



UTM

UNIVERSITI TEKNOLOGI MALAYSIA

Draft Phase 3 (P3) – Project Proposal & Database Requirement

SECD2523 DATABASE

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SECTION: 10

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1.0 Introduction

UTMSmart is an application provided by Universiti Teknologi Malaysia at no cost and is intended for use as is for students and staff. This application was created as part of UTM's digital campus lifestyle application to provide services that assist and simplify the needs of staff, students, and even general public users.

The UTMSmart problem statement will be explained in this project. Due to the separation of the current systems, there is a lack of controlled availability of essential services and problems. In order to enhance the campus experience and accelerate processes, a single digital platform is required. A multifunctional mobile application that combines several campus services into a single platform that aligns with current systems, addressing the problems identified in the problem statement. In addition, the information-gathering process will provide a detailed explanation of the methods used, involving interviews, questionnaires, and observations to identify the requirements and preferences of faculty, staff, and students. Important information was gathered in this part to guide the design and features of the application.

The current business process, functional requirements, non-functional requirements, and the logical DFD AS-IS system will then be provided in the requirement analysis (AS-IS analysis) section. The analysis of current student and staff workflows and systems, along with the definition of inputs, processes, and outputs required for the application, as well as its performance and control requirements to ensure the application's effectiveness and safety, are all covered in these subsections. The context diagrams and process flows in the logical DFD AS-IS System assist in visualizing the current scenario and developing the new system.

Lastly, this project will end with a summary of the requirement analysis process. This section will outline an extensive investigation of the processes currently in place and the needs of the users, defining both functional and non-functional requirements to make sure the application efficiently solves problems and improves the campus experience for all users.

2.0 Overview of Project

The UTMSmart application is enhanced with an entirely comprehensive database solution in the operation of major functions of university such as scheduling transportation, managing student profiles, saving data history of transactions, managing profiles, and registering attendance. As an user interface for management team, staff members, and students, the system makes sure that all important data is efficiently, safely, and easily maintained. UTMSmart was enhanced to increase the reliability of data, decrease manual errors, and optimize overall operational efficiency by optimizing these processes.

In phase 3, our group will focus on improving the logical database design for the purpose to ensure the data integrity and remove redundancy by normalizing the data. A structured approach for reorganizing the database tables is implemented in this phase, it relies on the conceptual design and Entity Relationship Diagram (ERD) from Phase 2. The database structure is optimized through the use of normalization approaches, such as First Normal Form (1NF), Second Normal Form (2NF), and Third Normal Form (3NF). This procedure ensures that there are no errors in the database and that all data entities remain reliable.

The Phase 2 data dictionary is also updated to take into consideration the modifications that are caused by normalization. In keeping with the improved logical design, the updated data dictionary provides an easily understood and comprehensive description of every table, attribute, and relationship in the database. The outcomes of this phase includes the finalized relational database schemas, which provide the framework for system implementation.

This phase also contains Structured Query Language (SQL) statements for both Data Definition Language (DDL) and Data Manipulation Language (DML) to show that the UTMSmart application is ready for implementation. While the DML commands are used to add, edit, and query data inside the database, the DDL statements provide the database structure, including tables and relationships. When all taken together, these deliverables will ensure the system is reliable, effective, and fully ready for operation.

Phase 3 completed results in a structured and efficient database design for the UTMSmart application. This phase is a critical role in preparing the system for actual deployment and

ensuring it to achieve the functional and performance requirements specified in the previous phases of this project.

3.0 Database conceptual design

3.1 Updated business rule

UTM Students

- Students can zoom in on and scan the QR codes for attendance purposes.
- QR codes must be successfully scanned from camera or gallery to record attendance.
- Students can track bus locations, availability, and schedules through UTMSmart.
- Students can check their current total merit through the system.
- Students can make online transactions for fees through the system.

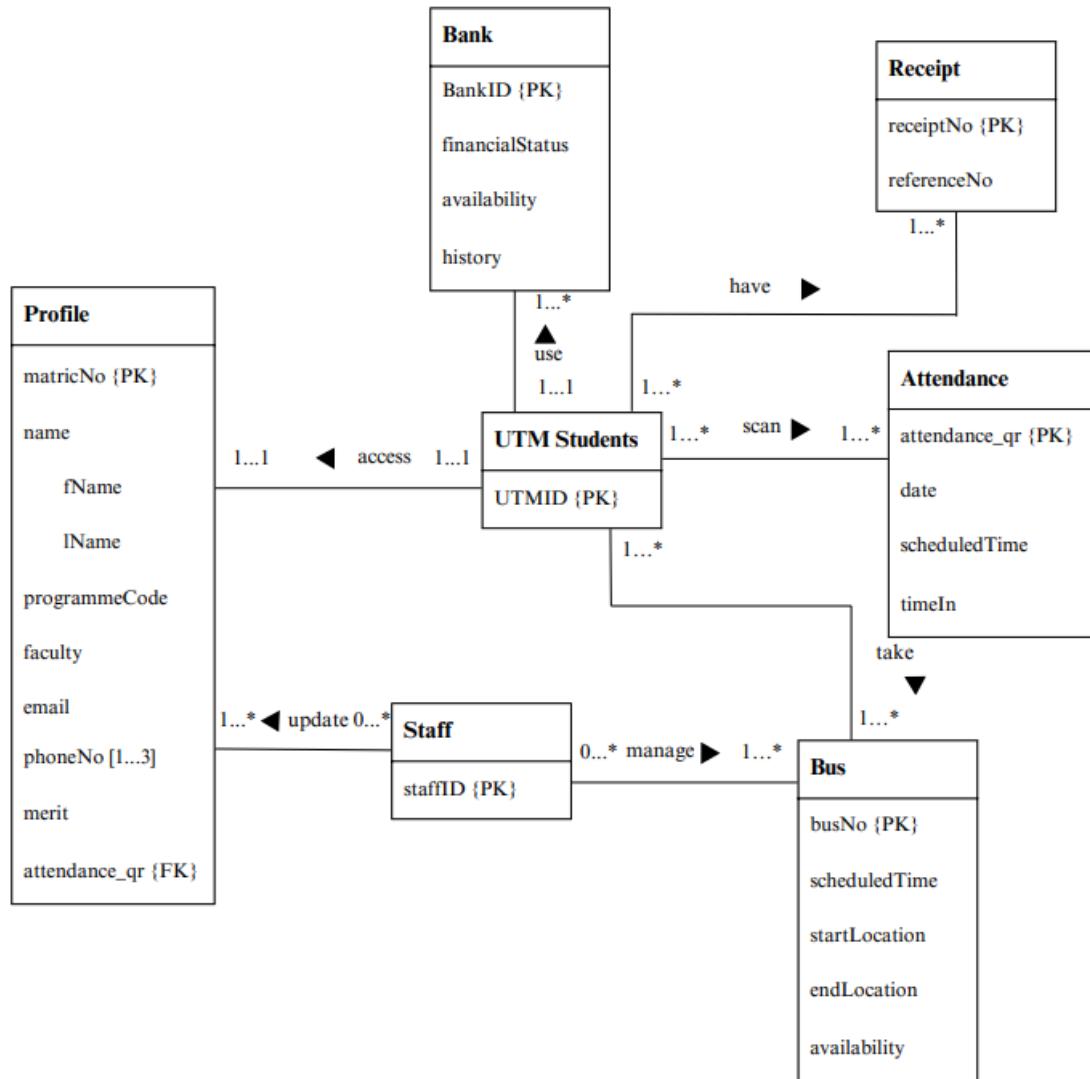
Bus

- Provide updated live location data to UTMSmart regularly while active.
- Share latest availability information with the system to ensure students receive updated schedules.
- Bus information, such as route and timing must be maintained and synced with UTMSmart.

Bank

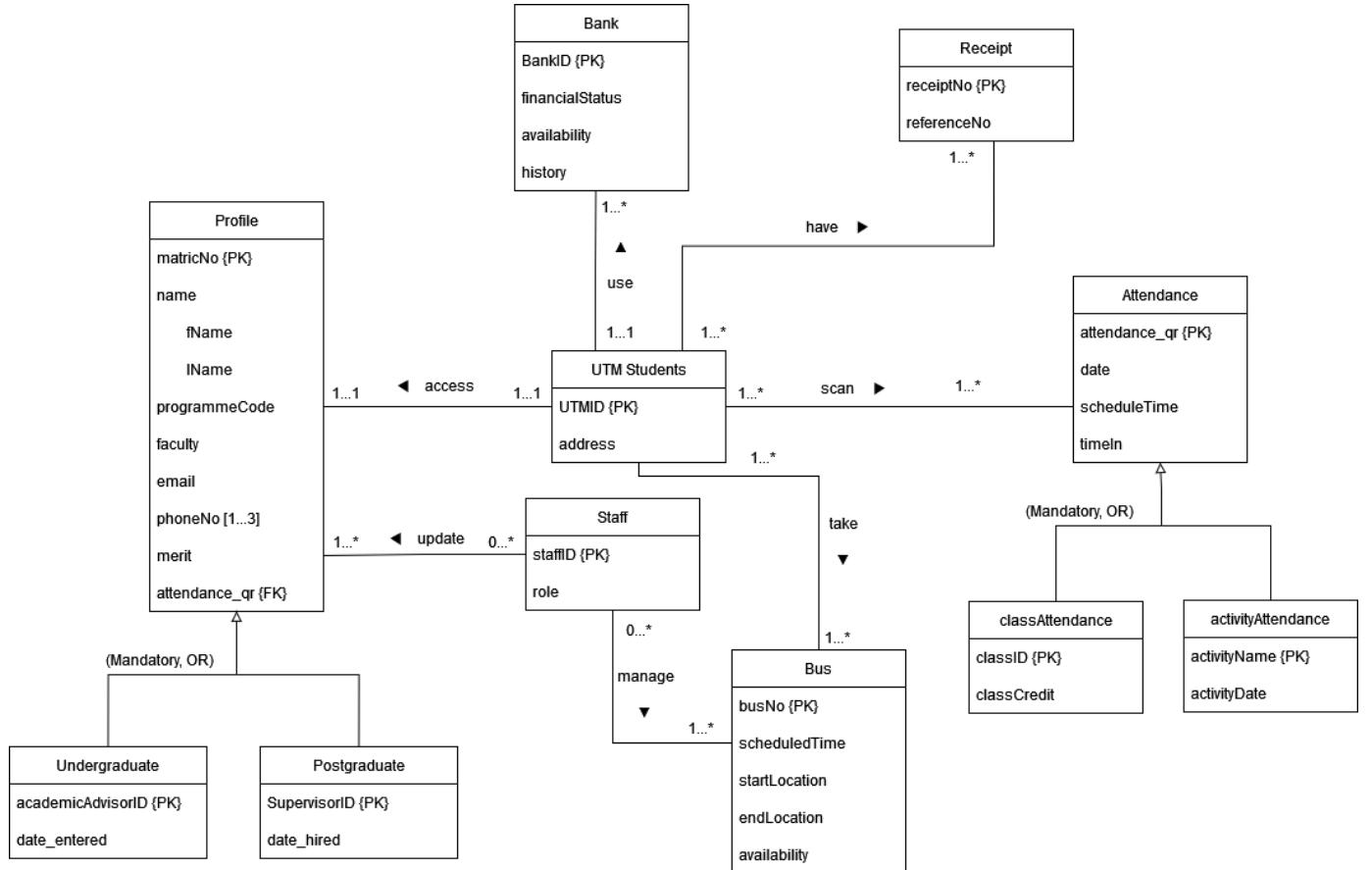
- Receive payment details from the system.
- Return a receipt to the UTMSmart system for completed transactions.

3.2 Conceptual ERD



4.0 DB logical design

4.1 Logical ERD



4.2 Updated Data Dictionary

Description of Entity

Entity	Description	Occurrence
UTM Students	UTMStudents' information	UTMStudents access profiles and use a bank to have receipts. UTMStudents can also scan attendance and take bus
Staff	Staff's information	Staff update profile and manage bus
Profile	Profile's information	Profile will be access by UTMStudents and updated by Staff
Bank	Bank's information	Bank will be use by UTMStudents
Bus	Buses information	Bus be taken by UTMStudents and managed by staff
Attendance	Attendance's information	Attendance is scan by UTMStudents
Receipt	Receipt's information	Receipt is get by UTMStudents
ClassAttendance	Attendance specific to academic classes or lectures.	ClassAttendance is recorded under attendance for UTMStudents
ActivityAttendance	Attendance specific to extra curricular activities or events.	ActivityAttendance is recorded under attendance for UTMStudents
Undergraduate	Undergraduate student information and their assigned academic advisors.	Undergraduate profiles are categorized under Profile for UTMStudents
Postgraduate	Postgraduate student	Postgraduate profiles are categorized

	information and their assigned supervisors.	under Profile for UTMStudents
--	---	-------------------------------

Description of Relationship (add eerd 的进来)

Entity	Multiplicity	Relationship	Multiplicity	Entity
UTM Students	1...*	Scan	1...*	Attendance
	1...*	Take	1...*	Bus
	1...1	Access	1...1	Profile
	1...1	Use	1...*	Bank
	1...*	Have	1...1	Receipt
Staff	0...*	Update	1...*	Profile
	0...*	Manage	1...*	Bus

Description Attributes

Entity	Attributes	Description	Data Type	Null	Multi-Valued
Profile	matricNo (PK)	Uniquely identifies a student profile.	VARCHAR (10)	No	No
	name	Full name of the student.	VARCHAR (50)	Yes	No
	fName	First name of the student.	VARCHAR (30)	Yes	No
	lName	Last name of the student.	VARCHAR (30)	Yes	No
	programmeCode	Code of the student's programme.	VARCHAR (15)	Yes	No
	faculty	Faculty of the student.	VARCHAR (50)	Yes	No
	email	Email address of the student.	VARCHAR (50)	Yes	No
	phoneNo [1...3]	Contact numbers of the student.	VARCHAR (13)	Yes	Yes
	merit	Merit points of the student.	INT	Yes	No
	attendance_qr (FK)	Foreign key	VARCHAR	Yes	No

		linking to attendance details.	(20)		
Undergraduate	academicAdvisorID (PK)	Unique identifies the academic advisor.	VARCHAR (10)	No	No
	date_entered	The date of entering university.	DATE	Yes	No
Postgraduate	SupervisorID (PK)	Unique identifies the supervisor.	VARCHAR (10)	No	No
	date_hired	Date that supervisor starts their work.	DATE	Yes	No
UTM Students	UTMID (PK)	Uniquely identifies a UTM student.	VARCHAR (10)	No	No
	address	Unique identifies the address of the student.	VARCHAR (80)	Yes	No
Bank	BankID (PK)	Uniquely identifies a bank.	VARCHAR (10)	No	No
	financialStatus	Financial status of the bank.	VARCHAR (20)	Yes	No
	availability	Availability	VARCHAR	Yes	No

		status of the bank.	(20)		
	history	Transaction history of the bank.	TEXT	Yes	No
Receipt	receiptNo (PK)	Uniquely identifies a receipt.	VARCHAR (10)	No	No
	referenceNo	Reference number of the receipt.	VARCHAR (30)	Yes	No
Attendance	attendance_qr (PK)	Uniquely identifies an attendance QR code.	VARCHAR (20)	No	No
	date	Date of attendance.	DATE	Yes	No
	scheduledTime	Scheduled time for attendance.	TIMESTAMP	Yes	No
	timeIn	Check-in time for attendance.	TIMESTAMP	Yes	No
classAttendance	classID (PK)	Unique identifies a class.	VARCHAR (50)	No	No
	classCredit	Credit hours of a course.	INT	Yes	No

activityAttendance	activityName (PK)	Unique identifies an activity.	VARCHAR (50)	No	No
	activityDate	Date of the activity.	DATE	Yes	No
Bus	busNo (PK)	Uniquely identifies a bus.	VARCHAR (10)	No	No
	scheduledTime	Scheduled time of the bus.	TIMESTAMP	Yes	No
	startLocation	Starting location of the bus.	VARCHAR (50)	Yes	No
	endLocation	Ending location of the bus.	VARCHAR (50)	Yes	No
	availability	Availability status of the bus.	VARCHAR (20)	Yes	No
Staff	staffID (PK)	Uniquely identifies a staff member.	VARCHAR (10)	No	No
	role	Position of the staff.	VARCHAR (50)	Yes	No

4.3 Normalization

1. PROFILE (matricNo, fName, lName, programmeCode, faculty, email, phoneNo, merit, attendance_qr)

fd1: matricNo → fName, lName, programmeCode, faculty, email, phoneNo, merit, attendance_qr

1NF&2NF&3NF&BNCF:

PROFILE (matricNo, fName, lName, programmeCode, faculty, email, phoneNo, merit, attendance_qr)

2. UNDERGRADUATE (AcademicAdvisorID, date_entered)

fd1: AcademicAdvisorID → date_entered

1NF&2NF&3NF&BNCF:

UNDERGRADUATE (AcademicAdvisorID, date_entered)

3. POSTGRADUATE (SupervisorID, date_hired)

fd1: SupervisorID → date_hired

1NF&2NF&3NF&BNCF:

POSTGRADUATE (SupervisorID, date_hired)

4. UTMSTUDENTS (UTMID, address)

fd1: UTMID → address

1NF&2NF&3NF&BNCF:

UTMSTUDENTS (UTMID, address)

5. STAFF (staffID, role)

fd1: staffID → role

1NF&2NF&3NF&BCNF:

STAFF (staffID, role)

6. BANK (BankID, financialStatus, availability, history)

fd1: BankID → financialStatus, availability, history

1NF&2NF&3NF&BCNF:

BANK (BankID, financialStatus, availability, history)

7. BUS (busNo, scheduledTime, startLocation, endLocation, availability)

fd1: busNo → scheduledTime, startLocation, endLocation, availability

1NF&2NF&3NF&BCNF:

BUS (busNo, scheduledTime, startLocation, endLocation, availability)

8. ATTENDANCE (attendance_qr, date, scheduleTime, timeIn)

fd1: attendance_qr → date, scheduleTime, timeIn

1NF&2NF&3NF&BCNF:

ATTENDANCE (attendance_qr, date, scheduleTime, timeIn)

9. CLASSATTENDANCE (ClassID, classCredit)

fd1: ClassID → classCredit

1NF&2NF&3NF&BCNF:

CLASSATTENDANCE (ClassID, classCredit)

10. ACTIVITYATTENDANCE (ActivityName, activityDate)

fd1: ActivityName → activityDate

1NF&2NF&3NF&BCNF:

ACTIVITYATTENDANCE (ActivityName, activityDate)

11. RECEIPT (receiptNo, referenceNo)

fd1: receiptNo → referenceNo

1NF&2NF&3NF&BCNF:

RECEIPT (receiptNo, referenceNo)

5.0 Relational DB Schemas (after normalization)

The relational database schema for UTMSmart database is a set of relation schema that consist of:

Profile (matricNo, fName, lName, programmeCode, faculty, email, phoneNo, merit, *attendance_qr*)

Undergraduate (AcademicAdvisorID, date_entered)

Postgraduate (SupervisorID, date_hired)

UTMStudents (UTMID, address)

Staff (staffID, role)

Bank (BankID, financialStatus, availability, history)

Bus (busNo, scheduledTime, startLocation, endLocation, availability)

Attendance (attendance_qr, date, scheduleTime, timeIn)

classAttendance (ClassID, classCredit)

activityAttendance (ActivityName, activityDate)

Receipt

(receiptNo, referenceNo)

6.0 SQL Statements (DDL & DML)

6.1 DDL

```
CREATE TABLE Profile (
    matricNo VARCHAR(15),
    fName VARCHAR(30),
    lName VARCHAR(30),
    programmeCode VARCHAR(10),
    faculty VARCHAR(50),
    email VARCHAR(50),
    phoneNo VARCHAR(13),
    merit INT,
    attendance_qr VARCHAR(15),
    CONSTRAINT pk_matricNo PRIMARY KEY (matricNo),
    CONSTRAINT fk_attendanceqr FOREIGN KEY(attendance_qr) REFERENCES
    Attendance(attendance_qr)
);
```

```
CREATE TABLE Undergraduate(
    date_entered DATE,
    CONSTRAINT pk_academicAdvisorID PRIMARY KEY (academicAdvisorID)
);
```

```
CREATE TABLE Postgraduate(
    data_hired DATE,
    CONSTRAINT pk_supervisorID PRIMARY KEY (supervisorID)
);
```

```
CREATE TABLE UTMStudents(
    Address VARCHAR(80),
    CONSTRAINT pk_UTMID PRIMARY KEY (UTMID)
```

);

```
CREATE TABLE Bank (
    financialStatus VARCHAR(20),
    availability VARCHAR(20),
    history TEXT,
    CONSTRAINT pk_BankID PRIMARY KEY (BankID)
);
```

```
CREATE TABLE Receipt (
    receiptNo VARCHAR(15),
    referenceNo VARCHAR(20),
    CONSTRAINT pk_receiptNo PRIMARY KEY (receiptNo)
);
```

```
CREATE TABLE Attendance (
    attendance_qr VARCHAR(15),
    date DATE,
    scheduledTime TIMESTAMP,
    timeIn TIMESTAMP,
    CONSTRAINT pk_attendanceqr PRIMARY KEY (attendance_qr)
);
```

```
CREATE TABLE classAttendance (
    classCredit INT,
    CONSTRAINT pk_classID PRIMARY KEY (classID)
);
```

```
CREATE TABLE activityAttendance(
    activityDate DATE,
```

```
        CONSTRAINT pk_classID PRIMARY KEY (activityName)
);

```

```
CREATE TABLE Bus (
    scheduledTime TIMESTAMP,
    startLocation VARCHAR(50),
    endLocation VARCHAR(50),
    availability VARCHAR(20),
    CONSTRAINT pk_busNo PRIMARY KEY (busNo)
);

```

```
CREATE TABLE Staff(
    role VARCHAR(50),
    CONSTRAINT pk_staffID PRIMARY KEY (staffID)
);

```

```
ALTER TABLE "UTMStudents" RENAME TO "Students";
```

```
ALTER TABLE "Profile"
MODIFY programmeCode VARCHAR(15);
```

```
ALTER TABLE "Receipt"
MODIFY referenceNo VARCHAR(30);
```

6.2 DML

Profile Records

```
INSERT INTO Profile (matricNo, fName, lName, programmeCode, faculty, email, phoneNo, merit, attendance_qr)
```

```
VALUES ('A23CS0010', 'Ahmad', 'Razak', 'CS001', 'Computing',  
'ahmad.razak@graduate.utm.my', '0123456781', 85, 'QR001');
```

```
INSERT INTO Profile (matricNo, fName, lName, programmeCode, faculty, email, phoneNo, merit, attendance_qr)
```

```
VALUES ('A23KM0020', 'Nur', 'Aisyah', 'KM002', 'Mechanical Engineering',  
'nur.aisyah@graduate.utm.my', '0123456782', 88, 'QR002');
```

```
INSERT INTO Profile (matricNo, fName, lName, programmeCode, faculty, email, phoneNo, merit, attendance_qr)
```

```
VALUES ('A23KE0030', 'Lim', 'Wei Hong', 'KE003', 'Electrical Engineering',  
'lim.weihong@graduate.utm.my', '0123456783', 90, 'QR003');
```

```
INSERT INTO Profile (matricNo, fName, lName, programmeCode, faculty, email, phoneNo, merit, attendance_qr)
```

```
VALUES ('A23CS0040', 'Tan', 'Siew Ling', 'CS004', 'Computing',  
'tan.siewling@graduate.utm.my', '0123456784', 78, 'QR004');
```

```
INSERT INTO Profile (matricNo, fName, lName, programmeCode, faculty, email, phoneNo, merit, attendance_qr)
```

```
VALUES ('A23KM0050', 'Rajesh', 'Kumar', 'KM005', 'Mechanical Engineering',  
'rajesh.kumar@graduate.utm.my', '0123456785', 92, 'QR005');
```

```
INSERT INTO Profile (matricNo, fName, lName, programmeCode, faculty, email, phoneNo, merit, attendance_qr)
```

```
VALUES ('A23KE0060', 'Aina', 'Zainal', 'KE006', 'Electrical Engineering',  
'aina.zainal@graduate.utm.my', '0123456786', 89, 'QR006');
```

```
INSERT INTO Profile (matricNo, fName, lName, programmeCode, faculty, email, phoneNo, merit, attendance_qr)
```

```
VALUES ('A23KT0070', 'Mohd', 'Hakim', 'KT007', 'Chemical Engineering',  
'mohd.hakim@graduate.utm.my', '0123456787', 84, 'QR007');
```

```
INSERT INTO Profile (matricNo, fName, lName, programmeCode, faculty, email, phoneNo, merit, attendance_qr)
```

```
VALUES ('A23CS0080', 'Chong', 'Li Mei', 'CS008', 'Computing',  
'chong.limei@graduate.utm.my', '0123456788', 95, 'QR008');
```

Attendance

```
INSERT INTO Attendance (attendance_qr, date, scheduledTime, timeIn)
```

```
VALUES ('QR001', '2025-01-01', '2025-01-01 08:00:00', '2025-01-01 08:05:00');
```

```
INSERT INTO Attendance (attendance_qr, date, scheduledTime, timeIn)
```

```
VALUES ('QR002', '2025-01-01', '2025-01-01 09:00:00', '2025-01-01 09:10:00');
```

```
INSERT INTO Attendance (attendance_qr, date, scheduledTime, timeIn)
```

```
VALUES ('QR003', '2025-01-01', '2025-01-01 10:00:00', '2025-01-01 10:15:00');
```

```
INSERT INTO Attendance (attendance_qr, date, scheduledTime, timeIn)
```

```
VALUES ('QR004', '2025-01-01', '2025-01-01 11:00:00', '2025-01-01 11:05:00');
```

```
INSERT INTO Attendance (attendance_qr, date, scheduledTime, timeIn)
```

```
VALUES ('QR005', '2025-01-01', '2025-01-01 12:00:00', '2025-01-01 12:10:00');
```

```
INSERT INTO Attendance (attendance_qr, date, scheduledTime, timeIn)
```

```
VALUES ('QR006', '2025-01-01', '2025-01-01 13:00:00', '2025-01-01 13:05:00');
```

```
INSERT INTO Attendance (attendance_qr, date, scheduledTime, timeIn)
```

```
VALUES ('QR007', '2025-01-01', '2025-01-01 14:00:00', '2025-01-01 14:10:00');
```

```
INSERT INTO Attendance (attendance_qr, date, scheduledTime, timeIn)
VALUES ('QR008', '2025-01-01', '2025-01-01 15:00:00', '2025-01-01 15:15:00');
```

Bank Records

```
INSERT INTO Bank (BankID, financialStatus, availability, history)
VALUES ('B001', 'Active', 'Available', 'No outstanding balance.');
```

```
INSERT INTO Bank (BankID, financialStatus, availability, history)
VALUES ('B002', 'Inactive', 'Unavailable', 'Account closed.');
```

```
INSERT INTO Bank (BankID, financialStatus, availability, history)
VALUES ('B003', 'Active', 'Available', 'Overdue payment.');
```

Bus Records

```
INSERT INTO Bus (busNo, scheduledTime, startLocation, endLocation, availability)
VALUES ('BUS001', '2025-01-01 07:30:00', 'Center Point', 'Kolej Perdana', 'Available');
```

```
INSERT INTO Bus (busNo, scheduledTime, startLocation, endLocation, availability)
VALUES ('BUS002', '2025-01-01 08:00:00', 'Kolej 9', 'Center Point', 'Unavailable');
```

```
INSERT INTO Bus (busNo, scheduledTime, startLocation, endLocation, availability)
VALUES ('BUS003', '2025-01-02 10:00:00', 'Center Point', 'Kolej Tun Razak', 'Available');
```

Receipt

```
INSERT INTO Receipt (receiptNo, referenceNo)
VALUES ('REC001', 'REF2025001');
```

```
INSERT INTO Receipt (receiptNo, referenceNo)
VALUES ('REC002', 'REF2025002');
```

```
INSERT INTO Receipt (receiptNo, referenceNo)
VALUES ('REC003', 'REF2025003');
```

View All Profiles

SELECT * FROM Profile;

matricNo	fName	lName	programmeCode	faculty	email	phoneNo	merit	attendance_qr
A23CS0010	Ahmad	Razak	CS001	Computing	ahmad.razak@graduate.utm.my	0123456781	85	QR001
A23CS0040	Tan	Siew Ling	CS004	Computing	tan.siewling@graduate.utm.my	0123456784	78	QR004
A23CS0080	Chong	Li Mei	CS008	Computing	chong.limei@graduate.utm.my	0123456788	95	QR008
A23KE0030	Lim	Wei Hong	KE003	Electrical Engineering	lim.weihong@graduate.utm.my	0123456783	90	QR003
A23KE0060	Aina	Zainal	KE006	Electrical Engineering	aina.zainal@graduate.utm.my	0123456786	89	QR006
A23KM0020	Nur	Aisyah	KM002	Mechanical Engineering	nur.aisyah@graduate.utm.my	0123456782	88	QR002
A23KM0050	Rajesh	Kumar	KM005	Mechanical Engineering	rajesh.kumar@graduate.utm.my	0123456785	92	QR005
A23KT0070	Mohd	Hakim	KT007	Chemical Engineering	mohd.hakim@graduate.utm.my	0123456787	84	QR007

Diagram 6.2.1 Output for Profile Table

View Profiles of Students from Faculty of Computing

SELECT * FROM Profile

WHERE faculty = 'Computing';

matricNo	fName	lName	programmeCode	faculty	email	phoneNo	merit	attendance_qr
A23CS0010	Ahmad	Razak	CS001	Computing	ahmad.razak@graduate.utm.my	0123456781	85	QR001
A23CS0040	Tan	Siew Ling	CS004	Computing	tan.siewling@graduate.utm.my	0123456784	78	QR004
A23CS0080	Chong	Li Mei	CS008	Computing	chong.limei@graduate.utm.my	0123456788	95	QR008

Diagram 6.2.2 Output for Students from Faculty of Computing

Delete A Student's Profile

DELETE FROM Profile

WHERE matricNo = 'A23KT0070';

```
mysql> DELETE FROM Profile
-> WHERE matricNo = 'A23KT0070';
Query OK, 1 row affected (0.03 sec)

mysql> SELECT * FROM Profile;
+-----+-----+-----+-----+-----+-----+-----+-----+
| matricNo | fName | lName | programmeCode | faculty | email | phoneNo | merit | atten
dance_qr |
+-----+-----+-----+-----+-----+-----+-----+-----+
| A23CS0010 | Ahmad | Razak | CS001 | Computing | ahmad.razak@graduate.utm.my | 0123456781 | 85 | QR001
| A23CS0040 | Tan | Siew Ling | CS004 | Computing | tan.siewling@graduate.utm.my | 0123456784 | 78 | QR004
| A23CS0080 | Chong | Li Mei | CS008 | Computing | chong.limei@graduate.utm.my | 0123456788 | 95 | QR008
| A23KE0030 | Lim | Wei Hong | KE003 | Electrical Engineering | lim.weihong@graduate.utm.my | 0123456783 | 90 | QR003
| A23KE0060 | Aina | Zainal | KE006 | Electrical Engineering | aina.zainal@graduate.utm.my | 0123456786 | 89 | QR006
| A23KM0020 | Nur | Aisyah | KM002 | Mechanical Engineering | nur.aisyah@graduate.utm.my | 0123456782 | 88 | QR002
| A23KM0050 | Rajesh | Kumar | KM005 | Mechanical Engineering | rajesh.kumar@graduate.utm.my | 0123456785 | 92 | QR005
+-----+-----+-----+-----+-----+-----+-----+-----+
```

Diagram 6.2.3 Output After Deleting Profile

Order Students by Merit Marks with Selected Columns

SELECT matricNo, fname, lname, merit FROM Profile

ORDER BY merit ASC;

```
mysql> SELECT matricNo, fname, lname, merit FROM Profile
-> ORDER BY merit ASC;
+-----+-----+-----+-----+
| matricNo | fname | lname | merit |
+-----+-----+-----+-----+
| A23CS0040 | Tan | Siew Ling | 78 |
| A23CS0010 | Ahmad | Razak | 85 |
| A23KM0020 | Nur | Aisyah | 88 |
| A23KE0060 | Aina | Zainal | 89 |
| A23KE0030 | Lim | Wei Hong | 90 |
| A23KM0050 | Rajesh | Kumar | 92 |
| A23CS0080 | Chong | Li Mei | 95 |
+-----+-----+-----+-----+
```

Diagram 6.2.4 Output of Sorted Results

View all Attendances

```
SELECT * FROM Attendance;
```

attendance_qr	date	scheduledTime	timeIn
QR001	2025-01-01	2025-01-01 08:00:00	2025-01-01 08:05:00
QR002	2025-01-01	2025-01-01 09:00:00	2025-01-01 09:10:00
QR003	2025-01-01	2025-01-01 10:00:00	2025-01-01 10:15:00
QR004	2025-01-01	2025-01-01 11:00:00	2025-01-01 11:05:00
QR005	2025-01-01	2025-01-01 12:00:00	2025-01-01 12:10:00
QR006	2025-01-01	2025-01-01 13:00:00	2025-01-01 13:05:00
QR007	2025-01-01	2025-01-01 14:00:00	2025-01-01 14:10:00
QR008	2025-01-01	2025-01-01 15:00:00	2025-01-01 15:15:00

Diagram 6.2.5 Output for Attendance Table

Scan a New Attendance

```
INSERT INTO Attendance (attendance_qr, date, scheduledTime, timeIn)
VALUES ('QR009', '2025-01-02', '2025-01-02 12:00:00', '2025-01-02 12:15:00');
```

attendance_qr	date	scheduledTime	timeIn
QR001	2025-01-01	2025-01-01 08:00:00	2025-01-01 08:05:00
QR002	2025-01-01	2025-01-01 09:00:00	2025-01-01 09:10:00
QR003	2025-01-01	2025-01-01 10:00:00	2025-01-01 10:15:00
QR004	2025-01-01	2025-01-01 11:00:00	2025-01-01 11:05:00
QR005	2025-01-01	2025-01-01 12:00:00	2025-01-01 12:10:00
QR006	2025-01-01	2025-01-01 13:00:00	2025-01-01 13:05:00
QR007	2025-01-01	2025-01-01 14:00:00	2025-01-01 14:10:00
QR008	2025-01-01	2025-01-01 15:00:00	2025-01-01 15:15:00
QR009	2025-01-02	2025-01-02 12:00:00	2025-01-02 12:15:00

Diagram 6.2.6 Output for New Attendance Table

Count Attendances in a Day

```
SELECT COUNT(*) FROM Attendance
```

```
WHERE date = '2025-01-01';
```

```
mysql> SELECT COUNT(*) FROM Attendance  
      -> WHERE date = '2025-01-01';  
+-----+  
| COUNT(*) |  
+-----+  
|      8 |  
+-----+
```

Diagram 6.2.7 Output for Count of Attendances

View All Banks

```
SELECT * FROM Bank;
```

```
mysql> SELECT * FROM Bank;  
+-----+-----+-----+-----+  
| BankID | financialStatus | availability | history |  
+-----+-----+-----+-----+  
| B001   | Active        | Available    | No outstanding balance. |  
| B002   | Inactive       | Unavailable  | Account closed. |  
| B003   | Active        | Available    | Overdue payment. |  
+-----+-----+-----+-----+
```

Diagram 6.2.8 Output for Bank Table

Check Financial Status of Bank

```
SELECT financialStatus, COUNT(*) AS count_status
```

```
FROM Bank
```

```
GROUP BY financialStatus;
```

```
mysql> SELECT financialStatus, COUNT(*) AS count_status  
      -> FROM Bank  
      -> GROUP BY financialStatus;  
+-----+-----+  
| financialStatus | count_status |  
+-----+-----+  
| Active         |          2 |  
| Inactive        |          1 |  
+-----+-----+
```

Diagram 6.2.9 Output for Count of Each Financial Status

View All Buses

```
SELECT * FROM Bus;
```

busNo	scheduledTime	startLocation	endLocation	availability
BUS001	2025-01-01 07:30:00	Center Point	Kolej Perdana	Available
BUS002	2025-01-01 08:00:00	Kolej 9	Center Point	Unavailable
BUS003	2025-01-02 10:00:00	Center Point	Kolej Tun Razak	Available

Diagram 6.2.10 Output for Bus Table

Update Bus Availability

```
UPDATE Bus
```

```
SET availability = 'Available'
```

```
WHERE busNo = 'BUS002';
```

mysql> UPDATE Bus -> SET availability = 'Available' -> WHERE busNo = 'BUS002'; Query OK, 1 row affected (0.04 sec) Rows matched: 1 Changed: 1 Warnings: 0
mysql> SELECT * FROM Bus -> ;

Diagram 6.2.11 Output with Updated Bus Availability

View all Receipts

```
SELECT * FROM Receipt;
```

```
mysql> SELECT * FROM receipt;
+-----+-----+
| receiptNo | referenceNo |
+-----+-----+
| REC001   | REF2025001  |
| REC002   | REF2025002  |
| REC003   | REF2025003  |
+-----+-----+
```

Diagram 6.2.12 Output of Receipt Table

Delete all Receipts

```
TRUNCATE TABLE Receipt;
```

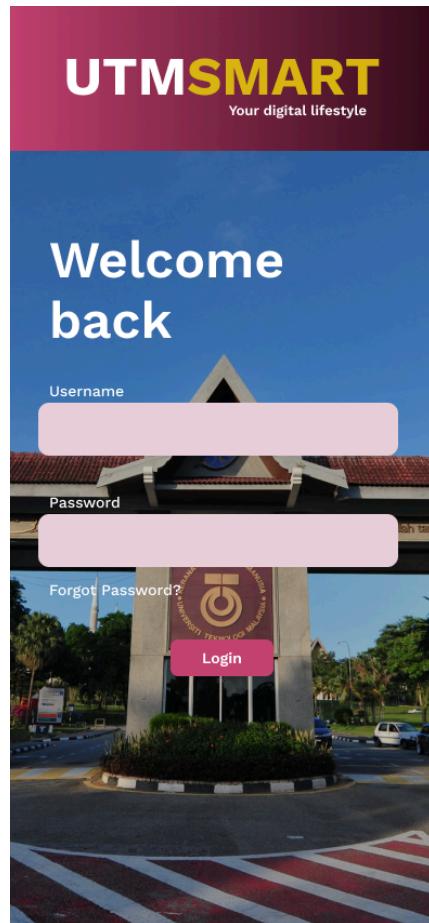
```
mysql> TRUNCATE TABLE Receipt;
Query OK, 0 rows affected (0.05 sec)

mysql> SELECT * FROM receipt;
Empty set (0.00 sec)
```

Diagram 6.2.12 Output After Deleting All Rows from Receipt

7.0 Interface Design

7.1 User Login (User View)



7.2 Home Page (User View)



News



 What's new  Going around  Staff directory  Library

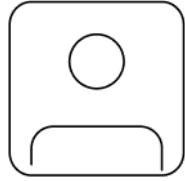
 Financial status  Health  Contact  Survey

Charity



Keep up to date:     

7.3 View Profile (User View)



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7.4 Reset Password (User View)



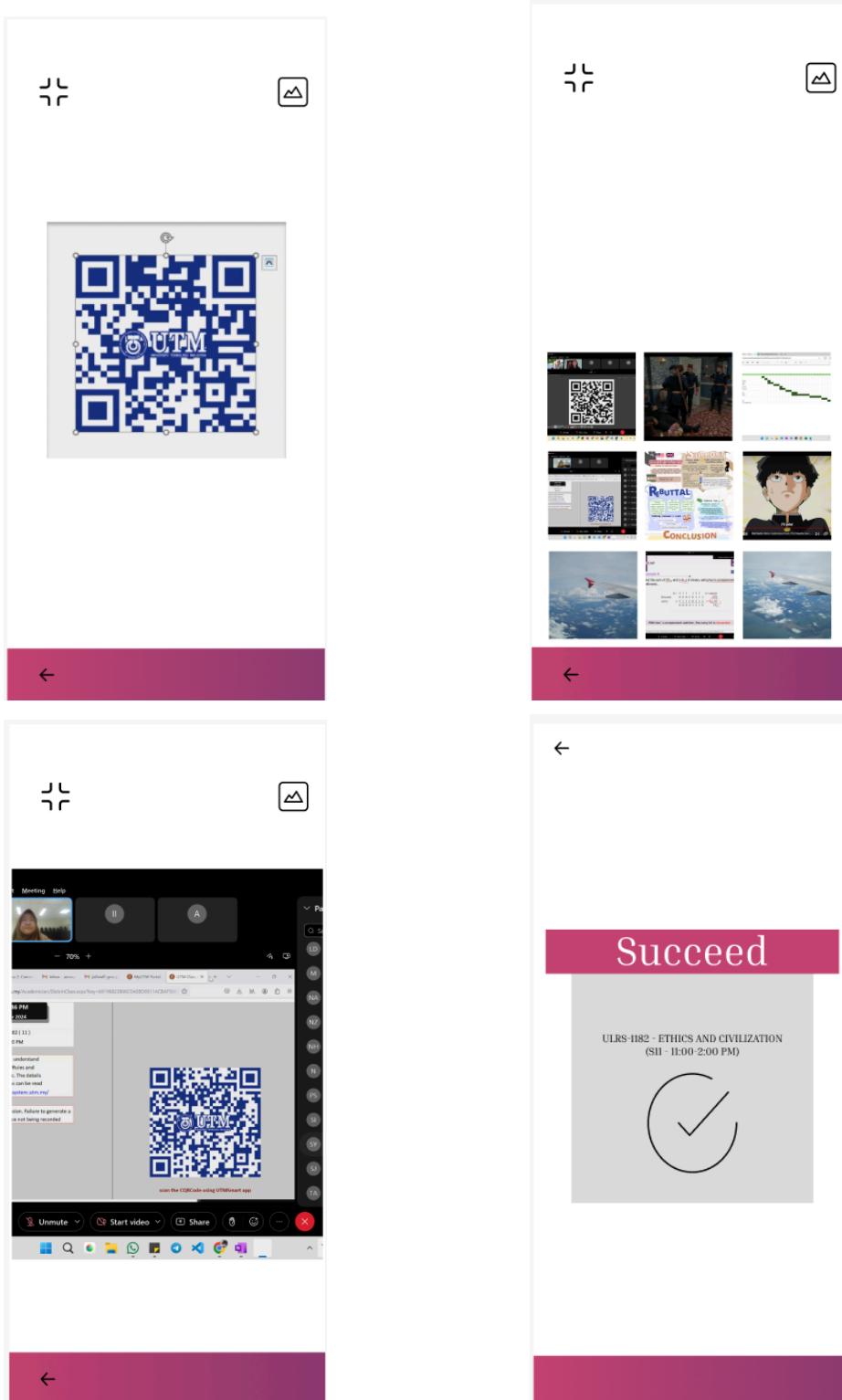
Forgot Password?

The reset link will be sent to your email

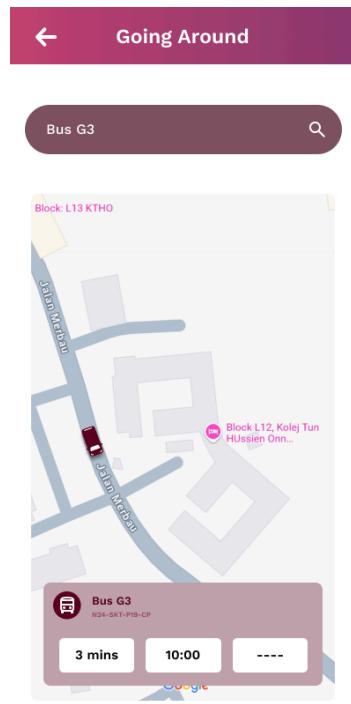
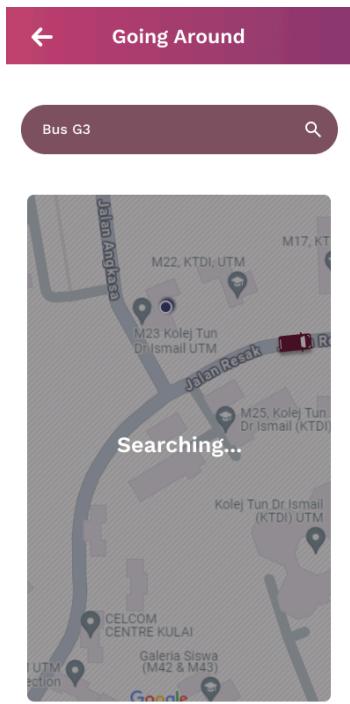
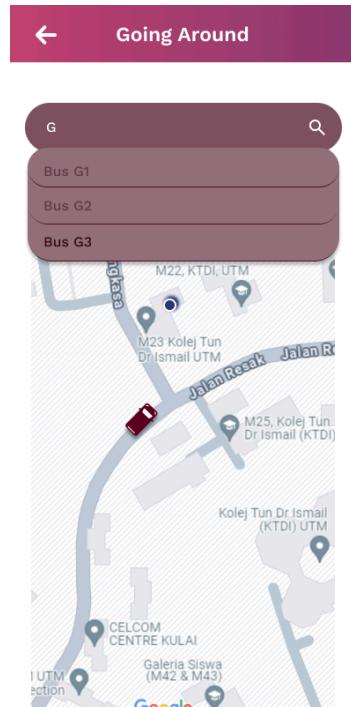
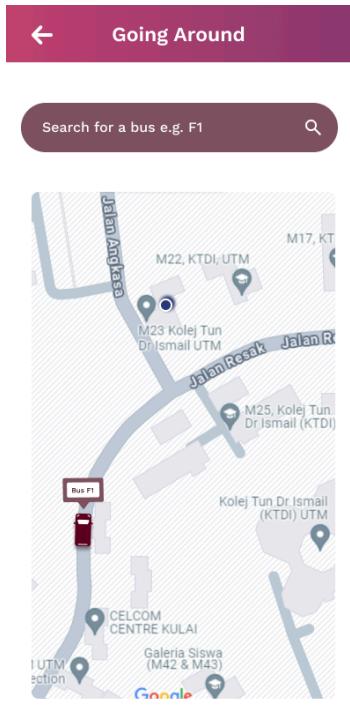
Email

Submit

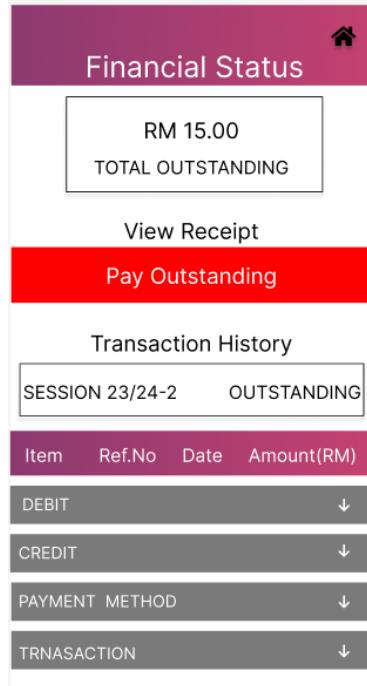
7.5 Scan attendance from gallery (User View)



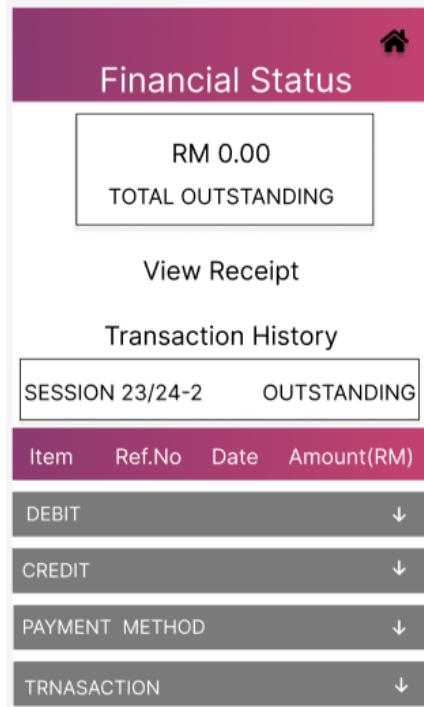
7.6 Check bus status (User View)



7.7 Before payment (User View)



7.8 After payment (User View)



7.9 System transaction (User View)

The first screenshot shows a pink background with a white box containing the text "Redirecting to FPX Payment...".

The second screenshot is titled "Payment Details" and shows the following information:

- From:** Savings Pro Account-i
1234567890
- To:** Universiti Teknologi Malaysia
0987654321
- Amount in MYR:** 15.00
- Recipient Reference:** Yuran Perkakasan Elektrik
- Bank:** Afin Bank Berhad
- Payment Type:** Fund Transfer
- Amount:** MYR 30.00

The third screenshot shows the completed transaction details:

- Buyer name:** Raden
- Buyer order no.:** UTMISV342045932850
- Source:** NOIC
- Status:** SUCCESSFUL
- Receipt date:** 21/1/2024
- Merchant Name:** Universiti Teknologi Malaysia
- Bank Receipt No.:** 077489
- Transaction details:** Payment for tuition fees
- Total:** RM1000.90

At the bottom, there is a handwritten signature and the text MUHAMMAD SAIFUL BIN HISHAM, BENDAHARI, UNIVERSITI TEKNOLOGI MALAYSIA.

The first screenshot shows a "Print or save pdf?" button with options "print" and "save". Below it is a table of payment details.

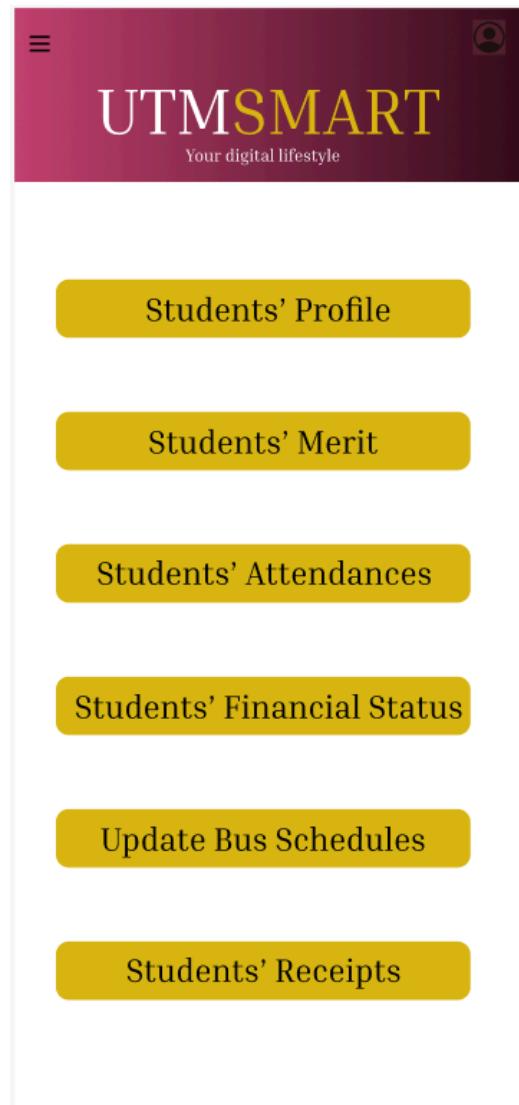
Payment for tuition fees	RM1000.90
Total	RM1000.90

At the bottom, there is a handwritten signature and the text MUHAMMAD SAIFUL BIN HISHAM, BENDAHARI, UNIVERSITI TEKNOLOGI MALAYSIA.

The second screenshot shows a "Print Successfully" message above the same payment table and signature.

The third screenshot shows a "Download Successfully" message with the text "the pdf receipt is in your document file" above the same payment table and signature.

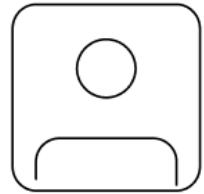
7.10 Home Page (Admin View)



7.11 View All Profiles (Admin View)

Students' Profile

Alice Lee Hui Mee	↓
Cheng Kang Huey	↓
Khoo Zi Ling	↓
Lee Jian Ai	↓
Loh Hui Yi	↓
Muhammad Adam	↓
Ngeow Zhi Yu	↓
Ong Jie Min	↓
Tan Sze Qing	↓
Vincent Tan	↓
Yan Hao Xiang	↓
Zhu Yi	↓



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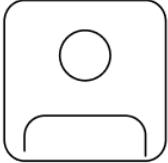
 012-3456789



7.12 View Profiles of Students from Faculty of Computing (Admin View)

Faculty
Computing
Electrical Engineering
Mechanical Engineering
Science
Civil Engineering
Management

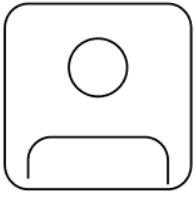
Faculty Computing		
Name	Course	
Alice Lee Hui Mee	SECVH	↓
Cheng Kang Huey	SECVH	↓
Khoo Zi Ling	SECVH	↓
Lee Jian Ai	SECVH	↓
Loh Hui Yi	SECRH	↓
Muhammad Adam	SECRH	↓
Ngeow Zhi Yu	SECRH	↓
Ong Jie Min	SECRH	↓
Tan Sze Qing	SECJH	↓
Vincent Tan	SECJH	↓
Yan Hao Xiang	SECJH	↓
Zhu Yi	SECJH	↓



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←

7.13 Delete A Student's Profile (Admin View)



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7.14 Order Students by Merit Marks with Selected Columns (Admin View)

Students' Merit		
Name	Matric No	Merit
Alice Lee Hui Mee	A23CS1234	78
Cheng Kang Huey	A23CS2345	80
Khoo Zi Ling	A23CS3456	82
Lee Jian Ai	A23CS4567	84
Loh Hui Yi	A23CS5678	86
Muhammad Adam	A23CS6789	88
Ngeow Zhi Yu	A23CS7891	90
Ong Jie Min	A23CS8912	92
Tan Sze Qing	A23CS9123	94
Vincent Tan	A23CS0123	96
Yan Hao Xiang	A23CS0120	98
Zhu Yi	A23CS0234	100

7.15 View All Attendance (Admin View)

SECD2523 - 10 DATABASE 3 CREDIT HOURS		
Date	Class Time	View Class List
14 Jan 2025	08:00:00	View
13 Jan 2025	08:00:00	View
07 Jan 2025	08:00:00	View
03 Jan 2025	08:00:00	View
31 Dec 2024	08:00:00	View
30 Dec 2024	08:00:00	View
18 Dec 2024	08:00:00	View
09 Dec 2024	08:00:00	View
03 Dec 2024	08:00:00	View
02 Dec 2024	08:00:00	View
18 Nov 2024	08:00:00	View
12 Nov 2024	08:00:00	View
11 Nov 2024	08:00:00	View
05 Nov 2024	08:00:00	View
04 Nov 2024	08:00:00	View
28 Oct 2024	08:00:00	View

Student	Matric No.	Time In
Lim You Ling	A23CS0123	08:00:45
Chew Yan Lin	A23CS0122	08:01:00
Lam Ping Yong	B24CS0124	08:01:05
Mong Yong Ting	A23CS7894	08:01:06
Sam Lim Ying	A23CS0756	08:01:08
Wang Rou Li	A23CS0568	08:01:15
Peng Yong Xing	A23CS0235	08:01:40
Kong Jing Wen	A23CS0147	08:02:00
Lau Kun Xing	A23CS0258	08:02:07
Wong Chun Jun	A23CS0369	08:02:09
Lim Weng Qi	A23CS0321	08:02:40
Teng Ring Si	A23CS0654	08:02:50
Sun Qian Li	A23CS0987	08:03:05
Sun Shang Xiang	B24CS0257	08:03:10
Ooi Xun Xi	A23CS0367	08:03:16
Zhong Han Liang	A23CS0158	08:03:21

7.16 Scan New Attendance (Admin View)

SECD2523 - 10
DATABASE
3 CREDIT HOURS

Class Attendance

Course	Credit Hour	Section
SECJ2203 Software Engineering	3	04
SECJ2203 Software Engineering	3	07
SECD2523 Database	3	09
SECD2523 Database	3	10

Attendance

DATABASE - SECD2523 (10)
15 Jan 2025 08:00:00 AM

Scan the QR code below for UTM Merit.



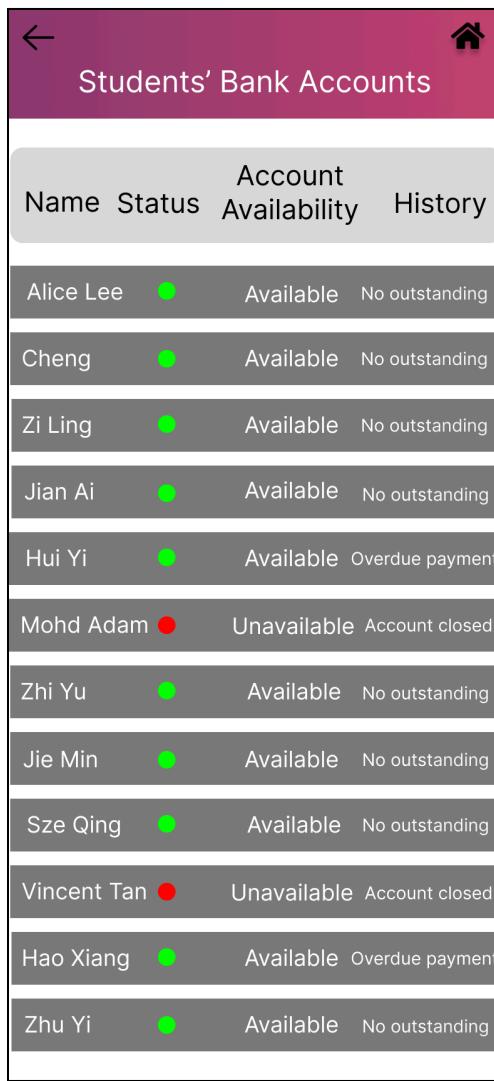
Lim You Ling A23CS0123 08:00:45
Chew Yan Lin A23CS0122 08:01:00
Lam Ping Yong B24CS0124 08:01:05
Sam Lim Ying A23CS0756 08:01:08

[Scroll](#)

7.17 Count Attendance (Admin View)

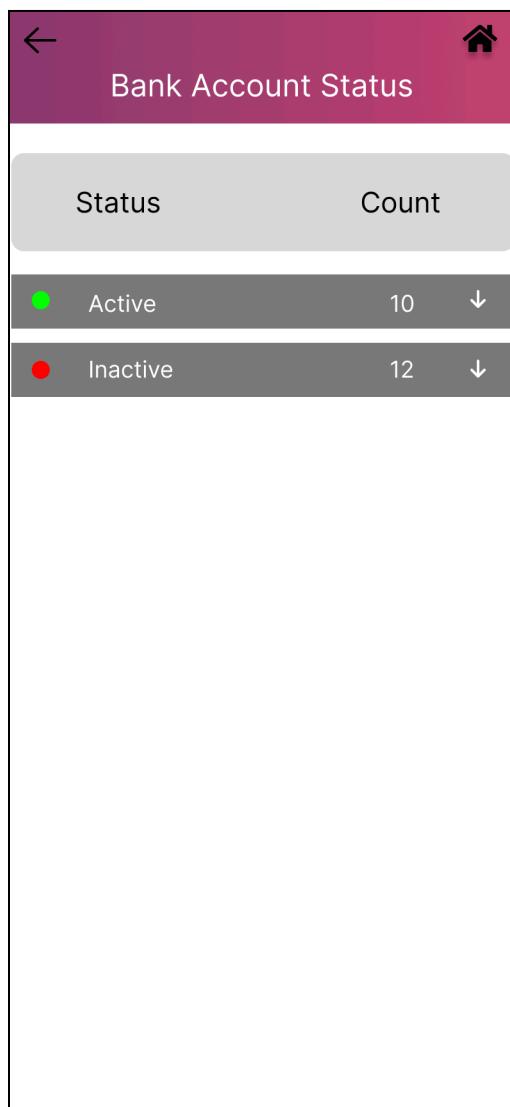
SECD2523 - 10 DATABASE 3 CREDIT HOURS			SECD2523 - 10 DATABASE 3 CREDIT HOURS			SECD2523 - 10 DATABASE 3 CREDIT HOURS			
Date	Class Time	View Count	Date	Class Time	Count	Date	Student	Matric No.	Time In
14 Jan 2025	08:00:00	View	14 Jan 2025	08:00:00	25/29	14 Jan 2025	Lim You Ling	A23CS0123	08:00:45
13 Jan 2025	08:00:00	View	13 Jan 2025	08:00:00	29/29	13 Jan 2025	Chew Yan Lin	A23CS0122	08:01:00
07 Jan 2025	08:00:00	View	07 Jan 2025	08:00:00	28/29	07 Jan 2025	Lam Ping Yong	B24CS0124	08:01:05
03 Jan 2025	08:00:00	View	03 Jan 2025	08:00:00	29/29	03 Jan 2025	Wong Yong Ting	A23CS7894	08:01:06
31 Dec 2024	08:00:00	View	31 Dec 2024	08:00:00	29/29	31 Dec 2024	Sam Lim Ying	A23CS0756	08:01:08
30 Dec 2024	08:00:00	View	30 Dec 2024	08:00:00	29/29	30 Dec 2024	Wang Rou Li	A23CS0568	08:01:15
10 Dec 2024	08:00:00	View	10 Dec 2024	08:00:00	27/29	10 Dec 2024	Peng Yong Xing	A23CS0235	08:01:40
09 Dec 2024	08:00:00	View	09 Dec 2024	08:00:00	28/29	09 Dec 2024	Kong Jing Wen	A23CS0147	08:02:00
03 Dec 2024	08:00:00	View	03 Dec 2024	08:00:00	29/29	03 Dec 2024	Lau Kun Xing	A23CS0258	08:02:07
02 Dec 2024	08:00:00	View	02 Dec 2024	08:00:00	29/29	02 Dec 2024	Wong Chun Jun	A23CS0369	08:02:09
18 Nov 2024	08:00:00	View	18 Nov 2024	08:00:00	28/29	18 Nov 2024	Lim Weng Qi	A23CS0321	08:02:40
12 Nov 2024	08:00:00	View	12 Nov 2024	08:00:00	29/29	12 Nov 2024	Teng Ring Si	A23CS0654	08:02:50
11 Nov 2024	08:00:00	View	11 Nov 2024	08:00:00	29/29	11 Nov 2024	Sun Qian Li	A23CS0987	08:03:05
05 Nov 2024	08:00:00	View	05 Nov 2024	08:00:00	27/29	05 Nov 2024	Sun Shang Xiang	B24CS0257	08:03:10
04 Nov 2024	08:00:00	View	04 Nov 2024	08:00:00	29/29	04 Nov 2024	Ooi Xun Xi	A23CS0367	08:03:16
28 Oct 2024	08:00:00	View	28 Oct 2024	08:00:00	29/29	28 Oct 2024	Zhong Han Liang	A23CS0158	08:03:21

7.18 View Bank Accounts (Admin View)



Name	Status	Availability	History
Alice Lee	●	Available	No outstanding
Cheng	●	Available	No outstanding
Zi Ling	●	Available	No outstanding
Jian Ai	●	Available	No outstanding
Hui Yi	●	Available	Overdue payment
Mohd Adam	●	Unavailable	Account closed
Zhi Yu	●	Available	No outstanding
Jie Min	●	Available	No outstanding
Sze Qing	●	Available	No outstanding
Vincent Tan	●	Unavailable	Account closed
Hao Xiang	●	Available	Overdue payment
Zhu Yi	●	Available	No outstanding

7.19 Check Financial Status of Bank (Admin View)



Status	Count	
● Active	10	↓
● Inactive	12	↓

7.20 View Buses (Admin View)



The image shows a smartphone screen displaying a table of bus schedules. The table has columns for No., Time, Start, End, and Availability. The rows list six buses (A1 to F6) with their respective details. The background of the app interface is white, and the table has a dark grey header row.

No.	Time	Start	End	Availability
A1	07 30	CP	KP	Available
B2	08 00	K9	CP	Unavailable
C3	10 00	CP	KTR	Available
D4	11 00	KDOJ	CP	Available
E5	13 00	CP	KTC	Available
F6	17 00	KTR	KTDI	Unavailable

7.21 Update Bus Availability (Admin View)

No.	Time	Status	Location	Availability
A1	07 30	●	U6	Available
B2	08 00	●	Out of UTM	Unavailable
C3	10 00	●	K9	Available
D2	11 00	●	CP	Available
E1	13 00	●	N24	Available
F2	17 00	●	Main Gate	Ava
G3	17 30	●	Out of UTM	Unavailable
B3	18 05	●	KP	Available

7.22 View All Receipts (Admin View)

Receipts		
Name	Receipt	
Alice Lee Hui Mee	3	↓
Cheng Kang Huey	2	↓
Khoo Zi Ling	3	↓
Lee Jian Ai	1	↓
Loh Hui Yi	2	↓
Muhammad Adam	3	↓
Ngeow Zhi Yu	1	↓
Ong Jie Min	2	↓
Tan Sze Qing	2	↓
Vincent Tan	2	↓
Yan Hao Xiang	1	↓
Zhu Yi	3	↓

Receipts		
Name	Receipt	
Alice Lee Hui Mee	3	↑
Session	Ref. No	Total Amount
202420251	ST242512345	1915.00
202320242	ST232424990	1741.00
202320241	ST232415413	2953.00
Cheng Kang Huey	2	↓
Khoo Zi Ling	3	↓
Lee Jian Ai	1	↓
Loh Hui Yi	2	↓
Muhammad Adam	3	↓
Ngeow Zhi Yu	1	↓
Ong Jie Min	2	↓
Tan Sze Qing	2	↓
Vincent Tan	2	↓
Yan Hao Xiang	1	↓
Zhu Yi	3	↓

7.23 Delete all Receipts (Admin View)

Receipts		
Name	Receipt	
Alice Lee Hui Mee	3	○
Cheng Kang Huey	2	○
Khoo Zi Ling	3	○
Lee Jian Ai	1	○
Loh Hui Yi	2	○
Muhammad Adam	3	○
Ngeow Zhi Yu	1	○
Ong Jie Min	2	○
Tan Sze Qing	2	○
Vincent Tan	2	○
Yan Hao Xiang	1	○
Zhu Yi	3	○

Receipts		
Name	Receipt	
Alice Lee Hui Mee	3	○
Cheng Kang Huey	2	○
Khoo Zi Ling	3	○
Lee J		
Loh H		
Muha		
Ngeow Zhi Yu	1	○
Ong Jie Min	2	○
Tan Sze Qing	2	○
Vincent Tan	2	○
Yan Hao Xiang	1	○
Zhu Yi	3	○

Receipts		
Name	Receipt	
Alice Lee Hui Mee	0	↓
Cheng Kang Huey	0	↓
Khoo Zi Ling	0	↓
Lee J		↓
Loh H		↓
Muha		↓
Ngeow Zhi Yu	0	↓
Ong Jie Min	0	↓
Tan Sze Qing	0	↓
Vincent Tan	0	↓
Yan Hao Xiang	0	↓
Zhu Yi		↓

8.0 Summary

In a nutshell, our Logical ERD had been successfully converted from the previous Conceptual Entity Relationship Diagram (ERD). For the purpose of suiting our system better, the non-relational features were eliminated in a precise way, and the relationships were clarified to make sure the database would only be tightly compliant with the relational principles.

The business rule and data dictionary were also updated, where all of the primary keys and their attributes were updated and listed in the table form. After that, the normalization was done by following the rules of Boyce Codd Normative Format (BCNF), where any redundancy or dependence data were removed. Through the process, the relational database schema was also created and listed all the entities and their attributes in the relational schema notation.

The prototype of our system was designed and the interface's important features were included in this report. This will let us clearly get a grasp of the overall functions of the system if it were marketed in the app store. Besides that, the database system was also implemented through MySQL.

Overall, in this phase, we have not only learned the essentials of revamping ERD into Logical ERD but also the normalization following the rules of BCNF, database design, and the system implementation through prototype.