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BSCS 3A

University Logic Rules System Report

1. Explanation of Rules Tested

The program implements a mini-expert system using propositional logic. The core mechanism is a logical implication function, impl(P, Q), which follows the standard truth table for P -> Q (equivalent to -P or Q).

The following rules are tested within the system:

- Rule 1: Attendance Check
  This rule enforces the policy regarding lateness.
  - **Proposition P:** The student is late.
  - **Proposition Q:** The student has an excuse letter.
  - **Logic:** If the student is late (P=True), they must have an excuse letter (Q=True) to satisfy the rule. If they are not late (P=False), the rule is automatically satisfied regardless of the excuse letter.
- Rule 2: Grading System
  This rule determines if a student passes based on their numerical grade.
  - **Proposition P:** Grade 75.
  - **Proposition Q:** Student passes.
  - **Logic:** If the grade is 75 or above, the condition for passing is met. The system treats the input grade as defining both the condition (P) and the resulting status (Q).
- Rule 3: Login Authentication
  This rule validates user access based on a specific password ("admin123").
  - **Proposition P:** Input password matches the stored password.
  - **Proposition Q:** Access is granted.
  - **Logic:** A correct password implies access is granted. An incorrect password implies no access triggers, mathematically satisfying the implication by default (vacuously true), though the output text distinguishes "Access denied" for clarity.
- Rule 4: Bonus Eligibility
  This rule checks for bonus point qualifications.
  - **Proposition P:** The student has regular attendance.
  - **Proposition Q:** The student is eligible for a bonus.
  - **Logic:** Regular attendance implies eligibility.

2. Description of the New Rule

The **Library Borrowing Rule** (Option 5) is the newly added feature in the code. Unlike previous rules that generally rely on a single condition for P, this rule uses a **compound conjunction** for its antecedent.

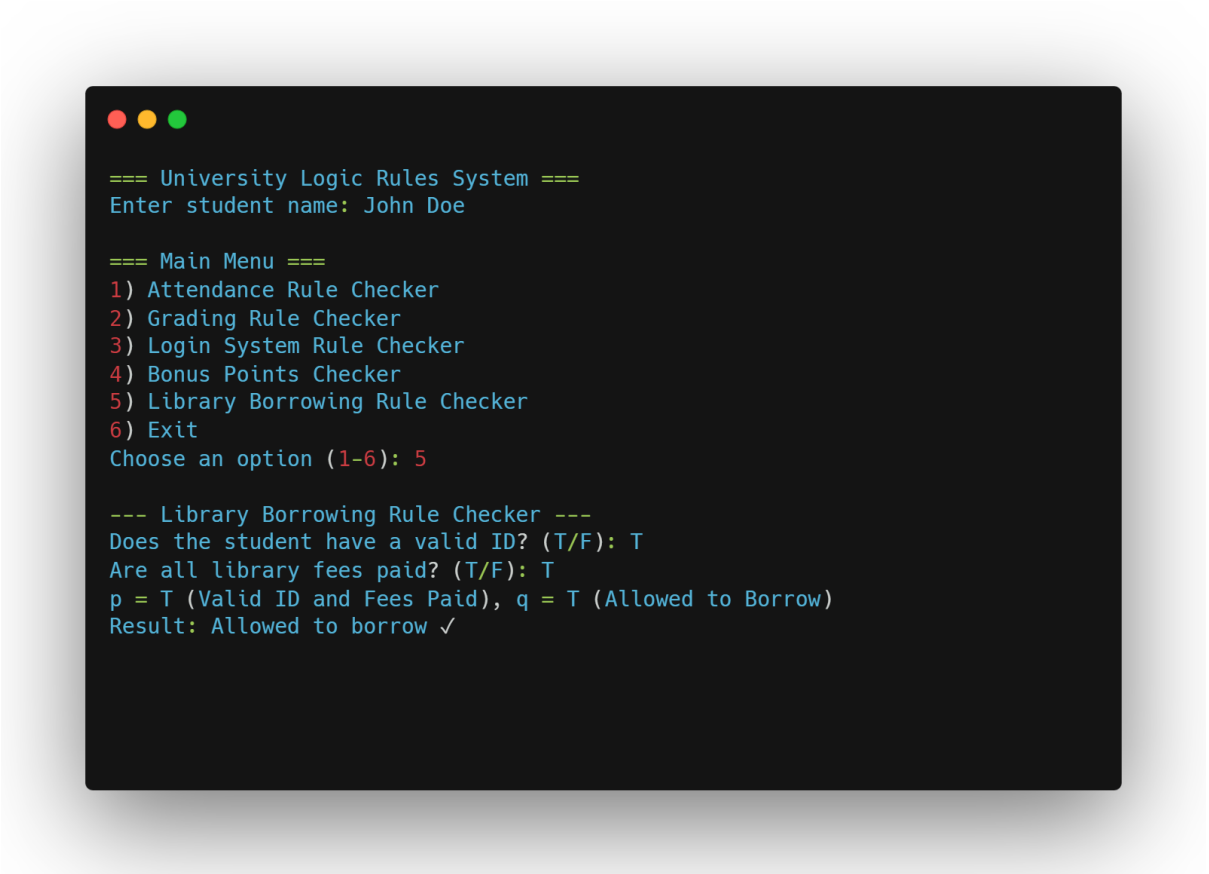
- **Antecedent (P):** The student must possess a valid ID **AND** have paid all library fees. Both inputs must be "T" for P to be true.

- **Consequent (Q):** The student is allowed to borrow books.
- **Outcome:** The system validates that a student cannot borrow books unless *both* administrative requirements are met.

3. Program Execution (Simulated Screenshots)

Below are simulated output logs representing the console interaction when running the program.

Scenario A: Testing the New Library Rule (Success) *In this run, the student has both a valid ID and has paid fees.*



Scenario B: Testing the Attendance Rule (Violation) *In this run, the student is late but fails to provide an excuse letter.*

```
=== Main Menu ===
1) Attendance Rule Checker
...
Choose an option (1-6): 1

--- Attendance Rule Checker ---
Was the student late? (T/F): T
Did the student provide an excuse letter? (T/F): F
p = T (Late), q = F (Excuse Letter)
Result: Violated ✗
```

Scenario C: Saving and Exiting *The program saves the session logs to a CSV file upon exit.*

```
=== Main Menu ===
...
6) Exit
Choose an option (1-6): 6
Created 'data' folder for storing results.
Results saved to data/logic_results_20231027_143000.csv
Exiting...
```