CSY2030
Systems Design & Development
UML Interaction Diagrams

Interaction Diagrams

- Interaction Diagrams model the dynamic aspects of a software system
- They show how a set of actors and objects communicate with each other to perform the steps of a use case (or some other piece of functionality)
  - They show behaviour of objects from our static class and use case models
  - This allows us to decide which operations will be allocated to which classes
  - They also allow us to make decisions about which classes contain the operations needed to carry out parts of a use case

Use Case – Interaction Diagrams

- Use Case diagrams present an outside view of the system.
  - Interaction Diagrams show an interaction, consisting of a set of objects and their relationships, including the messages that may be dispatched among them
  - Diagrams describe behaviour - but do not define it
- **Interaction Diagrams** show how use cases are realised as interactions amongst objects – there are 2 types of Interaction Diagram:
  - **Sequence Diagrams**
  - **Communication Diagrams**

Sequence Diagrams

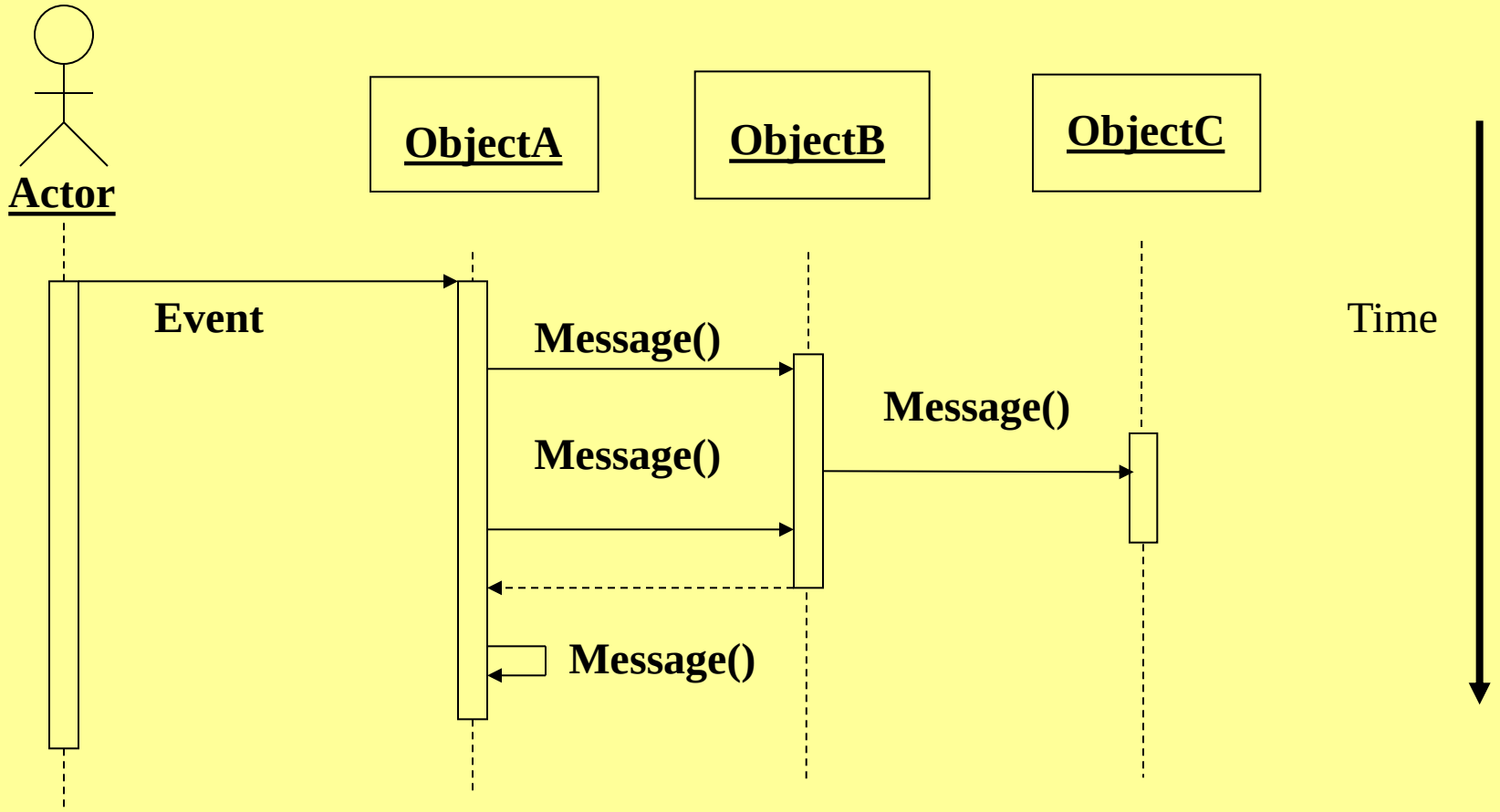
- A sequence diagram is a graphical representation of a use case (or some other piece of functionality)
  - The interactions between the use case and the objects is what you are trying to show
- A sequence diagram is made up of statements, objects and stimuli
  - Each statement describes the processes which occur
  - Stimuli are found between objects and are sent from sequence statements

Sequence Diagrams

- Here objects are arranged from left to right across diagram
- Actor initiating interaction is often shown on the left
- The vertical dimension represents time
  - The top of the diagram is the starting point and time progresses downwards towards the bottom of the diagram
- A vertical dashed line, called a **lifeline**, is attached to each object or actor
  - The **lifeline** becomes a box, called an **activation box**, during the period of time that the object is performing computation
  - The object is said to have **live activation** during these times
- A message is represented as an arrow between activation boxes of the sender and receiver.
  - You give each message a label

Sequence Diagrams

Sequence Diagrams are represented as follows:

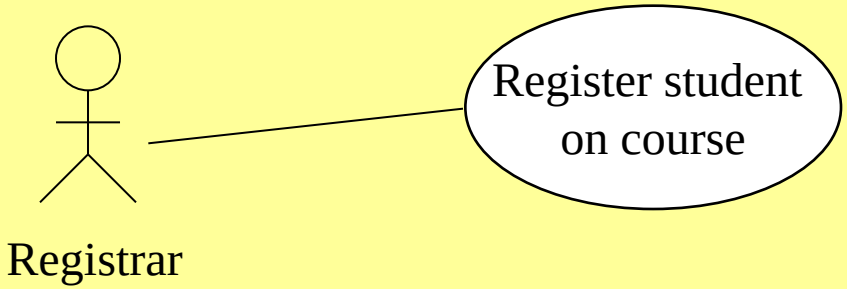


Object interactions arranged in time sequence

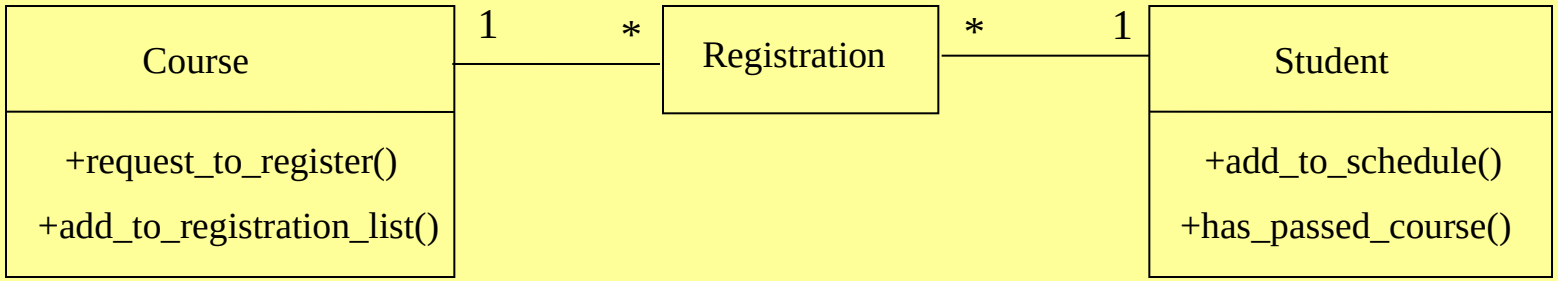
Sequence Diagrams

Say had following use case diagram and class diagram

Use Case Diagram



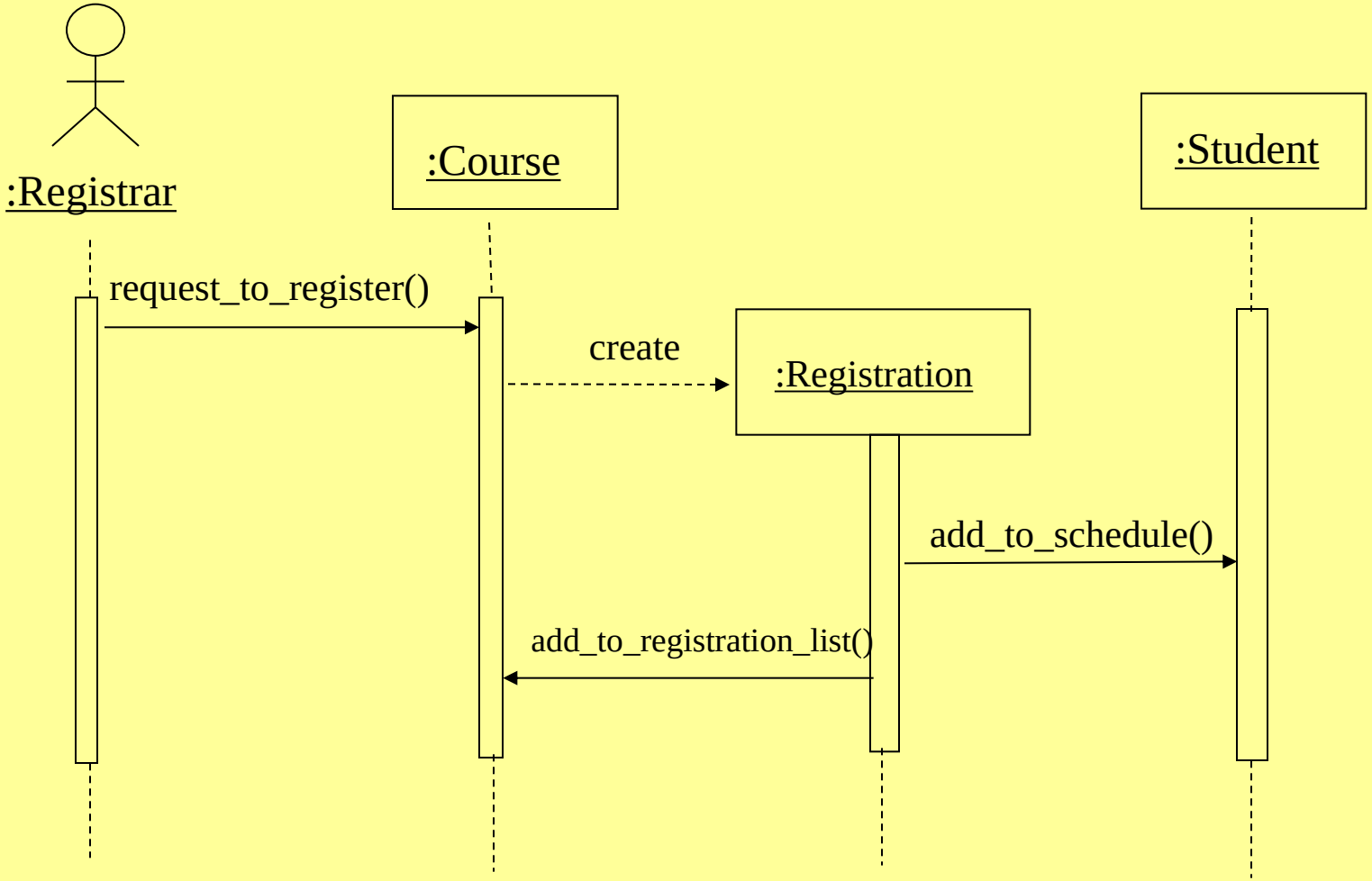
Class Diagram



We will now show how the actor and objects communicate with each other to perform the steps of the use case *Register student on course*

Sequence Diagrams

Our Sequence Diagrams could be represented as follows:

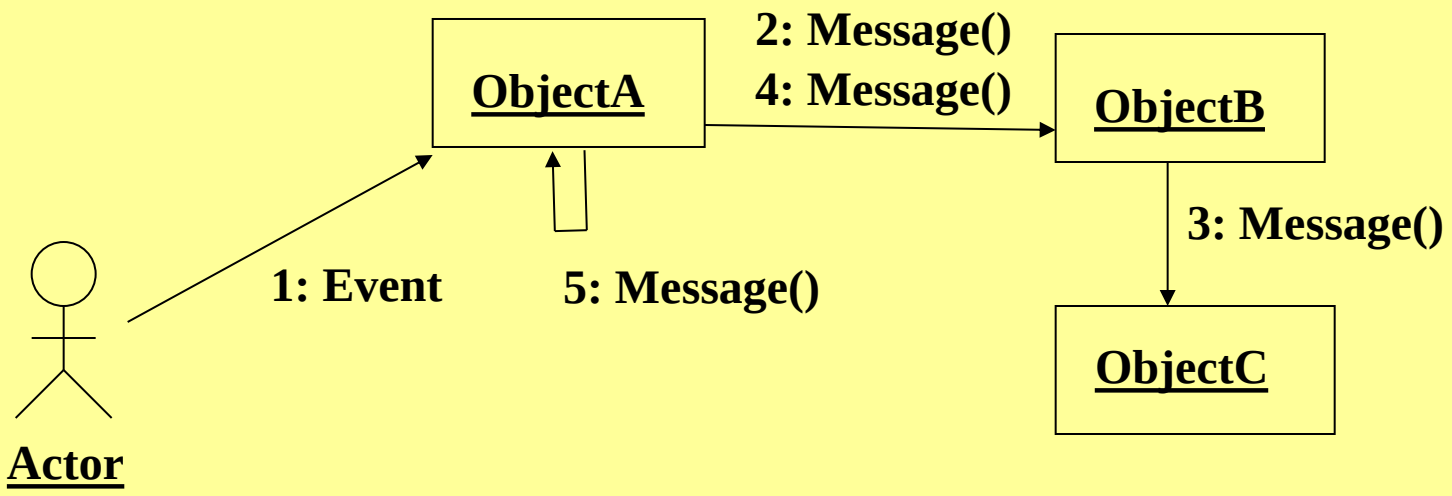


Communication Diagrams

- Similar to sequence diagrams i.e
  - Show communication link between a pair of objects and attach message to link with arrow for direction
- However there is no lifelines or activation boxes
  - Instead, you use boxes for objects and specify the ordering of messages by pre-fixing message with a numbering scheme
    - The numbering scheme indicates time

Communication Diagrams

The objects which interact to perform some task, together with the links between them, are collectively known as a communication - represented as follows:



Note that time is indicated by numbering scheme

Commuication Diagrams

Our previous example would be represented as follows as a communication diagram: