Interaction Diagrams

• Basic Concepts

• A Small Case Study

• Collaboration Diagram

• Case Study Collaborations

• Sequence Diagram

• Case Study Sequence Diagram

• Comparing and Contrasting: Collaboration and Sequence
Basic Concepts

• We are now starting to take a look at system dynamics

• This will be a mid-level view
  - We will look at interactions between (classes of) objects
  - We will not look inside the (classes of) objects themselves

• Generally speaking, there should be one interaction diagram for every use case

• There are two kinds of interaction diagrams
  - Collaboration Diagrams
  - Sequence Diagrams
A Small Case Study

• Use Cases

![Use Case Diagram]

• Class Model

![Class Diagram]

[Ward86]
Collaboration Diagram

- Collaboration diagrams are centered on objects
  - Use UML's UnderlineName convention to emphasize
  - Objects are named <an object name>:<its class>
  - Either <an object name> or <a class name> can be omitted
    * If <an object name> is omitted, use :<a class name>

- A Collaboration is a set of objects that communicate
  - Collaborations are shown by lines between objects

- That communication is made up of messages
  - Messages are shown as labelled arrows
  - Numbers show sequence

- Notation

- In some cases it can be better to use sequence numbers of the form x.y.z
- For example 3.2.5, 3.2.6, ...
Collaboration Diagram (cont)

- Multiobject

- Conditional messages
  - Conditional messages mean that under certain conditions the message will be sent and under other conditions it won’t
  - The message is sent when the condition in the square brackets is true

- Repetitive messages
  - The message repeats while the condition in the square brackets is true

- Objects will sometimes send messages to themselves
anObject:ItsClass  N: Message to Self
Case Study Collaborations

- A collaboration diagram for the sample case study
Sequence Diagram

• Sequence diagrams are also centered on objects
  - Objects are named the same way

• A Lifeline shows the time-ordered history of the interaction
  - Lifelines run either vertically or horizontally
  - The usual style is vertical

• Messages are shown in time-order along the object lifelines

• Notation

```
 anObject:ItsClass
     MsgA
     MsgB
     MsgC
   SomeClass
```
Sequence Diagram (cont)

• Conditional messages

• Repetitive messages

• Messages to self
Case Study Sequence Diagram

- The sequence diagram for the sample case study

- Some modelers prefer to include the use case descriptive text along the time axis of a sequence diagram
  - This can help correlate the use case to the interaction
Comparing and Contrasting: Collaboration and Sequence

• Both diagrams show the same information
  - Objects/classes
  - Messages
  - Sequence
  - Conditional
  - Repetition
  - Messages to self

• Collaboration diagrams emphasize who-is-talking-to-who
  - But the time-ordering of the messages gets obscured

• Sequence diagrams emphasize time-ordering
  - But the who-is-talking-to-who gets obscured

• Use the diagram that you are most comfortable with
  - A good CASE tool really ought to be able to generate one given the other
Key Points

• We are now looking at system dynamics

• This is a mid-level view
  - We looked at interactions between (classes of) objects
  - We did not look inside the (classes of) objects themselves

• Both diagrams show the same information
  - Objects/classes
  - Messages
  - Sequence
  - Conditional
  - Repetition
  - Messages to self

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• Sequence diagrams emphasize time-ordering
  - But the who-is-talking-to-who gets obscured