

**NANYANG  
TECHNOLOGICAL  
UNIVERSITY**  
**SINGAPORE**

## **SC2006 – Software Engineering**

### **Lab 4 Deliverables**

|                  |                                  |
|------------------|----------------------------------|
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# 1. Black Box Testing

## I. AuthController

Control class to test - **AuthController**

The AuthController class manages user authentication within the application, covering both user registration (signup) and user login.

The AuthController is a crucial component responsible for managing **user authentication** within the application. When a user attempts to log in, the controller collects their email and password. Subsequently, it validates the input data for correctness, ensuring the integrity and accuracy of the provided information. To authenticate the user, the controller retrieves the hashed password associated with the provided email from the database. The retrieved hashed password is then compared with the user's provided password. If the comparison results in a match, signifying successful authentication, the user will be directed to the home screen. Information managed by the AuthController in the login process includes email and password.

Apart from user authentication, the AuthController is also responsible for **user registration**. When a new user registers for the application, the controller will ensure essential information is collected, validating the input data ensuring correctness and completeness. Prior to storing the user's password in the database, the password will undergo a secure hashing process. The AuthController will also generate a user ID and assign it to the newly registered user. This unique identifier becomes a key element in distinguishing and managing user data. Additionally, if the role of the user selected is Hawker or Driver, the system will require additional inputs such as Vehicle Number, License Number for Driver and Business Name, Operating Hours, Food Type, Postal Code for Hawker. Information managed by AuthController in the sign up process includes Name, Email, Address, Contact Number, Role, Password, Confirm Password and Profile Picture.

## II. Equivalence Class and Boundary Value Testing

### Equivalence Class Testing

A basic black-box test design technique in which test cases are designed to execute representatives from equivalence partitions. Equivalence classes (partitions) are portions of an input or output domain. The behavior of a component or system is assumed to be the same for every member of a partition class. Test cases are designed to cover each partition at least once. The operation of equivalence partitioning is performed by splitting a set (domain) into two or more disjoint sets where all the members of each subset share some trait in common ie.

- Produces the same output
- If one catches a bug, the others probably will too
- If one value does not catch a bug, the others probably will not either

This trait is not shared with the members of other subsets.

Valid equivalence classes describe valid situations and the system should handle them normally.

Invalid equivalence classes describe invalid situations and the system should reject them.

### Boundary Value Testing

Boundary Value Testing is an extension of equivalence partitioning and applies only when the members of an equivalence class are ordered. It focuses on testing the boundaries of the input domain. It checks how the system behaves at the edges or limits of acceptable input values.

#### 1. Login Function

**Valid Equivalence Class:** Usernames and passwords with correct formats.

**Invalid equivalence Class:** Usernames and passwords with incorrect formats or missing information.

#### 2. Sign up function

**Valid Equivalence Class:** Name, Email, Address, Contact Number, Role, Password, Confirm Password and Profile Picture with correct formats

**Invalid Equivalence Class:** Name, Email, Address, Contact Number, Role, Password, Confirm Password and Profile Picture with incorrect formats or missing information

- If role selected is Hawker:

**Valid Equivalence Class:** Business Name, Operating Hours, Food Type and Postal Code with correct formats.

**Invalid equivalence Class:** Business Name, Operating Hours, Food Type and Postal Code with incorrect formats or missing information.

- If role selected is Driver:

**Valid Equivalence Class:** Vehicle number, License number with correct formats.

**Invalid equivalence Class:** Vehicle number, License number with incorrect formats or missing information.

### III. Test Cases and Results

#### a) Login

Input parameters: Email and Password

| No. | Test Input   | Expected Output  | Actual Output  | Pass? |
|-----|--|--|--|-------|
| 1   | <b>(Valid)</b> Email: "admin1@gmail.com"<br><b>(Valid)</b> Password: "Password"  | Successful login   | Successful login   | Yes   |
| 2   | <b>(Invalid)</b> Email: ""<br><b>(Valid)</b> Password: "Password"                | Login failed,<br>system notify<br>"Please enter<br>your email and<br>password!"                  | Login failed,<br>system notify<br>"Please enter<br>your email and<br>password!"                  | Yes   |
| 3   | <b>(Invalid)</b> Email: "test123"<br><b>(Valid)</b> Password: "Password"         | Login failed,<br>system notify<br>"Please include<br>an @ in your<br>email."                     | Login failed,<br>system notify<br>"Please include<br>an @ in your<br>email."                     | Yes   |
| 4   | <b>(Valid)</b> Email: "admin1@gmail.com"<br><b>(Invalid)</b> Password: ""        | Login failed,<br>system notify<br>"Please enter<br>your email and<br>password!"                  | Login failed,<br>system notify<br>"Please enter<br>your email and<br>password!"                  | Yes   |
| 5   | <b>(Valid)</b> Email: "admin1@gmail.com"<br><b>(Invalid)</b> Password: "Pass123" | Login failed,<br>system notify<br>"Password length<br>must be at least<br>8 characters<br>long!" | Login failed,<br>system notify<br>"Password length<br>must be at least<br>8 characters<br>long!" | Yes   |

**b) Sign up**

Input Parameters: Name, Email, Address, Contact Number, Role, Password, Confirm Password and Profile Picture

| No. | Test Input  | Expected Output   | Actual Output   | Pass? |
|-----|---|---|---|-------|
| 1   | <b>(All Valid Inputs)</b><br>Name: "Admin Jane"<br>Email: "admin1@gmail.com"<br>Address: "160 Paya Lebar Road<br>07-08 Orion Industrial Building"<br>Contact Number: "98553641"<br>Password: "Password"<br>Confirm Password: "Password" | Successful<br>signup  | Successful<br>signup  | Yes   |
| 2   | <b>(All Valid Inputs except Name)</b><br>Name: ""   | System notify<br>"Please input all<br>fields."                          | System notify<br>"Please input all<br>fields."                          | Yes   |
| 3   | <b>(All Valid Inputs except Name)</b><br>Name: "Jane!"  | System notify<br>"Name should<br>not contain<br>special<br>characters." | System notify<br>"Name should<br>not contain<br>special<br>characters." | Yes   |
| 4   | <b>(All Valid Inputs except Email)</b><br>Email: ""   | System notify<br>"Please input all<br>fields."                          | System notify<br>"Please input all<br>fields."                          | Yes   |
| 5   | <b>(All Valid Inputs except Email)</b><br>Email: "admin1"   | System notify<br>"Please include<br>an @ in your<br>email."             | System notify<br>"Please include<br>an @ in your<br>email."             | Yes   |
| 6   | <b>(All Valid Inputs except Email)</b><br>Email: "admin@gmail.com"  | System notify<br>"Email is already<br>registered!"                      | System notify<br>"Email is already<br>registered!"                      | Yes   |
| 7   | <b>(All Valid Inputs except Address)</b><br>Address: ""   | System notify<br>"Please input all<br>fields."                          | System notify<br>"Please input all<br>fields."                          | Yes   |
| 8   | <b>(All Valid Inputs except Contact<br/>Number)</b><br>Contact Number: ""   | System notify<br>"Please input all<br>fields."                          | System notify<br>"Please input all<br>fields."                          | Yes   |
| 9   | <b>(All Valid Inputs except Password)</b><br>Password: ""   | System notify<br>"Please input all<br>fields."                          | System notify<br>"Please input all<br>fields."                          | Yes   |

|    |   |  |  |     |
|----|---|--|--|-----|
| 10 | <b>(All Valid Inputs except Password)</b><br>Password: "pass123"                                      | System notify<br>"Password must be at least 8 characters."   | System notify<br>"Password must be at least 8 characters."   | Yes |
| 11 | <b>(All Valid Inputs except Confirm Password)</b><br>Confirm Password: ""                             | System notify<br>"Please input all fields."                  | System notify<br>"Please input all fields."                  | Yes |
| 12 | <b>(All Valid Inputs except Confirm Password)</b><br>Password: "Password"<br>Confirm Password: "Pass" | System notify<br>"Password and Confirm Password must match." | System notify<br>"Password and Confirm Password must match." | Yes |
| 13 | <b>(All Valid Inputs except Role)</b><br>Role not chosen from dropdown menu                           | System notify<br>"Please input all fields."                  | System notify<br>"Please input all fields."                  | Yes |
| 14 | <b>(All Valid Inputs except Profile Picture)</b><br>No picture/file uploaded                          | System notify<br>"Please upload a photo."                    | System notify<br>"Please upload a photo."                    | Yes |
| 15 | <b>(All Valid Inputs except Profile Picture)</b><br>Incorrect file type uploaded                      | System notify<br>"Failed to upload photo!"                   | System notify<br>"Failed to upload photo!"                   | Yes |

c) **Signup - if role selected is Driver**

Additional input parameters: Vehicle number, License number

| No. | Test Input   | Expected Output                             | Actual Output                               | Pass? |
|-----|--|---|---|-------|
| 1   | (Valid) Vehicle Number: "1GKLVKED8AJ155580"<br>(Valid) License Number: "C006-340-56-864-0" | Successful signup                           | Successful signup                           | Yes   |
| 2   | (Invalid) Vehicle Number: ""<br>(Valid) License Number: "C006-340-56-864-0"                | System notify<br>"Please input all fields." | System notify<br>"Please input all fields." | Yes   |
| 3   | (Valid) Vehicle Number: "1GKLVKED8AJ155580"<br>(Invalid) License Number: ""                | System notify<br>"Please input all fields." | System notify<br>"Please input all fields." | Yes   |

d) **Signup - if role selected is Hawker**

Additional input parameters: Business Name, Operating Hours, Food Type, Postal Code

| No. | Test Input   | Expected Output                             | Actual Output                               | Pass? |
|-----|--|---|---|-------|
| 1   | (Valid) Business Name: "A Hot Hideout (NTU)"<br>(Valid) Operating Hours: "9am - 5pm"<br>(Valid) Food Type: "Mala"<br>(Valid) Postal Code: "636957" | Successful signup                           | Successful signup                           | Yes   |
| 2   | (Invalid) Business Name: ""<br>(Valid) Operating Hours: "9am - 5pm"<br>(Valid) Food Type: "Mala"<br>(Valid) Postal Code: "636957"                  | System notify<br>"Please input all fields." | System notify<br>"Please input all fields." | Yes   |
| 3   | (Valid) Business Name: "A Hot Hideout (NTU)"<br>(Invalid) Operating Hours: ""<br>(Valid) Food Type: "Mala"<br>(Valid) Postal Code: "636957"        | System notify<br>"Please input all fields." | System notify<br>"Please input all fields." | Yes   |
| 4   | (Valid) Business Name: "A Hot Hideout (NTU)"<br>(Valid) Operating Hours: "9am - 5pm"<br>(Invalid) Food Type: ""<br>(Valid) Postal Code: "636957"   | System notify<br>"Please input all fields." | System notify<br>"Please input all fields." | Yes   |
| 5   | (Valid) Business Name: "A Hot Hideout (NTU)"   | System notify<br>"Please input all fields." | System notify<br>"Please input all fields." | Yes   |

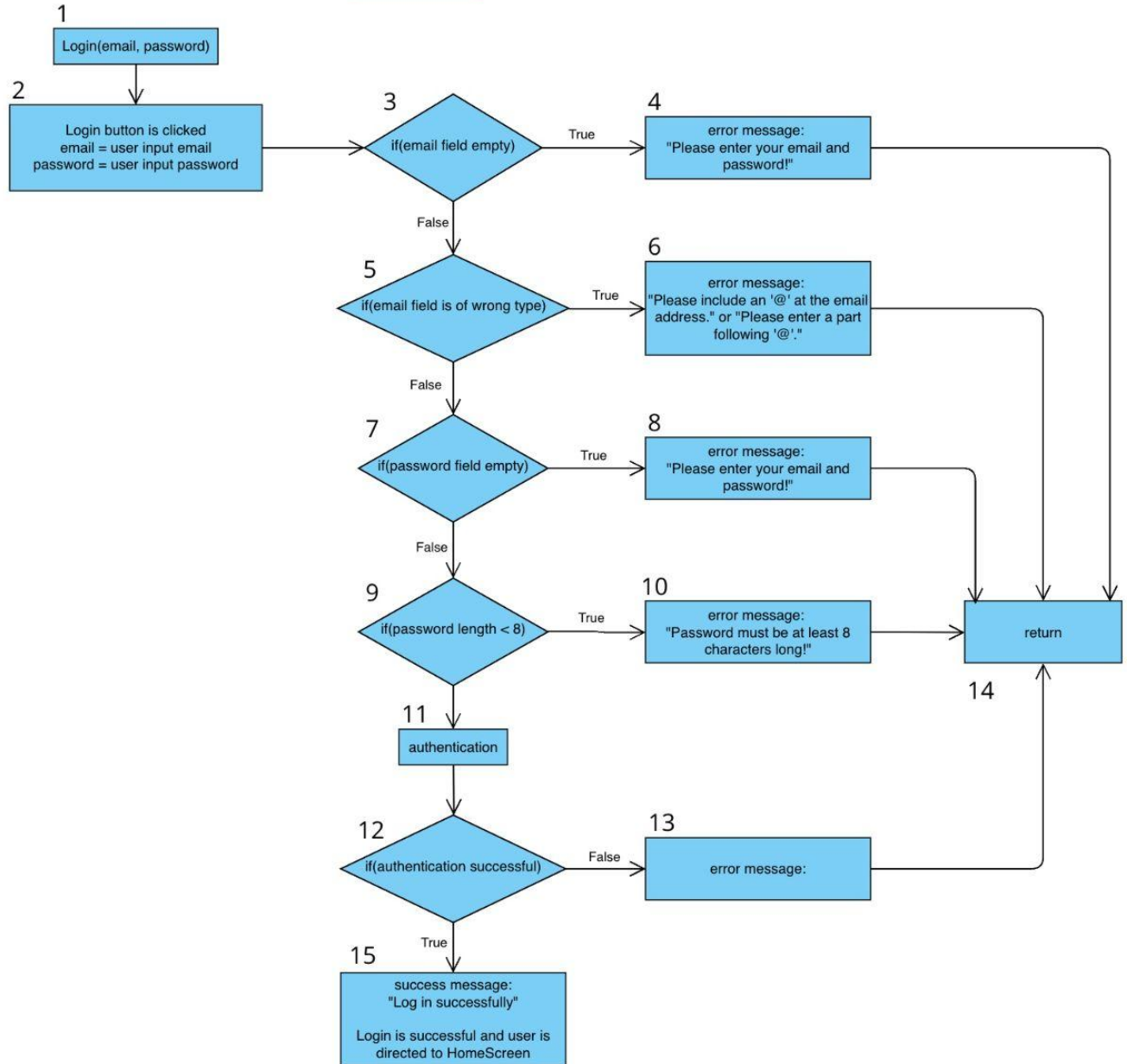


|   |  |   |   |     |
|---|--|---|---|-----|
|   | <b>(Valid)</b> Operating Hours: "9am - 5pm"<br><b>(Valid)</b> Food Type: "Mala"<br><b>(Invalid)</b> Postal Code: ""  | fields."                                | fields."                                |     |
| 6 | <b>(Valid)</b> Business Name: "A Hot Hideout (NTU)"<br><b>(Valid)</b> Operating Hours: "9am - 5pm"<br><b>(Valid)</b> Food Type: "Mala"<br><b>(Invalid)</b> Postal Code: "S636" | System notify<br>"Invalid Postal Code!" | System notify<br>"Invalid Postal Code!" | Yes |

## 2. White Box Testing

### I. Login

#### I.I Control Flow Graph



## I.II Basic Path Testing

**Cyclomatic Complexity** = | decision points | + 1 = 5 + 1 = 6

### Basis Paths

1. Baseline path: 1, 2, 3, 5, 7, 9, 11, 12, 15
2. Basis path 2: 1, 2, 3, 4, 14
3. Basis path 3: 1, 2, 3, 5, 6, 14
4. Basis path 4: 1, 2, 3, 5, 7, 8, 14
5. Basis path 5: 1, 2, 3, 5, 7, 9, 10, 14
- Basis path 6: 1, 2, 3, 5, 7, 9, 11, 12, 13, 14

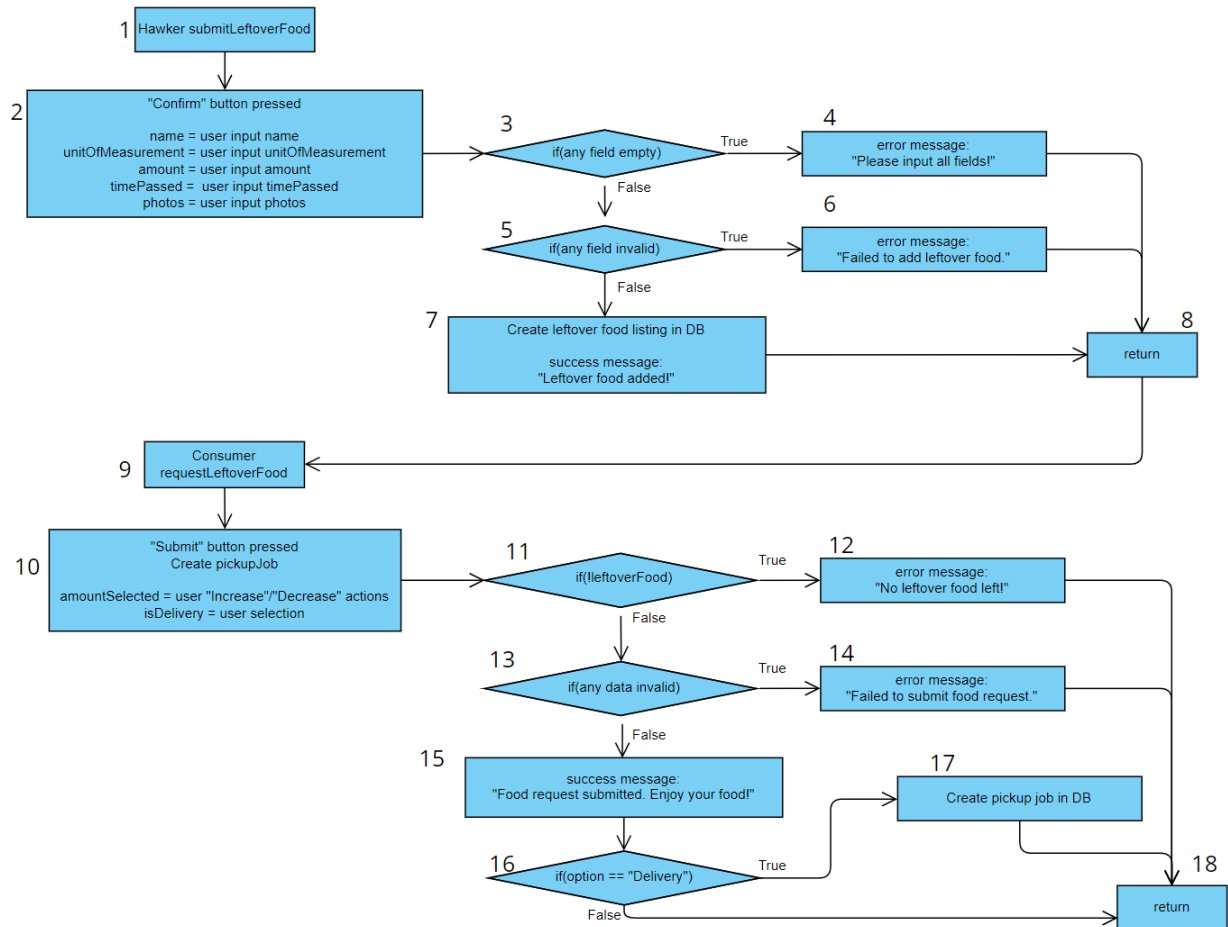
## I.III Test Cases and Results

Login(email, password)

| No. | Test Input   | Expected Output                                | Actual Output                                  | Pass? |
|-----|--|--|--|-------|
| 1   | email = "pinyang@gmail.com"<br>password = "12345678" | "Log in successfully"                          | "Log in successfully"                          | Yes   |
| 2   | email = ""<br>password = "12345678"                  | "Please enter your email and password!"        | "Please enter your email and password!"        | Yes   |
| 3   | email = "pinyang"<br>password = "12345678"           | "Please include an '@' at the email address."  | "Please include an '@' at the email address."  | Yes   |
| 4   | email = "pinyang@"<br>password = "12345678"          | "Please enter a part following '@'."           | "Please enter a part following '@'."           | Yes   |
| 5   | email = "pinyang@gmail.com"<br>password = ""         | "Please enter your email and password!"        | "Please enter your email and password!"        | Yes   |
| 6   | email = "pinyang@gmail.com"<br>password = "1234567"  | "Password must be at least 8 characters long!" | "Password must be at least 8 characters long!" | Yes   |
| 7   | email = "hacker@gmail.com"<br>password = "12345678"  | error  | error  | Yes   |

## II. Submit Leftover Food & Request Leftover Food

### II.I Control Flow Graph



## II.II Basic Path Testing

**Cyclomatic Complexity** = | decision points | + 1 = 5 + 1 = 6

### Basic Paths

1. Baseline path: 1, 2, 3, 5, 7, 8, 9, 10, 11, 13, 15, 16, 17, 18
2. Basis path 1: 1, 2, 3, 4, 8, 9, 10, 11, 12\*, 18
3. Basis path 2: 1, 2, 3, 5, 6, 8, 9, 10, 11, 12\*, 18
4. Basis path 3: 1, 2, 3, 5, 7, 8, 9, 10, 11, 13, 14,
5. Basis path 4: 1, 2, 3, 5, 7, 8, 9, 10, 11, 13, 15, 16, 18

\*Assuming that no pre-existing leftover food, so since hawker failed to submit leftover food, there would be no leftover food listing such that if(!leftoverFood) must be true. Thus, we change outcomes of 2 decision points at the same time for **basis path 2** and **basis path 3**.

## I.III Test Cases and Results

Submit Leftover Food, Request Leftover Food

| No. | Test Input  | Expected Output  | Actual Output  | Pass? |
|-----|---|--|--|-------|
| 1   | name = "Nasi Lemak"<br>unitOfMeasurement = "packets"<br>amount = "5"<br>timePassed = "1 hour"<br>photos = nasilemak.jpg<br><br>amountSelected = "1"<br>option = "Delivery"  | "Leftover food added!"<br><br>"Food request submitted. Enjoy your food!" | "Leftover food added!"<br><br>"Food request submitted. Enjoy your food!" | Yes   |
| 2   | name = ""<br>unitOfMeasurement = "packets"<br>amount = "5"<br>timePassed = "1 hour"<br>photos = nasilemak.jpg<br><br>amountSelected = "1"<br>option = "Delivery"            | "Please input all fields!"<br><br>"No leftover food left!"               | "Please input all fields!"<br><br>"No leftover food left!"               | Yes   |
| 3   | name = "Nasi Lemak"<br>unitOfMeasurement = "packets"<br>amount = "-1"<br>timePassed = "1 hour"<br>photos = nasilemak.jpg<br><br>amountSelected = "1"<br>option = "Delivery" | "Failed to add leftover food."   | "Failed to add leftover food."   | Yes   |
| 4   | name = "Nasi Lemak"   | "Leftover food"  | "Leftover food"  | Yes   |

|   |   |  |  |     |
|---|---|--|--|-----|
|   | unitOfMeasurement = "packets"<br>amount = "5"<br>timePassed = "1 hour"<br>photos = nasilemak.jpg<br><br>amountSelected = "-1"<br>option = "Delivery"                          | added!"<br><br>"Failed to submit food request."                          | added!"<br><br>"Failed to submit food request."                          |     |
| 5 | name = "Nasi Lemak"<br>unitOfMeasurement = "packets"<br>amount = "5"<br>timePassed = "1 hour"<br>photos = nasilemak.jpg<br><br>amountSelected = "1"<br>option = "Self Pickup" | "Leftover food added!"<br><br>"Food request submitted. Enjoy your food!" | "Leftover food added!"<br><br>"Food request submitted. Enjoy your food!" | Yes |