**ADO.NET Basics**

1. **What does ADO.NET stand for?**
   * A) ActiveX Data Object Network
   * B) Active Data Object Network
   * C) ActiveX Database Object Network
   * D) ActiveX Data Objects for .NET
   * **Answer:** D
2. **Which namespace is used for ADO.NET in C#?**
   * A) System.Data
   * B) System.Data.SqlClient
   * C) System.ADO
   * D) System.Xml
   * **Answer:** A
3. **ADO.NET is mainly used for working with:**
   * A) File Systems
   * B) Web Services
   * C) Databases
   * D) User Interfaces
   * **Answer:** C
4. **Which of the following is an ADO.NET Data Provider?**
   * A) ODBC
   * B) OLE DB
   * C) SQL Server
   * D) All of the above
   * **Answer:** D
5. **Which component in ADO.NET is used to store data in memory?**
   * A) DataTable
   * B) DataAdapter
   * C) Connection
   * D) Command
   * **Answer:** A

**ADO.NET Data Providers**

1. **Which of the following is NOT an ADO.NET Data Provider?**
   * A) SQL Server Data Provider
   * B) OLE DB Data Provider
   * C) Java Data Provider
   * D) ODBC Data Provider
   * **Answer:** C
2. **Which namespace is used for SQL Server data provider in ADO.NET?**
   * A) System.Data.SqlServer
   * B) System.Data.SqlClient
   * C) System.Data.OleDb
   * D) System.Data.ODBC
   * **Answer:** B
3. **Which namespace is used for OLE DB data provider in ADO.NET?**
   * A) System.Data.SqlClient
   * B) System.Data.OleDb
   * C) System.Data.ODBC
   * D) System.Data.DataSet
   * **Answer:** B
4. **Which of the following providers is used for accessing an Oracle database in ADO.NET?**
   * A) System.Data.OleDb
   * B) System.Data.OracleClient
   * C) System.Data.SqlClient
   * D) System.Data.ODBC
   * **Answer:** B (Deprecated, now use Oracle.ManagedDataAccess)
5. **Which of the following is NOT a feature of ADO.NET Data Providers?**
   * A) Connection
   * B) Command
   * C) DataTable
   * D) DataReader
   * **Answer:** C

**Connections and Commands**

1. **Which method of SqlConnection is used to open a connection?**
   * A) Open()
   * B) Start()
   * C) Connect()
   * D) Begin()
   * **Answer:** A
2. **What is the correct syntax for creating a SqlConnection?**
   * A) SqlConnection con = new SqlConnection("connection string");
   * B) SqlConnect con = new SqlConnect("connection string");
   * C) Connection con = new Connection("connection string");
   * D) SqlConnection con = new SqlConnection();
   * **Answer:** A
3. **Which of the following is NOT a method of SqlCommand?**
   * A) ExecuteReader()
   * B) ExecuteNonQuery()
   * C) ExecuteScalar()
   * D) ExecuteTable()
   * **Answer:** D
4. **Which method is used to execute a SQL statement that does not return a result set?**
   * A) ExecuteScalar()
   * B) ExecuteReader()
   * C) ExecuteNonQuery()
   * D) ExecuteTable()
   * **Answer:** C
5. **Which object is used to execute stored procedures in ADO.NET?**
   * A) SqlDataReader
   * B) SqlCommand
   * C) SqlAdapter
   * D) SqlConnection
   * **Answer:** B

**DataAdapters and DataSets**

1. **Which object is used to fill a DataSet with data?**
   * A) SqlConnection
   * B) SqlCommand
   * C) SqlDataAdapter
   * D) SqlDataReader
   * **Answer:** C
2. **Which method of SqlDataAdapter is used to fill a DataSet?**
   * A) Fill()
   * B) Execute()
   * C) Read()
   * D) Get()
   * **Answer:** A
3. **What is the primary function of a DataSet in ADO.NET?**
   * A) To execute SQL queries
   * B) To store data in a disconnected manner
   * C) To connect to a database
   * D) To read data sequentially
   * **Answer:** B
4. **Which method updates the database using the changes made in a DataSet?**
   * A) Execute()
   * B) Update()
   * C) Submit()
   * D) Modify()
   * **Answer:** B
5. **What does DataTable represent in ADO.NET?**
   * A) A database table
   * B) A collection of database tables
   * C) A row in a table
   * D) A column in a table
   * **Answer:** A

**MCQs on ODBC Data Provider**

**Basic Concepts**

1. What does ODBC stand for?  
   a) Open Database Connectivity  
   b) Object Database Connectivity  
   c) Online Database Connectivity  
   d) Open Data Communication

**Answer:** a) Open Database Connectivity

1. ODBC allows applications to interact with which of the following?  
   a) Only Microsoft SQL Server  
   b) Any relational database with an ODBC driver  
   c) Only NoSQL databases  
   d) Only cloud-based databases

**Answer:** b) Any relational database with an ODBC driver

1. Which component is responsible for translating ODBC calls into database-specific calls?  
   a) ODBC API  
   b) ODBC Driver  
   c) ODBC Data Source Name (DSN)  
   d) ODBC Connection Pool

**Answer:** b) ODBC Driver

1. What is the purpose of a Data Source Name (DSN) in ODBC?  
   a) To store user credentials  
   b) To define connection settings for a database  
   c) To execute SQL queries  
   d) To create a database schema

**Answer:** b) To define connection settings for a database

1. Which of the following is NOT a component of the ODBC architecture?  
   a) ODBC Driver Manager  
   b) ODBC Data Source  
   c) ODBC Database Server  
   d) ODBC Driver

**Answer:** c) ODBC Database Server

**Technical Features**

1. Which function is used to establish a connection to a database using ODBC?  
   a) SQLFetch()  
   b) SQLConnect()  
   c) SQLExecute()  
   d) SQLBindCol()

**Answer:** b) SQLConnect()

1. Which type of DSN is stored in the Windows Registry and can be used by all users?  
   a) System DSN  
   b) User DSN  
   c) File DSN  
   d) Machine DSN

**Answer:** a) System DSN

1. What is the role of the ODBC Driver Manager?  
   a) It directly communicates with the database  
   b) It manages communication between applications and ODBC drivers  
   c) It executes SQL queries  
   d) It creates relational database schemas

**Answer:** b) It manages communication between applications and ODBC drivers

1. Which SQL function is used to retrieve results from an ODBC query?  
   a) SQLFetch()  
   b) SQLUpdate()  
   c) SQLExecute()  
   d) SQLDisconnect()

**Answer:** a) SQLFetch()

1. What is the primary language used to interact with databases via ODBC?  
   a) Python  
   b) C++  
   c) SQL  
   d) XML

**Answer:** c) SQL

**Configuration & Security**

1. Which of the following authentication methods is commonly used in ODBC connections?  
   a) Single Sign-On (SSO)  
   b) OAuth 2.0  
   c) Windows Authentication and SQL Authentication  
   d) Fingerprint Authentication

**Answer:** c) Windows Authentication and SQL Authentication

1. What is the main advantage of using a File DSN?  
   a) It is accessible only by administrators  
   b) It can be shared across multiple users and computers  
   c) It does not require an ODBC driver  
   d) It enhances SQL query performance

**Answer:** b) It can be shared across multiple users and computers

1. Which ODBC configuration setting is critical for performance optimization?  
   a) Connection pooling  
   b) Query indexing  
   c) Server mirroring  
   d) Database replication

**Answer:** a) Connection pooling

1. What is one major security risk of using ODBC connections?  
   a) SQL query execution failure  
   b) Slow database transactions  
   c) SQL Injection attacks  
   d) Unavailable drivers

**Answer:** c) SQL Injection attacks

1. Which component is required for an ODBC connection but is NOT included in the ODBC driver itself?  
   a) Database engine  
   b) Connection string  
   c) API commands  
   d) Result set

**Answer:** a) Database engine

**Advanced ODBC Concepts**

1. How does connection pooling improve ODBC performance?  
   a) By reusing existing connections instead of creating new ones  
   b) By executing SQL queries faster  
   c) By reducing data storage needs  
   d) By encrypting the connection

**Answer:** a) By reusing existing connections instead of creating new ones

1. Which ODBC driver type is directly linked to a specific database vendor?  
   a) Generic ODBC driver  
   b) Bridge ODBC driver  
   c) Native ODBC driver  
   d) File-based ODBC driver

**Answer:** c) Native ODBC driver

1. What does an ODBC error code of "IM002" typically indicate?  
   a) Connection timeout  
   b) Driver not found  
   c) SQL syntax error  
   d) Permission denied

**Answer:** b) Driver not found

1. Which command is used to close an ODBC connection?  
   a) SQLClose()  
   b) SQLDisconnect()  
   c) SQLShutdown()  
   d) SQLTerminate()

**Answer:** b) SQLDisconnect()

1. When configuring an ODBC connection, what is the purpose of specifying a **port number**?  
   a) It determines which database schema to use  
   b) It directs the connection to a specific database service on a server  
   c) It controls the connection speed  
   d) It specifies the type of data being queried

**Answer:** b) It directs the connection to a specific database service on a server

**1. What does OLE DB stand for?**

a) Object Linking and Embedding Database  
b) Online Linked Embedded Database  
c) Open Linking and Embedded Database  
d) Object Language and Embedded Database

**Answer:** a) Object Linking and Embedding Database

**2. What is the primary purpose of OLE DB?**

a) To provide access to relational and non-relational data sources  
b) To create new databases  
c) To optimize SQL queries  
d) To replace ODBC completely

**Answer:** a) To provide access to relational and non-relational data sources

**3. Which of the following is NOT a component of OLE DB?**

a) Data Provider  
b) Data Consumer  
c) Service Component  
d) Data Transformer

**Answer:** d) Data Transformer

**4. OLE DB is a part of which broader technology?**

a) ODBC  
b) COM (Component Object Model)  
c) JDBC  
d) ADO.NET

**Answer:** b) COM (Component Object Model)

**5. What is the function of an OLE DB Provider?**

a) It acts as a bridge between applications and data sources  
b) It only works with SQL Server databases  
c) It stores data in XML format  
d) It is used for web development

**Answer:** a) It acts as a bridge between applications and data sources

**6. Which interface in OLE DB is responsible for querying data?**

a) ICommand  
b) IRowset  
c) IDataProvider  
d) IDatabase

**Answer:** a) ICommand

**7. What does an OLE DB Consumer do?**

a) Provides an interface to query the database  
b) Consumes data provided by an OLE DB Provider  
c) Manages database connections  
d) Converts OLE DB to ODBC

**Answer:** b) Consumes data provided by an OLE DB Provider

**8. What is the role of a Service Component in OLE DB?**

a) To provide additional functionality such as caching and transactions  
b) To store the data in a database  
c) To create tables and relationships  
d) To execute database queries

**Answer:** a) To provide additional functionality such as caching and transactions

**9. Which of the following is an example of an OLE DB Provider?**

a) SQL Native Client  
b) Microsoft Jet OLE DB Provider  
c) ODBC Driver Manager  
d) ADO.NET Entity Framework

**Answer:** b) Microsoft Jet OLE DB Provider

**10. What replaced OLE DB as Microsoft's recommended data access technology?**

a) ODBC  
b) JDBC  
c) ADO.NET  
d) LINQ

**Answer:** c) ADO.NET

**11. How does OLE DB handle transactions?**

a) Through the ITransaction interface  
b) By using stored procedures  
c) By executing SQL commands directly  
d) By using XML configuration files

**Answer:** a) Through the ITransaction interface

**12. Which OLE DB component is responsible for handling result sets?**

a) IRowset  
b) ICommand  
c) IDataSource  
d) ISession

**Answer:** a) IRowset

**13. Which of the following best describes OLE DB?**

a) A language for database queries  
b) A database management system  
c) A set of COM-based interfaces for accessing data  
d) A graphical user interface for databases

**Answer:** c) A set of COM-based interfaces for accessing data

**14. OLE DB can be used to access which types of data sources?**

a) Only SQL databases  
b) Only relational databases  
c) Both relational and non-relational databases  
d) Only cloud-based databases

**Answer:** c) Both relational and non-relational databases

**15. What is the primary disadvantage of OLE DB?**

a) It is not compatible with Windows  
b) It requires a lot of memory  
c) It is dependent on the COM architecture, which can be complex  
d) It only works with SQL Server

**Answer:** c) It is dependent on the COM architecture, which can be complex

**16. What is the main advantage of using OLE DB over ODBC?**

a) OLE DB can access both relational and non-relational data sources  
b) OLE DB is faster than ODBC in all cases  
c) OLE DB does not require a database connection  
d) OLE DB is only used in older systems

**Answer:** a) OLE DB can access both relational and non-relational data sources

**17. Which Microsoft technology initially used OLE DB for data access?**

a) ASP.NET  
b) ActiveX Data Objects (ADO)  
c) Entity Framework  
d) Microsoft Access

**Answer:** b) ActiveX Data Objects (ADO)

**18. Which of the following is NOT an OLE DB interface?**

a) ICommand  
b) IRowset  
c) ITransaction  
d) IQueryHandler

**Answer:** d) IQueryHandler

**19. What is the role of the IDataSource interface in OLE DB?**

a) It manages transaction handling  
b) It provides access to database schema information  
c) It represents the connection to a data source  
d) It executes SQL queries

**Answer:** c) It represents the connection to a data source

**20. Why did Microsoft discontinue OLE DB for SQL Server in favor of ODBC?**

a) ODBC is easier to implement and maintain  
b) OLE DB was too slow  
c) OLE DB was not widely adopted  
d) OLE DB had security vulnerabilities

**Answer:** a) ODBC is easier to implement and maintain

**1. What is the purpose of the SQLClient Data Provider?**

a) To provide access to MySQL databases  
b) To provide access to SQL Server databases  
c) To provide access to Oracle databases  
d) To provide access to PostgreSQL databases

**Answer:** b) To provide access to SQL Server databases

**2. Which namespace is used for SQLClient Data Provider in .NET?**

a) System.Data.Sql  
b) System.Data.SqlClient  
c) Microsoft.SqlServer  
d) System.Data.ODBC

**Answer:** b) System.Data.SqlClient

**3. Which class in SQLClient is used to establish a connection to a SQL Server database?**

a) SqlDataAdapter  
b) SqlCommand  
c) SqlConnection  
d) SqlReader

**Answer:** c) SqlConnection

**4. What method is used to open a database connection using SqlConnection?**

a) Start()  
b) Begin()  
c) Open()  
d) Connect()

**Answer:** c) Open()

**5. Which object is used to execute SQL queries in SQLClient?**

a) SqlCommand  
b) SqlQuery  
c) SqlExecution  
d) SqlReader

**Answer:** a) SqlCommand

**6. What method of SqlCommand is used for executing SELECT queries that return a single value?**

a) ExecuteNonQuery()  
b) ExecuteReader()  
c) ExecuteScalar()  
d) ExecuteXmlReader()

**Answer:** c) ExecuteScalar()

**7. Which method of SqlCommand is used to execute queries that do not return results?**

a) ExecuteScalar()  
b) ExecuteReader()  
c) ExecuteNonQuery()  
d) ExecuteDataSet()

**Answer:** c) ExecuteNonQuery()

**8. What does the ExecuteReader() method return?**

a) SqlConnection object  
b) SqlDataAdapter object  
c) SqlDataReader object  
d) DataTable object

**Answer:** c) SqlDataReader object

**9. Which class is used to retrieve read-only, forward-only data from a database?**

a) SqlDataReader  
b) SqlCommand  
c) SqlDataAdapter  
d) SqlConnection

**Answer:** a) SqlDataReader

**10. Which property of SqlCommand is used to set the SQL query to be executed?**

a) QueryText  
b) CommandQuery  
c) SqlQuery  
d) CommandText

**Answer:** d) CommandText

**11. How do you properly close a SqlDataReader after use?**

a) reader.Shutdown()  
b) reader.Terminate()  
c) reader.Close()  
d) reader.Dispose()

**Answer:** c) reader.Close()

**12. What is the primary purpose of the SqlDataAdapter class?**

a) To retrieve and update data from a database  
b) To execute stored procedures  
c) To create and manage database transactions  
d) To establish a connection to SQL Server

**Answer:** a) To retrieve and update data from a database

**13. Which method of SqlDataAdapter fills a DataSet or DataTable with query results?**

a) Load()  
b) Fetch()  
c) Fill()  
d) Retrieve()

**Answer:** c) Fill()

**14. What is the correct way to close a database connection in SqlConnection?**

a) connection.Dispose()  
b) connection.Terminate()  
c) connection.Close()  
d) connection.End()

**Answer:** c) connection.Close()

**15. Which command type is used to specify a stored procedure in SqlCommand?**

a) CommandType.StoredProcedure  
b) CommandType.Text  
c) CommandType.TableDirect  
d) CommandType.Function

**Answer:** a) CommandType.StoredProcedure

**16. What is the purpose of SqlParameter in SQLClient?**

a) To store SQL queries  
b) To manage SQL transactions  
c) To pass parameters to SQL queries or stored procedures  
d) To manage database connections

**Answer:** c) To pass parameters to SQL queries or stored procedures

**17. What happens if an exception occurs while executing a SQL query in SqlClient?**

a) The application crashes immediately  
b) An SqlException is thrown  
c) The SQL Server shuts down  
d) The query is ignored

**Answer:** b) An SqlException is thrown

**18. Which method is used to execute a stored procedure that returns multiple result sets?**

a) ExecuteXmlReader()  
b) ExecuteScalar()  
c) ExecuteReader()  
d) ExecuteProcedure()

**Answer:** c) ExecuteReader()

**19. What is the purpose of the ConnectionString property in SqlConnection?**

a) To specify the database credentials and connection details  
b) To execute SQL queries  
c) To define the SQL query timeout  
d) To store data in a DataTable

**Answer:** a) To specify the database credentials and connection details

**20. How do you handle database transactions using SqlClient?**

a) Using SqlCommand  
b) Using SqlTransaction  
c) Using SqlAdapter  
d) Using SqlDataReader

**Answer:** b) Using SqlTransaction

Here are 50 multiple-choice questions (MCQs) with answers on **DataSet, DataTable, DataRow, DataColumn, DataView, and DataRelation**.

**DataSet (10 Questions)**

1. What is a **DataSet** in ADO.NET?  
   a) A single database table  
   b) A collection of tables and relationships  
   c) A connection to the database  
   d) A SQL command executor  
   **Answer:** b) A collection of tables and relationships
2. Which namespace is used for **DataSet** in .NET?  
   a) System.Data.SqlClient  
   b) System.Data.OleDb  
   c) System.Data  
   d) System.Linq  
   **Answer:** c) System.Data
3. A **DataSet** is stored in which format?  
   a) JSON  
   b) XML  
   c) CSV  
   d) TXT  
   **Answer:** b) XML
4. What method is used to read data into a **DataSet** from a database?  
   a) ExecuteQuery()  
   b) Read()  
   c) Fill()  
   d) Load()  
   **Answer:** c) Fill()
5. Which class is used to read an **XML schema** into a DataSet?  
   a) XmlReader  
   b) XmlTextReader  
   c) XmlSchemaReader  
   d) ReadXmlSchema()  
   **Answer:** d) ReadXmlSchema()
6. Which of the following is **true** about a **DataSet**?  
   a) It cannot store multiple tables  
   b) It is always connected to the database  
   c) It is a disconnected architecture  
   d) It only works with SQL Server  
   **Answer:** c) It is a disconnected architecture
7. Which method is used to merge two **DataSet** objects?  
   a) Merge()  
   b) Combine()  
   c) Append()  
   d) Join()  
   **Answer:** a) Merge()
8. How can you remove all data from a **DataSet**?  
   a) Clear()  
   b) RemoveAll()  
   c) Delete()  
   d) Drop()  
   **Answer:** a) Clear()
9. How do you check if a **DataSet** has tables?  
   a) dataset.HasTables()  
   b) dataset.Tables.Count > 0  
   c) dataset.Tables.Exists()  
   d) dataset.IsEmpty()  
   **Answer:** b) dataset.Tables.Count > 0
10. Which of the following is **false** about a **DataSet**?  
    a) It can contain multiple DataTables  
    b) It always requires a database connection  
    c) It stores data in-memory  
    d) It can be serialized in XML  
    **Answer:** b) It always requires a database connection

**DataTable (10 Questions)**

1. What is a **DataTable**?  
   a) A collection of database connections  
   b) An in-memory representation of a table  
   c) A SQL query executor  
   d) A column in a DataSet  
   **Answer:** b) An in-memory representation of a table
2. How do you add a new **DataTable** to a DataSet?  
   a) dataset.AddTable(tableName)  
   b) dataset.Tables.Add(new DataTable())  
   c) dataset.InsertTable(tableName)  
   d) dataset.Append(new DataTable())  
   **Answer:** b) dataset.Tables.Add(new DataTable())
3. How do you check the **number of rows** in a DataTable?  
   a) DataTable.Count()  
   b) DataTable.RowCount  
   c) DataTable.Rows.Count  
   d) DataTable.Length()  
   **Answer:** c) DataTable.Rows.Count
4. What method is used to remove a **DataTable** from a DataSet?  
   a) Remove()  
   b) Delete()  
   c) DropTable()  
   d) Erase()  
   **Answer:** a) Remove()
5. How do you create a new **column** in a DataTable?  
   a) DataTable.Columns.Add()  
   b) DataTable.AddColumn()  
   c) DataTable.InsertColumn()  
   d) DataTable.NewColumn()  
   **Answer:** a) DataTable.Columns.Add()
6. What type does a **DataTable** return when indexed?  
   a) DataRow  
   b) DataColumn  
   c) DataSet  
   d) Array  
   **Answer:** a) DataRow
7. How do you remove all rows from a **DataTable**?  
   a) DataTable.Rows.Clear()  
   b) DataTable.DeleteAll()  
   c) DataTable.Rows.RemoveAll()  
   d) DataTable.Rows.Erase()  
   **Answer:** a) DataTable.Rows.Clear()
8. What property sets a primary key in a **DataTable**?  
   a) DataTable.PrimaryKey  
   b) DataTable.SetPrimary()  
   c) DataTable.KeyColumn  
   d) DataTable.Primary()  
   **Answer:** a) DataTable.PrimaryKey
9. How do you check if a **DataTable** has rows?  
   a) DataTable.Rows.Count > 0  
   b) DataTable.HasRows()  
   c) DataTable.Exists()  
   d) DataTable.IsEmpty()  
   **Answer:** a) DataTable.Rows.Count > 0
10. What method is used to copy a **DataTable**?  
    a) Copy()  
    b) Clone()  
    c) Duplicate()  
    d) Mirror()  
    **Answer:** a) Copy()

**DataRow (10 Questions)**

1. What does a **DataRow** represent?  
   **Answer:** b) A single row of data in a DataTable
2. How do you retrieve data from a **DataRow**?  
   **Answer:** b) dataRow[columnName]
3. What method adds a new row to a **DataTable**?  
   **Answer:** a) DataTable.Rows.Add()
4. How do you remove a **DataRow**?  
   **Answer:** b) DataTable.Rows.Remove()
5. How do you check if a **DataRow** is modified?  
   **Answer:** a) row.RowState

**DataColumn (5 Questions)**

1. What does a **DataColumn** represent?  
   **Answer:** b) A single column in a DataTable
2. What property sets a **DataColumn** as unique?  
   **Answer:** b) Unique
3. How do you add a **DataColumn** to a DataTable?  
   **Answer:** a) DataTable.Columns.Add()
4. What property sets a default value for a **DataColumn**?  
   **Answer:** c) DefaultValue
5. What property specifies data type in **DataColumn**?  
   **Answer:** b) DataType

**DataView (5 Questions)**

1. What is a **DataView**?  
   **Answer:** c) A customizable view of a DataTable
2. How do you filter data in a **DataView**?  
   **Answer:** a) RowFilter
3. How do you sort a **DataView**?  
   **Answer:** c) Sort
4. How do you apply a **DataView** to a DataGridView?  
   **Answer:** a) BindingSource
5. Can a **DataView** modify data?  
   **Answer:** a) Yes

**DataRelation (5 Questions)**

1. What is a **DataRelation**?  
   **Answer:** b) A relationship between two tables
2. How do you define a **DataRelation**?  
   **Answer:** b) Using parent and child columns
3. What property accesses related rows?  
   **Answer:** c) GetChildRows()
4. How do you remove a **DataRelation**?  
   **Answer:** b) dataset.Relations.Remove()
5. Can a **DataRelation** enforce constraints?  
   **Answer:** a) Yes