## Short Answer questions (20 points)

1. Suppose you a consultant working for a small business and part of responsibility is the design of a database. You tell the manager you report to that you are in the process of normalization of your logical design. He asks you what normalization is and why is it important? Answer his question.
2. Define the term *entity integrity*.
3. Traditionally in database design database designers worried about database performance early in the design process. What is wrong with this approach?
4. Describe the three step process of taking an normalized relation and normalizing to third normal form?
5. What is the difference between weak entity and a strong entity?

## Entity-Relationship Modeling

We will design an entity-relationship diagram for a **Bank** database. The actual instructions are given below the following business rules. This information will be used in questions 6 and 7.

• Each bank has a unique ID, name, and headquarter address. Each bank has many branches, and for each branch we need to keep the branch ID (unique within the bank but not unique across different banks), location, and telephone number.

• Customers can have many accounts at the same branch or at different branches. An account has a unique account ID, type (E.g., saving, or checking), currency (E.g., dollar, euro), and balance.

• A customer can take many loans from different branches, however there are a restriction that a customer cannot take more than one loan from a given branch in the same year. For each loan we need to keep the loan amount and the year.

• Each customer has a SSN (unique ID), name, address, and birth date attributes.

• We need to capture the transactions done by each customer over each account. We capture the type of the transaction (E.g., either withdrawal or deposit), the transaction time, and the amount.

1. Draw an ERD for the proposed **Bank** database. At this time do not include any attributes in your diagram. Be sure to label your relationships and give cardinalities. (20 points)
2. Continuing with the Bank ERD list each entity type. Denote primary keys by underling all attributes included in the primary key. Foreign attributes should be denoted by **FK.** (Entity name) followed by name of the entity to which the foreign key points. An partial example of this notation is given below:

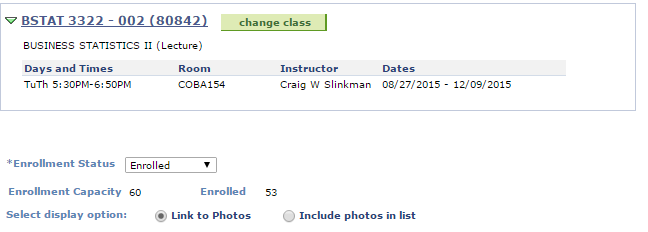
|  |
| --- |
| Entity: Class |
| departmentID |
| name |
| departmentID FK: College |
| chairID: FK: Faculty |

|  |
| --- |
| Entity: Class |
| subjectPrefix |
| number |
| title |
| creditHours |
| departmentID FK: Department |

Write your answer below and on the next page if needed. (20 points)

## Normalization

Consider the following MyMav displays:



|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Please an example of the student enrollment display below:   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | **ID** | **Student** | **Grade**  **Basis** | **Units** | **Program** | Level | **Attendance** | | 44189012 | Ali , Rino | Graded | 3 | Business Intended | Senior | Yes | | 82070817 | Akinmade , Neha | Graded | 3 | Business Intended | Senior | Yes | | 82904451 | Lajqi , Manoella | Graded | 3 | Marketing-BBA | Senior | Yes | | 16138198 | Tran , Juan J | Graded | 3 | Marketing-BBA | Junior | Yes | | 12979443 | Cabanas , Jahaziel | Graded | 3 | Operations Management-BBA | Senior | No | | 14340606 | Valeria , Joan | Graded | 3 | Information Systems-BS | Sophomore | No | | 6517023 | Tate , Christophe | Graded | 3 | Undergraduate - Finance-BBA | Senior | Yes | | 46642444 | Nguyen , Tarek | Graded | 3 | Undergraduate - Finance-BBA | Senior | Yes | | 58646465 | John , David | Graded | 3 | Information Systems-BS | Senior | Yes | | 18435780 | Monga , Anthony | Graded | 3 | Information Systems-BS | Junior | No | | 30282737 | Nguyen , Manisha | Graded | 3 | Undergraduate - Finance-BBA | Sophomore | Yes | | 21624290 | Weis , Jahaziel | Graded | 3 | Management-BBA | Junior | Yes | | 53014980 | Lajqi , Alejandro | Graded | 3 | Marketing-BBA | Sophomore | Yes | | 62589285 | Quach , Nisa G | Graded | 3 | Marketing-BBA | Senior | Yes | | 58942220 | Hughes , Mehdi | Graded | 3 | Undergraduate - Finance-BBA | Senior | Yes | | 29286172 | Nguyen , Alejandro | Graded | 3 | Management-BBA | Senior | Yes | | 82336791 | Lajqi , Christine | Graded | 3 | Management-BBA | Senior | Yes | | 2336812 | Herrera , David | Graded | 3 | Information Systems-BS | Junior | Yes | | 28087373 | Smith , Brittany | Graded | 3 | Management-BBA | Junior | Yes | |  |

Design table third normal form database tables using the above displays as your source information as well as your subject matter knowledge about UTA.