**CS1765 DATABASE MANAGEMENT SYSTEMS**

Assignment 1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **STUDENT** |  |  |  |  |
| StudentName | StudentID | Class | Major |  |
| Kennedy | 26179923 | Fr | BIO |  |
| Marshall | 28345612 | Ju | CS |  |
| Jones | 28672356 | Ju | MATH |  |
|  |  |  |  |  |
| **COURSE** |  |  |  |  |
| CourseName | CourseID | Department | CreditHours |  |
| Intro to Computer Science | CS0101 | CS | 3 |  |
| Data Structures | CS0501 | CS | 3 |  |
| Intro to Biology | BIO0101 | BIO | 3 |  |
| Calculus 1 | MATH0101 | MATH | 4 |  |
| English Composition | ENG0101 | ENG | 3 |  |
|  |  |  |  |  |
| **SECTION** |  |  |  |  |
| SectionID | CourseID | Semester | Year | Instructor |
| 102345 | CS0101 | Fall | 2018 | Smith |
| 128453 | CS0101 | Fall | 2019 | Smith |
| 113982 | MATH0101 | Spring | 2019 | Hoke |
| 123900 | MATH0201 | Spring | 2019 | Lake |
| 104533 | MATH0101 | Fall | 2018 | King |
| 118349 | BIO1201 | Spring | 2019 | Jonah |
|  |  |  |  |  |
| **GRADES** |  |  |  |  |
| StudentNumber | SectionID | Grade |  |  |
| 80234299 | 102345 | B |  |  |
| 26179923 | 121345 | A- |  |  |
| 71290453 | 128453 | C |  |  |
| 71290453 | 107283 | D |  |  |
| 53928109 | 129873 | C+ |  |  |
|  |  |  |  |  |
| **PREREQUISITE** |  |  |  |  |
| CourseID | PreRequisite |  |  |  |
| CS0501 | CS0401 |  |  |  |
| MATH0101 | MATH0051 |  |  |  |
| MATH0201 | MATH0101 |  |  |  |
| BIO1201 | BIO1001 |  |  |  |

The database instance on this page shows **some** possible records/tuples in a database for a college. When doing the questions on the back, assume that the tables are filled with thousands of records.

1. How many tables/relations in the database? **5**

2. Give an example of an entity in the database. **Student**

3. How many attributes in the COURSE table? **There are 4 attributes in the COURSE table**

4. Give an example of a tuple in the PREREQUISTE relation. **MATH0201 + CS0401**

5. For the three tables below, fill in the degree, cardinality, and candidate key

|  |  |  |  |
| --- | --- | --- | --- |
| Table | Degree | Cardinality | Candidate Key (may be multiple attributes) |
| STUDENT | **4** | **3** | **StudentID** |
| SECTION | **5** | **6** | **Section ID** |
| GRADES | **3** | **5** | **StudentNumber + Section ID** |

6a. In the SECTION table explain why {Semester, Year, Instructor} is not a candidate key.

**Semester, year, and Instructor is not a candidate key in the Section Table because those do not uniquely identify the table. One instructor can teach multiple courses in the same semester and year.**

b. In the SECTION table explain why {SectionID, Semester} is not a candidate key.

**SectionID and Semester is not a candidate key because the same class can be offered twice within the same semester. SectionID is unique, however Semester is not.**

c. Is the statement "**The GRADES table has two candidate keys"** true or false? **Explain your answer clearly and list the candidate key(s).**

SectionID + StudentNumber is a candidate?

7. What is a possible primary key for the PREREQUSITE table? Explain your answer.

**A possible primary key for the PREREQUISITE table is both CourseID+PreRequisite**

8a. For the STUDENT relation, give an example of a superkey which is not a candidate key.

**StudentID + Class**

b. How many possible superkeys are there in the STUDENT relation? (Show work).

**2^(N-1) where n is the number of attributes. In the STUDENT relation, we have 4 attributes.**

**2^(4-1) is 2^3, which is 8. Therefore, we have 8 super keys within the STUDENT relation.**

9. Now suppose that the COURSE table has a primary key of *CourseID*. When is CourseID a foreign key?

**CourseID is a foreign key within the Section table and Grades table.**

10. Give one case where some table could have a NULL entry. Specify the table, attribute and reason.

**Some table that could have a NULL entry is the Grades table. For example, if the Grade has not been entered yet, the Grade will be NULL until there is a grade available to input. Another example could be found in the Course table. If a specific course has NO prereqs, then it would have to be a null entry!**

11. In general, is it possible for a table to not have a candidate key? Explain your answer.

**In general, relational tables must have at least 1 candidate key. If it is not a relational table, then no it is possible for the table to not have a candidate key.**

12. In general, is it possible for a primary key to contain a NULL entry? Explain your answer.

**The primary key must contain unique values. Null is NOT a unique value, therefore primary keys cannot be null.**