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COMP1216. Software Modelling and Design (2019-20)

Solution Sheet 4: Dynamic Modelling

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This Problem Class relates to the following train ticket system. You can use Virtual Paradigm to draw the diagrams.

A Train Ticket System

A system must be specified for the automated purchase of train tickets from a ticket distributor. It is possible for the traveller to buy single or return tickets to available destinations, as well as weekly and monthly season tickets. The traveller will interact with the machine to specify ticket type, select destination, select payment mode (cash or credit card). A ticket purchase transaction may fail for various reasons: the distributor is out of change, out of ticket paper, credit card fails to validate, etc.

Question 1. Object Classifications

Consider the following scenario for a successful ticket purchase.

- The customer selects "Buy weekly card" and is taken to the "Select destinations" screen
- The customer selects a destination and is taken to the "Basket" screen
- The customer selects "Pay" and is take to the "Select payment type" screen.
- The customer selects "Credit Card" and enters his card
- The distributor validates the card and requests his PIN

- The customer enters a PIN and the distributor validates it by reference to the bank
- The distributor takes payment and returns the credit card to the customer
- The weekly season card is printed and the customer takes it

Which are the participating objects? Specify the type of the objects, i.e., boundary, control or entity.

Solution:

- Boudary objects: Screen, CardReader
- Control objects: TicketController
- Entity objects: Ticket, Basket

Question 2. Sequence Diagrams

Draw a sequence diagram corresponding to the above scenario (ignoring exception behaviours).

Solution:
A sample sequence diagram is in Figure 1
Note the usage of the following features:

- The heuristic layout of the sequence diagram, e.g., from left-to-right: actors, boundary objects, control objects, entity objects, other actors.
- Object creation with create message and deletion with X at the end of the lifeline. Only create the object when necessary.
- One should have additionally before Step 2.1.2 messege from TicketControl to Basket to get its content.

Question 3. Activity Diagrams

Draw an activity diagram to buy tickets for the Train Ticket System. Remember to take into account the different payment options for the activities.

Solution:
A sample activity diagram is in
Note the usage of the following features:

- Decisions points
- forks / joins
- Swimlanes

Many details are "abstracted" at the moment (e.g., "Choose ticket details"). Other activities can be added, e.g., "Return credit card".

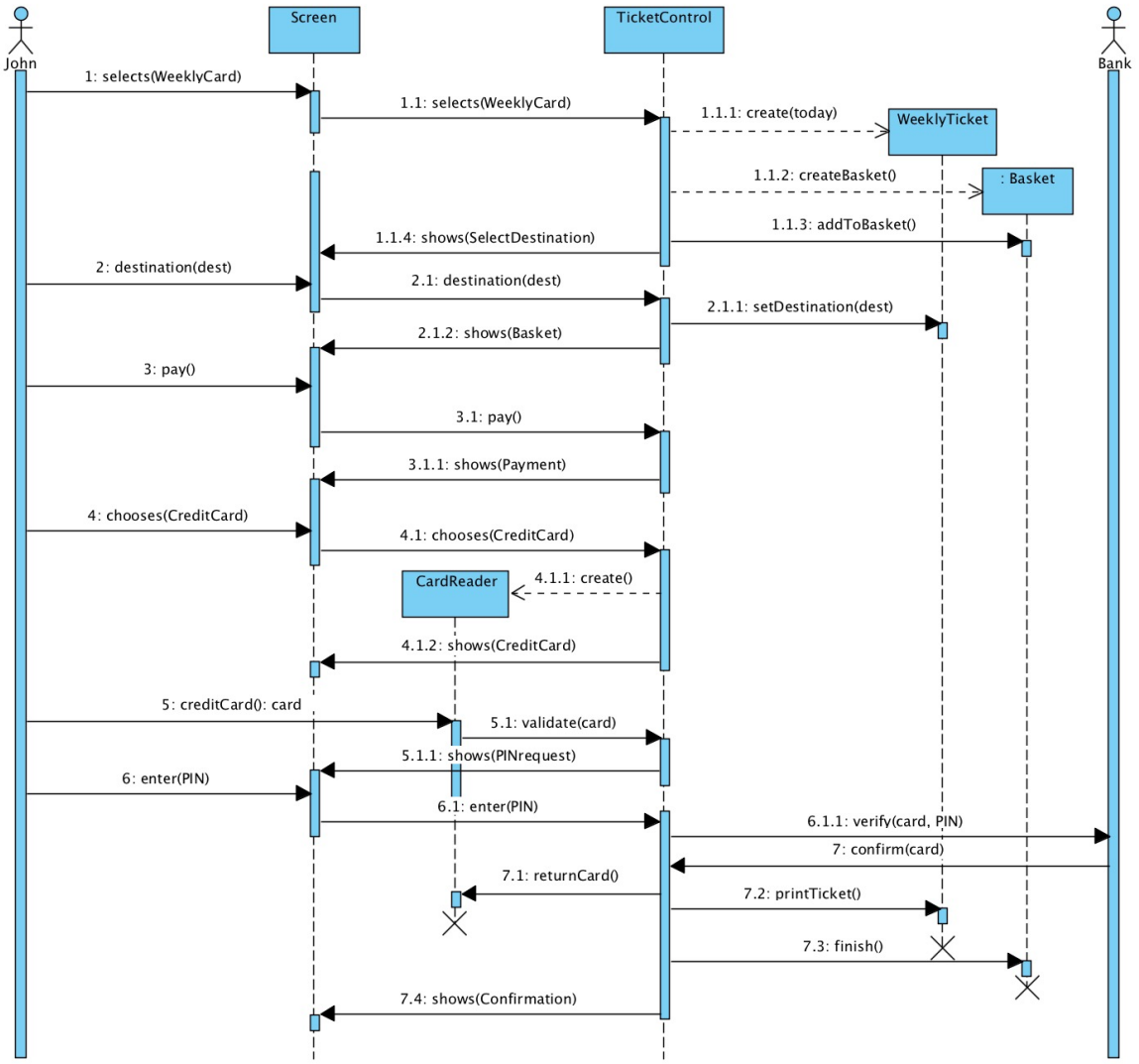

Figure 1: Train Ticket System Sequence Diagram

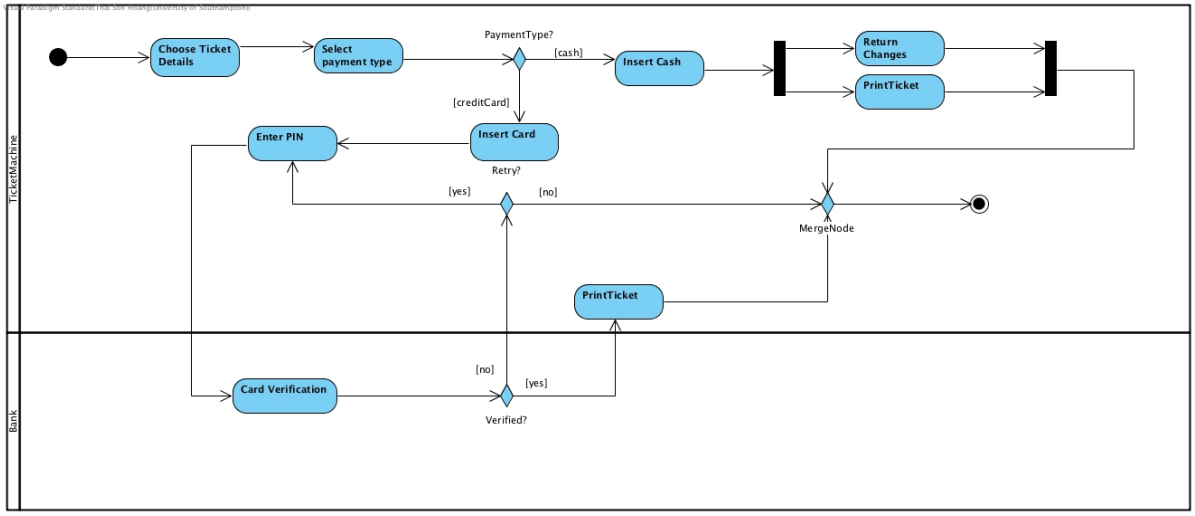

Figure 2: Train Ticket System Activity Diagram