

ADO.NET Interview Questions & Answers

A large blue circle with a white border, containing the text "ADO.NET" in white, bold, sans-serif font. The circle is positioned in the center of the page, overlapping a diagonal split background of blue and purple.

ADO.NET



By Shailendra Chauhan

Microsoft MVP, Founder & CEO - Dot Net Tricks

 **DotNetTricks**

ADO.NET Interview Questions & Answers

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Dot Net Tricks is founded by Shailendra Chauhan (Microsoft MVP), in Jan 2010. Dot Net Tricks came into existence in the form of a blog post over various technologies including .NET, C#, SQL Server, ASP.NET, ASP.NET MVC, JavaScript, Angular, Node.js and Visual Studio etc.

The company which is currently registered by a name of Dot Net Tricks Innovation Pvt. Ltd. came into the shape in 2015. Dot Net Tricks website has an average footfall on the tune of 300k+ per month. The site has become a cornerstone when it comes to getting skilled-up on .NET technologies and we want to gain the same level of trust in other technologies. This is what we are striving for.

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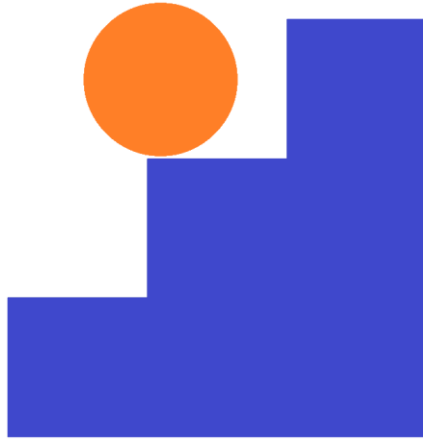
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Dedication

My mother Mrs Vriksha Devi and my wife Reshu Chauhan deserve to have their name on the cover as much as I do for all their support made this possible. I would like to say thanks to all my family members Virendra Singh(father), Jaishree and Jyoti(sisters), Saksham and Pranay(sons), friends, to you and to readers or followers of my articles at <https://www.dotnettricks.com/mentors/shailendra-chauhan> to encourage me to write this book.

-Shailendra Chauhan



Introduction

Writing a book has never been an easy task. It takes a great effort, patience and consistency with strong determination to complete it. Also, one should have a depth knowledge over the subject is going to write.

So, what where my qualification to write this book? My qualification and inspiration come from my enthusiasm for and the experience with the technology and from my analytic and initiative nature. Being a trainer, analyst, consultant and blogger, I have thorough knowledge and understandings of .NET technologies. My inspiration and knowledge have also come from many years of my working experience and research over it.

What This Book Is

ADO.NET is an integral part of the .NET Framework which provides access to relational data, XML documents, and application data. This book will teach you ADO.NET from scratch to advance with the help of Interview Questions & Answers. Here, you will about the ADO.NET fundamentals, connection, command, data reader, datasets, advanced datasets and transactions.

What You'll Learn

This book is for .NET developers who are looking for a change or want to make a bright future in .NET technologies stack. This book covers the interview questions on the following topics:

- ADO.NET Architecture.
- Connected and Disconnected Architecture.
- Data Providers and Connection Pooling.
- How to use Connection and command objects.
- Using DataReader and DataSets.
- Data Adapter and DataView.
- Using and Managing DataTable.
- Strongly typed datasets and untyped data sets.
- Use of Transaction in ADO.NET.

Our best wishes always with you for your learning and growth!

About the Author

Shailendra Chauhan - An Entrepreneur, Author, Architect, Corporate Trainer, and Microsoft MVP



He is the **Founder and CEO** of DotNetTricks which is a brand when it comes to e-Learning. DotNetTricks provides training and consultation over an array of technologies like **Cloud, .NET, Angular, React, Node and Mobile Apps development**. He has been awarded as **Microsoft MVP** three times in a row (2016-2018).

He has changed many lives from his writings and unique training programs. He has a number of most sought-after books to his name which have helped job aspirants in **cracking tough interviews** with ease.

Moreover, and to his credit, he has delivered **1000+ training sessions** to professionals worldwide in Microsoft .NET technologies and other technologies including JavaScript, AngularJS, Node.js, React and NoSQL Databases. In addition, he provides **Instructor-led online training, hands-on workshop** and **corporate training** programs.

Shailendra has a strong combination of **technical skills and solution development for complex application architecture with proven leadership and motivational skills** have elevated him to a world-renowned status, placing him at the top of the list of most sought-after trainers.

"I always keep up with new technologies and learning new skills to deliver the best to my students," says Shailendra Chauhan, he goes on to acknowledge that the betterment of his followers and enabling his students to realize their goals are his prime objective and a great source of motivation and satisfaction.

Shailendra Chauhan - **"Follow me and you too will have the key that opens the door to success"**

How to Contact Us

Although the author of this book has tried to make this book as accurate as it possible but if there is something strikes you as odd, or you find an error in the book please drop a line via e-mail.

The e-mail addresses are listed as follows:

- mentor@dotnettricks.com
- info@dotnettricks.com

We always happy to hear from our readers. Please provide your valuable feedback and comments!

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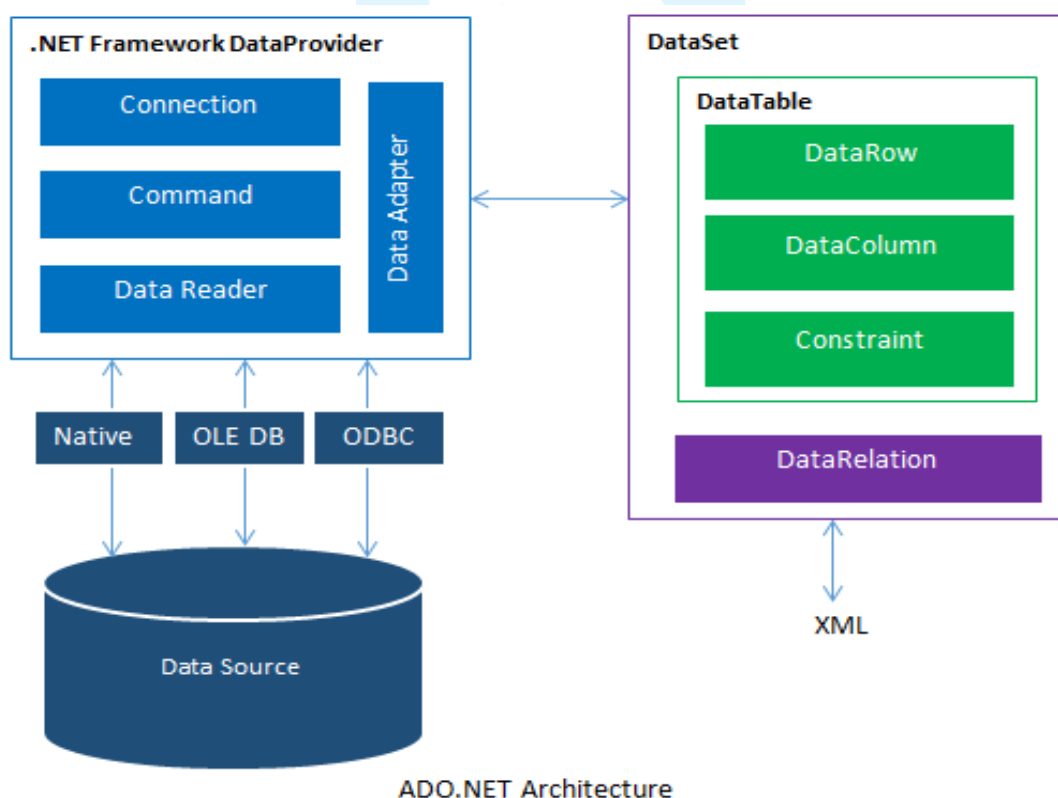
Introducing ADO.NET

Q1. What is ADO.NET?

Ans. ADO.NET is an evolutionary improvement to Microsoft ActiveX Data Objects (ADO). ADO.NET is an integral part of the .NET Framework which provides access to relational data, XML documents, and application data.

Q2. Explain the architecture of ADO.NET?

Ans. ADO .NET Architecture is a multilayered architecture that has two main components- .NET Framework Data Provider and DataSet. .NET provider has four main objects Connection, Command, DataReader and DataAdapter while DataSet has two main objects DataTable and DataRelation as shown in below diagram.



.NET Framework Data Provider: They actually talk to the database to assist in data retrievals and updates.

Class	Description
Connection	Connection represents a connection to the database system.
Command	Represents SQL query or command to be executed at the database management system.
DataAdapter	DataAdapter class connects to the database system, fetch the record and fill the DataSet. It contains four different commands to perform database operations; Select, Update, Insert and Delete.
DataReader	A stream that reads data from the database in connected design.

DataSet: The DataSet is a local buffer of tables or a collection of disconnected record sets and hold actual data. Its main components are given below:

Class	Description
DataTable	DataTable is used to contain the data in tabular form using rows and columns. DataRow Represents a single record or row in DataTable.
DataRow	DataRow Represents a single record or row in DataTable.
DataColumn	DataColumn Represents a column or field of DataTable.
DataRelation	DataRelation Represents the relationship between different tables in a DataSet.
Constraint	Represents the constraints or limitations that apply to a particular field or column.

Q3. What are the advantages of using ADO.NET?

Ans. There are following advantages of using ADO.NET:

- **Performance and scalability:** ADO.NET offer high performance and scalability than ADO. In ADO.NET, disconnected cached data in XML helps in performance and scalability
- **Optimized SQL Provider:** ADO.NET SQL Server Data Provider that is highly optimized for interaction with MS-SQL Server. It uses SQL Server's own TDS (Tabular Data Stream) format for exchanging information.
- **XML Support (Data transfer in XML format):** ADO.NET data is cached and transferred in XML (Extensible Markup Language) format. XML provide fast access of data for desktop and distributed applications.
- **Disconnected Model:** In ADO.NET, the DataSet operates in an entirely disconnected fashion. The disconnected model makes the DataSet to be unaware of the data source of its data. In this way you can use an unlimited number of supported data sources to be plugged into code without any hassle.

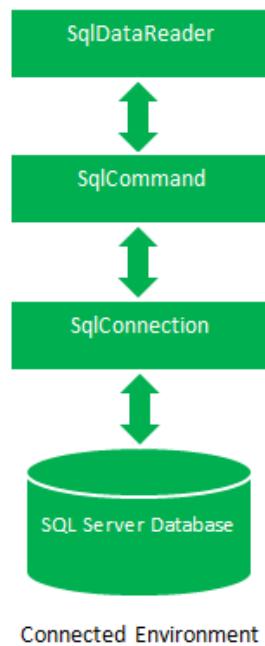
Q4. What is the difference between ADO and ADO.NET?

Ans. Following are the major difference between ADO and ADO.NET.

ADO	ADO.NET
ADO has RecordSet to access and manipulate data. In RecordSet, there can be one table. To contains more than one tables, you need to perform inner join.	ADO.NET has DataSet to access and manipulate data. In ADO.NET, a DataSet can have multiple tables.
XML support is less as compared to ADO.NET It supports only connected model.	XML support is high. It supports both connected and disconnected model.

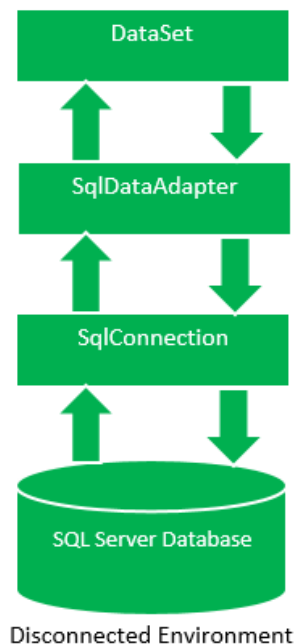
Q5. What is connected environment in ADO.NET?

Ans. In a connected environment while querying or modifying the data source, you are connected to it. The components of Connected environment are given below:



Q6. What is disconnected environment in ADO.NET?

Ans. In a disconnected environment, a subset of data is fetched from the main data store and stored in a memory cache using DataSet. A DataSet can be modified independently, and the changes sync back to the main data source. Disconnected environment components are given below:



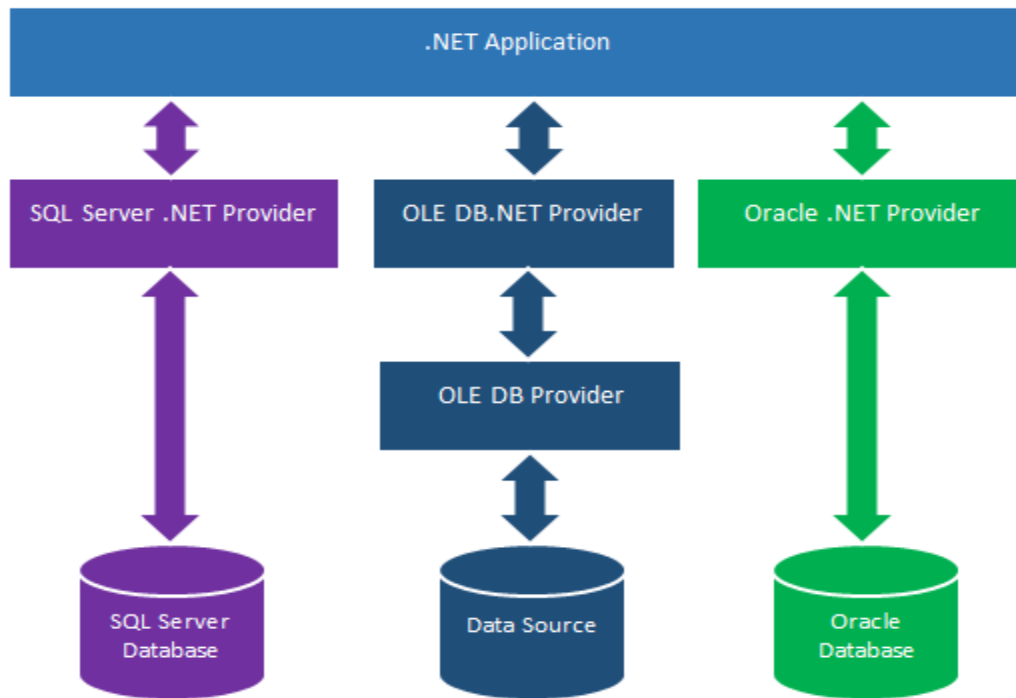
Q7. What are the most commonly used namespaces in ADO.NET?

Ans. Following are the most commonly used namespace in ADO.NET.

1. System.Data
2. System.Data.OleDb
3. System.Data.SqlClient
4. System.Data.OracleClient
5. System.Xml

Q8. What is the role of .NET Framework data Providers?

Ans. The .NET Framework data providers serve as a bridge between an application (presentation layer) and a data source (data layer) that execute SQL commands as well as retrieve data by using a DataReader or a DataAdapter.



Q9. What are the different types of data providers in .NET framework?

Ans. Following are the different data providers in .NET framework.

Provider Name	Access	Description
System.Data.SqlClient	.NET Data Provider for SQL Server	Provides access to Microsoft SQL Server 7.0 or later version
System.Data.OleDb	.NET Data Provider for OLE DB	Provides access to databases exposed by using OLE DB.
System.Data.Odbc	.NET Data Provider for ODBC	Provides access to databases exposed by using ODBC.

System.Data.OracleClient	.NET Data Provider for Oracle	Provides access to Oracle database version 8 or later versions.
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Q10. What are managed providers?

Ans. In ADO.NET a managed provider is similar to ODBC driver or OLEDB provider that performs operation of communication with the database. ADO.NET currently provides two distinct managed providers.

- **SQL Server managed provider:** The SQL Server managed provider is used with SQL server and is a very efficient way of communicating with SQL Server.
- **OLEDB managed provider:** OLEDB managed provider is used to communicate with any OLEDB compliant database like MS Access, Oracle, DB2 etc.



2

Connection and Command

Q1. What is Connection Pooling?

Ans. Grouping of database connections in cache to make them reusable is called connection pooling. You know that opening new connections every time to a database is a time-consuming process. And so, connection pooling enables us to reuse already existing and active database connections, whenever required. In this way it increases the performance of our application.

Q2. What are the pre-requisites for Connection Pooling?

Ans. The prerequisites for connection pooling are there must be multiple processes to share the same connection describing the same parameters and security settings. Also, the connection string must be identical.

Q3. How can you enable or disable connection pooling?

Ans. Using *Pooling=true* in connection string you can enable connection pooling. To disable connection pooling set *Pooling=false*. By default it is enabled in an application.

```
<connectionStrings>
  <add name="strCon" connectionString="Data Source=dotnet-tricks.com;Initial Catalog=dotnet-
tricks; Persist Security Info=True; Pooling=true; User ID=tricks;Password=123@dt"
  providerName="System.Data.SqlClient"/>
</connectionStrings>
```

Q4. What is default maximum pool size in ADO.NET connection string?

Ans. The maximum pool size specifies the maximum number of connections allowed in the pool. The default max pool size is 100.

Q5. Write a sample code for ADO.NET connection to SQL Server.

Ans. Following are the sample code in C# for ADO.NET Connection to SQL Server.

```
string strCon = "server=dotnet-tricks.com; uid=yourId;pwd=yourPwd; database=dbname";

SqlConnection conn = new SqlConnection(strCon);

try
{
    conn.Open();// Open DB connection

    //Our source code here.
```

```

    }
    catch (Exception ex)
    {
        // Log Exceptions
    }
    finally
    {
        conn.Close(); // Close the connection
    }
}

```

Q6. What is Command Object?

Ans. Each .NET Framework data provider included with the .NET Framework has a Command object which is used to execute SQL commands like insert, update, delete, select, create, alter, drop etc. You can also call stored procedures with the command object.

Q7. What are Command Object methods?

Ans. The command object has the following important methods:

1. **ExecuteNonQuery():** It executes a SQL statement that doesn't return any value like insert, update and delete. The return type of this method is *int* and it returns the number of rows affected by a SQL statement.
2. **ExecuteReader():** It executes a select a statement and return the rows returned by the select statement as a DataReader. The return type of this method is a DataReader.
3. **ExecuteScalar:** It executes a SQL statement which returns a single value, like avg, min, max etc. The return type of this method is object.

Q8. What is difference between SqlCommand and SqlCommandBuilder?

Ans. SqlCommand is used to execute all kind of SQL queries (DML & DDL). However, SqlCommandBuilder object is used to build & execute SQL (DML) queries like select, insert, update & delete.

Q9. What is SqlCommand Object?

Ans. SqlCommand: SqlCommand is a collection of strings containing SQL statements which will be send to database for various operations. SQL Commands can be of type **Select, Insert, Delete, Update** or **Stored procedures**.

```

string strCon = "server=dotnet-tricks.com; uid=yourId;pwd=yourPwd; database=dbname";

SqlConnection conn = new SqlConnection(strCon);

try
{
    conn.Open(); // Open DB connection

    string strSelect = "select * from dbo.Tbl_Employe";
    SqlCommand cmd = new SqlCommand(strSelect, conn);
}
catch (Exception ex)
{
    // Log Exceptions
}

```

```
finally
{
    conn.Close(); // Close the connection
}
```

Q10. What is CommandType in SqlCommand?

Ans. It specifies how a command string is interpreted. The different CommandType are: StoredProcedure, TableDirect and Text.

- **For Stored Procedures**, CommandType should be specified as shown below:

```
SqlCommand cmd = new SqlCommand("dbo.Usp_GetEmployeeDetailById", conn);
cmd.CommandType = CommandType.StoredProcedure;
cmd.Parameters.Add("@EmployeeID", "U00000001");
```

- **For TableDirect**, CommandType should be specified as shown below:

```
OleDbConnection conn = new OleDbConnection(Connection);

try
{
    conn.Open(); // Open DB connection

    OleDbCommand cmd = new OleDbCommand("dbo.Tbl_Employee", conn);
    cmd.CommandType = CommandType.TableDirect;

}
catch (Exception ex)
{
    // Log Exceptions
}
finally
{
    conn.Close(); // Close the connection
}
```

- **For normal queries** like select, CommandType is not specified.

```
string strSelect = "select * from dbo.Tbl_Employee";
SqlCommand cmd = new SqlCommand(strSelect, conn);
```

Q11. What are ReadCommitted and ReadUncommitted Transactions?

Ans. ReadCommitted: This is a state of transaction where changes in database made by a user can be reflected to others only after the transaction is being committed by first user. **By default**, transactions are ReadCommitted. This prevents dirty reads.

For example, if two persons are accessing same table, if one person executes an insert, other person will be able to access the newly inserted row only after the first person commit the transaction.

ReadUncommitted: This is a state of transaction where changes in database made by a user can be reflected to others before the first user commits the transaction. Transactions running at the Read Uncommitted level do not

issue shared locks to prevent other transactions from modifying data read by the current transaction. This does not prevent dirty reads.

Q12. What is difference between Optimistic and Pessimistic locking?

Ans. Optimistic: In Pessimistic locking when a user wants to update the data it locks the records and till then no one can modify the data. Other users can only view the data when there is pessimistic locking

Pessimistic: In Optimistic locking multiple users can open the same record for modification, thus increase maximum concurrency. The record is only locked when it is modified by someone and starts committing it to the database.



DataReaders and DataSets

Q1. What is DataReader in ADO.NET?

Ans. A DataReader object is a forward-only and read-only cursor. It needs a live connection with the data source to fetch the result.

Key points about DataReader

1. DataReader object cannot be directly instantiated. Instead, it must be called by ExecuteReader method of the Command object.
2. By using DataReader your application performance can be increased since it retrieves data as soon as it is available, and by default it stores only one row at a time in memory.
3. A DataReader provides fast access when a forward-only sequential read is needed.
4. Be sure to close the connection when done using data reader. Otherwise, the connection stays alive until it is explicitly closed.

Q2. What is DataSet in ADO.NET?

Ans. A DataSet is a set of tables or a collection of disconnected record sets which allows you to store data for using in your application. In fact, a DataSet is disconnected cache store. A DataSet structure is similar to a relational database containing tables, rows, and columns. Also, it can have constraints and relationships between the tables as we have in database.

Q3. What is difference between DataReader and DataSet?

Ans. Following are the key difference between DataReader and DataSet.

DataReader	DataSet
Works in connected mode only.	Works in disconnected mode only.
Can navigate forward only.	Can navigate backward and forward.
Data is read only.	Data is editable.
Can contain only one row/record at a time.	It cached the entire data. Hence contain multiple records.
Faster as compared to DataSet.	Slower as compared to DataReader.
Need to open or close connection explicitly.	Do not need to open or close the connection.

Q4. What is difference between DataSet and RecordSet?

Ans. The difference between DataSet and RecordSet is given below:

DataSet	RecordSet
Supports disconnected approach.	Supports connected approach.
A DataSet can represent a relational database in memory along with tables, relations, and views.	A RecordSet is able to load the structure and data of only one table at a time.
Data in a DataSet is cache, rather than being loaded on demand.	A RecordSet can contain one record at a time.
DataSet can be transmitted over http protocol.	A RecordSet cannot be transmitted over http protocol.
There is no concept of cursor in DataSet	There is concept of cursor in RecordSet
You can use foreach loop to move through the data.	RecordSet have current record pointer and so you cannot use foreach loop.

Q5. How can you determine the changes done in DataSet?

Ans. In DataSet changes can be determine by using following methods:

1. **GetChanges()**– It returns a copy of the DataSet containing all changes made to it since it was last loaded, or since the last time AcceptChanges was called.
2. **HasChanges()**– It returns a boolean value (true or false) to indicates any changes occurred to DataSet including new, deleted, or modified rows. If changes occur, it returns true otherwise returns false.
3. **RejectChanges()**– It rolls back all the changes made to the DataSet object since it was created, or since the last time AcceptChanges was called.

Q6. What is Data Adapter?

Ans. A Data adapter is a part of ADO.NET data providers. It is used to communicate between a data source and a dataset. It uses the Connection object to connect to the data source, and it uses Command objects to retrieve data from database and resolve changes to the database.

Q7. How to use Data Adapter in ADO.NET?

Ans. The example code for Data Adapter is given below:

```
string strCon = "server=servername; uid=UserName; pwd=Password; database=dbname";
SqlConnection conn = new SqlConnection(strCon);
conn.Open();

string StrSql = "Select * from tbl_Employee";
SqlDataAdapter Adapter = new SqlDataAdapter();
Adapter.SelectCommand = new SqlCommand(StrSql, conn);
DataSet ds = new DataSet("ds_Employees");
Adapter.Fill(ds);

// Code to update data in a data source
ds.Tables["tbl_Employee"].Rows[0]["Name"] = "Asif";
Adapter.Update(ds, "tbl_Employee");
```

Q8. What are basic methods of DataAdapter?

Ans. Following are the methods of DataAdapter:

Method	Description
Fill	This method fills data records from a DataAdapter to a DataSet object by executing the Select statement.
FillSchema	This method adds a DataTable with its schema to a DataSet. It creates an empty table in the DataSet object with all the corresponding constraints.
Update	This executes the Insert, Update, or Delete SQL statement to update the original data source with the changes made to the content of the DataSet.

Q9. What is the use of AcceptChanges method in DataSet?

Ans. This method commits all the changes made to the DataSet since it was loaded or since the last time AcceptChanges was called.

Q10. What is the use of DataView?

Ans. DataView is data container that contain user define view of tables. A complete table or a small section of table depending on some criteria can be presented by an object of the DataView class. You can use this class to sort and find data within DataTable.

Q11. What are different methods associated with DataView?

Ans. The different methods associated to DataView are as:

1. **Find()**- Finds a row in a DataView by using sort key value.
2. **FindRows()**- Uses the sort key value to match it with the columns of DataRowView objects. It returns an array of all the corresponding objects of DataRowView whose columns match with the sort key value.
3. **AddNew()**- Adds a new row to the DataView object.
4. **Delete()**- Deletes the specified row from the DataView object according to the specified index.

Q12. How can you sort DataTable using DataView?

Ans. By following way, you can use *DataView* for filtering and sorting data in a *DataTable*.

```
DataTable DtEmployee = new DataTable();  
  
//sorting done by Name column using DataView  
DtEmployee.DefaultView.Sort = "Name";
```

Q13. How can you add multiple DataTable to a DataSet?

Ans. By following way, you can add multiple DataTable to a DataSet.

```
//Creating 1st DataTable
DataTable DtEmployee = new DataTable("Employee"); //Create Table name

// Adding Column To Employee DataTable
DtEmployee.Columns.Add("ID");
DtEmployee.Columns.Add("Name");

//Adding record to Employee DataTable
DtEmployee.Rows.Add("A0000001", "Shailendra Chauhan");
DtEmployee.Rows.Add("A0000002", "Asif Iqbal");

//Creating 2nd DataTable
DataTable DtStudent = new DataTable("Student"); //Create Table name

// Adding Column To Student DataTable
DtStudent.Columns.Add("RollNo");
DtStudent.Columns.Add("Name");

//Adding record to Student DataTable
DtStudent.Rows.Add(1, "Peter Smith");
DtStudent.Rows.Add(2, "Jhon Doe");

//Adding Tables to DataSet
DataSet ds = new DataSet();
ds.Tables.Add(DtEmployee);
ds.Tables.Add(DtStudent);
```

Q14. What is difference between Clone and Copy methods of DataSet?

Ans. The difference between Clone and Copy methods is given below:

Clone	Copy
The Clone() method copies only the structure of a DataSet. The structure of a DataSet includes all the relations, constraints and the DataTables.	The Copy() method copies the structure as well as the data stored in the DataSet.

Q15. How can you delete a row from a DataTable?

Ans. Using Delete method you can delete a row from DataTable as given below:

```
DataTableName.Rows[index].Delete();
DataTableName.AcceptChanges();
```


4

Advanced DataSets and Transactions

Q1. What is Strongly Typed DataSets?

Ans. A Typed DataSet is a class that derives from a DataSet and contains all the methods, events, and properties of a DataSet. It is stored in an .xsd file and type checking is done at design time using the .xsd definitions. A Typed dataset binds with the database tables at design time and contains all the schema information at design.

Q2. What is UnTyped DataSets?

Ans. An UnTyped DataSet is an instance of class System.Data.DataSet. It binds with the table at runtime and at runtime and there no corresponding built-in schema. So, there is not type checking.

Q3. What are the different methods in DataSet to manipulate with XML?

Ans. The methods to create, read and return XML in DataSet are given below:

1. **ReadXml()**- Reads XML document into a DataSet object.
2. **GetXml()**- Returns a string containing an XML document.
3. **WriteXml()**- Writes an XML data to disk.

Q4. What is the use of Transaction in ADO.NET?

Ans. A transaction is useful when you want to execute a set of commands in ADO.NET in a scope as a single unit. If one of the operations failed in the group, all of the database updates would be rolled back i.e. there is no change in the database.

Q5. How to create a Transaction in ADO.NET?

Ans. In ADO.NET a transaction can be opened as given below:

```
SqlConnection con = new SqlConnection("<your connection string here>");
con.Open();

//start transaction
transaction = con.BeginTransaction();
try
{
```

```
SqlCommand cmd = new SqlCommand("<your sql statement1 here>", con, transaction);
cmd.ExecuteNonQuery();
cmd = new SqlCommand("<your sql statement2 here>", con, transaction);
cmd.ExecuteNonQuery();

//commit db changes
transaction.Commit();
}
catch (SqlException sqlError)
{
    //rollback/undo db changes
    transaction.Rollback();
}
con.Close();
```



References

This book has been written by referring to the following sites:

1. <https://docs.microsoft.com/en-us/dotnet/framework/data/adonet/> - Microsoft Docs - ADO.NET
2. <https://stackoverflow.com/questions/tagged/ado.net> - Stack Overflow - ADO.NET
3. <https://www.dotnettricks.com/learn> - Dot Net Tricks

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