UNIVERSITI TEKNOLOGI MALAYSIA

UNIVERSITI PENYELIDIKAN

GROUP PROJECT COVER PAGE

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COURSE NAME : DATABASE

SECTION : 06

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SESSION/SEMESTER : 2023-2024/1

ASSIGNMENT TITLE : Phase 3 (P3) – Database Logical Design & SQL

GROUP NUMBER : 02

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1.0 Introduction

Based on the case study, MBIP has faced some challenges in their current way of collecting data for the Iskandar Puteri Calendar Competition. To address these issues, we have proposed a design that has a number of features that provides MBIP an efficient and reliable platform. In this project, MBIP is the user of the current system, IPRK System, which is a platform that can help MBIP to address the challenges through the integration of efficient carbon footprint calculations, registration and login processes, and monitoring dashboards. Emphasizing inclusivity, the system aims to provide user-friendly interfaces to encourage participation from individuals of all age groups. During the business process, MBIP faced some difficulties while using the current system. We wish to upgrade the current system to help MBIP for integration of efficient carbon footprint calculations, registration and login processes, and monitoring dashboards so that the system can run smoothly and thrive over time. We will provide our plans for the development of the current system, which is unsatisfactory from our standpoint as a client or owner. Thus, we are assigned to design a database system that can improve the system productivity. In this phrase, we will update the business rule and data dictionary based on previous phrases to make sure the IPRK system is more suitable for MBIP. This phase is more focused about database logical design to use in to be system based on the data model.

2.0 Overview of project

In this phase, we will describe some of what we got in the previous phase, such as updating business rules, conceptual ERD, enhanced ERD, logical enhanced ERD and updating some of them at once. The final logical ERD must be created to achieve the normalization process to the Boyce-Codd Normal Form (BCNF) relation. After completing phase 2 which is the database conceptual design phase, we have proceeded to phase 3 to implement the database logical design and produce SQL statements (both DDL and DML) for our IPRK System. In this paper, we will transform the conceptual ERD in phase 2 into logical ERD and followed by producing the relation schema. Normalization will also be done to minimize the duplicated data so that it can enhance the data stored logically. After that, we will update the data dictionary for the IPRK System website by referring to the normalized relation. Lastly, the database for the website will be created using SQL statements to transform the requirements into complete and detailed system design specifications.

3.0 Database conceptual design

3.1 Updated business rule

- Each community user can submit one or more recycle details.
- Each recycle detail can be submitted by one community user.

- Each community user can submit one or more consumptions.
- Each consumption can be submitted by one community user.
- Each community user can have one or more monthly footprints.
- Each monthly footprint can be owned by one community user.

- Each community user can have one total footprint.
- Each total footprint can be owned by one community user.

- Community user can submit their personal information for registration
- Community user can submit their userID and password for login

- Community user can submit their consumption for each month
- Community user can submit their recycle details for each month

- Community user can view their consumption and recycle details for each month
- Community user can view their monthly total footprint, monthly released footprint and monthly reduced footprint
- Community user can view their total footprint and total released footprint and total reduced footprint

- Community user can view their full name and userID

- MBIP_Admin user can view the lowest total footprint and the related community user's userID
- Community user can submit their userID and password for login

- MBIP_Admin user can view all community user's total footprint combined
- MBIP_Admin can view their full name, userID and division

3.2 Conceptual ERD

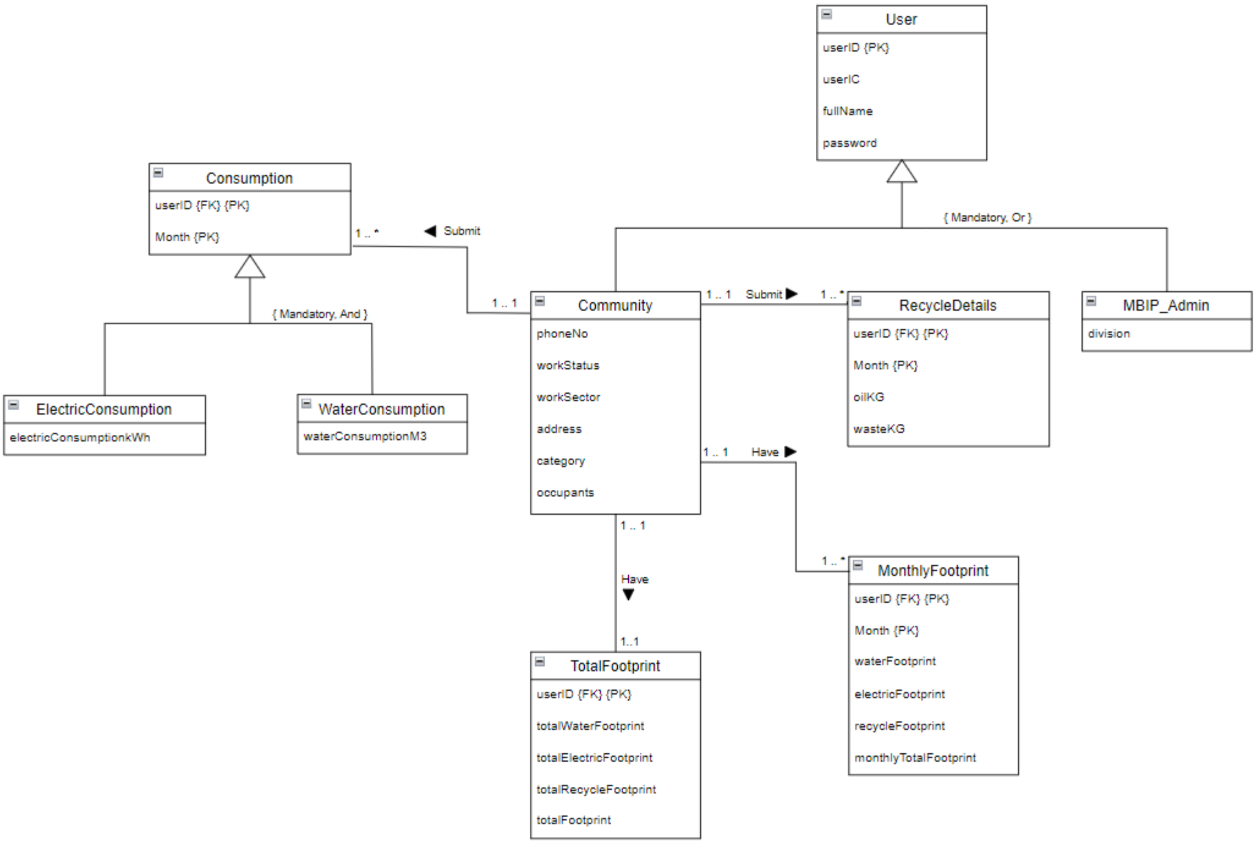


Figure 1: Conceptual ERD

4.0 DB logical design

4.1 Logical ERD

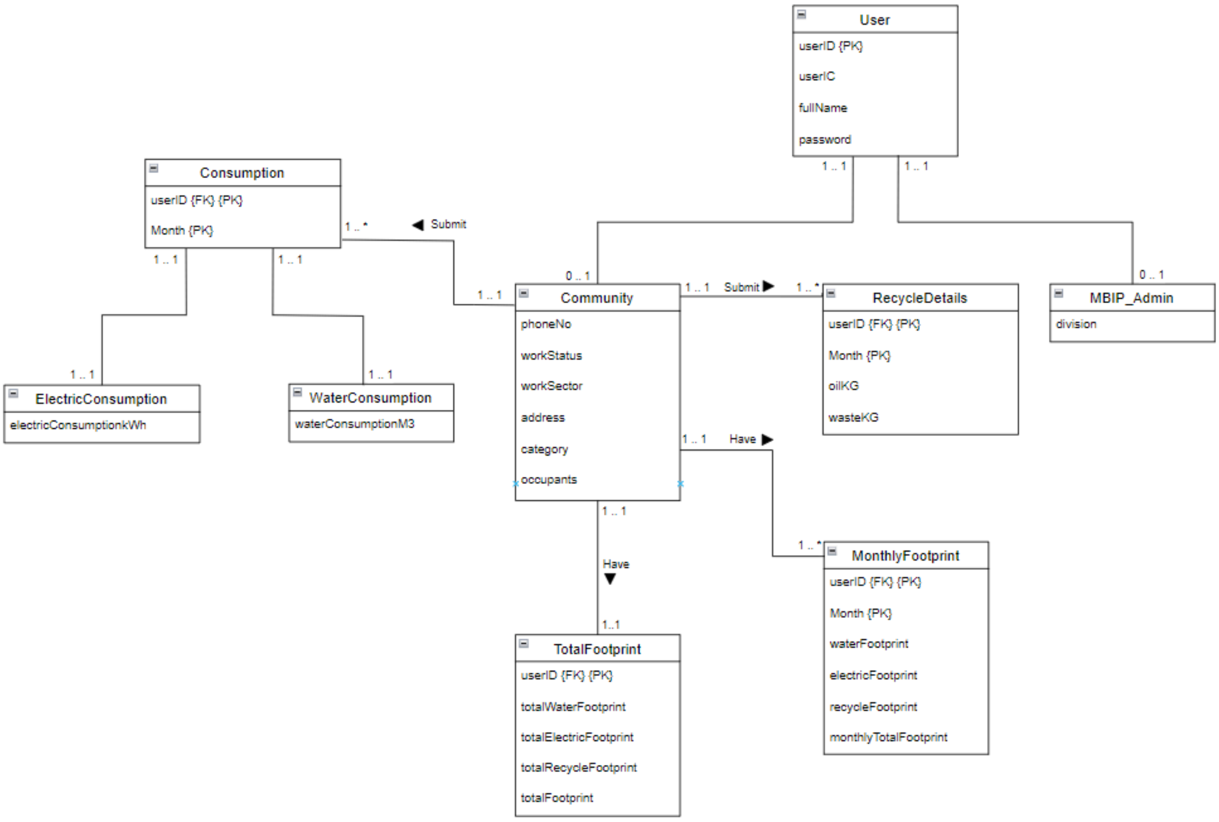


Figure 2: Logical ERD

Relation Schemas

- ElectricWaterConsumption (<u>userID, Month</u>, electricConsumptionkWh, waterConsumptionM3)
  PK: userID, Month
  FK: userID references CommunityUser_TotalFoot (userID)

- RecycleDetails (<u>userID, Month</u>, oilKG, wasteKG)
  PK: userID, Month
  FK: userID references CommunityUser_TotalFoot (userID)

- MonthlyFootprint (<u>userID, Month</u>, waterFootprint, electricFootprint, recycleFootprint, monthlyTotalFootprint)
  PK: userID, Month
  FK: userID references CommunityUser_TotalFoot (userID)

- CommunityUser_TotalFoot (<u>userID</u>, userIC, fullName, password, phoneNo, workStatus, workSector, address, category, occupants, totalWaterFootprint, totalElectricFootprint, totalRecycleFootprint, totalFootprint)

PK: userID

- MBIP_AdminUser (userID, userIC, fullName, password, division)
  PK: userID

4.2 Updated Data Dictionary

4.2.1 Description of Entity

Entity	Description	Occurrence
ElectricWaterConsumption	Hold the data of electric and water consumption	Record the electric and water consumption.
RecycleDetails	Hold the data of recycle details	Record the total amount of waste and oil.
MonthlyFootprint	Hold the data of monthly footprint	Record the monthly footprint.
CommunityUser_TotalFoot	Hold the data of the user and total footprint	Users fill in their information and total footprint.
MBIP_AdminUser	Hold the data of MBIP admin user	MBIP admin users record their information.

4.2.2 Description of Relationship

Entity	Multiplicity	Relationship	Multiplicity	Entity
Community	1..1	Submit	1..*	consumption
	1..1	Submit	1..*	RecycleDetails
	1..1	Have	1..1	TotalFootprint
	1..1	Have	1..*	MonthlyFootprint
Consumption	1..1		1..1	ElectricConsumption
	1..1		1..1	WaterConsumption
User	1..1		0..1	Community
	1..1		0..1	MBIP_Admin

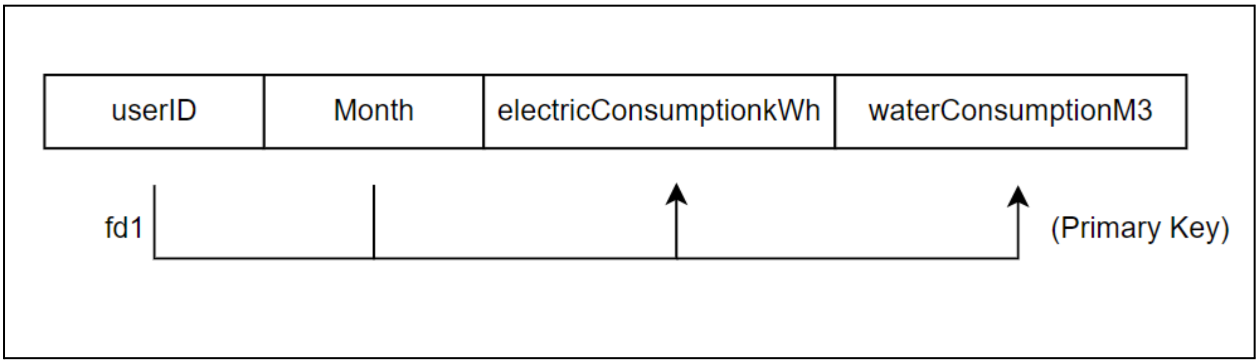
4.2.1 Description of Attributes

Entity	Attribute	Description	Data Type	Constraint
ElectricWaterConsumption	userID	Uniquely identified user	VARCHAR2(10)	FOREIGN KEY REFERENCES: CommunityUser_TotalFoot
	Month	Month for consumption	VARCHAR2(10)	PRIMARY KEY
	electricConsumptionkWh	Total electric consumption	NUMBER(5)	NOT NULL
	waterConsumptionM3	Total water consumption	NUMBER(10,2)	NOT NULL
RecycleDetails	userID	Uniquely identified user	VARCHAR2(10)	FOREIGN KEY REFERENCES: CommunityUser_TotalFoot
	Month	Month for consumption	VARCHAR2(10)	PRIMARY KEY
	oilKG	Total oil	NUMBER(5)	NOT NULL
	wasteKG	Total waste	NUMBER(5)	NOT NULL
MonthlyFootprint	userID	Uniquely identified user	VARCHAR2(10)	FOREIGN KEY REFERENCES: CommunityUser_TotalFoot
	Month	Month for consumption	VARCHAR2(10)	PRIMARY KEY
	waterFootprint	Water footprint	NUMBER(10)	NOT NULL
	electricFootprint	Electric footprint	NUMBER(10)	NOT NULL
	recycleFootprint	Recycle footprint	NUMBER(10)	NOT NULL
	monthlyTotalFootprint	Total footprint in a month	NUMBER(38)	NOT NULL
CommunityUser_TotalFoot	userID	Uniquely identified user	VARCHAR2(10)	PRIMARY KEY
	userIC	User ic number	VARCHAR2(14)	NOT NULL
	fullName	User name	VARCHAR2(50)	NOT NULL

	password	User password	VARCHAR2(20)	NOT NULL
	phoneNo	Community phone number	VARCHAR2(15)	NOT NULL
	workStatus	Work status for community	VARCHAR2(10)	NOT NULL
	workSector	Work sector for community	VARCHAR2(20)	NOT NULL
	address	Address for community	VARCHAR2(150)	NOT NULL
	category	Category for community	VARCHAR2(10)	NOT NULL
	occupants	Occupants of community	NUMBER(2)	NOT NULL
	totalWaterFootprint	Total water footprint	NUMBER(10)	
	totalElectricFootprint	Total electric footprint	NUMBER(10)	
	totalRecycleFootprint	Total recycle footprint	NUMBER(10)	
	totalFootprint	Total footprint	NUMBER(38)	
MBIP_Admin User	userID	Uniquely identified user	VARCHAR2(10)	PRIMARY KEY
	userIC	User ic number	VARCHAR2(14)	NOT NULL
	fullName	User name	VARCHAR2(50)	NOT NULL
	password	User password	VARCHAR2(20)	NOT NULL
	division	MBIP admin division	VARCHAR2(50)	NOT NULL

4.3 Normalization

1. ElectricWaterConsumption



1NF

ElectricWaterConsumption(userID, Month, electricConsumptionkWh, waterConsumptionM3)

PK: userID, Month

FK: userID references CommunityUser_TotalFoot (userID)

2NF

ElectricWaterConsumption(userID, Month, electricConsumptionkWh, waterConsumptionM3)

PK: userID, Month

FK: userID references CommunityUser_TotalFoot (userID)

3NF

ElectricWaterConsumption(userID, Month, electricConsumptionkWh, waterConsumptionM3)

PK: userID, Month

FK: userID references CommunityUser_TotalFoot (userID)

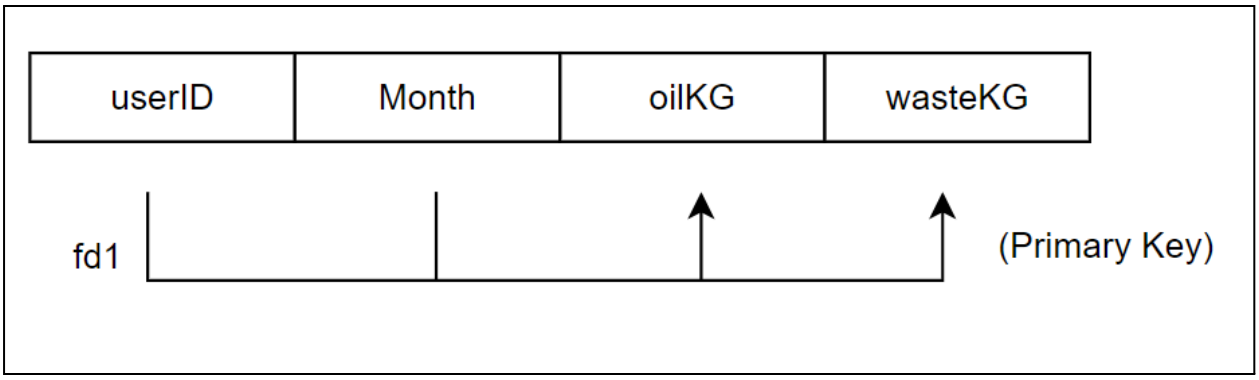
BCNF

ElectricWaterConsumption(userID, Month, electricConsumptionkWh, waterConsumptionM3)

PK: userID, Month

FK: userID references CommunityUser_TotalFoot (userID)

2. RecycleDetails



1NF

RecycleDetails (userID, Month, oilKG, wasteKG)

PK: userID, Month

FK: userID references CommunityUser_TotalFoot (userID)

2NF

RecycleDetails (userID, Month, oilKG, wasteKG)

PK: userID, Month

FK: userID references CommunityUser_TotalFoot (userID)

3NF

RecycleDetails (userID, Month, oilKG, wasteKG)

PK: userID, Month

FK: userID references CommunityUser_TotalFoot (userID)

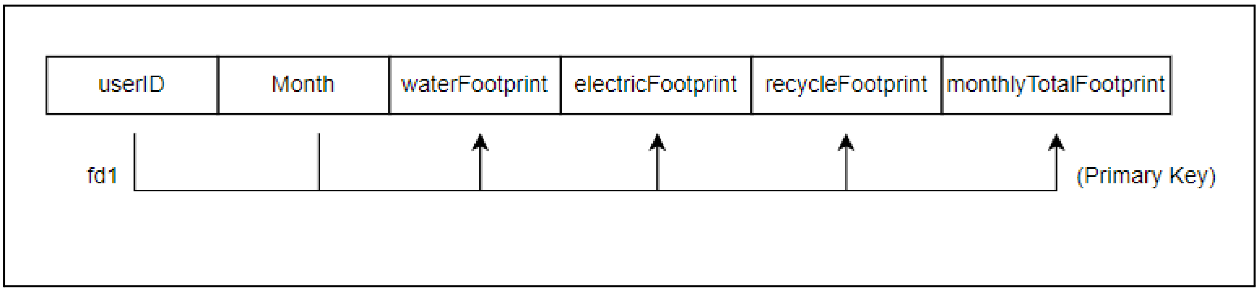
BCNF

RecycleDetails (userID, Month, oilKG, wasteKG)

PK: userID, Month

FK: userID references CommunityUser_TotalFoot (userID)

3. MonthlyFootprint



1NF

MonthlyFootprint (userID, Month, waterFootprint, electricFootprint, recycleFootprint, monthlyTotalFootprint)

PK: userID, Month

FK: userID references CommunityUser_TotalFoot (userID)

2NF

MonthlyFootprint (userID, Month, waterFootprint, electricFootprint, recycleFootprint, monthlyTotalFootprint)

PK: userID, Month

FK: userID references CommunityUser_TotalFoot (userID)

3NF

MonthlyFootprint (userID, Month, waterFootprint, electricFootprint, recycleFootprint, monthlyTotalFootprint)

PK: userID, Month

FK: userID references CommunityUser_TotalFoot (userID)

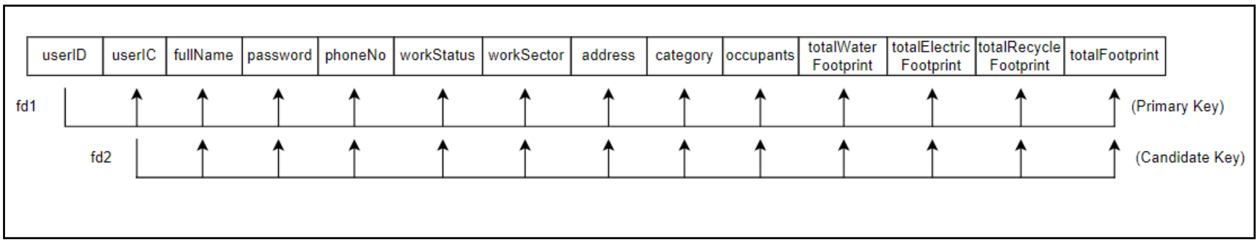
BCNF

MonthlyFootprint (userID, Month, waterFootprint, electricFootprint, recycleFootprint, monthlyTotalFootprint)

PK: userID, Month

FK: userID references CommunityUser_TotalFoot (userID)

4. CommunityUser_TotalFoot



<u>1NF</u>

CommunityUser_TotalFoot (<u>userID</u>, userIC, fullName, password, phoneNo, workStatus, workSector, address, category, occupants, totalWaterFootprint, totalElectricFootprint, totalRecycleFootprint, totalFootprint)

PK: userID

<u>2NF</u>

CommunityUser_TotalFoot (<u>userID</u>, userIC, fullName, password, phoneNo, workStatus, workSector, address, category, occupants, totalWaterFootprint, totalElectricFootprint, totalRecycleFootprint, totalFootprint)

PK: userID

<u>3NF</u>

CommunityUser_TotalFoot (<u>userID</u>, userIC, fullName, password, phoneNo, workStatus, workSector, address, category, occupants, totalWaterFootprint, totalElectricFootprint, totalRecycleFootprint, totalFootprint)

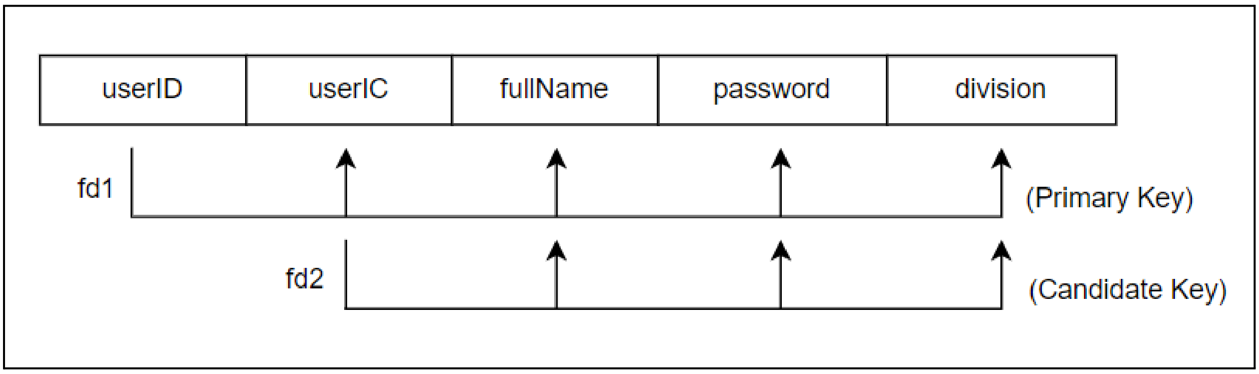
PK: userID

<u>BCNF</u>

CommunityUser_TotalFoot (<u>userID</u>, userIC, fullName, password, phoneNo, workStatus, workSector, address, category, occupants, totalWaterFootprint, totalElectricFootprint, totalRecycleFootprint, totalFootprint)

PK: userID

5. MBIP_AdminUser



1NF

MBIP_AdminUser (userID, userIC, fullName, password, division)
PK: userID

2NF

MBIP_AdminUser (userID, userIC, fullName, password, division)
PK: userID

3NF

MBIP_AdminUser (userID, userIC, fullName, password, division)
PK: userID

BCNF

MBIP_AdminUser (userID, userIC, fullName, password, division)
PK: userID

5.0 Relational DB Schemas (after normalization)

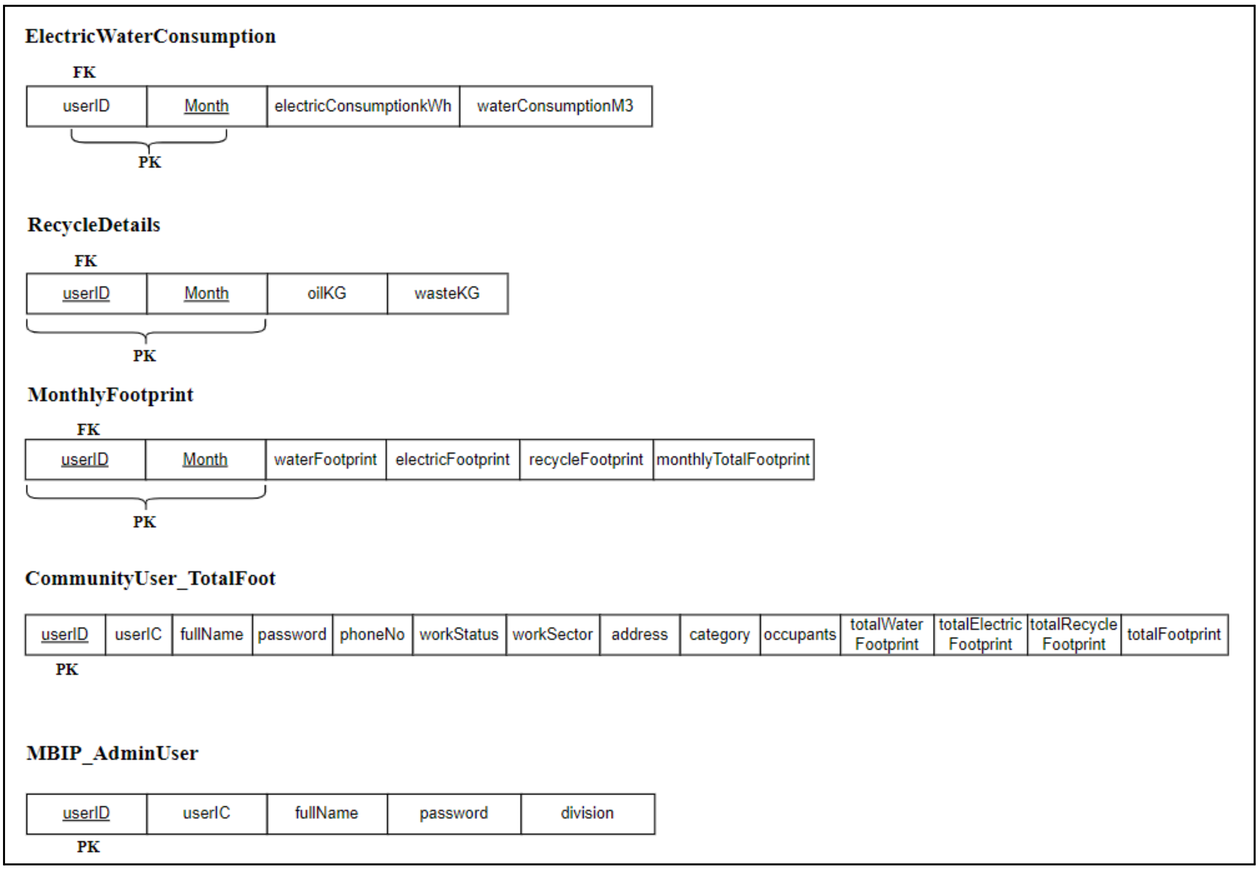
ElectricWaterConsumption(userID, Month, electricConsumptionkWh, waterConsumptionM3)
PK: userID, Month
FK: userID references CommunityUser_TotalFoot (userID)

RecycleDetails (userID, Month, oilKG, wasteKG)
PK: userID, Month
FK: userID references CommunityUser_TotalFoot (userID)

MonthlyFootprint (userID, Month, waterFootprint, electricFootprint, recycleFootprint, monthlyTotalFootprint)
PK: userID, Month
FK: userID references CommunityUser_TotalFoot (userID)

CommunityUser_TotalFoot (userID, userIC, fullName, password, phoneNo, workStatus, workSector, address, category, occupants, totalWaterFootprint, totalElectricFootprint, totalRecycleFootprint, totalFootprint)
PK: userID

MBIP_AdminUser (userID, userIC, fullName, password, division)
PK: userID



ElectricWaterConsumption

FK

userID	Month	electricConsumptionkWh	waterConsumptionM3

PK

RecycleDetails

FK

userID	Month	oilKG	wasteKG

PK

MonthlyFootprint

FK

userID	Month	waterFootprint	electricFootprint	recycleFootprint	monthlyTotalFootprint

PK

CommunityUser_TotalFoot

userID	userIC	fullName	password	phoneNo	workStatus	workSector	address	category	occupants	totalWater Footprint	totalElectric Footprint	totalRecycle Footprint	totalFootprint

PK

MBIP_AdminUser

userID	userIC	fullName	password	division

PK

5.1 Final Logical ERD (based on 5.0 schemas)

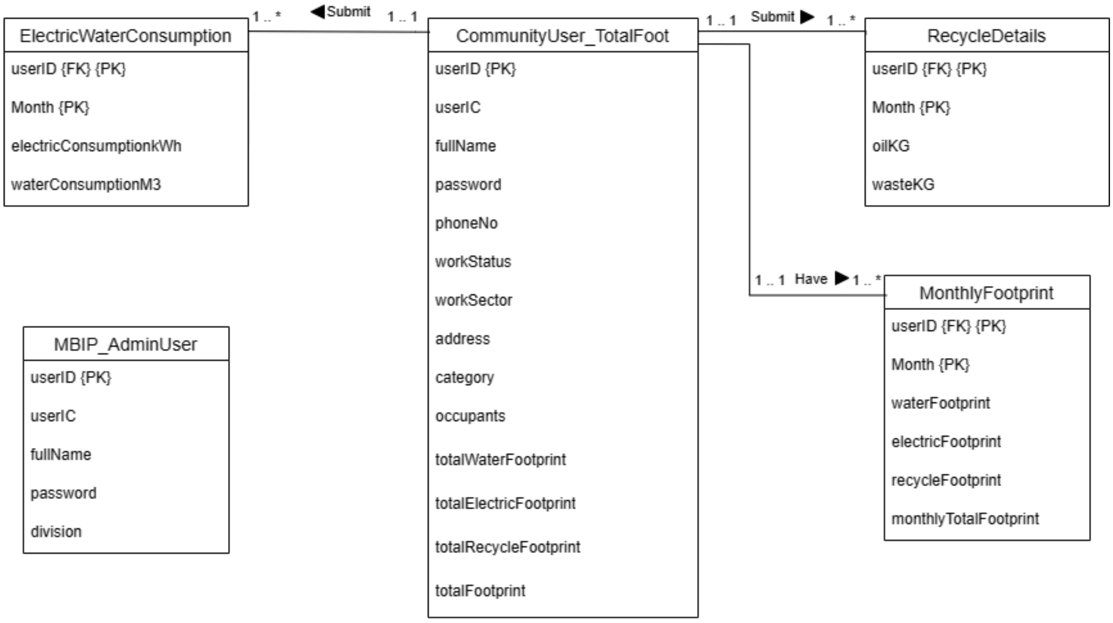


Figure 3

6.0 SQL Statements (DDL & DML)

Create all tables

#The purpose of these SQL statements are to create the table of the entity and its attributes.

```
CREATE TABLE ElectricWaterConsumption(
     userID VARCHAR2(10) NOT NULL,
     Month VARCHAR2(10) NOT NULL,
     electricConsumptionkWh NUMBER(5) NOT NULL,
     waterConsumptionM3 NUMBER(10,2) NOT NULL,
     CONSTRAINT PK_ElectricWaterConsumption PRIMARY KEY (userID, 
Month)
);

CREATE TABLE RecycleDetails(
     userID VARCHAR2(10) NOT NULL,
     Month VARCHAR2(10) NOT NULL,
     oilKG NUMBER(5) NOT NULL,
     wasteKG NUMBER(5) NOT NULL,
     CONSTRAINT PK_RecycleDetails PRIMARY KEY (userID, Month)
);

CREATE TABLE MonthlyFootprint(
     userID VARCHAR2(10) NOT NULL,
     Month VARCHAR2(10) NOT NULL,
     waterFootprint NUMBER(10) NOT NULL,
     electricFootprint NUMBER(10) NOT NULL,
     recycleFootprint NUMBER(10) NOT NULL,
     monthlyTotalFootprint NUMBER(38) NOT NULL,
     CONSTRAINT PK_MonthlyFootprint PRIMARY KEY (userID, Month)
);

CREATE TABLE CommunityUser_TotalFoot(
     userID VARCHAR2(10),
     userIC VARCHAR2(14) NOT NULL,
     fullName VARCHAR2(50) NOT NULL,
     password VARCHAR2(20) NOT NULL,
     phoneNo VARCHAR2(15) NOT NULL,
     workStatus VARCHAR2(10) NOT NULL,
     workSector VARCHAR2(20) NOT NULL,
     address    VARCHAR2(150) NOT NULL,
     category VARCHAR2(10) NOT NULL,
     occupants NUMBER(2) NOT NULL,
     totalWaterFootprint NUMBER(10),
     totalElectricFootprint NUMBER(10),
     totalRecycleFootprint NUMBER(10),
     totalFootprint NUMBER(38),
     CONSTRAINT PK_CommunityUser_TotalFoot PRIMARY KEY (userID)
);

CREATE TABLE MBIP_AdminUser (
     userID VARCHAR2(10) NOT NULL,
     userIC VARCHAR2(14) NOT NULL,
     fullName VARCHAR2(50) NOT NULL,
     password VARCHAR2(20) NOT NULL,
     division VARCHAR2(50) NOT NULL,
     CONSTRAINT PK_MBIP_AdminUser PRIMARY KEY (userID)
);
```

Add Foreign Key to 3 tables

#The purpose of these SQL statements are to add the foreign key to the table..

```
ALTER TABLE ElectricWaterConsumption
ADD CONSTRAINT FK_ElectricWaterConsumption FOREIGN KEY(userID)
REFERENCES CommunityUser_TotalFoot(userID);

ALTER TABLE RecycleDetails
ADD CONSTRAINT FK_RecycleDetails FOREIGN KEY(userID)
REFERENCES CommunityUser_TotalFoot(userID);

ALTER TABLE MonthlyFootprint
ADD CONSTRAINT FK_MonthlyFootprint FOREIGN KEY(userID)
REFERENCES CommunityUser_TotalFoot(userID);
```

Insert all values into the created tables (10 community users and 2 admins)

#The purpose of these SQL statements is to insert the information of the user into CommunityUser_TotalFoot.

```
INSERT INTO CommunityUser_TotalFoot
VALUES(‘kuantong69’, ‘030101-01-0001’, ‘KUAN JI TONG’, ‘KUAN123#’,
‘012-3456789’, ‘Bekerja’, ‘Sektor Awam’, ‘No. 26, Jln. 25/9, Taman
Sri Muda, Shah Alam, 40400, Shah Alam, Selangor’, ‘B1’, 1, null,
null, null, null);

INSERT INTO CommunityUser_TotalFoot
VALUES(‘faridul33’, ‘030202-02-0002’, ‘MD FARIDUL ISLAM’,
‘FARIDUL123#’, ‘013-5121 311’, ‘Pelajar’, ‘Sektor Awam’, ‘4, jalan
Tengku Ampuan Zabedah, Seksyen 9, Shah Alam, 40000, Shah Alam,
Selangor’, ‘B2’, 2, null, null, null, null);

INSERT INTO CommunityUser_TotalFoot
VALUES(‘saifudin23’, ‘030301-01-0003’, ‘AHMAD SAIFUDIN BIN NARDI
SUSANTO’, ‘SAIFUDIN123#’, ‘012-98402784’, ‘Bekerja’, ‘Sektor
Swasta’, ‘Lot 4133, Jalan Perkhidmatan, Kampung Baru Sungai Buloh,
47000, Sungai Buloh, Selangor’, ‘B2’, 3, null, null, null, null);

INSERT INTO CommunityUser_TotalFoot
VALUES(‘hariz99’, ‘030412-05-0041’, ‘ALI HARIZ BIN ANUARI’,
‘ALI123#’, ‘013-6156 181’, ‘Bekerja’, ‘Sektor Awam’, ‘Lot 4133,
Jalan Perkhidmatan, Kampung Baru Sungai Buloh, 47000, Sungai Buloh,
Selangor’, ‘A1’, 6, null, null, null, null);

INSERT INTO CommunityUser_TotalFoot
VALUES(‘wang89’, ‘030121-06-0301’, ‘WANG LEI’, ‘WANGLEI123#’,
‘012-9483965’, ‘Bekerja’, ‘Sektor Awam’, ‘J-31-G, Block J, Jaya One,
72A, Jalan Universiti, 46200, Petaling Jaya, Selangor’, ‘A2’, 3,
null, null, null, null);

INSERT INTO CommunityUser_TotalFoot
VALUES(‘jianheng66’, ‘040516-03-0023’, ‘KEW JIAN HENG’, ‘KEW123#’,
‘012-5569546’, ‘Pelajar’, ‘Sektor Swasta’, ‘No. 132, Jalan Kundor,
05400, Alor Setar’, ‘B1’, 4, null, null, null, null);

INSERT INTO CommunityUser_TotalFoot
VALUES(‘yanhong23’, ‘030605-01-8952’, ‘LEOW YAN HONG’, ‘LEOW123#’,
‘011-5269426’, ‘Bekerja’, ‘Sektor Awam’, ‘Jalan Iman, 81310 Skudai,
Johor’, ‘A2’, 2, null, null, null, null);

INSERT INTO CommunityUser_TotalFoot
VALUES(‘mingze45’, ‘031230-02-1001’, ‘LIM MING ZE’, ‘:LIM123#’,
‘013-889 1111’, ‘Pelajar’, ‘Sektor Swasta’, ‘Lot G32, Ground Floor,
No 1, Jalan Tun Abdul Razak, 75400, Tesco Melaka, Peringgit,
Melaka’, ‘A2’, 2, null, null, null, null);

INSERT INTO CommunityUser_TotalFoot
VALUES(‘aqil12’, ‘030228-01-5630’, ‘MUHAMMAD AQIL HAZIQ BIN
ZULKARNAIN’, ‘AQIL123#’, 018-561589’, ‘Bekerja’, ‘Sektor Swasta’,
‘Stesyen Minyak Shell, Adjacent To Wisma Innoprise, Jalan Kota
Kinabalu-Sulaman Highway, Kota Kinabalu, 89257, Tamparuli, Sabah’,
‘B2’, 1, null, null, null, null);
```

```
INSERT INTO CommunityUser_TotalFoot
VALUES(‘fahim78’, ‘030501-03-5363’, ‘MUHAMMAD FAHIM BIN ZULKIFLI
AMIR’, ‘FAHIM123#’, ‘019-2901624’, ‘Pelajar’, ‘Sektor Awam’, ‘8,
Jln. Beserah, 25000 Kuantan, Pahang’, ‘A1’, 4, null, null, null,
null);
```

#The purpose of these SQL statements is to insert the information of the admin user into MBIP_AdminUser .

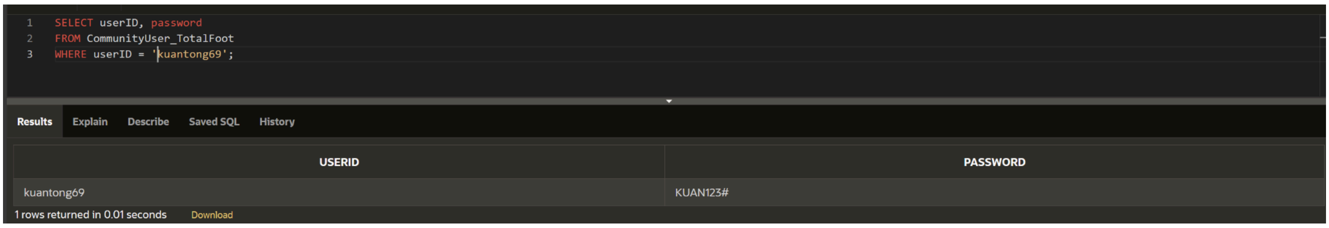
```
INSERT INTO MBIP_AdminUser
VALUES(‘aiman111’, ‘000221-01-0032’ , ‘MOHAMAD AIMAN BIN SAMSUL’,
‘AIMAN123’, ‘GIS and Development Planning Division’)

INSERT INTO MBIP_AdminUser
VALUES(‘iddin888’, ‘980502-01-0320’ , ‘MOHAMAD IDDIN BIN SHED AIMAN’,
‘IDDIN666’, ‘Planning Control Division’);
```

<u>Login</u>

#The purpose of these SQL statements are to display user ID and password for each user.

#These SQL statements will display the user ID and password of the user.

```
SELECT userID, password
FROM CommunityUser_TotalFoot
WHERE userID = ‘kuantong69’;
```



```
SELECT userID, password
FROM CommunityUser_TotalFoot
WHERE userID = 'kuantong69';
```

USERID	PASSWORD
kuantong69	KUAN123#

1 rows returned in 0.01 seconds

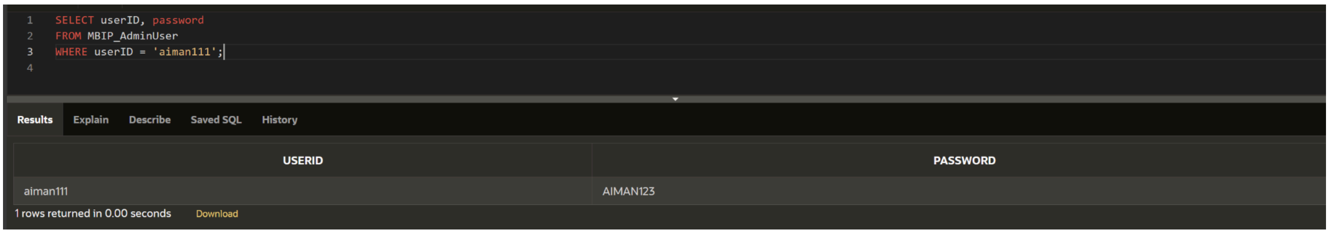
Figure 4: Query to display community user’s userID and password

```
SELECT userID, password
FROM CommunityUser_TotalFoot
WHERE userID = ‘faridul33’;

SELECT userID, password
FROM CommunityUser_TotalFoot
WHERE userID = ‘saifudin23’;
```

```
SELECT userID, password
FROM CommunityUser_TotalFoot
WHERE userID = ‘hariz99’;

SELECT userID, password
FROM CommunityUser_TotalFoot
WHERE userID = ‘wang89’;

SELECT userID, password
FROM CommunityUser_TotalFoot
WHERE userID = ‘jianheng66’;

SELECT userID, password
FROM CommunityUser_TotalFoot
WHERE userID = ‘yanhong23’;

SELECT userID, password
FROM CommunityUser_TotalFoot
WHERE userID = ‘mingze45’;


SELECT userID, password
FROM CommunityUser_TotalFoot
WHERE userID = ‘aqil12’;

SELECT userID, password
FROM CommunityUser_TotalFoot
WHERE userID = ‘fahim78’;
```

#These SQL statements will display the user ID and password of the Admin user.

```
SELECT userID, password
FROM MBIP_AdminUser
WHERE userID = ‘aiman111’;
```



```
SELECT userID, password
FROM MBIP_AdminUser
WHERE userID = 'aiman111';
```

```
USERID                                   PASSWORD
aiman111                                 AIMAN123
1 rows returned in 0.00 seconds   Download
```

Figure 5: Query to display MBIP admin’s userID and password

```
SELECT userID, password
FROM MBIP_AdminUser
WHERE userID = ‘iddin888’;
```

Record Consumption Details

#The purpose of these SQL statements are to insert user’s consumption data into ElectricWaterConsumption table

```
INSERT INTO ElectricWaterConsumption
VALUES(‘kuantong69’, ‘Januari’, 474, 22);

INSERT INTO ElectricWaterConsumption
VALUES(‘faridul33’, ‘Januari’, 450, 18);

INSERT INTO ElectricWaterConsumption
VALUES(‘saifudin23’, ‘Januari’, 451, 19);

INSERT INTO ElectricWaterConsumption
VALUES(‘hariz99’, ‘Januari’, 452, 20);

INSERT INTO ElectricWaterConsumption
VALUES(‘wang89’, ‘Januari’, 453, 21);

INSERT INTO ElectricWaterConsumption
VALUES(‘jianheng66’, ‘Januari’, 454, 22);

INSERT INTO ElectricWaterConsumption
VALUES(‘yanhong23’, ‘Januari’, 455, 23);

INSERT INTO ElectricWaterConsumption
VALUES(‘mingze45’, ‘Januari’, 456, 24);

INSERT INTO ElectricWaterConsumption
VALUES(‘aqil12’, ‘Januari’, 457, 25);

INSERT INTO ElectricWaterConsumption
VALUES(‘fahim78’, ‘Januari’, 458, 26);

INSERT INTO ElectricWaterConsumption
VALUES(‘kuantong69’, ‘Februari’, 459, 27);

INSERT INTO ElectricWaterConsumption
VALUES(‘faridul33’, ‘Februari’, 460, 28);
```

```
INSERT INTO ElectricWaterConsumption
VALUES(‘saifudin23’, ‘Februari’, 461, 29);

INSERT INTO ElectricWaterConsumption
VALUES(‘hariz99’, ‘Februari’, 462, 30);

INSERT INTO ElectricWaterConsumption
VALUES(‘wang89’, ‘Februari’, 463, 31);

INSERT INTO ElectricWaterConsumption
VALUES(‘jianheng66’, ‘Februari’, 464, 32);

INSERT INTO ElectricWaterConsumption
VALUES(‘yanhong23’, ‘Februari’, 465, 33);

INSERT INTO ElectricWaterConsumption
VALUES(‘mingze45’, ‘Februari’, 466, 34);

INSERT INTO ElectricWaterConsumption
VALUES(‘aqil12’, ‘Februari’, 467, 35);

INSERT INTO ElectricWaterConsumption
VALUES(‘fahim78’, ‘Februari’, 468, 36);
```

#The purpose of these SQL statements are to insert user’s recycle details into RecycleDetails table

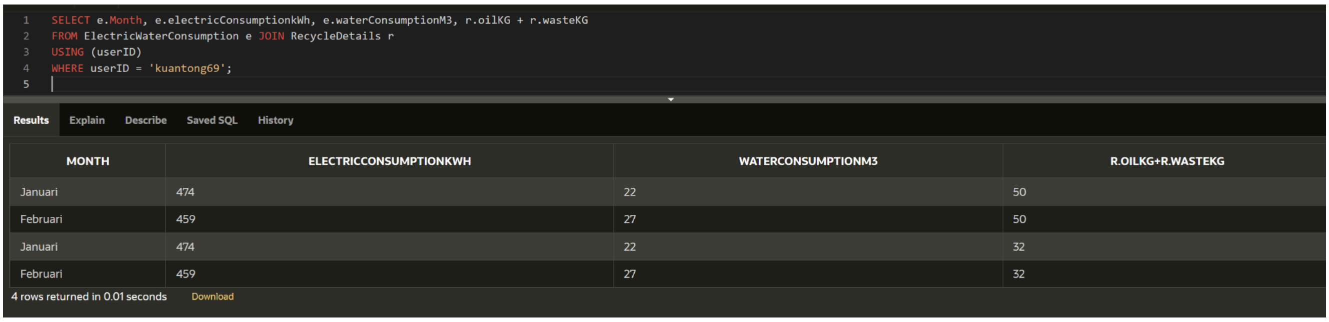
```
INSERT INTO RecycleDetails
VALUES(‘kuantong69’, ‘Januari’, 25, 25);

INSERT INTO RecycleDetails
VALUES(‘faridul33’, ‘Januari’, 20, 12);

INSERT INTO RecycleDetails
VALUES(‘saifudin23’, ‘Januari’, 19, 13);

INSERT INTO RecycleDetails
VALUES(‘hariz99’, ‘Januari’, 18, 14);

INSERT INTO RecycleDetails
VALUES(‘‘wang89’, ‘Januari’, 17, 15);

INSERT INTO RecycleDetails
VALUES(‘jianheng66’, ‘Januari’, 16, 16);
```

```
INSERT INTO RecycleDetails
VALUES(‘yanhong23’, ‘Januari’, 15, 17);

INSERT INTO RecycleDetails
VALUES(‘mingze45’, ‘Januari’, 14, 18);

INSERT INTO RecycleDetails
VALUES(‘aqil12’, ‘Januari’, 13, 19);

INSERT INTO RecycleDetails
VALUES(‘fahim78’, ‘Januari’, 12, 20);

INSERT INTO RecycleDetails
VALUES(‘kuantong69’, ‘Februari’, 11, 21);

INSERT INTO RecycleDetails
VALUES(‘faridul33’, ‘Februari’, 10, 22);

INSERT INTO RecycleDetails
VALUES(‘saifudin23’, ‘Februari’, 9, 23);

INSERT INTO RecycleDetails
VALUES(‘hariz99’, ‘Februari’, 8, 24);

INSERT INTO RecycleDetails
VALUES(‘‘wang89’, ‘Februari’, 22, 25);

INSERT INTO RecycleDetails
VALUES(‘jianheng66’, ‘Februari’, 23, 26);

INSERT INTO RecycleDetails
VALUES(‘yanhong23’, ‘Februari’, 24, 27);

INSERT INTO RecycleDetails
VALUES(‘mingze45’, ‘Februari’, 25, 28);

INSERT INTO RecycleDetails
VALUES(‘aqil12’, ‘Februari’, 26, 29);

INSERT INTO RecycleDetails
VALUES(‘fahim78’, ‘Februari’, 27, 30);
```

Calculate Carbon Footprint

#The purpose of these sql statements is to display the water consumption, electricity consumption and total recycled waste by month

```
SELECT e.Month, e.electricConsumptionkWh, e.waterConsumptionM3,
r.oilKG + r.wasteKG
FROM ElectricWaterConsumption e JOIN RecycleDetails r
USING (userID)
WHERE userID = 'kuantong69';
```



```
SELECT e.Month, e.electricConsumptionkWh, e.waterConsumptionM3, r.oilKG + r.wasteKG
FROM ElectricWaterConsumption e JOIN RecycleDetails r
USING (userID)
WHERE userID = 'kuantong69';
```

MONTH	ELECTRICCONSUMPTIONKWH	WATERCONSUMPTIONM3	R.OILKG+R.WASTEKG
Januari	474	22	50
Februari	459	27	50
Januari	474	22	32
Februari	459	27	32

4 rows returned in 0.01 seconds

Figure 6: Query to display monthly consumptions and recycle details of a user

```
SELECT e.Month, e.electricConsumptionkWh, e.waterConsumptionM3,
r.oilKG + r.wasteKG
FROM ElectricWaterConsumption e JOIN RecycleDetails r
USING (userID)
WHERE userID = 'faridul33';
```

```
SELECT e.Month, e.electricConsumptionkWh, e.waterConsumptionM3,
r.oilKG + r.wasteKG
FROM ElectricWaterConsumption e JOIN RecycleDetails r
USING (userID)
WHERE userID = 'saifudin23';
```

```
SELECT e.Month, e.electricConsumptionkWh, e.waterConsumptionM3,
r.oilKG + r.wasteKG
FROM ElectricWaterConsumption e JOIN RecycleDetails r
USING (userID)
WHERE userID = 'hariz99';
```

```
SELECT e.Month, e.electricConsumptionkWh, e.waterConsumptionM3,
r.oilKG + r.wasteKG
FROM ElectricWaterConsumption e JOIN RecycleDetails r
USING (userID)
WHERE userID = 'wang89';
```

```
SELECT e.Month, e.electricConsumptionkWh, e.waterConsumptionM3,
r.oilKG + r.wasteKG
FROM ElectricWaterConsumption e JOIN RecycleDetails r
USING (userID)
WHERE userID = 'jianheng66';

SELECT e.Month, e.electricConsumptionkWh, e.waterConsumptionM3,
r.oilKG + r.wasteKG
FROM ElectricWaterConsumption e JOIN RecycleDetails r
USING (userID)
WHERE userID = 'yanhong23';


SELECT e.Month, e.electricConsumptionkWh, e.waterConsumptionM3,
r.oilKG + r.wasteKG
FROM ElectricWaterConsumption e JOIN RecycleDetails r
USING (userID)
WHERE userID = 'mingze45';

SELECT e.Month, e.electricConsumptionkWh, e.waterConsumptionM3,
r.oilKG + r.wasteKG
FROM ElectricWaterConsumption e JOIN RecycleDetails r
USING (userID)
WHERE userID = 'aqil12';

SELECT e.Month, e.electricConsumptionkWh, e.waterConsumptionM3,
r.oilKG + r.wasteKG
FROM ElectricWaterConsumption e JOIN RecycleDetails r
USING (userID)
WHERE userID = 'fahim78';


==========================================
```

#The purpose of these sql statements is to insert the calculated carbon footprint values for water, electricity and recycle waste for each users by month into the MonthlyFootprint table

```
INSERT INTO MonthlyFootprint
VALUES('kuantong69', 'Januari', 9.2, 276.8, 143, 143);

INSERT INTO MonthlyFootprint
VALUES('kuantong69', 'Februari', 11.3, 268.1, 91.5, 187.9);
```

```
INSERT INTO MonthlyFootprint
VALUES('faridul33', 'Januari', 7.5, 262.8, 91.5, 178.8);

INSERT INTO MonthlyFootprint
VALUES('faridul33', 'Februari', 11.7, 268.6, 91.5, 188.8);

INSERT INTO MonthlyFootprint
VALUES('saifudin23', 'Januari', 8, 263.4, 91.5, 179.9);

INSERT INTO MonthlyFootprint
VALUES('saifudin23', 'Februari', 12.2, 269.2, 91.5, 189.9);

INSERT INTO MonthlyFootprint
VALUES('hariz99', 'Januari', 8.4, 264, 91.5, 180.9);

INSERT INTO MonthlyFootprint
VALUES('hariz99', 'Februari', 12.6, 269.8, 91.5, 190.9);

INSERT INTO MonthlyFootprint
VALUES('wang89', 'Januari', 8.8, 264.6, 91.5, 181.9);
INSERT INTO MonthlyFootprint
VALUES('wang89', 'Februari', 13, 270.4, 134.4, 149);

INSERT INTO MonthlyFootprint
VALUES('jianheng66', 'Januari', 9.2, 265.1, 91.5, 182.8);

INSERT INTO MonthlyFootprint
VALUES('jianheng66', 'Februari', 13.4, 271, 140.1, 144.3);

INSERT INTO MonthlyFootprint
VALUES('yanhong23', 'Januari', 9.6, 265.7, 91.5, 183.8);

INSERT INTO MonthlyFootprint
VALUES('yanhong23', 'Februari', 13.8, 271.6, 145.9, 139.5);

INSERT INTO MonthlyFootprint
VALUES('mingze45', 'Januari', 10.1, 266.3, 91.5, 184.9);

INSERT INTO MonthlyFootprint
VALUES('mingze45', 'Februari', 14.2, 272.1, 151.6, 134.7);

INSERT INTO MonthlyFootprint
VALUES('aqil12', 'Januari', 10.5, 266.9, 91.5, 185.9);
```

```
INSERT INTO MonthlyFootprint
VALUES('aqil12', 'Februari', 14.7, 272.7, 157.3, 130.1);

INSERT INTO MonthlyFootprint
VALUES('fahim78', 'Januari', 11, 267.5, 91.5, 187);

INSERT INTO MonthlyFootprint
VALUES('fahim78', 'Februari', 15.1, 273.3, 163, 125.4);

============================================
```

#The purpose of these sql statements is to update CommunityUser_TotalFoot table with the calculated total carbon footprint values for each users

```
UPDATE CommunityUser_TotalFoot
SET totalWaterFootprint = 20.5, totalElectricFootprint = 544.9,
totalRecycleFootprint = 234.5, totalFootprint = 330.9
WHERE userID = 'kuantong69';

UPDATE CommunityUser_TotalFoot
SET totalWaterFootprint = 19.2, totalElectricFootprint = 531.4,
totalRecycleFootprint = 183, totalFootprint = 367.6
WHERE userID = 'faridul33';
UPDATE CommunityUser_TotalFoot
SET totalWaterFootprint = 20.2, totalElectricFootprint = 532.6,
totalRecycleFootprint = 183, totalFootprint = 369.8
WHERE userID = 'saifudin23';

UPDATE CommunityUser_TotalFoot
SET totalWaterFootprint = 21, totalElectricFootprint = 533.8,
totalRecycleFootprint = 183, totalFootprint = 371.8
WHERE userID = 'hariz99';

UPDATE CommunityUser_TotalFoot
SET totalWaterFootprint = 21.8, totalElectricFootprint = 535,
totalRecycleFootprint = 225.9, totalFootprint = 330.9
WHERE userID = 'wang89';

UPDATE CommunityUser_TotalFoot
SET totalWaterFootprint = 22.6, totalElectricFootprint = 536.1,
totalRecycleFootprint = 231.6, totalFootprint = 327.1
WHERE userID = 'jianheng66';
```

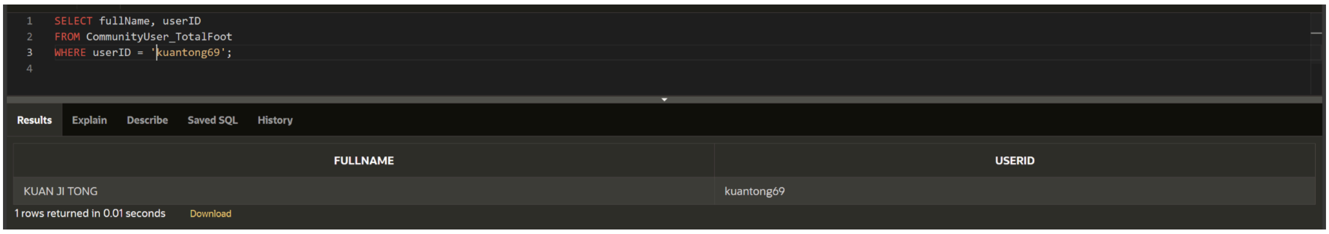
```
UPDATE CommunityUser_TotalFoot
SET totalWaterFootprint = 23.4, totalElectricFootprint = 537.3,
totalRecycleFootprint = 237.4, totalFootprint = 323.3
WHERE userID = 'yanhong23';

UPDATE CommunityUser_TotalFoot
SET totalWaterFootprint = 24.3, totalElectricFootprint = 538.4,
totalRecycleFootprint = 243.1, totalFootprint = 319.6
WHERE userID = 'mingze45';

UPDATE CommunityUser_TotalFoot
SET totalWaterFootprint = 25.2, totalElectricFootprint = 539.6,
totalRecycleFootprint = 248.8, totalFootprint = 316
WHERE userID = 'aqil12';

UPDATE CommunityUser_TotalFoot
SET totalWaterFootprint = 26.1, totalElectricFootprint = 540.8,
totalRecycleFootprint = 254.5, totalFootprint = 312.4
WHERE userID = 'fahim78';
```

Display User Dashboard

#The purpose of these SQL statements are to display all the values in the admin dashboard as shown in the interface.

#These SQL statements will display the full name and userID of the user.

```
SELECT fullName, userID
FROM CommunityUser_TotalFoot
WHERE userID = ‘kuantong69’;
```



```
SELECT fullName, userID
FROM CommunityUser_TotalFoot
WHERE userID = 'kuantong69';
```

FULLNAME	USERID
KUAN JI TONG	kuantong69

1 rows returned in 0.01 seconds

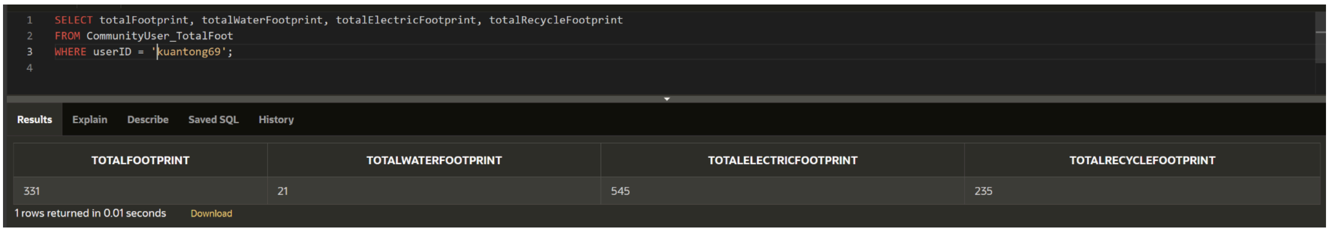
Figure 7: Query to display community user’s full name and userID

```
SELECT fullName, userID
FROM CommunityUser_TotalFoot
WHERE userID = ‘faridul33’;
```

```
SELECT fullName, userID
FROM CommunityUser_TotalFoot
WHERE userID = ‘saifudin23’;

SELECT fullName, userID
FROM CommunityUser_TotalFoot
WHERE userID = ‘hariz99’;

SELECT fullName, userID
FROM CommunityUser_TotalFoot
WHERE userID = ‘wang89’;

SELECT fullName, userID
FROM CommunityUser_TotalFoot
WHERE userID = ‘jianheng66’;

SELECT fullName, userID
FROM CommunityUser_TotalFoot
WHERE userID = ‘yanhong23’;

SELECT fullName, userID
FROM CommunityUser_TotalFoot
WHERE userID = ‘mingze45’;

SELECT fullName, userID
FROM CommunityUser_TotalFoot
WHERE userID = ‘aqil12’;

SELECT fullName, userID
FROM CommunityUser_TotalFoot
WHERE userID = ‘fahim78’;

==============================================
```

#These SQL statements will display the total footprint values of the user.

```
SELECT totalFootprint, totalWaterFootprint, totalElectricFootprint,
totalRecycleFootprint
FROM CommunityUser_TotalFoot
WHERE userID = ‘kuantong69’;
```



```
SELECT totalFootprint, totalWaterFootprint, totalElectricFootprint, totalRecycleFootprint
FROM CommunityUser_TotalFoot
WHERE userID = 'kuantong69';
```

TOTALFOOTPRINT	TOTALWATERFOOTPRINT	TOTALELECTRICFOOTPRINT	TOTALRECYCLEFOOTPRINT
331	21	545	235

1 rows returned in 0.01 seconds

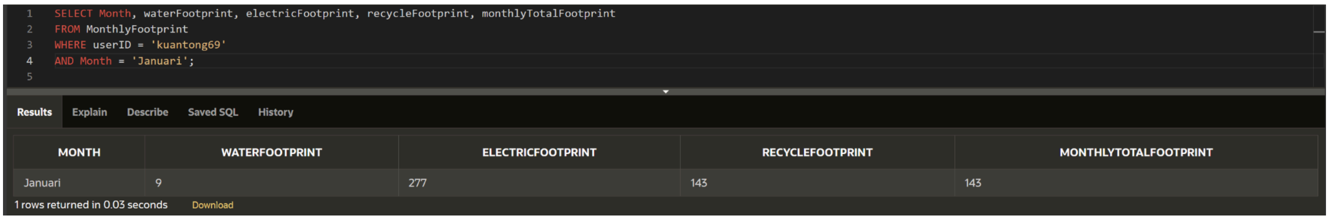
Figure 8: Query to display community user's total footprint for all consumptions and recycles

```
SELECT totalFootprint, totalWaterFootprint, totalElectricFootprint,
totalRecycleFootprint
FROM CommunityUser_TotalFoot
WHERE userID = 'faridul33';

SELECT totalFootprint, totalWaterFootprint, totalElectricFootprint,
totalRecycleFootprint
FROM CommunityUser_TotalFoot
WHERE userID = 'saifudin23';

SELECT totalFootprint, totalWaterFootprint, totalElectricFootprint,
totalRecycleFootprint
FROM CommunityUser_TotalFoot
WHERE userID = 'hariz99';

SELECT totalFootprint, totalWaterFootprint, totalElectricFootprint,
totalRecycleFootprint
FROM CommunityUser_TotalFoot
WHERE userID = 'wang89';

SELECT totalFootprint, totalWaterFootprint, totalElectricFootprint,
totalRecycleFootprint
FROM CommunityUser_TotalFoot
WHERE userID = 'jianheng66';

SELECT totalFootprint, totalWaterFootprint, totalElectricFootprint,
totalRecycleFootprint
FROM CommunityUser_TotalFoot
WHERE userID = 'yanhong23';

SELECT totalFootprint, totalWaterFootprint, totalElectricFootprint,
totalRecycleFootprint
FROM CommunityUser_TotalFoot
WHERE userID = 'mingze45';
```

```
SELECT totalFootprint, totalWaterFootprint, totalElectricFootprint,
totalRecycleFootprint
FROM CommunityUser_TotalFoot
WHERE userID = ‘aqil12’;

SELECT totalFootprint, totalWaterFootprint, totalElectricFootprint,
totalRecycleFootprint
FROM CommunityUser_TotalFoot
WHERE userID = ‘fahim78’;

===============================================
```

#These SQL statements will display the monthly footprint values of the user

```
SELECT Month, waterFootprint, electricFootprint, recycleFootprint,
monthlyTotalFootprint
FROM MonthlyFootprint
WHERE userID = ‘kuantong69’
AND Month = ‘Januari’;
```



```
SELECT Month, waterFootprint, electricFootprint, recycleFootprint, monthlyTotalFootprint
FROM MonthlyFootprint
WHERE userID = 'kuantong69'
AND Month = 'Januari';
```

MONTH	WATERFOOTPRINT	ELECTRICFOOTPRINT	RECYCLEFOOTPRINT	MONTHLYTOTALFOOTPRINT
Januari	9	277	143	143

1 rows returned in 0.03 seconds

Figure 9: Query to display community user’s monthly footprint values

```
SELECT Month, waterFootprint, electricFootprint, recycleFootprint,
monthlyTotalFootprint
FROM MonthlyFootprint
WHERE userID = ‘kuantong69’
AND Month = ‘Februari’;

SELECT Month, waterFootprint, electricFootprint, recycleFootprint,
monthlyTotalFootprint
FROM MonthlyFootprint
WHERE userID = ‘faridul33’
AND Month = ‘Januari’;

SELECT Month, waterFootprint, electricFootprint, recycleFootprint,
monthlyTotalFootprint
FROM MonthlyFootprint
WHERE userID = ‘faridul33’
AND Month = ‘Februari’;
```

```
SELECT Month, waterFootprint, electricFootprint, recycleFootprint,
monthlyTotalFootprint
FROM MonthlyFootprint
WHERE userID = ‘saifudin23’
AND Month = ‘Januari’;

SELECT Month, waterFootprint, electricFootprint, recycleFootprint,
monthlyTotalFootprint
FROM MonthlyFootprint
WHERE userID = ‘saifudin23’
AND Month = ‘Februari’;

SELECT Month, waterFootprint, electricFootprint, recycleFootprint,
monthlyTotalFootprint
FROM MonthlyFootprint
WHERE userID = ‘hariz99’
AND Month = ‘Januari’;

SELECT Month, waterFootprint, electricFootprint, recycleFootprint,
monthlyTotalFootprint
FROM MonthlyFootprint
WHERE userID = ‘hariz99’
AND Month = ‘Februari’;

SELECT Month, waterFootprint, electricFootprint, recycleFootprint,
monthlyTotalFootprint
FROM MonthlyFootprint
WHERE userID = ‘wang89’
AND Month = ‘Januari’;

SELECT Month, waterFootprint, electricFootprint, recycleFootprint,
monthlyTotalFootprint
FROM MonthlyFootprint
WHERE userID = ‘wang89’
AND Month = ‘Februari’;

SELECT Month, waterFootprint, electricFootprint, recycleFootprint,
monthlyTotalFootprint
FROM MonthlyFootprint
WHERE userID = ‘jianheng66’
AND Month = ‘Januari’;
```

```
SELECT Month, waterFootprint, electricFootprint, recycleFootprint,
monthlyTotalFootprint
FROM MonthlyFootprint
WHERE userID = ‘jianheng66’
AND Month = ‘Februari’;

SELECT Month, waterFootprint, electricFootprint, recycleFootprint,
monthlyTotalFootprint
FROM MonthlyFootprint
WHERE userID = ‘yanhong23’
AND Month = ‘Januari’;

SELECT Month, waterFootprint, electricFootprint, recycleFootprint,
monthlyTotalFootprint
FROM MonthlyFootprint
WHERE userID = ‘yanhong23’
AND Month = ‘Februari’;

SELECT Month, waterFootprint, electricFootprint, recycleFootprint,
monthlyTotalFootprint
FROM MonthlyFootprint
WHERE userID = ‘mingze45’
AND Month = ‘Januari’;

SELECT Month, waterFootprint, electricFootprint, recycleFootprint,
monthlyTotalFootprint
FROM MonthlyFootprint
WHERE userID = ‘mingze45’
AND Month = ‘Februari’;

SELECT Month, waterFootprint, electricFootprint, recycleFootprint,
monthlyTotalFootprint
FROM MonthlyFootprint
WHERE userID = ‘aqil12’
AND Month = ‘Januari’;

SELECT Month, waterFootprint, electricFootprint, recycleFootprint,
monthlyTotalFootprint
FROM MonthlyFootprint
WHERE userID = ‘aqil12’
AND Month = ‘Februari’;
```

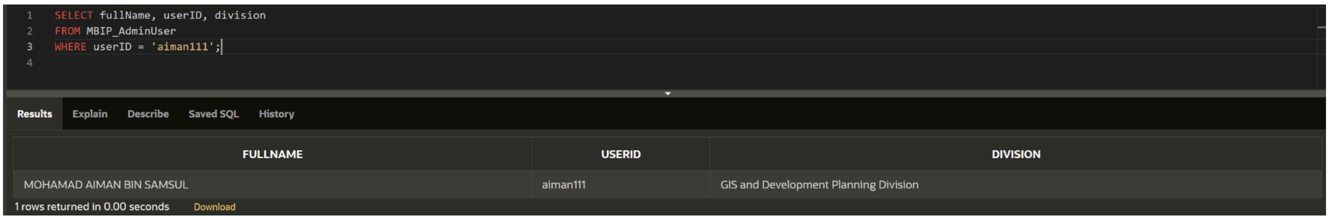
```
SELECT Month, waterFootprint, electricFootprint, recycleFootprint,
monthlyTotalFootprint
FROM MonthlyFootprint
WHERE userID = ‘fahim78’
AND Month = ‘Januari’;

SELECT Month, waterFootprint, electricFootprint, recycleFootprint,
monthlyTotalFootprint
FROM MonthlyFootprint
WHERE userID = ‘fahim78’
AND Month = ‘Februari’;
```

<u>Display Admin Dashboard</u>

#The purpose of these SQL statements are to display all the values in the admin dashboard as shown in the interface.

#These SQL statements will display full name, userID and the division of the admin.

```
SELECT fullName, userID, division
FROM MBIP_AdminUser
WHERE userID = ‘aiman111’;
```



```
SELECT fullName, userID, division
FROM MBIP_AdminUser
WHERE userID = 'aiman111';
```

FULLNAME	USERID	DIVISION
MOHAMAD AIMAN BIN SAMSUL	aiman111	GIS and Development Planning Division

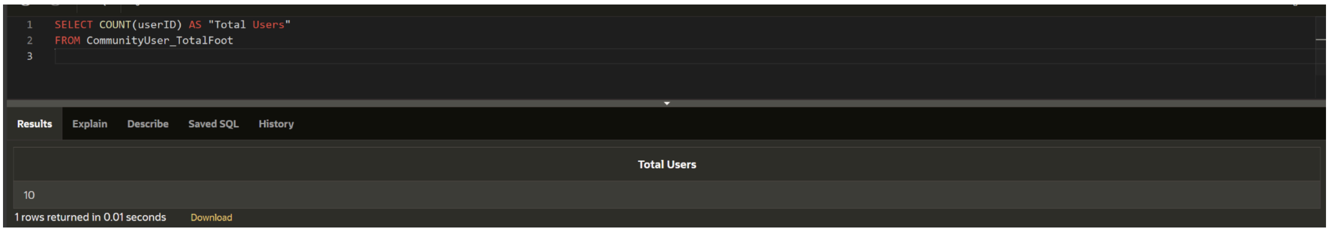
1 rows returned in 0.00 seconds

Figure 10: Query to display MBIP admin’s full name, userID and division

```
SELECT fullName, userID, division
FROM MBIP_AdminUser
WHERE userID = ‘iddin888’;

===============================================
```

#This SQL statement will display the total number of users in the system.

```
SELECT COUNT(userID) AS “Total Users”
FROM CommunityUser_TotalFoot
```



```
SELECT COUNT(userID) AS "Total Users"
FROM CommunityUser_TotalFoot
```

Total Users
10

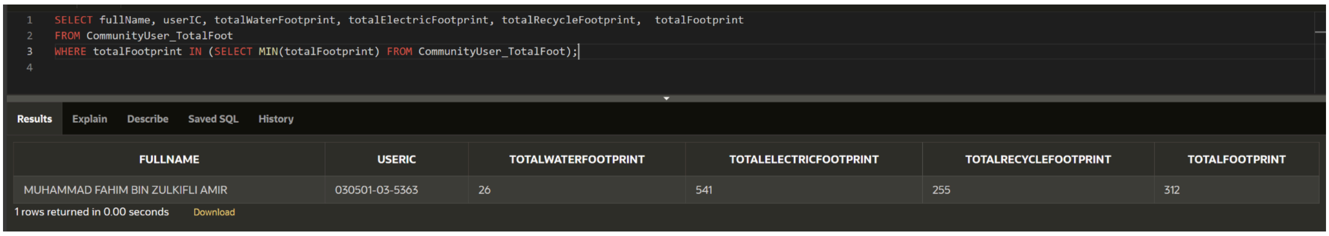
1 rows returned in 0.01 seconds

Figure 11: Query to display the total community users in the system

===

#These SQL statements will display the total footprint values as well as the monthly footprint values of the user with the lowest total footprint value.

```
SELECT fullName, userIC, totalWaterFootprint, totalElectricFootprint,
totalRecycleFootprint,  totalFootprint
FROM CommunityUser_TotalFoot
WHERE totalFootprint IN (SELECT MIN(totalFootprint) FROM
CommunityUser_TotalFoot);
```



```
SELECT fullName, userIC, totalWaterFootprint, totalElectricFootprint, totalRecycleFootprint,  totalFootprint
FROM CommunityUser_TotalFoot
WHERE totalFootprint IN (SELECT MIN(totalFootprint) FROM CommunityUser_TotalFoot);
```

FULLNAME	USERIC	TOTALWATERFOOTPRINT	TOTALELECTRICFOOTPRINT	TOTALRECYCLEFOOTPRINT	TOTALFOOTPRINT
MUHAMMAD FAHIM BIN ZULKIFLI AMIR	030501-03-5363	26	541	255	312

1 rows returned in 0.00 seconds

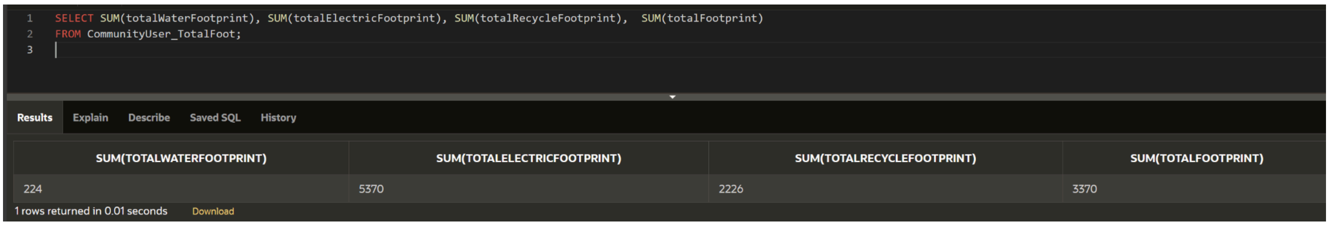
Figure 12: Query to display the total footprint values as well as the monthly footprint values of the user with the lowest total footprint value

```
SELECT Month, waterFootprint, electricFootprint, recycleFootprint,
monthlyTotalFootprint
FROM MonthlyFootprint
WHERE totalFootprint IN (SELECT MIN(totalFootprint) FROM
CommunityUser_TotalFoot)
AND Month = ‘Januari’;

SELECT Month, waterFootprint, electricFootprint, recycleFootprint,
monthlyTotalFootprint
FROM MonthlyFootprint
WHERE totalFootprint IN (SELECT MIN(totalFootprint) FROM
CommunityUser_TotalFoot)
AND Month = ‘Februari’;
```

===

#These SQL statements will display the total monthly footprints and total footprints of all users in total

```
SELECT SUM(totalWaterFootprint), SUM(totalElectricFootprint),
SUM(totalRecycleFootprint),  SUM(totalFootprint)
FROM CommunityUser_TotalFoot;
```



```
SELECT SUM(totalWaterFootprint), SUM(totalElectricFootprint), SUM(totalRecycleFootprint),  SUM(totalFootprint)
FROM CommunityUser_TotalFoot;
```

SUM(TOTALWATERFOOTPRINT)	SUM(TOTALELECTRICFOOTPRINT)	SUM(TOTALRECYCLEFOOTPRINT)	SUM(TOTALFOOTPRINT)
224	5370	2226	3370

1 rows returned in 0.01 seconds

Figure 13: Query to display the total monthly footprints and total footprints of all users in total

```
SELECT Month, SUM(waterFootprint), SUM(electricFootprint),
SUM(recycleFootprint), SUM(monthlyTotalFootprint)
FROM MonthlyFootprint
WHERE Month = ‘Januari’;

SELECT Month, SUM(waterFootprint), SUM(electricFootprint),
SUM(recycleFootprint), SUM(monthlyTotalFootprint)
FROM MonthlyFootprint
WHERE Month = ‘Februari’;
```

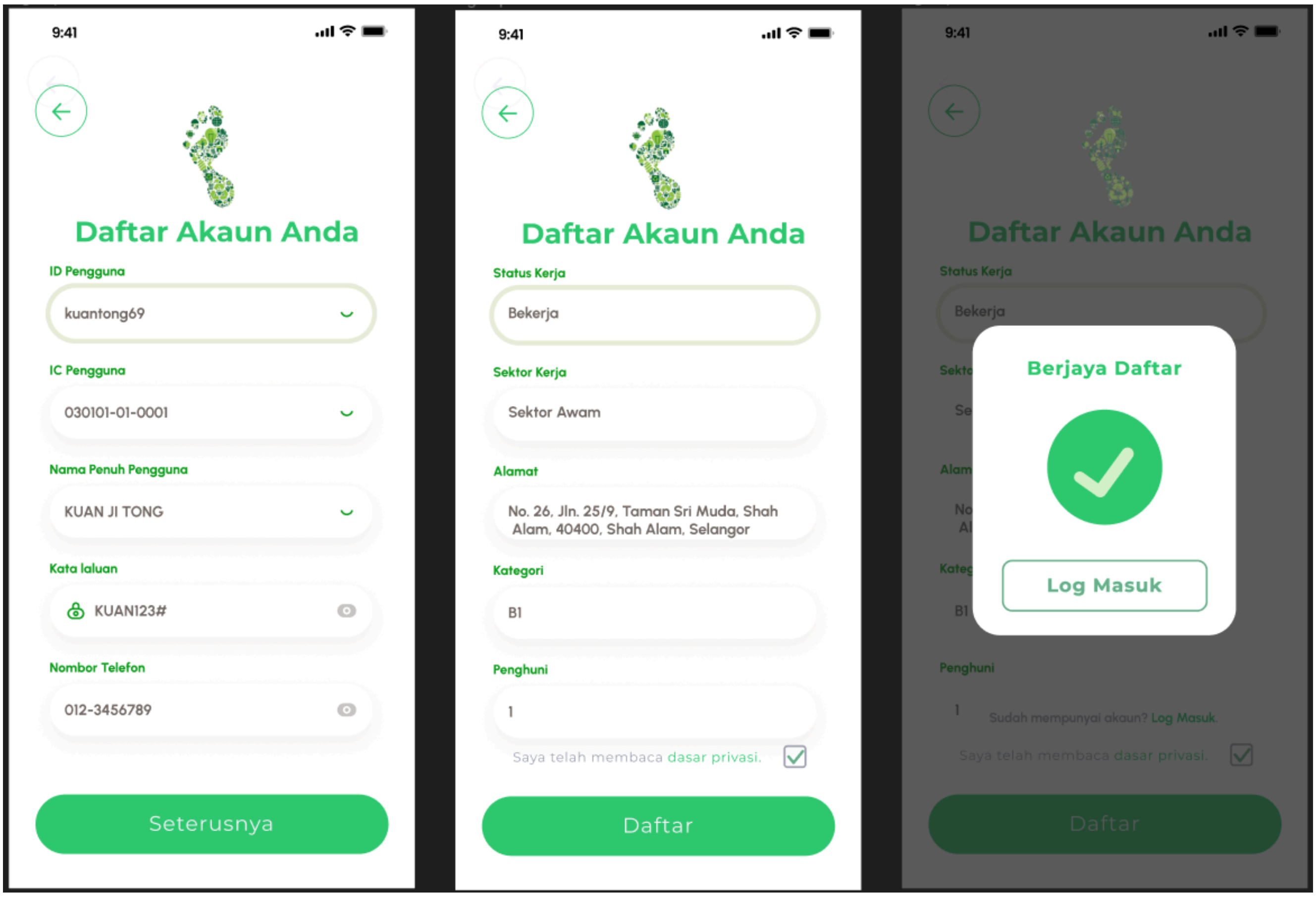
7.0 Summary

In this phase of the project, we did an extensive update on our system, solving the data management issues faced by the Iskandar Puteri Calendar Competition. We enhance some features like efficient carbon footprint calculations, registration and login processes, and monitoring dashboards. We update the business rules, conceptual ERD, logical ERD in the database conceptual design part, and the most important part is the normalization part which we achieved with the BCNF relations to ensure the database performance and organization.

To reduce the data redundancy, normalization methods are used in entities which are MonthDay,ElectricWaterConsumption, RecycleDetails, MonthlyFootprint, CommunityUser_TotalFoot and MBIP_AdminUser. The relational database schema provides a more clearer structure for data organisation, lowering the possibility of anomalies. Then, we translate the conceptual ERD into SQL statements (DDL & DML) to produce a more detailed system design. Lastly, this phase provides a structure for a more efficient and easily usable system, customized to fulfil the requirements for the Iskandar Puteri Calendar Competition and MBIP.

8.0 Interfaces

Register Community User



9:41

Daftar Akaun Anda

ID Pengguna: kuantong69

IC Pengguna: 030101-01-0001

Nama Penuh Pengguna: KUAN JI TONG

Kata laluan: KUAN123#

Nombor Telefon: 012-3456789

9:41

Daftar Akaun Anda

Status Kerja: Bekerja

Sektor Kerja: Sektor Awam

Alamat: No. 26, Jln. 25/9, Taman Sri Muda, Shah Alam, 40400, Shah Alam, Selangor

Kategori: B1

Penghuni: 1

Saya telah membaca dasar privasi. ☑

9:41

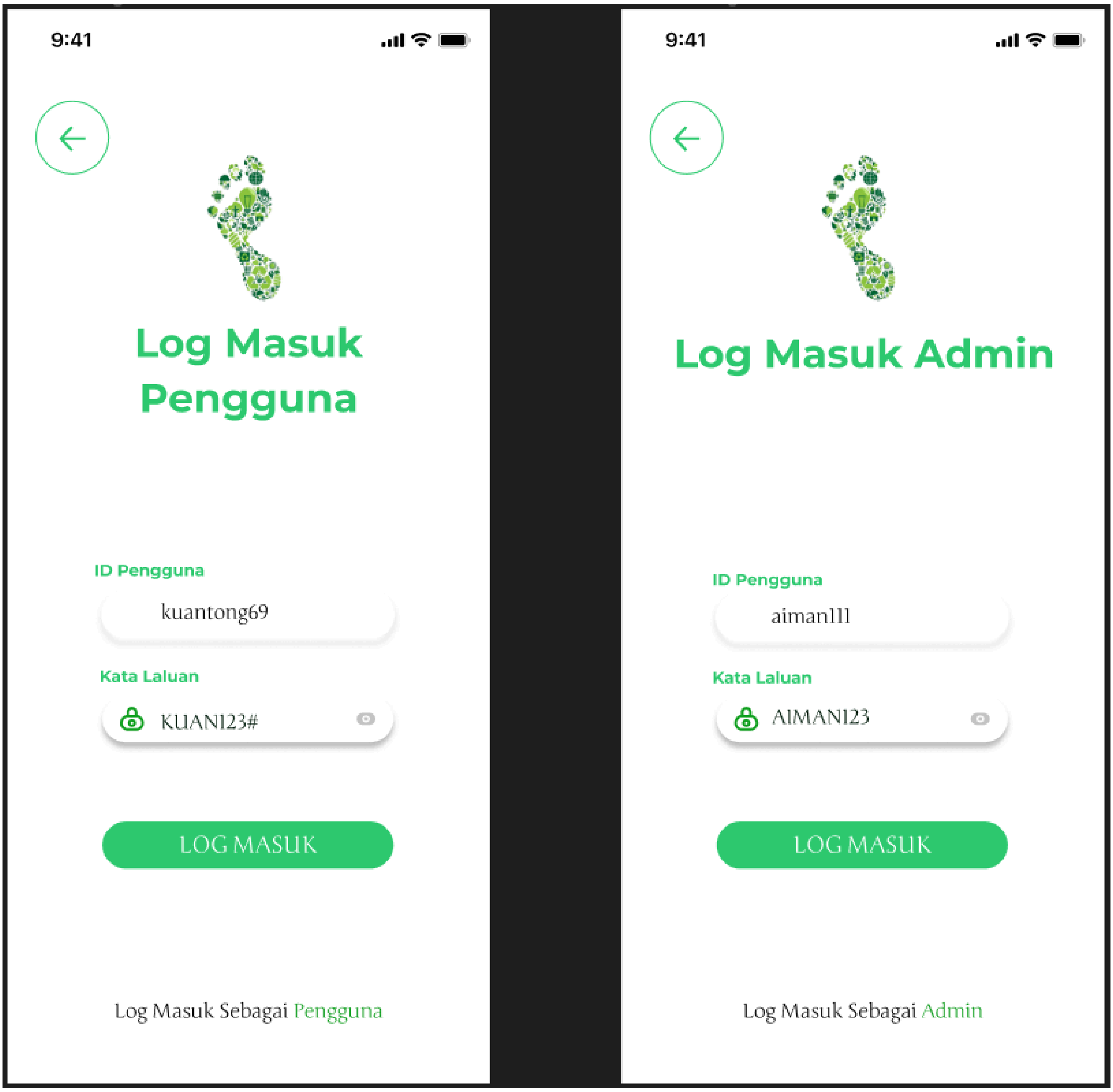
Daftar Akaun Anda

Berjaya Daftar

Sudah mempunyai akaun? Log Masuk.

Saya telah membaca dasar privasi. ☑

Log-in Community User and MBIP Admin



Log Masuk Pengguna

ID Pengguna: kuantong69

Kata Laluan: KUAN123#

Log Masuk Sebagai Pengguna

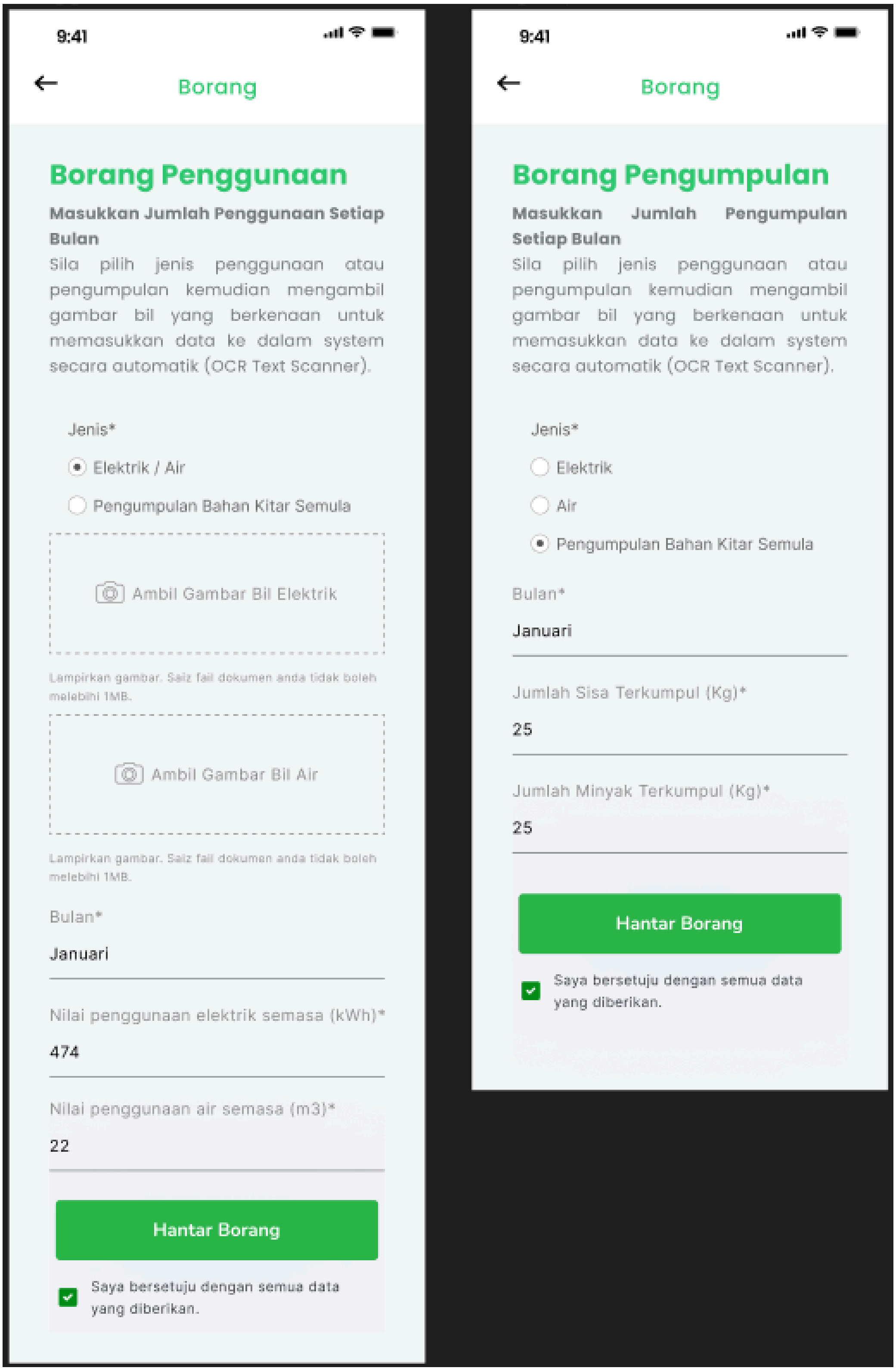
Log Masuk Admin

ID Pengguna: aiman111

Kata Laluan: AIMAN123

Log Masuk Sebagai Admin

Community user record consumption and recycle details



9:41

← Borang

Borang Penggunaan

Masukkan Jumlah Penggunaan Setiap Bulan

Sila pilih jenis penggunaan atau pengumpulan kemudian mengambil gambar bil yang berkenaan untuk memasukkan data ke dalam system secara automatik (OCR Text Scanner).

Jenis*

● Elektrik / Air

○ Pengumpulan Bahan Kitar Semula

Ambil Gambar Bil Elektrik

Lampirkan gambar. Saiz fail dokumen anda tidak boleh melebihi 1MB.

Ambil Gambar Bil Air

Lampirkan gambar. Saiz fail dokumen anda tidak boleh melebihi 1MB.

Bulan*: Januari

Nilai penggunaan elektrik semasa (kWh)*: 474

Nilai penggunaan air semasa (m3)*: 22

Hantar Borang

☑ Saya bersetuju dengan semua data yang diberikan.

9:41

← Borang

Borang Pengumpulan

Masukkan Jumlah Pengumpulan Setiap Bulan

Sila pilih jenis penggunaan atau pengumpulan kemudian mengambil gambar bil yang berkenaan untuk memasukkan data ke dalam system secara automatik (OCR Text Scanner).

Jenis*

○ Elektrik

○ Air

● Pengumpulan Bahan Kitar Semula

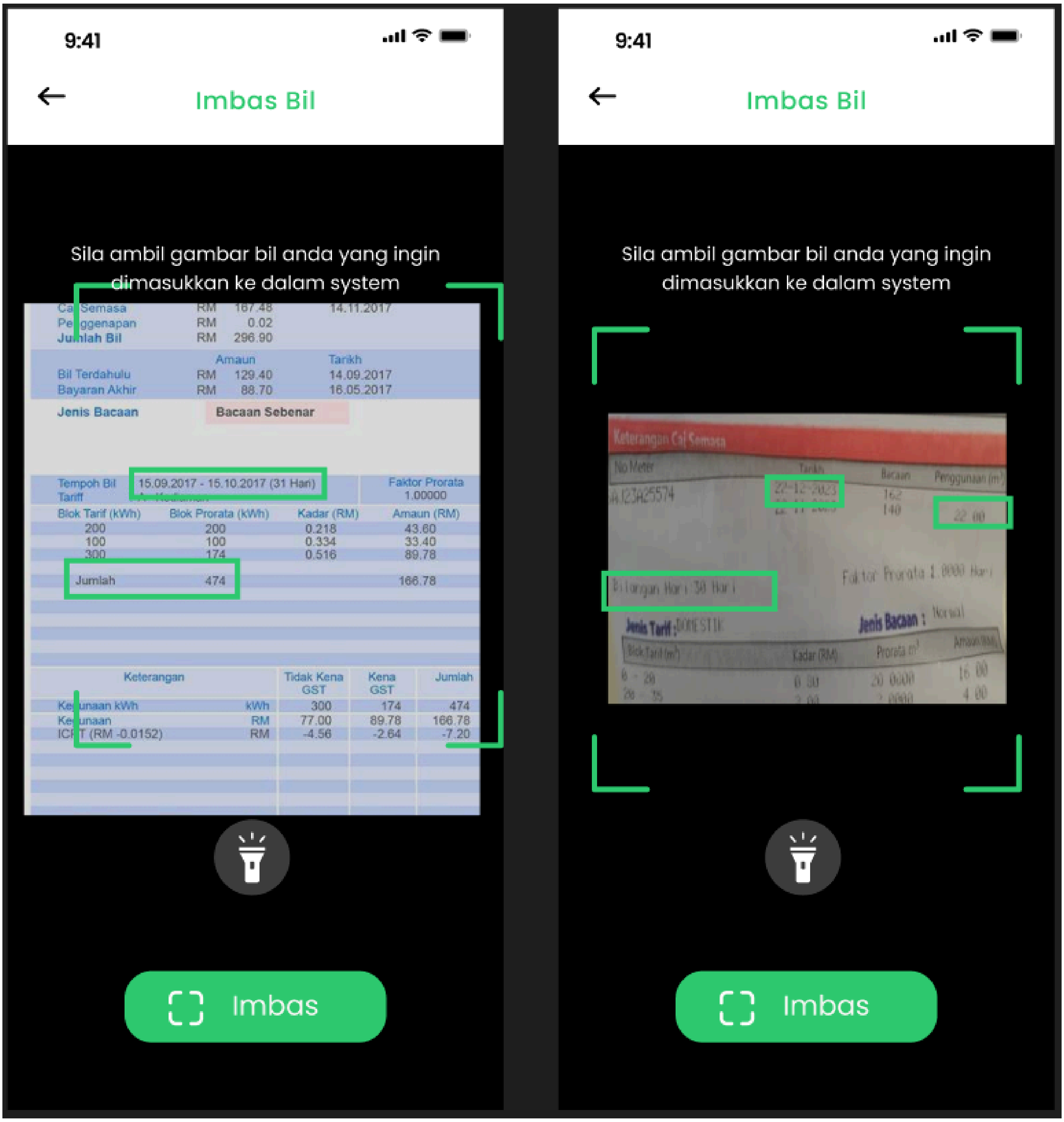
Bulan*: Januari

Jumlah Sisa Terkumpul (Kg)*: 25

Jumlah Minyak Terkumpul (Kg)*: 25

Hantar Borang

☑ Saya bersetuju dengan semua data yang diberikan.



Sila ambil gambar bil anda yang ingin dimasukkan ke dalam system

Ca Semasa	RM	167.48	14.11.2017
Pe ggenapan	RM	0.02	
Ju lah Bil	RM	296.90	
		Amaun	Tarikh
Bil Terdahulu	RM	129.40	14.09.2017
Bayaran Akhir	RM	88.70	16.05.2017

Jenis Bacaan — Bacaan Sebenar

Tempoh Bil 15.09.2017 - 15.10.2017 (31 Hari) — Faktor Prorata 1.00000

Tariff

Blok Tarif (kWh)	Blok Prorata (kWh)	Kadar (RM)	Amaun (RM)
200	200	0.218	43.60
100	100	0.334	33.40
300	174	0.516	89.78
Jumlah	474		166.78

Keterangan		Tidak Kena GST	Kena GST	Jumlah
Ke unaan kWh	kWh	300	174	474
Ke unaan	RM	77.00	89.78	166.78
IC T (RM -0.0152)	RM	-4.56	-2.64	-7.20

Sila ambil gambar bil anda yang ingin dimasukkan ke dalam system

Keterangan Caj Semasa

No Meter	Tarikh	Bacaan	Penggunaan (m³)
AJ23A25574	22-12-2023	162	
		140	22.00

Bilangan Hari : 30 Hari

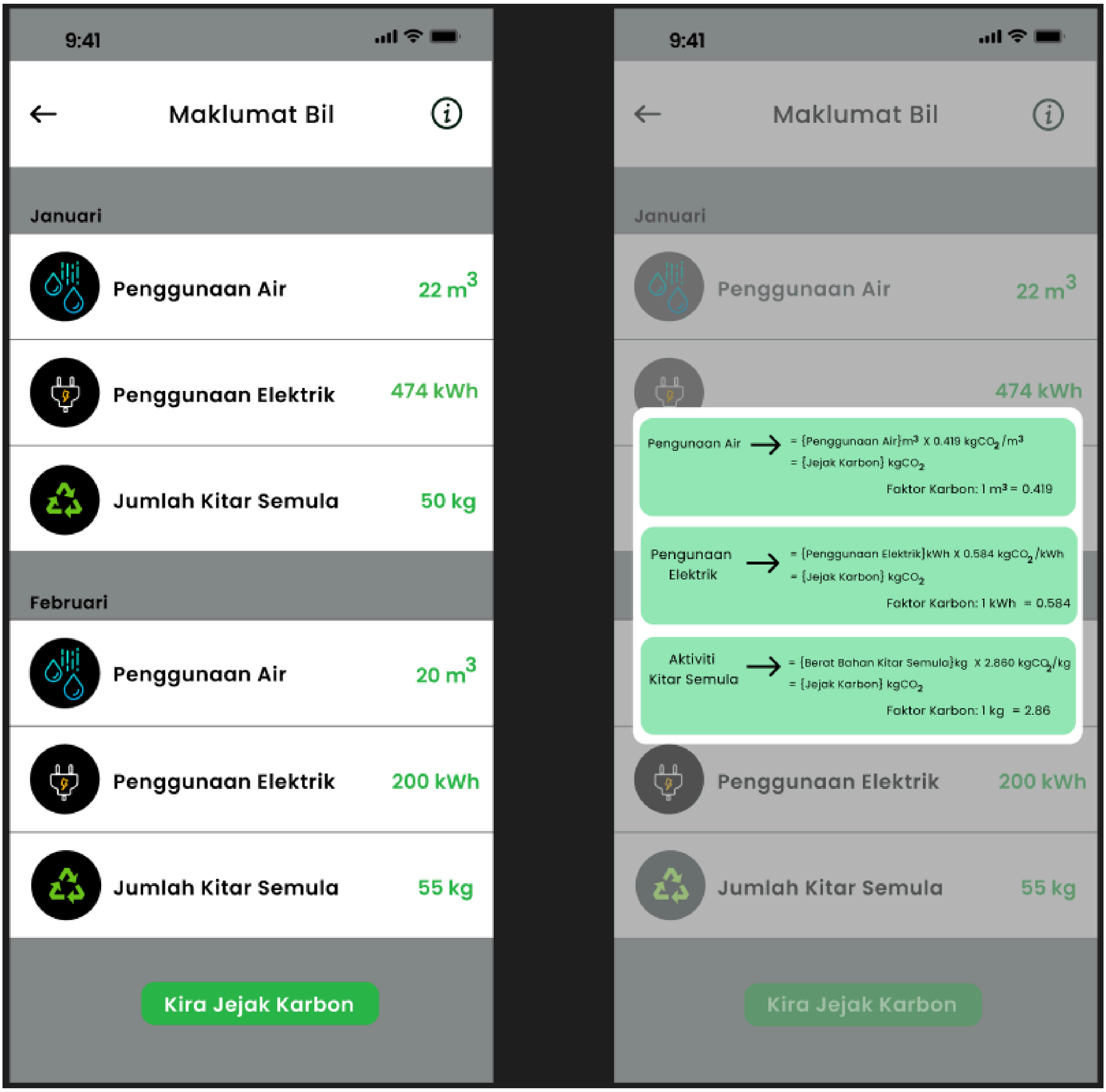
Faktor Prorata 1.0000 Hari

Jenis Tarif : DOMESTIK

Jenis Bacaan : Normal

Blok Tarif (m³)	Kadar (RM)	Prorata m³	Amaun (RM)
0 - 20	0.80	20.0000	16.00
20 - 35	2.00	2.0000	4.00

Calculate Carbon footprints for Community User using recorded consumption and recycle details



9:41

← Maklumat Bil ⓘ

Januari

Penggunaan Air	22 m^3
Penggunaan Elektrik	474 kWh
Jumlah Kitar Semula	50 kg

Februari

Penggunaan Air	20 m^3
Penggunaan Elektrik	200 kWh
Jumlah Kitar Semula	55 kg

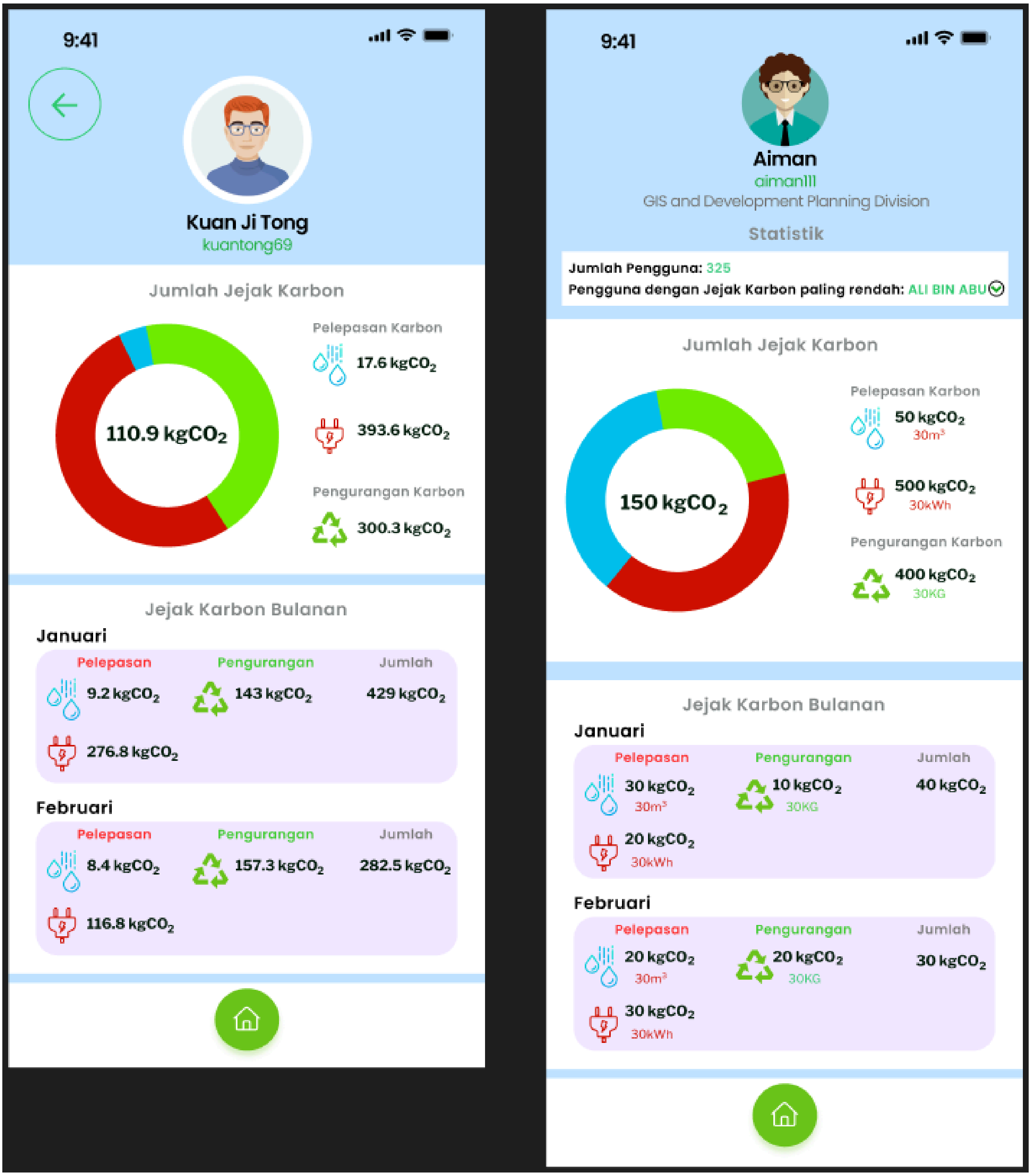
Kira Jejak Karbon

Pengunaan Air → = {Penggunaan Air}m^3 X 0.419 $kgCO_2/m^3$
= {Jejak Karbon} $kgCO_2$
Faktor Karbon: 1 m^3 = 0.419

Pengunaan Elektrik → = {Penggunaan Elektrik}kWh X 0.584 $kgCO_2$/kWh
= {Jejak Karbon} $kgCO_2$
Faktor Karbon: 1 kWh = 0.584

Aktiviti Kitar Semula → = {Berat Bahan Kitar Semula}kg X 2.860 $kgCO_2$/kg
= {Jejak Karbon} $kgCO_2$
Faktor Karbon: 1 kg = 2.86

Community User dashboard (Screen 1) and MBIP Admin dashboard (Screen 2 & 3)



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Kuan Ji Tong
kuantong69

Jumlah Jejak Karbon

110.9 kgCO$_2$

Pelepasan Karbon

17.6 kgCO$_2$

393.6 kgCO$_2$

Pengurangan Karbon

300.3 kgCO$_2$

Jejak Karbon Bulanan

Januari

Pelepasan	Pengurangan	Jumlah
9.2 kgCO$_2$	143 kgCO$_2$	429 kgCO$_2$
276.8 kgCO$_2$		

Februari

Pelepasan	Pengurangan	Jumlah
8.4 kgCO$_2$	157.3 kgCO$_2$	282.5 kgCO$_2$
116.8 kgCO$_2$		

9:41

Aiman
aiman111
GIS and Development Planning Division

Statistik

Jumlah Pengguna: 325
Pengguna dengan Jejak Karbon paling rendah: ALI BIN ABU

Jumlah Jejak Karbon

150 kgCO$_2$

Pelepasan Karbon

50 kgCO$_2$
30m^3

500 kgCO$_2$
30kWh

Pengurangan Karbon

400 kgCO$_2$
30KG

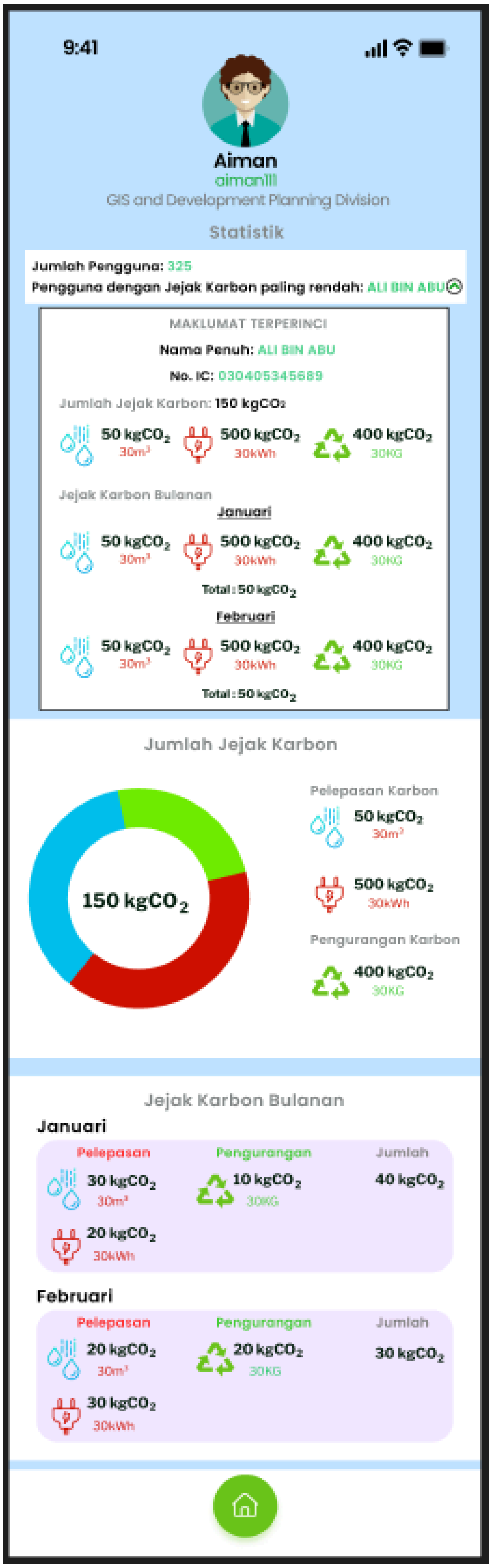
Jejak Karbon Bulanan

Januari

Pelepasan	Pengurangan	Jumlah
30 kgCO$_2$ 30m^3	10 kgCO$_2$ 30KG	40 kgCO$_2$
20 kgCO$_2$ 30kWh		

Februari

Pelepasan	Pengurangan	Jumlah
20 kgCO$_2$ 30m^3	20 kgCO$_2$ 30KG	30 kgCO$_2$
30 kgCO$_2$ 30kWh		



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Aiman

aiman111

GIS and Development Planning Division

Statistik

Jumlah Pengguna: 325

Pengguna dengan Jejak Karbon paling rendah: ALI BIN ABU

MAKLUMAT TERPERINCI

Nama Penuh: ALI BIN ABU

No. IC: 030405345689

Jumlah Jejak Karbon: **150 $kgCO_2$**

50 $kgCO_2$ 30m^3 | 500 $kgCO_2$ 30kWh | 400 $kgCO_2$ 30KG

Jejak Karbon Bulanan

Januari

50 $kgCO_2$ 30m^3 | 500 $kgCO_2$ 30kWh | 400 $kgCO_2$ 30KG

Total : 50 $kgCO_2$

Februari

50 $kgCO_2$ 30m^3 | 500 $kgCO_2$ 30kWh | 400 $kgCO_2$ 30KG

Total : 50 $kgCO_2$

Jumlah Jejak Karbon

Pelepasan Karbon

50 $kgCO_2$ 30m^3

500 $kgCO_2$ 30kWh

Pengurangan Karbon

400 $kgCO_2$ 30KG

Jejak Karbon Bulanan

Januari

Pelepasan	Pengurangan	Jumlah
30 $kgCO_2$ 30m^3 20 $kgCO_2$ 30kWh	10 $kgCO_2$ 30KG	40 $kgCO_2$

Februari

Pelepasan	Pengurangan	Jumlah
20 $kgCO_2$ 30m^3 30 $kgCO_2$ 30kWh	20 $kgCO_2$ 30KG	30 $kgCO_2$