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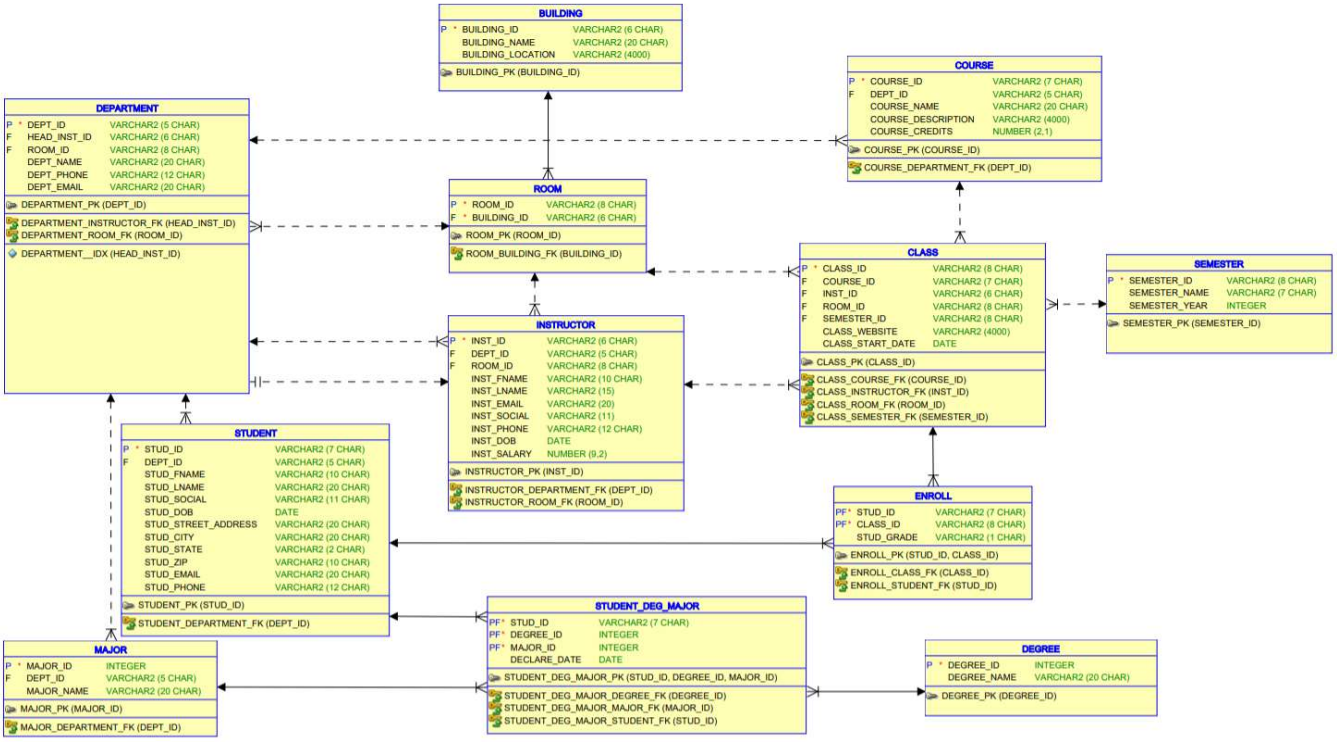
MCIS 510

Milestone 3

Normalization of Database Tables

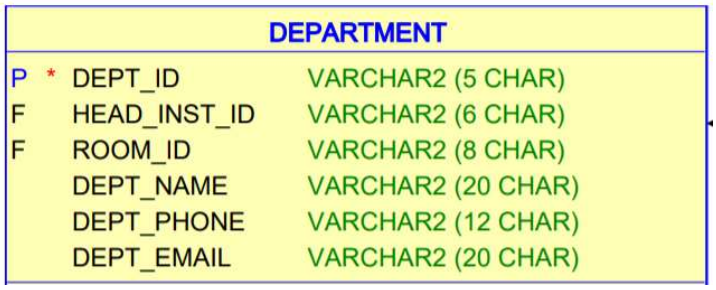
For this milestone, we are asked to Normalize our Database Tables to Third Normal Form (3NF). First, we must ensure the tables are in First Normal Form (1NF). A table is in 1NF if the relation has no repeating groups, has a primary key identified, and all non-key attributes are dependent on the primary key. Next, we must ensure the tables are in Second Normal Form (2NF). A table is in 2NF if the relation satisfies 1NF and there are no partial dependencies. Finally, a table is in 3NF if it is in 2NF and there are no transitive dependencies.

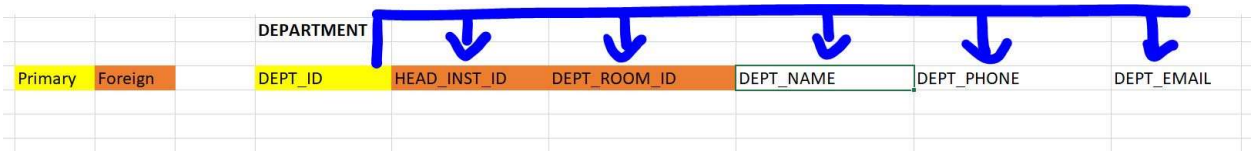
We will be evaluating the physical model that was created in Milestone 2.



Considering our Relations:

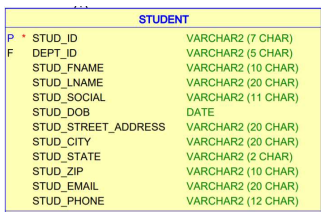
1)





We can observe that (DEPT_ID) -> (HEAD_INST_ID, DEPT_ROOM_ID, DEPT_NAME, DEPT_PHONE, DEPT_EMAIL). Each attribute is atomic, so there are no repeating groups. Each non-key attribute is dependent on the primary key. Therefore, this table is in 1NF. The relation also does not have any partial dependencies, so this table is in 2NF. Finally, there are no transitive dependencies, so this table is in 3NF.

2)



We can observe that (STUD_ID) -> (DEPT_ID, STUD_FNAME, STUD_LNAME, STUD_SOCIAL, STUD_DOB, STUD_STREET_ADDRESS, STUD_CITY, STUD_STATE, STUD_ZIP, STUD_EMAIL, STUD_PHONE). Each attribute is atomic, so there are no repeating groups. Each non-key attribute is dependent on the primary key. Therefore, this table is in 1NF. The relation also does not have any partial dependencies, so this table is in 2NF. Finally, there are no transitive dependencies, so this table is in 3NF.

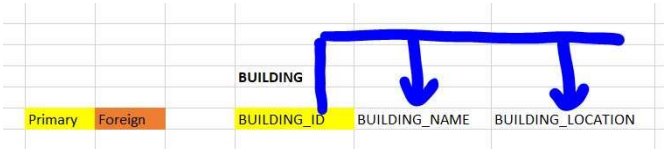
3)

MAJOR		
P *	MAJOR_ID	INTEGER
F	DEPT_ID	VARCHAR2 (5 CHAR)
	MAJOR_NAME	VARCHAR2 (20 CHAR)

We can observe that (MAJOR_ID) -> (DEPT_ID, MAJOR_NAME). Each attribute is atomic, so there are no repeating groups. Each non-key attribute is dependent on the primary key. Therefore, this table is in 1NF. The relation also does not have any partial dependencies, so this table is in 2NF. Finally, there are no transitive dependencies, so this table is in 3NF.

4)

BUILDING		
P *	BUILDING_ID	VARCHAR2 (6 CHAR)
	BUILDING_NAME	VARCHAR2 (20 CHAR)
	BUILDING_LOCATION	VARCHAR2 (4000)



We can observe that (BUILDING_ID) -> (BUILDING_NAME, BUILDING_LOCATION). Each attribute is atomic, so there are no repeating groups. Each non-key attribute is dependent on the primary key. Therefore, this table is in 1NF. The relation also does not have any partial dependencies, so this table is in 2NF. Finally, there are no transitive dependencies, so this table is in 3NF.

5)

ROOM		
P *	ROOM_ID	VARCHAR2 (8 CHAR)
F *	BUILDING_ID	VARCHAR2 (6 CHAR)

We can observe that (ROOM_ID) -> (BUILDING_ID). Each attribute is atomic, so there are no repeating groups. Each non-key attribute is dependent on the primary key. Therefore, this table is in 1NF. The relation also does not have any partial dependencies, so this table is in 2NF. Finally, there are no transitive dependencies, so this table is in 3NF.

6)

INSTRUCTOR		
P *	INST_ID	VARCHAR2 (6 CHAR)
F	DEPT_ID	VARCHAR2 (5 CHAR)
F	ROOM_ID	VARCHAR2 (8 CHAR)
	INST_FNAME	VARCHAR2 (10 CHAR)
	INST_LNAME	VARCHAR2 (15)
	INST_EMAIL	VARCHAR2 (20)
	INST_SOCIAL	VARCHAR2 (11)
	INST_PHONE	VARCHAR2 (12 CHAR)
	INST_DOB	DATE
	INST_SALARY	NUMBER (9,2)

We can observe that (INST_ID) -> (DEPT_ID, ROOM_ID, INST_FNAME, INST_LNAME, INST_EMAIL, INST_SOCIAL, INST_PHONE, INST_DOB, INST_SALARY). Each attribute is atomic, so there are no repeating groups. Each non-key attribute is dependent on the primary key. Therefore, this table is in 1NF. The relation also does not have any partial dependencies, so this table is in 2NF. Finally, there are no transitive dependencies, so this table is in 3NF.

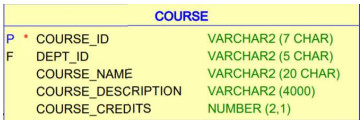
7)

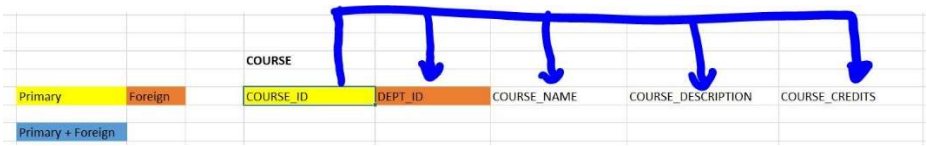
STUDENT_DEG_MAJOR		
PF*	STUD_ID	VARCHAR2 (7 CHAR)
PF*	DEGREE_ID	INTEGER
PF*	MAJOR_ID	INTEGER
	DECLARE_DATE	DATE

We can observe that (STUD_ID + DEGREE_ID + MAJOR_ID) -> (DECLARE_DATE). Each attribute is atomic, so there are no repeating groups. Each non-key attribute is dependent on the primary key. Therefore,

this table is in 1NF. The relation also does not have any partial dependencies, so this table is in 2NF. Finally, there are no transitive dependencies, so this table is in 3NF.

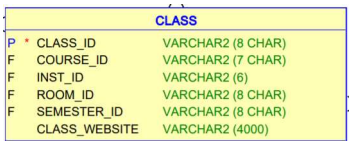
8)

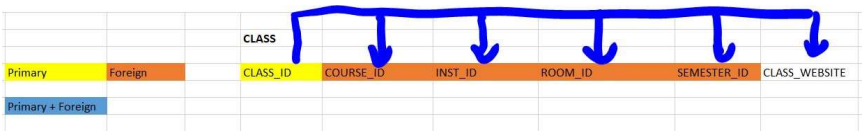




We can observe that (COURSE_ID) -> (DEPT_ID, COURSE_NAME, COURSE_DESCRIPTION, COURSE_CREDITS). Each attribute is atomic, so there are no repeating groups. Each non-key attribute is dependent on the primary key. Therefore, this table is in 1NF. The relation also does not have any partial dependencies, so this table is in 2NF. Finally, there are no transitive dependencies, so this table is in 3NF.

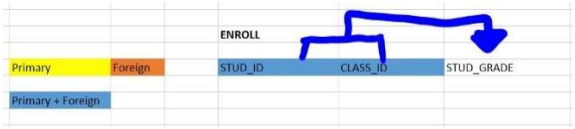
9)





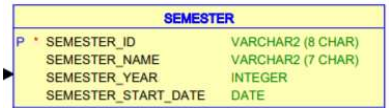
We can observe that (CLASS_ID) -> (COUSE_ID, INST_ID, ROOM_ID, SEMESTER_ID, CLASS_WEBSITE). Each attribute is atomic, so there are no repeating groups. Each non-key attribute is dependent on the primary key. Therefore, this table is in 1NF. The relation also does not have any partial dependencies, so this table is in 2NF. Finally, there are no transitive dependencies, so this table is in 3NF.

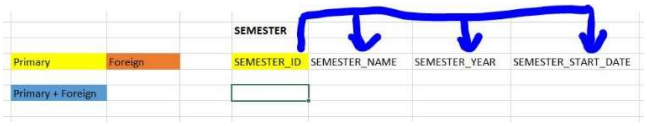
10)



We can observe that (STUD_ID + CLASS_ID) -> (STUD_GRADE). Each attribute is atomic, so there are no repeating groups. Each non-key attribute is dependent on the primary key. Therefore, this table is in 1NF. The relation also does not have any partial dependencies, so this table is in 2NF. Finally, there are no transitive dependencies, so this table is in 3NF.

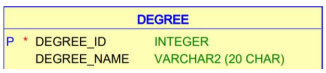
11)





We can observe that (SEMESTER_ID) -> (SEMESTER_NAME, SEMESTER_YEAR, SEMESTER_START_DATE). Each attribute is atomic, so there are no repeating groups. Each non-key attribute is dependent on the primary key. Therefore, this table is in 1NF. The relation also does not have any partial dependencies, so this table is in 2NF. Finally, there are no transitive dependencies, so this table is in 3NF.

12)



We can observe that (DEGREE_ID) -> (DEGREE_NAME). Each attribute is atomic, so there are no repeating groups. Each non-key attribute is dependent on the primary key. Therefore, this table is in 1NF. The relation also does not have any partial dependencies, so this table is in 2NF. Finally, there are no transitive dependencies, so this table is in 3NF.