Systems Modelling Techniques using UML

Exercise Sample Answers
Exercise 1 – Lending library use case diagram

Sample answer:

[Diagram of a use case diagram showing interactions between a Member and a Librarian for loaning and managing items. The diagram includes actions such as Reserve Item, Lend Item, Collect Fine Payment, Update Loan Item, Catalogue Loan Item, Catalogue Title, Update Title, Enrol Member, and Update Member.]
Exercise 2 – Course booking use case diagram

Sample answer
This diagram is intended to summarise the functional requirements of the proposed IT system, based on the text. There may be some scope for interpreting the text differently, as is the case with all requirements documents, and your diagram may reflect that.

Part of the purpose of modelling is to highlight areas for further investigation with the business. For example delegates could confirm their own bookings, or send in an email. Delegates could be prompted by the system if they haven't confirmed by a certain date etc.
Exercise 3 – T’n’T use case diagram

Sample answer
Exercise 4 – T’n’T record product delivery

MFTnT09 | Record Product Delivery
---|---
Brief Description: | When a delivery is received from a supplier it is checked and the goods (products) moved into the warehouse. The delivery is recorded after matching the delivery with the original purchase order, which is held on the purchasing system. Stock for quality testing will be held separately (quarantined) from available stock.
Actor(s): | Store person.
Trigger(s): | Supplier’s delivery vehicle has been unloaded.

Main Flow:

1. Store person enters the purchase order number into the system.
2. System retrieves the purchase order details.
3. Store person enters delivery details.
4. System creates the delivery.
5. For each purchase order item comprising the purchase order:
   6. Store person enters the quantity unloaded.
   7. System updates the product balance by the amount delivered.
   8. System highlights any product to quarantine for testing.
9. Store person confirms end of delivery details input
10. System displays delivery details
11. Stores person confirms OK
12. Use Case Ends.
Exercise 5 – DVD Sales Activity Diagram Sample Answer
Notes:

1. This answer illustrates 2 different ways to label a decision node. Another common way of labelling is to use the [else] keyword on one of the flows – this ensures that there is always a default flow out of the decision node.
Exercise 6 – T’n’T Activity Diagrams Sample Answers

Receive Delivery

[Activity Diagram Image]

- Delivery Arrives
- Validate Delivery
  - [delivery content processed] [delivery content not processed]
- Receive Delivery
  - [items]
  - [no items]
- Whole Delivery Rejected
- Delivery Received (No Quarantined Items)
- Perform Quality Tests
  - Q tests performed, 00:00:00 recorded
- Review Q Items
  - [Q items recorded]
  - [Q items not recorded]
- Arrange Returns
  - Delivery Received (some returned items)
- Move Q Items
- Produce Delivery Report
  - [delivery completed]
- Mark Delivery as Complete
  - Delivery Completed
- End of Day
- The daily activity data for any single delivery will appear on this report.
Issues to Manufacturing

1. Production Worker brings Requisition
   - Validate Requisition
     - Requisition Invalid
     - Reject Requisition
     - Items issued

2. Review Items
   - Items issued
   - Count Items
     - [not combined weigh/count]
     - [else]

3. Retrieve Material
   - [else]
   - [no items to weigh]
   - [more material to weigh]

4. Weigh Material
   - [else]
Check Stock

Start of the Day → Produce Stock Check Lists

End of Day → Produce Discrepancy Audit Report

Allocate Stock Check Lists → [further checks pending] → Produce Daily Stock Check Report

Input Results → Check Stock

Review Stock Check Report → [add hoc checks needed] → Request Ad-hoc Checks

Review Stock Check Report → [add hoc checks needed] → Request Ad-hoc Checks

Take Action on Discrepancies
Exercise 7 – Hospital appointment

Sample Answer 1

![Class diagram for Hospital Appointment](image)
Exercise 7 – Hospital appointment

Sample Answer 2
Exercise 7 – Hospital appointment

Sample Answer 3
Exercise 8 – Lending library class diagram

Sample answer
Exercise 9 – Rail ticket class diagram

Sample answer
Exercise 10 – Bakery class diagram

Sample answer
Exercise 11 – T’n’T class diagram

Sample answer
Exercise 12 – Lending Library – LoanItem State Machine

Sample answer
Exercise 14 – Course booking state machine

Sample answer
Exercise 13 – Expense Claim Activity Diagram (with Object Flows)

Sample answer
Exercise 13 – Expense Claim Class Diagram

Sample answer
Exercise 13 – Expense Claim State Machine

Sample answer

[Image of a State Machine diagram for Expense Claim]

- **Registered**
  - Claim received
  - LM Approval
  - Not Approved
    - Incompletely filled
    - Resubmitted
  - Rejected
    - Rejected
    - Withdrawn
  - Queried
    - Policy non-compliance
    - Resubmitted
    - LM Disapproval
  - Disapproved
    - LM Disapproval
    - Withdrawn
- **Withdrawn**
  - Withdrawn
- **Approved**
  - Approved
  - When (true 5PU)
    - Cleared
    - Entry/Order payment
    - After (7 days)
    - Reimbursed
    - After (3 years)

- **Withdrawn**
Exercise – T’n’T State Machines Sample Answers

Product

- **Active**
  - product created
  - target set
  - balance adjusted
  - issued
  - delivered
  - PO raised

- **Suspended**
  - selected for check
  - no discrepancy

- **Discontinued**
  - noticed obsolete
  - re-activated

- **Archived**
  - issued (Balance = 0)
  - 2 years after archive
Purchase order
Exercise 18 – Expense Claim Activity Diagram
Lending library retrieve reservation communication diagram

1: search(Reservation)
2: getReservation(ReservationNo)
3: getMember(ReservationNo)
4: Reservation details
5: getMember(ReservationNo)
6: getMember(MemberId)
7: Member details
8: Member details
9: getTitle(ReservationNo)
10: getTitle(TitleId)
11: Title details
12: Title details
13: full Reservation details
Lending library retrieve reservation sequence diagram