

University Database Management System

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I. Introduction

University Database Management System (UDMS) is a software system that manages the data and information of a university. It is designed to manage the various operations and tasks of a university such as student registration, course registration, faculty management, scheduling, grading, and billing. UDMS plays a critical role in the efficient and effective management of university operations and data.

The purpose of this project report is to provide an overview of the UDMS, its functionalities, and its importance in managing university data. The report will also detail the design and development process of the UDMS and provide insights into the technical aspects of the system. Additionally, this report will discuss the benefits of UDMS for universities and how it can enhance the overall management of university operations.

The report is structured in the following way: the first section will provide an overview of the UDMS, its functions, and its importance in managing university data. The second section will discuss the design and development process of the UDMS, including the architecture, data model, and software tools used in its development. The third section will focus on the results and benefits of UDMS and how it can improve the overall management of university operations. Finally, the report will conclude with a summary of the key findings and future directions for research in the field of university database management systems.

II. Methodology

The University Database Management System (UDMS) project was developed using the MySQL database management system. The methodology involved the following steps:

1. Requirement gathering:

The first step in developing the UDMS was to gather requirements from stakeholders such as university administrators, faculty, and students. The requirements included student registration, course registration, faculty management, scheduling, grading, and billing.

We gathered data of our university with students, lecturers, courses, grades and workers.

2. Data modeling:

Once the requirements were gathered, the next step was to create a data model that would represent the relationships between the various entities in the system. The data model was created using the Entity-Relationship (ER) modeling technique.

The ER diagram is given below:

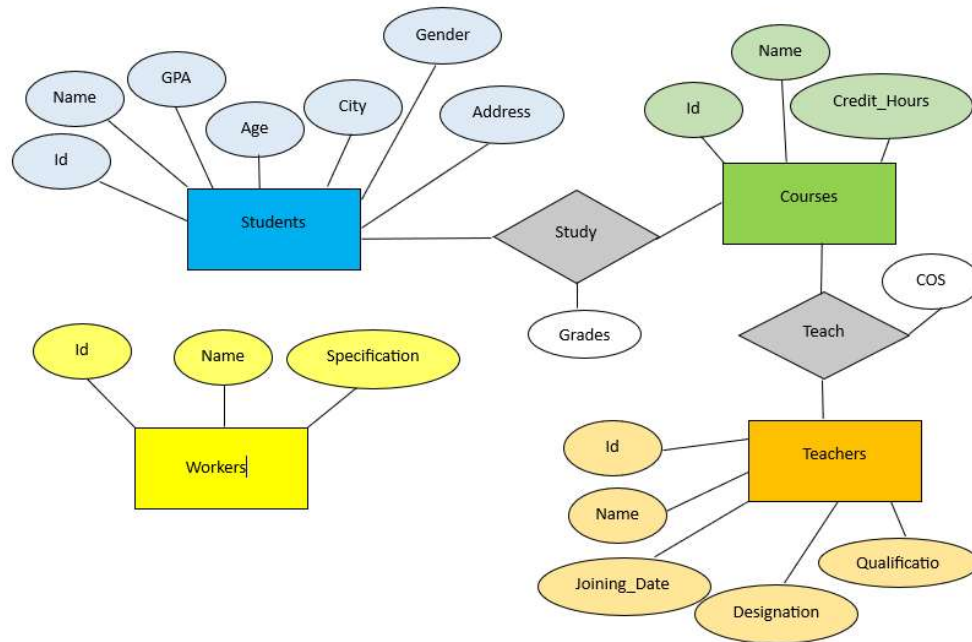


Fig.1.1 ER diagram showing Entities and Relationships

3. Database design:

After the data model was created, the next step was to design the database schema. The schema was designed based on the ER model and the specific requirements of the system. We considered six tables named students, courses, teachers, student_courses, teacher_courses and workers for designing of database management system.

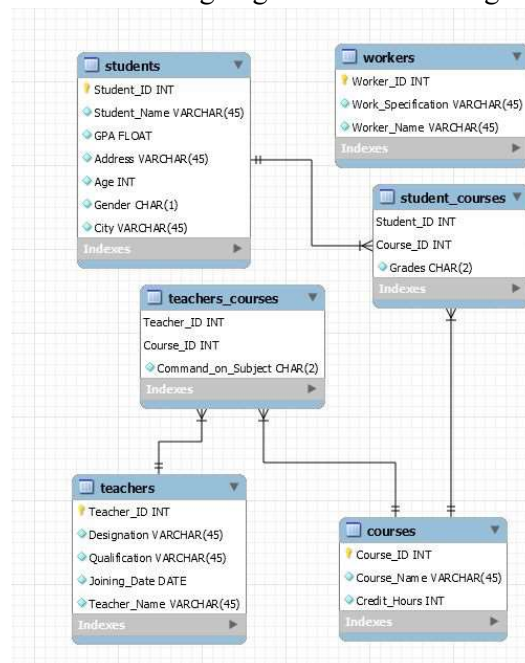


Fig.1.2 View of six tables in MySQL Workbench

4. Database implementation:

The database was implemented using the MySQL database management system and MySQL Workbench software. The schema was created and the tables were populated with sample data to test the system.



Fig.2 Database in MySQL Workbench

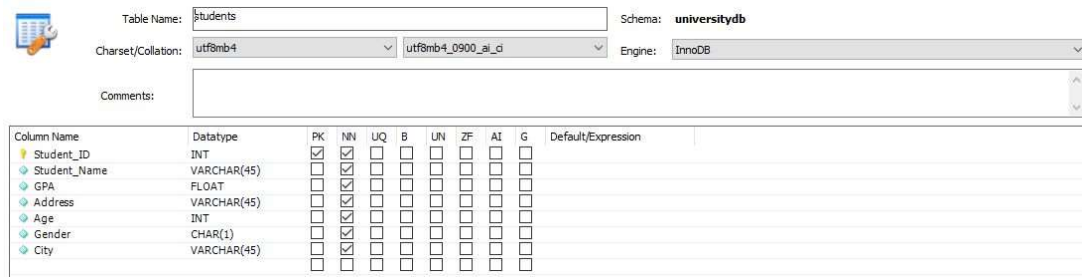


Fig.3 Student table description in MySQL Workbench

	Student_ID	Student_Name	GPA	Address	Age	Gender	City
▶	254	Fozia Rafiq	3.65	24, B block	20	F	Multan
	295	Unsa Ilyas	3.74	25, A block	22	F	Lahore
	296	Marwa Omar	3.86	83, D block	21	F	Lahore
	297	Fatima Amjad	3.52	38, D block	20	F	Vihari
	299	Laiba Akbar	3.4	26, E block	21	F	Lahore
	301	Hiba Waqas	3.56	22, D block	20	F	Lahore
	303	Fatima Waheed	3.96	83, W block	21	F	Lahore
	304	Hamid Shahid	3.93	13, F block	22	M	Gujranwala
	320	Zakriya Ibrahim	3.72	80, D block	22	M	Lahore
	321	Hamza Sikandar	3.9	82, B block	23	M	Lahore
	322	Amna Liaqat	3.67	81, D block	21	F	Lahore
	329	Raima Imran	3.45	77, U block	20	F	Lahore
	341	Safa Omar	3.78	33, P block	23	F	Lahore
	343	Khadija Wahab	3.87	63, D block	22	F	Lahore
	345	Abdullah Ali	3.77	27, E block	24	M	Faisalabad
	347	Umar Shareef	3.1	29, E block	23	M	Pindi
	349	Talha Waqas	3.44	36, E block	24	M	Islamabad
	351	Toobah Imran	3.6	26, J block	20	F	Lahore

Fig.4 Students table in MySQL Workbench

Table Name: Schema: **universitydb**

Charset/Collation: Engine:

Comments:

Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G	Default/Expression
Course_ID	INT	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Course_Name	VARCHAR(45)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Credit_Hours	INT	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Fig.5 Courses table description in MySQL Workbench

	Course_ID	Course_Name	Credit_Hours
▶	129	Chinese Language	0
	250	Electric Circuits	3
	289	Numerical Methods	3
	321	Circuit Analysis and Design	3
	340	Control Systems	3
	345	Sociology	2
	355	Social Ethics	2
	358	Communication Skills	2
	376	Digital Processing Systems	3
	411	Industrial Control Systems	3
	421	Digital Systems	3
	433	Operating Systems	3
	436	Database	3

Fig.6 Courses table in MySQL Workbench

Table Name: Schema: **universitydb**

Charset/Collation: Engine:

Comments:

Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G	Default/Expression
Teacher_ID	INT	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Designation	VARCHAR(45)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Qualification	VARCHAR(45)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Joining_Date	DATE	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Teacher_Name	VARCHAR(45)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Fig.7 Teachers table description in MySQL Workbench

	Teacher_ID	Designation	Qualification	Joining_Date	Teacher_Name
▶	1	Assistant Professor	Masters in Control Engineering	2007-11-12	Sir Rafay Chughtai
	2	Assistant Professor	Masters in Electronics	2007-10-10	Sir Fahad Ijaz
	3	Professor	Phd in Communications	2007-10-10	Dr. Umar Rashid
	4	Professor	Phd in Power	2022-10-12	Dr. Bilal Anwar
	5	Professor	Phd in Computer	2017-10-04	Dr. Farukh Arsalan
	6	Professor	Phd in Computer	2019-10-02	Dr. Bilal Wajid
	7	Associate Professor	Phd in Electronics	2012-10-10	Maam Hifsa Shahid
	8	Associate Professor	Masters in Power	2011-10-09	Sir Fahim Gohar

Fig.8 Teachers table in MySQL Workbench

Table Name: Schema: **universitydb**

Charset/Collation: Engine:

Comments:

Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G	Default/Expression
Worker_ID	INT	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Work_Specification	VARCHAR(45)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Worker_Name	VARCHAR(45)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Fig.9 Workers table description in MySQL Workbench

	Worker_ID	Work_Specification	Worker_Name
▶	1	Sweeper	Sunny Jamil
	2	Gardener	Akbar Ali
	3	Supplier	Waseem Karim
	4	HOD	Dr.Muhammad Ali
	5	Acting HOD	Maam Hifsa
	6	Typist	Amjad Akram
	7	Watch Man	Abdullah Malhi
	8	Mess Boy	Talha Khawaja
	9	Record Keeper	Shiraz Akram
	10	Peon	Sabtain Khan

Fig.10 Workers table in MySQL Workbench

Table Name: Schema: **universitydb**

Charset/Collation: Engine:

Comments:

Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G	Default/Expression
Student_ID	INT	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Course_ID	INT	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Grades	CHAR(2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Fig.11 Student_Courses table description in MySQL Workbench

	Student_ID	Course_ID	Grades
▶	254	436	A
	295	321	C+
	296	340	A-
	297	340	B-
	299	321	D+
	301	436	A
	303	355	A
	304	411	B+
	320	436	A

Fig.12 Student_Courses table in MySQL Workbench

Table Name: Schema: **universitydb**

Charset/Collation: Engine:

Comments:

Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G	Default/Expression
Teacher_ID	INT	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Course_ID	INT	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Command_on_Subject	CHAR(2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Fig.13 Teachers_Courses table description in MySQL Workbench

	Teacher_ID	Course_ID	Command_on_Subject
▶	1	289	C
	1	340	A
	1	411	A+
	2	289	B-
	2	411	D
	2	421	A+
	3	376	A
	3	421	B
	4	321	A
	4	340	F
	5	436	A+

Fig.14 Teachers_Courses table in MySQL Workbench

Name: The name of the view is parsed automatically from the DDL statement. The DDL is parsed automatically while you type.

DDL:

```

1  CREATE
2      ALGORITHM = UNDEFINED
3      DEFINER = `root`@`localhost`
4      SQL SECURITY DEFINER
5  VIEW `universitydb`.`female_student_info` AS
6  SELECT
7      `s`.`Student_Name` AS `STUDENT_NAME`
8  FROM
9      `universitydb`.`students` `s`
10 WHERE
11     (`s`.`Gender` = 'F')

```

Fig.14 Female_Student View definition in MySQL Workbench

STUDENT_NAME
Unsa Ilyas
Marwa Omar
Fatima Fatima Amja
Laiba Akbar
Hiba Waqas
Fatima Waheed
Amna Liaqat
Raima Imran
Safa Omar
Khadija Wahab
Toobah Imran

Fig.15 Female_Student View in MySQL Workbench

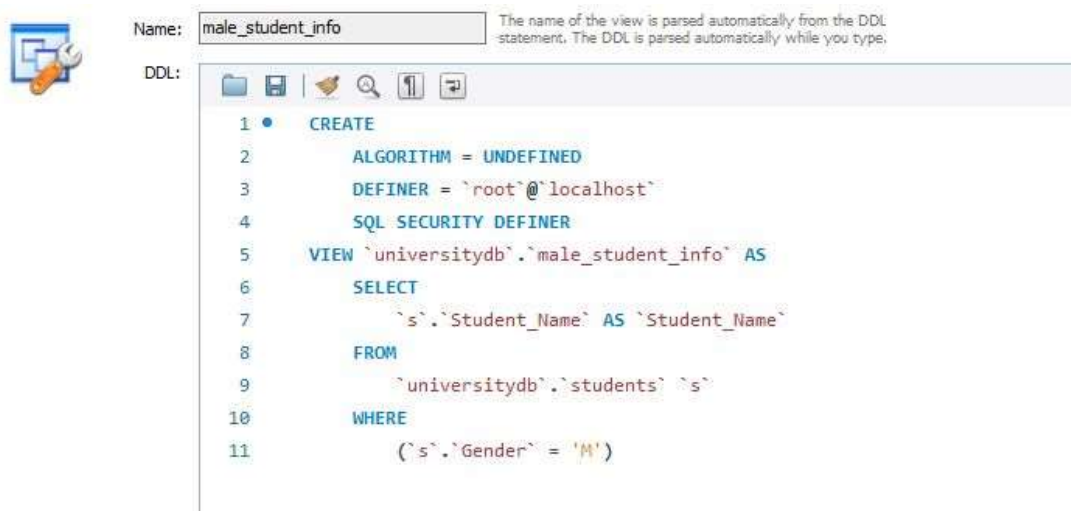


Fig.16 Male_Student View definition in MySQL Workbench

Student_Name
Hamid Shahid
Zakriya Ibrahim
Hamza Sikandar
Abdullah Ali
Umar Shareef
Talha Waqas
AbuBakar Waseem
Ali Raza

Fig.17 Male_Student View in MySQL Workbench

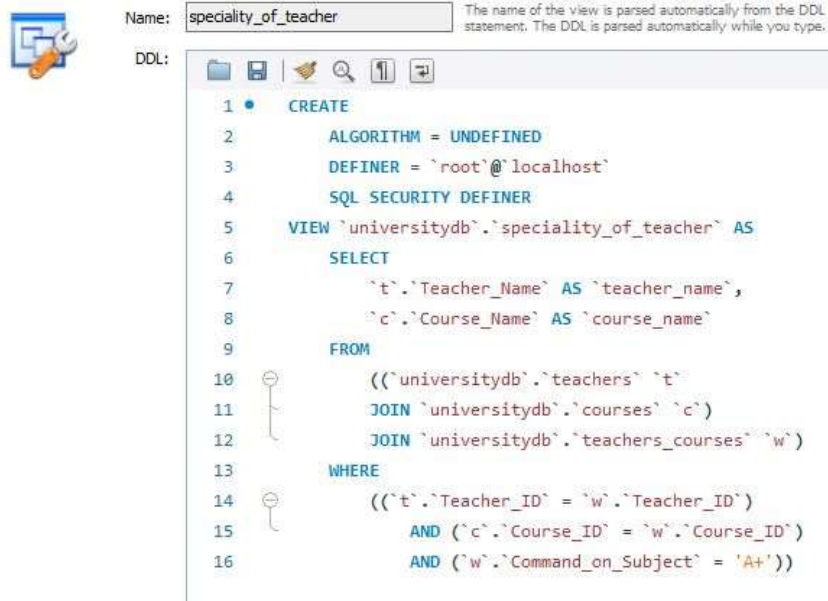


Fig.18 Teacher_Grip View definition in MySQL Workbench

	teacher_name	course_name
▶	Sir Rafay Chughtai	Industrial Control Systems
	Sir Fahad Ijaz	Digital Systems
	Dr. Farukh Arsalan	Database

Fig.19 Teacher_Grip View in MySQL Workbench

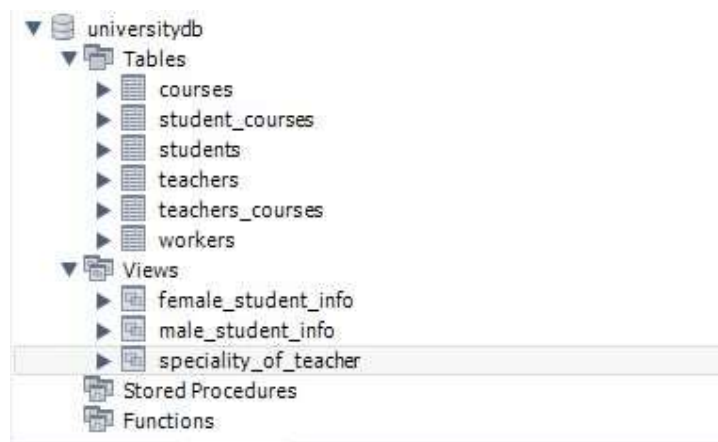


Fig.20 Hierarchy of universitydb in MySQL Workbench


```

1 • use universitydb;
2 • describe table courses;
3 • insert into courses value (340,'Control Systems', 3);
4 • insert into courses value (411,'Industrial Control Systems', 3);
5 • insert into courses value (289,'Numerical Methods', 3);
6 • select * from courses;
7 • describe table teachers;
8 • insert into teachers value (1,'Assistant Professor', 'Masters in Control Engineering', '07-11-12', 'Sir Rafay Chughtai');
9 • insert into teachers value (2,'Assistant Professor', 'Masters in Electronics', '07-10-10', 'Sir Fahad Ijaz');
10 • insert into teachers value (3,'Professor', 'Phd in Communications', '07-10-10', 'Dr. Umar Rashid');
11 • select * from teachers;
12 • select teacher_name from teachers where teacher_id = 3;
13 • DESC STUDENTS;
14 • insert into STUDENTS VALUES (254, 'Fozia Rafiq', 3.8);

```

Fig.21 Editing some tables in MySQL Workbench

In summary, the methodology for developing the University Database Management System using MySQL involved requirement gathering, data modeling, database design and database implementation.

III. Results

Following are the tested results on our university database management system:

```

1 • select S.Student_name, S.GPA, S.GENDER, C.course_name
2   from Students S, courses C , student_courses W
3   where S.Student_id = W.student_id And C.course_id = W.course_id
4   and W.Grades = 'A';

```

Fig.22 Select student name, gpa, gender and course name where grade is A

	Student_name	GPA	GENDER	course_name
▶	Fozia Rafiq	3.65	F	Database
	Hiba Waqas	3.56	F	Database
	Fatima Waheed	3.96	F	Social Ethics
	Zakriya Ibrahim	3.72	M	Database

Fig.23 Output of previous statement in MySQL Workbench

```

5 • SELECT *
6   from teachers
7   where designation = 'Assistant Professor';

```

Fig.24 Select all from teachers where teachers designation is Assistant Professor

	Teacher_ID	Designation	Qualification	Joining_Date	Teacher_Name
▶	1	Assistant Professor	Masters in Control Engineering	2007-11-12	Sir Rafay Chughtai
	2	Assistant Professor	Masters in Electronics	2007-10-10	Sir Fahad Ijaz

Fig.25 Output of previous statement in MySQL Workbench

```

8 • alter table teachers
9   add column (salary real);

```

Fig.26 Alter command in MySQL Workbench

	Teacher_ID	Designation	Qualification	Joining_Date	Teacher_Name	salary
▶	1	Assistant Professor	Masters in Control Engineering	2007-11-12	Sir Rafay Chughtai	NULL
	2	Assistant Professor	Masters in Electronics	2007-10-10	Sir Fahad Ijaz	NULL
	3	Professor	Phd in Communications	2007-10-10	Dr. Umar Rashid	NULL
	4	Professor	Phd in Power	2022-10-12	Dr. Bilal Anwar	NULL
	5	Professor	Phd in Computer	2017-10-04	Dr. Farukh Arsalan	NULL
	6	Professor	Phd in Computer	2019-10-02	Dr. Bilal Wajid	NULL
	7	Associate Professor	Phd in Electronics	2012-10-10	Maam Hifsa Shahid	NULL
	8	Associate Professor	Masters in Power	2011-10-09	Sir Fahim Gohar	NULL

Fig.27 Output of Alter command in MySQL Workbench

```

10 • UPDATE teachers
11   SET salary = 20000
12   WHERE Teacher_ID = 4;

```

Fig.28 Update command in MySQL Workbench

	Teacher_ID	Designation	Qualification	Joining_Date	Teacher_Name	salary
▶	1	Assistant Professor	Masters in Control Engineering	2007-11-12	Sir Rafay Chughtai	50000
	2	Assistant Professor	Masters in Electronics	2007-10-10	Sir Fahad Ijaz	NULL
	3	Professor	Phd in Communications	2007-10-10	Dr. Umar Rashid	100000
	4	Professor	Phd in Power	2022-10-12	Dr. Bilal Anwar	20000

Fig.29 Output of Update command in MySQL Workbench

```

14 • select S.Student_name, C.course_name
15   from Students S, courses C , student_courses W
16  where S.Student_id = W.student_id And C.course_id = W.course_id
17  and C.course_id = 340;

```

Fig.30 Select students who read course having id 340

	Student_name	course_name
▶	Marwa Omar	Control Systems
	Fatima Amjad	Control Systems

Fig.31 Output of previous statement in MySQL Workbench

```

19 • select *
20 from courses
21 where credit_hours < 3;

```

Fig.32 Select courses whose credit hours are less than 3

	Course_ID	Course_Name	Credit_Hours
▶	129	Chinese Language	0
	345	Sociology	2
	355	Social Ethics	2
	358	Communication Skills	2

Fig.33 Output of previous statement in MySQL Workbench

IV. Conclusion

The University Database Management System (UDMS) is an important tool for managing the data and information of a university. The use of MySQL as the database management system was a good choice, as it is a widely-used and reliable system with good performance characteristics. The development methodology used for the project ensured that the system met the requirements of stakeholders and was tested thoroughly before deployment.

The report also discussed the benefits of UDMS, including improved efficiency in managing university operations, better tracking of student progress, and easier management of billing and financial operations. Additionally, the report highlighted the potential for future research in the field of university database management systems, such as exploring the use of artificial intelligence and machine learning to improve system performance and functionality.

Overall, the UDMS project report demonstrated the importance of effective database management systems in managing the data and information of a university. The project successfully developed a system that met the requirements of stakeholders and provided significant benefits to the university. It is hoped that this project report will serve as a useful resource for future research in the field of university database management systems.