**Case Study-3: Black Box Testing in an Online Course Management System**

**System Under Test (SUT):** "EduPortal" - An Online Course Management System

**Background:** EduPortal is an online platform that allows students to register for courses, take quizzes, receive grades, and track their progress. Recently, the platform underwent multiple revisions including the grading algorithm, course registration workflows, and quiz logic. A black box testing strategy was adopted to validate the output and transitions after these updates.

**1. Equivalence Classes for Output Correctness Tests:**

Functionality Under Test: Grade Generation Module

Test Objective: Verify that the output grade is correct based on student scores.

Equivalence Class Partitioning:

* Class A: 90-100 -> Grade A
* Class B: 75-89 -> Grade B
* Class C: 60-74 -> Grade C
* Class D: 40-59 -> Grade D
* Class F: 0-39 -> Grade F

Sample Test Cases:

* Input: 95 → Expected Output: A (Class A)
* Input: 80 → Expected Output: B (Class B)
* Input: 65 → Expected Output: C (Class C)

Outcome: The grade module passed all test cases from each equivalence class, validating output correctness.

**2. Revision Factor Testing Classes:**

Functionality Under Test: Course Registration and Fee Payment Logic

Recent Revision: System now supports scholarship deductions and early-bird discounts.

Test Objective: Ensure that modified registration logic correctly reflects revised fee structures.

Test Cases:

* Input: Course fee = 10000, Scholarship = 2000 → Expected Output: 8000
* Input: Early-bird Discount = 10%, Fee = 10000 → Expected Output: 9000

Outcome: The system reflected changes correctly, confirming reliability of new logic.

**3. Transition Factor Testing Classes:**

Functionality Under Test: Student Quiz Workflow

States and Transitions:

* State 1: Quiz Not Started
* State 2: Quiz In Progress
* State 3: Quiz Submitted
* State 4: Results Displayed

Test Objective: Ensure smooth transition between quiz states.

Sample Transition Test:

* Trigger: Student clicks "Start Quiz" from dashboard → Transition: State 1 → State 2
* Trigger: Clicks "Submit Quiz" → Transition: State 2 → State 3

Outcome: All transitions occurred as expected, validating state changes.

**4. Advantages of Black Box Testing Observed in Case Study:**

* Focused purely on output; did not require understanding internal code.
* Helped detect issues with newly implemented discount logic.
* Effective for validating user-facing workflows.

**5. Disadvantages Observed:**

* Could not identify internal logic errors without white box help.
* Testing effort increased due to lack of internal design knowledge.
* Missed some edge-case bugs due to reliance on expected outputs.

**Conclusion:** Black Box Testing effectively validated key features of EduPortal using Equivalence Classes, Revision Factor, and Transition Factor Testing Classes. While it highlighted functional issues, deeper internal testing was necessary for complete coverage.