Information Systems Analysis & Design (M8748)

Tutorial 9 Answer

1. List two specific features of bad object-oriented modeling that are discouraged by the use of collaboration diagrams.
   Collaboration diagrams discourage both using a large number of messages between two objects and having too many parameters for each message as these are clumsy to represent on the diagram

2. What are the benefits of keeping all classes reasonably small and self-contained?
   Small self-contained classes are easier to develop, test and maintain.

3. What are the main differences between sequence diagrams and collaboration diagrams?
   Sequence diagrams have a time dimension (normally vertically down the page) while collaboration diagrams do not. Collaborations show the links between objects, which are not shown on sequence diagrams.

4. What are the essential parts of a message label (i) in a sequence diagram and (ii) in a collaboration diagram?
   (i) The essential part of the message label in an interaction sequence diagram is the signature of the operation being invoked. If the name of the operation is sufficient to uniquely identify it then this may be sufficient though CASE tools may report a consistency error if the message label does not match the signature of the operation in the class.
   (ii) In addition each message on a collaboration diagram also requires a sequence expression to show the sequence of the messages. This is normally not necessary on a sequence diagram as the sequence is represented by the order of the messages along the time dimension (normally down the page).

5. What is an object lifeline?
   An object lifeline represents the existence of an object during an interaction represented in a sequence diagram.

6. What is meant by the focus of control?
   The focus of control indicates which operation is executing at a particular stage in an interaction represented in a sequence diagrams.

7. How do asynchronous messages differ from synchronous messages (i) in their behavior and (ii) in their notation?

   An asynchronous message is not a blocking call. The operation in the sending object continues to execute after sending the asynchronous message that invokes an operation in the destination object, which executes concurrently. A synchronous message is a blocking call, and the sending operation waits for the receiving object to complete execution before resuming. An asynchronous message is drawn with an open arrowhead. A synchronous message is drawn with a full arrowhead.

8. In what circumstances are sequence numbers in a collaboration diagram written in nested style (e.g. 3.2.1)?

   Sequence numbers are written in a nested style in collaboration diagram to represent nested procedural calls.

9. What consistency checks should be applied to interaction diagrams?

   The following consistency checks should be made for interaction diagrams:

   - Classes should be defined on a class diagram for all objects or classes referenced in interaction diagrams.
   - Each message should have a corresponding operation defined in the destination class with the same signature.

   The semantics of each interaction diagram should also be checked—see section 9.5.

10. Describe three ways in which complex interactions may be represented using UML.

    Complex interactions may be represented by managed by one of the following:

    - Representing the interaction on several linked sequence diagrams
    - Using object grouping to simplify the representation by hiding that part of the interaction within the group.
    - Not showing all the messages explicitly but annotating the diagram with a note to make this clear.