

Lesson 6: Understanding Databases

1. Your application needs to store the customer list in a text file. You want to minimize the size of this disk file and be able to open it in common text editors. Which of the following classes should you use to write the file?

- a) StreamReader
- b) StreamWriter
- c) BinaryWriter
- d) XmlWriter

Answer: b

Difficulty: Medium

Section Ref: Working with Flat Files

The StreamWriter class provides you with an easy way to manipulate text files. The StreamReader class lets you read the contents of a text file. The BinaryWriter class writes the file in a binary format, which is not readable with common text editors. The XmlWriter class creates a text file but inserts XML tags, which increases the file size.

2. Your C# program needs to return the total number of customers in a SQL Server database. The program will be used several times a day. What is the fastest way to return this information from your program? (Select all answers that apply.)

- a) Write a SQL query.
- b) Write a stored procedure.
- c) Use the `SqlDataAdapter.Fill` method.
- d) Use the `SqlCommand.ExecuteScalar` method.
- e) Use the `OleDbDataAdapter.Fill` method.

Answer: b and d

Difficulty: Medium

Section Ref: Understanding Database Connection Methods

Because the program will be executed several times a day, creating a stored procedure will give better performance over a query. Also, because you are retrieving only a single value as the result, using `SqlCommand.ExecuteScalar` provides better performance over the `SqlDataAdapter.Fill` method.

3. You need to update the Products table and remove all discontinued products. When the products are discontinued, the value of the field Discontinued is set to true. Which of the following SQL statements should you use to make changes to the Products table?

- a) INSERT
- b) SELECT
- c) UPDATE
- d) DELETE

Answer: d

Difficulty: Medium

Section Ref: Introducing Algorithms

Use the DELETE statement to remove records you don't need. The UPDATE statement changes an existing record but cannot remove it. The INSERT statement is used to insert new data to the table, and the SELECT statement is used to retrieve data from the table.

4. You need to update the Region fields for customers whose reference code is "TKY". The updated Region should be set to "Japan". Also, this change should affect only customers who live in Tokyo. Which of the following SQL statement should you use?

- a)

```
UPDATE Customers
SET Region = 'Japan'
WHERE RefCode = 'TKY'
AND City = 'TOKYO'
```
- b)

```
UPDATE Customers
SET Region = 'Tokyo'
WHERE RefCode = 'TKY'
AND City = 'Japan'
```
- c)

```
UPDATE Customers
SET Region = 'Tokyo'
WHERE RefCode = 'TKY'
```
- d)

```
UPDATE Customers
SET Region = 'Japan'
WHERE RefCode = 'TKY'
```

Answer: a

Difficulty: Medium

Section Ref: Working with SQL Queries

According to the question's requirements, the SET clause should set the region to 'Japan'. This change should be done for records where RefCode equals 'TKY' and City equals 'TOKYO'. Your queries should address both conditions.

5. You are developing an application that needs to retrieve a list of customers and their orders from a SQL Server database. After the list is retrieved, you should be able to display this data, even when a connection to the SQL Server is not available. Which of the following classes should you use to hold the data?

- a) DataAdapter
- b) DataSet
- c) DataView
- d) SqlDataReader

Answer: b

Difficulty: Medium

Section Ref: Working With DataSet

DataSet is very useful for creating disconnected applications, which can continue to function without a constant connection to network resources such as databases.

DataAdapter is not a correct answer because it only stores the data connection and data

commands needed to connect to the data source. DataView and SqlDataReader cannot work in a disconnected scenario.

6. The application you are developing needs to write data to a flat file that include items such as a five-digit integer key, followed by a 20-character customer name, followed by two date and time fields. Your solution should be as fast as possible and should create smallest size data file. Which of the following classes should you use?

- a) FileStream
- b) StreamWriter
- c) BinaryWriter
- d) DataWriter

Answer: c

Difficulty: Medium

Section Ref: Working With Flat Files

Flat files can be in either plain-text or binary format. BinaryWriter works very quickly and creates the smallest data files when compared to a text-only file.

7. You are developing an application that needs to copy data from a SQL Server table to a DataSet. Which of the following methods should you use to copy the data?

- a) Fill
- b) FillSchema
- c) GetFillParameters
- d) Update

Answer: a

Difficulty: Medium

Section Ref: Introducing Algorithms

The Fill method connects to the data source and retrieves data via the SELECT command. Use the Fill method to copy data from SQL Server to the DataSet object.

8. You are developing an application that manages customers and their orders. Any solution that you develop must take the least amount of effort but offer the best performance.. Which of the following situations is not a good candidate for implementation with stored procedures in your application?

- a) Retrieving the list of all customers in the database
- b) Retrieving the list of all orders for particular customers
- c) Inserting a new order into the Orders table
- d) Ad hoc querying by the database administrator

Answer: d

Difficulty: Medium

Section Ref: Working with SQL Queries

Ad hoc queries are best run standalone. Running a query multiple times takes less effort and provides better performance when using a stored procedure.

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9. Your application connects to a SQL Server database that contains a table called Employees with the following columns:

```
EmployeeID (int, identity)
EmployeeType (char(1))
EmployeeDate (datetime)
```

You need to write a query that selects all rows from the table where the `EmployeeType` value is either C or T. Which statement should you use?

- a)

```
SELECT * FROM Employees
WHERE EmployeeType LIKE '[CT]'
```
- b)

```
SELECT * FROM Employees
WHERE EmployeeType LIKE '[C-T]'
```
- c)

```
SELECT * FROM Employees
WHERE EmployeeType LIKE 'C' OR 'T'
```
- d)

```
SELECT FROM Employees
WHERE EmployeeType IN ('C', 'T')
```

Answer: a

Difficulty: Medium

Section Ref: Running SQL Queries

The correct `SELECT` statement to use in the given case is the following:

```
SELECT * FROM Employees
WHERE EmployeeType LIKE '[CT]'
```

The other forms of the `SELECT` statements will not get you the desired results.

10. Your application includes a `SqlDataAdapter` object named `sqlDataAdapter` and an `OleDbDataAdapter` object named `oledbDataAdapter`. You need to connect to the Employees table of a SQL Server database. Your application also includes a `DataSet` object named `dsEmployees`. You need to load the data from the database into the `DataSet` object. You must select a solution that gives you the best performance. Which of the following lines of code should you choose?

- a) `dsEmployees = sqlDataAdapter.Fill("Employees");`
- b) `dsEmployees = oledbDataAdapter.Fill("Employees");`
- c) `oledbDataAdapter.Fill(dsEmployees, "Employees");`
- d) `sqlDataAdapter.Fill(dsEmployees, "Employees");`

Answer: d

Difficulty: Medium

Section Ref: Working with DataSet

The correct syntax is to pass the name of the dataset and the name of the table to the `Fill` method. For best performance while connecting to a SQL Server database, you should use

the `sqlDataAdapter` object. Although `OleDbDataAdapter` will work, it will have less performance when compared to `SqlDataAdapter`.

11. Your application includes a `SqlDataAdapter` object named `sqlDataAdapter` that connects to the `Employees` table. You use the `Fill` method to retrieve the data from the `Employees` table. The `SqlDataAdapter`'s `Connection` property is set to a valid connection to the SQL Server database, but the connection is in the closed state. Which of the following statements is true about the working of the `Fill` method?

- a) The `Fill` method will throw an exception because the connection is closed.
- b) The `Fill` method will open the connection, read the data, and leave the connection open.
- c) The `Fill` method will open the connection, read the data, and leave the connection closed.
- d) The `Fill` method will return an empty resultset because the connection is closed.

Answer: c

Difficulty: Medium

Section Ref: Working with DataSet

The connection object associated with the `Fill` method doesn't need to be open. If the connection is closed before `Fill` is called, it is opened to retrieve data, and then closed. If the connection is open before `Fill` is called, it remains open. In the given example, the connection was closed before the `Fill` method was called, so the `Fill` method opens the connection, retrieves data, and then closes the connection.

12. You need to develop a C# program that exports the contents of the `Customers` table to an XML file. The exported data must be in the following format:

```
<Customer CustomerID="ALFKI" ContactName="Maria Anders" Phone="030-007-4321" />
<Customer CustomerID="ANATR" ContactName="Ana Trujillo" Phone="(5) 555-4729" />
```

Which of the following code segments should you use to export the `Customers` table to the specified XML format?

- a)

```
foreach(DataColumn c in dataset1.tables["Customers"].Columns)
{
    c.ColumnMapping = MappingType.Attribute;
}
dataset1.WriteXml("Customers.xml");
```
- b)

```
foreach(DataColumn c in dataset1.tables["Customers"].Columns)
{
    c.ColumnMapping = MappingType.Element;
}
dataset1.WriteXml("Customers.xml");
```
- c)

```
foreach(DataColumn c in dataset1.tables["Customers"].Columns)
{
    c.ColumnMapping = MappingType.Attribute;
}
dataset1.WriteXml("Customers.xml", XmlWriteMode.WriteSchema);
```

```
d) foreach(DataColumn c in dataset1.tables["Customers"].Columns)
    {
        c.ColumnMapping = MappingType.Element;
    }
dataset1.WriteXml("Customers.xml", XmlWriteMode.WriteSchema);
```

Answer: a

Difficulty: Medium

Section Ref: Working with XML

In the desired output, each table row is mapped as a single XML element in which each table field is an attribute. To get the output in this format, column mapping should be set to `MappingType.Attributes`. The desired output does not specify XML schema, so you must not include `XmlWriteMode.WriteSchema` as a `WriteMode` parameter in the `WriteXml` method.

13. You are designing a database for your company. You are reviewing the normalization for the database tables. You review the following Orders table:

<i>OrderId</i>	<i>CustomerId</i>	<i>OrderDate</i>	<i>FirstName</i>	<i>LastName</i>
101	1	10/1/2010	Jane	Doe
102	2	10/5/2010	John	Doe
103	1	10/4/2010	Jane	Doe

Which of the following statement is true for the Orders table?

- a) It meets the requirements for the first normal form.
- b) It meets the requirements for the second normal form.
- c) It meets the requirements for the third normal form.
- d) It meets the requirements for the fourth normal form.

Answer: a

Difficulty: Medium

Section Ref: Understanding Data Normalization

For a table to be in the first normal form (1NF), none of its columns should have multiple values in the same row of data. The given table meets this requirement and is therefore in the first normal form. The `OrderId` and `CustomerId` columns together identify a unique row and therefore make up a composite primary key. However, the `OrderDate` column is functionally dependent only on `OrderId`, and the `CustomerName` column is dependent only on `CustomerId`. This violates the second normal form because non-key columns are functionally dependent on only part of the primary key. A table must meet the requirements of second normal form before it can be in the third normal form.

14. You are designing a database for your company and are reviewing the normalization for the database tables. You review the following Customer table:

<i>Id</i>	<i>FirstName</i>	<i>LastName</i>	<i>PhoneNumber</i>
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1	Jane	Doe	(503) 555-6874
2	John	Doe	(509) 555-7969, (509) 555-7970
3.	Howard	Steel	(604) 555-3392, (604) 555-3393

Which of the following statements is true?

- a) The Customer table meets the requirements for the first normal form.
- b) It meets the requirements for the second normal form.
- c) It meets the requirements for the third normal form.
- d) It is not normalized.

Answer: d

Difficulty: Medium

Section Ref: Understanding Data Normalization

For a table to be in the first normal form (1NF), none of the columns in the table should have multiple values in the same row of data. The Customer table is not in 1NF because the PhoneNumber column is storing more than one value in each row. Also, the table does not meet the requirements for 2NF and 3NF because to meet those requirements, the table must first satisfy the requirements of 1NF. As a result, the given table is not normalized.

15. You are designing a database for your company and are reviewing the normalization for the database tables. You review the following Customer table:

<i>Id</i>	<i>FirstName</i>	<i>LastName</i>
1	Jane	Doe
2	John	Doe
3	Howard	Steel

Which of the following statements is true?

- a) The highest normal form of the Customer table is the first normal form.
- b) The highest normal form of the Customer table is the second normal form.
- c) The highest normal form of the Customer table is the third normal form.
- d) The Customer table is not normalized.

Answer: c

Difficulty: Medium

Section Ref: Understanding Data Normalization

For a table to be in the first normal form (1NF), none of the columns in the table should have multiple values in the same row of data. The Customer table is in 1NF because none of the columns are storing more than one value in each row. For a table to be in second normal form (2NF), it must first meet the requirements for 1NF. Also, 2NF requires that all non-key columns be functionally dependent on the entire primary key. In the Customer

table, all columns are functionally dependent on the Id column and therefore the table is in 2NF. The third normal form (3NF) requires that 2NF is met and that no functional dependency exists between non-key attributes. In the given table, the FirstName and LastName columns share no dependency. As the result, the table is also in 3NF. As a result, the highest normal form of the Customer table is the third normal form.

16. As you design a database for your company, you review the normalization rules for the database tables. You need to ensure that your table design meets the requirements for the third normal form. Which of the following statements must be true for your tables? (Choose all that apply.)

- a) None of the columns in the table should have multiple values in the same row of data.
- b) All non-key columns are functionally dependent on the entire primary key.
- c) At least one non-key column is functionally dependent on the entire primary key.
- d) Non-key attributes don't share any functional dependency.
- e) Non-key attributes share functional dependency.

Answer: a, b, and d

Difficulty: Medium

Section Ref: Understanding Data Normalization

For a table to be in the first normal form (1NF), none of the columns in the table should have multiple values in the same row of data. For a table to be in second normal form (2NF), it must first meet the requirements for 1NF, and then require that all non-key columns be functionally dependent on the entire primary key. The third normal form (3NF) requires that 2NF is met and that no functional dependency is shared between non-key attributes.

17. You are designing database for a new Web application. You need to identify appropriate relational database structure to satisfy business requirements. Which of the following activities should you *not* perform as part of the design process?

- a) Identify tables and columns.
- b) Choose primary keys for the tables.
- c) Identify table relationships.
- d) Apply the normalization process.
- e) Write stored procedures.

Answer: e

Difficulty: Medium

Section Ref: Understanding Relational Database Design

You don't write stored procedures as part of the design process. Stored procedures are developed later as part of the database implementation. In the design process, your first priority is to create a database structure that ensures that you identify all the data elements that need to be stored and in a way that ensures data integrity.

18. You are developing a C# program for a bike rental company. The data is stored in a SQL Server 2000 server named BikeServer in a database named BikeDB. You must use the Windows

Integrated authentication to connect to the BikeDB database. Which of the following connection strings should you choose in your C# program for connecting to the BikeDB database?

- a) "Provider=SQLOLEDB;Data Source=BikeServer;InitialCatalog=BikeDB;Integrated Security=SSPI;"
- b) "Provider=SQLOLEDB;Data Source=BikeServer;InitialCatalog=BikeDB;UserId=sa;Password=gih6774y"
- c) "Data Source=BikeServer;InitialCatalog=BikeDB;Trusted_Connection=true;"
- d) "Data Source=BikeServer;InitialCatalog=BikeDB;UserId=sa;Password=gih6774y"

Answer: a

Difficulty: Medium

Section Ref: Connecting to a SQL Server Database

The correct answer is to use the following connection string:

```
"Provider=SQLOLEDB;Data Source=BikeServer;InitialCatalog=BikeDB;Integrated Security=SSPI;"
```

You must specify the provider, data source, and initial catalog to connect to. You don't need to specify the user ID and password because you must use the Windows Integrated authentication to connect to the BikeDB database.

19. You are developing a C# program for a bike rental company. Every night, your application needs to read data from a SQL Server 2000 database and write it to a flat file. This flat file will be transferred to your supplier. Which of the following classes shall you use to retrieve the data? Any solution that you suggest must have very little impact of the server while maximizing performance.

- a) DataSet
- b) DataTable
- c) SqlDataReader
- d) OleDbDataReader

Answer: c

Difficulty: Medium

Section Ref: Understanding the Database Connection Methods

You must use the `sqlDataReader` class to read data from a SQL Server very quickly. The `OleDbDataReader` is used to work with OLEDB data sources but offers slower performance than `sqlDataReader` when reading data from SQL Server.

20. You are developing an application that stores data in SQL Server 2005 database. You need to write a query that retrieves all orders in the orders table that were placed on January 1, 2011. You write the following query:

```
SELECT * FROM Orders
WHERE OrderDate = 01/01/2011
```

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The statement executes without any error but does not return any data. You are certain that the database contains order from this date. How should you correct the SQL statement?

- a)

```
SELECT * FROM Orders
WHERE OrderDate = #01/01/2011#
```
- b)

```
SELECT * FROM Orders
WHERE OrderDate = %01/01/2011%
```
- c)

```
SELECT * FROM Orders
WHERE OrderDate = '01/01/2011'
```
- d)

```
SELECT * FROM Orders
WHERE OrderDate = "01/01/2011"
```

Answer: c

Difficulty: Medium

Section Ref: Running SQL Queries

The correct delimiter for writing dates in this format is a single quotation mark ('). You must write your query as follows:

```
SELECT * FROM Orders
WHERE OrderDate = '01/01/2011'
```