A201 Object Oriented Programming with Visual Basic .Net

By:

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What do we need to learn in order to write computer programs?

- Fundamental programming constructs:
  - Variables,
  - Arithmetic operators,
  - Input and output
  - Conditionals,
  - Loops,
  - Procedures and functions,
  - Arrays (Multi-Dimensional Arrays),
  - Structures, classes and objects,
  - Files
  - Databases (Connecting VB to MS-ACCESS)
Connecting VB to MS-ACCESS

- VB .net applications are not allowed to directly access the data in a database.

- They must go through another layer called ADO .Net.

- ADO .net is an Application Programming Interface (API).
What is a Database Management System (DBMS)?
ADO .net

- ADO.NET is a technology used by VB to connect an application to a database.

- ADO.NET creates a temporary connection between the application and database. When the application first connects to the database, it makes a copy of the records and fields and loads them into an in-memory data structure called a **DataSet**.

- The application then closes both the connection to the database and the database itself.

- ADO.NET uses three objects (**DataAdapter**, **Connection**, and **Dataset**) as well as a **Provider** to access the database from Visual Basic .Net.
ADO .net

- ADO.NET uses three objects:
  - Dataset
  - DataAdapter
  - Connection

- as well as a Provider to access the database from Visual Basic .Net
DataAdapter Object: When a VB application needs to access a Database, it submits an appropriate request using a DataAdapter object.

Connection Object: The DataAdapter contacts the connection object which is responsible for establishing the connection to the database, and submitting the request for data.

Providers: The Connection object communicates with the Database using one of several providers. (e.g. Microsoft Jet 4.0 OLE DB is the provider that communicates with MS-ACCESS. Providers is simply a translator. (Translates the request for data to the native database’s language and back)

DataSet Object: The Provider sends the data back to the Connection object which gives it back to the DataAdapter object and finally DataAdapter will place the data in a DataSet object in the Application’s memory.
ADO .net

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What is a DataAdapter?

- Set of objects used to communicate between a data source and a dataset.

- This means reading data from a database into a dataset, and then writing changed data from the dataset back to the database.

- A data source can be a database, a spreadsheet, or even a XML file.
DataAdapters for Accessing Databases:

- The **OleDbDataAdapter** object is suitable for use with any data source exposed by an OLE DB provider.

- The **SqlDataAdapter** object is specific to SQL Server. Because it does not have to go through an OLE DB layer, it is faster than the **OleDbDataAdapter**. However, it can only be used with SQL Server 7.0 or later.

- The **OdbcDataAdapter** object is optimized for accessing ODBC data sources.

- The **OracleDataAdapter** object is optimized for accessing Oracle databases.
What is a connection?

- A data adapter needs an open connection to a data source to read and write data.

- An adapter uses a connection object *(chosen from: SqlConnection, OleDbConnection, OdbcConnection, or OracleConnection)* to communicate with a data source.

- The following table lists a set of connection objects available to a VB .Net programmer:

<table>
<thead>
<tr>
<th>Connection Object</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SqlConnection</td>
<td>A connection to a SQL Server 7.0 or later database.</td>
</tr>
<tr>
<td>OleDbConnection</td>
<td>A connection to any OLE DB data source.</td>
</tr>
<tr>
<td>OdbcConnection</td>
<td>A connection to an ODBC data source.</td>
</tr>
<tr>
<td>OracleConnection</td>
<td>A connection to an Oracle database.</td>
</tr>
</tbody>
</table>
 dataSet:

what is a data set?

- A data structure which will hold the database schema and its data in memory.

- The structure of a dataset is similar to that of a relational database; it maintains a hierarchical object model of tables, rows, and columns. In addition, it contains constraints and relationships defined for the dataset.
DataTable:

What is a DataTable?

- A DataTable object resembles a database table.

- A DataTable has:
  - A collection of `DataColumn` instances (the fields).
  - A collection of `DataRow` instances (the records).
  - Possibly a `primary key` based on one or more columns.
  - A collection of `constraint objects` which are useful for enforcing the uniqueness of value.
  - A set of `relationships` connecting DataTables together.