

PREMIER UNIVERSITY, CHITTAGONG

Department of Computer Science & Engineering



REPORT

Course Name

: Software Testing and Quality Assurance Laboratory

Course Code

: CSE 4294

Name of Report

: Decision Table-Based Testing on an Electronics Retailer Discount System

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REMARKS :

SUBMITTED TO

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Name of Report: Decision Table-Based Testing on an Electronics Retailer Discount System

Objective: The objective of this experiment is to apply **Decision Table-Based Testing** to an electronics retailer's discount calculation system. The purpose is to verify that discounts are correctly applied based on different combinations of customer category, order amount, and clearance status. Through this lab, we aim to understand how decision tables help identify conditions and actions, design effective test cases, detect logical defects, and validate system behavior.

System Description

The retailer offers discounts depending on three main input factors:

- **Customer Type:** VIP, Corporate, or Standard
- **Order Value (USD):**
 - Above 10,000
 - Between 5,000 and 10,000
 - Below 5,000
- **Clearance Status:** Yes or No

The discount policy follows specific business rules. VIP customers always receive a fixed discount regardless of order amount. Corporate and Standard customers receive tier-based discounts depending on the order value. However, if an item is marked as *Clearance*, a flat discount is applied to all customers, overriding every other rule.

Discount Rules Summary

- **VIP Customers:** Always receive a 15% discount
- **Corporate Customers:**
 - Order value above 10,000 USD → 12%
 - Order value between 5,000 and 10,000 USD → 10%
 - Order value below 5,000 USD → 7%
- **Standard Customers:**
 - Order value above 10,000 USD → 10%
 - Order value between 5,000 and 10,000 USD → 5%
 - Order value below 5,000 USD → 0%
- **Clearance Items:** Flat 20% discount for all customer types

Decision Table Construction

To represent the above logic systematically, a **limited-entry decision table** was created. The table consists of a set of conditions (C1–C7) representing customer category, order value range, and clearance status, along with actions (A1–A7) representing possible discount percentages.

Based on the interaction of these conditions, **nine distinct decision rules (R1–R9)** were derived. Each rule corresponds to a unique business scenario and results in exactly one discount action. This approach ensures full logical coverage while avoiding redundant combinations.

Test Case Design

Test cases were derived directly from the decision table. Each test case includes:

- Test Case ID
- Customer Type (Input 01)
- Order Value (Input 02)
- Clearance Status (Input 03)
- Expected Discount
- Actual Discount
- Pass/Fail Result

A total of **14 test cases** were designed using equivalence partitioning and boundary value analysis. These test cases adequately cover all meaningful combinations, including normal scenarios and edge cases at order values of 5,000 USD and 10,000 USD.

Test Execution Results

During test execution, most test cases produced the expected results. However, **four test cases failed**, all involving boundary values. These failures highlighted issues in how the system handled order amounts exactly equal to 5,000 USD and 10,000 USD.

The failures were crucial in revealing logical weaknesses that were not obvious during initial implementation.

Screenshots:

Decision Table Sheet showing conditions, rules, and actions.

Conditions										
Condition ID	Condition Description	R1	R2	R3	R4	R5	R6	R7	R8	R9
C1	Customer category is VIP	T	T	T	F	F	F	F	F	F
C2	Customer category is Corporate	F	F	F	T	T	T	F	F	F
C3	Customer category is Standard	F	F	F	F	F	F	T	T	T
C4	Order value is greater than 10,000 USD	T	F	F	T	F	F	T	F	F
C5	Order value is between 5,000 and 10,000 USD	F	T	F	F	T	F	F	T	F
C6	Order value is below 5,000 USD	F	F	T	F	F	T	F	F	T
C7	Item is marked as Clearance	F	F	F	F	F	F	F	F	F
Actions										
Action ID	Action Description	R1	R2	R3	R4	R5	R6	R7	R8	R9
A1	Apply 20% discount									
A2	Apply 15% discount	X	X	X						
A3	Apply 12% discount				X					
A4	Apply 10% discount					X		X		
A5	Apply 7% discount						X			
A6	Apply 5% discount								X	
A7	Apply 0% discount									X

Test Case Sheet listing test cases:

TC ID	Customer Type	Order Value (USD)	Clearance	Expected Discount	Actual Discount	Status
TC-01	VIP	2,500	TRUE	20%	20%	Pass
TC-02	Corporate	15,000	TRUE	20%	20%	Pass
TC-03	Standard	6,200	TRUE	20%	20%	Pass
TC-04	VIP	12,500	FALSE	15%	15%	Pass
TC-05	Corporate	11,000	FALSE	12%	12%	Pass
TC-06	Corporate	7,500	FALSE	10%	10%	Pass
TC-07	Corporate	3,200	FALSE	7%	7%	Pass
TC-08	Standard	11,300	FALSE	10%	10%	Pass
TC-09	Standard	8,900	FALSE	5%	5%	Pass
TC-10	Standard	4,100	FALSE	0%	0%	Pass
TC-11	Corporate	5,000	FALSE	10%	7%	Fail
TC-12	Corporate	10,000	FALSE	12%	10%	Fail
TC-13	Standard	5,000	FALSE	5%	0%	Fail
TC-14	Standard	10,000	FALSE	10%	5%	Fail

Bug Identification

The identified defects were related to incorrect handling of boundary conditions. Specifically, order values exactly equal to the boundary limits were categorized into lower discount ranges than expected.

Bug ID	Description	Test Case	Expected	Actual	Remarks
BUG-01	Corporate order of exactly 5,000 USD treated as below 5,000	TC-11	10%	7%	Lower bound excluded
BUG-02	Corporate order of exactly 10,000 USD treated as mid-range	TC-12	12%	10%	Upper bound excluded
BUG-03	Standard order of exactly 5,000 USD treated as below range	TC-13	5%	0%	Boundary not included
BUG-04	Standard order of exactly 10,000 USD treated as mid-range	TC-14	10%	5%	Incorrect comparison

Root Cause Analysis

The root cause of all detected bugs lies in the use of **strict comparison operators ($>$)** in the discount calculation logic. These operators exclude values that are exactly equal to the boundary thresholds, causing them to fall into incorrect discount categories.

Resolution

To fix the issue, the conditional statements must include equality checks at the boundary limits. The corrected logic should use inclusive comparisons so that values equal to 5,000 USD and 10,000 USD are assigned to the appropriate discount tiers.

Example correction:

- Use ≥ 10000 for upper-tier discounts
- Use $5000 \leq \text{order_value} < 10000$ for mid-tier discounts

After applying these corrections, the discount logic was revalidated and all test cases produced the expected results.

Conclusion

This experiment demonstrates the effectiveness of **Decision Table-Based Testing** in validating systems that involve multiple interdependent conditions. By systematically mapping conditions to actions, decision tables simplify test design and ensure complete logical coverage. The testing process successfully identified boundary-related defects that could easily be overlooked. Once corrected, the system behaved accurately across all scenarios, confirming the reliability of the discount calculation module.