ADO.NET

Basics

Data Providers

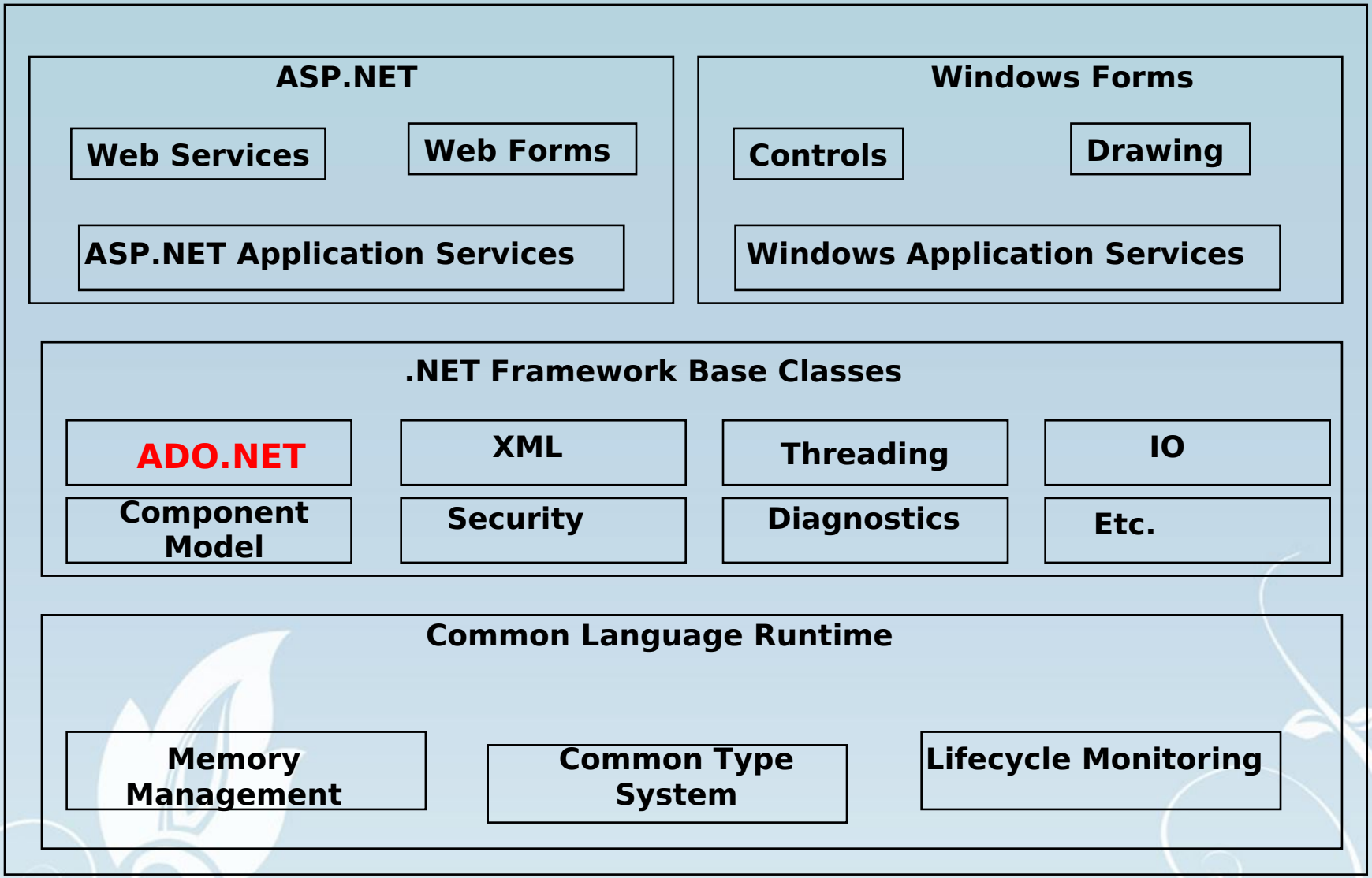
Data Set

ADO.NET

- Part of .NET Framework
- It consists of a set of classes used to handle data access.
- Entirely based on XML
- Provides disconnected approach

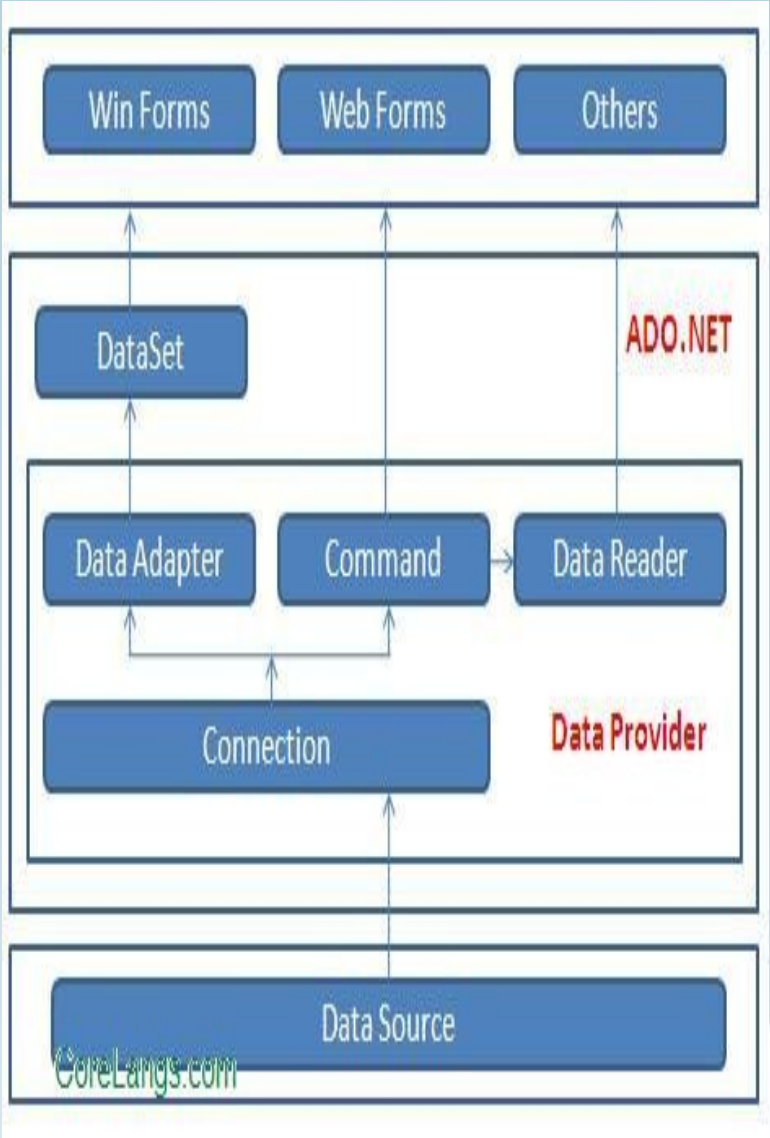
Difference between Connected and disconnected architecture

Connected	Disconnected
It is connection oriented.	It is dis_connection oriented.
Datareader	DataSet
Connected methods gives faster performance	Disconnected get low in speed and performance.
connected can hold the data of single table	disconnected can hold multiple tables of data
connected you need to use a read only forward only data reader	disconnected you cannot
Data Reader can't persist the data	Data Set can persist the data
It is Read only, we can't update the data.	We can update data

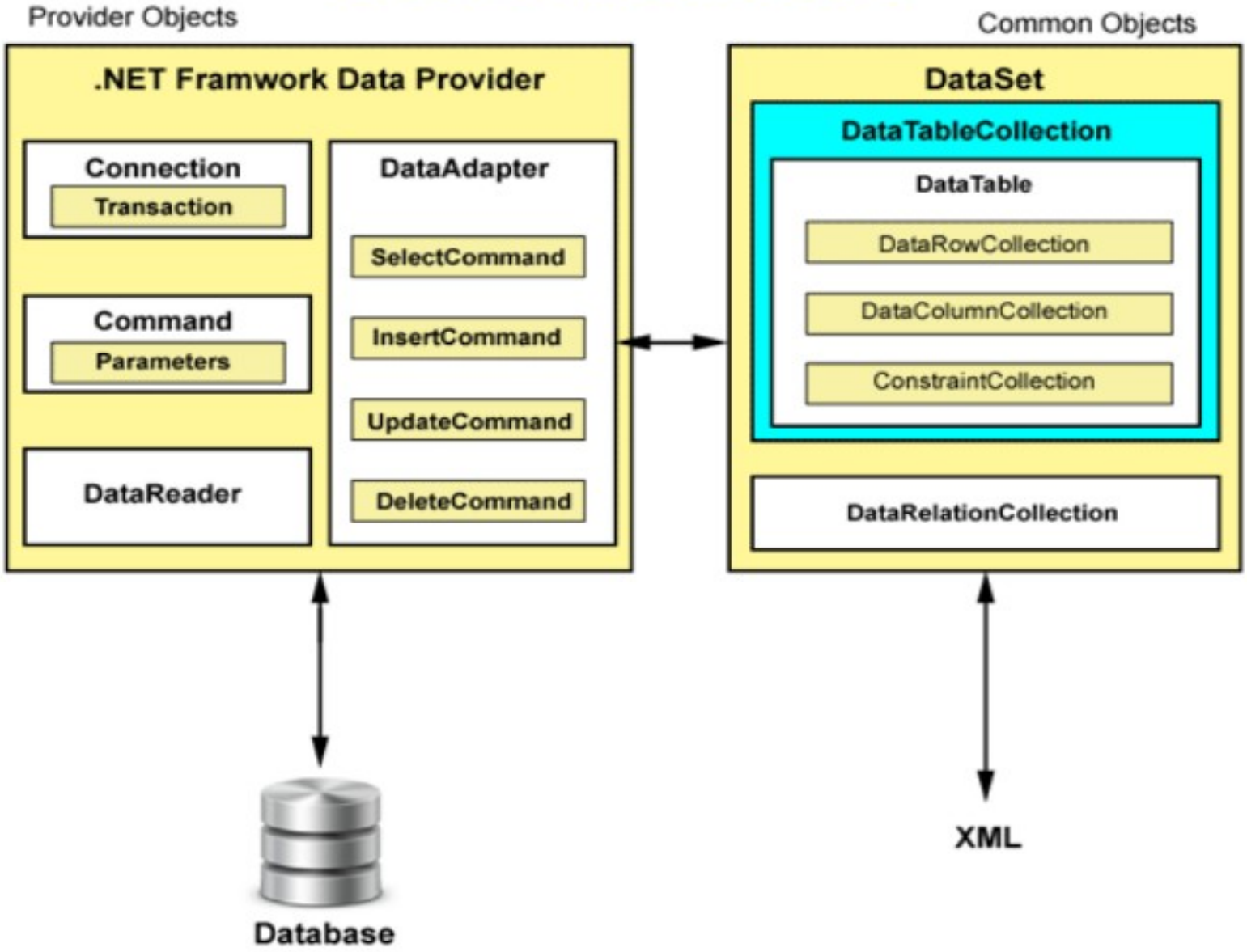

ASP.NET
Web Services
Web Forms
ASP.NET Application Services
Windows Forms
Controls
Drawing
Windows Application Services
.NET Framework Base Classes
ADO.NET
XML
Threading
IO
Component Model
Security
Diagnostics
Etc.
Common Language Runtime
Memory Management
Common Type System
Lifecycle Monitoring

ADO. NET ARCHITECTURE

- ADO.NET consist of a set of Objects that expose data access services to the .NET environment.
- provides communication between relational and non relational systems through a common set of components .
- System.Data



ADO.NET Architecture



Components of ADO.NET

- .NET Framework Data Providers
- Data Set
- The Data Provider classes are meant to work with different kinds of data sources.
  - used to perform all data-management operations on specific databases.
- DataSet class provides mechanisms for managing data when it is disconnected from the data source.

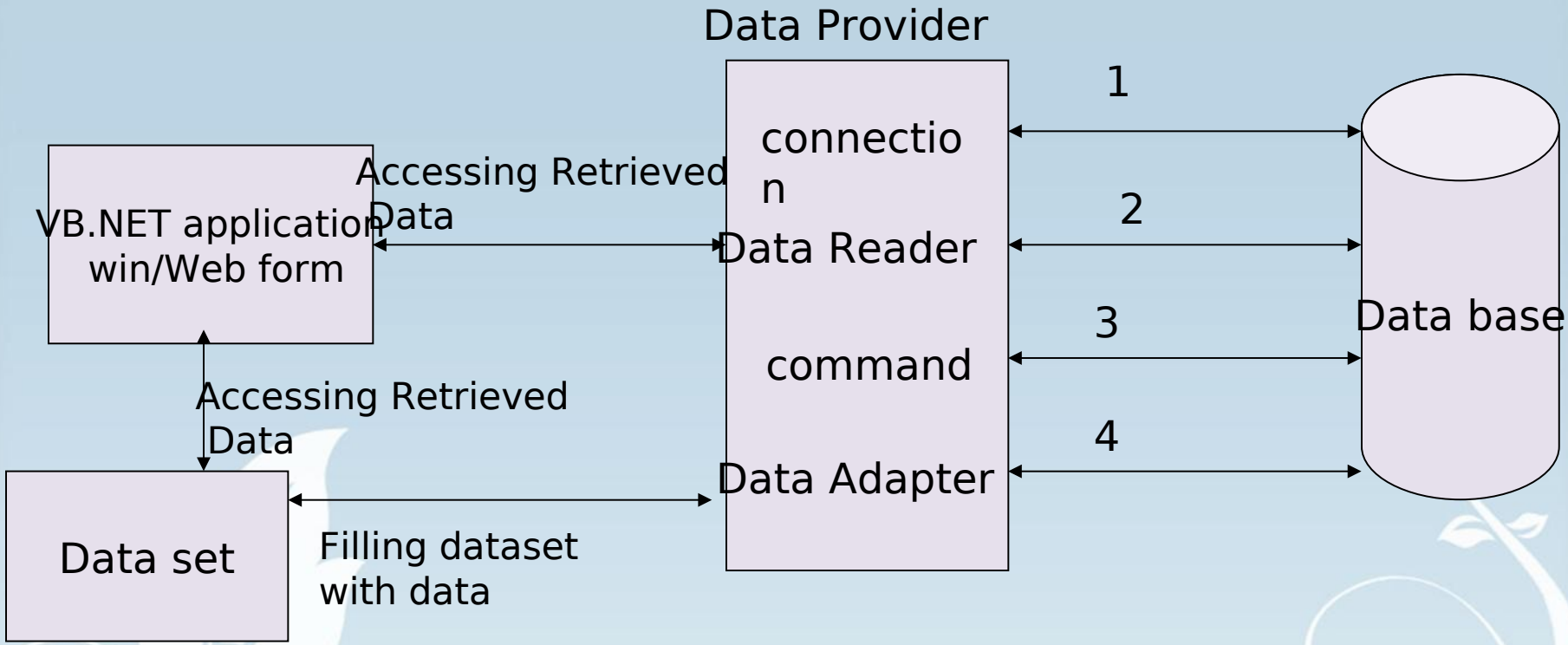
ADO.NET Data Providers

- Serve as a bridge between an application and a data source
- They are components that have been explicitly designed for data manipulation

Types of Data Providers

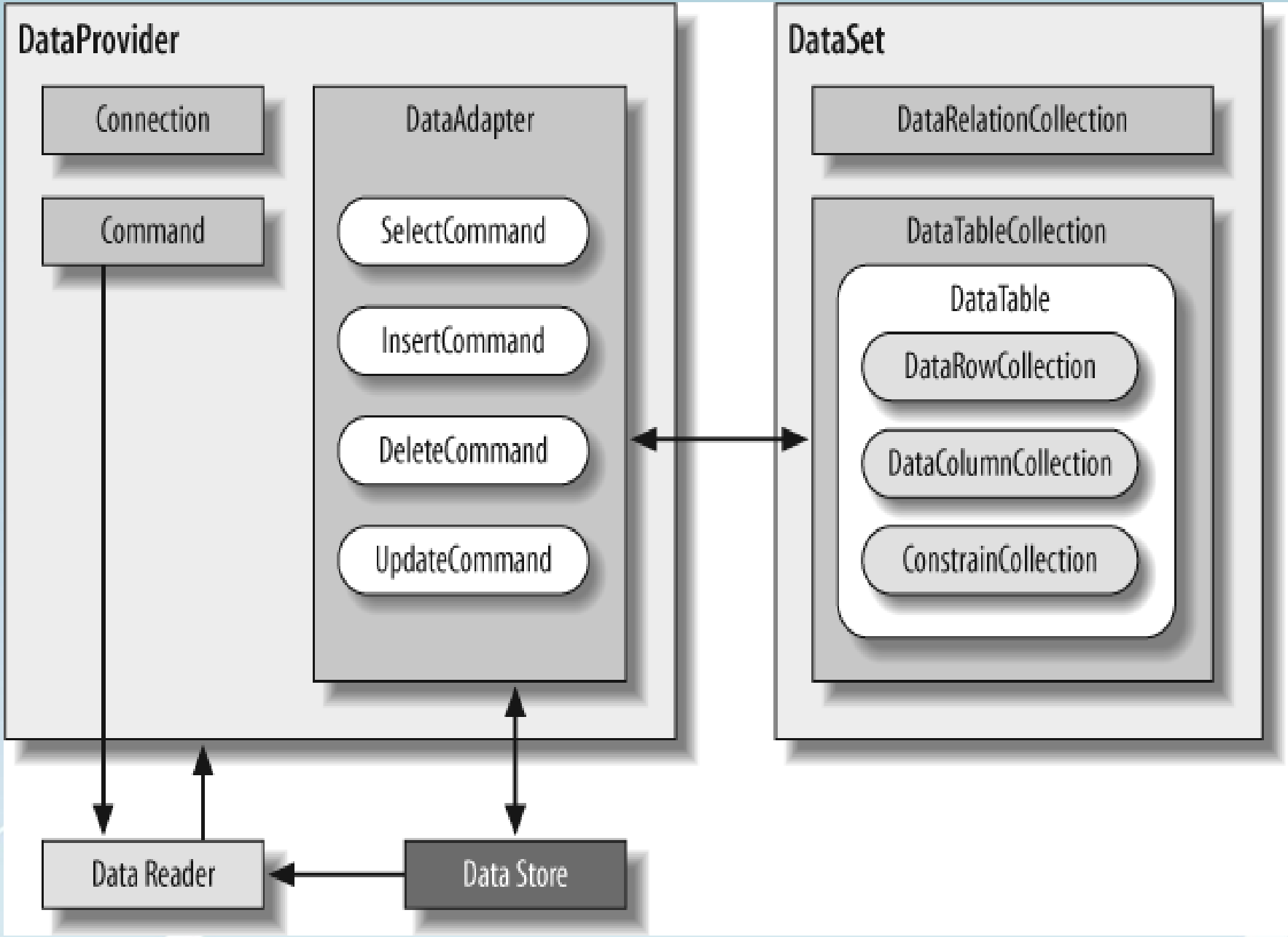
- The .Net Framework includes mainly three Data Providers for ADO.NET.
  - They are the Microsoft SQL Server Data Provider , OLEDB Data Provider and ODBC Data Provider .
  - SQL Server uses the SqlConnection object , OLEDB uses the OleDbConnection Object and ODBC uses OdbcConnection Object respectively.
- OLE DB data provider
  - Present in system.data.oledb namespace
- SQL Server data provider

ADO.NET Object Model



How does it work?

1. Establishes connection with the data base
2. Retrieves data in a read-only, forward only mode
3. Executes a command to retrieve data from the DB
4. Transfers data to the dataset and reflects the changes made in the data set to the DB


DataProvider
Connection
Command
DataAdapter
SelectCommand
InsertCommand
DeleteCommand
UpdateCommand
DataSet
DataRelationCollection
DataTableCollection
DataTable
DataRowCollection
DataColumnCollection
ConstrainCollection
Data Reader
Data Store

Data provider

- Connecting to a database
- Retrieving data
- Storing the data in a dataset
- Reading the retrieved data
- Updating the database
- A data provider contains Connection, Command, DataAdapter, and DataReader objects. These four objects provides the functionality of Data Providers in the ADO.NET.

Connection

- **Connection** object
  - provides connectivity to a data source.
  - Connection object needs the necessary information to recognize the data source and to log on to it properly, this information is provided through a connection string.

Connection

Connection string property	It provides information such as the data source and database name, that is used to establish connection with a database
Open() method	Opens a connection with the data source that is specified in the connection string property
Close() method	Used to close the connection with the data source
State property	Used to describe the current state of the connection object. 0 indicates connection is closed and 1 indicates open

Command

- **Command** object
  - Enables access to database commands to return data, modify data etc.
  - Uses to perform SQL statement or stored procedure to be executed at the Data Source.
  - Provides a number of Execute methods that can be used to perform the SQL queries in a variety of fashions.

Command object

- After establishing a connection, execute commands and return results from the data source using a **Command** object.
- Associated class: OleDbCommand
- ExecuteNonQuery() method executes commands such as SQL INSERT, DELETE, UPDATE, and SET statements.

Data Reader

- **Data Reader**
  - provides a high-performance stream of data from the data source.
  - The DataReader Object is a stream-based , forward-only, read-only retrieval of query results from the Data Source, which do not update the data.
  - DataReader requires a live connection with the databse and provides a very intelligent way of consuming all or part of the result set.

Data Reader

- Used to retrieve data in a read-only and forward-only mode.
- Uses connection object to connect to the DB.
- Command object to execute SQL statements.
- Results in faster access to data

Data Adapter

- **DataAdapter**
  - provides the bridge between the **DataSet** object and the data source.
  - It uses **Command** objects to execute SQL commands at the data source to both load the **DataSet** with data, and reconcile changes made to the data in the **DataSet** back to the data source.
  - DataAdapter Object populate a Dataset Object with results from a Data Source .

Data Adapter

Data is transferred to and from database

Properties and methods

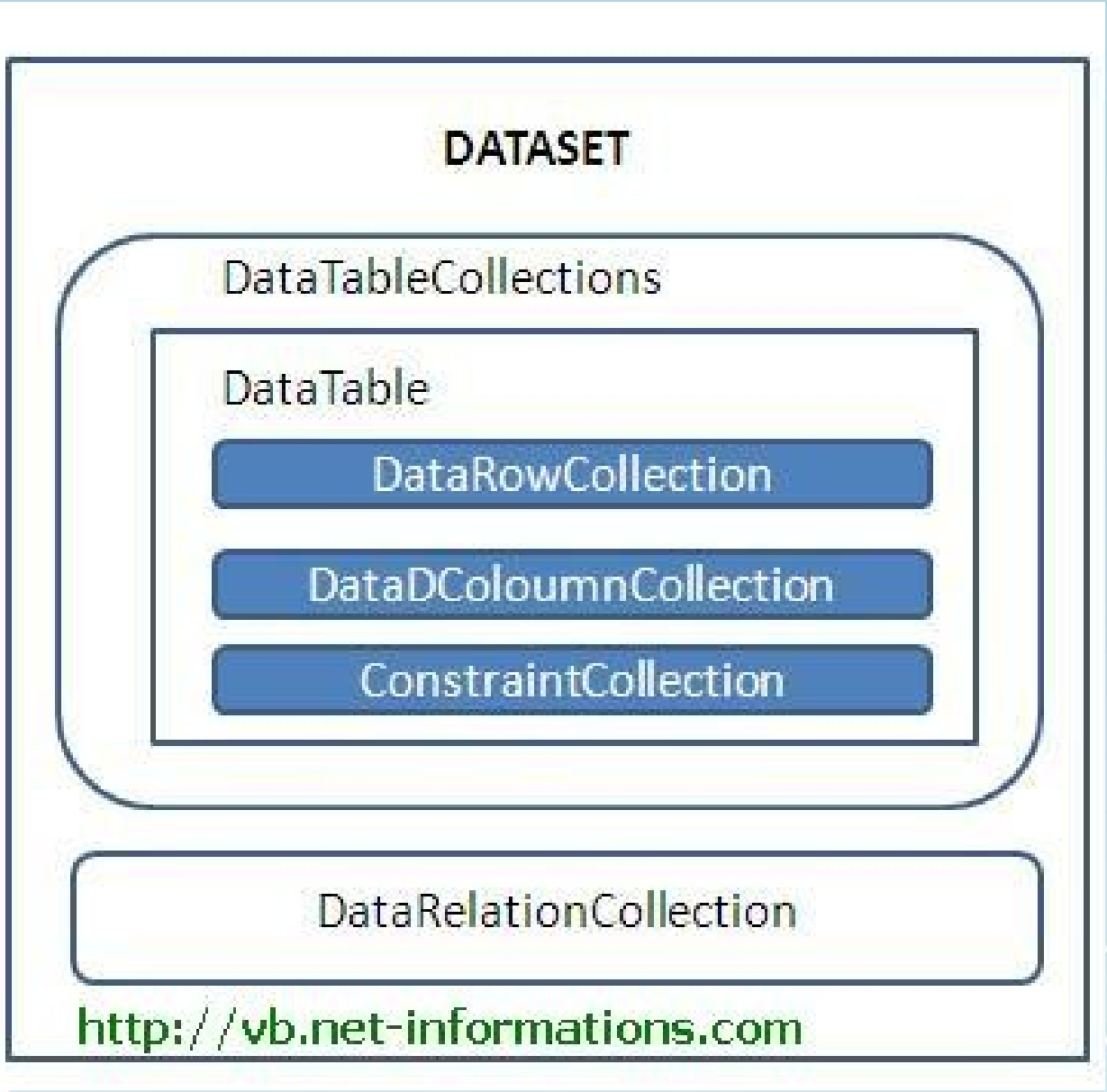
1. Select command
2. Insert command
3. Update command
4. Delete command
5. Fill
6. Update() method(Executes the corresponding Insert, update or delete command to reflect the changes in the database)

Data Set

- Explicitly designed for data access independent of any data source
- Can be used with multiple and differing data sources, used with XML data, or used to manage data local to the application The **DataSet** contains a collection of one or more DataTable objects consisting of rows and columns of data, and also primary key, foreign key, constraint, and relation information

- DataSet provides a disconnected representation of result sets from the Data Source, and it is completely independent from the Data Source. DataSet provides much greater flexibility when dealing with related Result Sets.

- DataSet contains rows, columns,primary keys, constraints, and relations with other DataTable objects. It consists of a collection of DataTable objects that you can relate


DATASET
DataTableCollections
DataTable
DataRowCollection
DataDColoumnCollection
ConstraintCollection
DataRelationCollection
http://vb.net-informations.com

Connected Architecture of ADO.NET

The architecture of ADO.net, in which connection must be opened to access the data retrieved from database is called as connected architecture. Connected architecture was built on the classes connection, command, datareader and transaction.

Connected architecture is when you constantly make trips to the database for any CRUD (Create, Read, Update and Delete) operation you wish to do. This creates more traffic to the database but is normally much faster as you should be doing smaller transactions.

Disconnected Architecture in ADO.NET

The architecture of ADO.net in which data retrieved from database can be accessed even when connection to database was closed is called as disconnected architecture. Disconnected architecture of ADO.net was built on classes connection, dataadapter, commandbuilder and dataset and dataview.

Disconnected architecture is a method of retrieving a record set from the database and storing it giving you the ability to do many CRUD (Create, Read, Update and Delete) operations on the data in memory, then it can be re-synchronized with the database when reconnecting. A method of using disconnected architecture is using a Dataset.

DataReader is Connected Architecture since it keeps the connection open until all rows are fetched one by one

DataSet is DisConnected Architecture since all the records are brought at once and there is no need to keep the connection alive

- In disconnected architecture a DataSet is used for retrieving data from the database. Then no need for maintaining the connection also. All the operations can be performed with the data once retrieved. It won't cause traffic problems while working with the data.

- In connected architecture a DataReader is used for retrieving data from the database. Here a connection is always maintained. Update, Delete, Read and Select operations can be performed as the data is accessed in the database, so

- The ADO.NET Framework supports two models of Data Access Architecture, Connection Oriented Data Access Architecture and Disconnected Data Access Architecture.
- In Connection Oriented Data Access Architecture the application makes a connection to the Data Source and then interact with it through SQL requests using the same connection. In these cases the application stays connected to the database system even when it is not using any Database Operations.
- ADO.Net solves this problem by introduces a new component called Dataset. The DataSet is the central component in the ADO.NET Disconnected Data Access Architecture. A DataSet is an in-memory data store that can hold multiple tables at the same time. DataSets only hold data and do not interact with a Data Source. One of the key characteristics of the DataSet is that it has no knowledge of the underlying Data Source that might have been used to populate it.
- DataSet ds = new DataSet();
- In Connection Oriented Data Access, when you read data from a database by using a DataReader object, an open connection must be maintained between your application and the Data Source. Unlike the DataReader, the DataSet is not connected directly to a Data Source through a Connection object when you populate it. It is the DataAdapter that manages connections between Data Source and Dataset by fill the data from Data Source to the Dataset and giving a disconnected

Knowing Practically.....