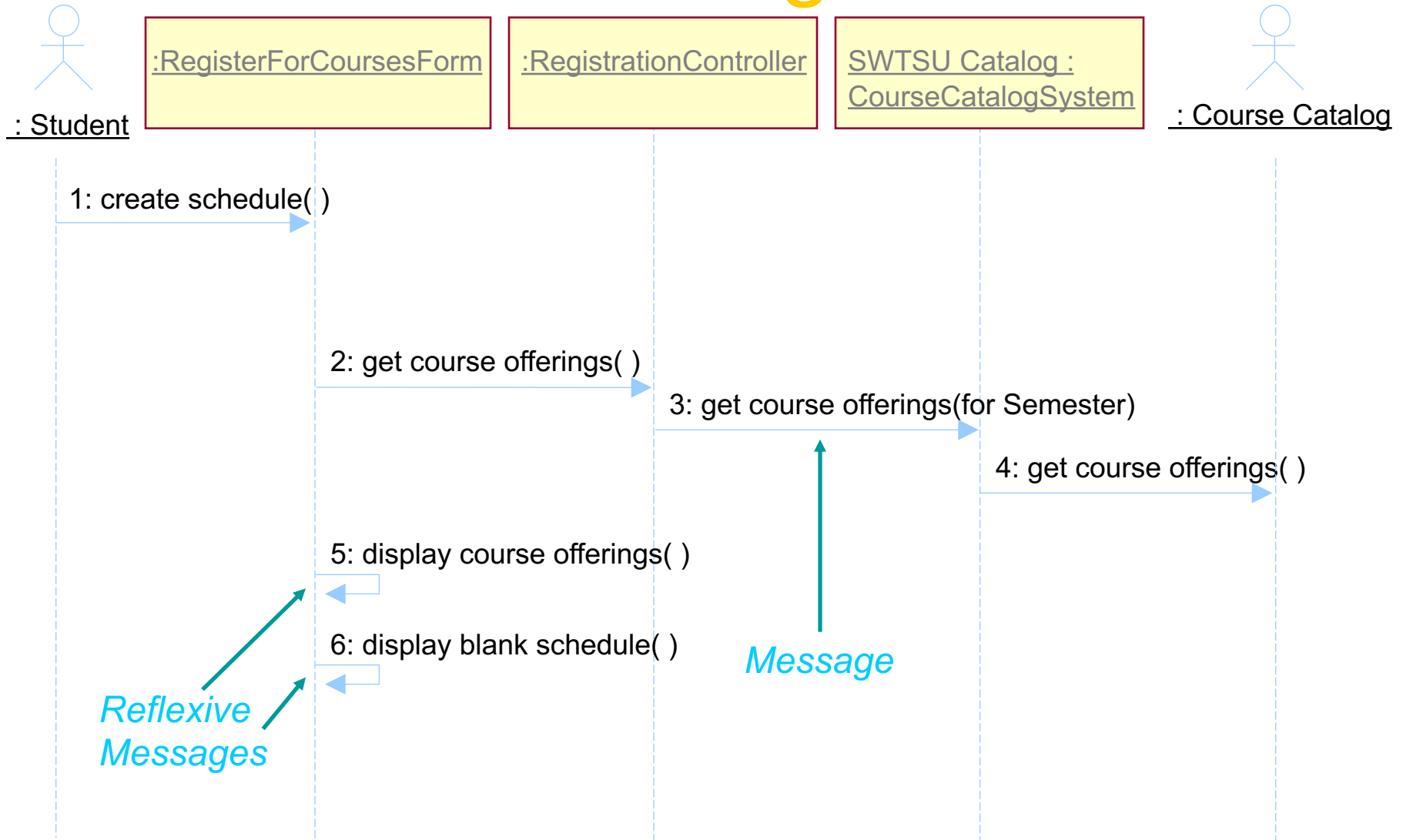
Example: Sequence Diagram



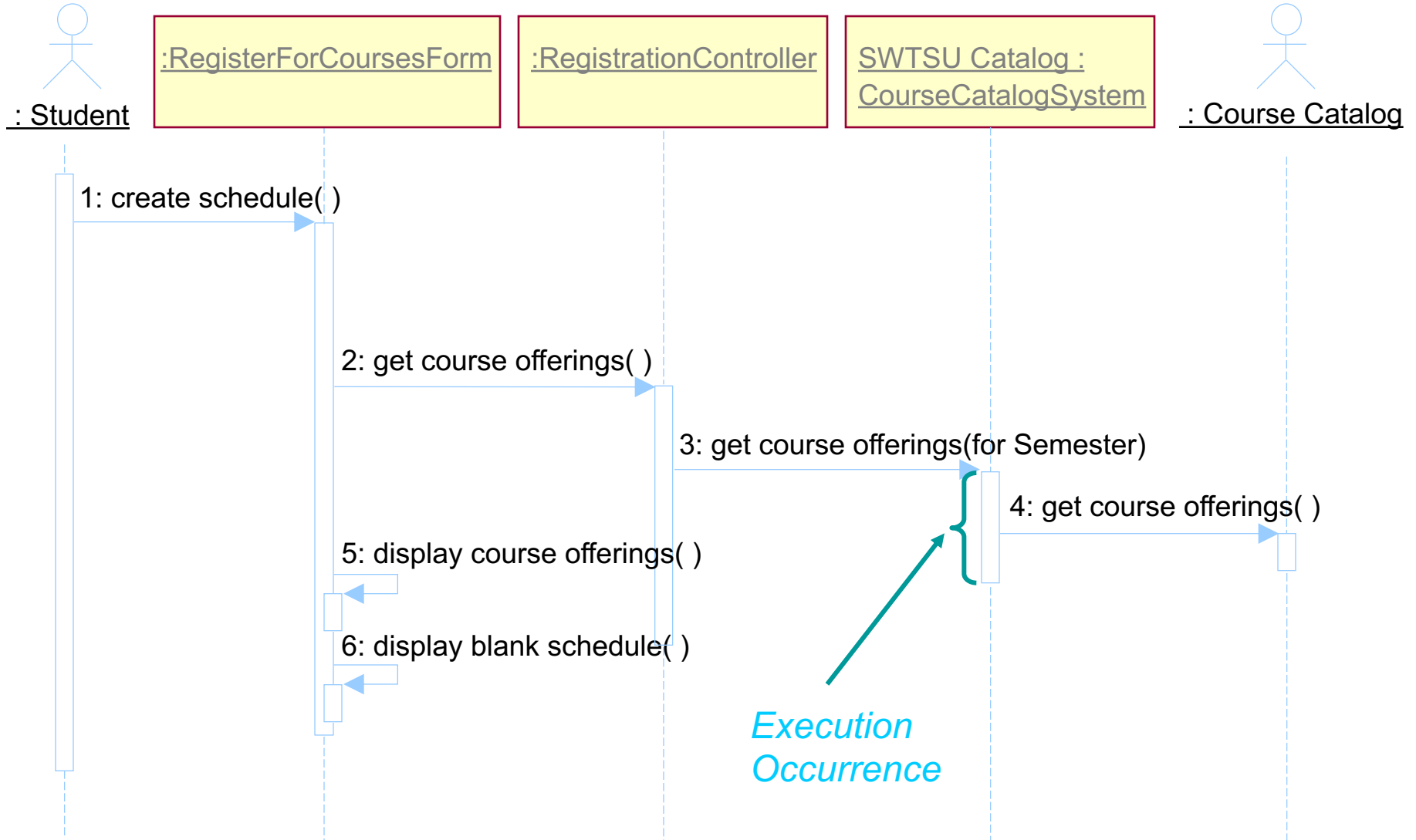
Sequence Diagram Contents: Objects



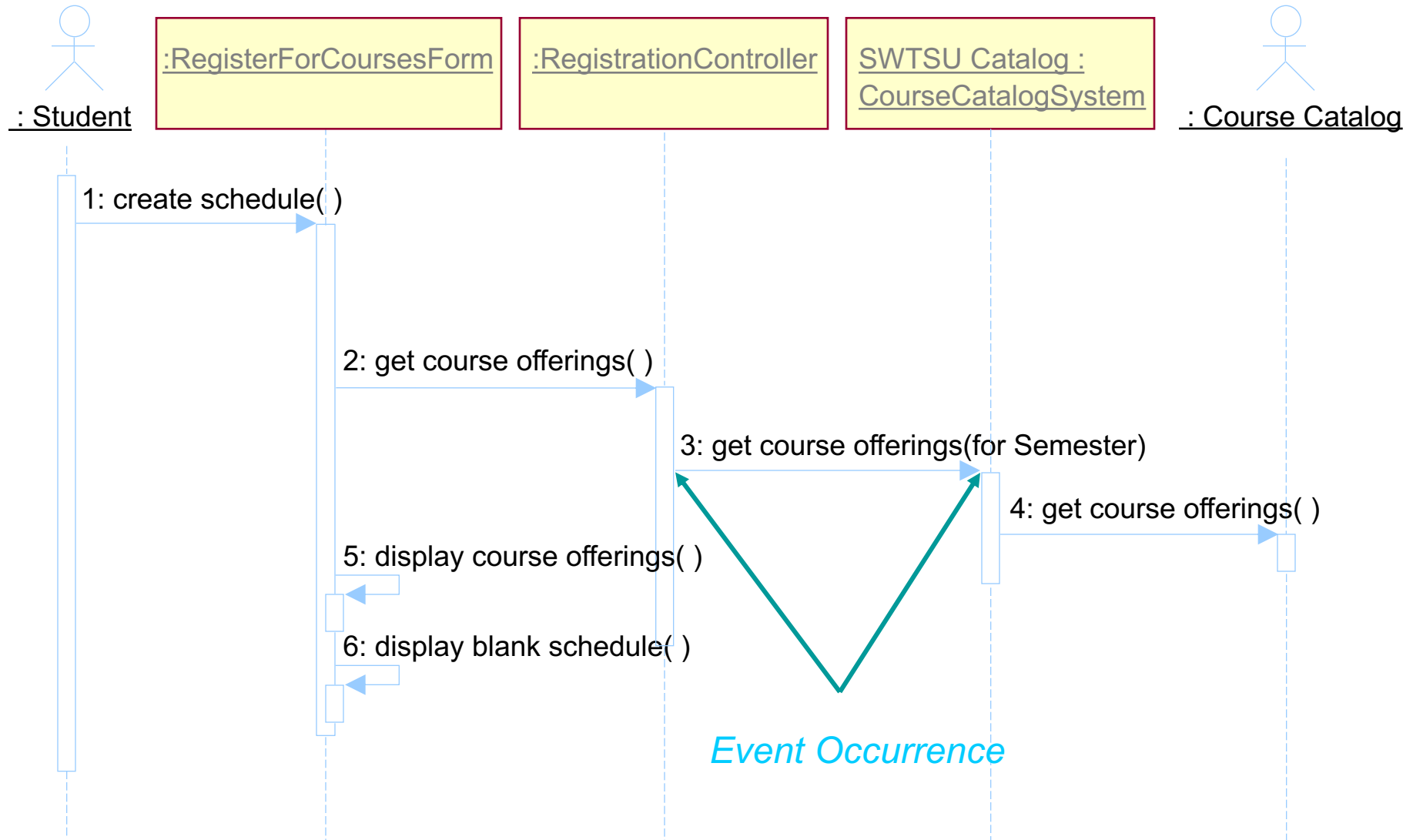
Sequence Diagram Contents: Messages



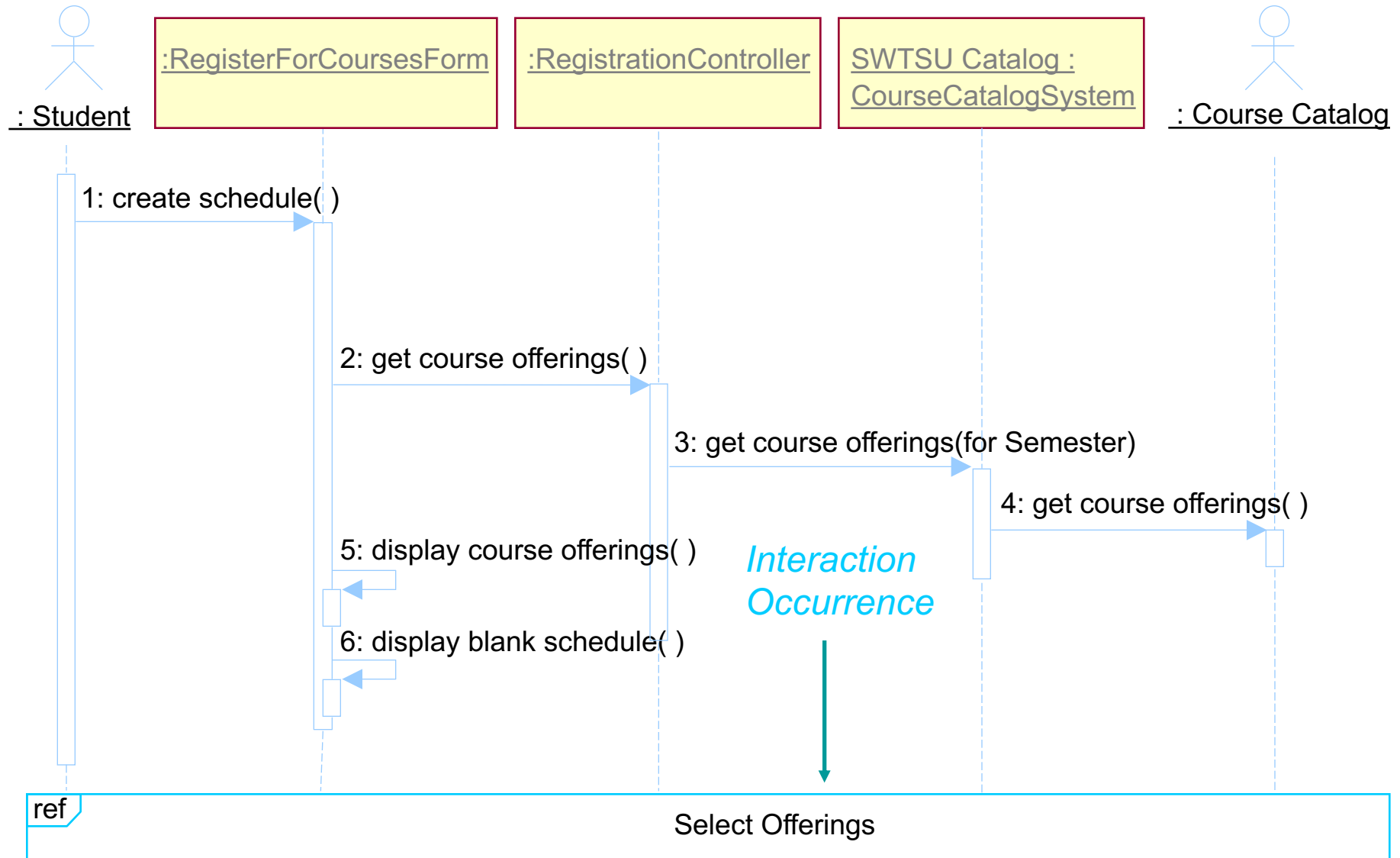
Sequence Diagram Contents: Execution Occurrence



Sequence Diagram Contents: Event Occurrence



Sequence Diagram Contents: Interaction Occurrence



Combined fragments

- ◆ Alternatives (Alt)

- ◆ Alternatives are used to designate a mutually exclusive choice between two or more message sequences

- ◆ Options (Opt)

- ◆ The option combination fragment is used to model a sequence that, given a certain condition, will occur; otherwise, the sequence does not occur

- ◆ Loops (Loop)

- ◆ Loop combination fragment is used to modeling a repeating sequence

Combined fragments

- ◆ Break (Break)

- ◆ The break combined fragment is almost identical in every way to the option combined fragment

- ◆ Parallel (Par)

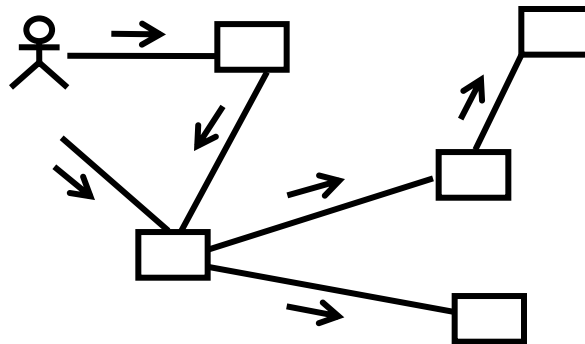
- ◆ The parallel combination fragment element needs to be used when creating a sequence diagram that shows parallel processing activities

Where Are We?

- ◆ Sequence diagrams
- ◆ **Communication diagrams**
- ◆ Interaction diagram comparison

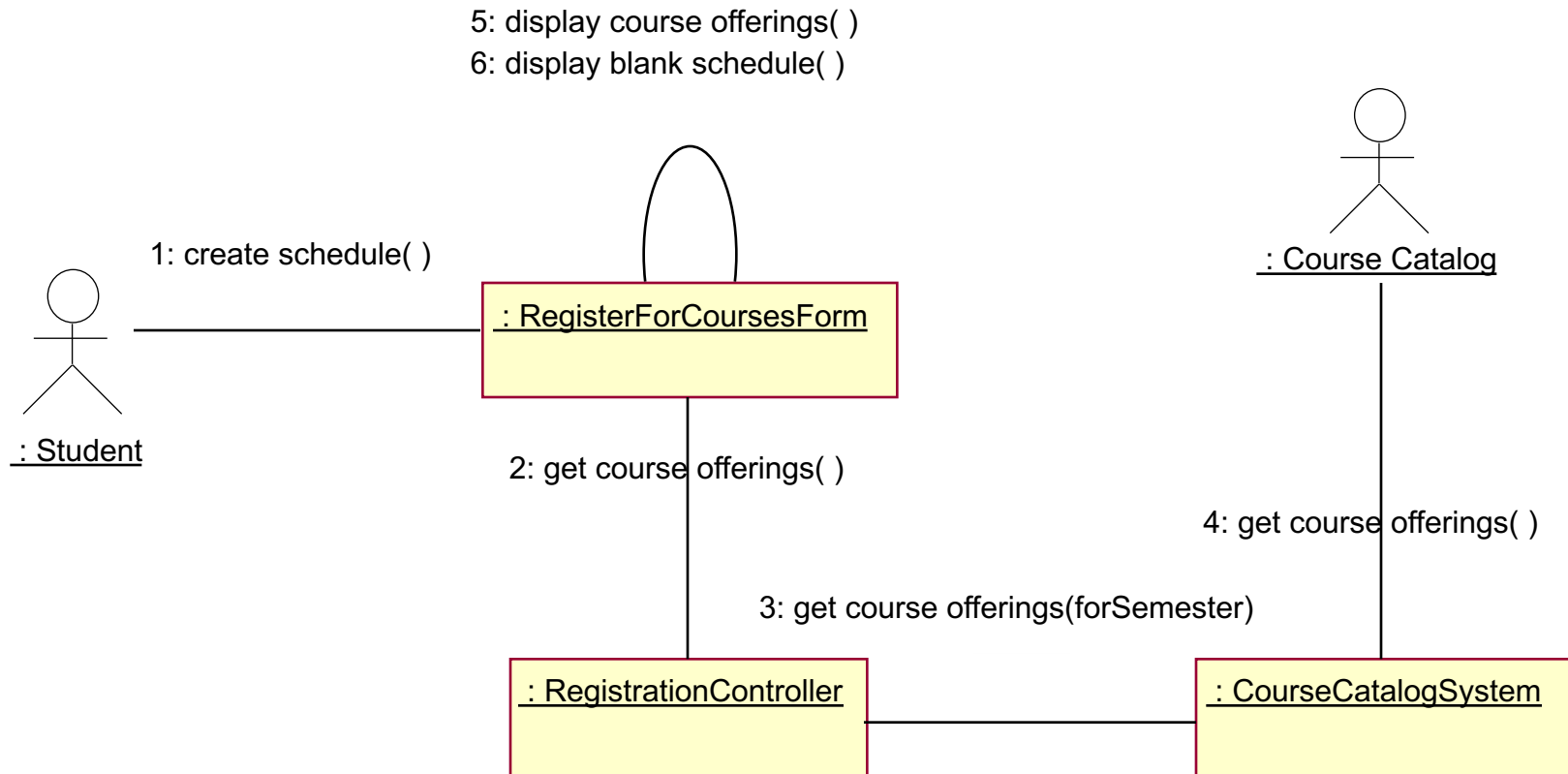
What Is a Communication Diagram?

- A communication diagram emphasizes the organization of the objects that participate in an interaction.
- The communication diagram shows:
 - The objects participating in the interaction.
 - Links between the objects.
 - Messages passed between the objects.



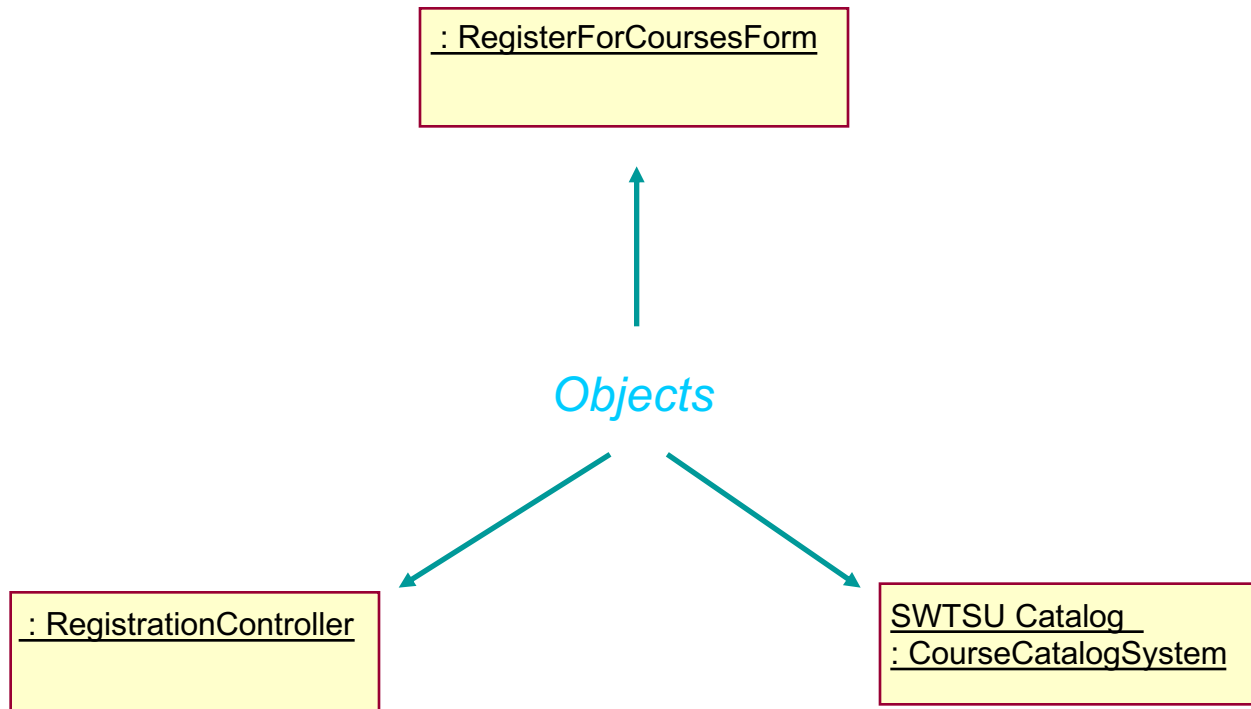
Communication Diagrams

Example: Communication Diagram



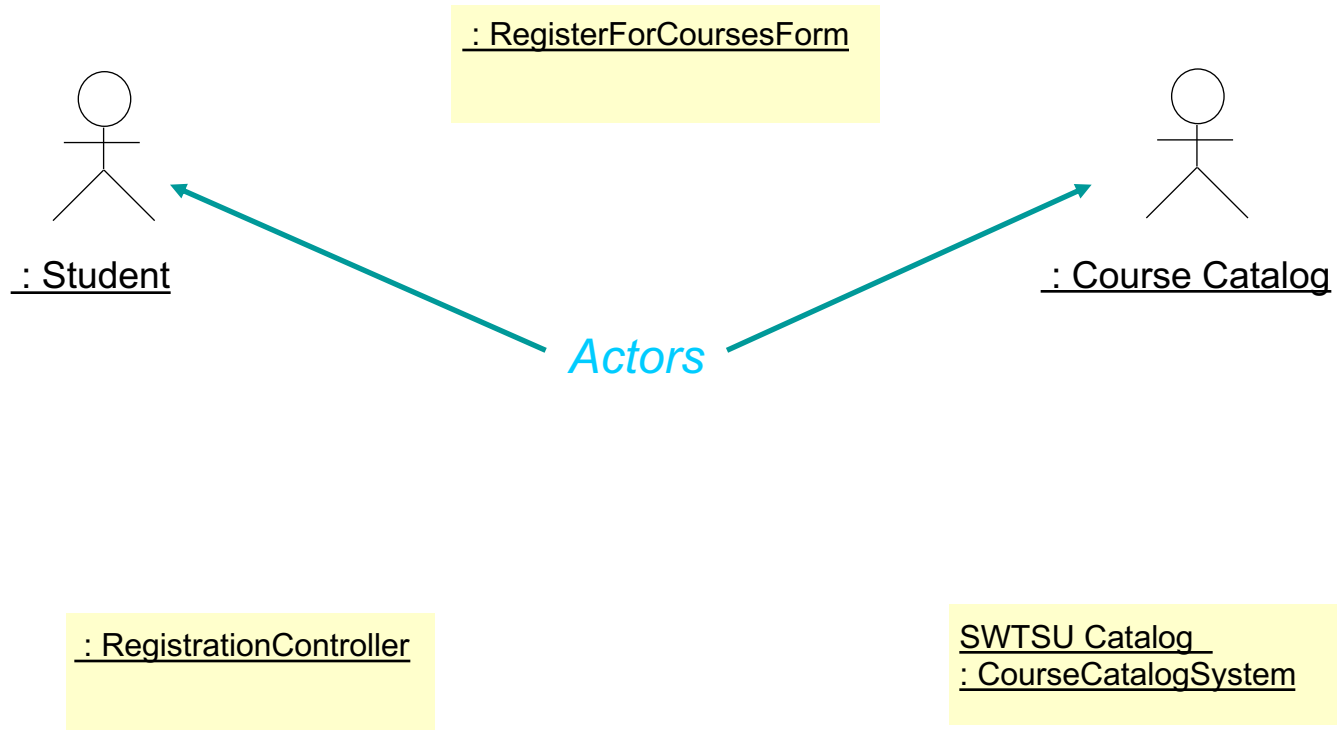
Communication Diagrams

Contents: Objects

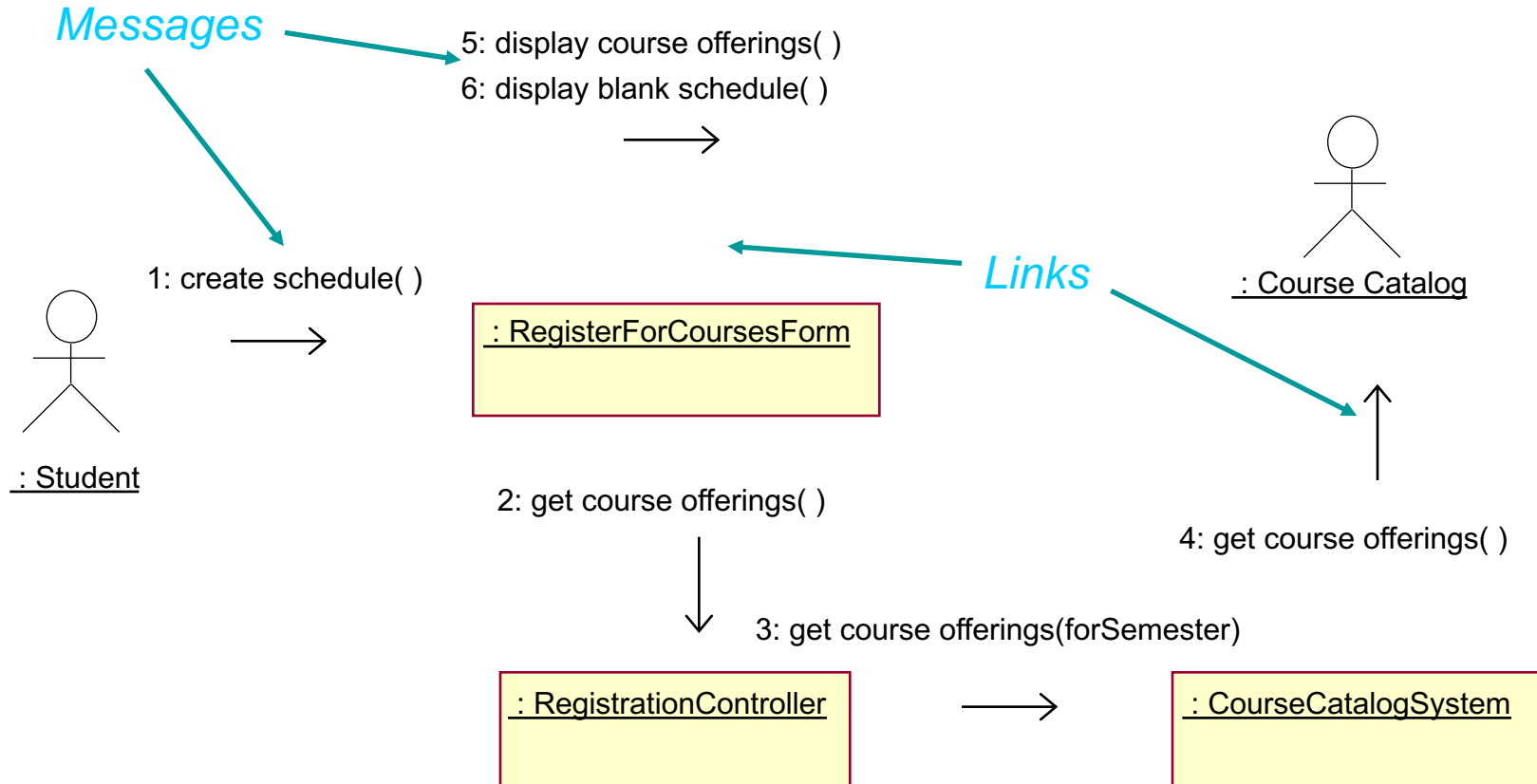


Communication Diagram

Contents: Actors



Communication Diagram Contents: Links and Messages



Where Are We?

- ◆ Sequence diagrams
- ◆ Communication diagrams
- ◆ Interaction diagram comparison

Sequence and Communication Diagram Similarities

- Semantically equivalent
 - Can convert one diagram to the other without losing any information
- Model the dynamic aspects of a system
- Model a use-case scenario

Sequence and Communication Diagram Differences

Sequence diagrams	Communication diagrams
<ul style="list-style-type: none">■ Show the explicit sequence of messages■ Show execution occurrence■ Better for visualizing overall flow■ Better for real-time specifications and for complex scenarios	<ul style="list-style-type: none">■ Show relationships in addition to interactions■ Better for visualizing patterns of communication■ Better for visualizing all of the effects on a given object■ Easier to use for brainstorming sessions

Review

- ◆ What is the purpose of an interaction diagram?
- ◆ What is a sequence diagram? A communication diagram?
- ◆ What is a timing diagram? An interaction overview diagram?
- ◆ What are the similarities between sequence and communication diagrams?
- ◆ What are the differences between sequence and communication diagrams?

