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Homework 1
CMSI 486

1. Some examples of systems that can use traditional file processing include: a local file explorer or a real-time GPS which needs much more processing power than actual data.
2. a) You'll need to change these values:

Table	Column(s)
STUDENT	Major
COURSE	CourseNumber and Department
SECTION	CourseNumber
PREREQUISITE	CourseNumber and PrerequisiteNumber

b)

Table	Columns to change
COURSE	Get rid of Department, only go by Course_number
SECTION	Course_number is already the only column being updated
PREREQUISITE	**Impossible** to adjust columns to only change one

3. The database schema is used upon definition, and is specified in the DBMS. The database state is the empty state without any data in it. The initial database state is obtained when the database is first loaded with data. Each update to the database brings a new database state, while the DBMS ensures that the updated states satisfy the constraints of the schema provided (i.e. is the state valid?).
4. Menu-Based Interfaces for Web Clients or Browsing are popular for web-based user interfaces and often used in browsing interfaces. Forms-Based Interfaces are interfaces where users can fill out form entries to insert new data, or fill out remaining entries. Many DBMS's have forms specification languages, which are special languages to specify these forms. A graphical user interface uses both menus and forms, and is a common interface for people browsing the web. The Natural Language Interface is designed to take a language and interpret it. These are used for interfaces requiring input from a language of some sort, for example, a search engine. Speech Input and Output is an interface using audio as input or output. It is useful for interfaces that are not intended to be viewed, like a simulated phone call. Interfaces for Parametric users are interfaces designed to offer a small set of operations that are going to be used frequently. Examples of people using these interfaces are bank tellers. The last interface is Interfaces for the DBA, which are designed specifically for the DBA staff to allow them to access privileged commands, such as creating accounts or changing a schema.

5. Three-Tier Client/Server Architecture for Web Application is the best choice. The web server can contain application logic, the database server contains the DBMS and the client has the web user interface.

   Centralized DBMS Architecture would not work since the user interface and database server are on different machines for a web-based system.

   Basic Client/Server Architecture and Two-Tier Client/Server Architecture would work if the business logic can reside on server other than the DBMS Server. The business logic can't go on a two tier architecture in a general case.
6. A relation is defined as a set of tuples. Mathematically, elements of a set have no order among them; hence, tuples in a relation do not have any particular order.
7. A particular candidate key is called as a primary key over the other candidate keys. This primary key is generally a single attribute or a smaller number of attributes. It becomes easier to deal with a database when we can have a single distinct key for a particular relation instead of having more than one key.
8. A foreign key is a primary key of one table that appears as an attribute in another table and acts to provide a logical relationship between the two tables.
9. Univ_Section# would be the best candidate for the primary key. It cannot be Course# since it's possible to have multiple sections during the same semester. All other attributes are definitively not unique.
10. Generated keys are not dangerous data to leak like SSNs and are guaranteed to be good primary keys (since they're generated, you can make them all unique), but you would have to generate an entire new column to store these keys (assuming SSNs are still put on file). The generation itself will also be a slight setback, since you will be generating data that really has no meaning outside of said database.