**Information Technology**

**COMP513 Fundamentals of Computer Programming**

**Trimester T2, 2025**

**Individual Project**

**Work Management System**

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**Task 1: Algorithm / Pseudocode**

Main Functional Algorithm for Work Management System:  
  
START PROGRAM  
  
FUNCTION connect\_to\_database()  
 CONNECT to MySQL database using host, username, password, db\_name  
 RETURN database\_connection  
  
FUNCTION login(database\_connection)  
 REPEAT  
 PROMPT "Enter username:"  
 PROMPT "Enter password:"  
 IF username and password match a record in login table THEN  
 PRINT "Login successful"  
 RETURN True  
 ELSE  
 PRINT "Invalid credentials, try again"  
 UNTIL valid credentials entered  
  
FUNCTION display\_menu()  
 PRINT "1. Add Staff"  
 PRINT "2. View Staff"  
 PRINT "3. Update Staff"  
 PRINT "4. Delete Staff"  
 PRINT "5. Exit"  
 PROMPT for user choice  
 RETURN choice  
  
FUNCTION add\_staff(database\_connection)  
 PROMPT for staff\_name, address, dob, contact  
 INSERT these values into staff table  
 PRINT "Staff added successfully"  
  
FUNCTION view\_staff(database\_connection)  
 FETCH all staff records from staff table  
 DISPLAY records in table format  
  
FUNCTION update\_staff(database\_connection)  
 PROMPT for staff\_id  
 PROMPT for new\_name, new\_address, new\_dob, new\_contact  
 UPDATE staff record in staff table where id = staff\_id  
 PRINT "Staff updated successfully"  
  
FUNCTION delete\_staff(database\_connection)  
 PROMPT for staff\_id  
 DELETE staff record from staff table where id = staff\_id  
 PRINT "Staff deleted successfully"  
  
# -------- Main Program Flow --------  
SET db\_connection = connect\_to\_database()  
  
IF login(db\_connection) == True THEN  
 REPEAT  
 SET choice = display\_menu()  
 IF choice == 1 THEN  
 add\_staff(db\_connection)  
 ELSE IF choice == 2 THEN  
 view\_staff(db\_connection)  
 ELSE IF choice == 3 THEN  
 update\_staff(db\_connection)  
 ELSE IF choice == 4 THEN  
 delete\_staff(db\_connection)  
 ELSE IF choice == 5 THEN  
 PRINT "Exiting program..."  
 BREAK  
 ELSE  
 PRINT "Invalid option"  
 UNTIL choice == 5  
ELSE  
 PRINT "Login failed. Program exiting."  
  
CLOSE db\_connection  
END PROGRAM

**Task 2: Functional Requirements**

1. User Login System:  
 - Input username & password  
 - Checks database for credentials  
 - Denies or grants access  
  
2. Add Staff Record:  
 - Collects staff details  
 - Inserts into MySQL database  
  
3. View Staff Records:  
 - Retrieves all records from database  
 - Displays in table format  
  
4. Update Staff Record:  
 - Allows user to select a staff ID  
 - Updates existing details  
  
5. Delete Staff Record:  
 - Removes staff record from database permanently  
  
Evidence: Screenshots of each functionality running without errors will be attached separately.

Task 3: Documentation and Code Justification

Modularization:  
- Splits code into logical chunks (e.g., login(), add\_staff())  
- Reduces complexity by focusing on one function at a time  
- Improves readability, maintainability, and adaptability  
  
Readability:  
- Functions are named clearly  
- Menu-driven structure makes program flow easy to follow  
  
Maintainability:  
- Bugs can be fixed in individual functions without affecting others  
  
Adaptability:  
- For example, login() can be changed to use OAuth without rewriting the entire application  
  
Control Mechanisms Justification:  
- Loops: Used in menu for continuous execution until user exits  
- Conditionals: Ensures correct function executes based on user choice  
- Functions: Prevents repetition and improves maintainability

**Task 4: Debugging Tool**

Two deliberate defects introduced:  
1. Syntax Error: Missing closing parenthesis in SQL query  
2. Logical Error: Wrong column name in UPDATE query  
  
Debugging Steps in VS Code:  
1. Set breakpoints in faulty functions  
2. Run debugger  
3. Step into each line and check variables  
4. Fix syntax or variable names  
5. Re-run program to verify fix

**Task 5: Testing Tool**

Five Unit Test Cases:  
  
1. Add a new staff record → Record exists in DB after function call  
2. View staff records → Function returns non-empty list  
3. Update staff record → Updated data matches expected values  
4. Delete staff record → Record no longer exists in DB  
5. Login with correct credentials → Returns True  
  
Unit test script written in test\_staff.py and executed using:  
python -m unittest test\_staff.py  
  
A screenshot of a computer program

AI-generated content may be incorrect.

**Testing Report**