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College of Informatics and Computing Sciences

IT 211 - Final Project: Database Documentation

First Semester, A.Y. 2025 - 2026

PROJECT INFORMATION	
Course:	IT 211 - Database Management System
Project Title:	**Beyond Zero**: A Smart Food Sharing and Donation Platform
Year and Section	BSIT 2106
Group Number:	Group 1
Group Members:	- Antonio, Ann Tracy S. - Dipasupil, Alessandra

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1 INTRODUCTION

1.1 Overview of the system

Beyond Zero: A Smart Food Sharing and Donation Platform is a web-based system designed to connect individuals, restaurants, and communities with surplus or near-expiry food to people who need it most. The platform provides a centralized and user-friendly space where donors can post available food items, while recipients can browse, reserve, and track pickups efficiently. By promoting responsible food distribution, Beyond Zero supports sustainable consumption, minimizes food waste, and strengthens community involvement in addressing hunger.

1.2 Purpose of database

The database serves as the central repository for all information related to food donations, user profiles, reservations, and transaction history within Beyond Zero. It ensures that records are stored securely, organized accurately, and retrieved efficiently. With structured and reliable data storage, the system enables smooth monitoring of donation availability, transparent tracking of activities, and safe coordination between donors and recipients ultimately supporting the platform's goal of reducing food waste and enhancing community access to edible food.

1.3 Database type and tools used (SQLite, PostgreSQL, MySQL, Flask)

The database and tools used in Beyond Zero are selected to support stable data management, real-time interaction, and seamless system functionality. These technologies allow efficient handling of transactions, user authentication, and structured communication between the interface and backend services.

- **Database Type:** Relational Database
- **Tools Used:**
  - Flask (backend framework for routes and API interaction)
  - SQLite (optional lightweight environment for development/testing)

1.4 Objectives of the project

This project aims to develop a functional and sustainable food-sharing platform that enables the safe and efficient redistribution of surplus food. The objectives guide the design, development, and documentation of a well-organized database and a smooth user experience.

- To design a structured and efficient database tailored for donation posting, user management, and reservation tracking.
- To ensure transparency, accuracy, and integrity in handling food-sharing records.
- To implement SQL queries for creating, managing, and retrieving meaningful data.
- To promote sustainable food distribution and support SDG 2: Zero Hunger.
- To enhance community engagement by providing a clean, accessible, and organized platform

2 ENTITY RELATIONSHIP DIAGRAM

This section presents the attributes of the Beyond Zero system, which represent the specific details or properties that describe each entity and support the platform's core functionalities.

2.1 Entities

In the system titled ***Beyond Zero***, the following entities are used to store and manage data related to food donations and users:

- **User entity**
- **Donation entity**

2.2 Attributes

Each entity in the Beyond Zero system contains specific attributes that define the data stored within it. These attributes are derived from the system's database models and are essential for supporting the platform's core functionalities.

User Entity

- id
- fullname
- email
- username
- password
- profile_picture

Donation Entity

- id
- ref_id
- food_type
- food_name
- status

- quantity
- expiration
- donor_name
- contact
- delivery
- location
- reservation_status
- user_id

2.3 Primary Key and Foreign Key

ENTITY	PRIMARY KEY	FOREIGN KEY
1. User Entity	id	none
2. Donation Entity	id	user_id

2.4 Relationship

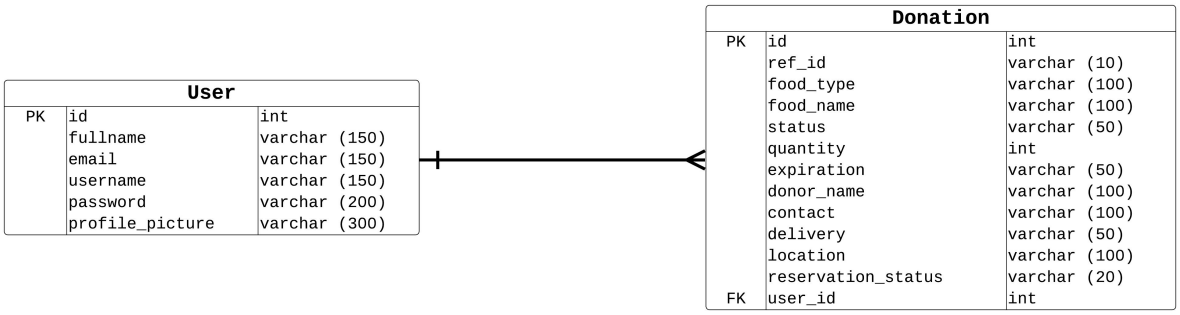
This section defines the logical structure of the database by illustrating how users and food donations interact within the system. The relationships ensure proper tracking of donors and donated food items while maintaining data consistency and integrity.

1. **One-to-Many relationship between User → Donation**

One user can create or post multiple food donations, while each donation is associated with only one user.

2.5 ERD

This ERD represents the Beyond Zero food sharing and donation platform, where users create food donation listings with essential details such as quantity, expiration date, and location. The database structure supports efficient tracking of users, donations, and their statuses to ensure organized system operations.



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3 NORMALIZATION PROCESS

3.1 Unnormalized Form (UNF)

Donor name	Donor email	Food Item	Quantity	Expiration Date	Donation Date	Recipient Name	Recipient Contact
Ann Tracy Antonio	anntracy@email.com	Rice	5 kg	2025/12/20	2025/12/18	Maria Santos	09171234567
Alessandra Dipasupil	alessandra@email.com	Bread	10 pcs	2025/12/19	2025/12/18	Pedro Cruz	09221234567
Ann Tracy Antonio	anntracy@email.com	Canned Goods	6 cans	2025/12/25	2025/12/18	Maria Santos	09171234567

The Unnormalized Form (UNF) table contains all data in a single table without proper organization. There is repetition of donor information and recipient information, which can lead to data redundancy and update anomalies.

3.2 First Normal Form (1NF)

Donors Table

Donor_id	Donor name	Donor Email
D001	Ann Tracy Antonio	anntracy@email.com
D002	Alessandra Dipasupil	alessandra@email.com

Recipients Table

Recipient_id	Recipient name	Recipient Contact
R001	Maria Santos	09171234567
R002	Pedro Cruz	09221234567

Food Items Table

Food_id	Donor_id	Food Item	Quantity	Expiration Date	Donation Date	Recipient_ id

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F001	D001	Rice	5 kg	2025/12/20	2025/12/18	R001
F002	D002	Bread	10 pcs	2025/12/19	2025/12/18	R002
F003	D001	Canned Goods	6 cans	2025/12/25	2025/12/18	R001

3.3 Second Normal Form (2NF)

Donation _id	Food_id	Donor_id	Recipient_ id	Quantity	Expiration Date	Donation Date
FD001	F001	D001	R001	5 kg	2025/12/20	2025/12/18
FD002	F002	D002	R002	10 pcs	2025/12/19	2025/12/18
FD003	F003	D001	R001	6 cans	2025/12/25	2025/12/18

3.4 Third Normal Form (3NF)

Donors

Donor_id	Donor name	Donor Email
D001	Ann Tracy Antonio	anntracy@email.com
D002	Alessandra Dipasupil	alessandra@email.com

Recipients

Recipient_id	Recipient name	Recipient Contact
R001	Maria Santos	09171234567
R002	Pedro Cruz	09221234567

Food Item

Food_id	Food Item	Quantity	Expiration Date
F001	Rice	5 kg	2025/12/20
F002	Bread	10 pcs	2025/12/19

F003	Canned Goods	6 cans	2025/12/25

Donations

Donation_id	Food_id	Donor_id	Recipient_id	Donation Date
FD001	F001	D001	R001	2025/12/18
FD002	F002	D002	R002	2025/12/18
FD003	F003	D001	R001	2025/12/18

4 DATA DICTIONARY

4.1 Table 'Donors'

Attribute	Data Type	Constraint	Default Values	PK/FK	Description
donor_id	INT	NOT NULL, AUTO INCREMENT	None	PK	Unique identifier for each donor
donor_name	VARCHAR (150)	NOT NULL	None		Full name of the donor
donor_email	VARCHAR (150)	NOT NULL, UNIQUE	None		Emain address of the donor

4.2 Table 'Recipients'

Attribute	Data Type	Constraint	Default Values	PK/FK	Description
recipient_id	INTEGER	NOT NULL, AUTO INCREMENT	None	PK	Unique identifier for each recipient
recipient_name	VARCHAR (150)	NOT NULL	None		Full name of the recipient

recipient_ contact	VARCHAR (50)	NOT NULL	None		Contact number of the recipient

4.3 **Table 'Food Items'**

Attribute	Data Type	Constraint	Default Values	PK/FK	Description
food_id	INTEGER	NOT NULL, AUTO INCREMEN T	None	PK	Unique identifier for each food item
food_item	VARCHAR (100)	NOT NULL	None		Name of the food item
quantity	VARCHAR (50)	NOT NULL	None		Amount of food available (kg, pcs, cans, etc.)
expiration _date	DATE	NOT NULL	None		Expiry date of the food item

4.4 **Table 'Donations'**

Attribute	Data Type	Constraint	Default Values	PK/FK	Description
donation_ id	INTEGER	NOT NULL, AUTO INCREMEN T	None	PK	Unique identifier for each donation record
food_id	INTEGER	NOT NULL	None	FK	References the donated food item
Donor_id	INTEGER	NOT NULL	None	FK	References the donor giving the food
Recipient_id	INTEGER	NOT NULL	None	FK	References the recipient receiving the food

Donation_ date	DATE	NOT NULL	Current_ date		Date when the donation was made

5 SAMPLE RECORDS/SQL SCRIPTS

This is the link for our sample records:
https://drive.google.com/file/d/1s6dKLkxnBvVdRBoz3Vsqb681bg6s9niF/view?usp=drive_link

6 SQL QUERIES

6.1 Basic Queries

This section presents the basic SQL queries used in the Beyond Zero system. These queries include creating tables, inserting sample records, and retrieving stored data.

(Create users table)

```
CREATE TABLE users (
    id INT AUTO_INCREMENT PRIMARY KEY,
    fullname VARCHAR(150),
    email VARCHAR(150) UNIQUE,
    username VARCHAR(150) UNIQUE,
    password VARCHAR(200),
    profile_picture VARCHAR(300)
);
```

(Insert sample users)

```
INSERT INTO users (fullname, email, username, password, profile_picture)
VALUES
('Marga Villanueva', 'marga@email.com', 'marga_v', 'hashedpass123',
'marga.jpg'),
('Vilma Virrey', 'vilma@email.com', 'vilma_v', 'hashedpass234', 'vilma.png'),
('Jonathan Manalo', 'jonathan@email.com', 'jon_manalo', 'hashedpass345',
'jonathan.jpg');
```

(Create donation table)

```
CREATE TABLE donation (
    id INT AUTO_INCREMENT PRIMARY KEY,
    ref_id VARCHAR(10) UNIQUE,
    food_type VARCHAR(100),
    food_name VARCHAR(100),
    status VARCHAR(50),
    quantity INT,
    expiration VARCHAR(50),
```

```
    donor_name VARCHAR(100),
    contact VARCHAR(100),
    delivery VARCHAR(50),
    location VARCHAR(100),
    user_id INT,
    reservation_status VARCHAR(20) DEFAULT 'available',
    FOREIGN KEY (user_id) REFERENCES users(id)
);
```

(Insert sample donations)

```
INSERT INTO donation (
    ref_id, food_type, food_name, status, quantity, expiration,
    donor_name, contact, delivery, location, user_id, reservation_status
) VALUES

('BZ001', 'Cooked Food', 'Chicken Adobo', 'Available', 5, '2025-12-20',
 'Marga Villanueva', '09171234567', 'Pickup', 'Lipa City', 1, 'available'),

('BZ002', 'Packed Food', 'Bread Loaves', 'Available', 10, '2025-12-19',
 'Vilma Virrey', '09221234567', 'Delivery', 'Batangas City', 2, 'reserved'),

('BZ003', 'Canned Goods', 'Sardines', 'Available', 20, '2026-01-10',
 'Jonathan Manalo', '09331234567', 'Pickup', 'Tanauan City', 3, 'available');
```

(Select all users)

```
SELECT * FROM users;
```

(Display all available donations)

```
SELECT * FROM donation
WHERE reservation_status = 'available';
```

(Display all donations located in Lipa City)

```
SELECT food_name, quantity, location
FROM donation
WHERE location = 'Lipa City';
```

6.2 Intermediate Queries

This section presents intermediate SQL queries used in the Beyond Zero system. These queries demonstrate the use of JOIN operations and conditional filtering to retrieve related data from multiple tables.

(Display donations with corresponding user information)

```
SELECT users.fullname, users.email, donation.food_name, donation.quantity,
donation.location
```

```
FROM users
INNER JOIN donation ON users.id = donation.user_id;
```

(Display all reserved donations and their donors)

```
SELECT users.fullname, donation.food_name, donation.reservation_status
FROM users
INNER JOIN donation ON users.id = donation.user_id
WHERE donation.reservation_status = 'reserved';
```

(Display donations that are for pickup only)

```
SELECT food_name, donor_name, location, delivery
FROM donation
WHERE delivery = 'Pickup';
```

6.3 Advanced Queries

This section presents advanced SQL queries used in the Beyond Zero system. These queries make use of aggregate functions, grouping, and date-based conditions for reporting and analysis.

(Count the total number of donations per user)

```
SELECT users.fullname, COUNT(donation.id) AS total_donations
FROM users
LEFT JOIN donation ON users.id = donation.user_id
GROUP BY users.fullname;
```

(Compute the total quantity of food donated by each user)

```
SELECT users.fullname, SUM(donation.quantity) AS total_quantity
FROM users
INNER JOIN donation ON users.id = donation.user_id
GROUP BY users.fullname;
```

(Display donations that will expire before a given date)

```
SELECT food_name, expiration, donor_name
FROM donation
WHERE expiration < '2025-12-21';
```

7 SQL SCHEMA & VERSION CONTROL

7.1 Folder Structure

```
/database/
    beyondzero_schema.sql
    beyondzero_seed.sql
    beyondzero_erd.png
```

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7.2 **Description per changes/version**

Version 1.0 – Initial Database Structure

- Created the **Beyond Zero** database.
- Implemented the core users table to store user account information.
- Implemented the donations table to store food donation details.
- Established a one-to-many relationship where one user can create multiple donations.

Version 1.1 – Donation Details Enhancement

- Added donation-specific attributes such as:
  - food name
  - quantity
  - expiration date
  - donation status
- Included location details to identify where the donation is available (e.g., Lipa City).
- Improved data validation using NOT NULL constraints.

Version 1.2 – User Roles and Data Integrity

- Added user role handling (donor, recipient, admin).
- Enforced unique constraints on email and username.
- Strengthened foreign key constraints between users and donations.

Version 1.3 – Reservation / Claim Support

- Enhanced the donations table to support claiming or reservation status.
- Added fields to track donation availability and completion.
- Updated ERD to reflect donation lifecycle changes.

Version 1.4 – Normalization and Optimization

- Normalized tables up to Third Normal Form (3NF).
- Removed redundant user and donation attributes.
- Optimized schema for faster querying and consistency.

Version 1.5 – Sample Data and Query Testing

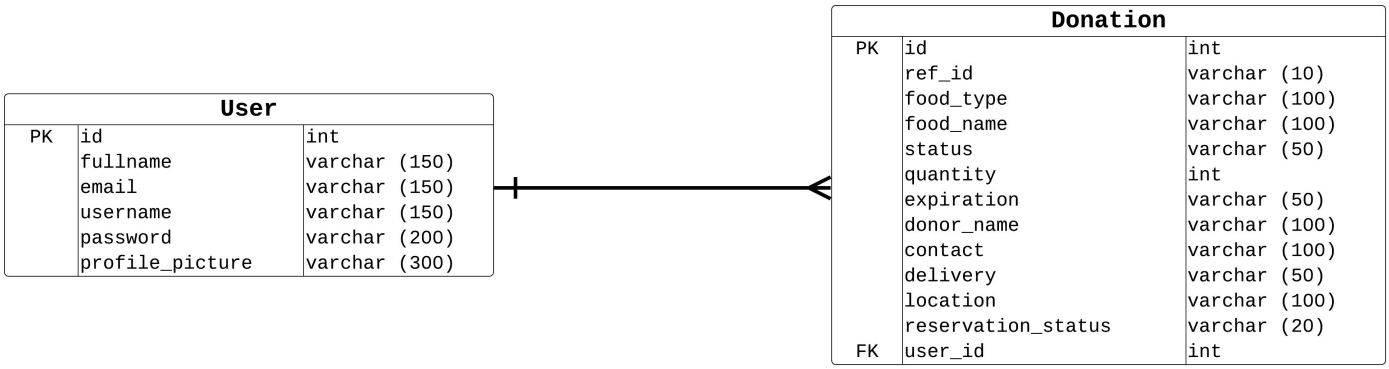
- Inserted sample user accounts (donors and recipients).
- Inserted sample donation records.
- Tested basic, intermediate, and advanced SQL queries including:
- Donations per user
- Available donations by location
- Completed vs pending donations

7.3 Github repository

This is the link for our github repository:
beaut12/ACP-AND-DATABASE-PROJECT

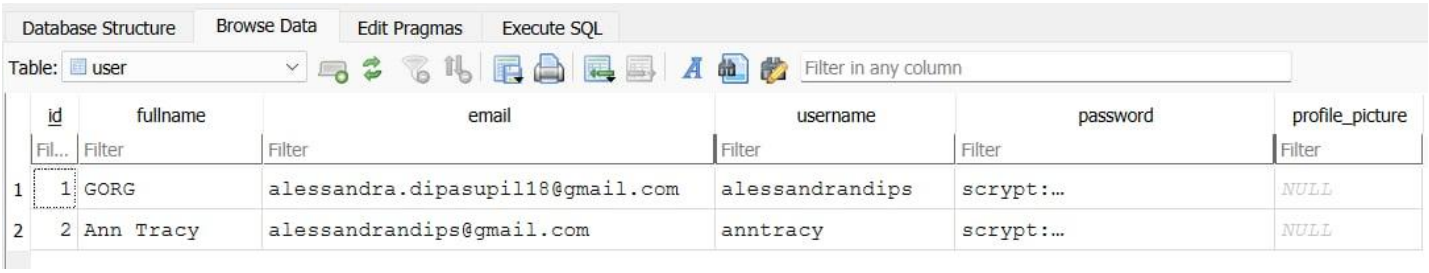
8 SCREENSHOTS

8.1 ERD Diagram



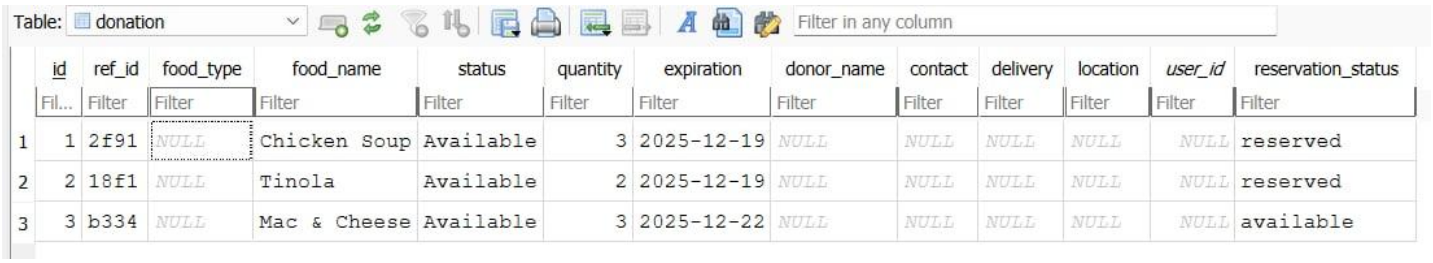
8.2 Database table/views

User Table



	id	fullname	email	username	password	profile_picture
1	1	GORG	alessandra.dipasupil18@gmail.com	alessandrandips	scrypt:…	NULL
2	2	Ann Tracy	alessandrandips@gmail.com	anntracy	scrypt:…	NULL

Donation Table



	id	ref_id	food_type	food_name	status	quantity	expiration	donor_name	contact	delivery	location	user_id	reservation_status
1	1	2f91	NULL	Chicken Soup	Available	3	2025-12-19	NULL	NULL	NULL	NULL	NULL	reserved
2	2	18f1	NULL	Tinola	Available	2	2025-12-19	NULL	NULL	NULL	NULL	NULL	reserved
3	3	b334	NULL	Mac & Cheese	Available	3	2025-12-22	NULL	NULL	NULL	NULL	NULL	available

8.3 Query Results

```
INSERT INTO user (fullname, email, username, password, profile_picture) VALUES
('Marga Villanueva', 'marga@email.com', 'marga_v', 'hashedpass123', 'marga.jpg'),
('Vilma Virrey', 'vilma@email.com', 'vilma_v', 'hashedpass234', 'vilma.png'),
('Jonathan Manalo', 'jonathan@email.com', 'jon_manalo', 'hashedpass345', 'jonathan.jpg');
```

9 CONCLUSION

9.1 Summary of Accomplishment

The project successfully designed and developed Beyond Zero: A Smart Food Sharing and Donation Platform, which aims to help reduce food waste by providing an organized system for food donations. The database of the system was carefully structured around the core entities, users and donations, to ensure efficient data management. Proper normalization techniques were applied to minimize data redundancy and maintain data integrity. The team also created an Entity Relationship Diagram (ERD), SQL schema, and sample data to test the functionality of the system. Through SQL queries, the database was verified to correctly store, retrieve, and manage donation information based on user and location.

9.2 Learning Reflections

During the development of Beyond Zero, the group gained a deeper understanding of database design and its role in real-world systems. The project helped the team learn how to translate system requirements into database tables, attributes, and relationships. Applying normalization rules improved the team's ability to design clean and efficient databases. The group also gained hands-on experience in writing and testing SQL queries, managing version control, and documenting database changes. Overall, the project strengthened the team's analytical skills, collaboration, and appreciation for proper database planning.

9.3 Importance of database in the system

The database serves as the backbone of the Beyond Zero system, as it stores and manages all information related to users and food donations. A well-designed database ensures that donation records are accurate, consistent, and easy to access. It allows the system to efficiently track food availability, donation status, and locations, which is essential for proper coordination between donors and recipients. Without a structured database, the system would be prone to data duplication, inconsistency, and errors. Therefore, the database is vital in ensuring that Beyond Zero operates smoothly, reliably, and effectively in supporting food sharing and donation efforts.