SC2006: Software Engineering

Lab 4 Deliverables

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Team	Hawkar
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1. Black Box Testing

A. Control Class: AuthController

Selected control class: AuthController
Encompassing the login, sign up and profile creation methods, AuthController is responsible for the registration and authentication of Users.

User Registration
The registration of Users for Hawkar occurs in two parts: Sign Up and Profile Creation.

In the initial Sign Up stage, the user interface requests for Users' basic information, including their names, email addresses and passwords. Upon receipt of the information, AuthController validates the input data to ensure their correctness and completeness. After which, Users' passwords are securely encrypted via a salted password hashing process before being stored in the database with their emails. This involves appending a unique, random string of characters (salt) to Users' passwords before they are hashed to prevent passwords from being compromised by attackers.

After the Sign Up stage, Users are directed to the Profile Creation stage where additional information is requested from them depending on their selected role.
- **Consumer**
  If a User selects the Consumer role, he will be prompted to input his address, contact number, dietary preference, preferred cuisines and ambulatory status to determine hawker stalls he might be interested in.
- **Hawker**
  If a User selects the Hawker role, he will be prompted to input his SFA licence number, address and contact number to determine the authenticity of his claim to be a Hawker.
- **Admin**
  If an Admin selected the Admin role, he will be prompted to input his Admin Unique ID and contact number to ensure that Admin privileges are only available to authorised personnel.

Information managed by AuthController within the User Registration process includes email and role of the user for validation and routing database operations to the appropriate application layers.

User Authentication
On attempting to log into Hawkar, Users are requested for their email addresses and passwords. Following which, the process of authenticating the User involves querying the database for a User record with an emailAddress identical to the entered email address. Thereafter, if such a user exists, the entered password is rehashed according to the salt in the stored hash, and a comparison of both passwords is made. If both passwords are identical, then the login is successful and the User is brought to their respective dashboard. Information

managed by AuthController in the User Authentication process includes Users' entered email address for matching within the database, while the entered password is routed to the application layer for hashing.

B. Equivalence Class Testing

Equivalence Class Testing is a black box testing method that reduces the number of test cases by identifying partitions of input data which produce the same output. Each equivalence class represents a set of valid or invalid inputs. The crux of Equivalence Class Testing lies in testing one representative value from each class, assuming the system behaves similarly for all values in the same class. This allows us to derive a small subset of test inputs with a high probability of detecting bugs.

1. **Signup Function**
   - Valid Equivalence Classes:
     - All fields are filled (Name, Email, Password)
     - Email is correctly formatted and not registered
     - Role is ADMIN, CONSUMER or HAWKER
     - Password is at least 8 characters
   - Invalid Equivalence Classes:
     - Email already exists in database
     - Email format is invalid
     - Email is empty
     - Password is empty
     - Name is empty

2. **Profile Creation Function**
   a. **Consumer** role is selected
      - Valid Equivalence Classes:
        - Address, Contact Number are filled
        - Address is correctly formatted
        - Contact Number is exactly 8 digits starting with an 8 or 9
        - Dietary Preference is selected
        - Preferred Cuisines is selected
        - Ambulatory Status is selected
      - Invalid Equivalence Classes:
        - Address, Contact Number is empty
        - Dietary Preference, Preferred Cuisines, Ambulatory Status is not selected
        - Contact Number exceeds 8 digits
        - Contact Number is less than 8 digits

- Contact Number does not start with 8 or 9
  b. **Hawker** role is selected
    - Valid Equivalence Classes:
      - All fields are filled (SFA Licence Number, Address, Contact Number)
      - Contact Number is exactly 8 digits starting with an 8 or 9
    - Invalid Equivalence Classes:
      - SFA Licence Number, Address or Contact Number is empty
      - Contact Number exceeds 8 digits
      - Contact Number is less than 8 digits
      - Contact Number does not start with 8 or 9
  c. **Admin** role is selected
    - Valid Equivalence Classes
      - All fields are filled (Admin Unique ID, Contact Number)
      - Contact Number is exactly 8 digits starting with an 8 or 9
    - Invalid Equivalence Classes:
      - Admin Unique ID or Contact Number is empty
      - Contact Number exceeds 8 digits
      - Contact Number is less than 8 digits
      - Contact Number does not start with 8 or 9

3. **Login Function**
   - Valid Equivalence Classes:
     - Non-empty email and password.
     - Email exists in the database.
     - Email in a valid format (contains '@')
     - Password matches the hashed password stored
   - Invalid Equivalence Classes:
     - Email is empty
     - Password is empty
     - Email does not follow format rules (e.g missing '@')
     - Email is not in the database or password does not match

C. Boundary Value Testing

Boundary Value Testing involves testing the boundary values of identified valid and invalid equivalence partitions. As such, it applies only for methods accepting ordered inputs, including numerical and ordinal inputs. The intuition behind Boundary Value Testing lies in the fact that behaviour at the edge of equivalence partitions is more likely to be erroneous.

D. Test Cases and Results

a) Sign-up

No.	Test Input	Expected Output	Actual Output	Pass?
1	Name: "User1" Email: "user1@gmail.com" Password: "Password123"	Success (User is directed to the Profile Creation stage)	Success (User is directed to the Profile Creation stage)	Yes
2	Name: "" Email: "user1@gmail.com" Password: "Password123" (Name is empty)	System notify "Please fill out this field"	System notify "Please fill out this field"	Yes
3	Name: "User1" Email: "" Password: "Password123" (Email is empty)	System notify "Please fill out this field"	System notify "Please fill out this field"	Yes
4	Name: "User1" Email: "user1" Password: "Password123"	System notify "Please include an '@' in the email address. "(input)" is missing an '@'.	System notify "Please include an '@' in the email address. "(input)" is missing an '@'.	Yes
5	Name: "User1" Email: "user1@gmail.com" Password: "" (Password is empty)	System notify "Please fill out this field"	System notify "Please fill out this field"	Yes
6	Name: "User1" Email: "user1@gmail.com" Password: "Pass"	System notify "Password must be at least 8 characters"	System notify "Password must be at least 8 characters"	Yes

b) Profile Creation - Consumer

No.	Test Input	Expected Output	Actual Output	Pass?
1	Address:"Jurong West" Contact Number: "89989889" Dietary Preference: "No Restriction" Preferred Cuisines: "Chinese" Ambulatory Status: "Ambulatory"	Successful signup, system notify "You're all signed up! Redirecting you to log in…"	Successful signup, system notify "You're all signed up! Redirecting you to log in…"	Yes
2	Address:"" Contact Number: "89989889" Dietary Preference: "Halal" Preferred Cuisines: "Chinese" Ambulatory Status: "Ambulatory" (Address is empty)	System notify "Please fill out this field"	System notify "Please fill out this field"	Yes
3	Address: "Jurong West" Contact Number: "" Dietary Preference: "Halal" Preferred Cuisines: "Chinese" Ambulatory Status: "Ambulatory" (Contact Number is empty)	System notify "Please fill out this field"	System notify "Please fill out this field"	Yes
4	Address: "Jurong West" Contact Number: "9234567" Dietary Preference: "Halal" Preferred Cuisines: "Chinese" Ambulatory Status: "Ambulatory" (Contact Number is <8 digits)	System notify "Phone number must be 8 digits and start with 8 or 9"	System notify "Phone number must be 8 digits and start with 8 or 9"	Yes
5	Address: "Jurong West" Contact Number: "923456780" Dietary Preference: "Halal" Preferred Cuisines: "Chinese" Ambulatory Status: "Ambulatory" (Contact Number is >8 digits)	System notify "Phone number must be 8 digits and start with 8 or 9"	System notify "Phone number must be 8 digits and start with 8 or 9"	Yes
6	Address: "Jurong West" Contact Number: "12345678" Dietary Preference: "Halal" Preferred Cuisines: "Chinese" Ambulatory Status: "Ambulatory"	System notify "Phone number must be 8 digits and start with 8 or 9"	System notify "Phone number must be 8 digits and start with 8 or 9"	Yes

No.	Test Input	Expected Output	Actual Output	Pass?
	(Contact Number does not begin with 8 or 9)			
7	Address: "Jurong West" Contact Number: "8998 9889" Dietary Preference: "" Preferred Cuisines: "Chinese" Ambulatory Status: "Ambulatory" (Dietary Preference is empty)	System notify "Please select an item in the list."	System notify "Please select an item in the list."	Yes
8	Address: "Jurong West" Contact Number: "89989889" Dietary Preference: "Halal" Preferred Cuisines: "" Ambulatory Status: "Ambulatory" (Preferred Cuisines is empty)	System notify "Please select an item in the list."	System notify "Please select an item in the list."	Yes
9	Address: "Jurong West" Contact Number: "89989889" Dietary Preference: "Halal" Preferred Cuisines: "Chinese" Ambulatory Status: "" (Ambulatory Status is empty)	System notify "Please select an item in the list."	System notify "Please select an item in the list."	Yes

c) **Profile Creation - Hawker**

No.	Test Input	Expected Output	Actual Output	Pass?
1	SFA license number: "B97158D000" Address:"Jurong West" Contact Number: "92345678"	Successful signup, system notify "You're all signed up! Redirecting you to log in…"	Successful signup, system notify "You're all signed up! Redirecting you to log in…"	Yes
2	SFA license number: "" Address: "Jurong West" Contact Number: "92345678" (SFA license number is empty)	System notify "Please fill out this field"	System notify "Please fill out this field"	Yes
3	SFA license number: "B97158D000" Address: "" Contact Number: "92345678" (Address is empty)	System notify "Please fill out this field"	System notify "Please fill out this field"	Yes

No.	Test Input	Expected Output	Actual Output	Pass?
4	SFA license number: "B97158D000" Address: "Jurong West" Contact Number: "9234567" (Contact Number is <8 digits)	System notify "Phone number must be 8 digits and start with 8 or 9"	System notify "Contact Number must be exactly 8 digits"	Yes
5	SFA license number: "B97158D000" Address: "Jurong West" Contact Number: "923456780" (Contact Number is >8 digits)	System notify "Phone number must be 8 digits and start with 8 or 9"	System notify "Contact Number must be exactly 8 digits"	Yes
6	SFA license number: "B97158D000" Address: "Jurong West" Contact Number: "12345678" (Contact Number does not begin with 8 or 9)	System notify "Contact Number must start with 8 or 9"	System notify "Contact Number must start with 8 or 9"	Yes
7	SFA license number: "B97158D000" Address: "Jurong West" Contact Number: "" (Contact Number is empty)	System notify "Please fill out this field"	System notify "Please fill out this field"	Yes

d) **Sign-up - Admin**

No.	Test Input	Expected Output	Actual Output	Pass?
1	Admin Unique ID: "Admin123" Contact Number: "92345678"	Successful signup, system notify "You're all signed up! Redirecting you to log in…"	Successful signup, system notify "You're all signed up! Redirecting you to log in…"	Yes
2	Admin Unique ID: "" Contact Number: "92345678" (Admin Unique ID is empty)	System notify "Please fill out this field"	System notify "Please fill out this field"	Yes
3	Admin Unique ID: "B97158D000" Address: "Jurong West" Contact Number: "9234567" (Contact Number is <8 digits)	System notify "Phone number must be 8 digits and start with 8 or 9"	System notify "Contact Number must be exactly 8 digits"	Yes
4	Admin Unique ID:"B97158D000" Address: "Jurong West" Contact Number: "923456780"	System notify "Phone number must be 8 digits and start with 8	System notify "Contact Number must be exactly 8	Yes

|		or 9"	digits"	
	(Contact Number is >8 digits)			
5	Admin Unique ID:"B97158D000" Address: "Jurong West" Contact Number: "12345678" (Contact Number does not begin with 8 or 9)	System notify "Phone number must be 8 digits and start with 8 or 9"	System notify "Contact Number must start with 8 or 9"	Yes
6	Admin Unique ID: "Admin123" Contact Number: "" (Contact Number is empty)	System notify "Please fill out this field"	System notify "Please fill out this field"	Yes

e) Login

No.	Test Input(Email, Password)	Expected Output	Actual Output	Pass?
1	Email: "user1@gmail.com" Password: "Password123"	Login successful	Login successful	Yes
2	Email: "" Password: "Password123"	Login failed, system notify "Please enter a valid email address"	Login failed, system notify "Please enter a valid email address"	Yes
3	Email: "user1" Password: "Password123"	Login failed, system notify "Please include an '@' in the email address. '' is missing an '@'"	Login failed, system notify "Please include an '@' in the email address. '' is missing an '@'"	Yes
4	Email: "user1@gmail.com" Password: ""	Login failed, system notify "Password is required"	Login failed, system notify "Password is required"	Yes
5	Email: "user1@gmail.com" Password: "Pass123"	Login failed, system notify "Please lengthen this text to 8 characters or more (you are currently using # characters)"	Login failed, system notify "Please lengthen this text to 8 characters or more (you are currently using # characters)"	Yes

2. White Box Testing

A. Method 1: Login

A.1 Control Flow Graph
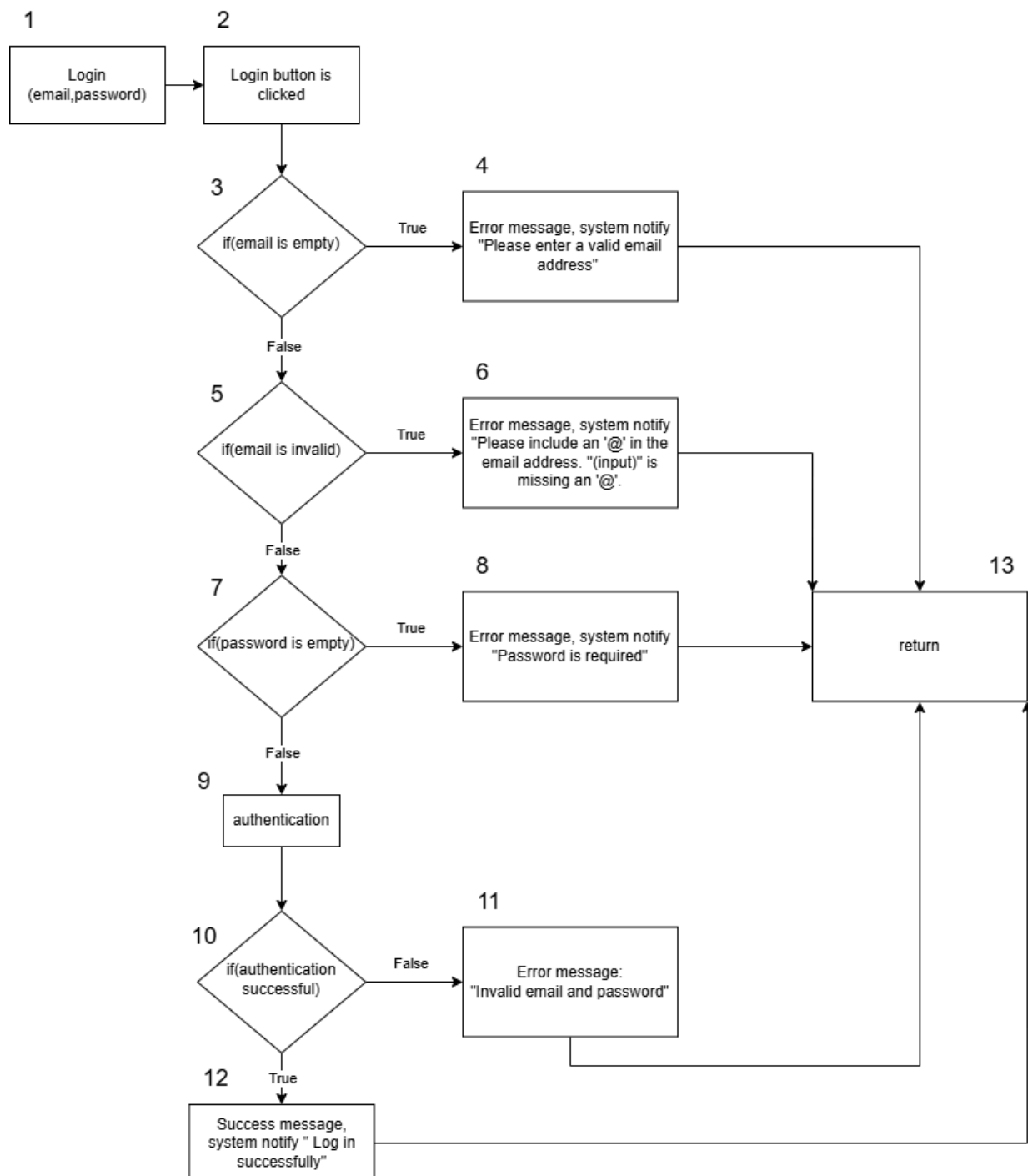
A.2 Basic Path Testing

Cyclomatic Complexity = 5

Basis Path:
1. Baseline path: 1, 2, 3, 5, 7, 9, 10, 12, 13
2. Basis path 2: 1, 2, 3, 4, 13
3. Basis path 3: 1, 2, 3, 5, 6, 13
4. Basis path 4: 1, 2, 3, 5, 7, 8, 13
5. Basis path 5: 1, 2, 3, 5, 7, 9, 10, 11, 15
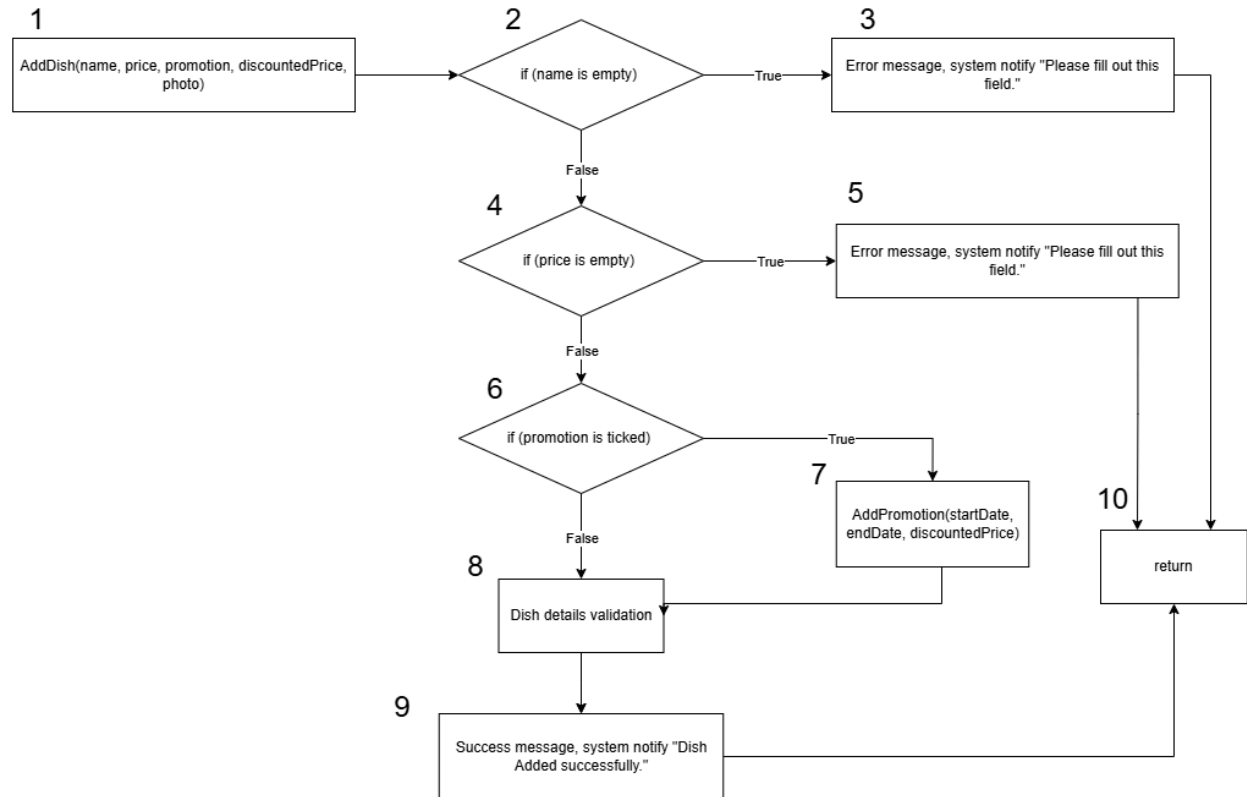
A.3 Test Cases and Results

Login(email, password)
- **Inputs:** email, password

No.	Test Input	Expected Output	Actual Output	Pass?
1	Email: "user1@gmail.com" Password: "Password123"	Login successfully	Login successfully	Yes
2	Email: "" Password: "Password123"	Display error message "Please enter a valid email address"	Display error message "Please enter a valid email address"	Yes
3	Email: "user1" Password: "Password123"	"Please include an '@' in the email address. '(input)' is missing an '@'"	"Please include an '@' in the email address. '(input)' is missing an '@'"	Yes
4	Email: "user1@gmail.com" Password: ""	Display error message "Password is required"	Display error message "Password is required"	Yes
5	Email: "user2@gmail.com" Password: "Password123"	Display error message "Invalid email or password"	Display error message "Invalid email or password"	Yes

B. Method 2: Add Dish

B.1 Control Flow Graph

B.2 Basic Path Testing

Cyclomatic Complexity = 4

Basis Path
1. Baseline path: 1, 2, 4, 6, 8, 9
2. Basis path 2: 1, 2, 3, 10
3. Basis path 3: 1, 2, 4, 5, 10
4. Basis path 4: 1, 2, 4, 6, 7, 8, 9

B.3 Test Cases and Results

AddDish(stallID, dishName, price, photo, promotion)
*   **Inputs:** dishName, price, photo, promotion
*   **Implied Input:** stallID

No.	Test Input	Expected Output	Actual Output	Pass?
1	Name: "Nasi Lemak" Price: 3.50 Promotion: - Discounted Price: - Start Date: - End Date: -	Display success message "Dish Added successfully"	Display success message "Dish Added successfully"	Yes
2	Name: "" Price: 3.50 Promotion: - Discounted Price: - Start Date: - End Date: --	Display error message "Please fill out this field"	Display error message "Please fill out this field"	Yes
3	Name: "Nasi Lemak" Price: "" Promotion: - Discounted Price: - Start Date: - End Date: --	Display error message "Please fill out this field"	Display error message "Please fill out this field"	Yes
4	Name: "Nasi Lemak" Price: 3.50 Promotion: (toggled) Discounted Price: 2.80 Start Date: 11/11/2025 End Date: 12/11/2025	Display success message "Dish Added successfully"	Display success message "Dish Added successfully"	Yes