

Final Project Report:

University's Dorms

Database Management

CCCS 215 – CY9

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Phase One: Project Proposal

1.1: Problem description

Maintaining university dorm records plays a big part in keeping the university records organized, which help universities to improve and develop in several areas. It's also essential for any educational institution to conserve these records to keep up on their data management.

Without such records a university may face many issues on tracking dorm rooms. Such as: whether a room is available or not, if the room is assigned to a student, faculty or a staff, and maintenance history.

1.2: Identification of the information needs

To create these records some information will be needed. And these information are Names, unique identifying number, dates, unit numbers, buildings number and maintenance type.

1.3: Entities

- Employees
- Staff
- Faculty

- Students
- Graduate
- Undergraduate

- Rooms

- Maintenance history

- Residents

Phase Two: **Rules & EER Diagram**

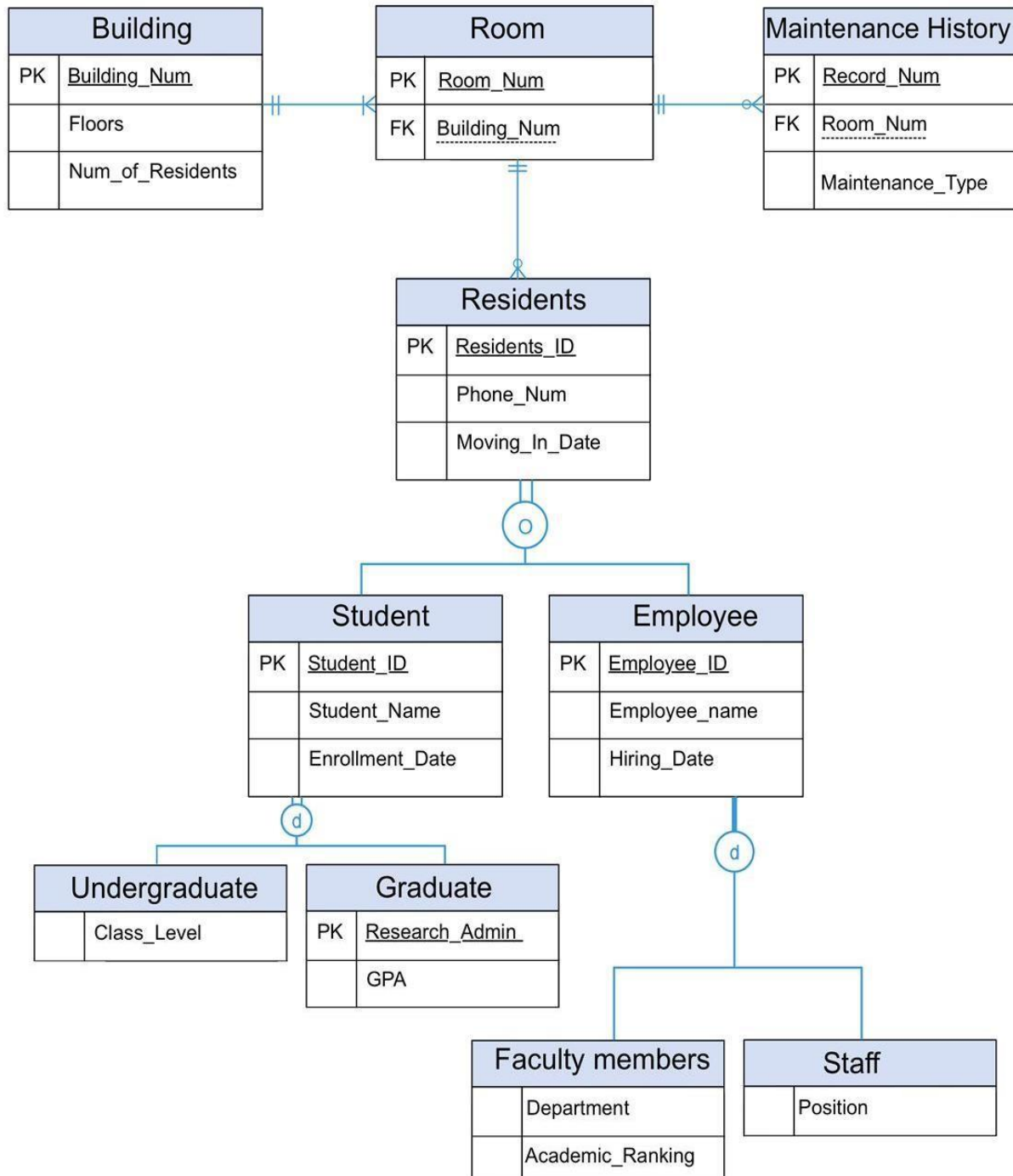
2.1: **University's dorms database management rules.**

In our university's dorms database management, we insure to meet certain criteria in order to build an organized database. And our rules are:

- Each building must have rooms, and all rooms must be in building.
- Rooms may have a maintenance history, and every maintenance history must be assigned to a Room.
- Each room may have a resident, and all residents must have a room.
- Residents can be a student, an employee or both.
- A student can be a graduate or undergraduate.
- An employee may be a faculty member, staff or neither.

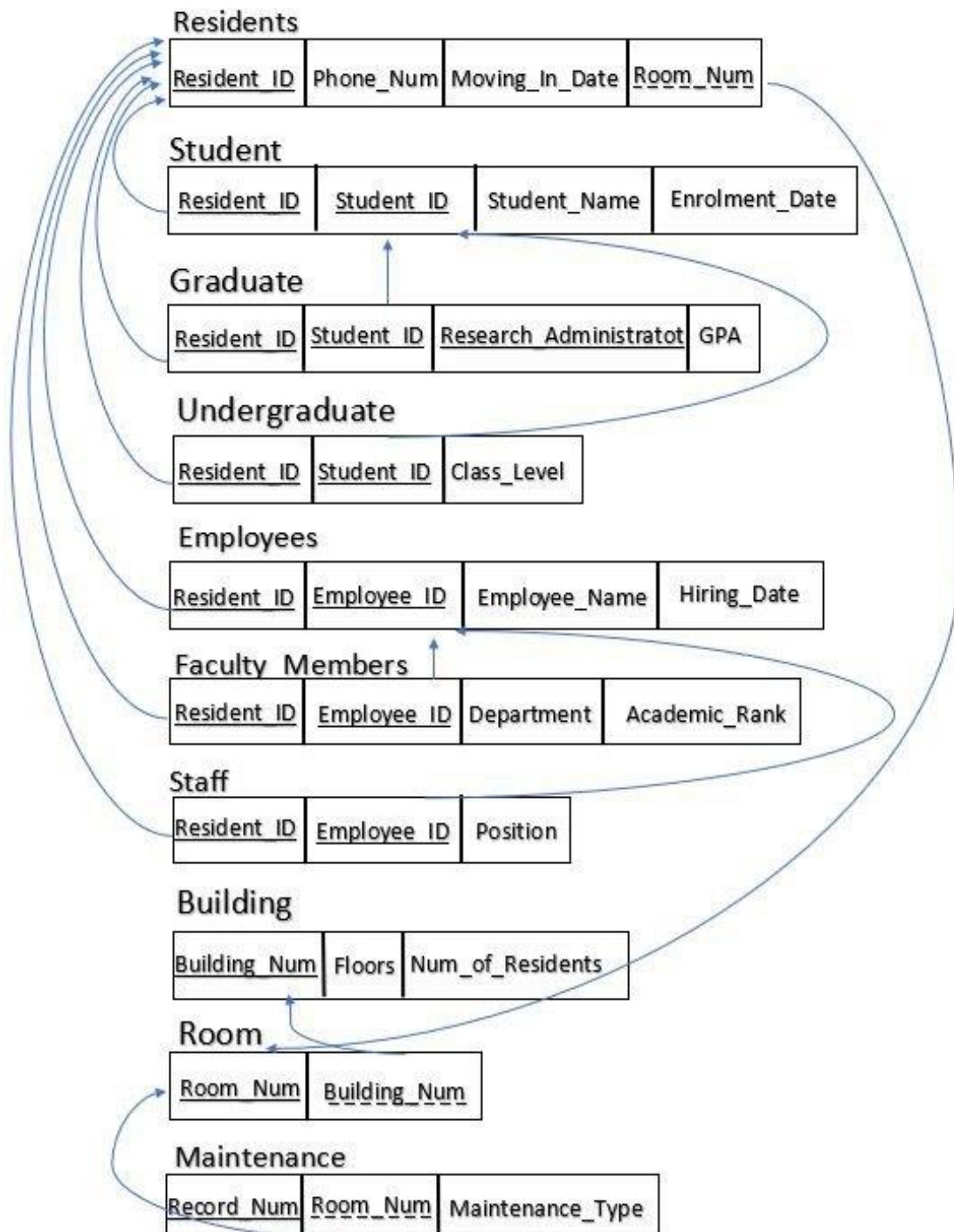
To sum our rules up we designed an EER diagram and relational tables.

2.2: EER Diagram



Phase Three: **Relation & Normalization**

3.1: **Relational Tables**



3.2: Normalizing the Tables

Building

UNF:

Building (Building_Num, Floors, Num_Of_Residents)

1NF:

Building (Building_Num, Floors, Num_Of_Residents)

2NF, 3NF:

There is no partial dependency nor transitive dependency.

The above relations are all in 2NF, 3NF already.

Room

UNF:

Room (Room_No, #Building_Num)

1NF:

Room (Room_No, #Building_Num)

2NF, 3NF:

There is no partial dependency nor transitive dependency.

The above relations are all in 2NF, 3NF already.

Maintenance

UNF:

Maintenance (Record_Num, #Room_Num, Maintenance_Type)

1NF:

Maintenance (Record_Num, #Room_Num, Maintenance_Type)

2NF, 3NF:

There is no partial dependency nor transitive dependency.

The above relations are all in 2NF, 3NF already.

Residents

UNF:

Resident (Resident_ID ,Phone_Num ,Moving_In_Date,# Room_Num)

1NF:

Resident (Resident_ID ,Phone_Num ,Moving_In_Date,# Room_Num)

2NF, 3NF:

There is no partial dependency nor transitive dependency.

The above relations are all in 2NF, 3NF already.

Employee

UNF:

Employee(Residents_ID,Employee_ID,Employee_name,Hiring_Date)

1NF:

Employee(Residents_ID , Employee_ID,Employee_name,Hiring_Date)

2NF:

Employee(Residents_ID , #Employee_ID)

Employee_det(Employee_ID , Employee_name,Hiring_Date) 3NF:

There is no transitive dependency.

The above relations are all in 3NF already.

Faculty_Members

UNF:

Faculty_Members(Residents_ID, Employee_ID, Department ,
Academic_Ranking)

1NF:

Faculty_Members(Residents_ID, Employee_ID, Department,
Academic_Ranking)

2NF:

Faculty_Members(Residents_ID, #Employee_ID)

Employee_Member(Employee_ID, Department, Academic_Ranking)

3NF:

There is no transitive dependency.

The above relations are all in 3NF already.

Staff

UNF:

Staff (Residents_ID, Employee_ID, Department, Position)

1NF:

Staff (Residents_ID, Employee_ID, Department, Position)

2NF:

Staff (Residents_ID, Employee_ID)

Staff (#Employee_ID, Position)

3NF:

There is no transitive dependency.

The above relations are in 3NF already

Student

UNF:

Student(Resident_ID, Student_ID, Student_Name, Enrollment_Date)

1NF:

Student(Resident_ID, Student_ID, Student_Name, Enrollment_Date)

2NF:

Student(Student_ID, Student_Name, Enrollment_Date)

Student_Resident(Resident_ID, #Student_ID)

3NF:

There is no transitive dependency.

The above relations are all in 3NF already.

Graduate

UNF:

Graduate(Resident_ID, Student_ID, Research_Administrator, GPA)

1NF:

Graduate(Resident_ID, Student_ID, Research_Administrator, GPA)

2NF:

Graduate(Resident_ID, Student_ID, Research_Administrator)

Graduate_Research(#Student_ID, Research_Administrator)

graduate_GPA(Student_ID, GPA)

3NF:

There is no transitive dependency.

The above relations are all in 3NF already.

Undergraduate

UNF:

Undergraduate (Resident_ID, Student_ID, Class_Level)

1NF:

Undergraduate (Resident_ID, Student_ID, Class_Level)

2NF:

Undergraduate(Resident_ID, #Student_ID)

Undergraduate_lvl(Student_ID, Class_Level)

3NF:

There is no transitive dependency.

The above relations are all in 3NF already.

Phase Four: **Creating the Tables**

Code:

```
CREATE TABLE Building(  
    Bulding_Num NUMBER(4) PRIMARY KEY,  
    Floors NUMBER(2),  
    Num_of_resident NUMBER(4)  
);  
  
CREATE TABLE Room (  
    Room_NUM NUMBER(4) PRIMARY KEY,  
    Bulding_Num NUMBER(4),  
    FOREIGN KEY (Bulding_Num) REFERENCES Building(Bulding_Num)  
);  
  
CREATE TABLE Maintenance(  
    Record_Num NUMBER(6) PRIMARY KEY,  
    Maintenance_Type VARCHAR2(20),  
    Room_NUM NUMBER(4),  
    FOREIGN KEY (Room_NUM) REFERENCES Room(Room_NUM)  
);  
  
CREATE TABLE Residents(  
    Residents_ID NUMBER(7) PRIMARY KEY,  
    Phone_Num NUMBER(10),  
    Room_NUM NUMBER(4),  
    Moving_In_Date DATE,  
    FOREIGN KEY (Room_NUM) REFERENCES Room (Room_NUM)  
);  
  
CREATE TABLE Employee(  
    Residents_ID NUMBER(7),  
    Employee_ID NUMBER(7) PRIMARY KEY,  
    Employee_Name VARCHAR2(15),  
    Hiring_Date DATE,
```

FOREIGN KEY (Residents_ID) **REFERENCES** Residents (Residents_ID)

);

CREATE TABLE FacultyMembers(

Residents_ID **NUMBER**(7),

Employee_ID **NUMBER**(7),

Department **VARCHAR2**(20),

Academic_Ranking **VARCHAR2**(20),

FOREIGN KEY (Residents_ID) **REFERENCES** Residents (Residents_ID),

FOREIGN KEY (Employee_ID) **REFERENCES** Employee (Employee_ID)

);

CREATE TABLE Staff(

Residents_ID **NUMBER**(7),

Employee_ID **NUMBER**(7),

Staff_Position **VARCHAR2**(20),

FOREIGN KEY (Residents_ID) **REFERENCES** Residents (Residents_ID),

FOREIGN KEY (Employee_ID) **REFERENCES** Employee (Employee_ID)

);

CREATE TABLE Student (

Residents_ID **NUMBER**(7),

Student_ID **NUMBER**(7) **PRIMARY KEY**,

Student_Name **VARCHAR**(15),

Enrollment_Date **DATE**,

FOREIGN KEY (Residents_ID) **REFERENCES** Residents (Residents_ID)

);

CREATE TABLE Graduate (

Residents_ID **NUMBER**(7),

Student_ID **NUMBER**(7),

Research_Admin **VARCHAR2**(15) **PRIMARY KEY**,

GPA **NUMBER**(4),

FOREIGN KEY (Residents_ID) **REFERENCES** Residents (Residents_ID),

FOREIGN KEY (Student_ID) **REFERENCES** Student (Student_ID)

```
);

CREATE TABLE Ungraduated (

Residents_ID NUMBER(7),

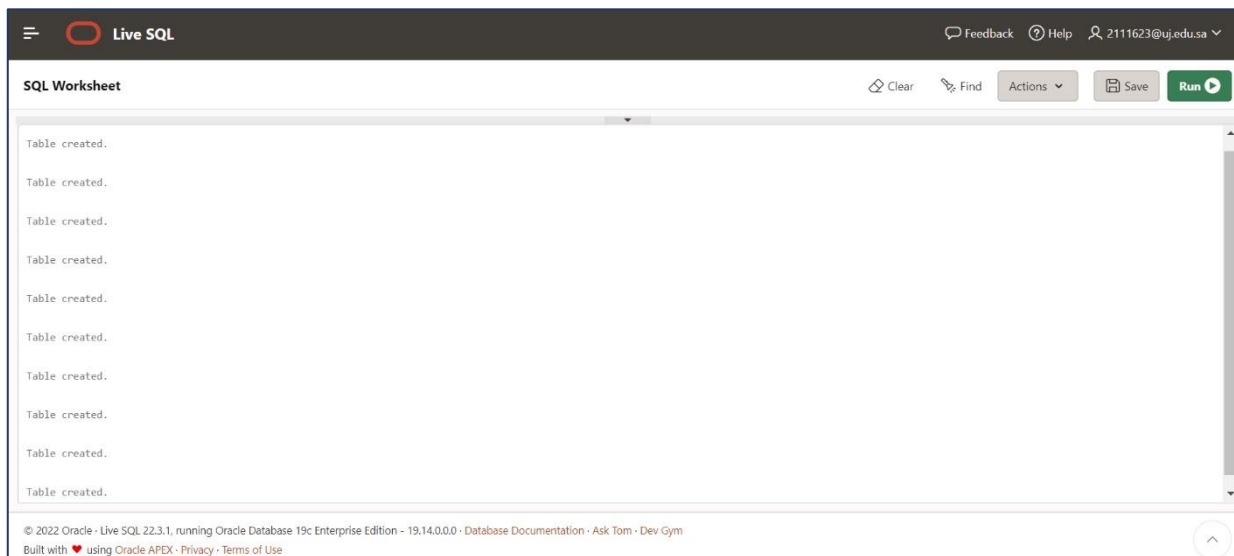
Student_ID NUMBER(7),

Class_Level NUMBER(2),

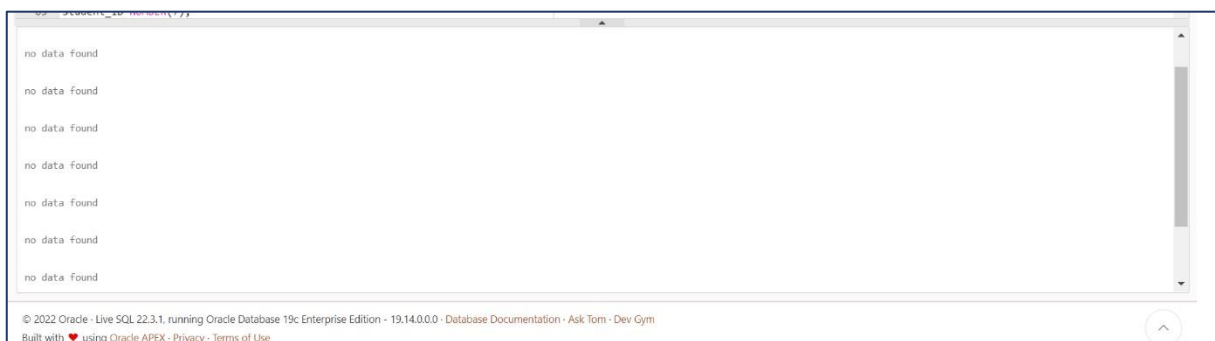
FOREIGN KEY (Residents_ID) REFERENCES Residents (Residents_ID),

FOREIGN KEY (Student_ID) REFERENCES Student (Student_ID)

);
```



Tables Before Populating:



Phase Four: **Populating the Tables**

Code:

```
INSERT INTO Building VALUES (1000, 20, 500);
```

```
INSERT INTO Building VALUES (2100, 17, 350);
```

```
INSERT INTO Building VALUES (3400, 15, 300);
```

```
INSERT INTO Building VALUES (6050, 22, 550);
```

```
INSERT INTO Building VALUES (6080, 22, 600);
```

```
INSERT INTO Room VALUES (1903, 1000);
```

```
INSERT INTO Room VALUES (1202, 2100);
```

```
INSERT INTO Room VALUES (302, 3400);
```

```
INSERT INTO Room VALUES (2019, 6050);
```

```
INSERT INTO Room VALUES (2102, 6080);
```

```
INSERT INTO Room VALUES (1712, 1000);
```

```
INSERT INTO Room VALUES (204, 2100);
```

```
INSERT INTO Room VALUES (505, 3400);
```

```
INSERT INTO Room VALUES (2202, 6050);
```

```
INSERT INTO Room VALUES (2002, 6080);
```

```
INSERT INTO Room VALUES (112, 1000);
```

```
INSERT INTO Room VALUES (1302, 2100);
```

```
INSERT INTO Room VALUES (614, 3400);
```

```
INSERT INTO Room VALUES (1502, 6050);
```

```
INSERT INTO Room VALUES (1103, 6080);
```

```
INSERT INTO Room VALUES (1201, 1000);
```

```
INSERT INTO Room VALUES (412, 2100);
```

```
INSERT INTO Room VALUES (704, 3400);
```

```
INSERT INTO Room VALUES (1012, 6050);
```

```
INSERT INTO Room VALUES (1801, 6080);
```

```
INSERT INTO Maintenance VALUES (111447, 'Air conditioning', 1903);
```

```
INSERT INTO Maintenance VALUES (232358, 'Lights', 1202);
```

INSERT INTO Maintenance VALUES (221170, 'Pipes' 302);

INSERT INTO Maintenance VALUES (413009, 'Kitchen', 2019);

INSERT INTO Maintenance VALUES (122057, 'Lights', 2102);

INSERT INTO Residents VALUES (2111623, 0500000510, 1903, '09-DEC-2020');

INSERT INTO Residents VALUES (1811072, 0555000522, 1202, '20-NOV-2019');

INSERT INTO Residents VALUES (2111527, 0505500123, 302, '15-JUL-2021');

INSERT INTO Residents VALUES (1600000, 0543000999, 2019, '04-APR-2017');

INSERT INTO Residents VALUES (2111119, 0543200577, 2102, '19-MAR-2022');

INSERT INTO Residents VALUES (2011555, 0500004412, 1712, '29-FEB-2020');

INSERT INTO Residents VALUES (1990066, 0555022101, 204, '11-NOV-2018');

INSERT INTO Residents VALUES (1855920, 0505503302, 505, '15-JUL-2017');

INSERT INTO Residents VALUES (1863388, 0543000821, 2202, '04-APR-2017');

INSERT INTO Residents VALUES (1775050, 0543200921, 2002, '19-MAR-2016');

INSERT INTO Residents VALUES (0400099, 0500056560, 112, '01-DEC-2012');

INSERT INTO Residents VALUES (0338801, 0555096102, 1302, '26-AUG-2014');

INSERT INTO Residents VALUES (1003877, 0505554303, 614, '14-SEP-2015');

INSERT INTO Residents VALUES (0441201, 0543011319, 1502, '28-JAN-2013');

INSERT INTO Residents VALUES (0442399, 0543210337, 1103, '19-MAR-2015');

INSERT INTO Residents VALUES (0400123, 0500672391, 1201, '31-OCT-2011');

INSERT INTO Residents VALUES (0344231, 0555906122, 412, '26-JUN-2012');

INSERT INTO Residents VALUES (1003229, 0505505284, 704, '13-SEP-2012');

INSERT INTO Residents VALUES (0402401, 0545016289, 1012, '21-JAN-2013');

INSERT INTO Residents VALUES (0448201, 0543021362, 1801, '07-JUL-2014');

INSERT INTO Employee VALUES (2111623, 4411194, 'Rana', '18-NOV-2019');

INSERT INTO Employee VALUES (1811072, 4411834, 'Amal', '01-MAR-2018');

INSERT INTO Employee VALUES (2111527, 4529322, 'Renad', '15-SEP-2020');

INSERT INTO Employee VALUES (1600000, 4201234, 'Amani', '12-JAN-2016');

INSERT INTO Employee VALUES (2111119, 4522548, 'Dina', '25-AUG-2021');

INSERT INTO Employee VALUES (2011555, 4454854, 'Sara', '03-JAN-2019');

INSERT INTO Employee VALUES (1990066, 4348375, 'Ahlam', '16-OCT-2019');

INSERT INTO Employee VALUES (1855920, 4233957, 'Lina', '13-JUL-2016');
INSERT INTO Employee VALUES (1863388, 4298768, 'Tala', '12-SEP-2016');
INSERT INTO Employee VALUES (1775050, 4141865, 'Salma', '25-AUG-2015');

INSERT INTO FacultyMembers VALUES(2111623, 4411194, 'Computer Science', 'Professor');
INSERT INTO FacultyMembers VALUES(1811072, 4411834, 'Psychology', 'Lecturer');
INSERT INTO FacultyMembers VALUES(2111527, 4529322, 'Business', 'Assistant Professor');
INSERT INTO FacultyMembers VALUES(1600000, 4201234, 'Geography', 'Lecturer');
INSERT INTO FacultyMembers VALUES(2111119, 4522548, 'Pharmacy', 'Assistant Professor');

INSERT INTO Staff VALUES(2011555, 4454854, 'Chancellor');
INSERT INTO Staff VALUES(1990066, 4348375, 'Dean');
INSERT INTO Staff VALUES(1855920, 4233957, 'Head of department');
INSERT INTO Staff VALUES(1863388, 4298768, 'Registrar');
INSERT INTO Staff VALUES(1775050, 4141865, 'Secretary');

INSERT INTO Student VALUES (0400099, 2111072, 'Lama', '20-NOV-2011');
INSERT INTO Student VALUES (0338801, 1720485, 'Danah', '26-OCT-2013');
INSERT INTO Student VALUES (1003877, 1478374, 'Lara', '18-SEP-2014');
INSERT INTO Student VALUES (0441201, 1837475, 'Nuha', '20-JAN-2012');
INSERT INTO Student VALUES (0442399, 1375749, 'Reem', '02-JUL-2014');
INSERT INTO Student VALUES (0400123, 2020236, 'Lamar', '02-MAR-2012');
INSERT INTO Student VALUES (0344231, 1628374, 'Manar', '13-JUN-2011');
INSERT INTO Student VALUES (1003229, 1173547, 'Amal', '12-OCT-2011');
INSERT INTO Student VALUES (0402401, 1027465, 'Hala', '11-JAN-2012');
INSERT INTO Student VALUES (0448201, 1037485, 'Rana', '07-JUL-2013');

INSERT INTO Graduate VALUES (0400099, 2111072, 'sara', 4.12);

INSERT INTO Graduate VALUES (0338801, 1720485, 'Rahma', 4.05);

INSERT INTO Graduate VALUES (1003877, 1478374, 'Mariam', 4.75);

INSERT INTO Graduate VALUES (0441201, 1837475, 'Sara', 4.90);

INSERT INTO Graduate VALUES (0442399, 1375749, 'Deem', 4.53);

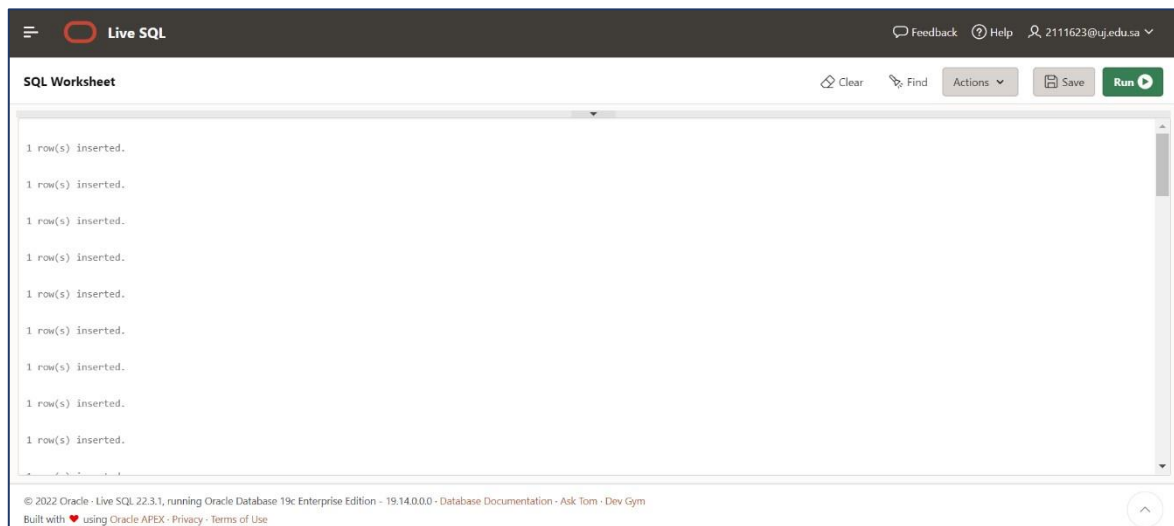
INSERT INTO Ungraduated VALUES (0400123, 2020236, 1);

INSERT INTO Ungraduated VALUES (0344231, 1628374, 5);

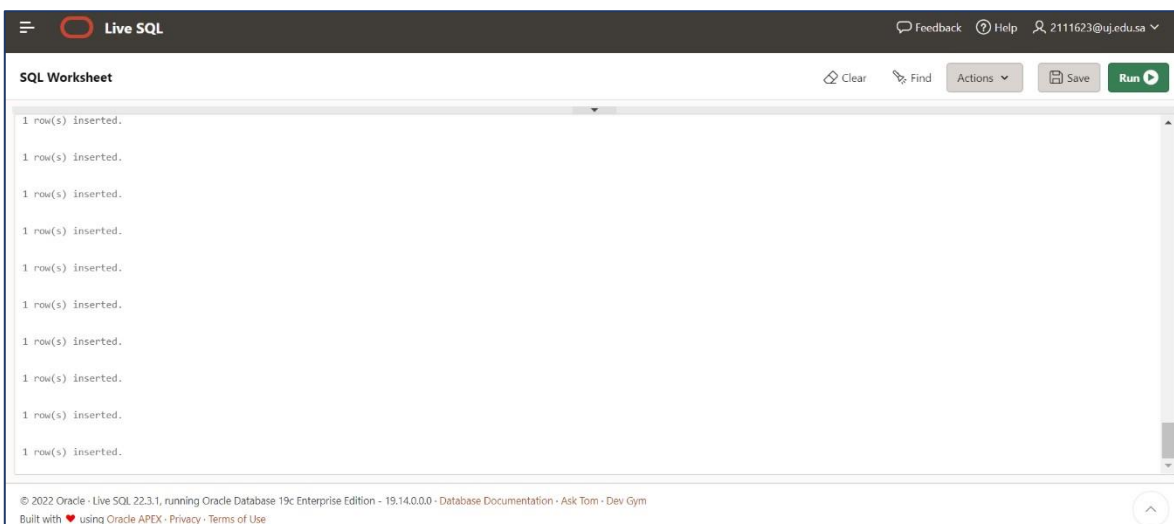
INSERT INTO Ungraduated VALUES (1003229, 1173547, 6);

INSERT INTO Ungraduated VALUES (0402401, 1027465, 2);

INSERT INTO Ungraduated VALUES (0448201, 1037485, 3);



The screenshot shows the Live SQL interface with a dark header bar containing the 'Live SQL' logo, a 'Feedback' link, a 'Help' icon, and a user profile icon with the email '2111623@uj.edu.sa'. Below the header is a toolbar with 'Clear', 'Find', 'Actions', 'Save', and 'Run' buttons. The main area is titled 'SQL Worksheet' and displays 10 lines of output, each stating '1 row(s) inserted.'. At the bottom, a footer contains copyright information: '© 2022 Oracle - Live SQL 22.3.1, running Oracle Database 19c Enterprise Edition - 19.14.0.0.0 - Database Documentation - Ask Tom - Dev Gym' and a note 'Built with using Oracle APEX - Privacy - Terms of Use'.



This screenshot is identical to the one above, showing the Live SQL interface with the same header, toolbar, and 'SQL Worksheet' output area displaying 10 '1 row(s) inserted.' messages. The footer information is also the same.

Tables After Population:

BULDING_NUM	FLOORS	NUM_OF_RESIDENT
1000	20	500
2100	17	350
3400	15	300
6050	22	550
6080	22	600

[Download CSV](#)
5 rows selected.

Building Table

ROOM_NUM	BULDING_NUM		
1903	1000	112	1000
1202	2100	1302	2100
302	3400	614	3400
2019	6050	1502	6050
2102	6080	1103	6080
1712	1000	1201	1000
204	2100	412	2100
505	3400	704	3400
2202	6050	1012	6050
2002	6080	1801	6080

[Download CSV](#)
20 rows selected.

Room Table

RECORD_NUM	MAINTENANCE_TYPE	ROOM_NUM
111447	Air conditioning	1903
232358	Lights	1202
221170	Pipes	302
413009	Kitchen	2019
122057	Lights	2102

[Download CSV](#)
5 rows selected.

Maintenance Table

RESIDENTS_ID	PHONE_NUM	ROOM_NUM	MOVING_IN_DATE
2111623	500000510	1903	09-DEC-20
1811072	555000522	1202	20-NOV-19
2111527	505500123	302	15-JUL-21
1600000	543000999	2019	04-APR-17
2111119	543200577	2102	19-MAR-22
2011555	500004412	1712	29-FEB-20
1990066	555022101	204	11-NOV-18
1855920	505503302	505	15-JUL-17
1863388	543000821	2202	04-APR-17
1775050	543200921	2002	19-MAR-16
400099	500056560	112	01-DEC-12
338801	555096102	1302	26-AUG-14
1003877	505554303	614	14-SEP-15
441201	543011319	1502	28-JAN-13
442399	543210337	1103	19-MAR-15
400123	500672391	1201	31-OCT-11
344231	555906122	412	26-JUN-12
1003229	505505284	704	13-SEP-12
402401	545016289	1012	21-JAN-13
448201	543021362	1801	07-JUL-14

Download CSV
20 rows selected.

Residents Table

RESIDENTS_ID	STUDENT_ID	CLASS_LEVEL
400123	2020236	1
344231	1628374	5
1003229	1173547	6
402401	1027465	2
448201	1037485	3

Download CSV
5 rows selected.

Undergraduate Table

RESIDENTS_ID	EMPLOYEE_ID	DEPARTMENT	ACADEMIC_RANKING
2111623	4411194	Computer Science	Professor
1811072	4411834	Psychology	Lecturer
2111527	4529322	Business	Associate Professor
1600000	4201234	Geography	Lecturer
2111119	4522548	Pharmacy	Assistant Professor

Download CSV
5 rows selected.

FacultyMember Table

RESIDENTS_ID	EMPLOYEE_ID	EMPLOYEE_NAME	HIRING_DATE
2111623	4411194	Rana	18-NOV-19
1811072	4411834	Amal	01-MAR-18
2111527	4529322	Renad	15-SEP-20
1600000	4201234	Amani	12-JAN-16
2111119	4522548	Dina	25-AUG-21
2011555	4454854	Sara	03-JAN-19
1990066	4348375	Ahlam	16-OCT-19
1855920	4233957	Lina	13-JUL-16
1863388	4298768	Tala	12-SEP-16
1775050	4141865	Salma	25-AUG-15

Download CSV
10 rows selected.

Employee Table

RESIDENTS_ID	STUDENT_ID	STUDENT_NAME	ENROLLMENT_DATE
400099	2111072	Lema	20-NOV-11
338801	1720485	Danah	26-OCT-13
1003877	1478374	Lara	18-SEP-14
441201	1837475	Nuha	20-JAN-12
442399	1375749	Reem	02-JUL-14
400123	2020236	Lamar	02-MAR-12
344231	1628374	Manar	13-JUN-11
1003229	1173547	Amal	12-OCT-11
402401	1027465	Hala	11-JAN-12
448201	1037485	Rana	07-JUL-13

Download CSV
10 rows selected.

Student Table

RESIDENTS_ID	STUDENT_ID	RESEARCH_ADMIN	GPA
400099	2111072	sara	4
338801	1720485	Rahma	4
1003877	1478374	Mariam	5
441201	1837475	Sara	5
442399	1375749	Deem	5

Download CSV
5 rows selected.

Graduate Table

RESIDENTS_ID	EMPLOYEE_ID	STAFF_POSITION
2011555	4454854	Chancellor
1990066	4348375	Dean
1855920	4233957	Head of department
1863388	4298768	Registrar
1775050	4141865	Secretary

Download CSV
5 rows selected.

Staff Table

Phase Four: **Implementing Queries on the Tables**

Query 1 : Total number of residents living in building number 6050

Code:

```
SELECT COUNT (Residents_ID) AS Residents_In_6050
FROM Residents
WHERE Room_Num = ANY
      (SELECT Room_Num
      FROM Room
      WHERE Bulding_Num = 6050 );
```

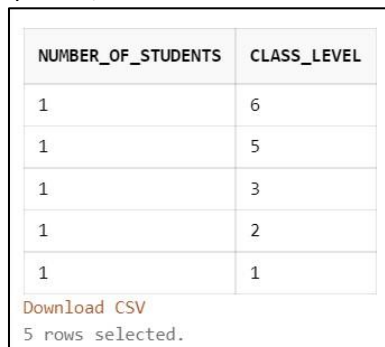


RESIDENTS_IN_6050
4

Download CSV

Query 2 : Total number of students in each class level Code:

```
SELECT COUNT (Student_ID) AS Number_of_Students, Class_Level
From Ungraduated
GROUP BY Class_Level
ORDER BY (Class_Level) DESC;
```



NUMBER_OF_STUDENTS	CLASS_LEVEL
1	6
1	5
1	3
1	2
1	1

Download CSV
5 rows selected.

Query 3 : Listing all residents IDs, their building number, and moving in date

Code:

```
SELECT Residents_ID, Bulding_Num, Moving_In_Date  
FROM Residents  
JOIN Room  
ON Room.Room_NUM = Residents.Room_NUM;
```

RESIDENTS_ID	BULDING_NUM	MOVING_IN_DATE
2111623	1000	09-DEC-20
1811072	2100	20-NOV-19
2111527	3400	15-JUL-21
1600000	6050	04-APR-17
2111119	6080	19-MAR-22
2011555	1000	29-FEB-20
1990066	2100	11-NOV-18
1855920	3400	15-JUL-17
1863388	6050	04-APR-17
1775050	6080	19-MAR-16
400099	1000	01-DEC-12
338801	2100	26-AUG-14
1003877	3400	14-SEP-15
441201	6050	28-JAN-13
442399	6080	19-MAR-15
400123	1000	31-OCT-11
344231	2100	26-JUN-12
1003229	3400	13-SEP-12
402401	6050	21-JAN-13
448201	6080	07-JUL-14

Download CSV
20 rows selected.

Query 4 : Listing all assistant professors names Code:

```
SELECT Employee_Name  
FROM Employee  
WHERE Employee_ID = ANY  
(SELECT Employee_ID FROM FacultyMembers WHERE Academic_Ranking  
= 'Assistant Professor');
```

EMPLOYEE_NAME
Dina
Renad

Download CSV
2 rows selected.