**Lab 2**

1. **Equivalence partitioning/Boundary Value Analysis exercise:**

**Scenario:** If you take the train before 6:30 am or in the afternoon after 4:30 pm until 7:00 pm ('the rush hour'), you must pay full fare. A saver ticket is available for trains between 6:30 am and 4:30 pm, and after 7:00 pm. What are the partitions and boundary values to test the train times for ticket types? Which are valid partitions and which are invalid partitions? What are the boundary values? (A table may be helpful to organize your partitions and boundaries.) Derive test cases for the partitions and boundaries. Are there any questions you have about this 'requirement'? Is anything unclear?

|  |  |
| --- | --- |
| **Full Fare** | Before 6:30 am |
| **Full Fare** | Between 4:30 pm and 7:00 pm |
| Saver Ticket | Between 6:30 am and 4:30 pm |
| Saver Ticket | after 7:00 pm |

**Test Cases**

Early Morning (Full Fare):

Test Case 1: Train time: 6:29 am -> Expected Ticket Type: Full Fare

Test Case 2: Train time: 6:30 am -> Expected Ticket Type: Saver Ticket (Boundary)

Test Case 3: Train time: 5:00 am -> Expected Ticket Type: Full Fare (Before operational hours)

Rush Hour (Full Fare):

Test Case 4: Train time: 4:30 pm -> Expected Ticket Type: Full Fare (Boundary)

Test Case 5: Train time: 6:00 pm -> Expected Ticket Type: Full Fare

Test Case 6: Train time: 7:00 pm -> Expected Ticket Type: Full Fare (Boundary)

Off-Peak Hours (Saver Ticket):

Test Case 7: Train time: 6:30 am -> Expected Ticket Type: Saver Ticket (Boundary)

Test Case 8: Train time: 12:00 pm -> Expected Ticket Type: Saver Ticket

Test Case 9: Train time: 8:00 pm -> Expected Ticket Type: Saver Ticket

1. **State transition exercise**

**Scenario:** A shopping website's cart initially begins empty. As a shopper selects items, they get added to the cart. Additionally, items can be removed from the cart. When the shopper chooses to proceed to checkout, a summary displaying the basket's contents and the total cost is presented. The customer can confirm whether the items and their prices are acceptable. If approved, the system moves to the payment section. However, if there are concerns regarding the items or prices, the user can return to shopping to remove or modify items before finalizing the purchase.

a. Produce a state diagram showing the different states and transitions. Define a test, in terms of the sequence of states, to cover all transitions.

b. Produce a state table. Give an example test for an invalid transition.

STATE TRANSITION DIAGRAM

1. **Decision table exercise**

**Scenario:** If you hold an 'over 55s' rail card, you get a 30% discount on whatever ticket you buy. If you are traveling with a child (under 14), you can get a 27% discount on any ticket if you hold a family rail card, otherwise you get a 20% discount. You can only hold one type of rail card. Produce a decision table showing all the combinations of fare types and resulting discounts and derive test cases from the decision table.

To create a decision table for the given scenario, we will identify the conditions and corresponding actions. Here are the conditions:

Age: Over 55

Traveling with a child: Yes/No

Rail card type: None/Over 55s/Family

And the resulting actions:

Discount: 30% (for Over 55s)

Discount: 27% (for Family with child under 14)

Discount: 20% (Default)

Decision Table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Condition | Over 55 | Travelling with Child | Rail Card Type | Action |
| Age | Yes | - | None | 30% discount |
| Age | Yes | - | Over 55s | 30% discount |
| Age | No | Yes | Family | 27% discount |
| Age | No | Yes | Over 55s | 20% discount |
| Age | No | No | Family | 20% discount |
| Age | No | No | Over 55s | 20% discount |
| Age | Yes | Yes | Family | 27% discount |
| Age | Yes | Yes | Over 55s | 30% discount |

Deriving Test Cases:

Based on the decision table, we need test cases covering all combinations of conditions and their corresponding actions:

Test Case 1: Age: Over 55, Traveling with Child: No, Rail Card Type: None -> Expected Action: 30% Discount

Test Case 2: Age: Over 55, Traveling with Child: No, Rail Card Type: Over 55s -> Expected Action: 30% Discount

Test Case 3: Age: Under 55, Traveling with Child: Yes, Rail Card Type: Family -> Expected Action: 27% Discount

Test Case 4: Age: Under 55, Traveling with Child: Yes, Rail Card Type: Over 55s -> Expected Action: 20% Discount

Test Case 5: Age: Under 55, Traveling with Child: No, Rail Card Type: Family -> Expected Action: 20% Discount

Test Case 6: Age: Under 55, Traveling with Child: No, Rail Card Type: Over 55s -> Expected Action: 20% Discount

Test Case 7: Age: Over 55, Traveling with Child: Yes, Rail Card Type: Family -> Expected Action: 27% Discount

Test Case 8: Age: Over 55, Traveling with Child: Yes, Rail Card Type: Over 55s -> Expected Action: 30% Discount

These test cases cover all combinations of conditions and actions outlined in the decision table, ensuring comprehensive test coverage.