**Module 4**

**The Relational Model: Advanced Topics**

**Solutions**

Module Review Questions

Problems

1. Which of the following is *not* true about a view?

a. It provides access to a subset of fields and records in one or more tables.

b. It consists of a duplicate copy of the selected data.

c. It provides a light blanket of security by limiting access to specific data.

d. It automatically shows up-to-date information when it is executed.

2. Why doesn’t Access SQL provide for the SQL CREATE VIEW statement?

a. In Access, queries function as views.

b. Access SQL needs to be compiled outside of the database in order to run all statements.

c. Access is not a true relational database system.

d. Access does not have the ability to run SQL.

3. What is the primary purpose of creating an index?

a. documenting relationships

b. identifying integrity issues

c. adding event trigger functionality to tables

d. improving the speed by which data is searched and presented

4. What best describes a null value?

a. a zero-length string, ""

b. a space or tab character

c. an intentional nothing

d. the string "null"

5. Which of the following is *not* prevented by enforcing referential integrity on a one-to-many relationship?

a. incorrect entry into a primary key field value

b. entry into a foreign key field that doesn’t have a match in the table that contains the primary key field

c. deleting a record in the parent table that has a matching record in a child table

d. changing a primary key field value that has matching records in a related table

6. Which of the following is *not* true about a one-to-many relationship?

a. The table on the “one” side is also called the parent or left table.

b. The table on the “one” side may or may not have related records in the “many” table.

c. The table on the “many” side may have orphan records, especially if referential integrity is not enforced.

d. The table on the “one” side may have orphan records.

7. RIGHT JOINS in SQL are helpful to find \_\_\_\_\_.

a. orphan records

b. parent records with no matching child records

c. records with AND criteria in the WHERE clause

d. records with OR criteria in the WHERE clause

8. When two tables are joined in an Access query, the default join type is \_\_\_\_\_.

a. OUTER

b. INNER

c. LEFT

d. RIGHT

9. Which feature of Access is used to create a report on the metadata about tables and queries?

a. data macros

b. referential integrity

c. cascade options

d. Database Documenter

10. Stored procedures differ from triggers in what essential way?

a. Stored procedures are usually run intentionally by users, whereas triggers are generally run automatically by processes.

b. Stored procedures are stored at the server, whereas triggers are generally stored at each user’s client machine.

c. Stored procedures may include some programming commands, whereas triggers are generally pure SQL.

d. Stored procedures can change data. Triggers do not change data.

11. Which feature of Access mimics that of relational database management system triggers?

a. SQL View

b. data macros

c. referential integrity

d. cascade options

12. Which Access field property might you use to set data integrity rules on a single field?

a. Validation Rule

b. Indexed?

c. Caption

d. Default Value

Critical Thinking Question

1. You have a table for a membership database that contains the following fields: MemberLastName, MemberFirstName, Street, City, State, ZipCode, and InitiationFee. There are 75,000 records in the table. What indexes would you create for the table, and why would you create these indexes?

Students should recognize that each table should have a primary key field that is indexed, and given there is no good primary key field candidate in the existing list, students should add one such as MemberID or MemberNumber. Given people are often sorted by their last name, an index MemberLastName would probably be very helpful. Given there are 75,000 records in the table, there are bound to be two or more members with the same last name, so an index on MemberLastName plus MemberFirstName would probably be very helpful. If several queries and reports are created by State, or City within State, ZipCode, or any other combination of address fields, those fields and combinations are also candidates for indexes. Finally, if several queries and lists are created based on the InitiationFee in ascending or descending order, that field is another index candidate. In all cases, the database administrator should set up tests to check the performance of common activities, queries, and processes both before and after the indexes are created given indexes themselves require overhead to create and maintain.

JC Consulting Case Exercises

The following exercises are based on the JC Consulting database. Don’t forget to use a copy of the JC Consulting database so any changes you make will not affect future modules.

Problems

1. Which of the following is *not* a benefit of a view within the JC Consulting database?

a. single location to store all data

b. organizes fields and records from one or more tables

c. shields sensitive data from unauthorized users

d. can be used to create calculated fields

2. Which of the following fields from the Projects table is *not* a good candidate to index?

a. ProjectID

b. ProjectStartDate

c. ClientID

d. ProjectNotes

3. Which of the following security features is *not* available to the JCConsulting database given it is an Access database?

a. encryption

b. database password

c. user-level security

d. startup options

4. In the Employees table, how could you ensure that no HireDate values were entered prior to 1/1/2019?

a. Use the Validation Rule property on the HireDate field.

b. Set referential integrity on the HireDate field.

c. Set the Cascade Update Related Fields option on the HireDate field.

d. Set the HireDate field as a primary key field.

5. To query whether the Clients table has records that do not have any matching records in the Projects table, you would use a(n) \_\_\_\_\_.

a. left join

b. right join

c. inner join

d. one-to-many join

6. Which SQL command would add a new field named Region to the Clients table?

a. ALTER TABLE Clients ADD Region TEXT(20)

b. ALTER TABLE Clients MODIFY Region TEXT(20)

c. MODIFY TABLE Clients ADD Region TEXT(20)

d. MODIFY TABLE Clients MODIFY Region TEXT(20)

7. What feature could you use to create system information about the tables and fields in the JCConsulting database?

a. Performance Analyzer

b. Database Documenter

c. Dependency Analyzer

d. Table Wizard

8. Where do you create data macros in the JCConsulting Access database?

a. as global macro objects accessed in the Navigation Pane

b. as global module objects accessed in the Navigation Pane

c. within the table that contains the data they work with

d. within the system tables

9. According to the article referenced by the Bureau of Labor Statistics, knowing which of the following is *not* a fundamental competency for a job in database administration?

a. Microsoft Access

b. Data Analysis

c. Oracle

d. Java

Critical Thinking Questions

1. Using Access, open the Relationships window and identify all of the one-to-many relationships in the database as well as the field used in both tables to make the connection using the following pattern found in SQL, when connecting two tables using a WHERE or INNER JOIN clause. An example of one of the relationships is provided as a guide.

Clients.ClientID = Projects.ClientID

Employees.EmployeeID = Projects.EmployeeID

Projects.ProjectID = ProjectLineItems.ProjectID

TaskMasterList.TaskID = ProjectListItems.TaskID

Categories.Category = TaskMasterList.CategoryID

2. Using Access, an employee at JC Consulting tried to delete TaskID CODE01 from the TaskMasterList table and received the following error message: “The record cannot be deleted or changed because table ‘ProjectLineItems includes related records.”

Why did the employee receive this error message?

The ProjectLineItems table contains records with CODE01 in the TaskID foreign key field. Deleting TaskID CODE01 from the TaskMasterList table would create orphans in the ProjectLineItems table. Given that referential integrity prevents the creation of orphan records, the error message is produced.

Pitt Fitness Case Exercises

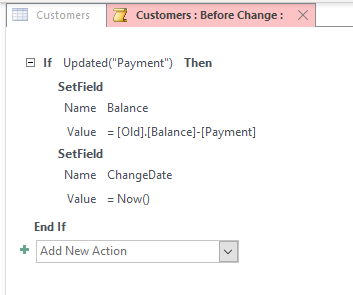
In each of the following questions, use Access or SQL to answer them either with using the data shown in Figures 1-15 through 1-19, or by using a copy of the Pitt Fitness database. You can test the SQL statements in SQL View in Access.

Problems

1. Using Access, create a view for Pitt Fitness that displays all the classes held at the Downtown location. Show only the fields ClassName, Room, Day, Time, and Description. Show the ClassName field as Class Name. How many records appear in the results when you display this view?
   1. 40
   2. 10
   3. 14
   4. 0
2. Write the SQL code to create a view for Pitt Fitness that displays all the classes held at the Downtown location. Show only the fields ClassName, Room, Day, Time, and Description. Show the ClassName field as Class Name.
   1. SELECT ClassName AS [Class Name], Room, Day, Time, Description   
      FROM Classes   
      WHERE Location="Downtown";
   2. SELECT Class Name, Room, Day, Time, Description   
      FROM Classes   
      WHERE Location="Downtown";
   3. SELECT ClassName, Room, Day, Time, Description   
      WHERE Location="Downtown";
   4. SELECT ClassName, Room, Day, Time, Description   
      FROM Classes   
      WHERE NOT Location="Downtown";
3. In the Customers table, which field would be ideal for creating an index?
   1. BirthDate
   2. PhoneNumber
   3. FirstName
   4. LastName
4. What is the SQL command to create an index on InstructorZipCode in the Instructors table?
   1. INDEX zipindex ON Instructors (InstructorZipCode)
   2. CREATE INDEX zipindex ON (InstructorZipCode)
   3. CREATE INDEX zipindex ON Instructors (InstructorZipCode)
   4. CREATE INDEX ON Instructors (InstructorZipCode)
5. What security feature can be used on the Pitt Fitness Access database?
   1. Grant a specific user rights to delete the table ClassInstructors.
   2. Grant a specific user rights to add data to the Reservations table.
   3. Set a password on the entire Pitt Fitness database.
   4. Revoke a given user’s rights.
6. The Instructors table and the ClassInstructors table have a one-to-many relationship. When forming the relationship, you want to ensure that if an instructor changes his or her InstructorID in the Instructors table, the related InstructorID will change in the ClassInstructors table. What option should you select when editing the relationship?
   1. Enforce Referential Integrity
   2. Cascade Update Related Fields
   3. Cascade Delete Related Records
   4. Enforce Referential Integrity and Cascade Update Related Fields
7. Using SQL, count how many classes each customer has signed up for. Show the customer’s last name, first name, and number of classes. Use an appropriate JOIN.
   1. SELECT LastName, FirstName, Count(ReservationID) AS [Number of Classes]   
      FROM Customers INNER JOIN Reservations ON CustomerID = CustomerID   
      GROUP BY LastName, FirstName;
   2. SELECT LastName, FirstName, Count(ReservationID) AS [Number of Classes]   
      FROM Customers INNER JOIN Reservations ON Customers.CustomerID = Reservations.CustomerID   
      GROUP BY LastName, FirstName;
   3. SELECT LastName, FirstName, Count(ReservationID) AS [Number of Classes]   
      FROM Customers INNER JOIN Reservations ON Customers.CustomerID = Reservations.CustomerID;
   4. SELECT LastName, FirstName, Count(ReservationID) AS [Number of Classes]   
      FROM Customers OUTER JOIN Reservations ON Customers.CustomerID = Reservations.CustomerID   
      GROUP BY LastName, FirstName;
8. Using SQL, list the classes that do not have a reservation. Show the class name, location, and reservation ID (which will be blank).
   1. SELECT Classes.ClassName, Classes.Location, Reservations.ReservationID   
      FROM Classes RIGHT JOIN Reservations ON Classes.ClassID = Reservations.ClassID   
      WHERE Reservations.ReservationID Is Null;
   2. SELECT Classes.ClassName, Classes.Location, Reservations.ReservationID   
      FROM Classes OUTER JOIN Reservations ON Classes.ClassID = Reservations.ClassID   
      WHERE Reservations.ReservationID Is Null;
   3. SELECT Classes.ClassName, Classes.Location, Reservations.ReservationID   
      FROM Classes LEFT JOIN Reservations ON Classes.ClassID = Reservations.ClassID   
      WHERE Reservations.ReservationID Is Null;
   4. SELECT Classes.ClassName, Classes.Location, Reservations.ReservationID   
      FROM Classes LEFT JOIN Reservations ON Classes.ClassID = Reservations.ClassID   
      WHERE Reservations.ReservationID;
9. Suppose you want to create a query that displays the class name, customer’s last name, instructor’s last name, and class date. What tables are required to answer this query?
   1. Classes, Customers, Reservations
   2. Classes, ClassInstructors, Customers, Reservations
   3. Classes, ClassInstructors, Reservations
   4. Classes, ClassInstructors, Customers, Instructors, Reservations
10. Suppose you want to create a query that displays the class name, customer’s last name, instructor’s last name, and class date. What type of JOIN should you use for linking the tables together?
    1. INNER
    2. OUTER
    3. LEFT
    4. RIGHT

Critical Thinking Questions

1. Assume that the Pitt Fitness accountant has met with the owner to discuss how to handle payments and balances. They both decide to add fields to the Customers table to record any payments arriving and the subsequent balance. Add the appropriate fields to the Customers table and set up a Before data macro to check the payment and balance.



Add the Payment, Balance, and ChangeDate fields to the Customers table.

Before Change macro:

If Updated(“Payment”) Then

SetField

Name Balance

Value = [Old].[Balance] – [Payment]

SetField

Name ChangeDate

Value = Now()

End If

1. Discuss security issues with the Pitt Fitness database. Who should have access to the database? Can any employee change the data? What are problems with that task?

Answer: The student should discuss how only certain employees should have access to the database for accounting purposes. It would be best to have some employees only filling out forms for reservations and not entering any payments or balances.

Sports Physical Therapy Case Exercises

In each of the following questions, use Access or SQL to answer them either with using the data shown in Figures 1-21 through 1-24, or by using a copy of the ports Physical Therapy database. You can test the SQL statements in SQL View in Access.

Problems

1. As the module material stated, although Access doesn’t create a stored procedure, a parameter query mimics what a stored procedure might do. How would you create a parameter query in SQL to prompt for the patient’s last name and display the patient’s last name and their therapy?

* 1. SELECT (ENTER Patient.LastName), Therapies.Description   
     FROM Therapies INNER JOIN (Patient INNER JOIN [Session] ON Patient.PatientNum = Session.PatientNum) ON Therapies.TherapyCode = Session.TherapyCode;
  2. SELECT Therapies.Description   
     FROM Therapies INNER JOIN (Patient INNER JOIN [Session] ON Patient.PatientNum = Session.PatientNum) ON Therapies.TherapyCode = Session.TherapyCode   
     WHERE (((Patient.LastName)=[Enter Last Name]));
  3. SELECT Patient.LastName, Therapies.Description   
     FROM Therapies   
     WHERE (((Patient.LastName)=[Enter Last Name]));
  4. SELECT Patient.LastName, Therapies.Description   
     FROM Therapies INNER JOIN (Patient INNER JOIN [Session] ON Patient.PatientNum = Session.PatientNum) ON Therapies.TherapyCode = Session.TherapyCode   
     WHERE (((Patient.LastName)=[Enter Last Name]));

2. To generate a schedule list, create a view in SQL that shows the session date and the last name and first name of the therapist. Show the list in chronological order.

1. SELECT Session.SessionDate, Therapist.LastName, Therapist.FirstName   
   FROM Therapist INNER JOIN [Session] ON Therapist.TherapistID = Session.TherapistID   
   ORDER BY Session.SessionDate;
2. SELECT Session.SessionDate, Therapist.LastName, Therapist.FirstName   
   FROM Therapist INNER JOIN [Session] ON Therapist.TherapistID = Session.TherapistID   
   DISPLAY BY Session.SessionDate;
3. SELECT Session.SessionDate, Therapist.LastName, Therapist.FirstName   
   FROM Therapist   
   ORDER BY Session.SessionDate;
4. SELECT Session.SessionDate, Therapist.LastName, Therapist.FirstName   
   FROM Therapist INNER JOIN [Session] ON Therapist.TherapistID = Session.TherapistID   
   ORDER BY Date;

3. What index(es) would be appropriate to create for the Session table? Select the best answer.

1. SessionDate
2. PatientNum
3. TherapistID
4. SessionDate, PatientNum, and TherapistID

4. Assume a new patient calls to make an appointment with a therapist. The clerk recording the appointment creates a new PatientNum value for the new patient. Before entering any other data, she first enters the PatientNum value into the Session table as part of a new record. What rule does this violate?

1. indexing
2. cascading
3. referential integrity
4. This action does not violate any rule.

5. From the following views, what view would be the most appropriate for the Sports Physical Therapy accountant?

1. PatientNum, LastName (Patient), SessionDate, SessionNum
2. PatientNum, LastName (Patient), Address, City, State, ZipCode, Balance
3. PatientNum, LastName (Patient), TherapistID, Description
4. PatientNum, LastName (Patient), TherapyCode

6. If you created an SQL query to list the patient number and the session date, which tables would be joined?

1. Session and Patient
2. Therapies and Patient
3. Therapist and Patient
4. all four tables

7. If you created an SQL query to list the patient number and the session date, what type of join should you use?

1. PLAIN JOIN
2. OUTER JOIN
3. INNER JOIN
4. LEFT JOIN

8. Write the SQL code to list the session date and therapist’s last name to display the upcoming schedule for the therapists.

1. SELECT Session.SessionDate, Therapist.LastName   
   FROM Therapist INNER JOIN (Therapies INNER JOIN [Session] ON Therapies.TherapyCode = Session.TherapyCode) ON Therapist.TherapistID = Session.TherapistID;
2. SELECT Session.SessionDate, Therapist.LastName   
   FROM Therapist INNER JOIN Session ON Therapist.TherapistID = Session.TherapistID;
3. SELECT Session.SessionDate, Therapist.LastName   
   FROM Therapist INNER JOIN ON Therapist.TherapistID = Session.TherapistID;
4. SELECT LastName   
   FROM Therapist INNER JOIN Session ON Therapist.TherapistID = Session.TherapistID;

9. Assume you are using two tables for an SQL query: Therapist and Session. You want to make sure that you display all the names of the therapists even if they are not yet booked into a session. What join do you need to create to ensure that all the therapists are listed?

1. LEFT JOIN Therapist ON Therapist.TherapistID=Session.TherapistID
2. RIGHT JOIN Therapist ON Therapist.TherapistID=Session.TherapistID
3. INNER JOIN Therapist ON Therapist.TherapistID=Session.TherapistID
4. OUTER JOIN Therapist ON Therapist.TherapistID=Session.TherapistID

10. If you want to send a mailing to all patients advertising a new facility, what tables would you need to generate the query that would print the mailing labels?

1. Patient, Session, Therapies, Therapist
2. Patient, Session, Therapies
3. Patient, Session, Therapist
4. Patient

Critical Thinking Questions

1. Create an SQL query that calculates how many different therapies have not yet been booked for a session.

SELECT Count(Therapies.TherapyCode) AS CountOfTherapyCode   
FROM Therapies LEFT JOIN [Session] ON Therapies.TherapyCode = Session.TherapyCode   
WHERE (((Session.SessionDate) Is Null));

2. Considering the information stored in the Sports Physical Therapy database, what security measures are important?

Because the database contains medical information about patients, their therapies and who their therapist is, it would be beneficial to password-protect the database to ensure only authorized employees can access the health data. If the database had a way to secure certain views, then different employees could be assigned different levels of access. For example, the accountant could see the patient’s name, address, balance, bills, and any payments, but not see the actual therapies performed.