Homework Questions

1. Give an informal definition of "database" as used in the expression “relational database management system.”

A database as used in an RDBMS is a container of objects such as tables, views, stored procedures, and other objects that is based on set theory and predicate logic.

1. Give an informal definition of "database" as used in the expression “Human Resources database.”

When a database serves only part of an organization, such as the Human Resources department, it is called a *data mart* (as opposed to a *data warehouse* that serves an entire organization). It is a container of objects usually only accessible to users from the HR department.

1. Give an informal definition of entity integrity.

Entity integrity is when a key is defined on one or more attributes that prevents more than one occurrence of the same row in a relation. An example is a candidate key.

1. Give an informal definition of referential integrity.

Referential integrity is when a key is defined on one or more attributes and references a candidate key in another relation. An example is a foreign key.

1. What is a relation as defined in the textbook? A one-word answer to this question is sufficient.

Table

1. Is this table in first normal form? Why or why not? If it is not, how would you change it?

Yes, it is in first normal form because each row is unique. For example, Alan Alda is only in row 1; he is not also in row 4, which would violate 1NF.

create table faculty (

facID int primary key,  
 facName text,  
 facCreds text);

| **facID** | **facName** | **facCreds** |
| --- | --- | --- |
| 1 | Alan Alda | BA, MA |
| 2 | Bridgette Bardot | BS, MS, PhD |
| 3 | Casey Cason | AA, BBA, MBA, DEd |

1. Is this table in second normal form? Why or why not? If it is not, how would you change it?

No, this table is not in second normal form. A nonkey attribute cannot be fully functionally dependent on an entire candidate key. For example, ownerFirstName is fully dependent on ownerID. To conform to 2NF, need to split the relation into two relations: Pets and Owners.

create table pets (  
 ownerID int primary key,

petID int primary key,

ownerFirstName text,

ownerLastName text,

petName text,

petType text);

| **ownerID** | **petID** | **ownerFirstName** | **ownerLastName** | **petName** | **petType** |
| --- | --- | --- | --- | --- | --- |
| 1 | 1 | Dom | Delouise | Rex | German Shepherd |
| 1 | 2 | Dom | Delouise | Lacy | Border Collie |
| 2 | 3 | Emilio | Estevez | Midnight | Persian Cat |

1. Is this table in third normal form? Why or why not? If it is not, how would you change it?

No, it violates the nontransitive rule because the street depends on the city which depends on the state. For example, 123 Rock Quarry Rd could be the street of multiple customers in different cities.

create table friends (

friendID int primary key,

friendName text,

friendStreet text,

friendCity text,

friendState text,

friendZip text);

| **ID** | **FirstName** | **LastName** | **Street** | **City** | **State** | **Zip** |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | Fred | Flintstone | 123 Rock Quarry Rd | Bedrock | GA | 31905 |
| 2 | Greta | Garbo | 456 Starlit Ave | Paris | FL | 30019 |
| 3 | Harry | Houdini | 789 Hidden Glen Lane | Alcatraz | CA | 00000 |

1. What is an OLTP database? What operations is it optimized for?

Online transactional processing database focuses mainly on data entry and not reporting. It is optimized for data modifications and transactions like insert, update, and delete data.

1. What is a star schema? What operations is it optimized for?

A star schema is the simplest data-warehouse design. It includes several dimension tables and a fact table. For example, in a system that deals with orders and sales, you will probably want to analyze data by dimensions such as customers, products, employees, and time.