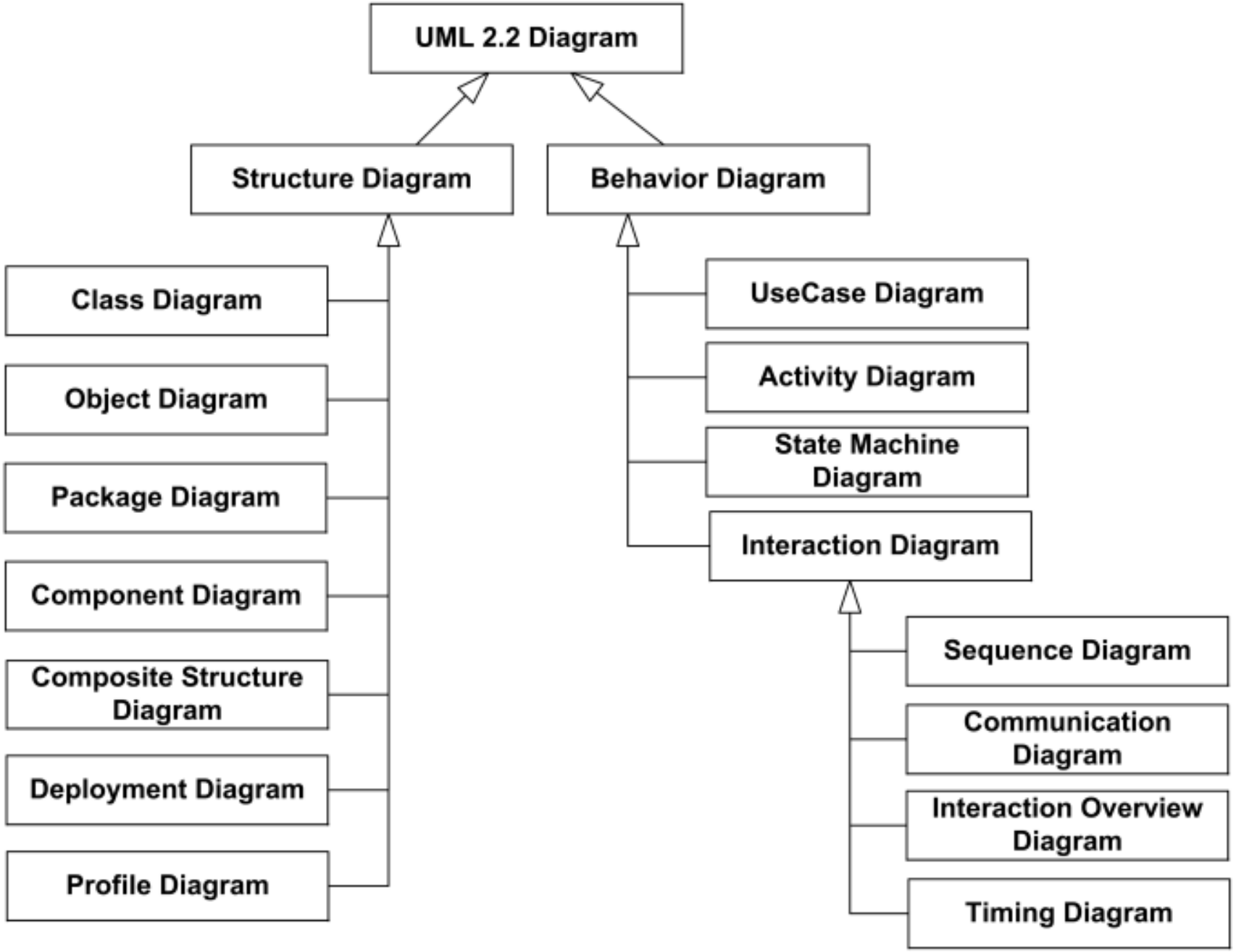
Communication Diagrams


UML 2.2 Diagram
Structure Diagram
Behavior Diagram
Class Diagram
Object Diagram
Package Diagram
Component Diagram
Composite Structure Diagram
Deployment Diagram
Profile Diagram
UseCase Diagram
Activity Diagram
State Machine Diagram
Interaction Diagram
Sequence Diagram
Communication Diagram
Interaction Overview Diagram
Timing Diagram

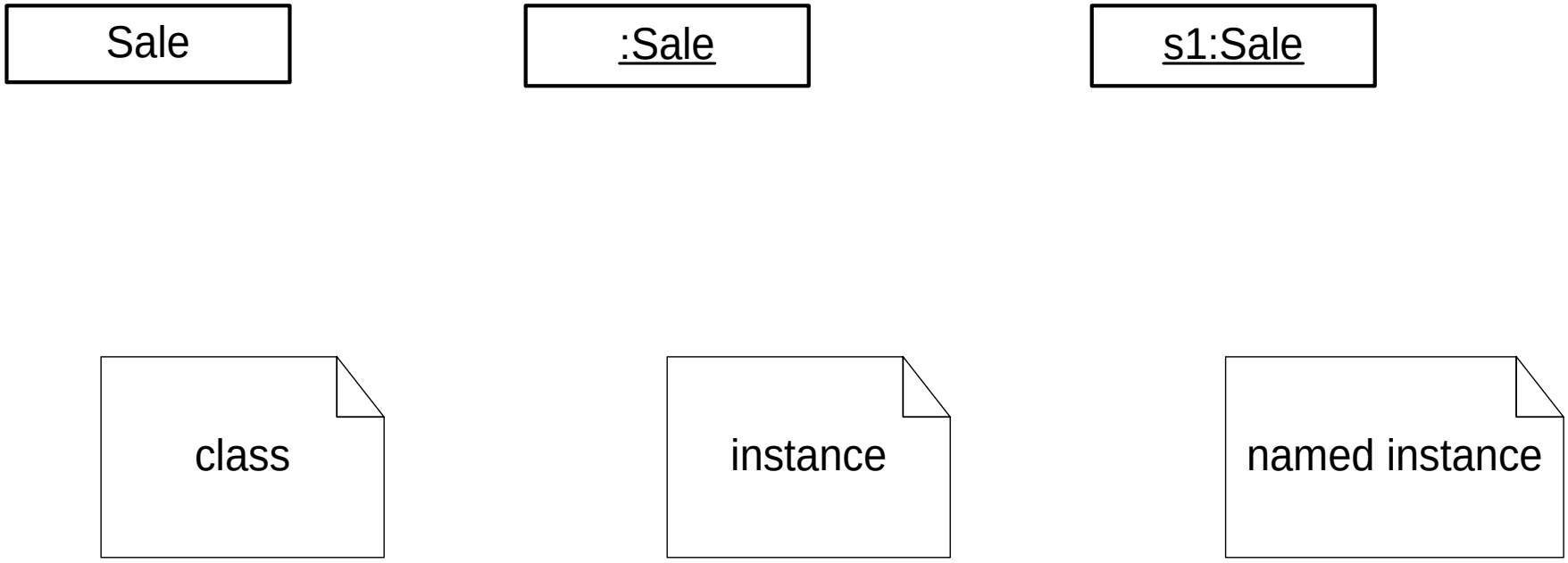
Introduction

- Interaction Diagrams are used to model system dynamics
  - How do objects change state?
  - How do objects interact (message passing)?

Communication & Sequence Diagrams

- An Interaction Diagram is a generalization of two specialized UML diagram types
  - Sequence Diagrams: Illustrate object interactions arranged in time sequence
  - Communication Diagrams: Illustrate object interactions organized around the objects and their links to each other

Common Interaction Diagram Notation



Collaboration

- A Collaboration is a collection of named objects and actors with links connecting them
- A Collaboration defines a set of participants and relationships that are meaningful for a given set of purposes
- Objects collaborate by communicating (passing messages) with one another in order to work together

Communication Diagrams

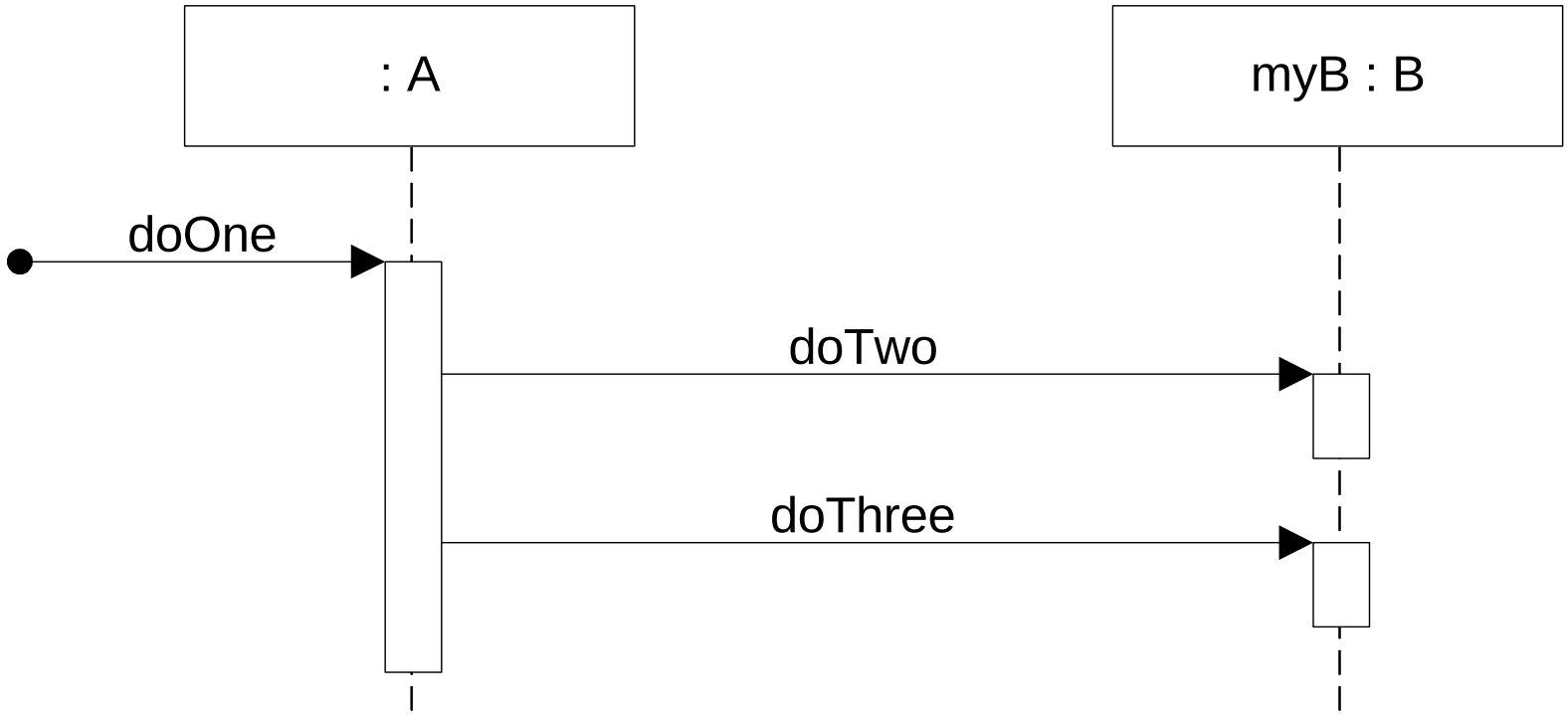
- Actors
  - Each Actor is named and has a role
  - One actor will be the initiator of the use case
- Objects
  - Each object in the collaboration is named and has its class specified

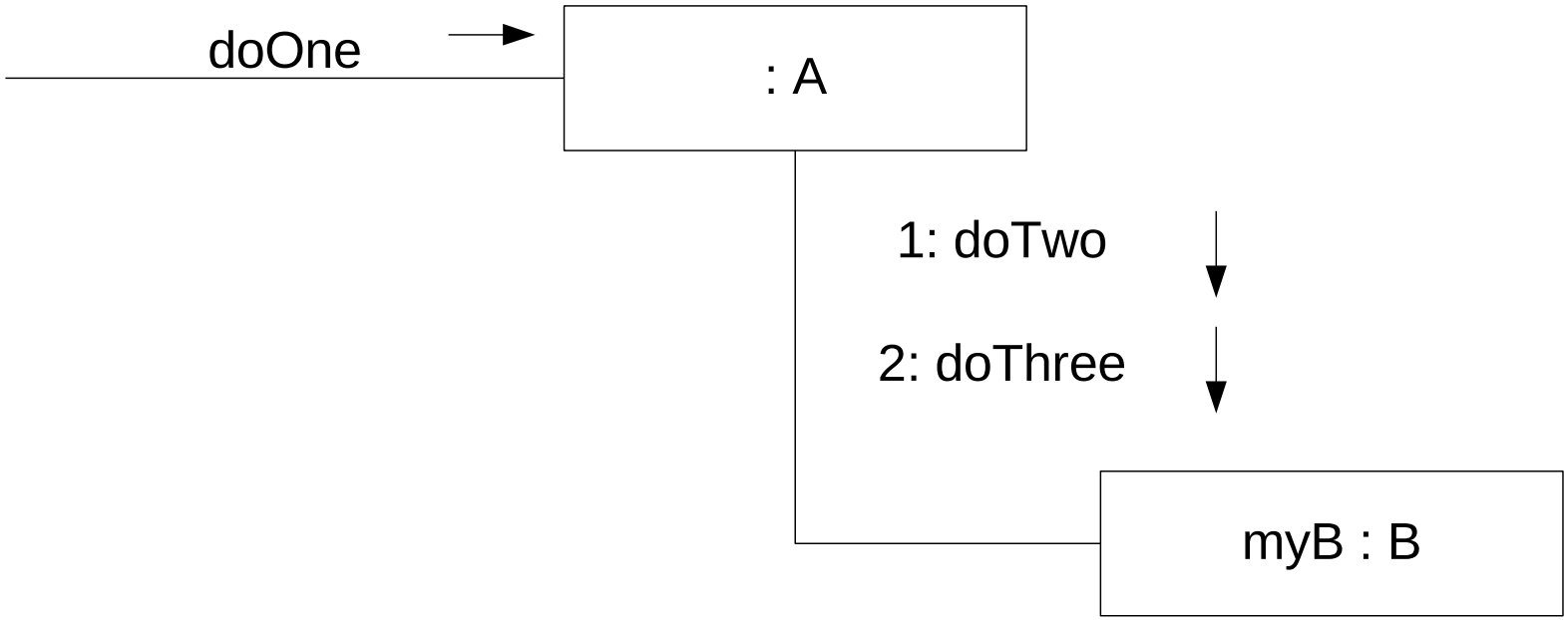
Communication Diagrams

- Not all classes need to appear
- There may be more than one object of a class

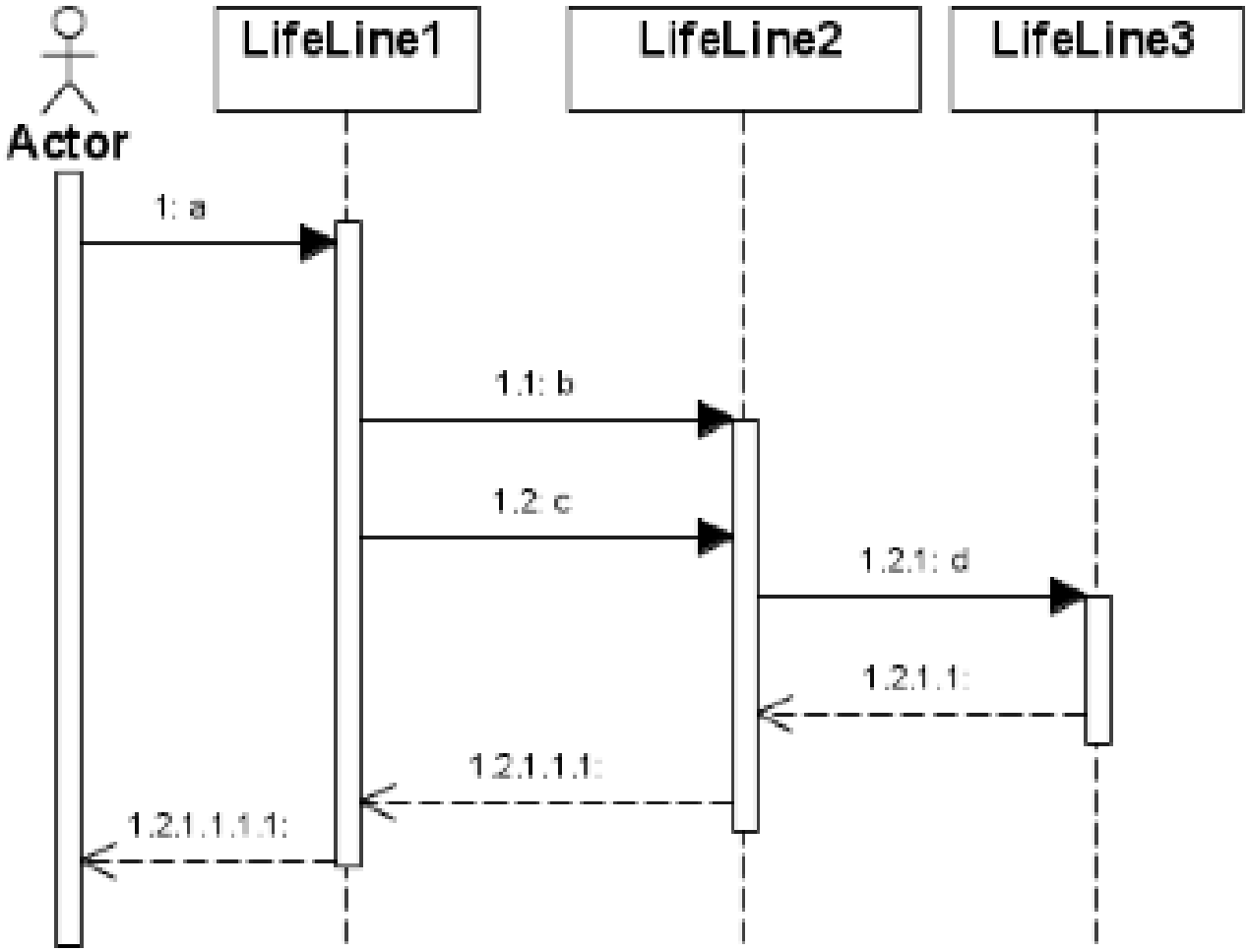
- Links
  - Links connect objects and actors and are instances of associations
  - Each link corresponds to an association in the class diagram

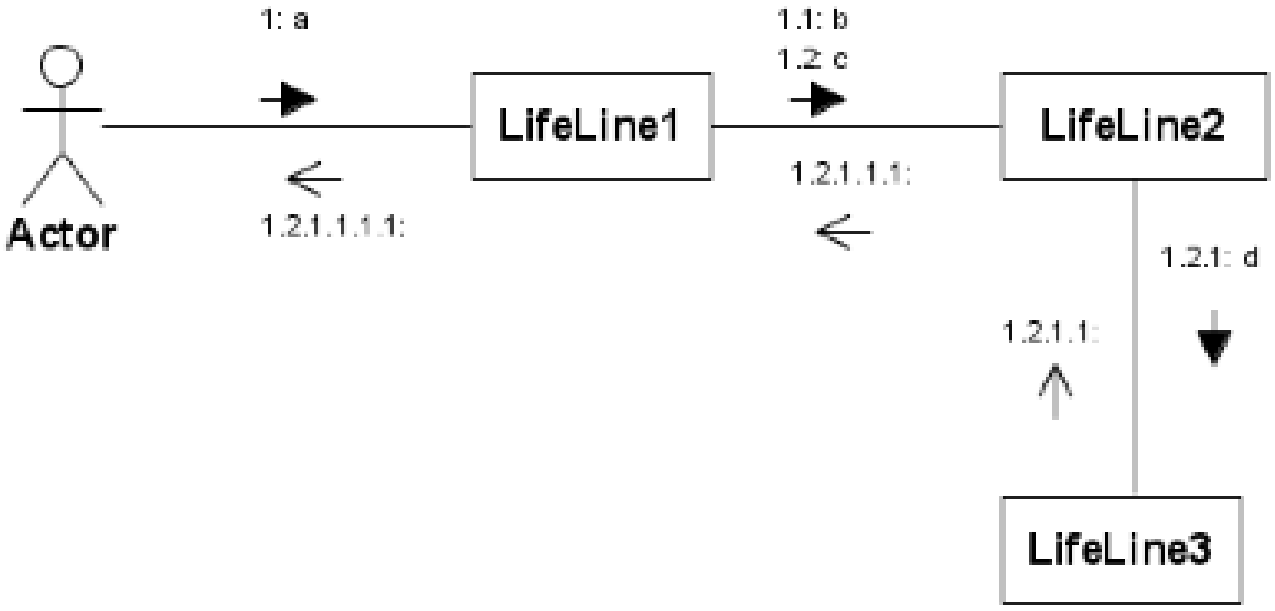
Communication vs. Sequence Diagram




doOne
: A
1: doTwo
2: doThree
myB : B

Communication vs. Sequence Diagram




1: a
1.1: b
1.2 c
LifeLine1
LifeLine2
Actor
1.2.1.1.1.1:
1.2.1.1.1:
1.2.1: d
1.2.1.1:
LifeLine3

Basic Communication Diagram Notation

- Link - connection path between two objects (an instance of an association)
- Message - represented with a message expression on an arrowed line between objects
- Sequence Number - represents the order in which the flows are used

Messages

- A message on a communication diagram is shown using an arrow from the message sender to the message receiver

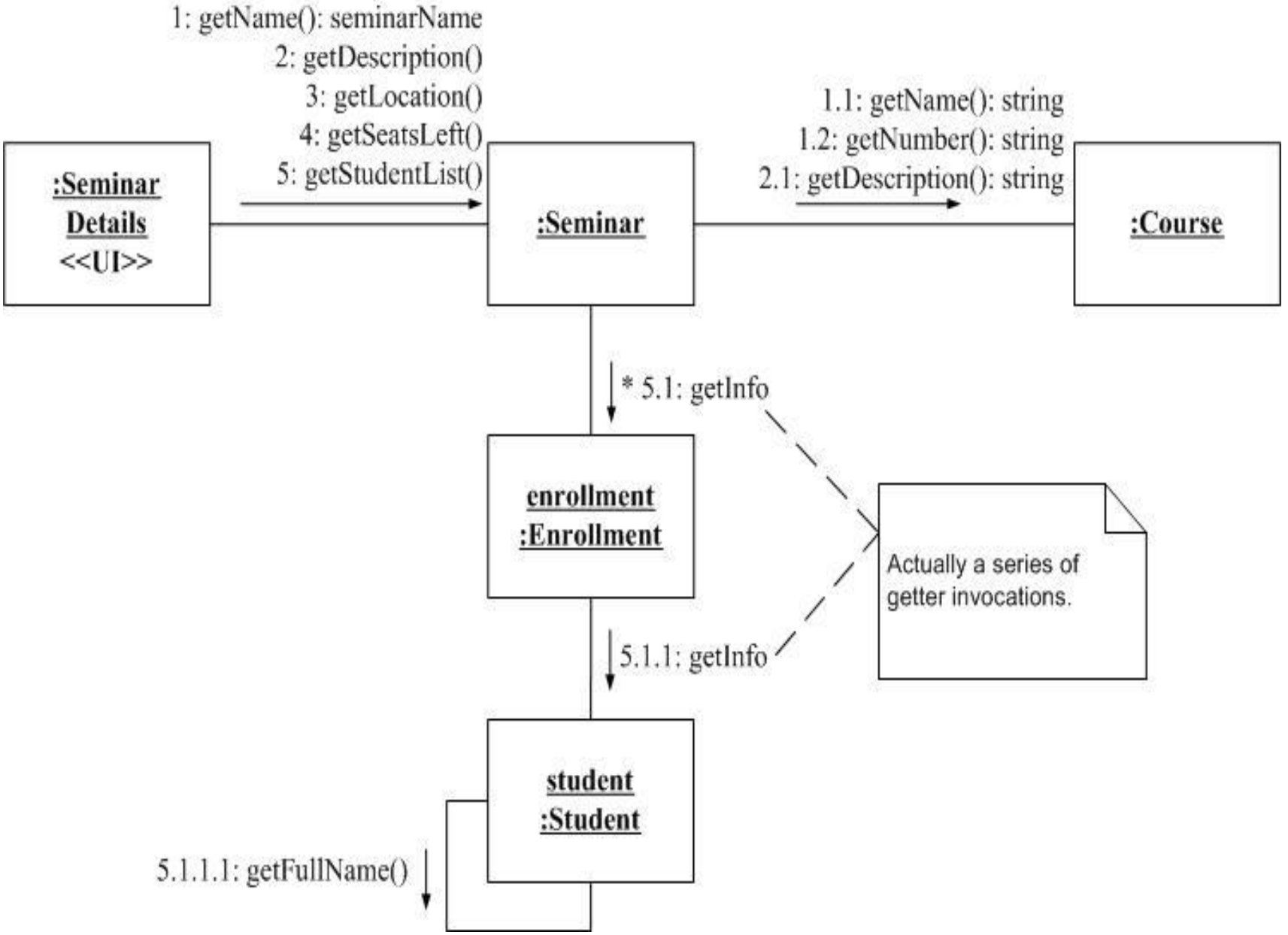
- Message Signature: return-value, message-name, argument-list

- Each message in a collaboration diagram has a sequence number. The top-level message is numbered 1. Messages sent during the same call have the same decimal prefix but suffixes of 1, 2, etc. according to when they occur.

Basic Communication Diagram Notation

- Conditional Message
  - Seq. Number *[variable = value]* : message()
  - Message is sent only if clause evaluates to *true*

- Iteration (Looping)
  - Seq. Number ** [i := 1..N]*: message()
  - “*” is required; [...] clause is optional


1: getName(): seminarName
2: getDescription()
3: getLocation()
4: getSeatsLeft()
5: getStudentList()
:Seminar Details <<UI>>
:Seminar
1.1: getName(): string
1.2: getNumber(): string
2.1: getDescription(): string
:Course
* 5.1: getInfo
enrollment :Enrollment
Actually a series of getter invocations.
5.1.1: getInfo
student :Student
5.1.1.1: getFullName()

Communication Diagrams

- The communication is implicit in a Sequence Diagram, rather than explicitly represented as in a Communication Diagram
- There is some redundancy between Communication and Sequence Diagrams
- They differently show how elements interact over time
- They document in detail how classes realize use cases

Communication Diagrams

- Communication Diagrams show relationship between objects
- Sequence Diagrams focus on the time in which events occur
- Communication Diagrams, formerly called Collaboration Diagrams

Interaction Diagram Strengths

- Communication Diagram
  - Space Economical - flexibility to add new objects in two dimensions
  - Better to illustrate complex branching, iteration, and concurrent behavior
- Sequence Diagram
  - Clearly shows sequence or time ordering of messages
  - Simple notation

Interaction Diagram Weaknesses

- Communication Diagram
  - Difficult to see sequence of messages
  - More complex notation
- Sequence Diagram
  - Forced to extend to the right when adding new objects; consumes horizontal space