ADO.NET

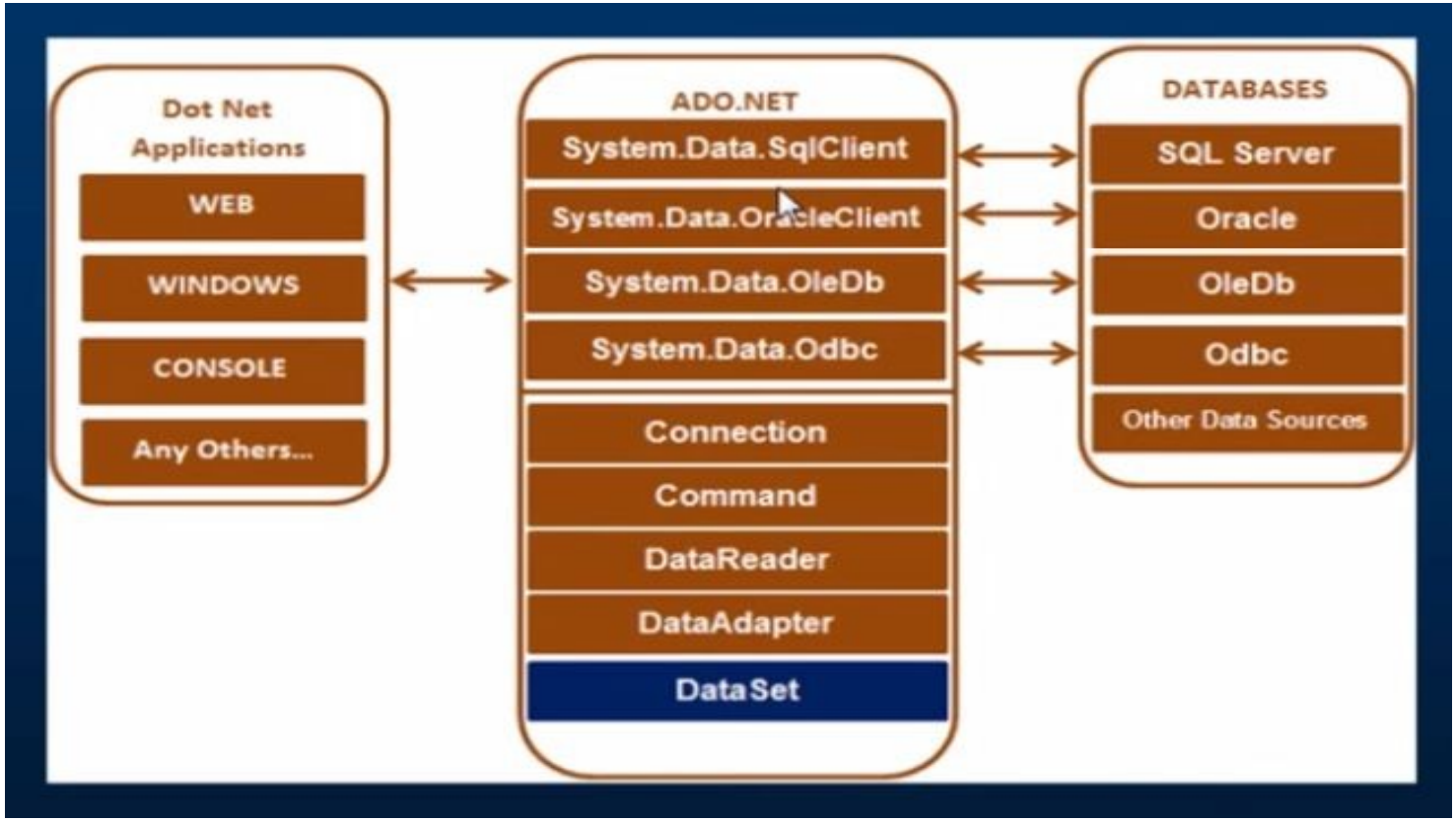
- ADO.NET is a set of classes (a framework) to interact with data sources such as databases and XML files.
- ADO is the acronym for **ActiveX Data Objects**. It allows us to connect to underlying data or databases. It has classes and methods to retrieve and manipulate data.
- The following are a few of the .NET applications that use ADO.NET to connect to a database, execute commands and retrieve data from the database.
  - ASP.NET Web Applications
  - Console Applications
  - Windows Applications.

Connection Architectures

- Connected architecture: the application remains connected with the database throughout the processing.
- Disconnected architecture: the application automatically connects/disconnects during the processing.
- The application uses temporary data on the application side called a DataSet.

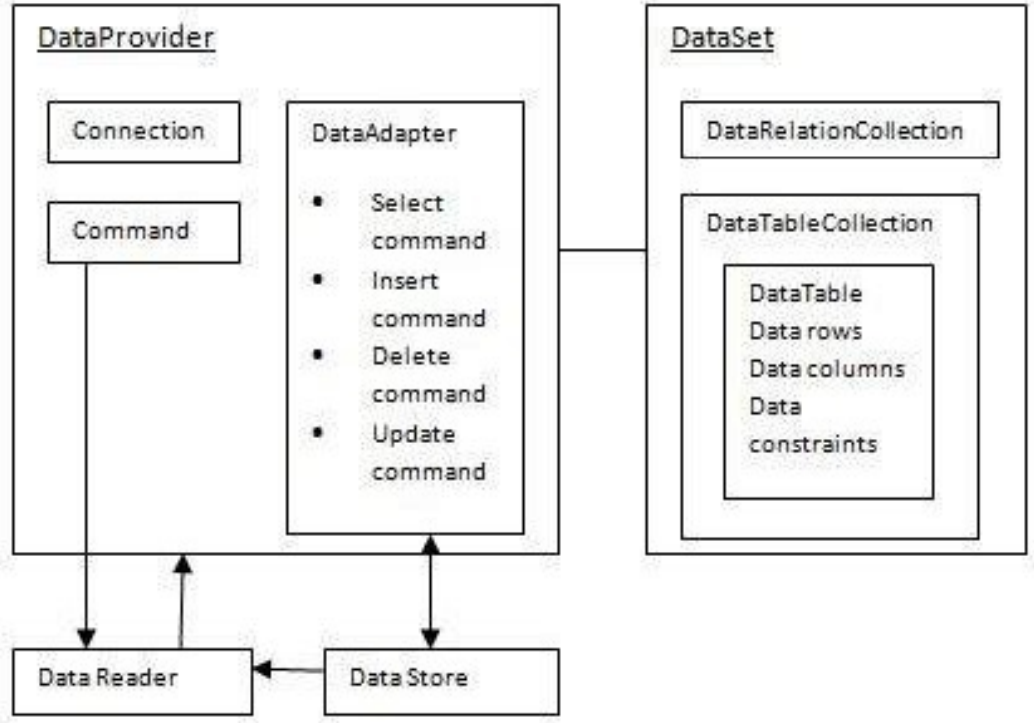
ADO.NET Class Library

- We can see that there are various types of applications (Web Application, Console Application, Windows Application and so on) that use ADO.NET to connect to databases (SQL Server, Oracle, OleDb, ODBC, XML files and so on).



ADO.NET objects

- The ADO.NET objects encapsulate all the data access operations and the controls interact with these objects to display data, thus hiding the details of movement of data.
- The following figure shows the ADO.NET objects at a glance:



Important Classes in ADO.NET

- **Connection Class**
- ADO.NET provides connection to multiple providers. Each provider has a functionality to connect with different database. Here is a list of data providers in ADO.NET and their purpose.
  - Data Provider for SQL Server (System.Data.SqlClient).
  - Data Provider for MS ACCESS (System.Data.OleDb).
  - Data Provider for MYSQL (System.Data.Odbc).
  - Data Provider for ORACLE (System.Data.OracleClient).
- How to use connection class with this provider is given below-
  - Connection object for SQL Server (SqlConnection).
  - Connection object for MSACCESS (OleDbConnection).
  - Connection object for MYSQL (OdbcConnaction).
  - Connection object for ORACLE (OracleConnection).

Important Classes in ADO.NET

- **Command Class**
- The Command class provides methods for storing and executing SQL statements and Stored Procedures. The following are the various commands that are executed by the Command Class.

- **ExecuteReader:** Returns data to the client as rows. This would typically be an SQL select statement or a Stored Procedure that contains one or more select statements.
- This method returns a DataReader object that can be used to fill a DataTable object or used directly for printing reports and so forth.

Important Classes in ADO.NET

- **Command Class**
- **ExecuteNonQuery:** Executes a command that changes the data in the database, such as an update, delete, or insert statement, or a Stored Procedure that contains one or more of these statements.
- This method returns an integer that is the number of rows affected by the query.
- **ExecuteScalar:** This method only returns a single value. This kind of query returns a count of rows or a calculated value.
- **ExecuteXMLReader:** (SqlClient classes only) Obtains data from an SQL Server 2000 database using an XML stream. Returns an XML Reader object.

Important Classes in ADO.NET

- **DataReader Class**
- The DataReader is used to retrieve data. It is used in conjunction with the Command class to execute an SQL Select statement and then access the returned rows.
- DataReader object provides a read only, forward only, high performance mechanism to retrieve data from a data store as a data stream, while staying connected with the data source.
- The .NET framework provides data providers for SQL Server native OLE DB providers and native ODBC drivers,
  - SqlDataReader
  - OleDbDataReader
  - OdbcDataReader
- **Note:** Using the DataReader can increase application performance and reduce system overhead because only one row at a time is ever in memory.

Important Classes in ADO.NET

- **DataAdapter Class**
- The DataAdapter is used to connect DataSets to databases.
- The DataAdapter is most useful with data-bound controls in Windows Forms, but it can also be used to manage the connection between an application and the underlying database tables, views and Stored Procedures.
- It performs the activities necessary to get the data from the data source on the server into the database that's held in the DataSet.
- DataAdapter object provides four properties to control how updates are made to the server: SelectCommand, UpdateCommand, InsertCommand, and DeleteCommand.
- We can consider an ADO.NET DataSet to be an in-memory database that we hold in our application's memory space.
- If the DataAdapter encounters multiple result sets, it will create multiple tables in the DataSet.

Important Classes in ADO.NET

- **DataSet Class**
- The DataSet being the collection of DataTable objects is the heart of ADO.NET. In turn each object contains a collection of DataColumn and DataRow objects.
- It also contains a Relations collection that can be used to define relations among Data Table Objects.
- **SqlException (For SQL server connections)**
- This class is used to throw SQL exceptions. It throws an exception when an error is occurred. This class cannot be inherited.

DataSet Class