Database Concepts Chapter 1

Structured Query Language (SQL) is not a complete programming language, but a data sublanguage. Using SQL you can reconstruct lists from their underlying tables, query for specific data conditions, and perform computations on data in the tables. You can also insert, update, and delete data.

Database System has 4 components: Users, the database application, the database management system, and the database itself. **Users** employ a database application to keep track of things, they use forms to read, enter, and query data and they produce reports.

The **database** is a collection of related tables and structures. A database is defined as a self-describing collection of related records and related tables. Data about the structure of a database is called **metadata** [i.e. names of tables and columns].

The database management system (**DBMS**) is a computer program used to create, process, and administer the database. The DBMS receives requests encoded in SQL and translates those requests into actions on the database. The DBMS is a large, complicated program that is licensed from software vendor l companies almost never write their own dbms. With most DBMS you can declare rules about data values for the DBMS to enforce, these are called the **referential integrity constraints**. A DBMS controls concurrency by ensuring that one user's work does not inappropriately interfere with another.

A **database application** is a set or one or more computer programs that serves as an intermediary between the user and the DBMS. Application programs read or modify database data by sending SQL statements to the DBMS. Data apps also present data to users in the format of forms and reports. Apps can be acquired from software vendors, and they are also frequently written in-house.

FIGURE 1-20

Functions of a DBMS

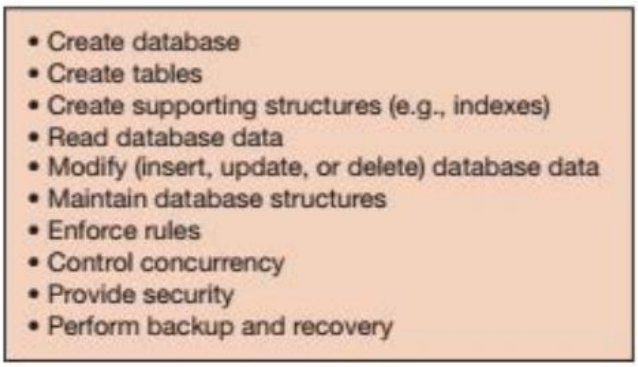
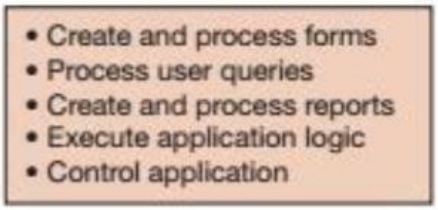


FIGURE 1-21

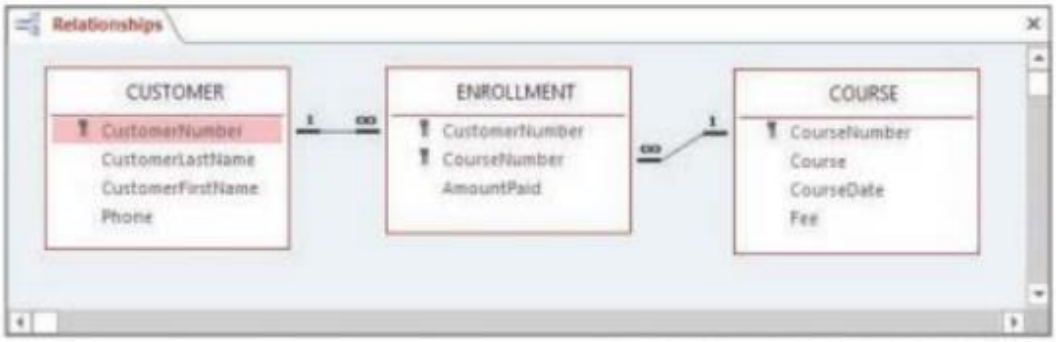
Functions of Database Application Programs



All DBMS products provide a set of tools for displaying the structure of their data. Ex: figure 1-18 shows a diagram produced by Microsoft Access that displays the relationship between the database tables in figure 1-12.

FIGURE 1-18

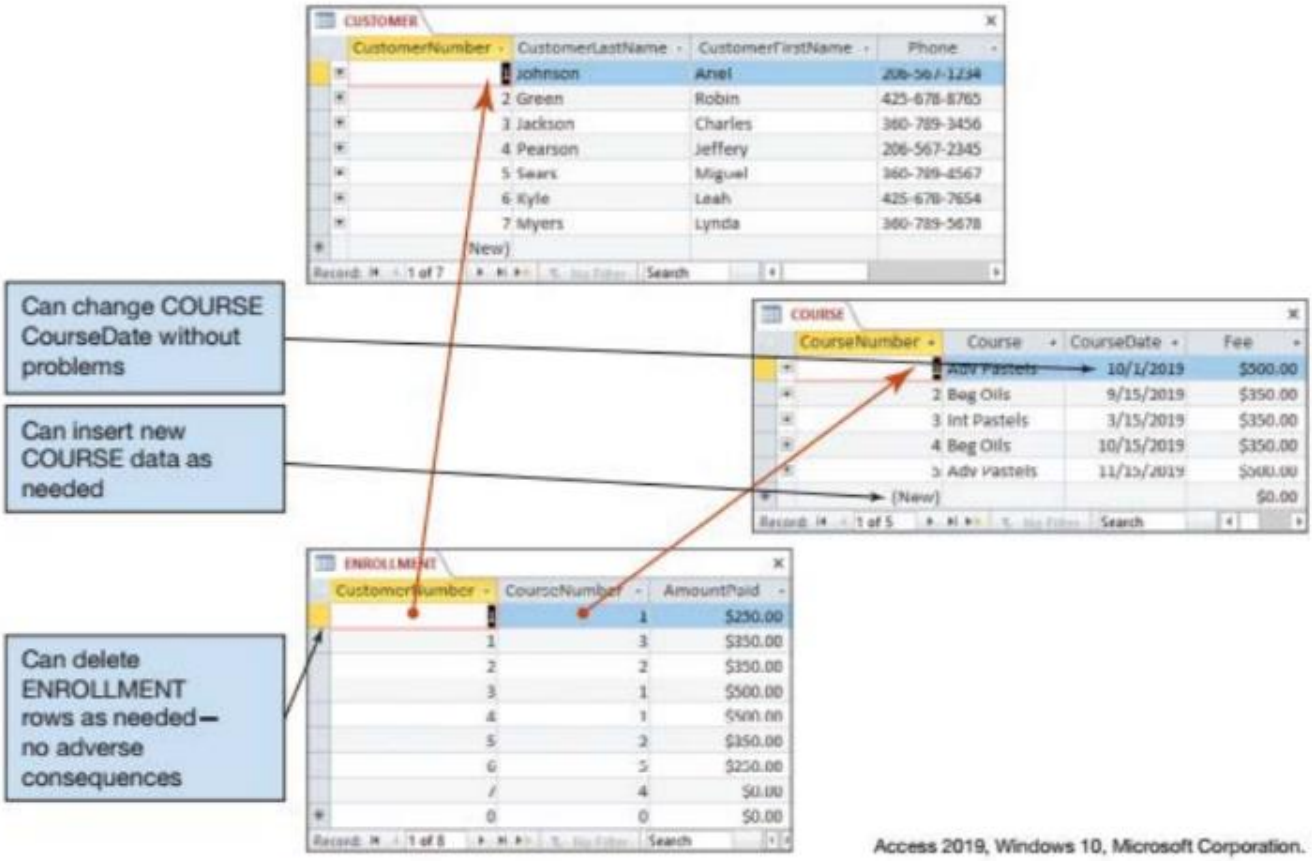
Example Metadata: A Relationship Diagram for the Art Course Tables in Figure 1-12



Access 2019, Windows 10, Microsoft Corporation.

FIGURE 1-12

The Art Course Database Tables



Access 2019, Windows 10, Microsoft Corporation.

Database Concepts Chapter 1

Web applications that let you shop online are dependent on a database to store the data needed by the application, this is referred to as a **Web Database Application**. Apps and web pages use an **Application Programming Interface** (**API**) in a programming language such as PHP or JavaScript to connect to a DBMS. This allows them to send SQL commands to the DBMS and receive results back.

When you buy something online the transaction is recorded in the company's **online transaction processing** database (**OLTP**)

Week 1 Homework Answers

A. *Create a sample list of owners and boats. Your list will be similar in structure to that in Figure 1-35, but it will concern owners and boats rather than owners and pets. Your list should include, at the minimum, owner name, phone, and billing address, as well as boat name, make, model, and length.*

BoatName	Make	Model	Length	OwnerLastName	OwnerFirstName	OwnerPhone	Address	City	State	ZIP
Far Horizon	Catalina	Morgan	38	Princeton	Darryl	206-543-6677	2345 15th NE	Seattle	WA	98115
Ebb Tide	Hunter	38	38	Tulsa	Bill	503-486-8786	1324 24th NE	Portland	OR	97215
Foreign Shores	Hans Christian	38 MK II	38	Berkely	George	425-765-4455	4567 35th W	Bellevue	WA	98040
Seafarer V	Endeavour	37	37	Tulsa	Bill	503-486-8786	1324 24th NE	Portland	OR	97215
Midnight on the Water	Sabre	32	32	Oxford	Kelly	503-578-7574	2435 36th SE	Astoria	OR	97103

B. *Describe modification problems that are likely to occur if SJSBC attempts to maintain the list in a spreadsheet.*

Note that owners may own more than one boat. For example, Bill Tulsa owns both Ebb Tide and Seafarer V. If the owner's phone number changes, this will require changing multiple rows. If the change is made incorrectly, one row can disagree with another. Phone numbers could be entered inconsistently. There is no place to record the owner data if you have no boat owned by him or her.

C. *Split the list into tables such that each has only one theme. Create appropriate ID columns. Use a linking column to represent the relationship between a* boat *and an owner. Demonstrate that the modification problems you identified in part B have been eliminated.*

BOAT (BoatID, BoatName, Make, Model, Length, *OwnerID*)

OWNER (OwnerID, OwnerLastName, OwnerFirstName, OwnerPhone, Address, City, State, ZIP)

BOAT:

BoatID	BoatName	Make	Model	Length	OwnerID
10001	Far Horizon	Catalina	Morgan	38	101
10002	Ebb Tide	Hunter	38	38	102
10003	Foreign Shores	Hans Christian	38 MK II	38	103
10004	Seafarer V	Endeavour	37	37	102
10005	Midnight on the Water	Sabre	32	32	104

OWNER:

OwnerID	OwnerLastName	OwnerFirstName	OwnerPhone	Address	City	State	ZIP
101	Princeton	Darryl	206-543-6677	2345 15th NE	Seattle	WA	98115
102	Tulsa	Bill	503-486-8786	1324 24th NE	Portland	OR	97215
103	Berkely	George	425-765-4455	4567 35th W	Bellevue	WA	98040
104	Oxford	Kelly	503-578-7574	2435 36th SE	Astoria	OR	97103