



Department of Computer Engineering

CS353 - Database Systems

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Term Project Final Report

Food Ordering and Delivery System: e-Meal

Group 18

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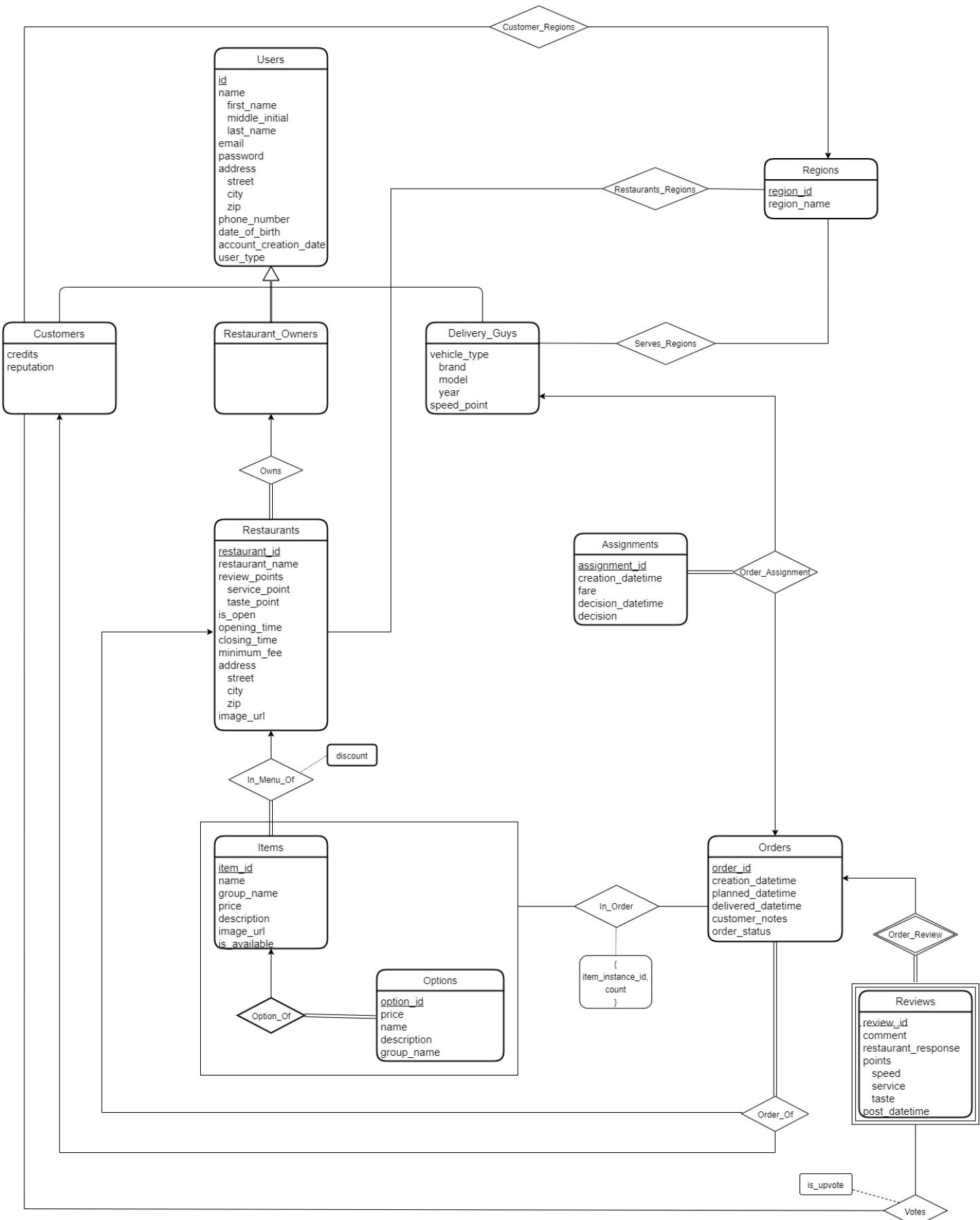
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Description

e-Meal is a web-based application implemented to manage a food ordering and delivery system. The system comprises restaurants, restaurant owners, customers, delivery guys, restaurant menus, food and beverages sold at restaurants, orders and so on. The user base thus consists of customers, restaurant owners and delivery guys. Every user has a profile that they can edit, consisting of their full names, addresses, profile pictures etc. The system allows customers to make an order from a restaurant they select, where they can buy a multitude of items as long as they are offered in the menu of the restaurant. The customer is allowed to make their order if the system sees that the customer has sufficient credit to buy the items they have specified. In that case, the order is processed by the system and a free delivery guy is assigned to this order. After the delivery, the customers are given the chance to rate and write a review on the restaurant and the delivery. Also, note that restaurant owners are allowed to add and edit meals for the menus of their restaurants, as well as maintain orders made at their restaurants.

In addition, the system would have extra functionalities. An example of such a feature would be reputation. Customers have a reputation value, calculated as $C*(\text{total_upvotes}-\text{total_downvotes})$ with C being an arbitrary positive real number. Next to the reviews of a customer, their reputation value is shown to make them more/less credible. This value can also be used in a way that customers with high enough reputations are offered special offers and discounts.

Final E/R Diagram



Final List of Tables

Users(id, first_name, middle_name, last_name, email, password, street, city, zip INT, phone_number, date_of_birth, account_creation_date, user_type)

- Candidate Keys: id, email
 - Primary Key: id
 - Foreign Keys: -
-

Customers(id, credits)

- Candidate Keys: id
 - Primary Key: id
 - Foreign Keys: id references Users(id)
-

Restaurant_Owners(id)

- Candidate Keys: id
 - Primary Key: id
 - Foreign Keys: id references Users(id)
-

Delivery_Guys(id, vehicle_brand, vehicle_model, vehicle_year, speed_point)

- Candidate Keys: id
 - Primary Key: id
 - Foreign Keys: id references Users(id)
-

Restaurants(restaurant_id, restaurant_name, owner_id, service_point, taste_point, is_open, opening_time, closing_time, minimum_fee, street, city, zip, image_url)

- Candidate Keys: restaurant_id, owner_id

- Primary Key: restaurant_id
 - Foreign Keys: owner_id references Restaurant_Owners(id)
-

Orders(order_id, restaurant_id, customer_id, creation_datetime, planned_datetime, delivered_datetime, customer_notes, order_status)

- Candidate Keys: order_id
 - Primary Key: order_id
 - Foreign Keys: restaurant_id references Restaurants(restaurant_id), customer_id references Customers(id)
-

Reviews(order_id, review_id, comment, restaurant_response, speed_point, service_point, taste_point, post_datetime, upvotes, downvotes)

- Candidate Keys: (order_id, review_id)
 - Primary Key: (order_id, review_id)
 - Foreign Keys: order_id references Orders(order_id)
-

Items(item_id, restaurant_id, name, group_name, price, discount, description, image_url, is_available)

- Candidate Key: item_id
 - Primary Key: item_id
 - Foreign Keys: restaurant_id references Restaurants(restaurant_id)
-

Options(option_id, item_id, group_name, name, description, price)

- Candidate Keys: option_id, (item_id, group_name, name, description, price)
 - Primary Key: option_id
 - Foreign Keys: item_id references Items(item_id)
-

In_Order(item_id, option_id, item_instance_id, order_id, count)

- Candidate Keys: (item_id, option_id, item_instance_id, order_id)
 - Primary Key: (item_id, option_id, item_instance_id, order_id)
 - Foreign Keys: item_id references Items(item_id), option_id references Options(option_id), order_id references Orders(order_id)
-

Regions(region_id, region_name)

- Candidate Keys: region_id
 - Primary Key: region_id
 - Foreign Keys: -
-

Restaurant_Regions(restaurant_id, region_id)

- Candidate Keys: (restaurant_id, region_id)
 - Primary Key: (restaurant_id, region_id)
 - Foreign Keys: restaurant_id references Restaurants(restaurant_id), region_id references Regions(region_id)
-

Serves_Regions(delivery_guy_id, region_id)

- Candidate Keys: (delivery_guy_id, region_id)
 - Primary Key: (delivery_guy_id, region_id)
 - Foreign Keys: delivery_guy_id references Delivery_Guys(id), region_id references Regions(region_id)
-

Assignments(assignment_id, order_id, delivery_guy_id, creation_time, fare, decision_datetime, decision)

- Candidate Keys: assignment_id
- Primary Key: assignment_id

- Foreign Keys: order_id references Orders(order_id), delivery_guy_id references Delivery_Guys(id)
-

Votes(order_id, review_id, customer_id, is_upvote)

- Candidate Keys: (order_id, review_id, customer_id)
 - Primary Key: (order_id, review_id, customer_id)
 - Foreign Keys: (order_id, review_id) references Reviews(order_id, review_id), customer_id references Customers(id)
-

Customer_Regions(customer_id, region_id)

- Candidate Keys: customer_id
- Primary Key: customer_id
- Foreign Keys: customer_id references Customers(id), region_id references Regions(region_id)

Changes

User type was added to the table Users to increase the efficiency of login queries.

Implementation Details

We have used PHP for development and MySQL for database management. The software we have chosen to use to directly interact with our database and observe our schema was Navicat. To test our GUI with local servers, we have used the IDE PhpStorm and configured its PHP interpreter with XAMPP. We have implemented our GUI using HTML, Javascript and PHP, and designed it using Mockplus, a mockup tool. We used Google Web Designer to draw objects on the pages and generate the HTML/CSS for use. We used the remote git server of our server as the version control system. In this way, we implemented the project synchronously. The web pages we push to this git server are published automatically on <http://emeal.xyz>. In addition, the MySQL server to which this website is connected was located on this server.

Limitations and Problems

One of the major problems we encountered was GUI design. We first made a successful GUI design through a prototype design tool called Mockup Plus. This tool enabled us to design fairly aesthetic and responsive web pages. However, when we tried to export this design in HTML / CSS format, we obtained quite complex and uneditable files. In addition, it was not possible to link the UI components with the PHP side. For this reason, we resketched our design with another UI sketcher tool called Google Web Designer by using only the pure images of the previous version. However, this software does not support the PHP side of a website. Therefore, we had to add the PHP side manually on PhpStorm. We did not prefer this option from the beginning because we aimed to focus more on SQL and the implementation of the functionalities specified in our design. Another limitation that we have encountered was that HTML does not allow you to use `onclick="function()"` where the `function()` is a PHP function. PHP only responds to requests (GET, POST, PUT, PATCH, and DELETE via `$_REQUEST`).

Contributions

Furkan: Style of the website via Google Web Designer; Login, Customer-Owner-Delivery Home pages, Customer's Restaurant View and Checkout pages.

Hakan: Registration, profile update, account settings, and address edit pages, as well as all the DDL queries and simple logistic arrangements (remote MySQL and custom git servers).

Yigit: Customer-Owner-Delivery Profile pages, Owner Maintain Orders, Delivery Assignments

Melisa: Add meal page, edit meal page, list of tables, writing the report.

Advanced Database Features

We used certain complex queries to implement the following additional features:

1) Most/least ordered and highest/lowest-grossing items

Restaurants may need to keep track of this data to develop a more effective marketing strategy. We used the view structure in MySQL for this query. First, we created a view consisting of the price of items and their order counts.

```
CREATE VIEW best_sellers AS
    SELECT restaurant_id, item_id, SUM(count) as purchase_count
    FROM Orders O, In_order I
    WHERE I.order_id = O.order_id
    GROUP BY restaurant_id, item_id;
```

Finally, we sort them with the *ORDER BY* clause. Sample result for an owner:

▶	4	2	Spicy Burger	29,99	150 gr Burger Meat, 2x Burger
	0	8	Steak Burger	29,99	150 gr Burger Meat, 2x Burger
	0	9	Smoke Burger	29,99	150 gr Burger Meat, 2x Burger

2) The most loyal customers list:

In order to measure and increase the customer retention capability of the restaurants, we retrieve the list of customers who place the most orders. This is achieved using a view.

```
CREATE VIEW loyal_customers AS
    SELECT restaurant_id, customer_id, COUNT(*)
    FROM Orders
    GROUP BY restaurant_id, customer_id;
```

3) Monthly restaurant revenues:

We compute the monthly incomes of restaurants with this query. In this query, we add up the prices of the non-canceled orders given within one month by using the *SUM* aggregate function.

```
CREATE VIEW highest_grossers AS
    SELECT B.restaurant_id, B.item_id, (price * purchase_count) as gross
    FROM best_sellers B, items I
    WHERE I.item_id = B.item_id
    GROUP BY B.restaurant_id, B.item_id;
```

Trigger and Secondary Index

We also used MySQL's trigger and secondary index structures to have a more efficient and reliable implementation.

There are three different user types on the system:customers, restaurant owners, and delivery guys. In addition to the Users table, where the common attributes are stored, there is a separate table for each. Therefore, when a registration is completed, we could make a second insertion query on the PHP side according to the user type. However, in this case, if we were to change the registration part, a bug may occur, and the schema becomes inconsistent. For this reason, we implemented a trigger on the Users table. To provide the necessary information to the trigger, we created an attribute called `user_type` in the Users table. This trigger automatically inserts the user's `id` to one of the aforementioned tables and initializes the other attributes as zero or null according to their domains, if any. In this way, we can now search for an attribute specific to the user's type without joining all three tables.

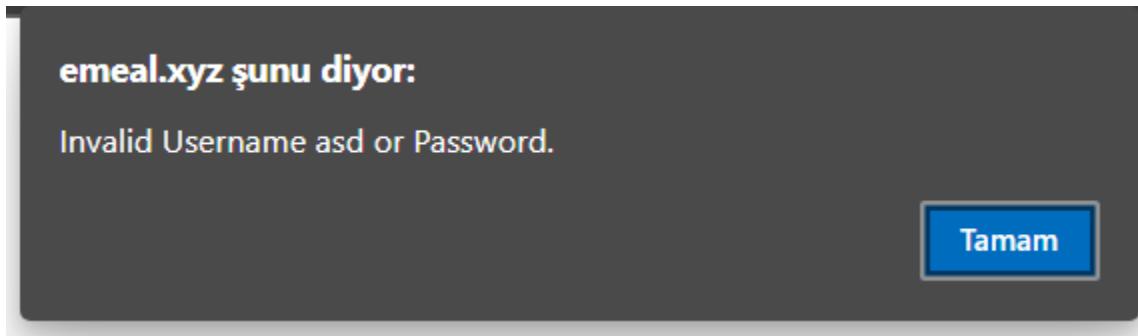
```
CREATE TRIGGER insert_user AFTER INSERT ON users FOR EACH ROW
BEGIN
    IF NEW.user_type = 0 THEN
        INSERT INTO customers (id, credits) VALUES (NEW.id, 0);
    ELSEIF NEW.user_type = 1 THEN
        INSERT INTO restaurant_owners (id) VALUES (NEW.id);
    ELSE
        INSERT INTO delivery_guys (id) VALUES (NEW.id);
    END IF;
END;
```

In addition, we set the `email` attribute of `Users` as a secondary index on `id`. This is because the user provides their email address when logging in. If we did not specify it as a secondary index, we would have to perform a linear search to find out the user's `id`. In this way, we can find that id much more efficiently.

```
CREATE INDEX mails ON Users(email);
```

Sample Output Reports

If you enter a wrong username-password couple, you will get an alert saying "Invalid Username or Password" which looks like below:

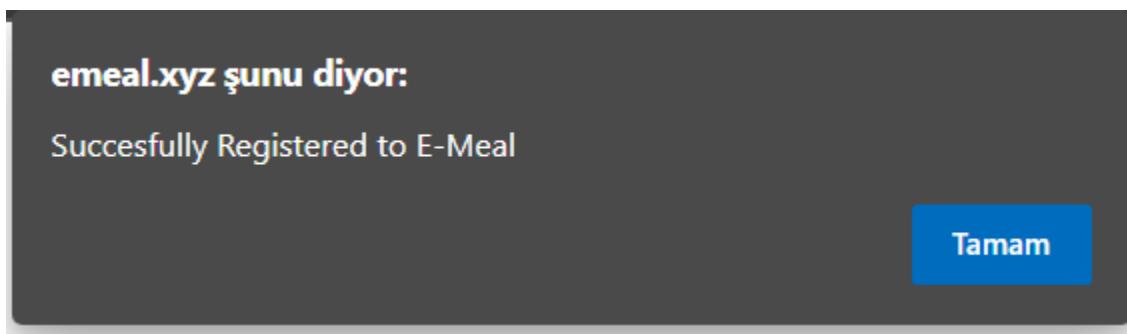


Or, on the login page, if you try to log-in without entering both your username and password, the system will warn you saying “Please fill out this field” for the fields you have not filled, as shown below.

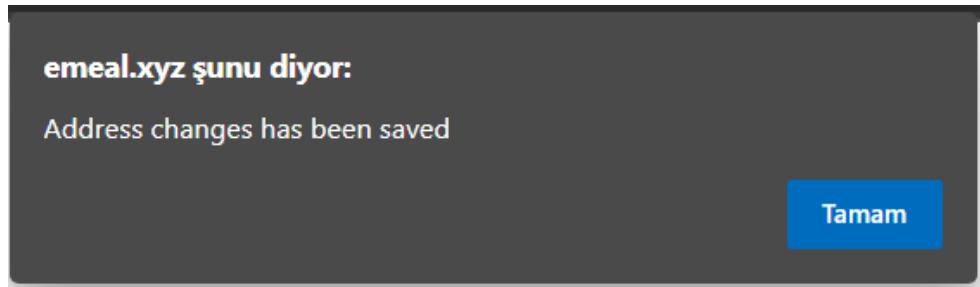
Log-In

Username	<input type="text"/>
	<div style="border: 1px solid #ccc; padding: 2px 10px; width: 150px;">! Please fill out this field.</div>
Password	<input type="password"/> ...

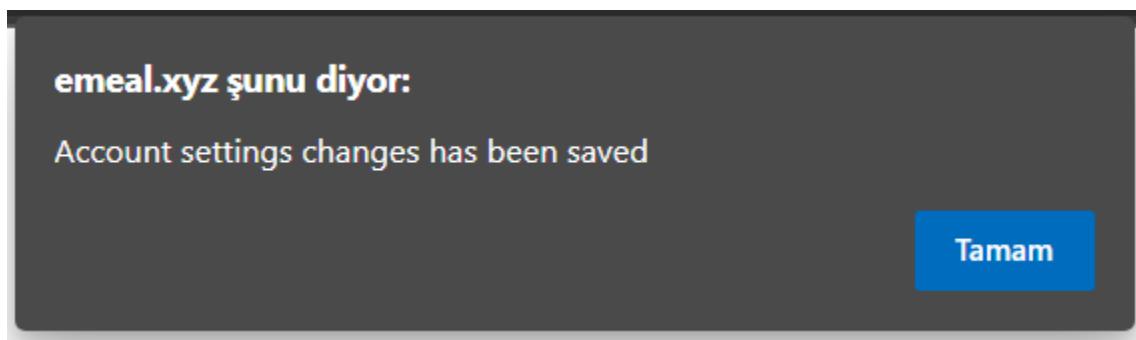
If you register to the system, you will get an alert saying: "Successfully registered to E-Meal" which looks like below:



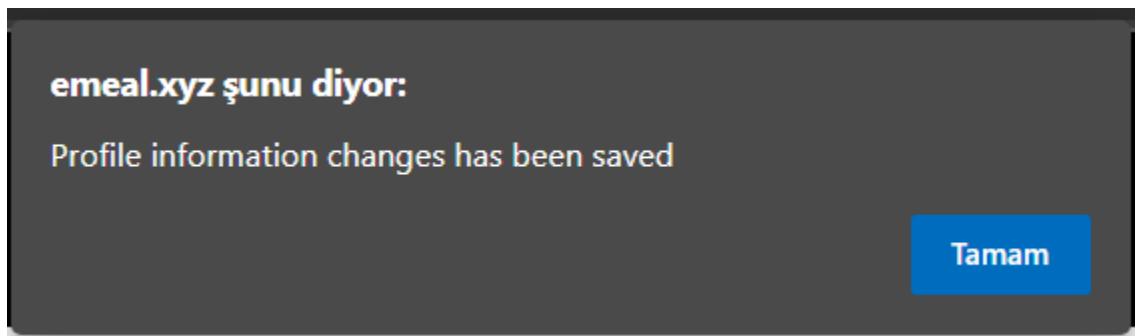
If you change your address, you will get an alert saying: "Address changes has been saved" which looks like below:



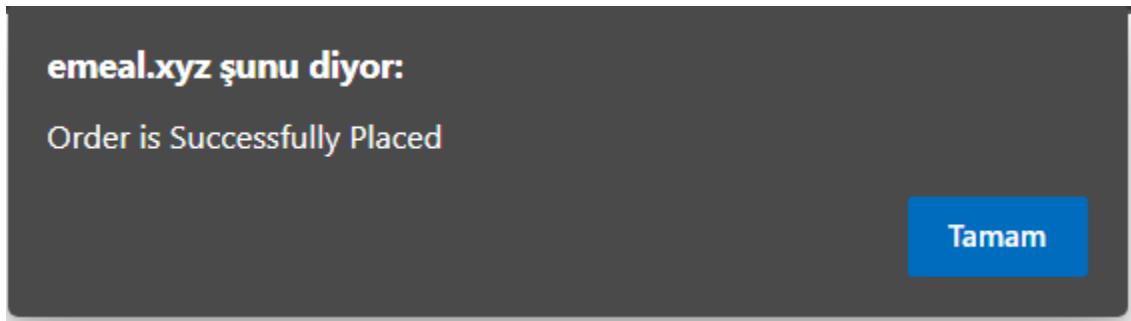
If you change your account settings, you will get an alert saying: "Account settings changes has been saved" which looks like below:



If you change your profile information, you will get an alert saying: "Profile information changes has been saved" which looks like below:



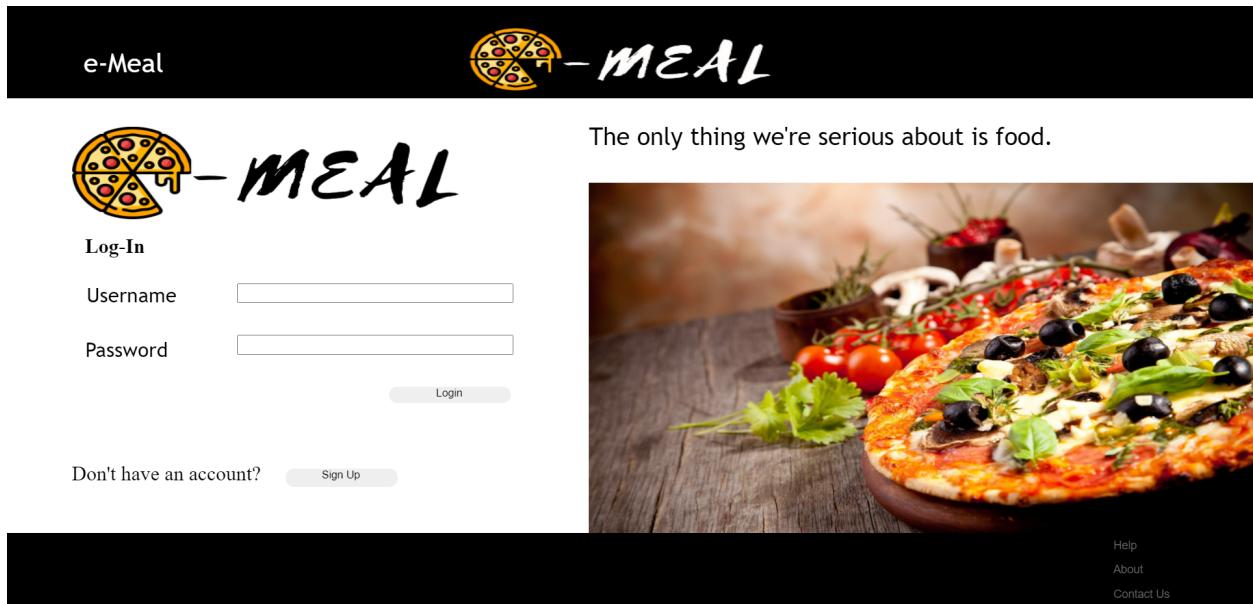
If you place an order, you will get an alert saying: "Order is Successfully Placed" which looks like below:



User's Manual

The logo at the top-center of the website in all pages is taking you to the home page if you've logged in. If not, it will take you to the login page. Back buttons on pages will take you to the previous page in your browser's history.

To begin with, the log-in page is the same for all user types (customers, restaurant owners and delivery guys). If you already have an account, you can enter your email address in the "username" box, your password in the "password" box, and then either click the "Login" button or press Enter.



Also, note that at any point you can click the "Help", "About" and "Contact Us" buttons on the bottom right corner. These buttons take you to their corresponding pages, the contents of which are self-explanatory.

If you do not already have an account, you should click the Sign Up button, which will take you to the following page.



The image shows a screenshot of the e-Meal sign-up page. At the top left is the "e-Meal" logo, and at the top right is a stylized "MEAL" logo featuring a pizza slice. The form consists of several input fields and dropdown menus:

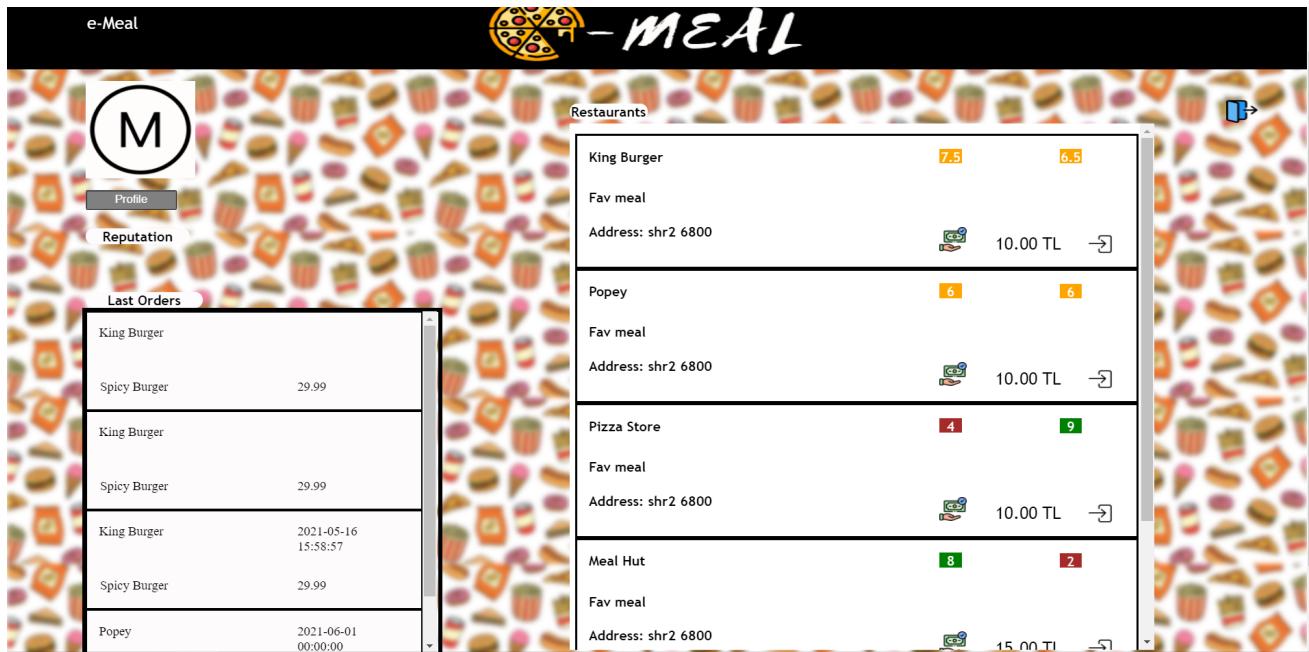
First Name	<input type="text"/>	Street	<input type="text"/>
Middle Name	<input type="text"/>	City	<input type="text"/>
Last Name	<input type="text"/>	Zip	<input type="text"/>
E-Mail Address	<input type="text"/>	Date of Birth	<input type="text"/> year-month-day
Password	<input type="password"/>	Phone Number	<input type="text"/>
Confirm Password	<input type="password"/>	User Type	<input type="button" value="Customer"/>

Below the form are two buttons: "Sign up" and "Back". At the bottom right of the page are links for "Help", "About", and "Contact Us".

Here, you should enter your information and then select a user type. This can be “Customer”, “Owner” or “Courier”. Clicking the “Sign Up” button will create your account.

For Customers

If you registered to the system as a customer, your home page will look like below.



The picture on the top left is your profile picture.

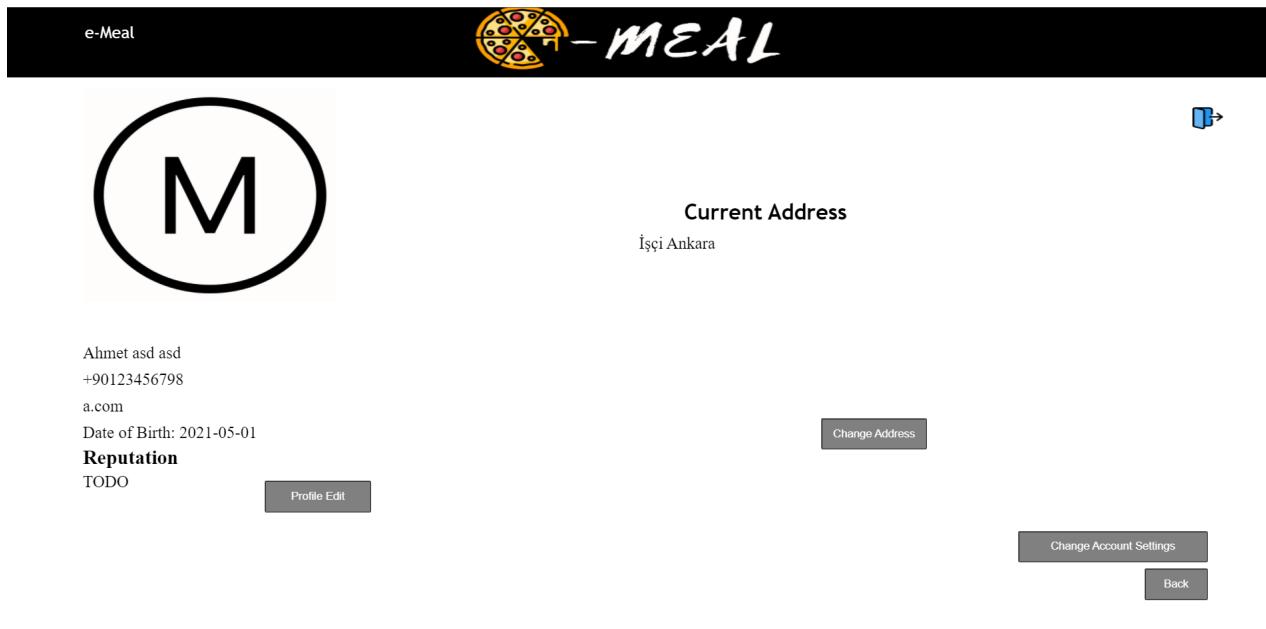
The “Profile” button will lead you to your profile.

The blue door icon on the top right serves as a log-out button.

On your left you can see a list of your last orders. This is now empty as the account is new.

On the right side of the screen you can see a scrollable link called “Restaurants”. This list shows you the list of restaurants that are currently open that you can order from. A row will show a restaurant, its ranking, your favorite meal from that restaurant. The button on the bottom right corner of a row will take you to the restaurant page. We will get to this later.

If you click the “Profile” button on your home page, it will lead you to your profile page, which can be seen below.



Here you can see your account information such as first name, phone number and current address.

The functionalities of the other buttons are explained below.

In your profile page, if you click the “Profile Edit” button, it will take you a page where you can change your name or phone number:



e-Meal

Profile Edit

First Name

Middle Name

Last Name

Phone Number

Or, in your profile page, if you click the “Change Address” button, it will take you a page where you can change your address:



e-Meal

Edit Your Address

Street

City

Zip

Or, in your profile page, if you click the “Change Account Settings” button, it will take you a page where you can change your email address or password:



e-Meal

Change Account Settings

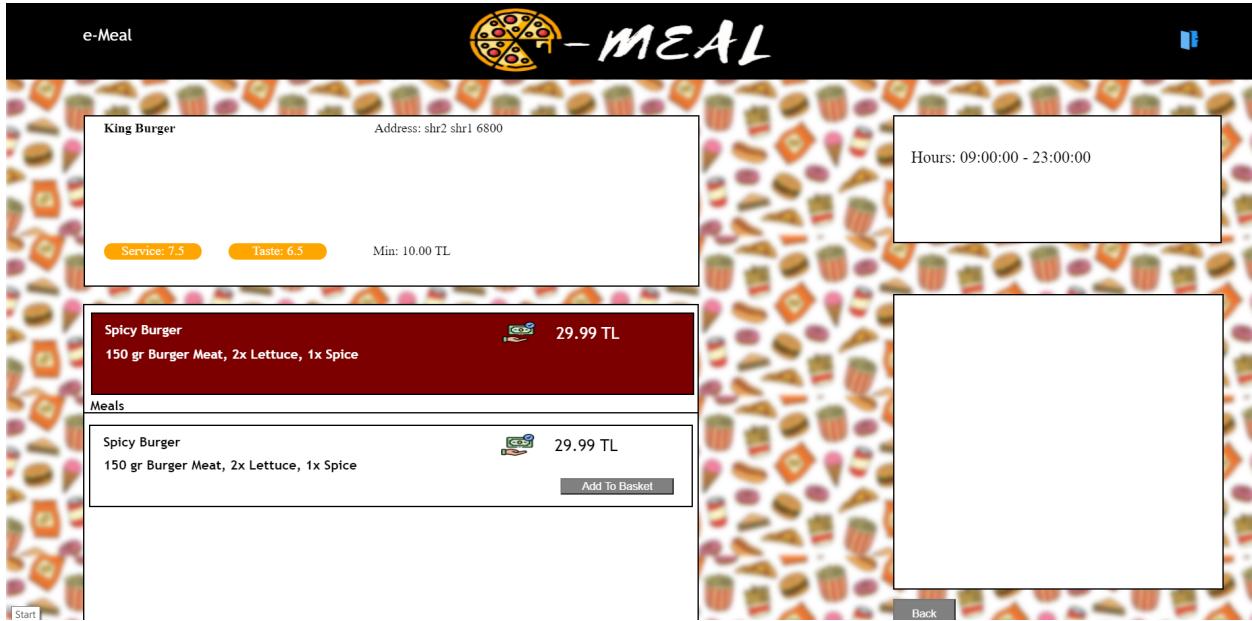
E-Mail

Current Password

New Password

Confirm Password

On your home page, instead of clicking on the “Profile” button, if you click the button on the right bottom corner of a restaurant row, it will take you to that restaurant’s page (Customer Restaurant View Page), which looks like below:



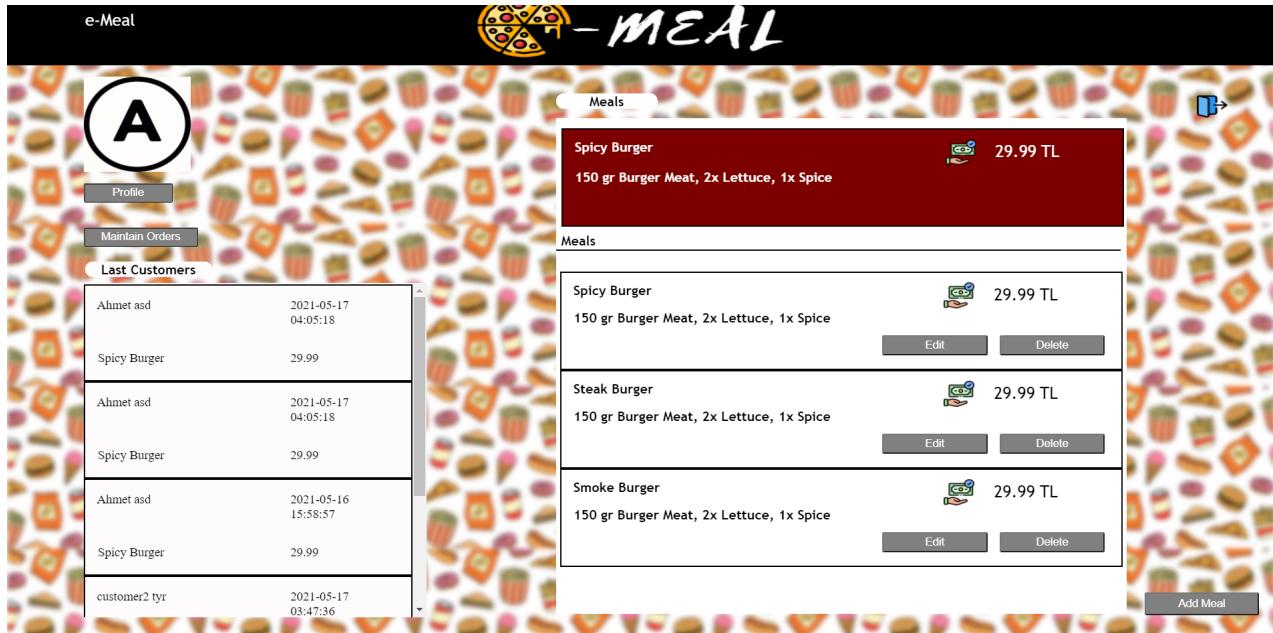
You can see the restaurant's properties on the top left corner, and the working hours of the restaurant's at the top right corner. The blank table on the bottom right corner is for the restaurant's comments. From the bottom left corner you can see the items of the restaurant's and you can add an item to your basket by clicking the Add to Basket button. Then, it will take you to the checkout page, which looks like below:



You can see your order's properties here and the checkout total at the bottom right corner. You can add a delivery note from the bottom left corner of the page. Then, you can place an order by clicking the Place Order button.

For Restaurant Owners:

If you are registered to the system as an owner, your home page will look like below.



At the bottom left corner of the page, you will see your old customers and their orders. It presents the meal name, customer name, order price and order completion date-time.

At the right side of the page, you will see your restaurants' items. You can delete an item from your restaurant by clicking the Delete button. You can edit your item's properties by clicking the Edit button.

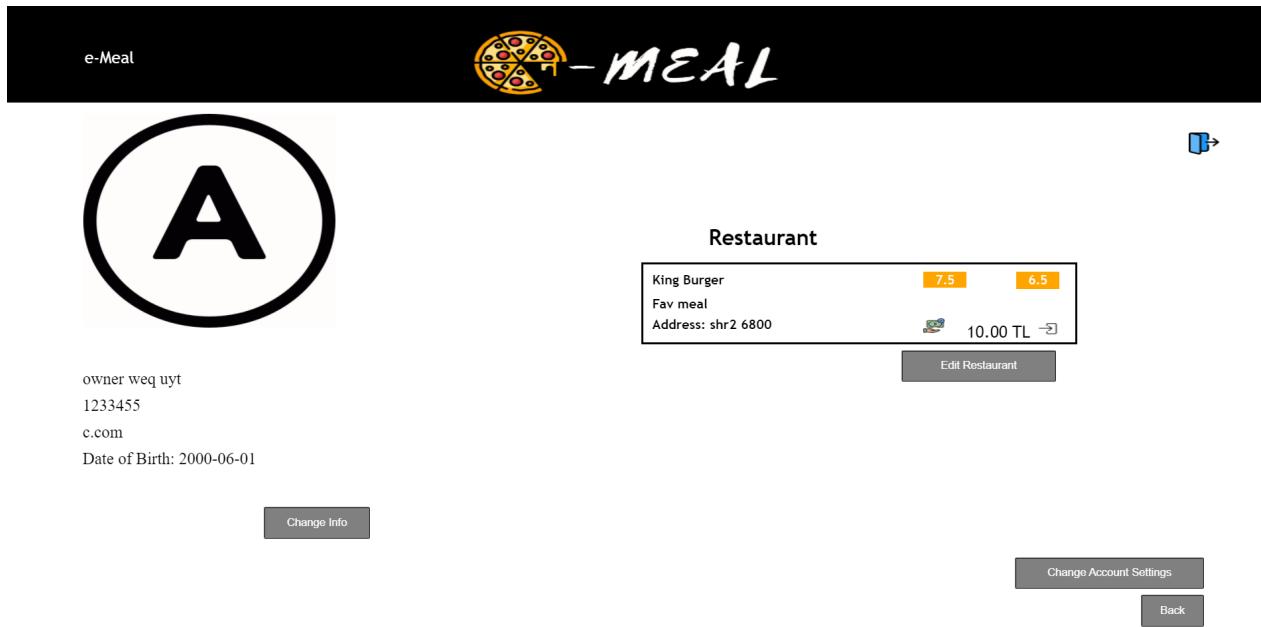
The profile button will take you to your profile page and the maintain orders button will take you to order maintaining page where you can manage the orders, which looks like below:



Pending	Preparing	Sending	Completed
<p>Note: 2021-05-16 15:58:57 Order: 3x Spicy Burger Accept Reject</p> <p>Note: 2021-05-16 15:58:57 Order: 1x Spicy Burger Accept Reject</p>	<p>Note: a note Order: 2x Spicy Burger Forward</p>	<p>Note: 2021-05-16 15:58:57 Order: 1x Spicy Burger Forward</p> <p>Note: not 2 Order: X Forward</p>	<p>Note: 2021-05-16 15:58:57 Order: X</p>

Go Back

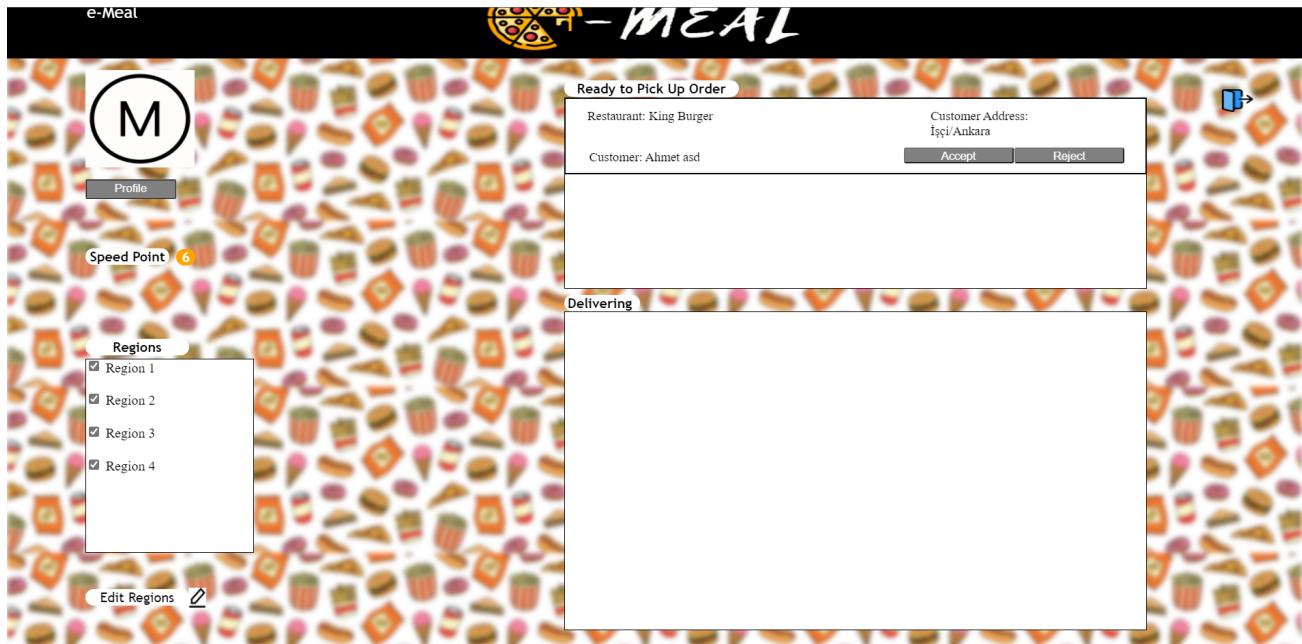
You will see the orders from your restaurant in their respective stages. You can Accept or REject an order from the Pending table. Accepted orders will go to the Preparing table. You can inform the system that you've finished preparing the order and now it is being sent by clicking the Forward button. After a notification from the Delivery person, the order will be listed in the Completed table.



By clicking the Profile button in your home page, you will go to your profile page which looks like above. You can change your profile info and account settings in the same way a customer does. By clicking the Edit Restaurant button, you can change your restaurant's properties.

For Delivery Guys:

If you are registered as a delivery guy to the system, your home page will look like below:



At the left side you can see your speed point and the regions you've selected to serve and you can edit your regions. You can see the orders that are ready to pick up at the top right corner. You can accept or reject a ready to pick up order by clicking Accept or Reject buttons. You will see the orders you are delivering now at the bottom right corner. By clicking the Profile button, you can go to your profile page which can be seen on the next page of the report.



In this page, you can see your profile information, change the profile information and account settings the same as a customer. You can change your vehicle information by clicking the change vehicle button.

Website

Project's information website: <https://e-meal.github.io/>

Project website: <http://emeal.xyz/>

Note:

<u>username</u> : a.com and <u>password</u> : 123	for customer login
<u>username</u> : c.com and <u>password</u> : qwe	for owner login
<u>username</u> : d.com and <u>password</u> : 123456	for delivery login