Beta Release 1.0

DOT NET Interview Questions

(According to latest VS.NET 2005 whidbey)

(Including SQL ServerUML,Architecture,Project Management and General Interview Questions)

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Happy job hunting.....

The Table of contents is different of what is available in traditional books.So that rather than reading through the whole book just look at what questions you feel uncomfortable and revise that.

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"Cheers to the true fighting spirit of IT professionals"

Introduction

Dedication

This book is dedicated to my kid sanjana, whose dad's play time has been stolen and given to this book. I am also thankful to my wife for constantly encouraging me for this assignment. Finally at the top of all thanks to two old eyes my mom and dad for always blessing me.

About the author

Author works in a big multinational company and has over 8 years of experience in software industry. He is working presently as project lead and in past has led projects in Banking, travel and financial sectors. Author can be contacted at shiv_koirala@yahoo.com, adding to chat is also invited.

Features of the book

- √ Around 400 plus interview questions from live .NET interviews.
- √ Section wise .NET interview question coverage according to multinational companies.
- √ Short and to the point answers.
- √ Every question is classified in to Basic,Intermediate and advanced category , thus providing more focus to readers on specific category.
- √ During interviews other than main technology (.NET , JAVA etc.) companies expect other areas to be strong for example UML,Architecture,Database etc.Other sections is the most strong point of the book , which makes reader prepared for the unexpected questions.
- √ Free .NET exam software with CD for practice.
- √ Full range of interview questions right from junior .NET developers to senior architects or project manager.
- √ Sample code provided according to new VS2005 beta release.
- √ General questions specifically from IT and .NET interviews point of view.

- √ .NET interviewers who are looking for what questions to be asked to get better and decent .NET professionals
- √ Freshers and students who want to have a feel of what .NET questions are asked in multinational companies.
- √ Developers who are looking for Quick reference and FAQ

I am sure after reading this book readers will have extra confidence and better approach for .NET interviews.

Introduction

When we look back at times of COBOL,PASCAL features provided by these languages where minimal.More emphasis was on completing projects than on quality of code.As features provided by languages where less , programmer had to code everything from scratch For example to write a simple sorting logic you have to write your own sorting algorithm.As languages grew and started becoming mature , these logic where in-built feature of language.As feature list of languages started growing programmer's became feature specialist rather than specialist of whole language.

If a developer who is working for past two to three years on remoting is a remoting specialist , but probably in ADO.NET he has minimal knowledge.Now after working day/night and becoming specialist he is looking for a job.But the bad part of IT industry today is that they do not look for specialist rather they look for developers who have fair knowledge of over all feature of the language.This remoting specialist stumbles with simple ADO.NET and SQL questions during interview.But guys that's ok when you are working and concentrating on one particular aspect it's but obvious that you will forget these fundamentals.

Software clients no more look source code as the only one deliverable , but even other documents like SRS (System Requirement documents) , SDD (System Design Documents) , Test Plans (SITP and UTP) etc. as a integral part of project.IT multinationals are now looking from both technical and process aspect of the project.So going with pure .NET technical fundamentals will only take you to a programmer position , but knowhow of documenting project ,UML understanding , SDLC cycle etc will take you to a better position (Project Manager , Program Manager , Senior architect etc).

This book covers the other aspect of .NET interview's by providing chapter like Architecture ,UML , SQL SERVER,Project Management ,General Interview question's etc.

I hope this book takes you to a better height and gives you extra confidence boost during interview's.Best of Luck and Happy Job-Hunting.....

How to read this book

If you can read English , you can read this book....kidding.There are some legends which will make your reading more effective.Every question has simple tags which mark the rating of the questions.

These rating are given by Author and can vary according to companies and individuals.

(B) Basic Questions

Basic Grade means according to the interviewer it's a fundamental question and should be answered .Example What is a CLR ?.Guy's stumbling on this question will rarely pass interviews.

(I) Intermediate Questions

These are Mid-level questions and will be expected to be answered if you are looking for a decent position in the company.

(A) Advanced Questions

These are advanced level question which are expected when they are looking for specialist in the field.

(P) Psyche Questions

These level of questions do not judge anything for a candidate and see it as a attitude problem of the interviewer.

* Marked Questions

These are general questions asked in IT world.Example "What's your expectation ?".You will see these question's as you keep reading.There are no direct answers to these question but they do affect a lot during job search.Be ready with some decent answers.

Note

While reading you can come across section marked as “Note” , which highlight special points of that section.

1. Basic .NET Framework

(B)What is IL?

Twist :- What is MSIL or CIL , What is JIT?

(IL)Intermediate Language is also known as MSIL (Microsoft Intermediate Language) or CIL (Common Intermediate Language). All .NET source code is compiled to IL. This IL is then converted to machine code at the point where the software is installed, or at run-time by a Just-In-Time (JIT) compiler.

(B)What is the CLR?

Full form of CLR is Common Language Runtime and it forms the heart of the .NET framework.All Languages have runtime and its the responsibility of the runtime to take care of the code execution of the program.For example VC++ has MSCRT40.DLL,VB6 has MSVBVM60.DLL , Java has Java Virtual Machine etc. Similarly .NET has CLR.Following are the responsibilities of CLR

- √ Garbage Collection :- CLR automatically manages memory thus eliminating memory leakes. When objects are not referred GC automatically releases those memory thus providing efficient memory management.
- √ Code Access Security :- CAS grants rights to program depending on the security configuration of the machine.Example the program has rights to edit or create a new file but the security configuration of machine does not allow the program to delete a file.CAS will take care that the code runs under the environment of machines security configuration.
- √ Code Verification :- This ensures proper code execution and type safety while the code runs.It prevents the source code to perform illegal operation such as accessing invalid memory locations etc.
- √ IL(Intermediate language)-to-native translators and optimizer's :- CLR uses JIT and compiles the IL code to machine code and then executes. CLR also determines depending on platform what is optimized way of running the IL code.

(B)What is the CTS?

In order that two language communicate smoothly CLR has CTS (Common Type System).Example in VB you have "Integer" and in C++ you have "long" these datatypes are not compatible so the interfacing between them is very complicated. In order that two different languages can communicate

**How much do you rate yourself in .NET in one out of ten ?*

** One of the first question asked during interview is "Can you say something about your self"?.*

Microsoft introduced Common Type System. So “Integer” datatype in VB6 and “int” datatype in C++ will convert it to System.int32 which is datatype of CTS.CLS which is covered in the coming question is subset of CTS.

> *If you have undergone COM programming period interfacing VB6 application with VC++ application was a real pain as the datatype of both languages did not have a common ground where they can come and interface , by having CTS interfacing is smooth.*

(B)What is CLS(Common Language Specification)?

This is a subset of the CTS which all .NET languages are expected to support.It was always a dream of microsoft to unite all different languages in to one umbrella and CLS is one step towards that.Microsoft has defined CLS which are nothing but guidelines that language to follow so that it can communicate with other .NET languages in a seamless manner.

(B)What is Managed Code?

Managed code runs inside the environment of CLR i.e. .NET runtime.In short all IL are managed code.But if you are using some third party software example VB6 or VC++ component they are unmanaged code as .NET runtime (CLR) does not have control over the source code execution of the language.

(B)What is Assembly ?

- √ Assembly is unit of deployment like EXE or a DLL.
- √ An assembly consists of one or more files (dlls, exe’s, html files etc.), and represents a group of resources, type definitions, and implementations of those types. An assembly may also contain references to other assemblies. These resources, types and references are described in a block of data called a manifest. The manifest is part of the assembly, thus making the assembly self-describing.
- √ An assembly is completely self-describing.An assembly contains metadata information, which is used by the CLR for everything from type checking and security to actually invoking the components methods.As all information is in assembly itself it is independent of registry.This is the basic advantage as compared to COM where the version was stored in registry.
- √ Multiple versions can be deployed side by side in different folders. These different versions can execute at the same time without interfering with each other.Assemblies can be private or shared. For private assembly deployment,the assembly is copied to the same directory as the client program that references it.No registration is needed, and no fancy installation program is required.

*Do not memorize each and every answer of this book.Just get the fundamentals straight and say in your own words.

* *Never talk for more than 1 minutes straight during interview.*

When the component is removed, no registry cleanup is needed,and no uninstall program is required. Just delete it from the hard drive.

√ In shared assembly deployment, an assembly is installed in the Global Assembly Cache (or GAC). The GAC contains shared assemblies that are globally accessible to all .NET applications on the machine.

(A) What are different types of Assembly?

There are two types of assembly Private and Public assembly.A private assembly is normally used by a single application, and is stored in the application's directory, or a sub-directory beneath. A shared assembly is normally stored in the global assembly cache, which is a repository of assemblies maintained by the .NET runtime. Shared assemblies are usually libraries of code which many applications will find useful, e.g. Crystal report classes which will be used by all application for Reports..

(B) What is NameSpace?

Namespace has two basic functionality :-

√ NameSpace Logically group types.Example System.Web.UI logically groups our UI related features.

√ In Object Oriented world may times its possible that programmers will use the same class name.By qualifying NameSpace with classname this collision can be removed.

(B) What is Difference between NameSpace and Assembly?

Following are the differences between namespace and assembly :

√ Assembly is physical grouping of logical units. Namespace logically groups classes.

√ Namespace can span multiple assembly.

(A)If you want to view a Assembly how to you go about it ?

Twist : What is ILDASM ?

When it comes to understanding of internals nothing can beat ILDASM.ILDASM basically converts the whole exe or dll in to IL code.To run ILDASM you have to go to "C:\Program Files\Microsoft

Can you give me two references of your previous company whom i can contact ?

Visual Studio .NET 2003\SDK\v1.1\Bin". Note that i had v1.1 you have to probably change it depending on the type of framework version you have.

If you run IDASM.EXE from the path you will be popped with the IDASM exe program as shown in figure ILDASM.Click on file and browse to the respective directory for the DLL whose assembly you want to view.After you select the DLL you will be popped with a tree view details of the DLL as shown in figure ILDASM.On double clicking on manifest you will be able to view details of assembly , internal IL code etc as shown in Figure Manifest View.

Note : The version number are in the manifest itself which is defined with the DLL or EXE thus making deployment much easier as compared to COM where the information was stored in registry.Note the version information in Figure Manifest view.

You can expand the tree for detail information regarding the DLL like methods etc.

** Do not mention client name's in resume.If asked say that it's confidential which brings ahead qualities like honesty.*

**When you make your resume keep you recent projects at the top.*

**It must be hard to leave the previous company , as you have spend quiet a lot time with them ?*

Figure:- 1.1 ILDASM

*Note :- * Find out what the employer is looking for by asking him questions at the start of interview and best is before going to interview.Example if a company has projects on server products employer will be looking for Biztalk , CS CMS experts.*

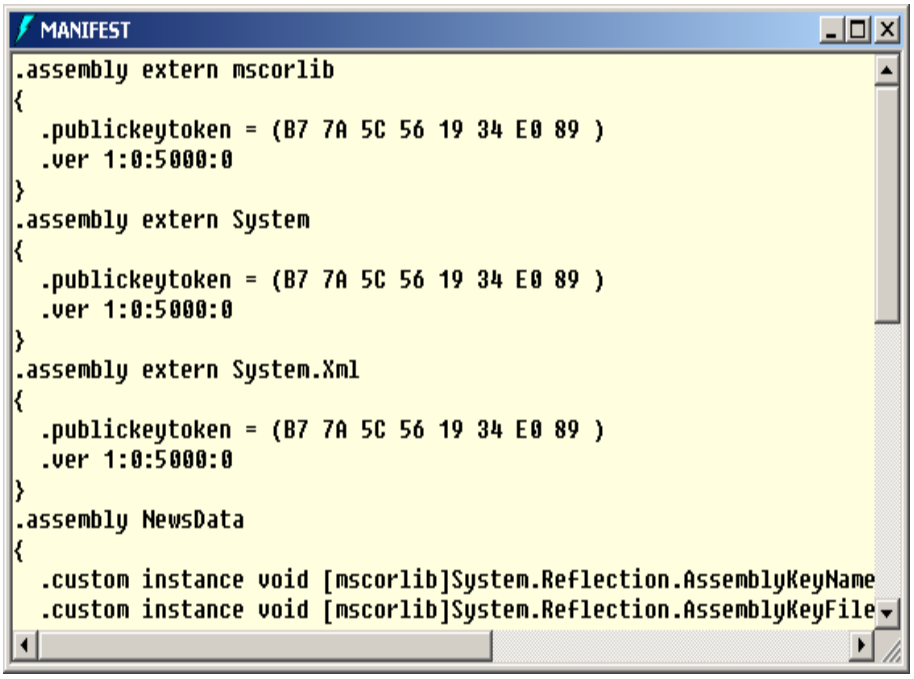


Figure :- 1.2 Manifest View

(A) What is Manifest?

Assembly metadata is stored in Manifest.Manifest contains all the metadata needed to do the following things(See Figure Manifest View for more details) :

- √ Version of assembly
- √ Security identity
- √ Scope of the assembly
- √ resolve references to resources and classes.
- √ The assembly manifest can be stored in either a PE file (an .exe or .dll) with Microsoft intermediate language (MSIL) code or in a stand-alone PE file that contains only assembly manifest information.

* *Have you heard about our company ? Say five points about our company ? Just read atleast once what company you are going for ?*

* *Which is the best project you have done till now ? and in what sense the project was the best ?*

(B)Where is version information stored of a assembly ?

Version information is stored in assembly in manifest.

(I)Is versioning applicable to private assemblies?

Versioning concept is only applicable to global assembly cache (GAC) as private assembly lie in there individual folders.

(B) What is GAC ?

Twist :- What are situations when you register .NET assembly in GAC ?

GAC (Global Assembly Cache) is where shared .NET assembly reside.GAC is used in the following situations :-

- √ If the application has to be shared among several application.
- √ If the assembly has some special security requirements like only administrators can remove the assembly.If the assembly is private then a simple delete of assembly the assembly file will remove the assembly.

Note :- Registering .NET assembly in GAC can lead to the old problem of DLL hell. Where COM version was stored in central registry.So GAC should be used when absolutely necessary.

(I) What is concept of strong names ?

Twist :- How do we generate strong names or what is the process of generating string names , What is use of SN.EXE , How do we apply strong names to assembly ? , How do you sign an assembly ?

Strong name is similar to GUID(It is supposed to be unique in space and time) in COM components.Strong Name is only needed when we need to deploy assembly in GAC.Strong Names helps GAC to differentiate between two versions.Strong names use public key cryptography (PKC) to ensure that no one can spoof it.PKC use public key and private key concept.

Following are the step to generate a strong name and sign a assembly :-

** Which is the biggest size of team you have worked with and was there any lead involved from your side ?*

√ Go to “Visual Studio Command Prompt”.See below figure to “Visual studio Command Prompt”.Note the samples are compiled in 2005 but 2003 users do not have to worry about it.Same type of command prompt will be seen in 2003 also.

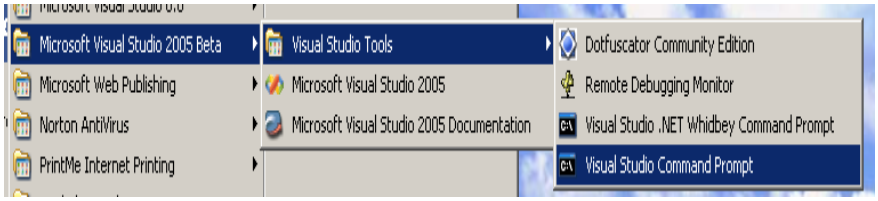


Figure :- 1.3 Visual Studio Command Prompt

√ After you are in command prompt type sn.exe -k “c:\test.snk”.

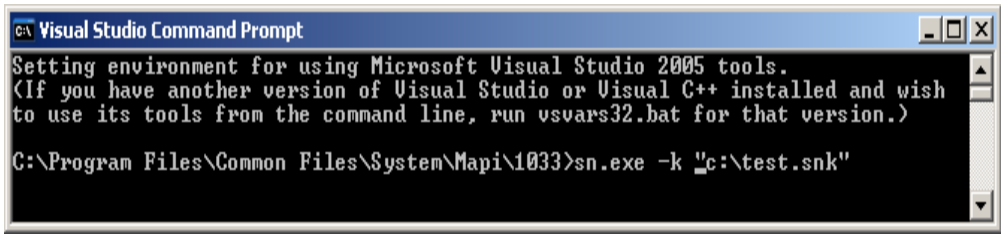
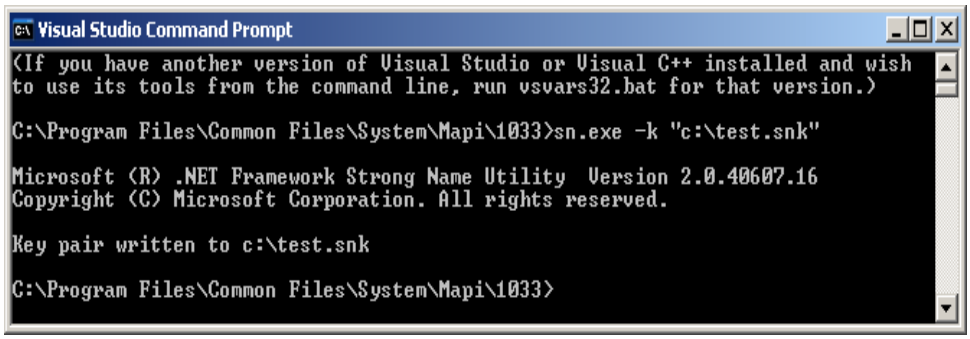


Figure :- 1.4 Running SN.EXE



** Have you done any kind of certification ?*

** What's the notice period for your previous company ?*

Figure :- 1.5 Successful output of SN.EXE

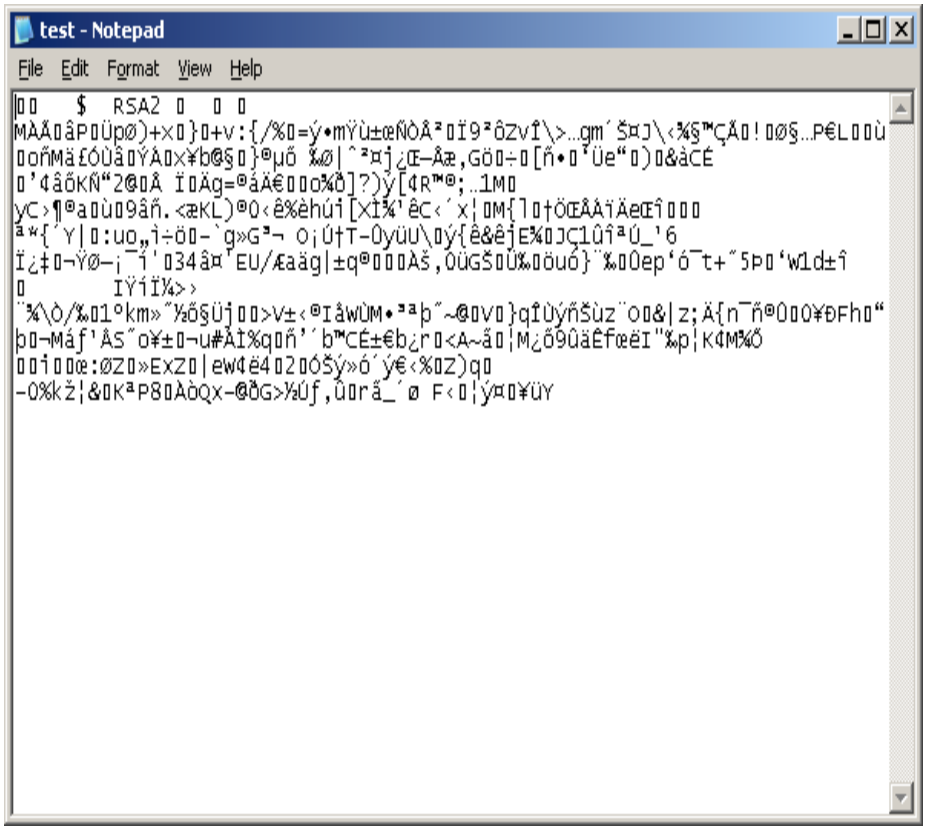


Figure :- 1.6 Sample view of test.snk file

√ After generation of the file you can view the SNK file in a simple notepad.

√ After the SNK file is generated its time to sign the project with this SNK file.

** Do you have passport size photos , passport , final year graduation certificate etc. etc.Be sure to take these documents with you.Do not know for these small things some companies do eliminate candidates.*

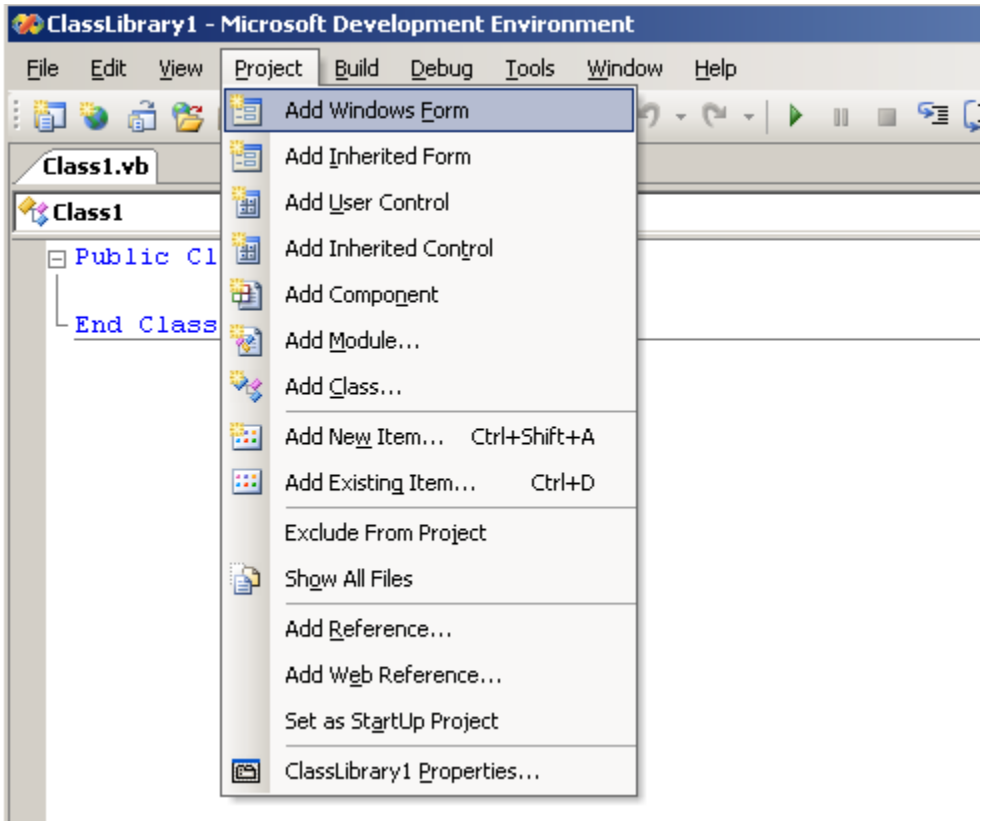


Figure:- 1.7 Click on project and then click on "classlibrary1 properties" menu to sign the assembly

√ Click on project -- properties and the browse the SNK file to the respective folder and compile the project.

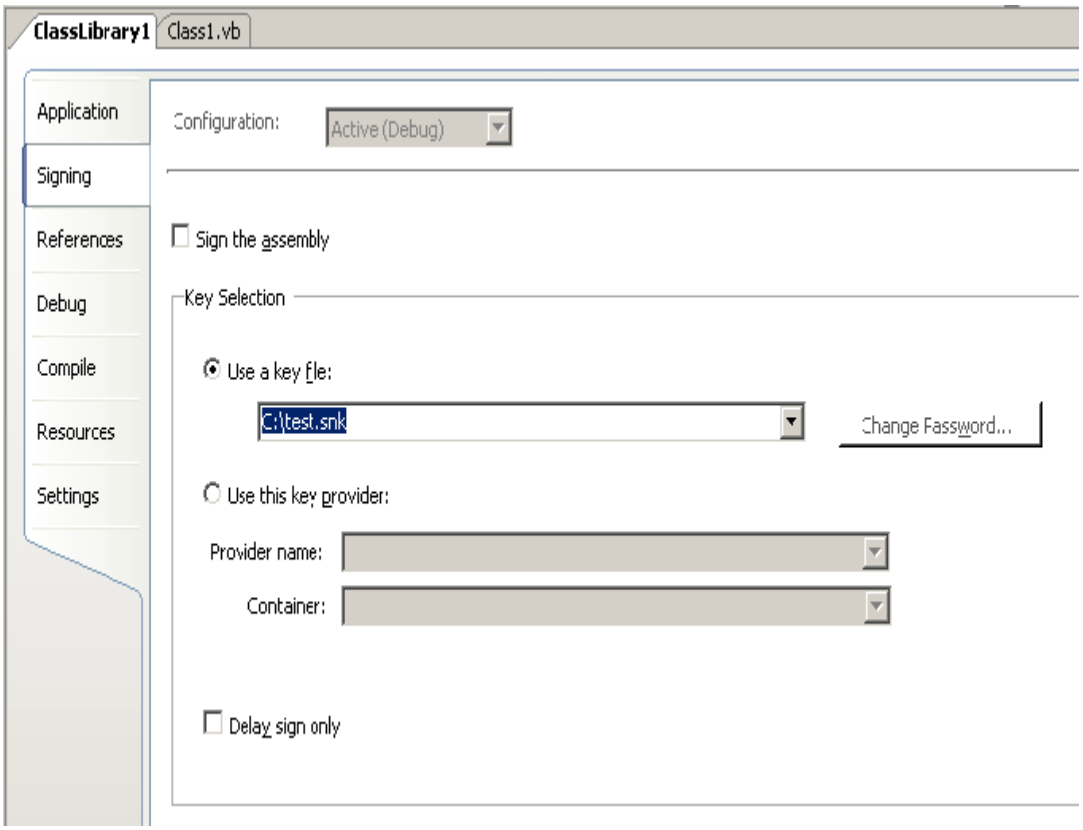


Figure :- 1.8 Click on Use a key file to sign the assembly with strong name

(I)How to add and remove a assembly from GAC?

There are two ways to install .NET assembly in GAC:-

- √ Using Microsoft Installer Package.You can get download of installer from http://www.microsoft.com.
- √ Using Gacutil. Goto "Visual Studio Command Prompt" and type "gacutil –i (assembly_name)".Where (assembly_name) is the DLL name of the project.

** As a interviewer always remember that you will also be sitting sometimes at the other end.So do not ask any psyche question which does not judge anything of a candidate.*

(B) What is Delay signing ?

During development process you will need strong name keys to be exposed to developer which will is not a good practice from security aspect point of view.In such situations you can assign the key later on and during development you an use delay signing

Following is process to delay sign a assembly:

- √ First obtain your string name keys using SN.EXE.
- √ Annotate the source code for the assembly with two custom attributes from System.Reflection: AssemblyKeyFileAttribute, which passes the name of the file containing the public key as a parameter to its constructor. AssemblyDelaySignAttribute, which indicates that delay signing is being used by passing true as a parameter to its constructor. For example as shown below:

[Visual Basic]

```
<Assembly:AssemblyKeyFileAttribute("myKey.snk")>
<Assembly:AssemblyDelaySignAttribute(true)>
```

[C#]

```
[assembly:AssemblyKeyFileAttribute("myKey.snk")]
[assembly:AssemblyDelaySignAttribute(true)]
```

The compiler inserts the public key into the assembly manifest and reserves space in the PE file for the full strong name signature. The real public key must be stored while the assembly is built so that other assemblies that reference this assembly can obtain the key to store in their own assembly reference.

- √ Because the assembly does not have a valid strong name signature, the verification of that signature must be turned off. You can do this by using the –Vr option with the Strong Name tool.The following example turns off verification for an assembly called myAssembly.dll.

```
Sn –Vr myAssembly.dll
```

√ Just before shipping, you submit the assembly to your organization's signing authority for the actual strong name signing using the –R option with the Strong Name tool.The following example signs an assembly called myAssembly.dll with a strong name using the sgKey.snk key pair.

Sn -R myAssembly.dll sgKey.snk

(B)What is garbage collection?

Garbage collection is a CLR feature which automatically manages memory. Programmers forget to release the objects while coding ..... laziness (Remember in VB6 where one of the good practices is to set object to nothing).CLR automatically releases objects when they are no longer referenced and in use.CLR runs on non-deterministic to see the unused objects and cleans them. One side effect of this non-deterministic feature is that we cannot assume an object is destroyed when it goes out of the scope of a function. Therefore, we should not put code into a class destructor to release resources.

(I) Can we force garbage collector to run ?

System.GC.Collect() forces garbage collector to run.This is not recommended but can be used if situations arises.

(B)What is reflection?

All .NET assemblies have metadata information stored about the types defined in modules.This metadata information can be accessed by mechanism called as "Reflection".System.Reflection can be used to browse through the metadata information.

Using reflection you can also dynamically invoke methods using System.Type.Invokemember.Below is sample source code if needed you can also get this code from CD provided , go to "Source code" folder in "Reflection Sample" folder.

```
Public Class Form1
    Private Sub Form1_Load(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles MyBase.Load
        Dim Pobjtype As Type
        Dim PobjObject As Object
        Dim PobjButtons As New Windows.Forms.Button()
        Pobjtype = PobjButtons.GetType()
        For Each PobjObject In Pobjtype.GetMembers
            LstDisplay.Items.Add(PobjObject.ToString())
        Next
    End Sub
End Class
```

Note :- Sample source code are compiled using VB.NET 2005.

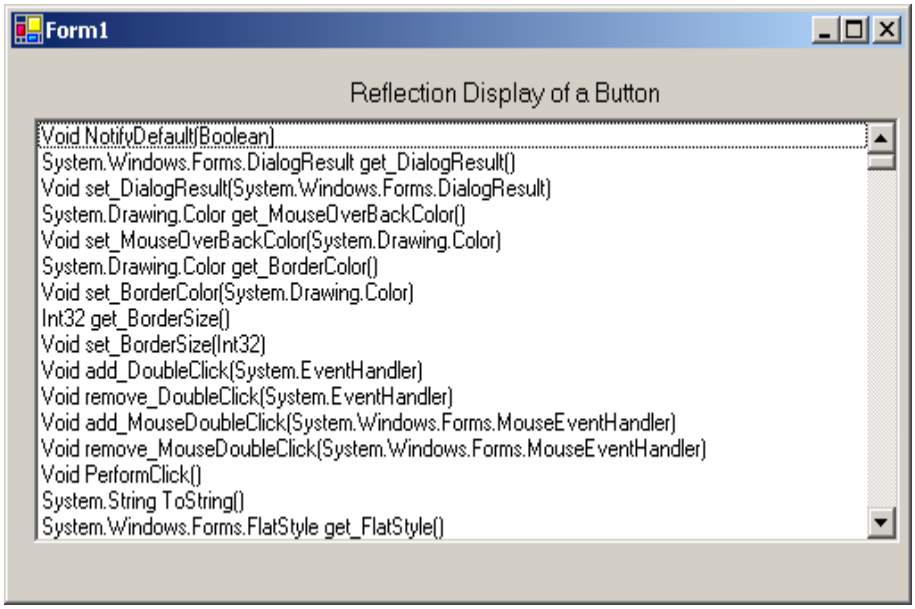


Figure:- 1.9 Sample reflection display

Sample source code uses reflection to browse through "Button" class of "Windows.Forms".If you compile and run the program following is output as shown in "Sample Reflection Display".Using reflection you can also dynamically invoke a method using "System.Type.InvokeMember".

Note :- System.Type.InvokeMember is left as homework for readers.Believe me you will enjoy doing it yourself and the concept of reflection will be more clearer.

(P)What are different type of JIT ?

Note :- This question can only be asked when the interviewer does not know what he wants.It was asked to me in one of interview and for 15 minutes he was roaming around the same question in order to get answer from me (requirement was for a simple database project). Beware of such companies and interviewers you an land up no where.

JIT compiler is a part of the runtime execution environment.

In Microsoft .NET there are three types of JIT compilers:

- √ Pre-JIT. Pre-JIT compiles complete source code into native code in a single compilation cycle. This is done at the time of deployment of the application.
- √ Econo-JIT. Econo-JIT compiles only those methods that are called at runtime. However, these compiled methods are removed when they are not required.
- √ Normal-JIT. Normal-JIT compiles only those methods that are called at runtime. These methods are compiled the first time they are called, and then they are stored in cache. When the same methods are called again, the compiled code from cache is used for execution.

(B) What are Value types and Reference types ?

Value types directly contain their data are either allocated on the stack or allocated in-line in a structure.

Reference types store a reference to the value's memory address, and are allocated on the heap. Reference types can be self-describing types, pointer types, or interface types.

Variables that are value types each have their own copy of the data, and therefore operations on one variable do not affect other variables. Variables that are reference types can refer to the same object; therefore, operations on one variable can affect the same object referred to by another variable.All types derive from the System.Object base type.

(B) What is concept of Boxing and Unboxing ?

Boxing permits any value type to be implicitly converted to type object or to any interface type implemented by value type.Boxing is process in which a object instances created and copying value types value in to that instance.

Unboxing is vice versa of boxing operation where the value is copied from the instance in to appropriate storage location.

Below is sample code of boxing and unboxing where integer data type is converted in to object and then vice versa.

```
Dim x As Integer
Dim y As Object
x = 10
‘ boxing process
y = x
‘ unboxing process
x = y
```

(B) What's difference between VB.NET and C# ?

Well this is the most debatable issue in .NET community and people treat there languages like religion.Its a subjective matter which language is best.Some like VB.NET's natural style and some like professional and terse C# syntaxes.Both use the same framework and speed is also very much equivalents . But still lets list down some major differences between them :-

Advantages VB.NET :-

- √ Has support for optional parameters which makes COM interoperability much easy.
- √ With Option Strict off late binding is supported.Legacy VB functionalities can be used by using Microsoft.VisualBasic namespace.
- √ Has the WITH construct which is not in C#.
- √ The VB.NET part of Visual Studio .NET compiles your code in the background. While this is considered an advantage for small projects, people creating very large projects have found that the IDE slows down considerably as the project gets larger.

Advantages of C#

- √ XML documentation is generated from source code but this is now been incorporated in Whidbey.
- √ Operator overloading which is not in current VB.NET but is been introduced in Whidbey.
- √ The using statement, which makes unmanaged resource disposal simple.
- √ Access to Unsafe code. This allows pointer arithmetic etc, and can improve performance in some situations. However, it is not to be used lightly, as a lot of the normal safety of C# is lost (as the name implies).This is the major difference that you can access unmanaged code in C# and not in VB.NET.

** How much ever this book tries it can not match the huge variations of questions that's been asked in.NET interviews.But note they will be variations and they will map to some question of this book.*

(I)What's difference between System exceptions and Application exceptions?

All exception derives from Exception Base class. Exceptions can be generated programmatically or can be generated by system. Application Exception serves as the base class for all application-

specific exception classes. It derives from Exception but does not provide any extended functionality. You should derive your custom application exceptions from Application Exception.

Application exception are used when we want to define user defined exception. While system exception are all which are defined by .NET.

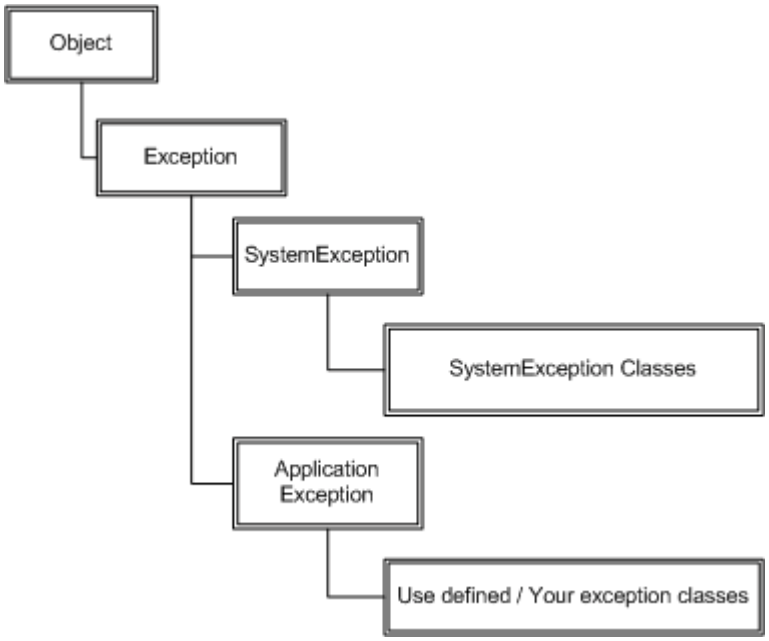


Figure :- 1.9 Exception Hierarchy

Note:- Frankly I have always relied on using Microsoft exception application blocks. As such I have never used application exception; I think most of the work is done using System exception classes.

(I)What is CODE Access security?

CAS is part of .NET security model that determines whether or not a piece of code is allowed to run and what resources it can use while running. Example CAS will allow a application to read but now write and delete rights are given to the application.

(I)What is a satellite assembly?

In multilingual application in .NET to support multilingual functionality you can modules which are customized for localization.These assemblies are called as satellite assemblies. You can distribute these assemblies separately than the core modules.

2..NET Interoperability

(I)How can we use COM Components in .NET?

Twist : What is RCW ?

.NET components communicate with COM using RCW (Runtime Callable Wrapper).Following are the ways with which you can generate RCW :-

√ Adding reference in Visual Studio.net.See figure below (Adding reference using VS.NET 2005).Wrapper class is generated and placed in the "BIN" directory.

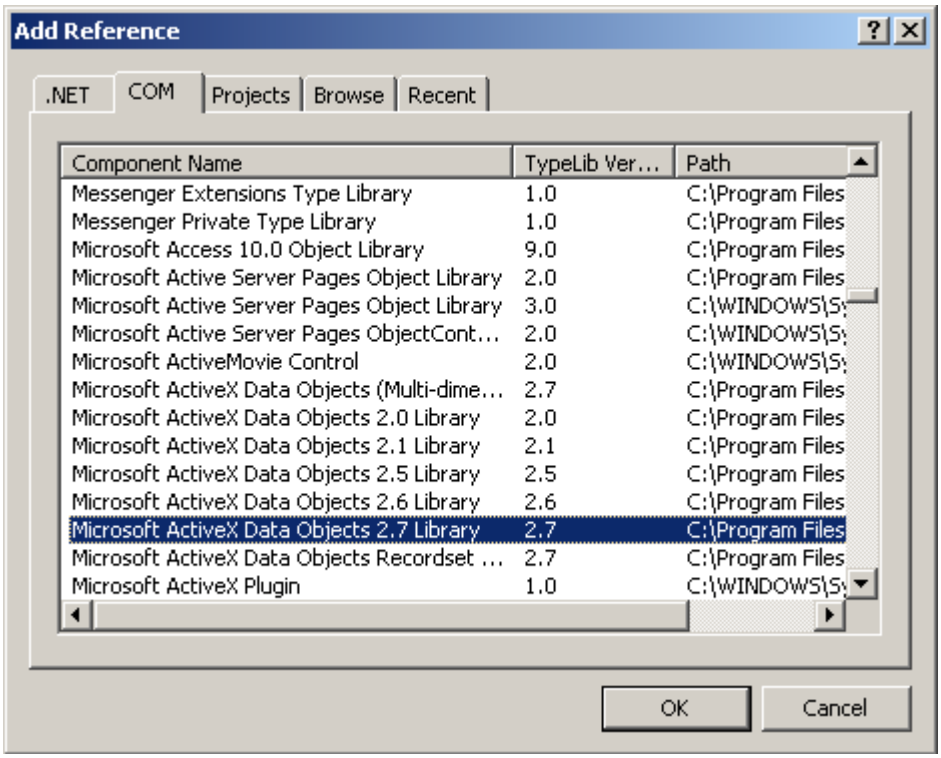


Figure :- 2.1 Adding Reference using VS.NET 2005

- √ Using Type library import tool. Tlbimp.exe yourname.dll.
- √ Using interopservices.System.runtime.Interopservices namespace contains class TypeLib Converter which provides methods to convert COM classes and interface in to assembly metadata.
- √ Make your custom wrappers.If your COM component does not have type library then the only way to communicate is writing custom wrappers. That means communicating directly with COM components.

(I) Once i have developed the COM wrapper do i have to still register the COM in registry?

Yes.

(A)How can we use .NET components in COM?

Twist :- What is CCW (COM callable wrapper) ?, What caution needs to be taken in order that .NET components is compatible with COM ?

.NET components can not be used in straight forward way with COM.You will need to create CCW in order that COM components communicate with .NET assemblies.Following are the different approaches to implement it :-

- √ Explicitly declare interfaces..

```
Public Interface ICustomer
    Property CustomerName() As String
    Property CustomerCode() As String
    Sub AddCustomer()
End Interface
Public Class Customer
    Implements ICustomer
    Private PstrCustomerName As String
    Private PstrCustomerCode As String

    Public Sub AddCustomer() Implements ICustomer.AddCustomer
        Try
            ‘ addin of database code can go here
        Catch ex As Exception
            Throw ex
        End Try
```

```
    End Sub

Public Property CustomerCode() As String Implements
ICustomer.CustomerCode
        Get
            Return PstrCustomerCode
        End Get
        Set(ByVal value As String)
            PstrCustomerCode = value
        End Set
    End Property

    Public Property CustomerName() As String Implements
ICustomer.CustomerName
        Get
            Return PstrCustomerName
        End Get
        Set(ByVal value As String)
            PstrCustomerName = value
        End Set
    End Property

    Public Sub New()

    End Sub
End Class
```

Note :- Source code of this is provided in CD in CODE folder in COMCALLABLEWRAPPER

The above customer class is going to be used by COM components so all the properties and methods are declared in interface and implemented in the customer class.Customer Name.Customer Code and AddCustomer are first declared in ICustomer and then implemented in Customer Class.Note also the class must have a default constructor.

Note :- All source code in this book is provided in VB.NET that does not mean that author of the book does not like C#. In fact the main programming language of author is C#.In order to keep things small i have only used one language.But the conversion is so seamless its of least matter.

- √ The second way to create CCW using InteropServices attributes.Here interfaces are created automatically.

Following are different type of class attributes :

None :No class interface is generated for the class.This is default setting when you do not specify anything.

AutoDispatch :- Interface that supports IDispatch is created for the class. However, no type information is produced.

AutoDual :- A dual interface is created for the class. Typeinfo is produced and made available in the type library.

In below source code we have used the third attribute.

```
Imports System.Runtime.InteropServices
<ClassInterfaceAttribute(ClassInterfaceType.AutoDual)> _
Public Class ClsCompliant

End Class
```

Other than class attributes defined up there are other attributes with which you can govern other part of assembly.Example "GuidAttribute" allows you to specify the GUID,"ComVisibleAttribute " can be used to hide .NET types from COM etc.All attributes are not in scope of the book as this is a interview questions book refer MSDN for more details.

- √ Once .NET assembly is created using either interface or using interopservices method we need to create a COM type library using Type library export tool.

  Tlbexp (AssemblyName)

- √ The final thing is registering the CCW in registry using regasm tool.

  regasm AssemblyName [Options]

- √ Finally refer the TLB in your COM IDE Below is figure showing VB6 IDE referencing the DLL

Note :- DLL and TLB should be in same directory where the application is executed.

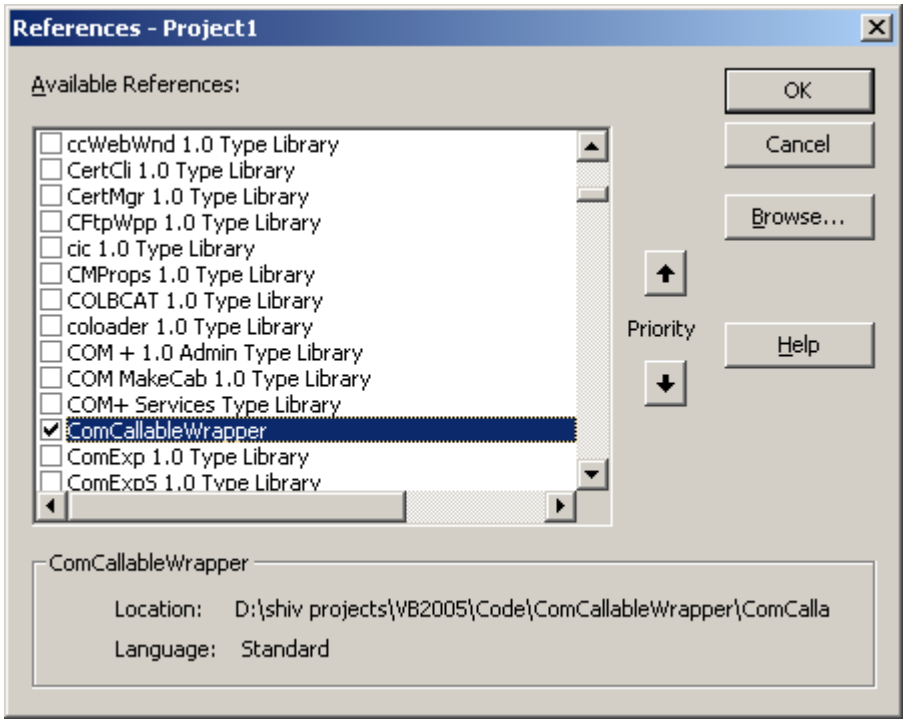


Figure :- 2.2 VB6 IDE referencing the CCW

(A)How can we make Windows API calls in .NET?

Windows API call are not COM based and are invoked through Platform Invoke Services.

Declare StringConversionType (Function | Sub) MethodName Lib "DllName" ([Args]) As Type

√ StringConversionType is for what type of conversion should take place.Either we can specify Unicode to convert all strings to Unicode values, or Auto to convert strings according to the .NET runtime rules.

√ MethodName is the name of the API to call.

√ DllName is the name of the DLL.

√ Args are any arguments to the API call.

√ Type is the return type of the API call.

Below is a sample code for VB.NET which uses Sleep windows API for delaying.

```
Public Class Form1
    Declare Auto Sub Sleep Lib “kernel32.dll” (ByVal dwMilliseconds
As Long)
    Private Sub Form1_Load(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles MyBase.Load
        MessageBox.Show(“ start sleeping for 5000 Milli
seconds.....”)
        Sleep(5000)
        MessageBox.Show(“ end of sleeping.....”)
    End Sub
End Class
```

In VB.NET we use declare keyword but in C# it goes little bit different we use DLLIMPORT here.

Note :- We have interopservices in this and EXTERN keyword.

```
#region Using directives

using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Windows.Forms;
using System.Runtime.InteropServices;
#endregion

namespace CSharpCode
{

      partial class Form1 : Form
      {
            [DllImport(“Kernel32.dll”)]
            static extern int Sleep(long dwMilliseconds);
            public Form1()
            {
                  InitializeComponent();
            }

            private void Form1_Load(object sender, EventArgs e)
```

```
            {
                  MessageBox.Show("Starting of 5000 ms...");
                  Sleep(5000);
                  MessageBox.Show("End of 5000 ms...");
            }
      }
}
```

(B)When we use windows API in .NET is it managed or unmanaged code ?

Windows API in .NET is unmanaged code.

> *Note:- Even though VB6 and V C++ has gone off still many people do ask these old questions again and again.Still there are decent old application which are working with COM very much fine.So interviewer still asks you these questions so that those application's can be ported to .NET.So let's play some old music..... By the way my favourite music is Kishore what's yours????*

(I)What is COM ?

Microsoft's COM is a technology for component software development. It is a binary standard which is language independent. DCOM is a distributed extension of COM.

(A) What is Reference counting in COM ?

Reference counting is a memory management technique used to count how many times an object has a pointer referring to it. The first time it is created, the reference count is set to one. When the last reference to the object is nulled, the reference count is set to zero and the object is deleted. Care must be exercised to prevent a context switch from changing the reference count at the time of deletion. In the methods that follow, the syntax is shortened to keep the scope of the discussion brief and manageable.

(A) Can you describe IUKNOWN interface in short ?

Every COM object supports at least one interface, the IUnknown interface. All interfaces are classes derived from the base class IUnknown. Each interface supports methods access data and perform operations transparently to the programmer. For example, IUnknown supports three methods, AddRef, Release(), and QueryInterface(). Suppose that pinterf is a pointer to an IUnknown. pinterf->AddRef() increments the reference count. pinterf->Release() decrements the reference count, deleting the object when the reference count reaches zero. pinterf->QueryInterface(IDesired,

pDesired) checks to see if the current interface (IUnknown) supports another interface, IDesired, creates an instance (via a call to CoCreateInstance()) of the object if the reference count is zero (the object does not yet exist), and then calls pDesired->AddRef() to increment the reference count (where pDesired is a pointer to IDesired) and returns the pointer to the caller.

(I)Can you explain what is DCOM ?

DCOM differs from COM in that it allows for creating objects distributed across a network, a protocol for invoking that object's methods, and secure access to the object. DCOM provides a wrapper around COM, hence it is a backwards compatible extension. DCOM uses Remote Procedural Calls (RPC) using Open Software Foundation's Distributed Computing Environment.

These RPC are implemented over TCP/IP and named pipes. The protocol which is actually being used is registered just prior to use, as opposed to being registered at initialization time. The reason for this is that if a protocol is not being used, it will not be loaded.

In order to inform an object that the client is still alive, periodic pinging is used. Hence, when the client has died and no ping has been received (to refresh it) before the expiration time, the server object will perform some clean up tasks (including decrementing its reference count).

Since RPC across a network are typically slow (compared to processes residing on the same machine), DCOM sends multiple requests in the same call. For example, in COM, the program performs a QueryInterface, one interface at a time. In DCOM, multiple QueryInterfaces are all clustered into one call.

This clustering optimization trick is also used when creating an instance of the object and serializing it with data. Since these two operations usually occur together, DCOM allows one method which will perform both operations in one call without waiting for an acknowledgment from the first task before performing the second one.

Similarly, when a client pings its server object, he can do it in one call. Moreover, if there are multiple clients sending pings to multiple servers, an optimization is made where the multiple pings going to the same object are consolidated into just one ping. This is to cut down on the use of precious bandwidth used only for pinging.

The client has the control to set the computer which will be responsible for the lifetime of the object. That is to say, these objects are not created just somewhere where the system resources and access privileges allow for it.

Call security is implemented in all four ways: authentication (to prevent false clients from impersonating the true client), authorization (to insure that a client only does what it is authorized to do), data integrity (to insure that data was not tampered with during transit) and data privacy (to insure that only designated sources can read it). The security issues are handled as they are on

operating systems. The client gives the server various access privileges to access memory or disk space

(B)How do we create DCOM object in VB6?

Using the CreateObject method you can create a DCOM object. You have to put the server name in the registry.

(A)How to implement DTC in .NET ?

DTC is implemented using COM+ .

Following are the steps to implement COM + in .NET :-

- √ "EnterpriseService" namespace has all the classes by which we can implement DTC in .NET. You have to add reference "EnterpriseService" namespace.

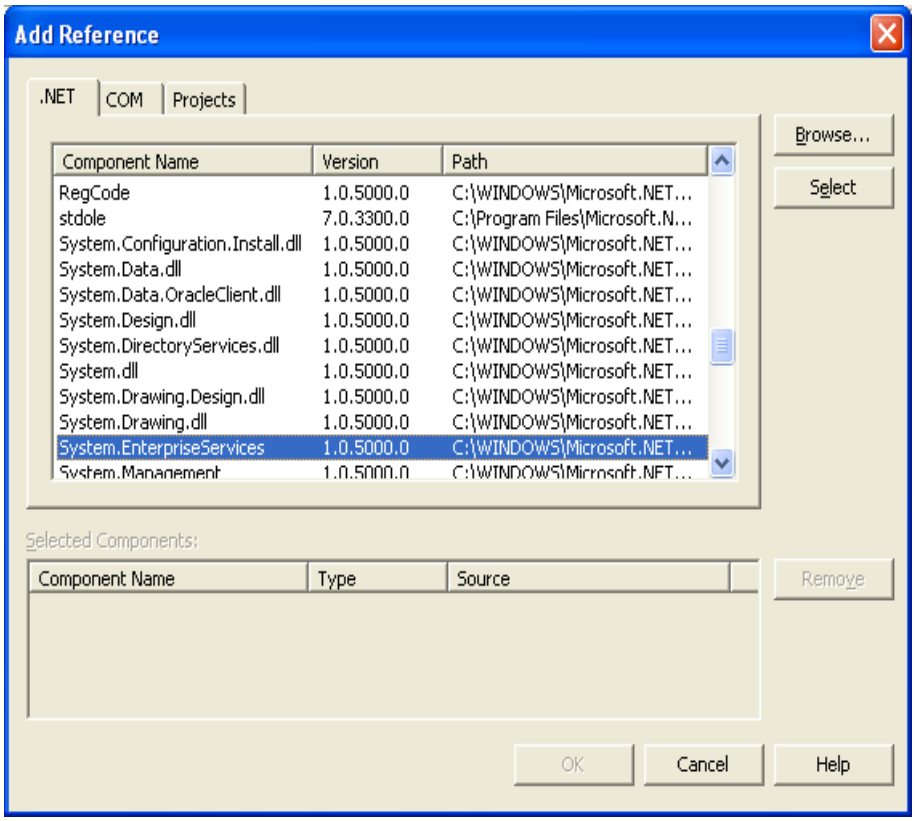


Figure :- 2.3 Add reference to EnterpriseServices.

√ You class must derive from “Serviced Component” object.

√ Then you have to define your class with the transaction attribute

(For all transaction attribute look the down question)

[Transaction(TransactionOption.RequiresNew)]

√ After the class level transaction type is defined.Its time to define at the method level the AutoComplete attribute. Autocomplete attribute says that if no exception is thrown then mark its part of the transaction as being okay. This helps cut down on the amount of code required. If the implementation sets AutoComplete to false, or

omits it all together, then we would need to manage the transaction manually. To manually control the transaction you will need to use the ContextUtil class and its static members.Following is small snippet of ContextUtil: -

```
public void SampleFunction()
{
    try
    {
        // Do something to a database
        // ...
        // Everything okay so far Commit the transaction

        ContextUtil.SetComplete();
    }
    catch(Exception)
    {
        // Something went wrong Abort and Rollback the Transaction.
        ContextUtil.SetAbort();
    }
}
```

√ Component derived from "ServicedComponent" should be strong named as they run under COM+.

√ Once the classes are compiled using the string name.Register the Component in COM+ services using

regsvcs c:\DllPath\TransactionComponent.dll

√ You can see that the component is registered using the COM+ explorer.

(A)How many types of Transactions are there in COM + .NET ?

There are 5 transactions types that can be used with COM+. Whenever an object is registered with COM+ it has to abide either to these 5 transaction types.

Disabled: - There is no transaction. COM+ does not provide transaction support for this component.

Not Supported: - Component does not support transactions. Hence even if the calling component in the hierarchy is transaction enabled this component will not participate in the transaction.

Supported: - Components with transaction type supported will be a part of the transaction if the calling component has an active transaction.If the calling component is not transaction enabled this component will not start a new transaction.

Required: - Components with this attribute require a transaction i.e. either the calling should have a transaction in place else this component will start a new transaction.

Required New: - Components enabled with this transaction type always require a new transaction. Components with required new transaction type instantiate a new transaction for themselves every time.

(A)How do you do object pooling in .NET ?

COM+ reduces overhead by creating object from scratch. So in COM+ when object is activated its activated from pool and when its deactivated it's pushed back to the pool. Object pooling is configures by using the "ObjectPoolingAttribute" to the class.

Note:- When a class is marked with objectpooling attribute it can not be inherited.

```
ObjectPooling(MinPoolSize := 2, MaxPoolSize := 5, CreationTimeout := 20000)> _
Public Class testingclass
Inherits ServicedComponent
    Public Sub DoWork()
        ' Method contents go here.
    End Sub
End Class
```

Above is a sample code which has the "ObjectPooling" attribute defined. Below is a sample code which uses the class.

```
Public Class App
    Overloads Public Shared Sub Main(args() As String)
        Dim xyz As New TestObjectPooling()
        xyz.doWork()
        ServicedComponent.DisposeObject (xyz)
    End Sub
End Class
```

Above is a sample code which uses the object pooled object. Note the DisposeObject() This ensures its safe return to the object pool.

(A)What are types of compatibility in VB6?

There are three possible project compatibility settings:

- √ No Compatibility
- √ Project Compatibility
- √ Binary Compatibility

No Compatibility

With this setting, new class ID's, new interface ID's and a new type library ID will be generated by VB each time the ActiveX component project is compiled. This will cause any compiled client components to fail (with error 429!) and report a missing reference to the 'VB ActiveX Test Component' when a client project is loaded in the VB IDE.

Note :- Use this setting to compile the initial release of a component to other developers.

Project Compatibility

With this setting, VB will generate new interface ID's for classes whose interfaces have changed, but will not change the class ID's or the type library ID. This will still cause any compiled client components to fail (with error 429!) but will not report a missing reference to the 'VB ActiveX Test Component' when a client project is loaded in the VB IDE. Recompilation of client components will restore them to working order again.

Note:- Use this setting during the initial development and testing of a component within the IDE and before the component is released to other developers.

Binary Compatibility

VB makes it possible to extend an existing class or interface by adding new methods and properties etc. and yet still retain binary compatibility. It can do this, because it silently creates a new interface ID for the extended interface and adds registration code to register the original interface ID but with a new Forward key containing the value of this new interface ID. COM will then substitute calls having the old ID with the new ID and hence applications built against the old interface will continue to work (assuming the inner workings of the component remain backward compatible!).

With this setting, VB will not change any of the existing class, interface or type library ID's, however in order that it can do so, VB requires the project to specify an existing compiled version that it can compare against to ensure that existing interfaces have not been broken

(A)What is equivalent for regsvr32 exe in .NET ?

Regasm

3. Threading

(B)What is Multi-tasking ?

Its a feature of modern operating systems with which we can run multiple programs at same time example Word,Excel etc.

(B)What is Multi-threading ?

Multi-threading forms subset of Multi-tasking instead of having to switch between programs this feature switches between different parts of the same program.Example you are writing in word and at the same time word is doing a spell check in background.

(B)What is a Thread ?

A thread is the basic unit to which the operating system allocates processor time.

(B)Did VB6 support multi-threading ?

While VB6 supports multiple single-threaded apartments, it does not support a free-threading model, which allows multiple threads to run against the same set of data.

(B)Can we have multiple threads in one App domain ?

One or more threads run in an AppDomain. An AppDomain is a runtime representation of a logical process within a physical process.Each AppDomain is started with a single thread, but can create additional threads from any of its threads.

Note :- All threading classes are defined in System.Threading namespace.

(B)Which namespace has threading ?

Systems.Threading has all the classes related to implement threading.Any .NET application who wants to implement threading has to import this namespace.

Note :- .NET program always has atleast two threads running one the main program and second the garbage collector.

(I)Can you explain in brief how can we implement threading ?

```
Private Sub Form1_Load(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles MyBase.Load
        Dim pthread1 As New Thread(AddressOf Thread1)
        Dim pthread2 As New Thread(AddressOf Thread2)
        pthread1.Start()
        pthread2.Start()
    End Sub
    Public Sub Thread1()
        Dim pintcount As Integer
        Dim pstr As String
        pstr = “This is first  thread”
        Do Until pintcount > 5
            lstThreadDisplay.Items.Add(pstr)
            pintcount = pintcount + 1

        Loop
    End Sub
    Public Sub Thread2()
        Dim pintcount As Integer
        Dim pstr As String
        pstr = “This is second thread”
        Do Until pintcount > 5
            lstThreadDisplay.Items.Add(pstr)
            pintcount = pintcount + 1
        Loop
    End Sub
```

Above is a sample code which shows simple sample code for threading..Above sample code can be found in “Threading” folder in CD provided.Above sample has two methods “Thread1()” and “Thread2()” which are started in multi-threaded mode in Form load event of the sample.

> *Note :- If you run the sample you will see that sometimes the first thread runs first and then the second thread.This happens because of thread priorities .The first thread is run with highest priority.*

(A)How can we change priority and what the levels of priority are provided by .NET ?

Thread Priority can be changed by using Threadname.Priority = ThreadPriority.Highest.In the sample provided look out for code where the second thread is ran with a high priority.

Following are different levels of Priority provided by .NET :-

- √ ThreadPriority.Highest
- √ ThreadPriority.AboveNormal
- √ ThreadPriority.Normal
- √ ThreadPriority.BelowNormal
- √ ThreadPriority.Lowest

(A)What does Addressof operator do in background ?

The AddressOf operator creates a delegate object to the BackgroundProcess method. A delegate within VB.NET is a type-safe, object-oriented function pointer. After the thread has been instantiated, you begin the execution of the code by calling the Start() method of the thread

(A)How can you reference current thread of the method ?

"Thread.CurrentThread" refers to the current thread running in the method."CurrentThread" is a public static property.

(I) What's Thread.Sleep() in threading ?

Thread's execution can be paused by calling the Thread.Sleep method. This method takes an integer value that determines how long the thread should sleep.Example Thread.CurrentThread.Sleep(2000).

(A)How can we make a thread sleep for infinite period ?

You can also place a thread into the sleep state for an indeterminate amount of time by calling Thread.Sleep (System.Threading.Timeout.Infinite).To interrupt this sleep you can call the Thread.Interrupt method.

(A) What is Suspend and Resume in Threading ?

It is Similar to Sleep and Interrupt. Suspend allows you to block a thread until another thread calls Thread.Resume. The difference between Sleep and Suspend is that the latter does not immediately place a thread in the wait state. The thread does not suspend until

the .NET runtime determines that it is in a safe place to suspend it. Sleep will immediately place a thread in a wait state.

> *Note :- In threading interviews most people get confused with Sleep and Suspend.They look very similar.*

(A)What the way to stop a long running thread ?

Thread.Abort() stops the thread execution at that moment itself.

(A) How do i debug thread ?

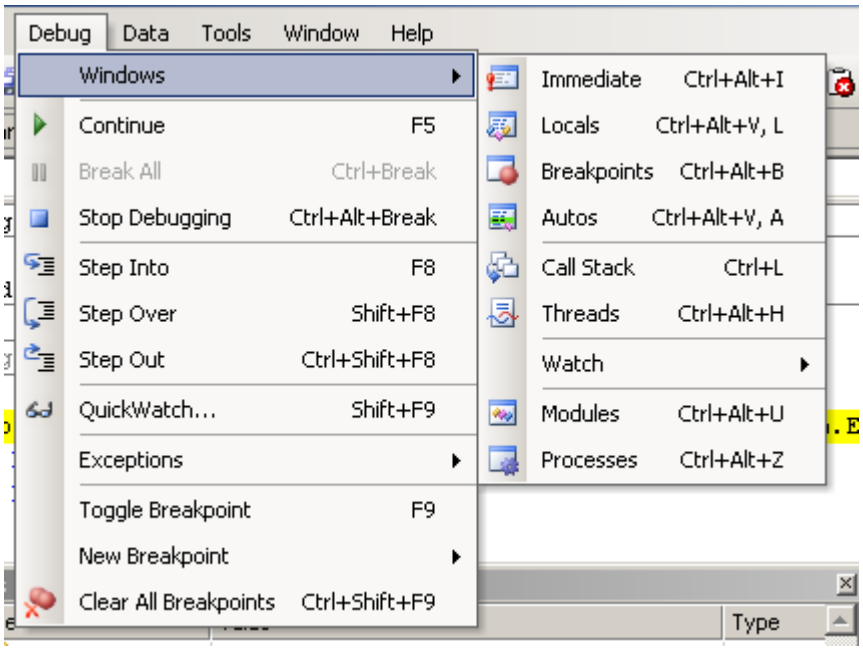


Figure :- 3.1 Debug thread window

This window is only seen when the program is running in debug mode.In windows one of the window is “Threads”.

(A)What's Thread.Join() in threading ?

There are two versions of Thread.Join :-

- √ Thread.join().
- √ Thread.join(Integer) this returns a boolean value.

The Thread.Join method is useful for determining if a thread has completed before starting another task. The Join method waits a specified amount of time for a thread to end. If the thread ends before the time-out, Join returns True; otherwise it returns False.Once you call Join the calling procedure stops and waits for the thread to signal that it is done.

Example you have "Thread1" and "Thread2" and while executing 'Thread1" you call "Thread2.Join()".So "Thread1" will wait until "Thread2" has completed its execution and the again invoke "Thread1".

Thread.Join(Integer) ensures that threads do not wait for a long time.If it exceeds a specific time which is provided in integer the waiting thread will start.

(A)What are Daemon thread's and how can a thread be created as Daemon?

Daemon thread's run in background and stop automatically when nothing is running program.Example of a Daemon thread is "Garbage collector".Garbage collector runs until some .NET code is running or else its idle.

You can make a thread Daemon by

Thread.Isbackground=true

(A) When working with shared data in threading how do you implement synchronization ?

There are a somethings you need to be careful with when using threads. If two threads (e.g. the main and any worker threads) try to access the same variable at the same time, you'll have a problem. This can be very difficult to debug because they may not always do it at exactly the same time. To avoid the problem, you can lock a variable before accessing it. However, if two threads lock the same variable at the same time, you'll have a deadlock problem.

```
SyncLock x
  'Do something with x
End SyncLock
```

(I)Can we use events with threading ?

Yes you can use events with threads , this is one of the technique to synchronize one thread with other.

(A)How can we know a state of a thread?

"ThreadState" property can be used to get detail of a thread.Thread can have one or combination of status.System.Threading.Threadstate enumeration has all the values to detect a state of thread.Some sample states are Isrunning,IsAlive,suspended etc.

(A) What is use of Interlocked class ?

Interlocked class provides methods by which you can achieve following functionalities :-

- √ increment Values.
- √ Decrement values.
- √ Exchange values between variables.
- √ Compare values from any thread.

in a synchronization mode.

Example :- System.Threading.Interlocked.Increment(IntA)

(A) what is a monitor object?

Monitor objects are used to ensure that a block of code runs without being interrupted by code running on other threads. In other words, code in other threads cannot run until code in the synchronized code block has finished.

SyncLock and End SyncLock statements are provided in order to simplify access to monitor object.

(A) what are wait handles ?

Twist :- What is a mutex object ?

Wait handles sends signals of a thread status from one thread to other thread.There are three kind of wait modes :-

- √ WaitOne.
- √ WaitAny.
- √ WaitAll.

When a thread wants to release a Wait handle it can call Set method.You can use Mutex (mutually exclusive) objects to avail for the following modes.Mutex objects are synchronization objects that can only be owned by a single thread at a time.Threads request ownership of the mutex object when they require exclusive access to a resource. Because only one thread can own a mutex object at any time, other threads must wait for ownership of a mutex object before using the resource.

The WaitOne method causes a calling thread to wait for ownership of a mutex object. If a thread terminates normally while owning a mutex object, the state of the mutex object is set to signaled and the next waiting thread gets ownership

(A) what is ManualResetEvent and AutoResetEvent ?

Threads that call one of the wait methods of a synchronization event must wait until another thread signals the event by calling the Set method. There are two synchronization event classes. Threads set the status of ManualResetEvent instances to signaled using the Set method. Threads set the status of ManualResetEvent instances to nonsignaled using the Reset method or when control returns to a waiting WaitOne call. Instances of the AutoResetEvent class can also be set to signaled using Set, but they automatically return to nonsignaled as soon as a waiting thread is notified that the event became signaled.

(A) What is ReaderWriter Locks ?

You may want to lock a resource only when data is being written and permit multiple clients to simultaneously read data when data is not being updated. The ReaderWriterLock class enforces exclusive access to a resource while a thread is modifying the resource, but it allows nonexclusive access when reading the resource. ReaderWriter locks are a useful alternative to exclusive locks that cause other threads to wait, even when those threads do not need to update data.

(I) How can you avoid deadlock in threading ?

A good and careful planning can avoid deadlocks.There so many ways microsoft has provided by which you can reduce deadlocks example Monitor ,Interlocked classes , Wait handles, Event raising from one thread to other thread , ThreadState property which you can poll and act accordingly etc.

(B) What's difference between thread and process?

A thread is a path of execution that run on CPU, a process is a collection of threads that share the same virtual memory. A process has at least one thread of execution, and a thread always run in a process context.

> *Note:- Its difficult to cover threading interview question in this small chapter.These questions can take only to a basic level.If you are attending interviews where people are looking for threading specialist , try to get more deep in to synchronization issues as that's the important point they will stress.*

4. Remoting and Webservices

(B)What is an application domain?

Previously "PROCESS" where used as security boundaries.One process has its own virtual memory and does not over lap the other process virtual memory , due to this one process can not crash the other process.So any problem or error in one process does not affect the other process.In .NET they went one step ahead introducing application domains.In application domains multiple application can run in same process with out influencing each other.If one of the application domains throws error it does not affect the other application domains.To invoke method in a object running in different application domain .NET remoting is used.

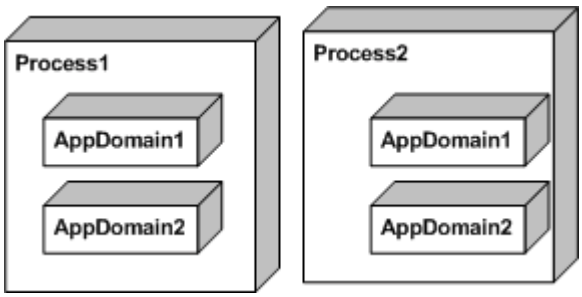


Figure :- 4.1 One process can have multiple Application domains

(B) What is .NET Remoting ?

.NET remoting is replacement of DCOM.Using .NET remoting you can make remote object calls which lie in different Application Domains.As the remote objects run in different process client calling the remote object can not call it directly.So the client uses a proxy which looks like a real object.

When client wants to make method call on the remote object it uses proxy for it.These method calls are called as "Messages".Messages are serialized using "formatter" class and sent to client "channel".Client Channel communicates with Server Channel.Server Channel uses as formatter to deserialize the message and sends to the remote object.

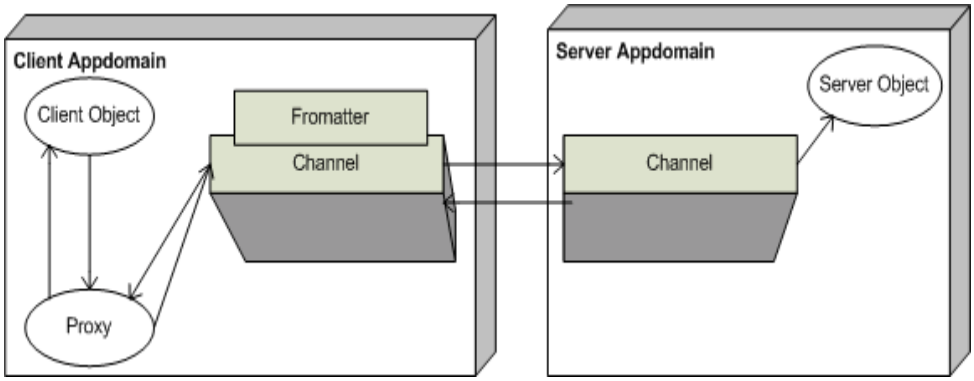


Figure :- 4.2 Channels,Formatters and Proxy in action.

(B) Which class does the remote object has to inherit ?

All remote object should inherit from System.MarshalbyRefObject.

(I) What are two different types of remote object creation mode in .NET ?

There are two different ways in which object can be created using Remoting :-

- √ SAO (Server Activated Objects) also called as Well-Known call mode.
- √ CAO (Client Activated Objects)

SAO has two modes “Single Call” and “Singleton”.With Single Call object the object is created with every method call thus making the object stateless.With Singleton the object is created only once and the object is shared with all clients.

CAO are stateful as compared to SAO. In CAO the creation request is sent from client side.Client holds a proxy to the server object created on server.

(A) Describe in detail Basic of SAO architecture of Remoting?

For these type of questions interviewer expects small and sweet answers.He is basically looking at what you know about the specific subject.For these type of question this book will provide detail code which is not necessary to be said during interview.Only the basic steps and overall brief are enough to convince that you have knowledge about the subject.Even though this question has detail code and answer say only what is needed in interview.

Remoting has atleast three sections :-

- √ Common Interface which will be shared between them.
- √ Server.
- √ Client.

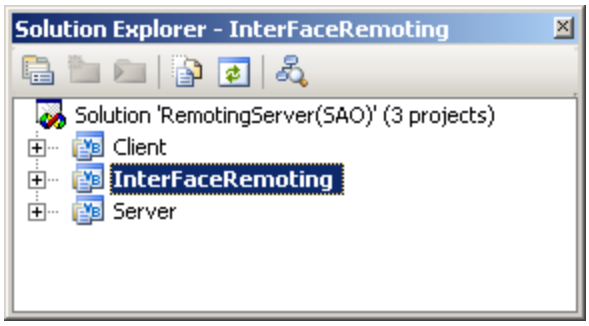


Figure :- 4.3 Solution Explorer of Remoting Project

In CD "RemotingSample(SAO)" project is provided which gives a insight of remoting.Above is the figure which shows the three important project sections needed to implement remoting.

First important section is the common interface between Server and Client."InterFaceRemoting" project has the interface code.For sample project interface is very simple with only two methods :- SetValue and GetValue.

```
Public Interface InterFaceRemoting
    Sub SetValue(ByVal value As String)
    Function GetValue() As String
End Interface
```

Second important section is the server.In this sample server is using HTTP channel and the server object is singleton.

```
Imports System
Imports System.Runtime.Remoting
Imports System.Runtime.Remoting.Channels.Http
Imports System.Runtime.Remoting.Channels
Imports InterFaceRemoting

Public Class RemotingServer
    Inherits MarshalByRefObject
```

```
    Implements InterFaceRemoting.InterFaceRemoting
    Private strData As String
    Public Function GetValue() As String Implements
InterFaceRemoting.InterFaceRemoting.GetValue
        Return strData
    End Function
    Sub New()
        strData = “testing..”
    End Sub
    Public Sub SetValue(ByVal value As String) Implements
InterFaceRemoting.InterFaceRemoting.SetValue
        strData = value
    End Sub
End Class
Module ModuleRemotingStartUp
    Sub Main()
        Dim objHttpChannel As HttpChannel
        Console.WriteLine(“Server Started....”)
        objHttpChannel = New HttpChannel(1234)
        ChannelServices.RegisterChannel(objHttpChannel)
     RemotingConfiguration.RegisterWellKnownServiceType(GetType(RemotingServer),
“RemoteObject”, WellKnownObjectMode.Singleton)
        Console.WriteLine(“Server registered and listening waiting
for clients...”)
        Console.ReadLine()

    End Sub
End Module
```

Following is detail explanation :-

√ Channel object is created and registered.Following is the code.

Dim objHttpChannel As HttpChannel

Console.WriteLine(“Server Started....”)

objHttpChannel = New HttpChannel(1234)

ChannelServices.RegisterChannel(objHttpChannel)

√ Server then hosts the object so that client can connect to it.This is the time when we specify what mode the server object will be created i.e. Singleton or SingleCall.This is done by the following below given code.Note in sample we are hosting the server object in singleton mode that means that the same object

will be shared between all clients.Also note the server object is implementing "InterFaceRemoting" and inheriting from "MarshalByRefObject".

RemotingConfiguration.RegisterWellKnownServiceType(GetType(RemotingServer), "RemoteObject", WellKnownObjectMode.Singleton)

Now comes the final section that is third section the client which will connect to this hosted remoting object.

Following is a detail explanation of client code :-

√ First we create the channel i.e. HTTP.Note whatever channel the server is using same will be used by the client.

ChannelServices.RegisterChannel(objHttpChannel)

√ As said before the common interface i.e."InterFaceRemoting" will be used to communicate with client.

√ After that we can get the server object reference using following code

objRemoting = CType(Activator.GetObject(GetType(InterFaceRemoting.InterFaceRemoting), "http://localhost:1234/RemoteObject"), InterFaceRemoting.InterFaceRemoting)

√ Then the client can make method call as if the object is local.But actually the object is a proxy.

Console.WriteLine("Value on server :- " & objRemoting.GetValue.ToString())

```
Imports System
Imports System.Runtime.Remoting
Imports System.Runtime.Remoting.Channels.Http
Imports System.Runtime.Remoting.Channels
Imports InterFaceRemoting

Module ModuleStartClient
    Sub Main()
        Dim objHttpChannel As New HttpChannel
        Dim objRemoting As InterFaceRemoting.InterFaceRemoting
        ChannelServices.RegisterChannel(objHttpChannel)
        objRemoting =
CType(Activator.GetObject(GetType(InterFaceRemoting.InterFaceRemoting),
"http://localhost:1234/RemoteObject"),
InterFaceRemoting.InterFaceRemoting)
```

```
        Console.WriteLine("Referenced the main object.... Now
displaying Data")
        Console.WriteLine("Value on server :-  " &
objRemoting.GetValue.ToString())
        Console.WriteLine("Press enter to Terminate")
        Console.ReadLine()
    End Sub

End Module
```

You an run the program and see the output.For running the program run the server program which is in server directory.Run "Server.exe" from BIN directory.If the EXE runs properly following will be the screen as shown below.

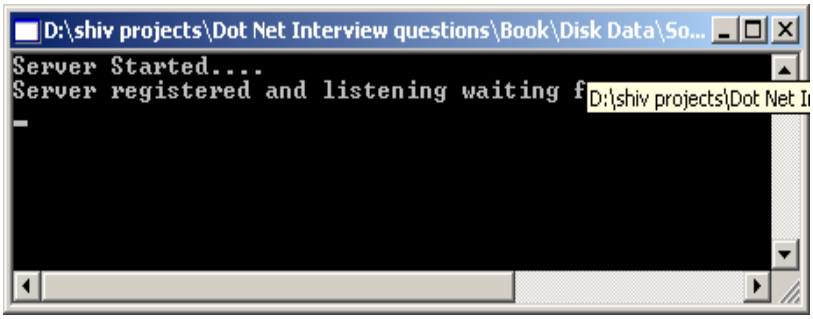


Figure :- 4.4 Running Server Program of Remoting

Now run "Client.exe" from client folder in BIN directory.Following will be the output seen.This means that the client connected to the server program and displayed the data in the server object.In the server object we have initialized value "testing....." In constructor of class "RemotingServer".Same value is displayed at the client side as shown in figure below.

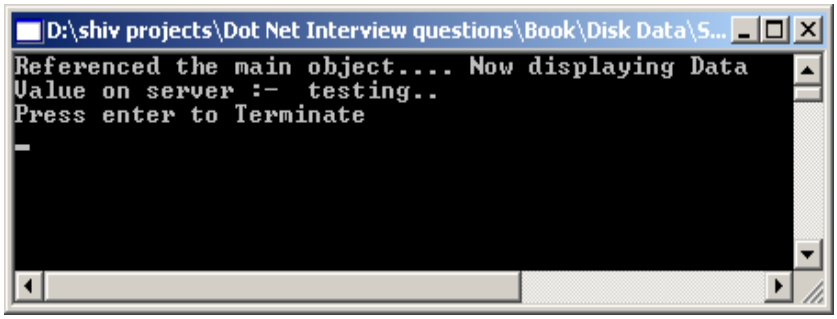


Figure :- 4.5 Client Program output of Remoting

(A) What is the situation you will use singleton architecture in remoting ?

If all remoting clients have to share the same data singleton architecture will be used.

(A) What is fundamental of published or precreated objects in Remoting ?

In scenarios of singleton or single call the objects are created dynamically.But in situations where you want to precreate object and publish it you will use published object scenarios.

Dim obj as new objRemote

obj.Initvalue = 100

RemotingServices.Marshal(obj,"RemoteObject")

As shown in above sample following changes will be needed on server side.RemotingConfiguration.RegisterWellKnownServiceType is replaced by RemotingServices.Marshal(obj,"RemoteObject") where "obj" is the precreated objected on the server whose value is initialized to 100.

(A) What are the ways client can create object on server in CAO model ?

There are two ways by which you can create Client objects on remoting server :-

- √ Activator.CreateInstance().
- √ By Keyword "New".

(A) Are CAO stateful in nature ?

Yes.In CAO remoting model client creates a instance on server and instance variable set by client on server can be retrieved again with correct value.

(A) In CAO model when we want client objects to be created by "NEW" keyword is there any precautions to be taken ?

Remoting Clients and Remoting Server can communicate because they share a common contract by implementing Shared Interface or Base Class (As seen in previous examples). But according to OOP's concept we can not create a object of interface or Base Classes (Abstract Class). Shipping the server object to client is not a good design practice.In CAO model we can use SOAPSUDS utility to generate Metadata DLL from server which can be shipped to client , clients can then use this DLL for creating object on server.Run the SOAPSUDS utility from visual studio command prompt for syntax see below :-

soapsuds -ia:RemotingServer -nowp -oa:ClientMetaData.dll

Where RemotingServer is your server class name.

ClientMetaData.dll is the DLL name by which you will want to create the metadll.

Server code will change as follows :-

```
ChannelServices.RegisterChannel(objHttpChannel)
RemotingConfiguration.ApplicationName = "RemoteObject"
RemotingConfiguration.RegisterActivatedServiceType(GetType(InterFaceRemoting.InterFaceRemoting))
```

Note :- We have to provide applicationname and register the object as ActivatedServiceType.

On client side we have to reference the generated ClientMetaData.dll from SOAPSUDS utility.Below are changes which are needed to be incorporated at the Remoting Client :-

RemotingConfiguration.RegisterActivatedClientType(typeof(RemoteObject),"http://localhost:1234/MyServer")

Dim objRemoteObject as new RemoteObject().

RemoteObject is class which is obtained from ClientMetaData.dll which we created using SOAPSUDS utility.Now you can reference the object as normal object.

(I) Is it a good design practice to distribute the implementation to Remoting Client ?

It's never advisable to distribute complete implementation at client , due to following reasons :-

- √ Any one can use ILDASM and decrypt your logic.
- √ It's a bad architecture move to have full implementation as client side as any changes in implementation on server side you have to redistribute it again.

So the best way is to have a interface or SOAPSUDS generated meta-data DLL at client side rather than having full implementation.

(A) What is LeaseTime,SponsorshipTime ,RenewonCallTime and LeaseManagerPollTime?

This is a very important question from practical implementation point of view.Companies who have specific requirement for Remoting project's will expect this question to be answered.

In normal .NET environment objects lifetime is managed by garbage collector.But in remoting environment remote clients can access objects which is out of control of garbage collector.Garbage collector boundary is limited to a single PC on which framework is running , any remote client across physical PC is out of control of GC (Garbage Collector).

This constraint of garbage collector leads to a new way of handling lifetime for remoting objects , by using concept called as "LeaseTime".Every server side object is assigned by default a "LeaseTime" of five minutes.This leasetime is decreased at certain intervals.Again for every method call a default of two minutes is assigned.When i say method call means every call made from client.This is called as "RenewalOnCallTime".

Let's put the whole thing in equation to make the concept more clear.

Total Remoting object life time = LeaseTime + (Number of method calls) X (RenewalTime).

If we take NumberOfMethodCalls as one.

Then default Remote Object Life Time = 5 + (1) X 2 = 10 minutes (Everything is in minutes)

When total object lifetime is reduced to zero , it queries the sponsor that should the object be destroyed.Sponsor is a object which decides should object Lifetime be renewed.So it queries any registered sponsors with the object , if does not find any then the object is marked for garbage collection.After this garbage collection has whole control on the object lifetime.If we do not foresee how long a object will be needed specify the "SponsorShipTimeOut" value. SponsorShipTimeOut is time unit a call to a sponsor is timed out.

"LeaseManagerPollTime" defines the time the sponsor has to return a leasetime extension.

(A) Which config file has all the supported channels/protocol ?

Machine.config file has all the supported channels and formatter supported by .NET remoting.Machine.config file can be found at "C:\WINDOWS\Microsoft.NET\Framework\vXXXXX\CONFIG" path.Find <system.runtime.remoting> element in the Machine.config file which has the channels and the formatters.Below is a figure shown which can give a clear idea of how the file looks like.

> *Note :- Interviewer will not ask you to name all channels and formatters in machine.config but will definitely like to know in which file are all the formatter and channels specified one sweet answer "Machine.config" can fetch you handsome job.*

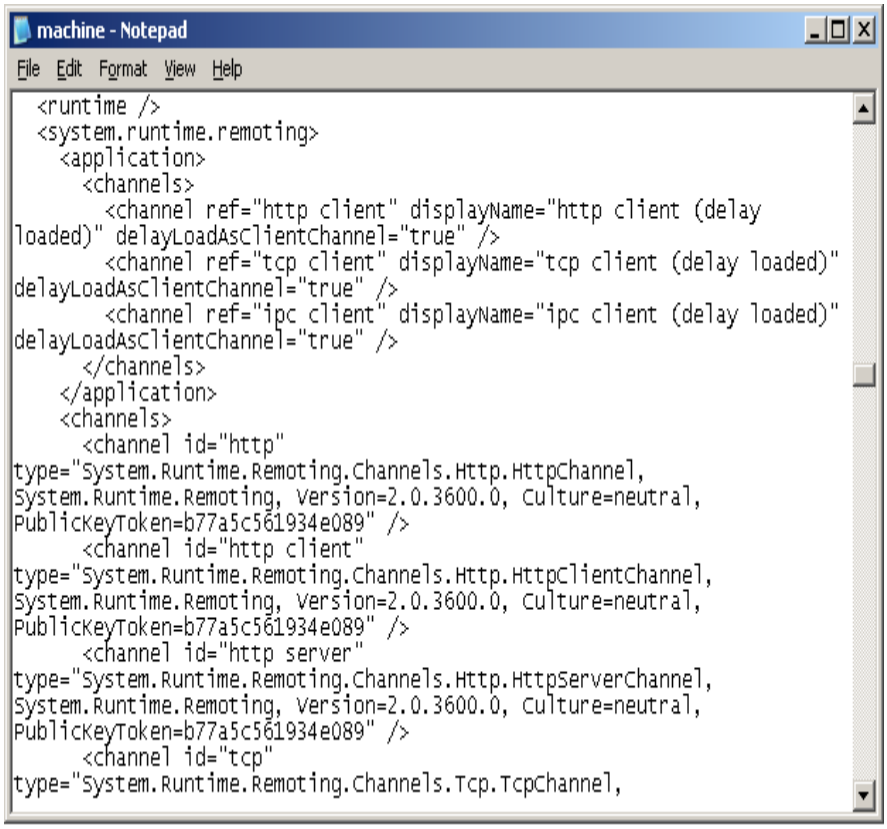


Figure :- 4.6 Channels and Formatter in machine.config file

(A) How can you specify remoting parameters using Config files ?

Both remoting server and remoting client parameters can be provided through config files.Below is a sample of server config file which provides all remoting parameter values which we where providing through code.

```
<configuration>
<system.runtime.remoting>
<application name=”Server”>
<service>
<wellknown
```

```
mode=”SingleCall”
type=”Server.ClsServer, Server”
objectUri=”RemoteObject” />
</service>
<channels>
<channel ref=”tcp server” port=”9000" />
</channels>
</application>
</system.runtime.remoting>
</configuration>
```

Later this config file can be loaded using the following code.

RemotingConfiguration.Configure(AppDomain.CurrentDomain.SetupInformation.ApplicationBase & “Server.config”)

Same way we also have client.config file for loading the client remoting parameters.

```
<configuration>
<system.runtime.remoting>
<application name=”Client”>
<client url=”tcp://localhost:9000/RemoteObject”>
<wellknown
type=”CommonInterface.Icommon, Icommon”
url = “tcp://localhost:9000/Server/RemoteObject”/>
</client>
<channels>
<channel ref=”tcp client” />
</channels>
</application>
</system.runtime.remoting>
</configuration>
```

client remoting can then load the configuration file by using :-

```
Dim IobjCommon As CommonInterFace.Icommon
Dim StrData As String
Dim objServiceEntries As WellKnownClientTypeEntry()

RemotingConfiguration.Configure(AppDomain.CurrentDomain.SetupInformation.ApplicationBase
& “Client.config”)
      objServiceEntries =
RemotingConfiguration.GetRegisteredWellKnownClientTypes()
      IobjCommon = Activator.GetObject(GetType(Icommon),
objServiceEntries(0).ObjectUrl.ToString())
      StrData = IobjCommon.GetValue()
```

```
Console.WriteLine(“ Serve side Data is “ & StrData)
Console.ReadLine()
```

Note :- Complete source is provided in CD in folder “RemotingObjectLifeTime”.If you run Server and Client following output can be seen.All source is compiled using VS2005 BETA1

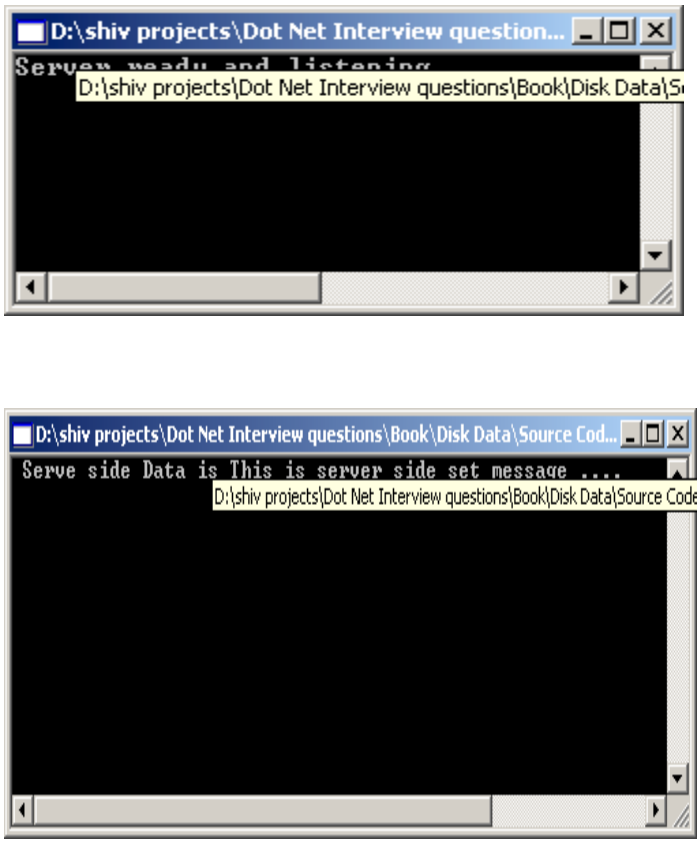


Figure : - 4.7 Output of Server and Client for RemotingObjectLifeTime project

(A) Can Non-Default constructors be used with Single Call SAO?

Twist :- What are the limitation of constructors for Single call SAO ?

Non-Default constructors can not be used with single call objects as object is created with every method call, there is no way to define Non-default constructors in method calls.

It's possible to use Non-Default constructor with Client activated objects as both methods :-

"NEW" keyword and "Activator.CreateInstance" provide a way to specify Non-Default constructors.

(I) How can we call methods in remoting Asynchronously ?

All previous examples are synchronous method calls , that means client has to wait until the method completes the process.By using Delegates we can make Asynchronous method calls.

(A) What is Asynchronous One-Way Calls ?

One-way calls are a different from asynchronous calls from execution angle that the .NET Framework does not guarantee their execution. In addition, the methods used in this kind of call cannot have return values or out parameters.One-way calls are defined by using [OneWay()] attribute in class.

(B) What is marshalling and what are different kinds of marshalling ?

Marshaling is used when an object is converted so that it can be sent across the network or across application domains.Unmarshaling creates an object from the marshaled data.There are two ways to do marshalling :-

- √ Marshal-by-value (MBV) :- In this the object is serialized into the channel, and a copy of the object is created on the other side of the network. The object to marshal is stored into a stream, and the stream is used to build a copy of the object on the other side with the unmarshalling sequence.
- √ Marshaling-by-reference (MBR):- Here it creates a proxy on the client that is used to communicate with the remote object. The marshaling sequence of a remote object creates an ObjRef instance that itself can be serialized across the network.

Objects that are derived from "MarshalByRefObject" are always marshaled by reference.All our previous samples have classes inherited from "MarshalByRefObject"

To marshal a remote object the static method RemotingServices.Marshal() is used.RemotingServices.Marshal() has following overloaded versions:-

public static ObjRef Marshal(MarshalByRefObject obj)

public static ObjRef Marshal(MarshalByRefObject obj, string objUri)

public static ObjRef Marshal(MarshalByRefObject obj, string objUri,Type requestedType)

The first argument obj specifies the object to marshal. The objUri is the path that is stored within the marshaled object reference; it can be used to access the remote object. The requestedType can be used to pass a different type of the object to the object reference. This is useful if the client using the remote object shouldn't use the object class but an interface that the remote object class implements instead. In this scenario the interface is the requestedType that should be used for marshaling.

(A) What is ObjRef object in remoting ?

All Marshal() methods return ObjRef object.The ObjRef is serializable because it implements the interface ISerializable, and can be marshaled by value. The ObjRef knows about :-

- √ location of the remote object
- √ host name
- √ port number
- √ object name.

(B) What is a WebService ?

Web Services are business logic components which provide functionality via the Internet using standard protocols such as HTTP.

Web Services uses Simple Object Access Protocol (SOAP) in order to expose the business functionality.SOAP defines a standardized format in XML which can be exchanged between two entities over standard protocols such as HTTP.SOAP is platform independent so the consumer of a Web Service is therefore completely shielded from any implementation details about the platform exposing the Web Service.For the consumer it is simply a black box of send and receive XML over HTTP.So any webservice hosted on windows can also be consumed by UNIX and LINUX platform.

(B) What is UDDI ?

Full form of UDDI is Universal Description,Discovery and Integration.It is a directory that can be used to publish and discover public Web Services.If you want to see more details you can visit the http://www.UDDI.org .

(B) What is DISCO ?

Abbreviation of DISCO is Discovery.It is basically used to club or group common services together on a server and provide links to the schema documents of the services it describes may require.

(B) What is WSDL?

Web Service Description Language (WSDL)is a W3C specification which defines XML grammar for describing Web Services.XML grammar describes details such as:-

- √ Where we can find the Web Service (its URI)
- √ What methods and properties that service supports
- √ Data type support.
- √ Supported protocols

In short its a bible of what the webservice can do.Clients can consume this WSDL and build proxy objects that clients use to communicate with the Web Services. Full WSDL specification is available at http://www.w3.org/TR/wsdl.

(A) What the different phase/steps of acquiring a proxy object in Webservice ?

The following are the different steps needed to get a proxy object of a webservice at the client side :-

- √ Client communicates to UDI node for WebService either through browser or UDDI's public web service.
- √ UDII responds with a list of webservice.
- √ Every service listed by webservice has a URI pointing to DISCO or WSDL document.

- √ After parsing the DISCO document, we follow the URI for the WSDL document related to the webservice which we need.
- √ Client then parses the WSDL document and builds a proxy object which can communicate with Webservice.

(B) What is file extension of Webservices ?

.ASMX is extension for Webservices.

Note :- After this we are going to deal with a sample of webservice.In VS2005 webproject is created from the menu itself as compared to 2003 where it was present in the explorer.

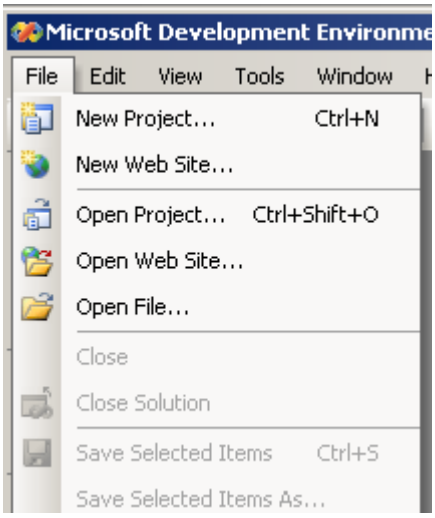


Figure :- 4.8 Create Web project menu in VS2005

(B)Which attribute is used in order that the method can be used as WebService ?

WebMethod attribute has to be specified in order that the method and property can be treated as WebService.

(A) What are the steps to create a webservice and consume it ?

Note :- For this question this book will make a attempt by creating a simple webservice and explaining steps to acheive it.A simple webservice will be created which takes two number and gives addition result of the two number.In CD sample webservice project with folder name "MathsWebService" is provided and same will be explained below. Definitely the

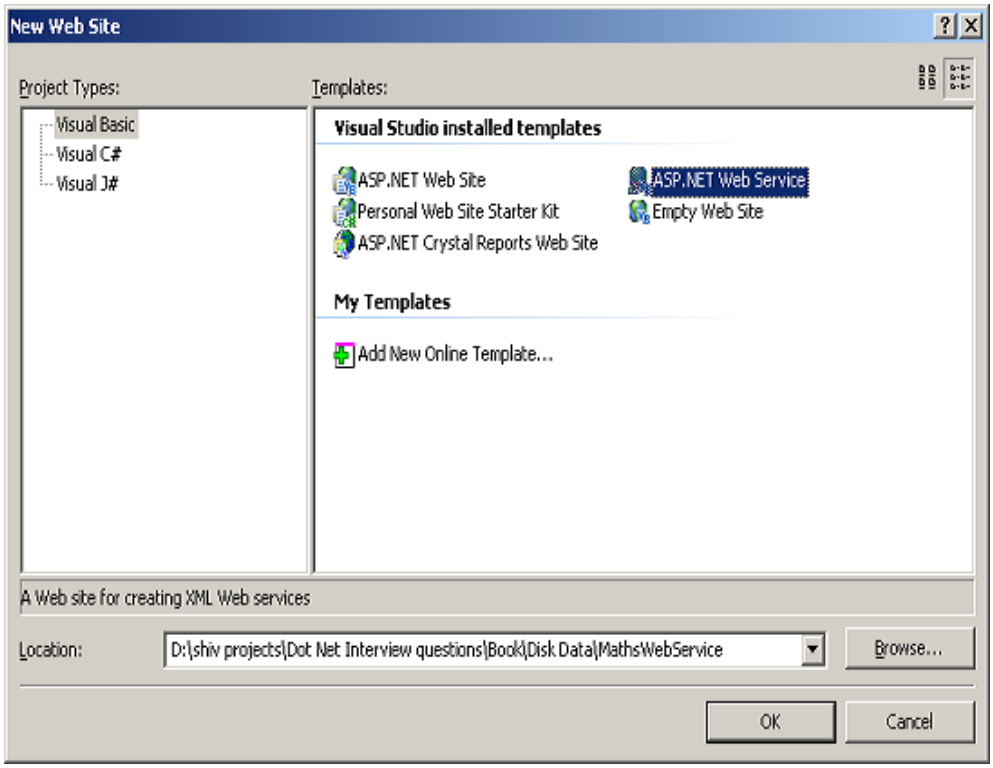
interviewer will not expect such a detail answer but this book will explain you in detail so that you are on right track during interview.

This webservice will add two numbers and give to the calling client.All the below steps are according to VS2005 beta editor :-

√ First create a website by clicking on File -- New WebSite.

√ From “Visual Studio Installed Templates” click on “Asp.NET Web Service”.See figure below.Name the figure as “Maths Web Service”.

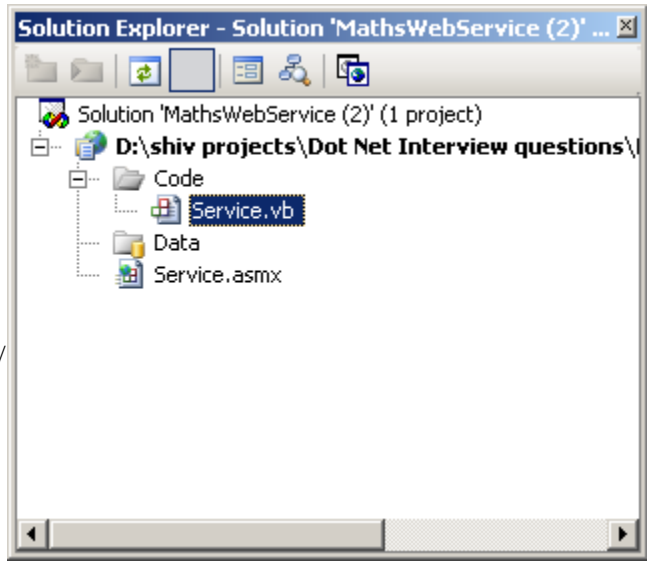
Figure :- 4.9 Create WebService Project



√ By default the .NET editor has made a default webservice method called as "HelloWord" which returns a string datatype.Let's rename "Service.vb" to "Maths.vb" and "Service.asmx" to "Maths.asmx".Let's replace the "HelloWorld" with following code below :-

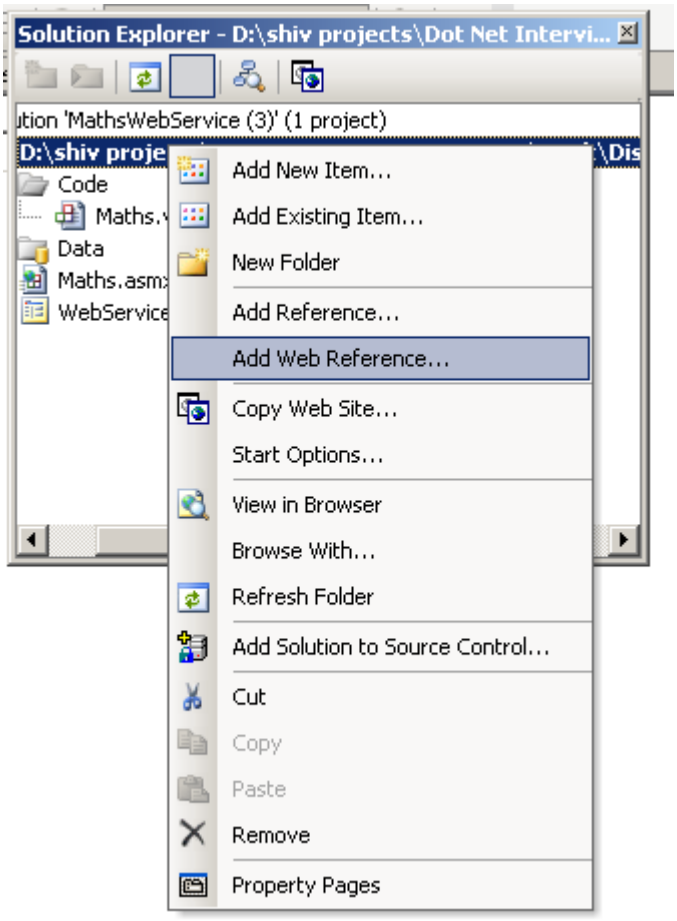
```
<WebMethod()> _
  Public Function AddTwoNumbers(ByVal Number1 As Integer, ByVal
    Number2 As Integer) As Integer
      Return Number1 + Number2
  End Function
```

Figure :- 4.10 Rename all your default “Service” to “Maths”



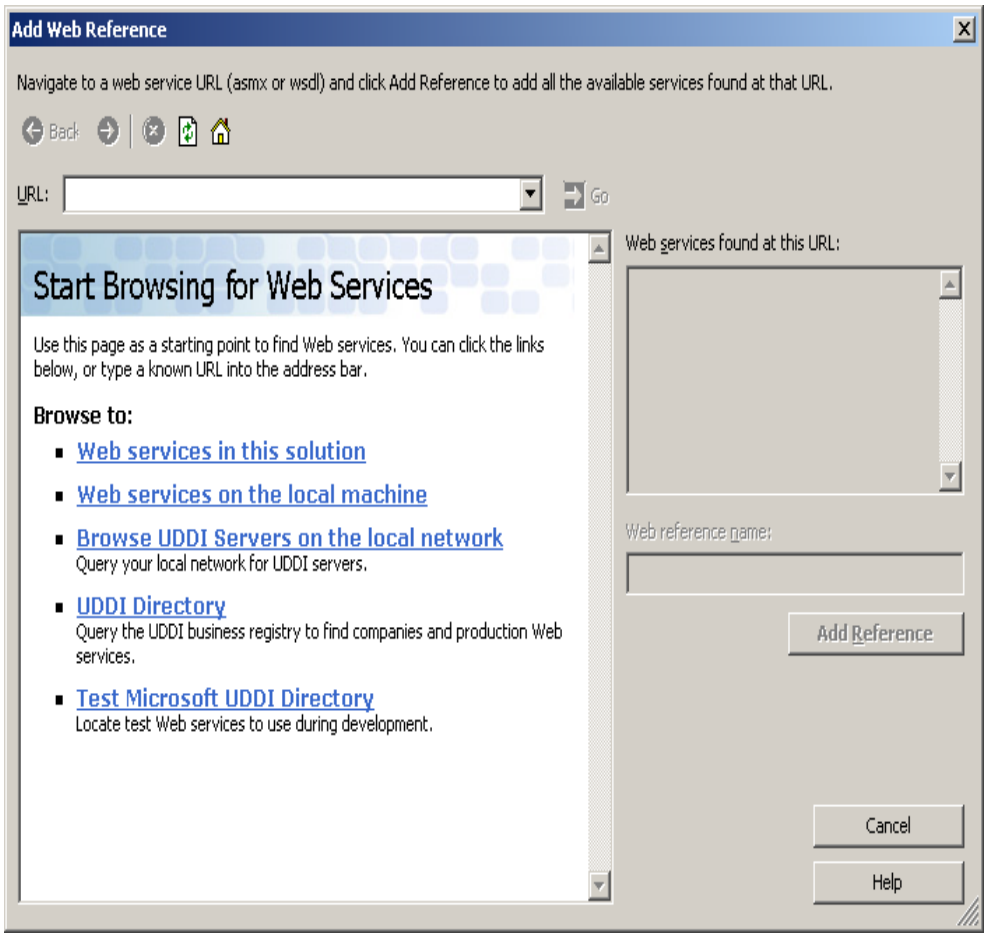
√ After the webservice is done click on add Webreference.Normally for components we do a “Add Reference” and for Webservices we do “Add Web Reference”.

Figure :- 4.11 Click on Add Web Reference



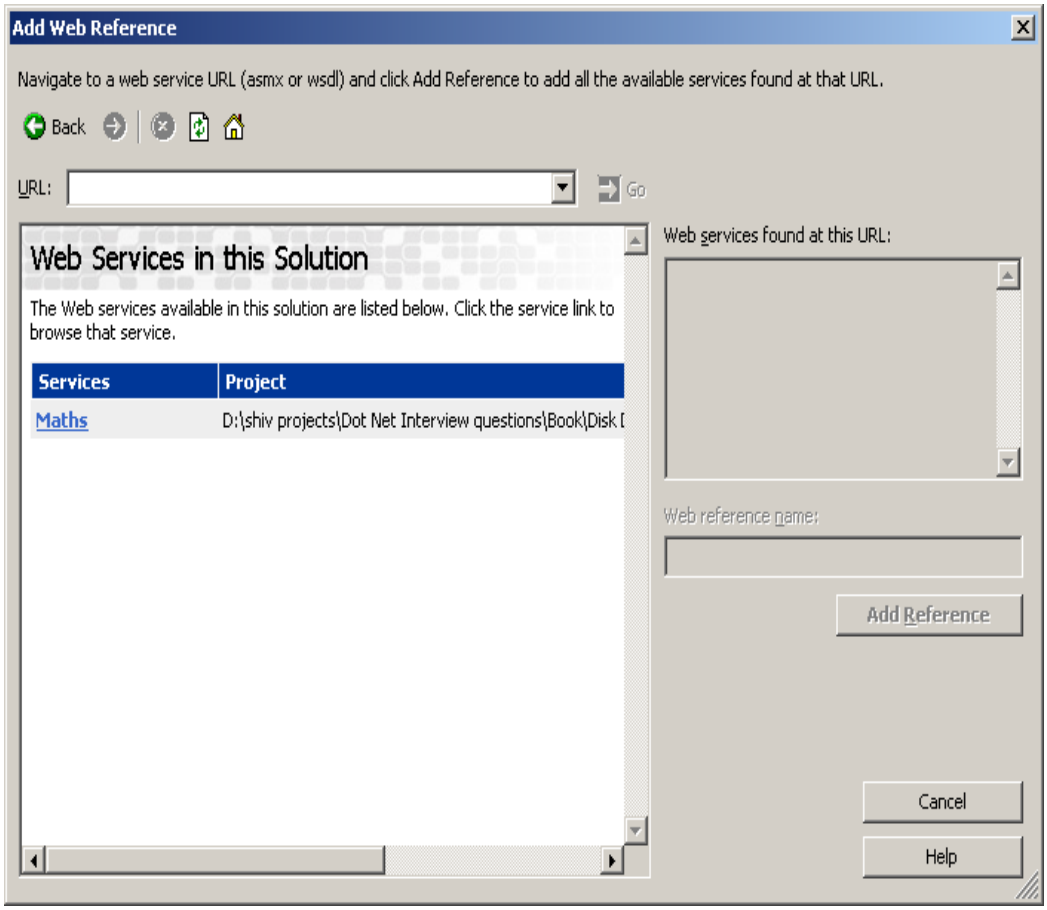
√ You will be shown with a list of webservices which are known to the solutions.As we are looking for our “Maths” webservice which exist in the same solution , we click “Webservices in this solution”.

Figure :- 4.12 List of webservices for browsing



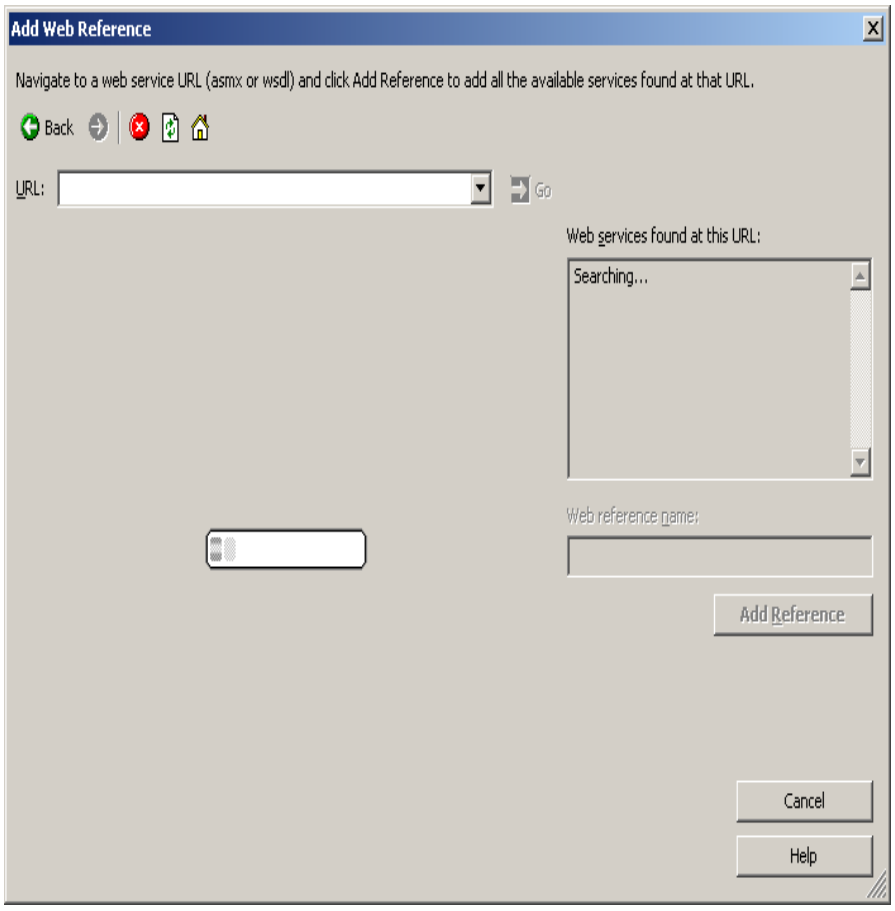
√ Your editor has located the “Maths” webservice.Select the webservice.

Figure :- 4.13 Solution showing the availability of Maths Webservice.


Add Web Reference
Navigate to a web service URL (asmx or wsdl) and click Add Reference to add all the available services found at that URL.
Back
URL:
Go
Web Services in this Solution
The Web services available in this solution are listed below. Click the service link to browse that service.
Services
Project
Maths
D:\shiv projects\Dot Net Interview questions\Book\Disk
Web services found at this URL:
Web reference name:
Add Reference
Cancel
Help

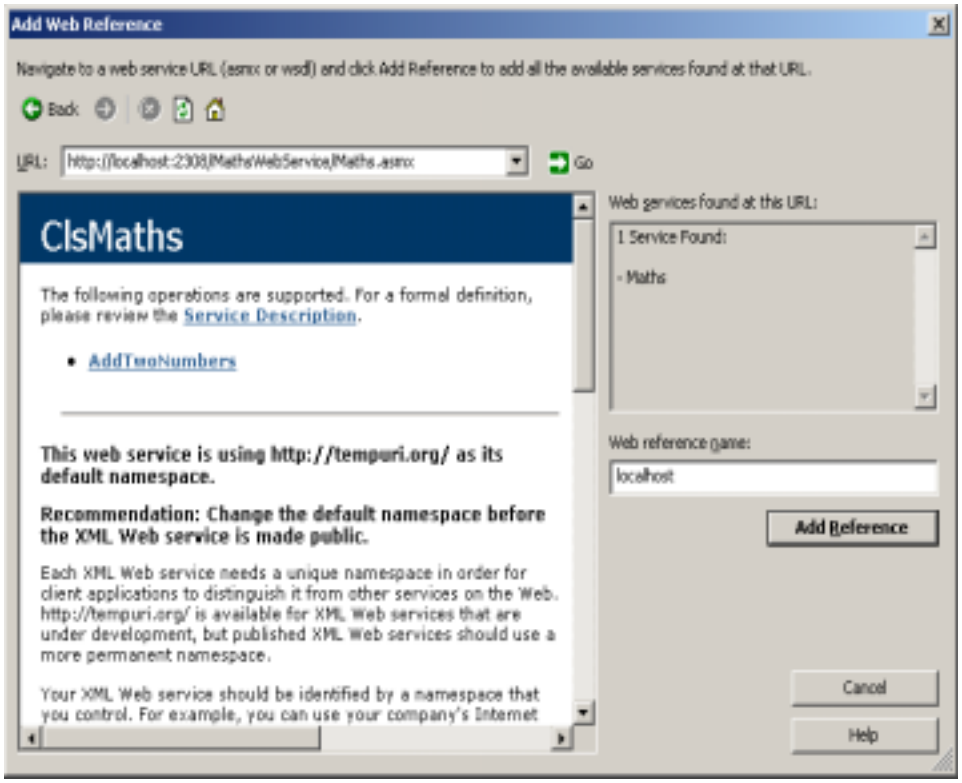
√ After you have clicked on “Maths” webservice you will see a search progress bar as shown in figure below.This process will start the webservice , reference it and create a proxy for the client , so that using it client can absorb the webservice.

Figure :- 4.14 Starting the webservice and creating the proxy for your solution.



√ Finally you are able to see your webservice which is ready for use.Click on Add Reference and you will see a “Localhost” reference in your .NET solution.

Figure :- 4.15 Starting the webservice and creating the proxy for your solution.

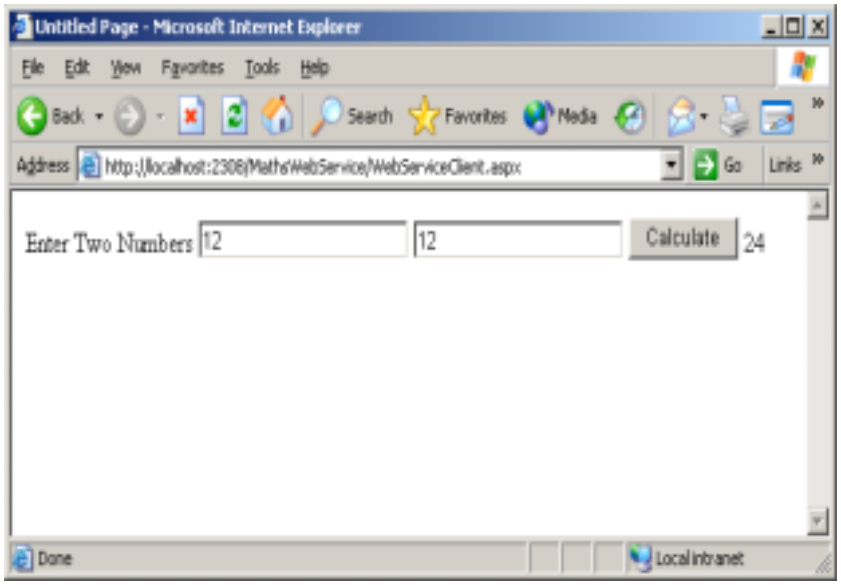


√ We need to make a client who will absorb this “Maths Webservice”.Add “WebserviceClient.aspx” and create a UI as shown below.In the button click put in the following code.”LocalHost.ClsMaths” is the proxy object by which you can make calls to the webservice.

```
Sub cmdCalculate_Click(ByVal sender As Object, ByVal e As
```

```
System.EventArgs)
        Dim pobjMaths As New localhost.ClsMaths
        lblResultDisplay.Text =
Convert.ToString(pobjMaths.AddTwoNumbers(Convert.ToInt16(txtNumber1.Text),
Convert.ToInt16(txtNumber2.Text)))
    End Sub
```

Figure :- 4.16 Complete Webservice in action.



Note :- The whole point of creating this "Maths Webservice" step by step was to have a understanding of practical angle of how webservices are created.It's very very rare that you will be asked to explain every step of how to write a webservice.But in case your interviewer is too bend down to also know what are the actual steps in creating a Webservice.

(A) Do webservice have state ?

Twist :- How can we maintain State in Webservices ?

Webservices as such do not have any mechanism by which they can maintain state.Webservices can access ASP.NET intrinsic objects like Session , application etc. if they inherit from "WebService" base class.

```
<%@ Webservice class="TestWebServiceClass" %>

Imports System.Web.Services
```

5. Caching Concepts

(B) What is application object ?

Application object can used in situation where we want data to be shared across users globally.

(I)What's the difference between Cache object and application object ?

The main difference between the Cache and Application objects is that the Cache object provides cache-specific features, such as dependencies and expiration policies.

(I)How can get access to cache object ?

The Cache object is defined in the System.Web.Caching namespace. You can get a reference to the Cache object by using the Cache property of the HttpContext class in the System.Web namespace or by using the Cache property of the Page object.

(A)What are dependencies in cache and types of dependencies ?

When you add an item to the cache, you can define dependency relationships that can force that item to be removed from the cache under specific activities of dependencies.Example if the cache object is dependent on file and when the file data changes you want the cache object to be update.Following are the supported dependency :-

- √ File dependency :- Allows you to invalidate a specific cache item when a disk based file or files change.
- √ Time-based expiration :- Allows you to invalidate a specific cache item depending on predefined time.
- √ Key dependency :-Allows you to invalidate a specific cache item depending when another cached item changes.

(P)Can you show a simple code showing file dependency in cache ?

```
Partial Class Default_aspx

    Public Sub displayAnnouncement()
        Dim announcement As String
        If Cache("announcement") Is Nothing Then
            Dim file As New _
              System.IO.StreamReader _
             (Server.MapPath("announcement.txt"))
            announcement = file.ReadToEnd
            file.Close()
            Dim depends As New _
                System.Web.Caching.CacheDependency _
               (Server.MapPath("announcement.txt"))
            Cache.Insert("announcement", announcement, depends)
        End If
        Response.Write(CType(Cache("announcement"), String))
    End Sub

    Private Sub Page_Init(ByVal sender As Object, ByVal e As
            System.EventArgs) Handles Me.Init
        displayAnnouncement()
    End Sub
End Class
```

Note :- Above source code can be obtained from CD in "CacheSample" folder."Announcement.txt" is in the same folder which you can play around to see the results.

Above given method displayAnnouncement() displays banner text from Announcement.txt file which is lying in application path of the web directory.Above method first checks is the Cache object nothing , if the cache object is nothing then it moves further to load the cache data from the file.Whenever the file data changes the cache object is removed and set to nothing.

(A) What is Cache Callback in Cache ?

Cache object is dependent on its dependencies example file based , time based etc.Cache items remove the object when cache dependencies change.ASP.NET provides capability to execute a callback method when that item is removed from cache.

(A) What is scavenging ?

When server running your ASP.NET application runs low on memory resources , items are removed from cache depending on cache item priority.cache item priority is set when you add item to cache.BY setting the cache item priority controls which items scavenging is removed first.

(B) What are different types of caching using cache object of ASP.NET?

You can use two types of output caching to cache information that is to be transmitted to and displayed in a Web browser:

- √ **Page Output Caching**

  Page output caching adds the response of page to cache object.Later when page is requested page is displayed from cache rather than creating the page object and displaying it.Page output caching is good if the site is fairly static.

- √ **Page Fragment Caching**

  If parts of the page are changing, you can wrap the static sections as user controls and cache the user controls using pagefragment caching.

(B) How can you cache different version of same page using ASP.NET cache object ?

Output cache functionality is achieved by using "OutputCache" attribute on ASP.NET page header.Below is the syntax

```
<%@ OutputCache Duration="20" Location="Server" VaryByParam="state"
VaryByCustom="minorversion" VaryByHeader="Accept-Language"%>
```

- √ VaryByParam :- Caches different version depending on input parameters send through HTTP POST/GET.
- √ VaryByHeader:- Caches different version depending on the contents of the page header.

- √ VaryByCustom:-Lets you customize the way the cache handles page variations by declaring the attribute and overriding the GetVaryByCustomString handler.
- √ VaryByControl:-Caches different versions of a user control based on the value of properties of ASP objects in the control.

(A) How will implement Page Fragment Caching ?

Page fragment caching involves the caching of a fragment of the page, rather than the entire page. When portions of the page need to be dynamically created for each user request this is best method as compared to page caching.You can wrap Web Forms user control and cache the control so that these portions of the page don't need to be recreated each time.

(B) What are ASP.NET session and compare ASP.NET session with classic ASP session variables?

ASP.NET session caches per user session state.It basically uses "HttpSessionState" class.

Following are the limitations in classic ASP sessions :-

- √ ASP session state is dependent on IIS process very heavily.So if IIS restarts ASP session variables are also recycled.ASP.NET session can be independent of the hosting environment thus ASP.NET session can maintained even if IIS reboots.
- √ ASP session state has no inherent solution to work with Web Farms.ASP.NET session can be stored in state server and SQL SERVER which can support multiple server.
- √ ASP session only functions when browser supports cookies.ASP.NET session can be used with browser side cookies or independent of it.

(B) Which various modes of storing ASP.NET session ?

- √ InProc:- In this mode Session state is stored in the memory space of the Aspnet_wp.exe process.This is the default setting.If the IIS reboots or web application restarts then session state is lost.

- √ StateServer:-In this mode Session state is serialized and stored in a separate process (Aspnet_state.exe); therefore, the state can be stored on a separate computer(a state server).
- √ SQL SERVER:- In this mode Session state is serialized and stored in a SQL Server database.

Session state can be specified in <sessionState> element of application configuration file.Using State Server and SQL SERVER session state can be shared across web farms but note this comes at speed cost as ASP.NET needs to serialize and deserialize data over network again and again.

(A) Is Session_End event supported in all session modes ?

Session_End event occurs only in "Inproc mode"."State Server" and "SQL SERVER" do not have Session_End event.

(A) What are the precautions you will take in order that StateServer Mode work properly ?

Following are the things to remember so that StateServer Mode works properly :-

- √ StateServer mode session data is stored in a different process so you must ensure that your objects are serializable.
- √ <machineKey> elements in Web.config should be indentical across all servers.So this ensures that encryption format is same across all computers.
- √ IIS metabase (\LM\W3SVC\2) must be identical across all servers in that farm.

(A) What are the precautions you will take in order that SQLSERVER Mode work properly ?

Following are the things to remember so that SQLSERVER Mode works properly :-

- √ SQLSERVER mode session data is stored in a different process so you must ensure that your objects are serializable.
- √ IIS metabase (\LM\W3SVC\2) must be indentical across all servers in that farm.

- √ By default Session objects are stored in “Tempdb” , you can configure it store outside “TempDB” by running microsoft provided SQL script.

Note :- “TempDB” database is re-created after SQL SERVER computer reboot.If you want to maintain session state with every reboot best is to run SQL Script and store session objects outside “TempDB” database.

(A) Where do you specify session state mode in ASP.NET ?

```
<sessionState mode=”SQLServer”
stateConnectionString=”tcpip=192.168.1.1:42424"
sqlConnectionString=”data source=192.168.1.1; Integrated
Security=SSPI”
cookieless=”false”
timeout=”20"
/>
```

Above is sample session state mode specified for SQL SERVER.

(B) What are the other ways you can maintain state ?

Other than session variables you can use the following technique to store state :

- √ Hidden fields
- √ View state
- √ Hidden frames
- √ Cookies
- √ Query strings

(B) What are benefits and Limitation of using Hidden fields ?

Following are the benefits of using Hidden fields :-

- √ They are simple to implement.
- √ As data is cached on client side they work with Web Farms.
- √ All browsers support hidden field.
- √ No server resources are required.

Following are limitations of Hidden field :-

- √ They can be tampered creating a security hole.
- √ Page performance decreases if you store large data , as the data is stored in pages itself.
- √ Hidden fields do not support rich structures as HTML hidden fields are only single valued.Then you have to work around with delimiters etc to handle complex structures.

Below is how you will actually implement hidden field in a project

```
<input id="HiddenValue" type="hidden" value="Initial Value"
runat="server"NAME="HiddenValue">
```

(B) What is ViewState ?

Viewstate is a built-in structure for automatically retaining values among multiple requests for the same page. The view state is internally maintained as a hidden field on the page but is hashed, providing greater security than developer-implemented hidden fields do.

(A) Do performance vary for viewstate according to User controls ?

Performance of view state varies depending on the type of server control to which it is applied. Label, TextBox, CheckBox, RadioButton, and HyperLink are server controls that perform well with ViewState. DropDownList, ListBox, DataGrid, and DataList suffer from poor performance because of their size and the large amounts of data making roundtrips to the server.

(B) What are benefits and Limitation of using Viewstate for state management?

Following are the benefits of using Viewstate :-

- √ No server resources are required because state is contained in a structure in the page code.
- √ Simplicity.
- √ States are retained automatically.
- √ The values in view state are hashed, compressed, and encoded, thus representing a higher state of security than hidden fields.

- √ View state is good for caching data in Web farm configurations because the data is cached on the client.

Following are limitation of using Viewstate:-

- √ Page loading and posting performance decreases when large values are stored because view state is stored in the page.
- √ Although view state stores data in a hashed format, it can still be tampered with because it is stored in a hidden field on the page. The information in the hidden field can also be seen if the page output source is viewed directly, creating a potential security risk.

Below is sample of storing values in view state.

```
this.ViewState["EnterTime"] = DateTime.Now.ToString();
```

(B) How an you use Hidden frames to cache client data ?

This technique is implemented by creating a Hidden frame in page which will contain your data to be cached.

```
<FRAMESET cols="100%,*,*">
<FRAMESET rows="100%">
<FRAME src="data_of_frame1.html"></FRAMESET>
<FRAME src="data_of_hidden_frame.html">
<FRAME src="data_of_hidden_frame.html" frameborder="0" noresize
scrolling="yes">
</FRAMESET>
```

Above is a sample of hidden frames where the first frame “data_of_frame1.html” is visible and the remaining frames are hidden by giving whole col section to first frame. See allocation where 100 % is allocated to first frame and remaining frames thus remain hidden.

(I) What are benefits and Limitation of using Hidden frames?

Following are the benefits of using hidden frames:

- √ You can cache more than one data field.

- √ The ability to cache and access data items stored in different hidden forms.
- √ The ability to access JScript® variable values stored in different frames if they come from the same site.

The limitations of using hidden frames are:

- √ Hidden frames are not supported on all browsers.
- √ Hidden frames data and be tampered thus creating security hole.

(I) What are benefits and Limitation of using Cookies?

Following are benefits of using cookies for state management :-

- √ No server resources are required as they are stored in client.
- √ They are light weight and simple to use

Following are limitation of using cookies :-

- √ Most browsers place a 4096-byte limit on the size of a cookie,although support for 8192-byte cookies is becoming more common in the new browser and client-device versions available today.
- √ Some users disable their browser or client device's ability to receive cookies, thereby limiting the use of cookies.
- √ Cookies can be tampered and thus creating a security hole.
- √ Cookies can expire thus leading to inconsistency.

Below is sample code of implementing cookies

```
Request.Cookies.Add(New HttpCookie("name", "user1"))
```

(I) What is Query String and What are benefits and Limitation of using Query Strings?

A query string is information sent to the server appended to the end of a page URL.

Following are the benefits of using query string for state management:-

- √ No server resources are required. The query string is contained in the HTTP request for a specific URL.

- √ All browsers support query strings.

Following are limitations of query string :-

- √ Query string data is directly visible to user thus leading to security problems.-
- √ Most browsers and client devices impose a 255-character limit on URL length.

Below is a sample “Login” query string passed in URL http://www.querystring.com/login.asp?login=testing.This querystring data can then be requested later by using Request.QueryString(“login”).

6. OOPS

(B) What is Object Oriented Programming ?

It is a problem solving technique to develop software systems.It's a technique to think real world in terms of objects.Object maps the software model to real world concept.These objects have responsibilities and provide services to application or other objects.

(B) What's a Class ?

A class describes all the attributes of objects , as well as the methods that implement the behavior of member objects.Its a comprehensive data type which represent a blue print of objects.It's a template of object.

(B) What's a Object ?

It's a basic unit of a system.An object is an entity that has attributes, behavior, and identity. Objects are members of a class.Attributes and behavior of an object are defined by the class definition.

(A) What's the relation between Classes and Objects ?

They look very much same but are not same.Class is a definition , while object is a instance of the class created.Class is a blue print while objects are actual objects existing in real world.Example we have class CAR which has attributes and methods like Speed,Brakes,Type of Car etc.Class CAR is just a prototype , now we can create real time objects which can be used to provide functionality . Example we can create a Maruti car object with 100 km speed and urgent brakes.

(B) What are different properties provided by Object-oriented systems ?

Twist :- Can you explain different properties of Object Oriented Systems?

Note:- Difference between abstraction and encapsulation is one of the favorite interview question and quiet confusing as both the terminology look alike.Best is if you can brainstorm with your friends or do a little reading.

Following are characteristic's of Object Oriented System's :-

Abstraction

It allows complex real world to be represented in simplified manner.Example color is abstracted to RGB.By just making the combination of these three colors we can achieve any color in world.It's a model of real world or concept.

Encapsulation

The process of hiding all the internal details of an object from the outside world.

Communication using messages

When application wants to achieve certain task it can only be done using combination of objects.A single object can not do all the task.Example if we want to make order processing form. We will use Customer object , Order object , Product object and Payment object to achieve this functionality.In short these objects should communicate with each other.This is achieved when objects send messages to each other.

Object lifetime

All objects have life time.Objects are created , initialized , necessary functionalities are done and later the object is destroyed.Every object have there own state and identity , which differ from instance to instance.

Class hierarchies (Inheritance and aggregation)

Twist :- What's difference between Association , Aggregation and Inheritance relationships?

In object oriented world objects have relation and hierarchies in between them.There are basically three kind of relationship in Object Oriented world :-

Association

This is the simplest relationship between objects.Example every customer has sales.So Customer object and sales object have a association relation between them.

Aggregation

This is also called as composition model.Example in order to make a "Accounts" class it has use other objects example "Voucher","Journal" and "Cash" objects.So accounts class is aggregation of these three objects.

Inheritance

Hierarchy is used to define more specialized classes based on a preexisting generalized class.Example we have VEHICLE class and we can inherit this class make more specialized class like CAR, which will add new attributes and use some existing qualities of the parent class.Its shows more of a parent-child relationship .This kind of hierarchy is called inheritance.

Polymorphism

When inheritance is used to extend a generalized class to a more specialized class,it includes behavior of the top clas(Generalized class).The inheriting class often implement a behavior that can be somewhat different than the generalized class, but the name of the behavior can be same.It is important that a given instance of an object use the correct behavior, and the property of polymorphism allows this to happen automatically.

(B) How can we acheive inheritance in VB.NET ?

Note:- The following explanation is for VB.NET

Inheritance is achieved by using “Inherits” keyword in VB.NET (For C# it is “:”).Simple Sample is provided in CD for understanding inheritance in folder “WindowsApplicationInheritance”.There are two classes one is the parent “ClsParent” and second is the child “ClsChild”.Parent class has a string which has to parsed for junk data “@” and “/”.ClsParent has the functionality which parses only cleans up “@”.”ClsChild” then inherits from parent and adds extra functionality by parsing “/”.

```
Public Class ClsParent
    Protected strData As String = “jksdhkj@dadad///ajkdhsjakd”
    Public Function Parse() As String
        Dim PstrData As String
        PstrData = strData
        PstrData = Replace(PstrData, “@”, “”)
        Return PstrData
    End Function
    Public Function GetActualString() As String
        Return strData
    End Function
End Class
```

Above is the source which parses only “@” of strData variable.

```
Public Class ClsChild
    Inherits ClsParent

    ‘ this is child and a special parse function is added which will
also parse “/”
    Public Function ParseBackSlash()
        Dim PstrData As String
        PstrData = Me.Parse()
        PstrData = Replace(PstrData, “/”, “”)
        Return PstrData
    End Function

End Class
```

Above is the source code for “ClsChild” which does the remaining work.It adds extra functionality by parsing “/” junk character's of the data.

Note:- Strdata was accessible only because it was defined as protected in the parent class.

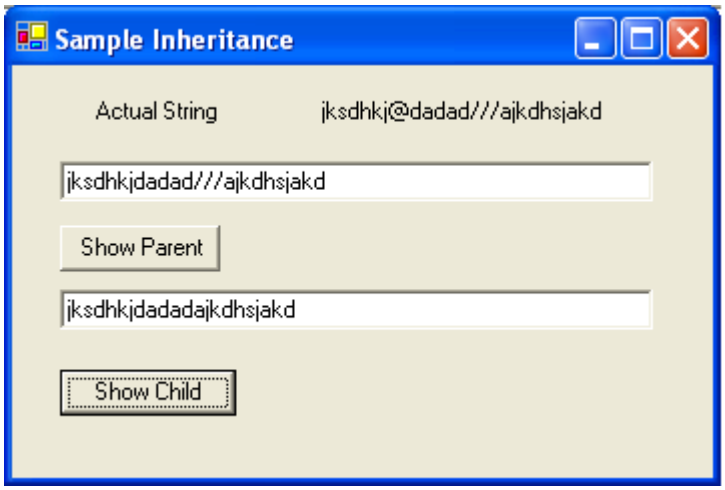


Figure :- 6.1 Inheritance in action

(I) What are abstract classes ?

Following are features of a abstract class :-

√ You can not create a object of abstract class

- √ Abstract class is designed to act as a base class (to be inherited by other classes). Abstract class is a design concept in program development and provides a base upon which other classes are built.
- √ Abstract classes are similar to interfaces. After declaring an abstract class, it cannot be instantiated on it's own, it must be inherited.
- √ In VB.NET abstract classes are created using “MustInherit” keyword.In C# we have “Abstract” keyword.
- √ Abstract classes can have implementation or pure abstract methods which should be implemented in the child class.

Note:- In order to understand the concept simple sample of add and multiply functionality is implemented in “WindowsAbstract” folder in CD.

From interview point of view just saying using “MustInherit” keyword is more than enough to convince that you have used abstract classes.But to clear simple fundamental let’s try to understand the sample code.There are two classes one is “ClsAbstract” class and other is “ClsChild” class.”ClsAbstract” class is a abstract class as you can see the mustinherit keyword.It has one implemented method “Add” and other is abstract method which has to be implemented by child class “MultiplyNumber”.In the child class we inherit the abstract class and implement the multiplynumber function.

Definitely this sample does not take out actually how things are implemented in live projects.Basically you put all your common functionalities or half implemented functionality in parent abstract class and later let child class define the full functionality of the abstract class.Example i always use abstract class with all my SET GET properties of object in abstract class and later make specialize classes for insert,update,delete for the corresponding entity object.

```
Public MustInherit Class ClsAbstract
    ‘ use the mustinherit class to declare the class as abstract
    Public Function Add(ByVal intnum1 As Integer, ByVal intnum2 As
Integer) As Integer
        Return intnum1 + intnum2
    End Function
    ‘ left this seconf function to be completed by the inheriting
class
    Public MustOverride Function MultiplyNumber(ByVal intnum1 As
Integer, ByVal intnum2 As Integer) As Integer
End Class
```

```
Public Class ClsChild
    Inherits ClsAbstract
    ‘ class child overrides the Multiplynumber function
    Public Overrides Function MultiplyNumber(ByVal intnum1 As
Integer, ByVal intnum2 As Integer) As Integer
        Return intnum1 * intnum2
    End Function
End Class
```

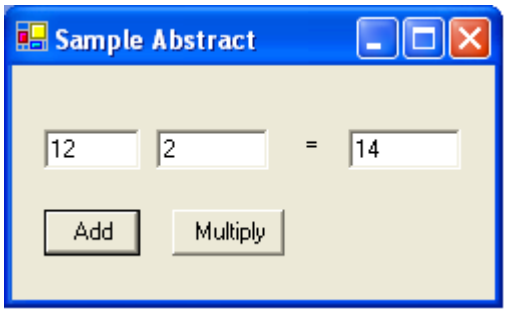


Figure :- 6.2 Abstract classes in action

My attitude towards abstract class has been that i put all my common functionality in abstract class.

(B) What’s a Interface ?

Interface is a contract that defines the signature of the functionality.So if a class is implementing a interface it says to the outer world , that it provides specific behavior . Example if a class is implementing Idisposable interface that means it has a functionality to release unmanaged resources . Now external objects using this class knows that it has contract by which it can dispose unused unmanaged objects.

- √ Single Class can implement multiple interfaces.
- √ If a class implements a interface then it has to provide implementation to all its methods.

Note:- In CD sample "WindowsInterFace" is provided , which has a simple interface implemented.

In sample there are two files.One has the interface definition and other class implements the interface.Below is the source code "IInterface" is the interface and "ClsDosomething" implements the "IInterface".This sample just displays a simple message box.

```
Public Interface IInterFace
    Sub DoSomething()
End Interface


Public Class ClsDoSomething
    Implements IInterFace
    Public Sub DoSomething() Implements
WindowsInterFace.IInterFace.DoSomething
        MsgBox("Interface implemented")
    End Sub
End Class
```

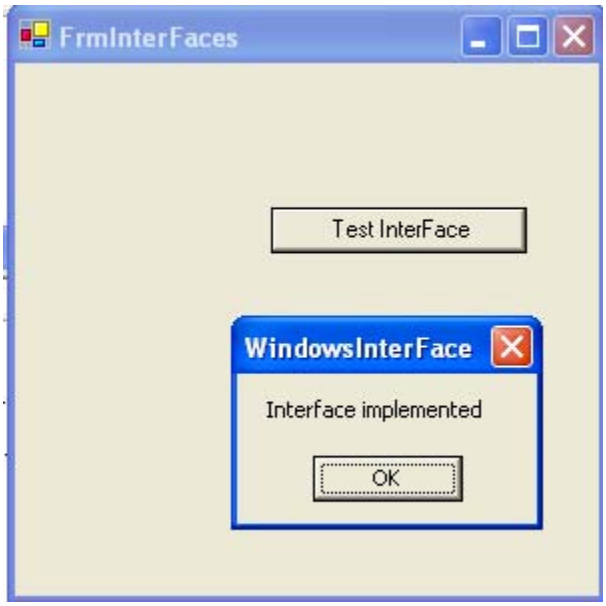


Figure:- 6.3 Interface in action

** Do you have any experience in creating Use cases , requirement documents etc ?*

(A) What is difference between abstract classes and interfaces?

Following are the differences between abstract and interfaces :-

- √ Abstract classes can have concrete methods while interfaces have no methods implemented.
- √ Interfaces do not come in inheriting chain , while abstract classes come in inheritance.

(B) What is a delegate ?

Delegate is a class that can hold a reference to a method or a function.Delegate class has a signature and it can only reference those methods whose signature is compliant with the class.Delegates are type-safe functions pointers or callbacks.

Below is a sample code which shows a example of how to implement delegates.

```
Public Class FrmDelegates
    Inherits System.Windows.Forms.Form
    Public Delegate Sub DelegateAddString()
    Private Sub FrmDelegates_Load(ByVal sender As System.Object,
ByVal e As System.EventArgs) Handles MyBase.Load

    End Sub
    Private Sub AddString()
        lstDelegates.Items.Add("Running AddString() method")
    End Sub
    Private Sub cmdDelegates_Click(ByVal sender As System.Object,
ByVal e As System.EventArgs) Handles cmdDelegates.Click
        Dim objDelegateAddString As DelegateAddString
        objDelegateAddString = AddressOf AddString
        objDelegateAddString.Invoke()
    End Sub
End Class
```

In the above there is a method called "AddString()" which adds a string to a listbox.You can also see a delegate declared as :-

Public Delegate Sub DelegateAddString()

This delegate signature is compatible with the "AddString" method.When i mean compatibility that means that there return types and passing parameter types are same.Later

in command click of the button object of the Delegate is created and the method pointer is received from “AddressOf ” keyword.Then by using the “Invoke” method the method is invoked.

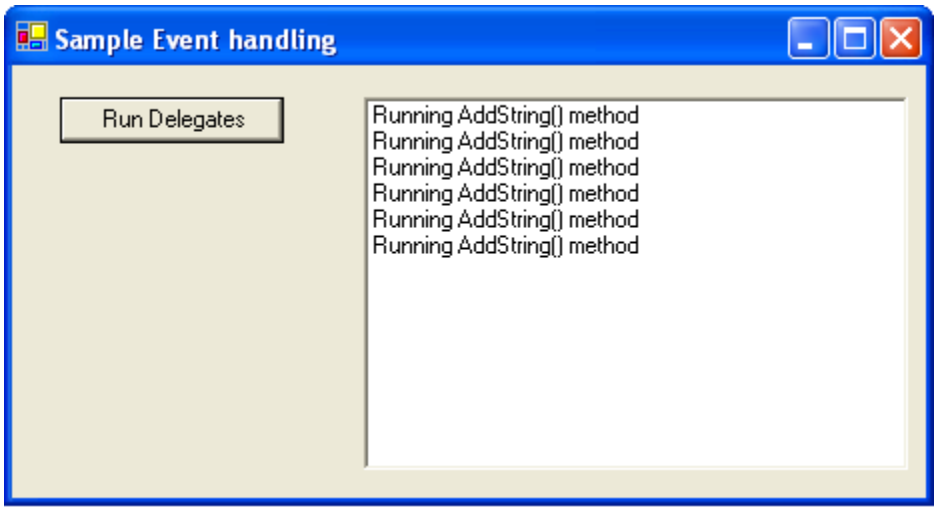


Figure :- 6.4 Delegate in Action

(B) What are event’s ?

As compares to delegates events works with source and listener methodology . So listener’s who are interested in receiving some events they subscribe to the source.Once this subscription is done the source raises events to all of it’s listener when needed.One source can have multiple listeners.

In example sample given below class “ClsWithEvents” is a event source class , which has a event “EventAddString()”.Now the listener’s who are interested in receiving this event’s they can subscribe to this event.In class “FrmWithEvents” you can see the handles clause which is associated with the “mobjClsWithEvents” objects.

```
Public Class ClsWithEvents
    Event EventAddString(ByVal Value As String)
    Public Sub AddString()
        RaiseEvent EventAddString(“String added by Event”)
    End Sub
End Class
```

```
Public Class FrmWithEvents
    Inherits System.Windows.Forms.Form
    Private WithEvents mobjClsWithEvents As New ClsWithEvents()
    Private Sub FrmWithEvents_Load(ByVal sender As System.Object,
ByVal e As System.EventArgs) Handles MyBase.Load

    End Sub

    Private Sub mobjClsWithEvents_EventAddString(ByVal Value As
String) Handles mobjClsWithEvents.EventAddString
        LstData.Items.Add(Value)
    End Sub

    Private Sub CmdRunEvents_Click(ByVal sender As System.Object,
ByVal e As System.EventArgs) Handles CmdRunEvents.Click
        mobjClsWithEvents.AddString()
    End Sub
End Class
```

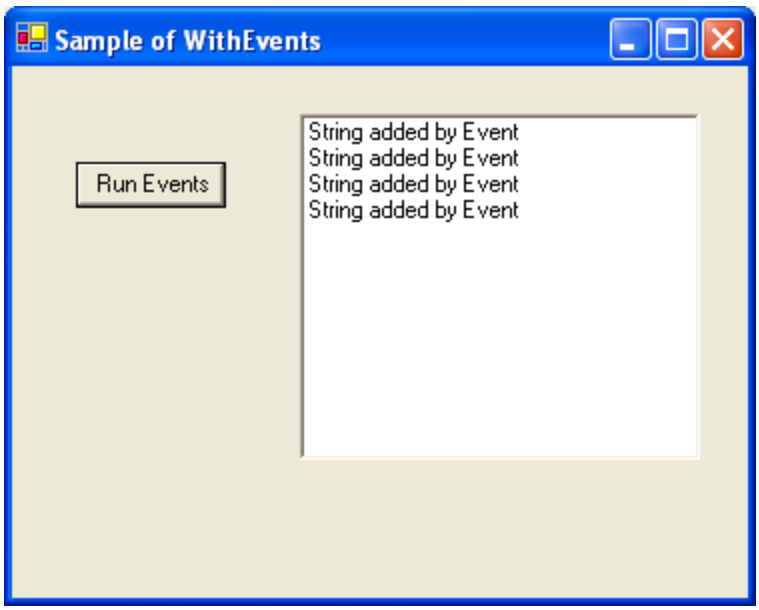


Figure :- 6.5 Events in action

(I) Do events have return type ?

No events do not have return type.

(A) Can event's have access modifiers ?

Event's are always public as they are meant to serve every one registering to it.But you can access modifiers in events.You can have events with protected keyword which will be accessible only to inherited classes.You can have private events only for object in that class.

(A) Can we have shared events ?

Yes you can have shared event's note only shared methods can raise shared events.

(I) What is shadowing ?

When two elements in a program have same name , one of them can hide and shadow the other one.So in such cases the element which shadowed the main element is referenced.

Below is a sample code , there are two classes "ClsParent" and "ClsShadowedParent".In "ClsParent" there is a variable "x" which is a integer."ClsShadowedParent" overrides "ClsParent" and shadows the "x" variable to a string.

> *Note:- In Sample CD "WindowsShadowing" is folder which has the sample code.If you run the program you can have two output's one which shows a integer and other which shows a string.*

```
Public Class ClsParent
    Public x As Integer
End Class


Public Class ClsShadowedParent
    Inherits ClsParent
    Public Shadows x As String
End Class
```

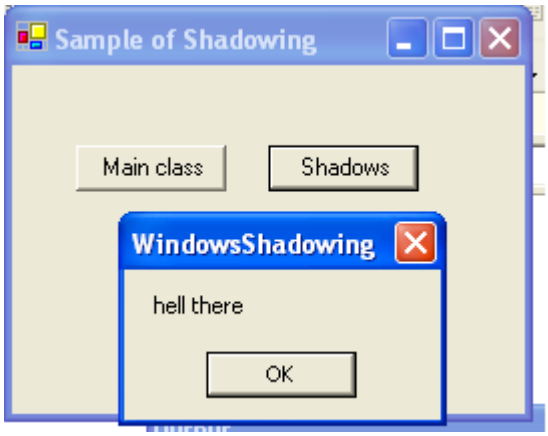


Figure :- 6.6 Shadowing in Action

(A) What's difference between Shadowing and Overriding ?

Following are the differences between shadowing and overriding :-

- √ Overriding redefines only the implementation while shadowing redefines the whole element.
- √ In overriding derived classes can refer the parent class element by using "ME" keyword , but in shadowing you can access it by "MYBASE".

(I) What's difference between delegate and events?

- √ Actually events use delegates in bottom. But they add an extra layer on the delegates, thus forming the publisher and subscriber model.
- √ As delegates are function to pointers they can move across any clients. So any of the clients can add or remove events , which can be pretty confusing. But events give the extra protection by adding the layer and making it a publisher and subscriber model.

Just imagine one of your clients doing this

```
c.XyzCallback = null
```

This will reset all your delegates to nothing and you have to keep figuring where the error is.

(B) If we inherit a class do the private variables also get inherited ?

Yes the variables are inherited but can not be accessed directly by the class interface.

(B) What are different accessibility levels defined in .NET ?

Following are the five levels of access modifiers :-

- √ Private : Only members of class have access.
- √ Protected :-All members in current class and in derived classes can access the variables.
- √ Friend (internal in C#) :- Only members in current project have access to the elements.
- √ Protected friend (protected internal in C#) :- All members in current project and all members in derived class can access the variables.
- √ Public :- All members have access in all classes and projects.

(I) Can you prevent a class from overriding ?

If you define a class as “Sealed” in C# and “NotInheritable” in VB.NET you can inherit the class any further.

(I) What’s the use of “MustInherit” keyword in VB.NET ?

If you want to create a abstract class in VB.NET it’s done by using “MustInherit” keyword.This acts only as base type and can not be inherited any further.You can not create a object of a class which is marked as “MustInherit”.

(I) Why can not you specify accessibility modifier in Interface ?

All elements in Interface should be public.So by default all interface elements are public by default.

(A) What are similarities between Class and structure ?

Following are the similarities between classes and structures :-

- √ Both can have constructors, methods, properties, fields, constants, enumerations, events, and event handlers.
- √ Structures and classes can implement interface.
- √ Both of them can have constructors without parameter and with parameter.
- √ Both can have delegates and events.

(A) What's the difference between Class and structure's ?

Following are the key differences between them :-

- √ Structure are value types and classes are reference types.So structures use stack and classes use heap.
- √ Structures members can not be declared as protected , but class members can be.You can not do inheritance in structures.
- √ Structures do not require constructors while classes require.
- √ Objects created from classes are terminated using Garbage collector.Structures are not destroyed using GC.

(B) What does virtual keyword mean ?

That method and property can be overridden.

(B) What are shared (VB.NET)/Static(C#) variables?

Static/Shared classes are used when a class provides functionality which is not specific to any instance.In short if you want a object to be shared between multiple instances you will use a static/Shared class.

Following are features of Static/Shared classes :-

- √ They can not be instantiated.By default a object is created on the first method call to that object.
- √ Static/Shared classes can not be inherited.
- √ Static/Shared classes can have only static members.
- √ Static/Shared classes can have only static constructor.

Note :- In CD there is a folder "WindowsShared" which has a sample code for shared variables.Below is a snippet.It has a "AddCount" function which increments a static "intCount" variable.In form there are two buttons which creates a new object and displays the count of the static variable.Even though the object is created and destroyed , the variable values does not change.It retains its old value.

```
Public Class ClsShared
    Shared intCount As Integer
    Public Function AddCount() As Integer
        intCount = intCount + 1
        Return intCount
    End Function
End Class

Public Class FrmSharedClasses
    Inherits System.Windows.Forms.Form
Private Sub CmdInstance1_Click(ByVal sender As System.Object, ByVal
e As System.EventArgs) Handles CmdInstance1.Click
        Dim pobjClsShared As New ClsShared()
        MessageBox.Show("The count at this moment is" &
      pobjClsShared.AddCount.ToString())
    End Sub

Private Sub CmdInstance2_Click(ByVal sender As System.Object, ByVal
e As System.EventArgs) Handles CmdInstance2.Click
        Dim pobjClsShared As New ClsShared()
        MessageBox.Show("The count at this moment is" &
pobjClsShared.AddCount.ToString())
```

```
    End Sub
End Class
```

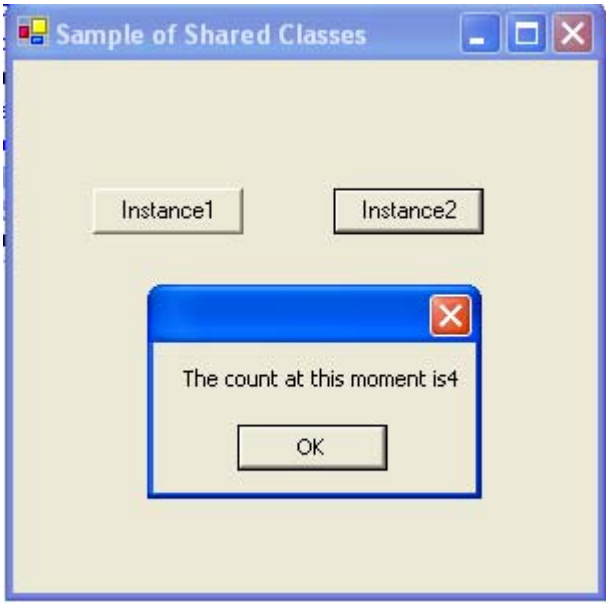


Figure :- 6.7 Shared/Static In Action

(B) What is Dispose method in .NET ?

.NET provides “Finalize” method in which we can clean up our resources.But relying on this is not always good so the best is to implement “Idisposable” interface and implement the “Dispose” method where you can put your clean up routines.

(B) Whats the use of “OverRides” and “Overridable” keywords ?

Overridable is used in parent class to indicate that a method can be overridden.Overrides is used in the child class to indicate that you are overriding a method

(A) Where are all .NET Collection classes located ?

System.Collection namespace has all the collection classes available in .NET.

(A) What is ArrayList ?

Array whose size can increase and decrease dynamically.Arraylist can hold item of different types.As Arraylist can increase and decrease size dynamically you do not have to use the REDIM keyword.You can access any item in array using the INDEX value of the array position.

(A) What's a HashTable ?

Twist :- What's difference between HashTable and ArrayList ?

You can access array using INDEX value of array , but how many times you know the real value of index.Hashtable provides way of accessing the index using a user identified KEY value , thus removing the INDEX problem.

(A) What are queues and stacks ?

Queue is for first-in, first-out (FIFO) structures. Stack is for last-in, first-out (LIFO) structures.

(B) What is ENUM ?

It's used to define constants.

(A) What is nested Classes ?

Nested classes are classes with in classes.In sample below "ClsNested" class has a "ChildNested" class nested inside it.

```
Public Class ClsNested
    Public Class ChildNested
        Public Sub ShowMessage()
            MessageBox.Show("Hi this is nested class")
        End Sub
    End Class
End Class
```

This is the way we can instantiate the nested class and make the method call.

```
Dim pobjChildNested As New ClsNested.ChildNested()
pobjChildNested.ShowMessage()
```

Note:-In CD the above sample is provided in "WindowsNestedClasses".

(B)What's Operator Overloading in .NET?

It provides a way to define and use operators such as +, -, and / for user-defined classes or structs. It allows us to define/redefine the way operators work with our classes and structs. This allows programmers to make their custom types look and feel like simple types such as int and string.

VB.NET till now does not support operator overloading. Operator overloading is done by using the "Operator" keyword.

Note:- Operator overloading is supported in VB.NET 2005

(I) In below sample code if we create a object of class2 which constructor will fire first ?

```
Public Class Class1
    Sub New()
    End Sub
End Class
Public Class class2
    Inherits Class1
    Sub New()
    End Sub
End Class
```

* I leave this to the readers.....

(B)What's the significance of Finalize method in .NET?

.NET Garbage collector does almost all clean up activity for your objects. But unmanaged resources (ex: - Windows API created objects, File, Database connection objects, COM objects etc) is outside the scope of .NET framework we have to explicitly clean our resources. For these types of objects .NET framework provides Object.Finalize method

which can be overridden and clean up code for unmanaged resources can be put in this section.

(A)Why is it preferred to not use finalize for clean up?

Problem with finalize is that garbage collection has to make two rounds in order to remove objects which have finalize methods.

Below figure will make things clear regarding the two rounds of garbage collection rounds performed for the objects having finalized methods.

In this scenario there are three objects Object1, Object2 and Object3. Object2 has the finalize method overridden and remaining objects do not have the finalize method overridden.

Now when garbage collector runs for the first time it searches for objects whose memory has to freed. He sees three objects but only cleans the memory for Object1 and Object3. Object2 it pushes to the finalization queue.

Now garbage collector runs for the second time. He see's there are no objects to be freed and then checks for the finalization queue and at this moment it clears object2 from the memory.

So if you notice that object2 was freed from memory in the second round and not first. That's why the best practice is not to write clean up Non.NET resources in Finalize method rather use the DISPOSE.

** Where you a part of some unsuccessful projects , then why was the project unsucessful ?*

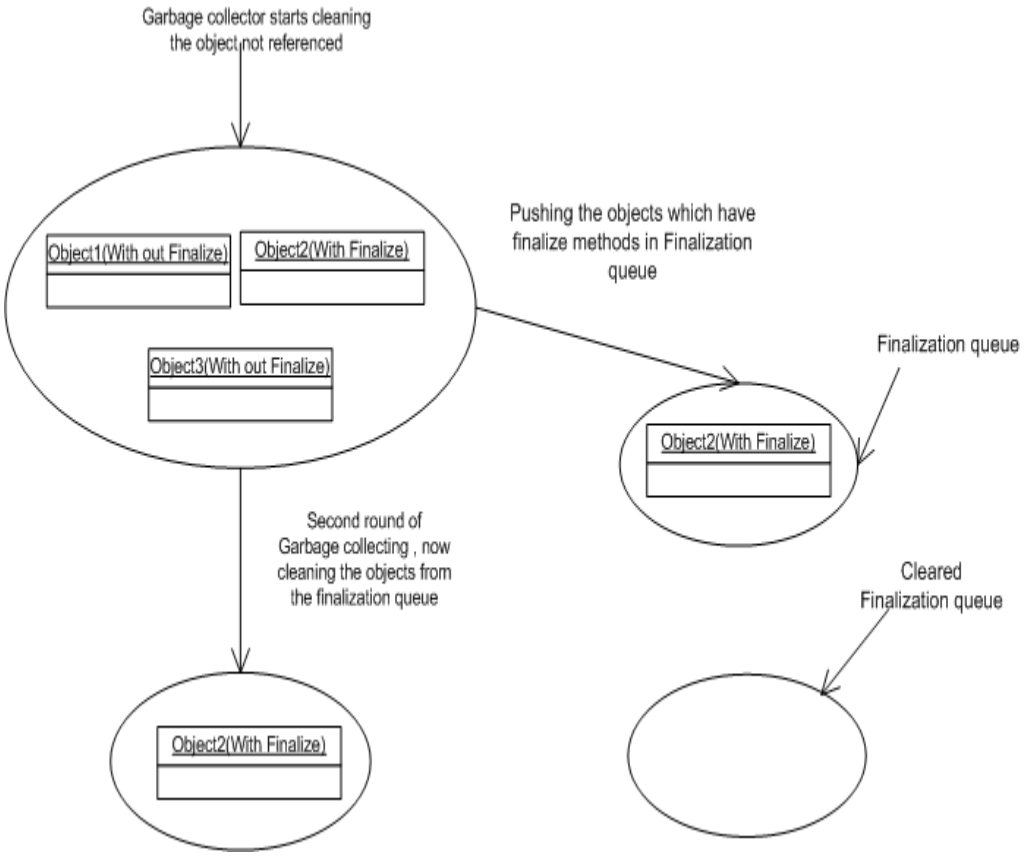


Figure :- 6.8 Garbage collection in actions

(I)How can we suppress a finalize method?

GC.SuppressFinalize ()

(B)What's the use of DISPOSE method?

Dispose method belongs to IDisposable interface. We had seen in the previous section how bad it can be to override the finalize method for writing the cleaning of unmanaged resources. So if any object wants to release its unmanaged code best is to implement

IDisposable and override the Dispose method of IDisposable interface. Now once your class has exposed the Dispose method it's the responsibility of the client to call the Dispose method to do the cleanup.

(A)How do I force the Dispose method to be called automatically, as clients can forget to call Dispose method?

Note :- I admire this question.

Call the Dispose method in Finalize method and in Dispose method suppress the finalize method using GC.SuppressFinalize. Below is the sample code of the pattern. This is the best way we do clean our unallocated resources and yes not to forget we do not get the hit of running the Garbage collector twice.

Note:- It will suppress the finalize method thus avoiding the two trip.

```
Public Class ClsTesting
    Implements IDisposable
    Public Overloads Sub Dispose()Implements IDisposable.Dispose
        ' write ytour clean up code here
        GC.SuppressFinalize(Me)
    End Sub
Protected Overrides Sub Finalize()
        Dispose()
End Sub
End Class
```

(I)In what instances you will declare a constructor to be private?

When we create a private constructor, we can not create object of the class directly from a client. So you will use private constructors when you do not want instances of the class to be created by any external client. Example UTILITY functions in project will have no

instance and be used with out creating instance, as creating instances of the class would be waste of memory.

(I)Can we have different access modifiers on get/set methods of a property ?

No we can not have different modifiers same property. The access modifier on a property applies to both its get and set accessors.

(I)If we write a goto or a return statement in try and catch block will the finally block execute ?

The code in the finally always runs even if there are statements like goto or a return statements.

(A)What is Indexer ?

An indexer is a member that enables an object to be indexed in the same way as an array.

(A)Can we have static indexer in C# ?

No.

(A)In a program there are multiple catch blocks so can it happen that two catch blocks are executed ?

No once the proper catch section is executed the control goes to finally block.So there will not be any scenarios in which multiple catch blocks will be executed.

(A) What is the difference between System.String and System.StringBuilder classes?

System.String is immutable; System.StringBuilder can have mutable string where a variety of operations can be performed.

(B) What's the sequence in which ASP.NET events are processed ?

Following are the sequence in which the events occur :-

- √ Page_Init.
- √ Page_Load.
- √ Control events
- √ Page_Unload event.

Page_init event only occurs when first time the page is started , but Page_Load occurs in subsequent request of the page.

(B) In which event are the controls fully loaded ?

Page_load event guarantees that all controls are fully loaded.Controls are also accessed in Page_Init events but you will see that viewstate is not fully loaded during this event.

(B) How can we identify that the Page is PostBack ?

Page object has a "IsPostBack" property which can be checked to know that is the page posted back.

(B) How does ASP.NET maintain state in between subsequent request ?

Refer caching chapter.

(A) What is event bubbling ?

Server controls like Datagrid , DataList , Repeater can have other child controls inside them.Example DataGrid can have combo box inside datagrid.These child control do not raise there events by themselves , rather they pass the event to the container parent (which can be a datagrid , datalist , repeater) , which passed to the page as "ItemCommand" event.

(B) How do we assign page specific attributes ?

Page attributes are specified using the @Page directive.

(A) Administrator wants to make a security check that no one has tampered with ViewState , how can we ensure this ?

Using the @Page directive EnableViewStateMac to True.

(B) What's the use of @ Register directives ?

@Register directive informs the compiler of any custom server control added to the page.

(B) What's the use of SmartNavigation property ?

It's a feature provided by ASP.NET to prevent flickering and redrawing when the page is posted back.

> *Note:- This is only supported for IE browser.Project's who have browser compatibility as requirement have to think some other ways of avoiding flickering.*

(B) What is AppSetting Section in "Web.Config" file ?

Web.config file defines configuration for a webproject.Using "AppSetting" section we can define user defined values.Example below defined is "ConnectionString" section which will be used through out the project for database connection.

```
<configuration>
<appSettings>
<add key="ConnectionString" value="server=xyz;pwd=www;database=testing" />
</appSettings>
```

(B) Where is ViewState information stored ?

In HTML Hidden Fields.

(I) What's the use of @ OutputCache directive in ASP.NET?

It's basically used for caching.See more for Caching chapter.

(B) How can we create custom controls in ASP.NET ?

User controls are created using .ASCX in ASP.NET.After .ASCX file is created you need to two things in order that the ASCX can be used in project:.

√ Register the ASCX control in page using the <%@ Register directive.Example

```
<%@ Register tagprefix="Accounting" Tagname="footer" Src="Footer.ascx" %>
```

√ Now to use the above accounting footer in page you can use the below directive.

```
<Accounting:footer runat="server" />
```

(B) How many types of validation controls are provided by ASP.NET ?

There are main six types of validation controls :-

RequiredFieldValidator

It checks does the control have any value.It's used when you want the control should not be empty.

RangeValidator

Checks if the value in validated control is in that specific range.Example TxtCustomerCode should not be more than eight length.

CompareValidator

Checks that the value in controls should match the value in other control.Example Textbox TxtPie should be equal to 3.14.

RegularExpressionValidator

When we want the control value should match with a specific regular expression.

CustomValidator

Used to define UserDefined validation.

ValidationSummary

Displays summary of all current validation errors.

> *Note:- It's rare that some one will ask step by step all the validation controls.Example in one of the interviews i was asked how do you display summary of all errors in the validation control...So there goes the last one.*

(B) Can you explain what is "AutoPostBack" feature in ASP.NET ?

If we want the control to automatically postback in case of any event , we will need to check this attribute as true.Example on a ComboBox change we need to send the event immediately to the server side then set the "AutoPostBack" attribute to true.

(B) How can you enable automatic paging in DataGrid ?

Following are the points to be done in order to enable paging in Datagrid :-

- √ Set the "AllowPaging" to true.
- √ In PageIndexChanged event set the current pageindex clicked.

> *Note:- The answers are very short , if you have implemented practically its just a revision.If you are fresher just make sample code using Datagrid and try to implement this functionality.*

(B) What's the use of "GLOBAL.ASAX" file ?

It allows to execute ASP.NET application level events and set application-level variables.

(B) What's the difference between "Web.config" and "Machine.Config" ?

"Web.config" files apply settings to each web application , while "Machine.config" file apply settings to all ASP.NET applications.

(B) What's a SESSION and APPLICATION object ?

(A) What's difference between Server.Transfer and response.Redirect ?

Following are the major differences between them:-

- √ Response.Redirect sends message to the browser saying it to move to some different page.While server.transfer does not send any message to the browser but rather redirects the user directly from the server itself. So in server.transfer there is no round trip while response.redirect has a round trip and hence puts a load on server.
- √ Using Server.Transfer you can not redirect to a different from the server itself. Example If your server is www.yahoo.com you can use server.transfer to move to www.microsoft.com but yes you can move to www.yahoo.com/travels , i.e. within websites. This cross server redirect is possible only using Response.redirect.
- √ With server.transfer you can preserve your information. It has a parameter called as "preserveForm". So the existing query string etc. will be able in the calling page. In response.redirect you can maintain the state. You can but has lot of drawbacks.

If you are navigating with in the same website use "Server.transfer" or else go for "response.redirect()"

(A)What's difference between Authentication and authorization?

This can be a tricky question. These two concepts seem altogether similar but there is wide range of difference. Authentication is verifying the identity of a user and authorization is process where we check does this identity have access rights to the system. In short we can say the following authentication is the process of obtaining some sort of credentials from the users and using those credentials to verify the user's identity. Authorization is the process of allowing an authenticated user access to resources. Authentication is always precedes to Authorization; even if your application lets anonymous users connect and use the application, it still authenticates them as being anonymous.

(I) What is impersonation in ASP.NET ?

By default, ASP.NET executes in the security context of a restricted user account on the local machine. Sometimes you need to access network resources such as a file on a shared drive, which requires additional permissions. One way to overcome this restriction is to use impersonation. With impersonation, ASP.NET can execute the request using the identity of the client who is making the request, or ASP.NET can impersonate a specific account you specify in web.config.

(B) Can you explain in brief how the ASP.NET authentication process works?

ASP.NET does not run by itself it run inside the process of IIS. So there are two authentication layers which exist in ASP.NET system. First authentication happens at the IIS level and then at the ASP.NET level depending on the WEB.CONFIG file.

Below is how the whole process works:-

- √ IIS first checks to make sure the incoming request comes from an IP address that is allowed access to the domain. If not it denies the request.
- √ Next IIS performs its own user authentication if it configured to do so. By default IIS allows anonymous access, so requests are automatically authenticated, but you can change this default on a per – application basis with in IIS.
- √ If the request is passed to ASP.net with an authenticated user, ASP.net checks to see whether impersonation is enabled. If impersonation is enabled, ASP.net acts as though it were the authenticated user. If not ASP.net acts with its own configured account.
- √ Finally the identity from step 3 is used to request resources from the operating system. If ASP.net authentication can obtain all the necessary resources it grants the users request otherwise it is denied. Resources can include much more than just the ASP.net page itself you can also use .Net's code access security features to extend this authorization step to disk files, Registry keys and other resources.

(A) What are the various ways of authentication techniques in ASP.NET?

Selecting an authentication provider is as simple as making an entry in the web.config file for the application. You can use one of these entries to select the corresponding built in authentication provider:

- √ <authentication mode="windows">
- √ <authentication mode="passport">
- √ <authentication mode="forms">
- √ Custom authentication where you might install an ISAPI filter in IIS that compares incoming requests to list of source IP addresses, and considers requests to be authenticated if they come from an acceptable address. In that case, you would set the authentication mode to none to prevent any of the .net authentication providers from being triggered.

Windows authentication and IIS

If you select windows authentication for your ASP.NET application, you also have to configure authentication within IIS. This is because IIS provides Windows authentication. IIS gives you a choice for four different authentication methods:

Anonymous, basic digest and windows integrated

If you select anonymous authentication, IIS doesn't perform any authentication, Any one is allowed to access the ASP.NET application.

If you select basic authentication, users must provide a windows username and password to connect. How ever this information is sent over the network in clear text, which makes basic authentication very much insecure over the internet.

If you select digest authentication, users must still provide a windows user name and password to connect. However the password is hashed before it is sent across the network. Digest authentication requires that all users be running Internet Explorer 5 or later and that windows accounts to stored in active directory.

If you select windows integrated authentication, passwords never cross the network. Users must still have a username and password, but the application uses either the Kerberos

or challenge/response protocols authenticate the user. Windows-integrated authentication requires that all users be running internet explorer 3.01 or later Kerberos is a network authentication protocol. It is designed to provide strong authentication for client/server applications by using secret-key cryptography. Kerberos is a solution to network security problems. It provides the tools of authentication and strong cryptography over the network to help to secure information in systems across entire enterprise

Passport authentication

Passport authentication lets you to use Microsoft's passport service to authenticate users of your application. If your users have signed up with passport, and you configure the authentication mode of the application to the passport authentication, all authentication duties are off-loaded to the passport servers.

Passport uses an encrypted cookie mechanism to indicate authenticated users. If users have already signed into passport when they visit your site, they'll be considered authenticated by ASP.NET. Otherwise they'll be redirected to the passport servers to log in. When they are successfully log in, they'll be redirected back to your site

To use passport authentication you have to download the Passport Software Development Kit (SDK) and install it on your server. The SDK can be found at http://msdn.microsoft.com/library/default.asp?url=/downloads/list/websrvpass.aps.It includes full details of implementing passport authentication in your own applications.

Forms authentication

Forms authentication provides you with a way to handle authentication using your own custom logic with in an ASP.NET application. The following applies if you choose forms authentication.

- √ When a user requests a page for the application, ASP.NET checks for the presence of a special session cookie. If the cookie is present, ASP.NET assumes the user is authenticated and processes the request.
- √ If the cookie isn't present, ASP.NET redirects the user to a web form you provide

You can carry out whatever authentication, checks you like in your form. When the user is authenticated, you indicate this to ASP.NET by setting a property, which creates the special cookie to handle subsequent requests.

(A)How does authorization work in ASP.NET?

ASP.NET impersonation is controlled by entries in the applications web.config file. The default setting is "no impersonation". You can explicitly specify that ASP.NET shouldn't use impersonation by including the following code in the file

<identity impersonate="false" />

It means that ASP.NET will not perform any authentication and runs with its own privileges. By default ASP.NET runs as an unprivileged account named ASPNET. You can change this by making a setting in the processModel section of the machine.config file. When you make this setting, it automatically applies to every site on the server. To user a high-privileged system account instead of a low-privileged, set the userName attribute of the processModel element to SYSTEM. Using this setting is a definite security risk, as it elevates the privileges of the ASP.NET process to a point where it can do bad things to the operating system.

When you disable impersonation, all the request will run in the context of the account running ASP.NET: either the ASPNET account or the system account. This is true when you are using anonymous access or authenticating users in some fashion. After the user has been authenticated, ASP.NET uses it own identity to request access to resources.

The second possible setting is to turn on impersonation.

<identity impersonate ="true" />

In this case, ASP.NET takes on the identity IIS passes to it. If you are allowing anonymous access in IIS, this means ASP.NET will impersonate the IUSR_ComputerName account that IIS itself uses. If you aren't allowing anonymous access,ASP.NET will take on the credentials of the authenticated user and make requests for resources as if it were that user. Thus by turning impersonation on and using a non-anonymous method of authentication in IIS, you can let users log on and use their identities within your ASP.NET application.

Finally, you can specify a particular identity to use for all authenticated requests

<identity impersonate="true" username="DOMAIN\username" password="password" />

With this setting, all the requests are made as the specified user (Assuming the password it correct in the configuration file). So, for example you could designate a user for a single application, and use that user's identity every time someone authenticates to the application. The drawback to this technique is that you must embed the user's password in the web.config file in plain text. Although ASP.NET won't allow anyone to download this file, this is still a security risk if anyone can get the file by other means.

(B)What's difference between Datagrid , Datalist and repeater ?

A Datagrid, Datalist and Repeater are all ASP.NET data Web controls.

They have many things in common like DataSource Property , DataBind Method ItemDataBound and ItemCreated.

When you assign the DataSource Property of a Datagrid to a DataSet then each DataRow present in the DataRow Collection of DataTable is assigned to a corresponding DataGridItem and this is same for the rest of the two controls also.But The HTML code generated for a Datagrid has an HTML TABLE <ROW> element created for the particular DataRow and its a Table form representation with Columns and Rows.

For a Datalist its an Array of Rows and based on the Template Selected and the RepeatColumn Property value We can specify how many DataSource records should appear per HTML <table> row. In short in datagrid we have one record per row, but in datalist we can have five or six rows per row.

For a Repeater Control,The Datarecords to be displayed depends upon the Templates specified and the only HTML generated is the due to the Templates.

In addition to these , Datagrid has a in-built support for Sort,Filter and paging the Data ,which is not possible when using a DataList and for a Repeater Control we would require to write an explicit code to do paging.

(A)From performance point of view how do they rate ?

Repeater is fastest followed by Datalist and finally datagrid.

(B)What's the method to customize columns in DataGrid?

Use the template column.

(B)How can we format data inside DataGrid?

Use the DataFormatString property.

(A) How will decide the design consideration to take a Datagrid , datalist or repeater ?

Many make a blind choice of choosing datagrid directly , but that's not the right way.

Datagrid provides ability to allow the end-user to sort, page, and edit its data.But it comes at a cost of speed.Second the display format is simple that is in row and columns. Real life scenarios can be more demanding that

With its templates, the DataList provides more control over the look and feel of the displayed data than the DataGrid.It offers better performance than datagrid

Repeater control allows for complete and total control. With the Repeater, the only HTML emitted are the values of the databinding statements in the templates along with the HTML markup specified in the templates—no "extra" HTML is emitted, as with the DataGrid and DataList. By requiring the developer to specify the complete generated HTML markup, the Repeater often requires the longest development time.But repeater does not provide editing features like datagrid so everything has to be coded by programmer . However, the Repeater does boast the best performance of the three data Web controls. Repeater is fastest followed by Datalist and finally datagrid.

(B) Difference between ASP and ASP.NET?

ASP.NET new feature supports are as follows :-

Better Language Support

- √ New ADO.NET Concepts have been implemented.
- √ ASP.NET supports full language (C# , VB.NET,C++) and not simple scripting like VBSCRIPT..

Better controls than ASP

- √ ASP.NET covers large set's of HTML controls..
- √ Better Display grid like Datagrid , Repeater and datalist.Many of the display grid have paging support.

Controls have event supports

- √ All ASP.NET controls support events.
- √ Load, Click and Change events handled by code makes coding much simpler and much better organized.

Compiled Code

The first request for an ASP.NET page on the server will compile the ASP.NET code and keep a cached copy in memory. The result of this is greatly increased performance.

Better Authentication Support

ASP.NET supports forms-based user authentication, including cookie management and automatic redirecting of unauthorized logins. (You can still do your custom login page and custom user checking).

User Accounts and Roles

ASP.NET allows for user accounts and roles, to give each user (with a given role) access to different server code and executables.

High Scalability

- √ Much has been done with ASP.NET to provide greater scalability.
- √ Server to server communication has been greatly enhanced, making it possible to scale an application over several servers. One example of this is the ability to run XML parsers, XSL transformations and even resource hungry session objects on other servers.

Easy Configuration

- √ Configuration of ASP.NET is done with plain text files.
- √ Configuration files can be uploaded or changed while the application is running. No need to restart the server. No more metabase or registry puzzle.

Easy Deployment

No more server restart to deploy or replace compiled code. ASP.NET simply redirects all new requests to the new code.

(A) What are major events in GLOBAL.ASAX file ?

The Global.asax file, which is derived from the HttpApplication class, maintains a pool of HttpApplication objects, and assigns them to applications as needed. The Global.asax file contains the following events:

Application_Init: Fired when an application initializes or is first called. It's invoked for all HttpApplication object instances.

Application_Disposed: Fired just before an application is destroyed. This is the ideal location for cleaning up previously used resources.

Application_Error: Fired when an unhandled exception is encountered within the application.

Application_Start: Fired when the first instance of the HttpApplication class is created. It allows you to create objects that are accessible by all HttpApplication instances.

Application_End: Fired when the last instance of an HttpApplication class is destroyed. It's fired only once during an application's lifetime.

Application_BeginRequest: Fired when an application request is received. It's the first event fired for a request, which is often a page request (URL) that a user enters.

Application_EndRequest: The last event fired for an application request.

Application_PreRequestHandlerExecute: Fired before the ASP.NET page framework begins executing an event handler like a page or Web service.

Application_PostRequestHandlerExecute: Fired when the ASP.NET page framework is finished executing an event handler.

Applcation_PreSendRequestHeaders: Fired before the ASP.NET page framework sends HTTP headers to a requesting client (browser).

Application_PreSendContent: Fired before the ASP.NET page framework sends content to a requesting client (browser).

Application_AcquireRequestState: Fired when the ASP.NET page framework gets the current state (Session state) related to the current request.

Application_ReleaseRequestState: Fired when the ASP.NET page framework completes execution of all event handlers. This results in all state modules to save their current state data.

Application_ResolveRequestCache: Fired when the ASP.NET page framework completes an authorization request. It allows caching modules to serve the request from the cache, thus bypassing handler execution.

Application_UpdateRequestCache: Fired when the ASP.NET page framework completes handler execution to allow caching modules to store responses to be used to handle subsequent requests.

Application_AuthenticateRequest: Fired when the security module has established the current user's identity as valid. At this point, the user's credentials have been validated.

Application_AuthorizeRequest: Fired when the security module has verified that a user can access resources.

Session_Start: Fired when a new user visits the application Web site.

Session_End: Fired when a user's session times out, ends, or they leave the application Web site.

> *Note :- During interview you do not have to really cram all these events.But just keep the basic events in mind*

(A) What order they are triggered ?

They're triggered in the following order:

Application_BeginRequest

Application_AuthenticateRequest

Application_AuthorizeRequest

Application_ResolveRequestCache

Application_AcquireRequestState

Application_PreRequestHandlerExecute

Application_PreSendRequestHeaders

Application_PreSendRequestContent

<<code is executed>>

Application_PostRequestHandlerExecute

Application_ReleaseRequestState

Application_UpdateRequestCache

Application_EndRequest.

(I) Do session use cookies ?

Twist:- How can we make session to not to use cookies ?

Left to the user , you will enjoy to find this answer.

(I)How can we force all the validation control to run ?

Page.Validate

(B)How can we check if all the validation control are valid and proper ?

Using the Page.IsValid() property you can check whether all the validation are done.

(A)If you have client side validation is enabled in your Web page , Does that mean server side code is not run?

When client side validation is enabled server emit's JavaScript code for the custom validators. But note that does not mean that server side checks on custom validators do not execute. It does this two time redundant check. As some of the validators do not support client side scripting.

(A)Which JavaScript file is referenced for validating the validators at the client side ?

WebUIValidation.js javascript file installed at “aspnet_client” root IIS directory is used to validate the validation controls at the client side

(B)How to disable client side script in validators?

Set EnableClientScript to false.

(A)I want to show the entire validation error message in a message box on the client side?

In validation summary set “ShowMessageBox” to true.

(B)You find that one of your validation is very complicated and does not fit in any of the validators , so what will you do ?

Best is to go for CustomValidators..Below is a sample code for a custom validator which checks that a textbox should not have zero value

```
<asp:CustomValidator id="CustomValidator1" runat="server"
    ErrorMessage="Number not divisible by Zero"
    ControlToValidate="txtNumber"
    OnServerValidate="ServerValidate"
    ClientValidationFunction="CheckZero" /><br>
Input:
<asp:TextBox id="txtNumber" runat="server" />
<script language="javascript">
<!--
function CheckZero(source, args) {
    int val = parseInt(args.Value, 10);
    if (value==0) {
        args.IsValid = false;
```

```
    }
    else {
        args.IsValid = true;
    }
}
// -->
</script>
```

(A)What is Tracing in ASP.NET ?

Tracing allows us to view in detail how the code was executed.

(A) How do we enable tracing ?

```
<%@ Page Trace="true" %>
```

(I)What exactly happens when ASPX page is requested from Browser?

Note: - Here the interviewer is expecting complete flow of how an ASPX page is processed with respect to IIS and ASP.NET engine.

Following are the steps which occur when we request a ASPX page :-

- √ The browser sends the request to the webserver.let's assume that the webserver at the other end is IIS.
- √ Once IIS receives the request he looks on which engine can serve this request. When I mean engine means the DLL who can parse this page or compile and send a response back to browser. Which request to map to is decided by file extension of the page requested.

Depending on file extension following are some mapping

- √ .aspx, for ASP.NET Web pages,
- √ .asmx, for ASP.NET Web services,
- √ .config, for ASP.NET configuration files,

- √ .ashx, for custom ASP.NET HTTP handlers,
- √ .rem, for remoting resources
- √ Etc

You can also configure the extension mapping to which engine it can route by using the IIS engine.

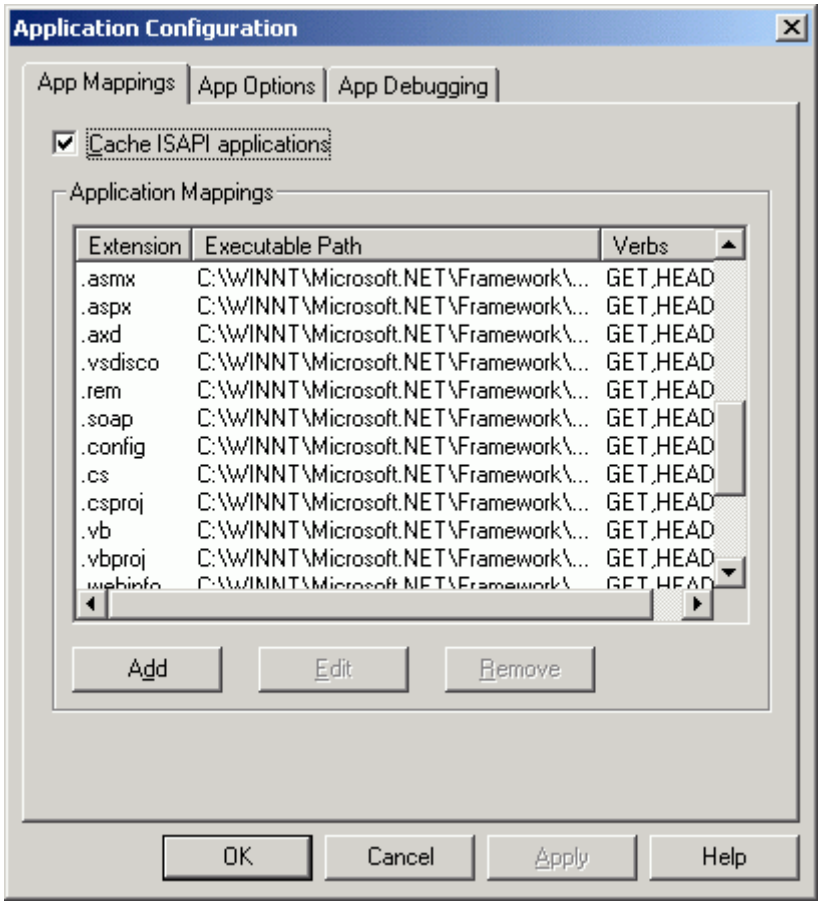


Figure: - 7.1 Following screen shows some IIS mappings

Example a ASP page will be sent to old classic ASP.DLL to compile. While .ASPX pages will be routed to ASP.NET engine for compilation.

√ As this book mainly will target ASP.NET we will look in to how ASP.NET pages that is ASPX pages generation sequence occurs. Once IIS passes the request to ASP.NET engine page has to go through two section HTTP module section and HTTP handler section. Both these section have there own work to be done in order that the page is properly compiled and sent to the IIS. HTTP modules inspect the incoming request and depending on that they can change the internal workflow of the request. HTTP handler actually compiles the page and generates output. If you see your machine.config file you will see following section of HTTP modules

```
<httpModules>
  <add name="OutputCache" type="System.Web.Caching.OutputCacheModule" />
  <add name="Session" type="System.Web.SessionState.SessionStateModule" />
  <add name="WindowsAuthentication"
type="System.Web.Security.WindowsAuthenticationModule" />
  <add name="FormsAuthentication"
type="System.Web.Security.FormsAuthenticationModule" />
  <add name="PassportAuthentication"
type="System.Web.Security.PassportAuthenticationModule" />
  <add name="UrlAuthorization"
type="System.Web.Security.UrlAuthorizationModule" />
  <add name="FileAuthorization"
type="System.Web.Security.FileAuthorizationModule" />
  <add name="ErrorHandlerModule" type="System.Web.Mobile.ErrorHandlerModule,
                                System.Web.Mobile, Version=1.0.5000.0,
                                Culture=neutral, PublicKeyToken=b03f5f7f11d50a3a" /
>
</httpModules>
```

The above mapping shows which functionality is handled by which Namespace. Example FormsAthuentication is handled by “System.Web.Security.FormsAuthenticationModule”. If you look at the web.config section HTTP module is where authentication and authorization happens.

Ok now the HTTP handler is where the actual compilation takes place and the output is generated.Following is a paste from HTTP handler section of WEB.CONFIG file.

```
<httpHandlers>
  <add verb="*" path="*.vjsproj" type="System.Web.HttpForbiddenHandler" />
  <add verb="*" path="*.java" type="System.Web.HttpForbiddenHandler" />
  <add verb="*" path="*.jsl" type="System.Web.HttpForbiddenHandler" />
  <add verb="*" path="trace.axd" type="System.Web.Handlers.TraceHandler" />
  <add verb="*" path="*.aspx" type="System.Web.UI.PageHandlerFactory" />
  <add verb="*" path="*.ashx" type="System.Web.UI.SimpleHandlerFactory" />
 ...
</httpHandlers>
```

√ Depending on the File extension handler decides which Namespace will generate the output. Example all .ASPX extension files will be compiled by System.Web.UI.PageHandlerFactory

√ Once the file is compiled it send back again to the HTTP modules and from there to IIS and then to the browser.

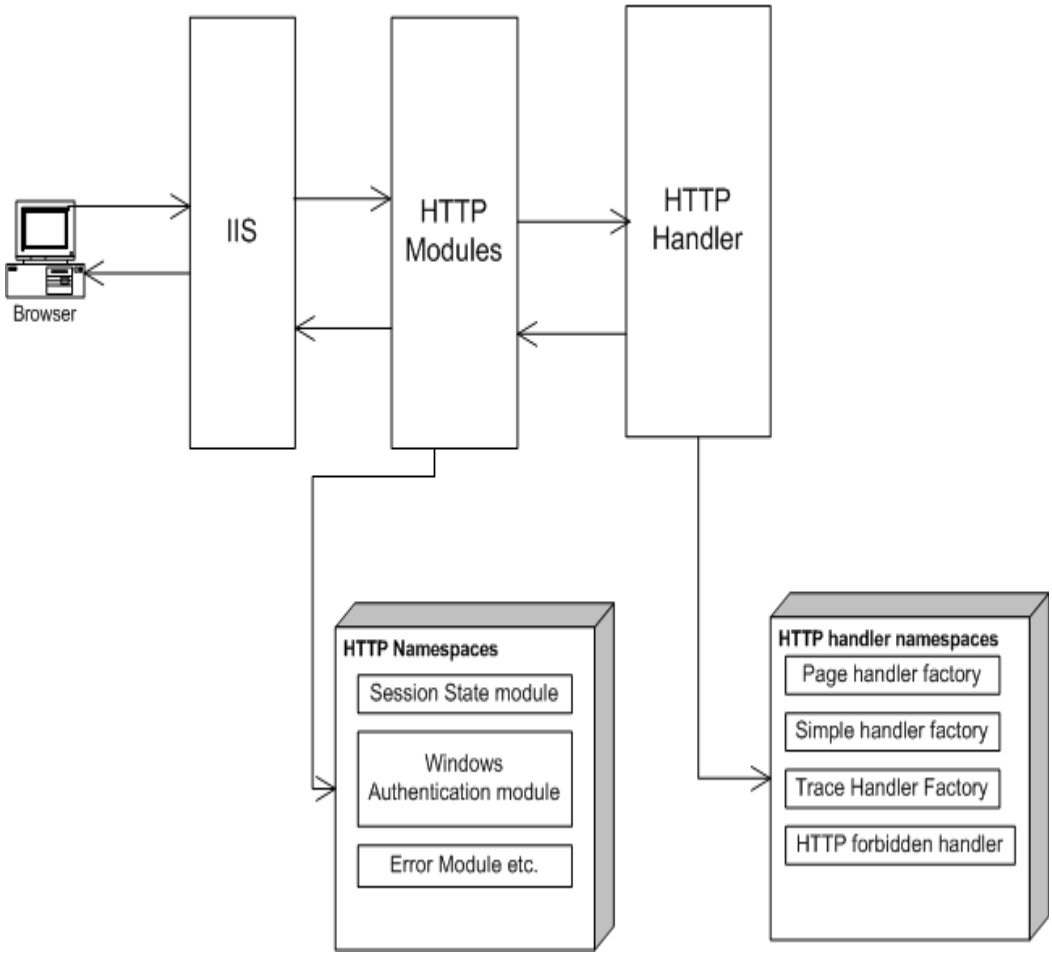


Figure :- 7.2 IIS flow from various sections.

(B)How can we kill a user session ?

Session.abandon

(I)How do you upload a file in ASP.NET ?

I will leave this to the readers … Just a hint we have to use System.Web.HttpPostedFile class.

(I)How do I send email message from ASP.NET ?

ASP.NET provides two namespaces System.WEB.mailmessage classand System.Web.Mail.Smtpmail class. Just a small homework create a Asp.NET project and send a email at shiv_koirala@yahoo.com . Do not Spam.

(A)What are different IIS isolation levels?

IIS has three level of isolation:-

LOW (IIS process):- In this main IIS process and ASP.NET application run in same process. So if any one crashes the other is also affected. Example let's say (well this is not possible) I have hosted yahoo , hotmail .amazon and google on a single PC. So all application and the IIS process runs on the same process.In case any website crashes it affects every one.

Figure: - 7.3 LOW IIS process scenario

Medium (Pooled):- In Medium pooled scenario the IIS and web application run in different process. So in this case there are two processes process1 and process2. In process1 the IIS process is running and in process2 we have all Web application running.

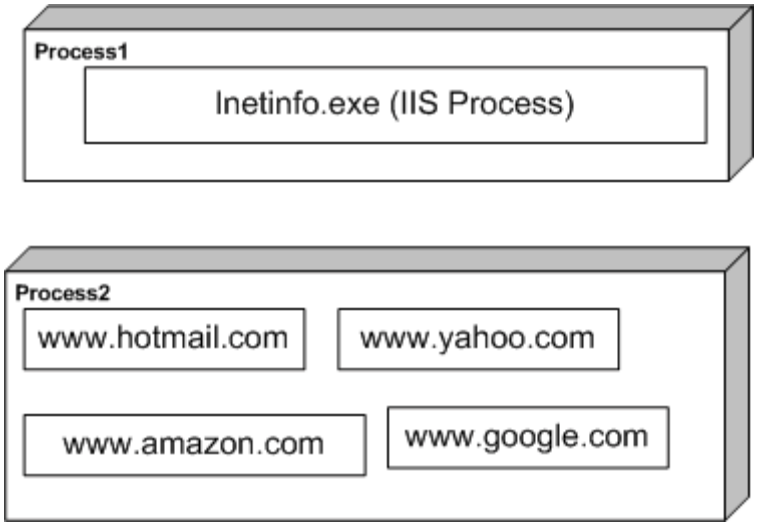


Figure: - 7.4 Medium pooled scenario

High (Isolated):-In high isolated scenario every process is running is there own process. In below figure there are five processes and every one handling individual application. This consumes heavy memory but has highest reliability.

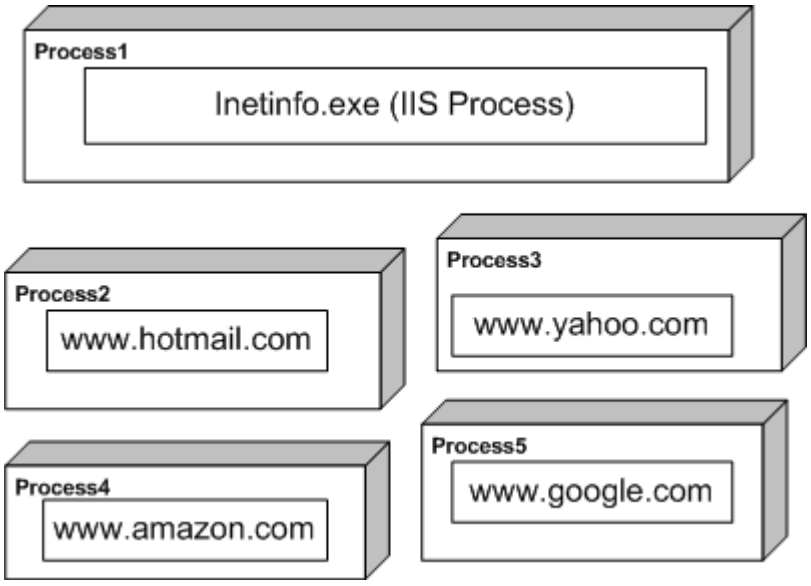


Figure: - 7.5 High isolation scenario

(A)ASP used STA threading model , whats the threading model used for ASP.NET ?

ASP.NET uses MTA threading model.

(A)Whats the use of <%@ page aspcompat=true %> attribute ?

This attribute works like a compatibility option. As said before ASP worked in STS model and ASP.NET works in MTA model. But what if your ASP.NET application is using a VB COM component. In order that VB COM runs properly in ASP.NET threading model we have to set that attribute. After defining the ASPCOMPAT directive attribute ASP.NET pages run in STA model thus building the compatibility between ASP.NET and old COM components who does not support MTA model.

(B)Explain the differences between Server-side and Client-side code?

Server side code is executed at the server side on IIS in ASP.NET framework , while client side code is executed on the browser.

(I)Can you explain Forms authentication in detail ?

In old ASP if you where said to create a login page and do authentication you have to do hell lot of custom coding. But now in ASP.NET that's made easy by introducing Forms authentication. So let's see in detail what form authentication is.

Forms authentication uses a ticket cookie to see that user is authenticated or not. That means when user is authenticated first time a cookie is set to tell that this user is authenticated. If the cookies expire then Forms authentication mechanism sends the user to the login page.

Following are the steps which defines steps for Forms authentication :-

√ Configure Web.config file with forms authentication.As shown below in the config file you can see we have give the cookie name and loginurl page.

```
<configuration>
    <system.web>
        <!-- Other settings omitted. -->
        <authentication mode="Forms">
            <forms name="logincookies"
                loginUrl="login.aspx"
                protection="All"
                timeout="30"
                path="/" />
        </authentication>
    </system.web>
</configuration>
```

√ Remove anonymous access to the IIS web application , following are changes done to web.config file.

```
<configuration>
    <system.web>
        <!-- Other settings omitted. -->
        <authorization>
            <deny users="?" />
        </authorization>
    </system.web>
</configuration>
```

√ Create the login page which will accept user information.Create your login page that is the Login.aspx which will actually take the user data.

√ Finally a Small coding in the login button.

Let's assume that the login page has two textboxes Txtname and txtapssword.

So import System.Web.Security and put the following code in login button of the page.

```
If Page.IsValid Then
    If FormsAuthentication.Authenticate(txtName.Text, txtPassword.Text) Then
        FormsAuthentication.RedirectFromLoginPage(txtName.Text, False)
    Else
        lblStatus.Text = "Error not proper user"
    End If
End If
```

(A)How do I sign out in forms authentication ?

FormsAuthentication.Signout()

(A)If cookies are not enabled at browser end does form Authentication work?

No it does not work.

(A)How to use a checkbox in a datagrid?

Twist :- How can I track event in checkbox which is one of the columns of a datagrid ?

Note: - This is normally asked when the interviewer wants to see that have you really worked practically on a project.

Following are the steps to be done :-

√ In ASPX page you have to add Itemtemplate tag in datagrid.

```
<ItemTemplate>
    <asp:CheckBox id="CheckBox1" runat="server" AutoPostBack="True"
OnCheckedChanged="Check_Clicked"></asp:CheckBox>
</ItemTemplate>
```

√ If you look at the Itemtemplate we have “OnCheckChanged” event. This “OnCheckChanged” event has “Check_Clicked” subroutine is actually in behind code.Note this method which is in behind code should either be “protected” or “public”

√ Following below is the subroutine which defines the method

```
Protected Sub Check_Clicked(ByVal sender As Object, ByVal e As EventArgs)
' do something
End Sub
```

The above steps should be defined in short to the interviewer which will give a quick feeling of your practical experience with ASP.NET

(I)What are the steps to create a windows service in VB.NET ?

Windows Services are long-running executable applications that run in its own Windows session, which then has the ability to start automatically when the computer boots and also can be manually paused, stopped or even restarted.

Following are the steps to create a service :-

√ Create a project of type “Windows Service”.

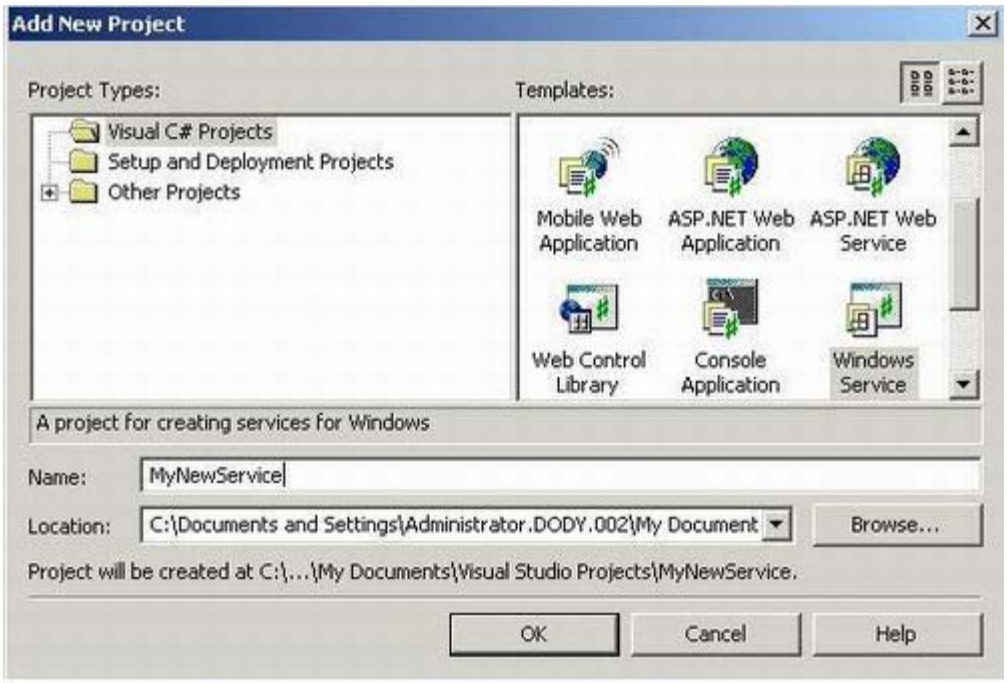


Figure 7.6 :- Create project for Windows Service

√ If you see the class created it is automatically inheriting from “System.ServiceProcess.ServiceBase”.

√ You can override the following events provided by service and write your custom code. All the three main events can be used that is Start , stop and continue.

```
protected override void OnStart(string[] args)
{
}
protected override void OnStop()
{
}
protected override void OnContinue()
{
}
```

√ Now to install the service you need to do run the install util exe.

InstallUtil <Project Path>\BIN\folderSPY.exe

8..NET Architecture

(B) What are design patterns ?

Design patterns are recurring solution to recurring problems in software architecture.

(A) Can you list down all patterns and there classification ?

> *Note :- This is advanced question because any one who says to list down all patterns can only be crazy for what he is asking.But its always a win-a-win situation for the interviewer.*

There are three basic classification of patterns Creational , Structural and Behavioral patterns.

Creational Patterns

- √ Abstract Factory:- Creates an instance of several families of classes
- √ Builder :- Separates object construction from its representation
- √ Factory Method:- Creates an instance of several derived classes
- √ Prototype:- A fully initialized instance to be copied or cloned
- √ Singleton:- A class of which only a single instance can exist

> *Note :- The best way to remember Creational pattern is by ABFPS (Abraham Became First President of States).*

Structural Patterns

- √ Adapter:-Match interfaces of different classes.
- √ Bridge:-Separates an object's interface from its implementation.
- √ Composite:-A tree structure of simple and composite objects.
- √ Decorator :-Add responsibilities to objects dynamically.
- √ Façade:-A single class that represents an entire subsystem.
- √ Flyweight:-A fine-grained instance used for efficient sharing.
- √ Proxy:-An object representing another object.

Note : To remember structural pattern best is (ABCDFFP)

Behavioral Patterns

- √ Mediator:-Defines simplified communication between classes.
- √ Memento:-Capture and restore an object's internal state.
- √ Interpreter:-A way to include language elements in a program.
- √ Iterator:-Sequentially access the elements of a collection.
- √ Chain of Resp:-A way of passing a request between a chain of objects.
- √ Command:-Encapsulate a command request as an object.
- √ State:-Alter an object's behavior when its state changes.
- √ Strategy:-Encapsulates an algorithm inside a class.
- √ Observer:-A way of notifying change to a number of classes.
- √ Template Method:-Defer the exact steps of an algorithm to a subclass.
- √ Visitor:-Defines a new operation to a class without change.

Note :- Just remember Music..... 2 MICS On TV (MMIICCSSOTV).

Note:- No source code is provided for architecture section. As much of the things can be clear from good UML diagrams.

(A)What's difference between Factory and Abstract Factory Pattern's?

Note: - This is quiet a confusing architect question especially in design pattern section. Interviewer can take you for a nice ride …. So get the difference's in your heart.

First read the definition provided in the first question about both these patterns. The common thing they have is that they belong to creational patterns. In short they hide the complexity of creating objects.

The main difference between factory and Abstract factory is factory method uses inheritance to decide which object has to be instantiated. While abstract factory uses delegation to decide instantiation of object. We can say Abstract factory uses factory method to complete the architecture. Abstract Factory is one level higher in abstraction over Factory.

The below two class diagrams will provide overview of what the actual difference is. First figure shows a sample implementation of Factory Patterns. In this figure there are two basic sections:-

- √ The actual product section i.e. Class "Product" it inherits from a abstract class "AbstractProduct".
- √ The creational aspect section that's "ConcreteCreator" class which inherits from class "Creator".
- √ Now there are some rules the client who will need the "Product" object will follow. He will never refer directly to the actual "Product" object he will refer the "Product" object using "AbstractProduct".
- √ Second client will never use "New" keyword to create the "Product" object but will use the "Creator" class which in turn will use the "ConcreteCreator" class to create the actual "Product" object.

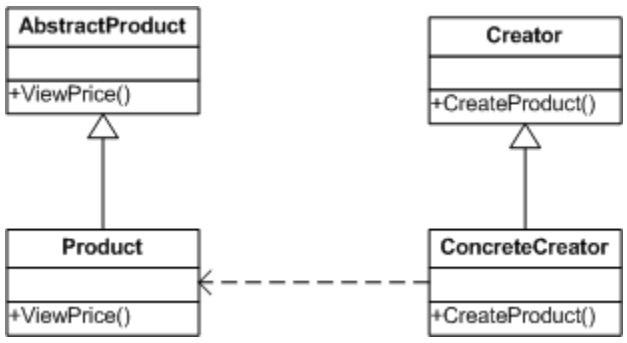


Figure: - 8.1 Class diagram of a factory Pattern

So what are benefits from this architecture? All creational and initializing aspects are now detached from the actual client. As your creational aspect is now been handled in "ConcreteCreator" and the client has reference to only "Creator", so any implementation change in "CreateProduct" will not affect the client code. In short now you creational aspect of object is completely encapsulated from the client's logic.

Now let's look at the second class diagram which provides an overview of what actually "Abstract factory" pattern is. It creates objects for families of classes. In short it describes collection of factor methods from various different families. In short it groups related

factory methods. Example in this the class “Creator” is implemented using the “Abstract” factory pattern. It now creates objects from multiple families rather one product.

> *Note :- Just stick up to this definition that Abstract factory classifies factory methods or groups logically related factory method together..*

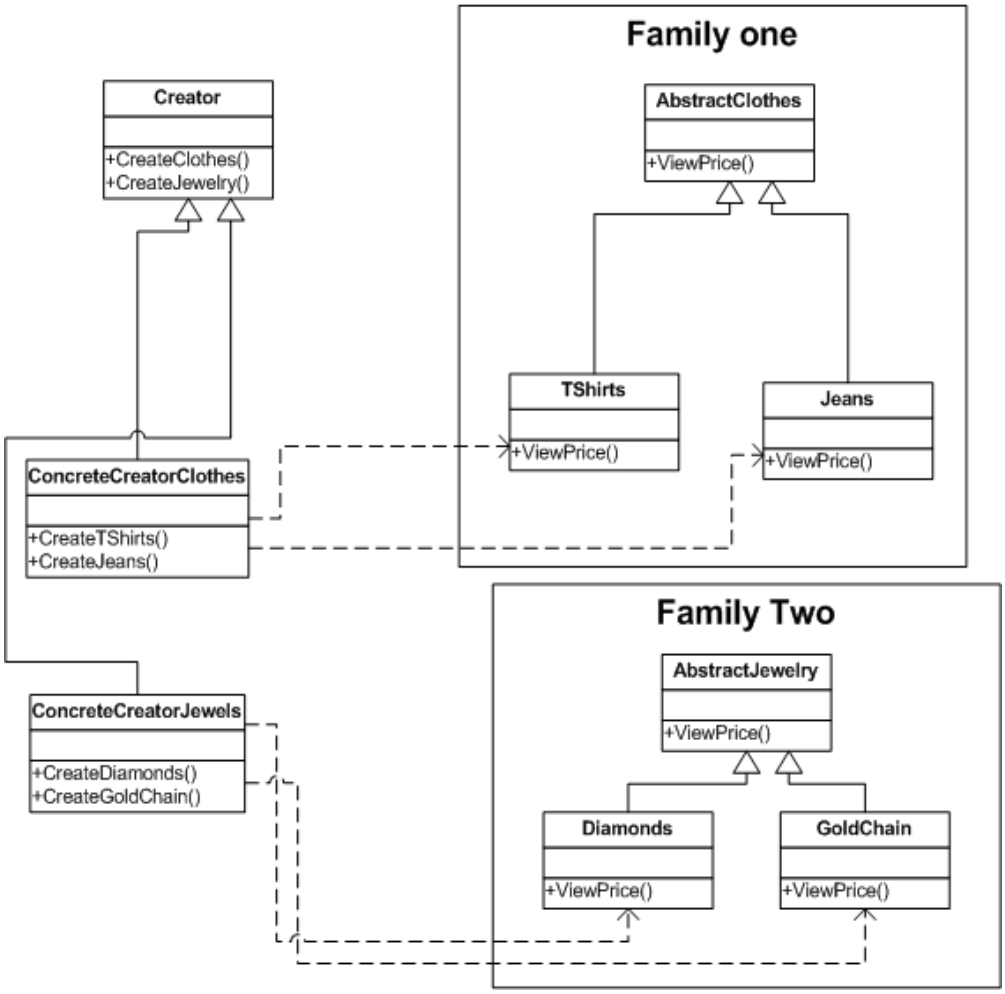


Figure:- 8.2 Class Diagram of Abstract Factory

(I)What's MVC pattern?

Twist: - How can you implement MVC pattern in ASP.NET?

The main purpose using MVC pattern is to decouple the GUI from the Data. It also gives the ability to provide multiple views for the same Data. MVC pattern separates objects in to three important sections:-

- √ Model: - This section is specially for maintaining data. It is actually where your business logic, querying database, database connection etc. is actually implemented.
- √ Views: - Displaying all or some portion of data, or probably different view of data. View is responsible for look and feel, Sorting, formatting etc.
- √ Controller: - They are event handling section which affects either the model or the view. Controller responds to the mouse or keyboard input to command model and view to change. Controllers are associated with views. User interaction triggers the events to change the model, which in turn calls some methods of model to update its state to notify other registered views to refresh their display.

Ok now this was all in theory. Let's look at how in actually ASP.NET can we implement MVC pattern. During interview with theory they will be looking are more at have you really implemented MVC or its just talks. Following are the various sections of ASP.NET which maps to MVC sections:-

- √ Model: - This section is represented by Data view, Dataset, Typed Dataset, Business components, business entity models etc. Now this section can then be tied up to either windows application or web UI.
- √ View: - ASPX, ASCX, or windows application UI like data grid etc. form the view part of it.
- √ Controller: - In ASP.NET the behind code is the controller. As the events are handled by that part. Controller communicates both with Model as well as view.

I hope I was able to map you imagination of ASP.NET with the diagram given below.

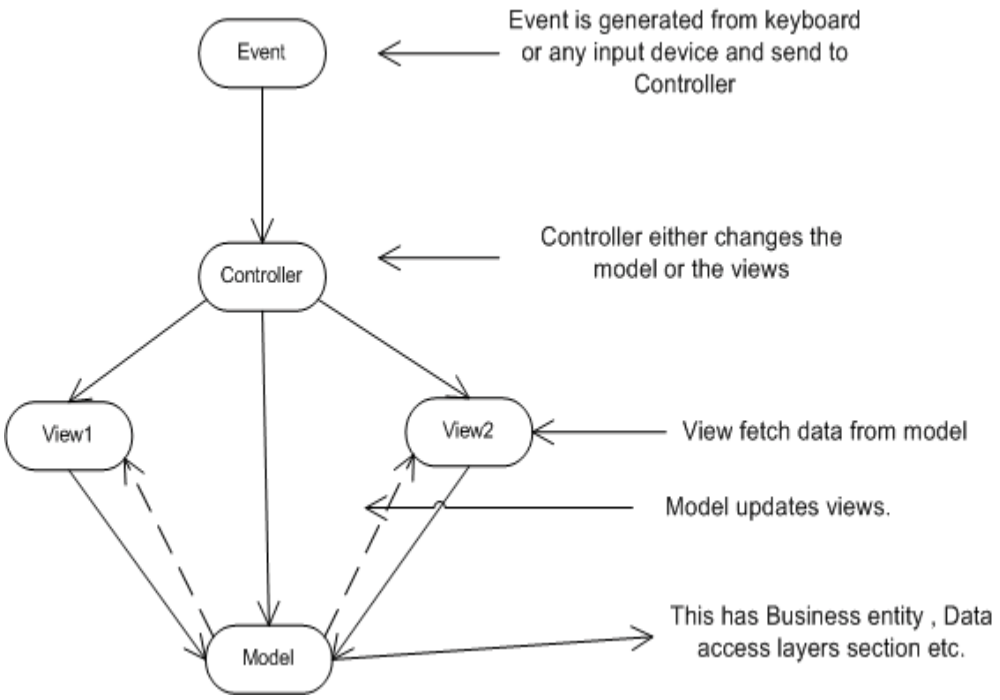


Figure: - 8. 3 Data flow between MVC architectures.

(A)How can we implement singleton pattern in .NET?

Singleton pattern mainly focuses on having one and only one instance of the object running. Example a windows directory service which has multiple entries but you can only have single instance of it through out the network.

> *Note:- May of developers would jump to a conclusion saying using the "STATIC" keyword we can have a single instance of object. But that's not the real case there is something more than to be done. But please note we can not define a class as STATIC, so this will not serve our actual purpose of implementing singleton pattern.*

Following are the three steps needed to implement singleton pattern in .NET:-

√ First create your class with static members.

```
Public class ClsStaticClass

        Private shared objCustomer as clsCustomer

End class
```

This ensures that there is actually only one Customer object through out the project.

√ Second define a private constructor to your class.

Note: - defining a private constructor to class does not allow a client to create objects directly.

√ Finally provide a static method to get access to your singleton object.

(A)How do you implement prototype pattern in .NET?

Twist: - How to implement cloning in .NET ? , What is shallow copy and deep copy ?

Cloning is achieved by using ICloneable of the System namespace. It has a "Clone" method which actually returns the reference of the same copy. Clone method allows a Shallow copy and not a deep copy. In Shallow copy if you make changes to the cloned object it actually does change on the main object itself. So how is deep copy achieved, by using "ISerializable" interface? So what you do is first serialize the object then deserialize back to a complete new copy. Now any changes to this new copy do not reflect on the original copy of the object, this is called as Deep copy.

(I)What are the situations you will use a Web Service and Remoting in projects?

Well "Web services" uses "remoting" concepts internally. But the major difference between "web service" and "remoting" is that "web service" can be consumed by clients who are not .NET platform. While remoting you need the client to be .NET compliant. Regarding the speed issue "Remoting" is faster than "Web Services". So I think when deciding the architecture side of choosing between "Web services" and "Remoting" keep the cross platform issue and the speed issue in mind.

(A)Can you give a practical implementation of FAÇADE patterns?

Façade pattern sits on the top of lot of subsystems and makes access easy to interfaces of these subsystems. Basic purpose of Façade is to make interfacing between many modules and classes manageable.

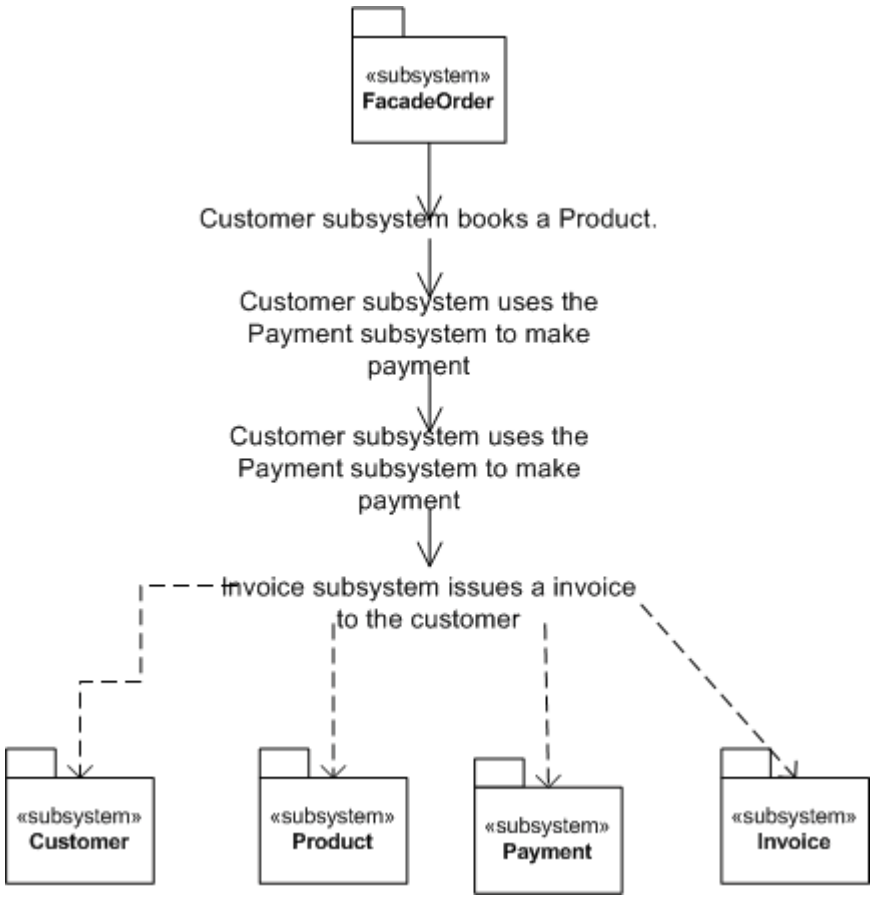


Figure: - 8.4 Façade in action

Above is a simple live application of a Façade class. In this we have four subsystems :-

- √ Customer
- √ Product

- √ Payment
- √ Invoicing

All the four modules when built at initial stage where built completely independent. The main interaction between all these subsystems is customer placing order. This functionality can be attained by using all these subsystems, which involves complex interaction between them.

There's where FAÇADE comes in to action. We have built a FAÇADE called as "FACADEORDER" which sits on the top of all these subsystem and fulfills our functionality.

(I) How can we implement observer pattern in .NET?

Observer patterns can be implemented using "Delegates" and "Events". I leave this to the readers to implement one sample code for observer patterns.

(B)What is three tier architecture?

The three tier software architecture emerged in the 1990s to overcome the limitations of the two tier architecture.

There are three layers in when we talk about three tier architecture:-

User Interface (Client) :- This is mostly the windows user interface or the Web interface. But this has only the UI part.

Mid layer: - Middle tier provides process management where business logic and rules are executed and can accommodate hundreds of users (as compared to only 100 users with the two tier architecture) by providing functions such as queuing, application execution, and database staging.

Data Access Layer: - This is also called by the famous acronym "DAL" component. It has mainly the SQL statement which do the database operation part of the job.

The three tier architecture is used when an effective distributed client/server design is needed that provides (when compared to the two tier) increased performance, flexibility, maintainability, reusability, and scalability, while hiding the complexity of distributed processing from the user.

(I)Have you ever worked with Microsoft Application Blocks, if yes then which?

Application Blocks are C# and VB.NET classes distributed as Visual Studio projects that can be downloaded from Microsoft's Web site and used in any .NET application, including ASP.NET Web applications. They are useful and powerful tools that can make applications more maintainable, scalable and efficient

The second question which of the application blocks has been used depends on really what you have implemented. But there are two famous MAB which is making buzz around the industry:-

- √ data access block

  The Data Access Block provides static methods located in the SqlHelper class that encapsulates the most common data access tasks performed with Microsoft SQL server. If the term "static method" is new to you, it means that the class methods can be called without instantiating an instance of the class. For example, the method ExecuteReader () within the SqlHelper class can be called by simply using the statement SqlHelper.ExecuteReader () -- no object instantiation of the SqlHelper class is required.

- √ Exception management block.

  The Exception Management Application Block provides a simple yet extensible framework for handling exceptions. With a single line of application code you can easily log exception information to the Event Log or extend it by creating your own components that log exception details to other data sources or notify operators, without affecting your application code. The Exception Management Application Block can easily be used as a building block in your own .NET application

Note: - It's beyond the scope the book to look in to details of application block. Best is go to www.microsoft.com and search for these application block. Try to compile one or two programs using there given classes and documentation.

(A)What is Service Oriented architecture?

"Services" are components which expose well defined interfaces and these interfaces communicate through XML messages. Using SOA you can build workflow, which uses

interfaces of these components. SOA is typically useful when you are crossing heterogeneous technical boundaries, organizations, domain etc.

In .NET SOA technically uses Web services to communicate with each service which is crossing boundaries. You can look SOA which sits on TOP of web services and provides a workflow.

SOA uses service components which operate in there own domain boundary. Let's note some points of service :-

- √ They are independent components and operate in there own boundary and own technology.
- √ They have well defined interfaces which use XML and WSDL to describe themselves.
- √ Services have URL where any one can find them and clients can bind to these URL to avail for the service.
- √ Services have very loosely coupled architecture. In order to communicate to service you only have to know the WSDL. Your client can then generate proxy from the WSDL of the service.

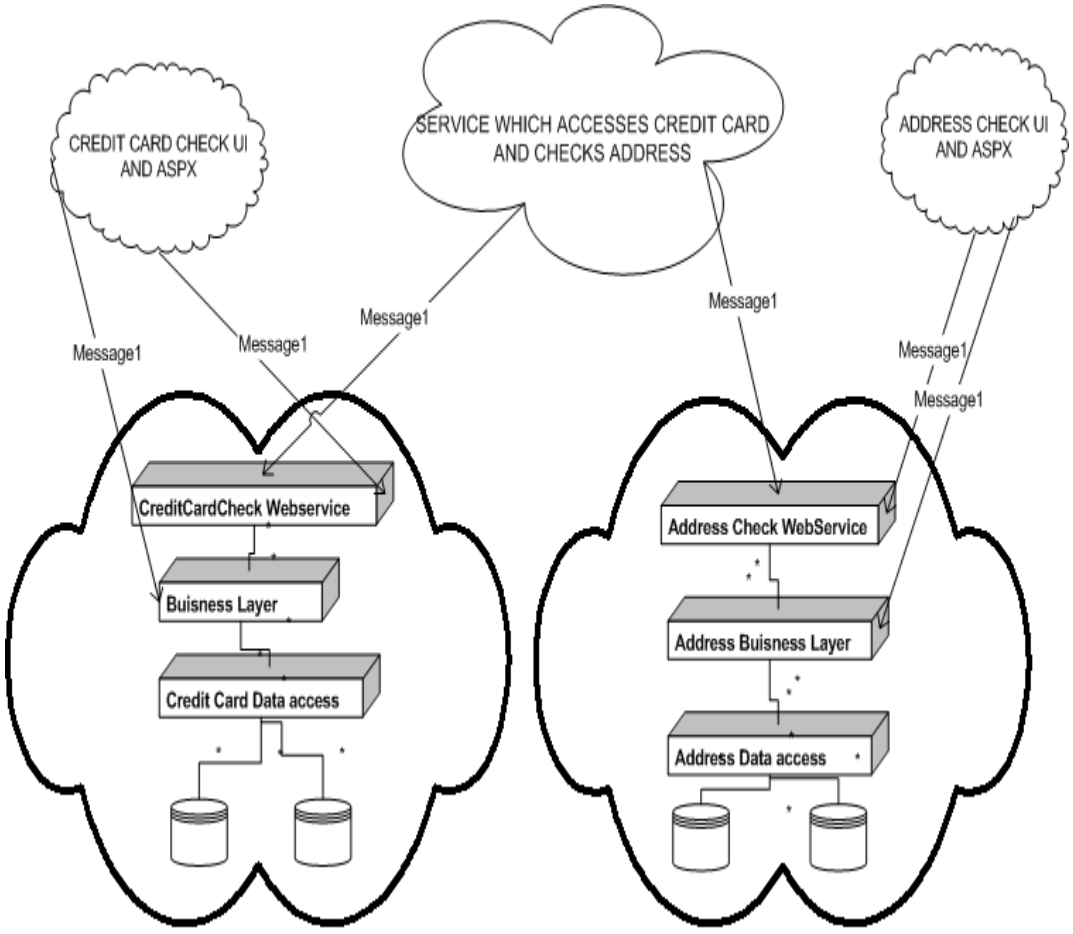


Figure: - 8.5 SOA basic architecture

Above figure describes a broader picture of what service oriented architecture will look like. The basic fundamental of SOA is a web service. In above diagram you can see there are two services available. One is the "Credit Card" service and other is "Address Check"

web service. Both these services are provided by different company. Now we want to build a functionality which needs to validate a credit card and also check that addresses are proper. In short we will need functionalities of both the "CreditCard" and "AddressCheck" service. Also note the "CreditCard" service has its own business layer and DAL components, which can be in a proprietary language. It's very much possible that the whole Credit card service is made in .NET and the Address check is SAP implementation or JAVA implementation. But because both the systems provide there functionality using Web services which is nothing but basically XML message communication. So we have made new service which sits like a FAÇADE on top of both the web service and performs both functionalities in one common service. You will see I have made a third service which sits on top of both the webservice and consumes them. Also you can see that the UI part of the systems have access to Buisness layer and Web service of there system. But the service which does both these check has only access to the Web service.

(I)What are different ways you can pass data between tiers?

There are many ways you can pass data between tiers :-

- √ Dataset the most preferred one as they maintain data in XML format.
- √ Datareader
- √ Custom classes.
- √ XML

Note:- It's beyond the scope of this book to discuss about SOA. But just to keep you safe during interview this book has tried to clear some basics of SOA.

(A)What is Windows DNA architecture?

Note :- If you have worked with classic ASP this question can come to you.

The Windows Distributed interNet Applications Architecture (DNA) is a Microsoft blueprint for robust, scalable, distributed business software. Windows DNA has evolved over time and was not preplanned. It gives all combined advantages of Centralized mainframe, application servers, internet technologies and Personal computers. Windows DNA is a evolution which started from mainframes (Where all logic was centralized) , Fox pro ages (Where we talked in terms of two tier systems) , VB6 / SQL SERVER (Three tier where we talked in terms of having one more tier which was mainly COM

where business logic resided) , COM+ (looking in terms of transactions and fulfilling ACID rules) and finally the DNA.

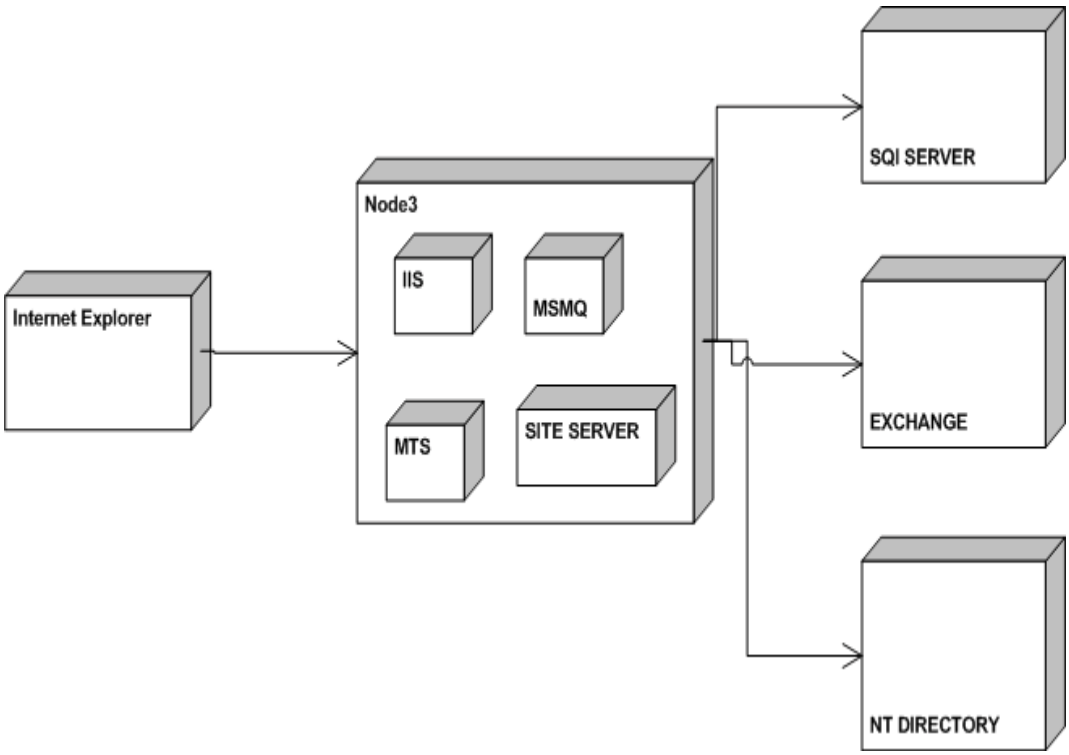


Figure :- 8.6 Windows DNA sections

Above shown is a Windows DNA model which is a blue print which Microsoft has proposed. So if interviewer is asking you have you worked with Windows DNA , then answer is yes. You will see that you always use this section. Do not get confused with the terminology DNA.

(A)What is aspect oriented programming?

Note :- This is something which is catching up the market so interviewer can ask you to see you how you are in touch with the market.So probably this explanation can be quiet long but bear with me it is worth of it

I will try to be as short as possible as this book is not a reference book. Just to save you from interviewer I will give a short description of aspect oriented programming in .NET.

First let's try to define it which can probably save you during interview

Aspect-oriented software development is a new technology for separation of concerns (SOC) in software development. The techniques of AOSD make it possible to modularize crosscutting aspects of a system.

Ok that statement's can save you for the first stage let's get down actually what is it. Let's revisit back how software development cycle evolved.

When we look back at times of Cobol where we used to break the modules in small functionalities and use reusability to its maximum.

Then came the time when we talked in terms of Objects where things where clearer as software was modeled in terms of real life examples. It worked fine and till today is the most accepted way of implementing and organizing project. So why AOP ?

Aspect oriented programming does not oppose OOP's but rather supports it and make's it more maintainable. So remove the logic from head the AOP is replacement of OOP. No its brother of OOP helping him to be better.

When we talk in terms of object's it's an entity which maps to real world domain. Object has attributes which represent the state of object and also define its behavior. By rule of object oriented programming object should be stand alone and communicate with other object's using messages or defined interface.

One object should not communicate with other object directly rather communicate through defined interfaces. Every object satisfies some "Concern" in relation to the system.

Twist: - What is Concern in AOP?

"A concern is a particular goal, concept, or area of interest"

There are mainly two types of concern from an object perspective:-

√ Core / Main concerns which it should satisfy and is his work.

- √ System concerns which are not related to business functionalities but software related concerns example audit trail, Error handling, Security etc.

Ok let's try to understand this principle by some actual example.

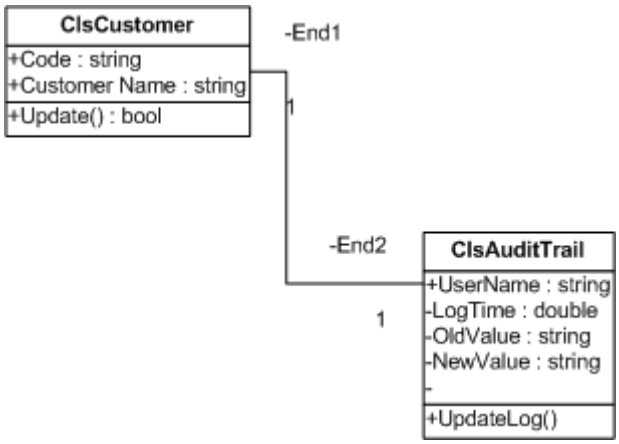


Figure :- 8.7 Customer and Audit trail relationships

Above is a class diagram which shows relationshipbetween two classes "ClsCustomer" and "ClsAuditTrail". "ClsCustomer" class does inserting of new customer's in to database and "ClsAuditTrail" does the auditing of what is changed in the customer class.

Now there are two concerns in this project :-

- √ Customer code should not exceed greater than 10 length (Business level concern)
- √ All customer data which is updated should be audited. (System level concern)

Here goes the class code. If you see the ClsCustomer implementation in the update method I have called the Audit trail implementation. If you really look from object oriented point of view we are doing something in customer class which is supposed to be not his implementation: - Audit Trail logging. Thus we have also broken down the rule of

encapsulation. In short the class not only handles his work but also some other work which is not his concern.

Ok now lets define crosscutting which is one of important aspect's of AOP.

Twist :- What is cross cutting in AOP ?

When one or many concerns span across module its called as cross cutting.Example in our audit trail example we will probably need to audit trail for customer as well as supplier.So Audit trail can span across other objects also that is termed as cross cutting.

Below are both the classes actually implemented as per class diagram 8.7. If you see the "Update" method of the customer class , its doing both of the concerns that is checking for customer code length and also maintaining the audit trail using the audit trail class.

```
Public Class ClsCustomer
    Private pstrCustcode As String
    Private pstrCustName As String
    Public Property Code() As String
        Get
            Return pstrCustcode
        End Get
        Set(ByVal Value As String)
            pstrCustcode = Value
        End Set
    End Property
    Public Property CustomerName() As String
        Get
            Return pstrCustName
        End Get
        Set(ByVal Value As String)
```

```
            pstrCustName = Value
        End Set
    End Property
    Public Function Update() As Boolean
        ‘ first / core concern
        If pstrCustcode.Length() > 10 Then
            Throw New Exception("Value can not be greater than 10")
        End If
        ' usingthe customer audit trail to do auditing
        ‘ second concern / system concern
        Dim pobjClsAuditTrail As New ClsAuditTrail
        With pobjClsAuditTrail
            .NewValue = "1001"
            .OldValue = "1003"
            .UserName = "shiv"
            .Update()
        End With
        ' then inserting the customer in database
    End Function
End Class
Public Class ClsAuditTrail
    Private pstrUserName As String
    Private pstrOldValue As String
    Private pstrNewValue As String
    Private pdblLogTime As Double
```

```
Public Property UserName() As String
    Get
        Return pstrUserName
    End Get
    Set(ByVal Value As String)
        pstrUserName = Value
    End Set
End Property
Public Property OldValue() As String
    Get
        Return pstrOldValue
    End Get
    Set(ByVal Value As String)
        pstrOldValue = Value
    End Set
End Property
Public Property NewValue() As String
    Get
        Return pstrNewValue
    End Get
    Set(ByVal Value As String)
        pstrNewValue = Value
    End Set
End Property
Public Property LogTime() As Double
```

```
        Get
            Return pdblLogTime
        End Get
        Set(ByVal Value As Double)
            pdblLogTime = Value
        End Set
    End Property
    Public Sub Update()
        ' do the logging activity here
    End Sub
End Class
```

In short the customer class is doing lot of activity. There is lot of tangling of code. So how do we overcome this problem… Simple separate the System level concern (Audit Trail) from the core level concern (Customer code check). This is achieved at this moment in .NET using attribute programming.

Here is the change to the customer class

```
Imports System.Reflection
Public Class ClsCustomer
    Private pstrCustcode As String
    Private pstrCustName As String
    Public Property Code() As String
        Get
            Return pstrCustcode
        End Get
        Set(ByVal Value As String)
```

```
        pstrCustcode = Value
    End Set
End Property
Public Property CustomerName() As String
    Get
        Return pstrCustName
    End Get
    Set(ByVal Value As String)

        pstrCustName = Value
    End Set
End Property
<ClsAuditTrail("Shiv", "1001", "1003", 12)> _
Public Function Update() As Boolean
    If pstrCustcode.Length() > 10 Then
        Throw New Exception("Value can not be greater than 10")
    End If
    ' usingthe customer audit trail to do auditing



    ' then inserting the customer in database
End Function

End Class
```

And here is the change to the audit trail class

```
Imports System.Reflection
<AttributeUsage(AttributeTargets.All)> _
Public Class ClsAuditTrail
    Inherits Attribute
    Private pstrUserName As String
    Private pstrOldValue As String
    Private pstrNewValue As String
    Private pdblLogTime As Double
    Public Property UserName() As String
      Get
          Return pstrUserName
      End Get
      Set(ByVal Value As String)
          pstrUserName = Value
      End Set
    End Property
    Public Property OldValue() As String
      Get
          Return pstrOldValue
      End Get
      Set(ByVal Value As String)
          pstrOldValue = Value
      End Set
```

```
End Property
Public Property NewValue() As String
   Get
      Return pstrNewValue
   End Get
   Set(ByVal Value As String)
      pstrNewValue = Value
   End Set
End Property
Public Property LogTime() As Double
   Get
      Return pdblLogTime
   End Get
   Set(ByVal Value As Double)
      pdblLogTime = Value
   End Set
End Property
Public Sub New(ByVal pstrUserName As String, _
               ByVal pstrOldValue As String, _
               ByVal pstrnewValue As String, _
               ByVal plng As Long)
   Update()
End Sub
Public Sub Update()
   ' do the logging activity here
```

```
    End Sub
End Class
```

The fun part of the code is below , you can see that the code audit trail is now seperate and the code check belongs to the customer code.

```
<ClsAuditTrail("Shiv", "1001", "1003", 12)> _
Public Function Update() As Boolean
    If pstrCustcode.Length() > 10 Then
        Throw New Exception("Value can not be greater than 10")
    End If
    ' usingthe customer audit trail to do auditing
    ' then inserting the customer in database
End Function
```

Note:- Architecture is everybodys favorite and the wide combination is difficult to be covered in this book. Many of the things can only come by live experience.

9. ADO.NET

(B)What is the namespace in which .NET has the data functionality classes ?

Following are the namespaces provided by .NET for data management :-

System.data

This contains the basic objects used for accessing and storing relational data, such as DataSet,DataTable, and DataRelation. Each of these is independent of the type of data source and the way we connect to it.

System.Data.OleDB

Contains the objects that we use to connect to a data source via an OLE-DB provider, such as OleDbConnection, OleDbCommand, etc. These objects inherit from the common base classes, and so have the same properties, methods, and events as the SqlClient equivalents.

System.Data.SqlClient:

This Contains the objects that we use to connect to a data source via the Tabular Data Stream (TDS) interface of Microsoft SQL Server (only). This can generally provide better performance as it removes some of the intermediate layers required by an OLE-DB connection.

System.XML

This Contains the basic objects required to create, read, store, write, and manipulate XML documents according to W3C recommendations.

(B) Can you give a overview of ADO.NET architecture ?

The most important section in ADO.NET architecture is “Data Provider”.Data Provider provides access to datasource (SQL SERVER , ACCESS ,ORACLE).In short it provides object to achieve functionalities like opening and closing connection , retrieve data and update data.In below figure you can see that data provider four main sections :-

- √ Connection.

** 70 percent of IT projects are database projects,so ADO.NET forms the heart of major .NET interviews.*

- √ Command object (This is the responsible object to use stored procedures)
- √ Data Adapter (This object acts as a bridge between datastore and dataset).
- √ Datareader (This object reads data from data store in forward only mode).

Dataset object represents disconnected and cached data.If you see the diagram it is not in direct connection with the data store (SQL SERVER , ORACLE etc) rather it talks with Data adapter , who is responsible for filling the dataset.Dataset can have one or more Datatable and relations.

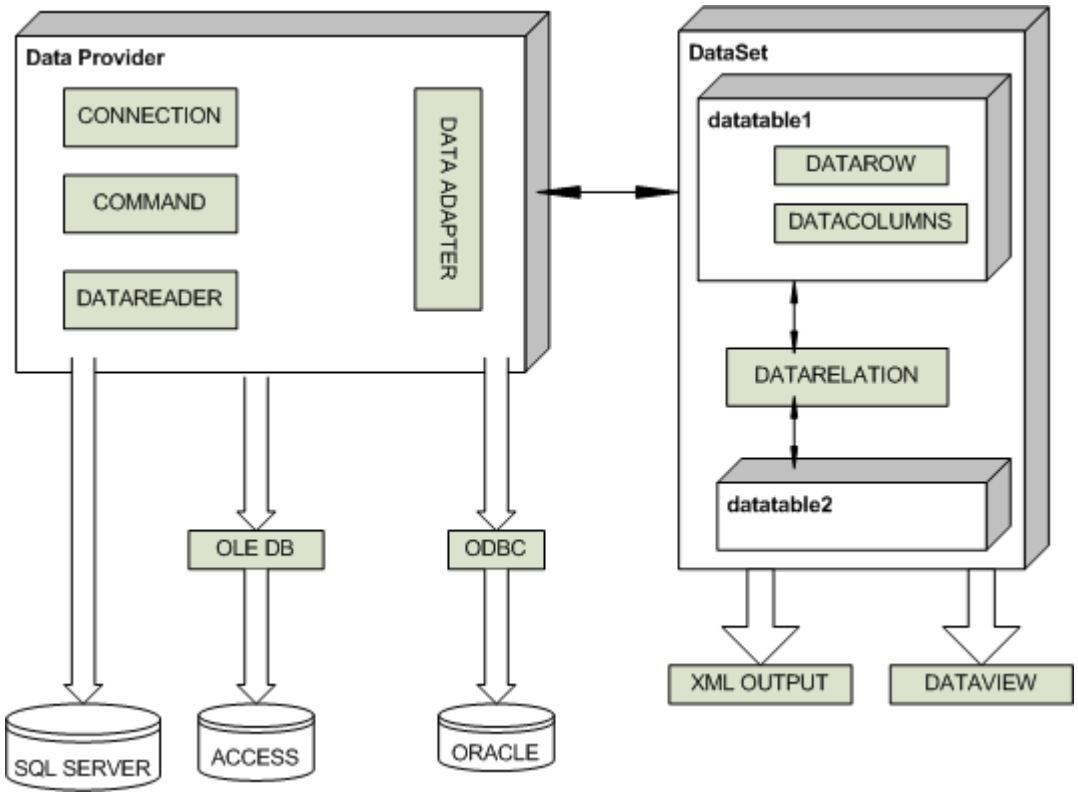


Figure :- 9.1 ADO.NET Architecture

"DataView" object is used to sort and filter data in Datatable.

Note:- This is one of the favorite question in .NET.Just paste the picture in your mind and during interview try to refer that image.

(B)What are the two fundamental objects in ADO.NET ?

Datareader and Dataset are the two fundamental objects in ADO.NET.

(B)What is difference between dataset and datareader ?

Following are some major differences between dataset and datareader :-

- √ DataReader provides forward-only and read-only access to data , while the DataSet object can hold more than one table (in other words more than one rowset) from the same data source as well as the relationships between them.
- √ Dataset is a disconnected architecture while datareader is connected architecture.
- √ Dataset can persists contents while datareader can not persist contents , they are forward only.

(I)What are major difference between classic ADO and ADO.NET ?

Following are some major differences between both

- √ As in classic ADO we had client and server side cursors they are no more present in ADO.NET.Note it's a disconnected model so they are no more applicable.
- √ Locking is not supported due to disconnected model.
- √ All data is persisted in XML as compared to classic ADO there where data which was persisted in Binary format also.

(B)What is the use of connection object ?

They are used to connect a data to a Command object.

- √ An OleDbConnection object is used with an OLE-DB provider

- √ A SqlConnection object uses Tabular Data Services (TDS) with MS SQL Server

(B)What is the use of command objects and what are the methods provided by the command object ?

They are used to connect connection object to Datareader or dataset.Following are the methods provided by command object :-

- √ ExecuteNonQuery :- Executes the command defined in the CommandText property against the connection defined in the Connection property for a query that does not return any rows (an UPDATE, DELETE or INSERT).Returns an Integer indicating the number of rows affected by the query.
- √ ExecuteReader :- Executes the command defined in the CommandText property against the connection defined in the Connection property. Returns a "reader" object that is connected to the resulting rowset within the database, allowing the rows to be retrieved.
- √ ExecuteScalar :- Executes the command defined in the CommandText property against the connection defined in the Connection property. Returns only a single value (effectively the first column of the first row of the resulting rowset). Any other returned columns and rows are discarded. Fast and efficient when only a "singleton" value is required

(B)What is the use of dataadapter ?

These are objects that connect one or more Command objects to a Dataset object..They provide logic that gets the data from the data store and populates the tables in the DataSet, or pushes the changes in the DataSet back into the data store.

- √ An OleDbDataAdapter object is used with an OLE-DB provider
- √ A SqlDataAdapter object uses Tabular Data Services with MS SQL Server.

(B)What are basic methods of Dataadapter ?

There are three most commonly used methods of Dataadapter :-

Fill :- Executes the SelectCommand to fill the DataSet object with data from the data source. Can also be used to update (refresh) an existing table in a DataSet with changes

 * *Author has Intentionally marked all Database questions as Basic belive me not answering them will not give a good impression during interviews.*

made to the data in the original datasource if there is a primary key in the table in the DataSet.

FillSchema :- Uses the SelectCommand to extract just the schema for a table from the data source, and creates an empty table in the DataSet object with all the corresponding constraints.

Update:- Calls the respective InsertCommand, UpdateCommand, or DeleteCommand for each inserted, updated,or deleted row in the DataSet so as to update the original data source with the changes made to the content of the DataSet. This is a little like the UpdateBatch method provided by the ADO Recordset object, but in the DataSet it can be used to update more than one table.

(B)What is Dataset object?

The DataSet provides the basis for disconnected storage and manipulation of relational data. We fill it from a data store,work with it while disconnected from that data store, then reconnect and flush changes back to the data store if required.

(B)What are the various objects in Dataset ?

Dataset has a collection of DataTable object within the Tables collection. Each DataTable object contains a collection of DataRow objects and a collection of DataColumn objects. There are also collections for the primary keys,constraints, and default values used in this table which is called as constraint collection, and the parent and child relationships between the tables.Finally, there is a DefaultView object for each table. This is used to create a DataView object based on the table, so that the data can be searched, filtered or otherwise manipulated while displaying the data.

> *Note :- Look back again to the main diagram for ADO.NET architecture for visualizing this answer in pictorial form*

(B) How can we connect to Microsoft Access , Foxpro , Oracle etc ?

Microsoft provides System.Data.OleDb namespace to communicate with databases like Access , oracle etc.In short any OLE DB-Compliant database can be connected using System.Data.OldDb namespace.

Note :- Small sample of OLEDB is provided in "WindowsAppOleDb" which uses "Nwind.mdb" in bin directory to display data in Listbox.

```
 Private Sub loadData()
        Dim strPath As String
        strPath = AppDomain.CurrentDomain.BaseDirectory
        Dim objOLEDBCon As New
OleDbConnection("Provider=Microsoft.Jet.OLEDB.4.0;Data Source =" &
strPath & "Nwind.mdb")
        Dim objOLEDBCommand As OleDbCommand
        Dim objOLEDBReader As OleDbDataReader
        Try

            objOLEDBCommand = New OleDbCommand("Select FirstName
            from Employees")
            objOLEDBCon.Open()
            objOLEDBCommand.Connection = objOLEDBCon
            objOLEDBReader = objOLEDBCommand.ExecuteReader()
            Do While objOLEDBReader.Read()
                lstNorthwinds.Items.Add(objOLEDBReader.GetString(0))
            Loop
        Catch ex As Exception
            Throw ex
        Finally
            objOLEDBCon.Close()
        End Try

    End Sub
```

The main heart is the "Loaddata()" method which actually loads the data in listbox.

Note:- This source code has the connectionstring har coded in the program itself which is not a good programming practice.For windows application the best place to store connectionstring is "App.config".Also note "AppDomain.CurrentDomain.BaseDirectory" function this gives the current path of the running exe which is "BIN" and the MDB file is in that directory.Also note the finally block which executes irrespective that there is error or not.Thus ensuring that all the connection to the datastore is freed.It's best practice to put all clean up statements in finally block thus ensuring that the resources are deallocated properly.

(B) How do we connect to SQL SERVER , which namespace do we use ?

```
Private Sub LoadData()
        ‘ note :- with and end with makes your code more readable
        Dim strConnectionString As String
        Dim objConnection As New SqlConnection
        Dim objCommand As New SqlCommand
        Dim objReader As SqlDataReader
        Try
            ‘ this gets the connectionstring from the app.config
file.
            ‘ note if this gives error see where the MDB file is
stored in your pc and point to that
            strConnectionString =
AppSettings.Item(“ConnectionString”)
            ‘ take the connectiostring and initialize the connection
object
            With objConnection
                .ConnectionString = strConnectionString
                .Open()
            End With
            objCommand = New SqlCommand(“Select FirstName from
Employees”)
            With objCommand
                .Connection = objConnection
                objReader = .ExecuteReader()
            End With
            ‘ looping through the reader to fill the list box
            Do While objReader.Read()
                lstData.Items.Add(objReader.Item(“FirstName”))
            Loop
        Catch ex As Exception
            Throw ex
        Finally
            objConnection.Close()
        End Try


<appSettings>
        <add key=”Connectionstring” value=”Server=ERMBOM1-IT2;User
ID=sa;Database=Employees”/>
    </appSettings>
```

Note:- The above code is provided in CD in folder WindowsAppSqlClient”.Comments in the code do explain a lot but we will again iterate through the whole code later..”LoadData” is the main method which loads the data from SQL SERVER.Before running this code you have to install SQL SERVER in your machine.As we are dealing

with SQLCLIENT we need to setup database in SQL SERVER.For this sample i have imported access "Nwind.mdb" in "SampleAccessDatabase" folder in CD in to SQlSERVER.Depending on computer you will also have to change the connectionstring in Web.config file.

We can use the DTS import wizard to import.See the below figure which is using data source as Microsoft Access.While importing the database author had give the database name as "Employees".

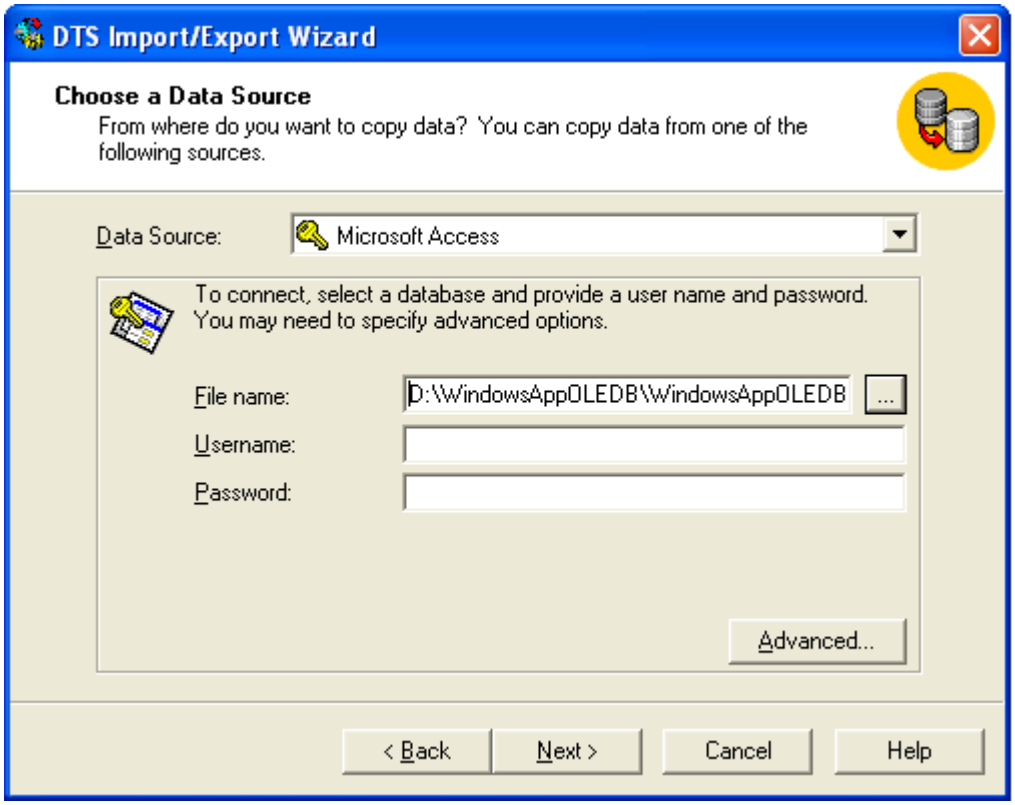


Figure:- 9.2 Loading "Nwind.mdb" in SQL SERVER for the sample

 * *Are you comfortable with location shift ? If you have personal problems say no right at the first stage.... or else after joining surely you will repent.*

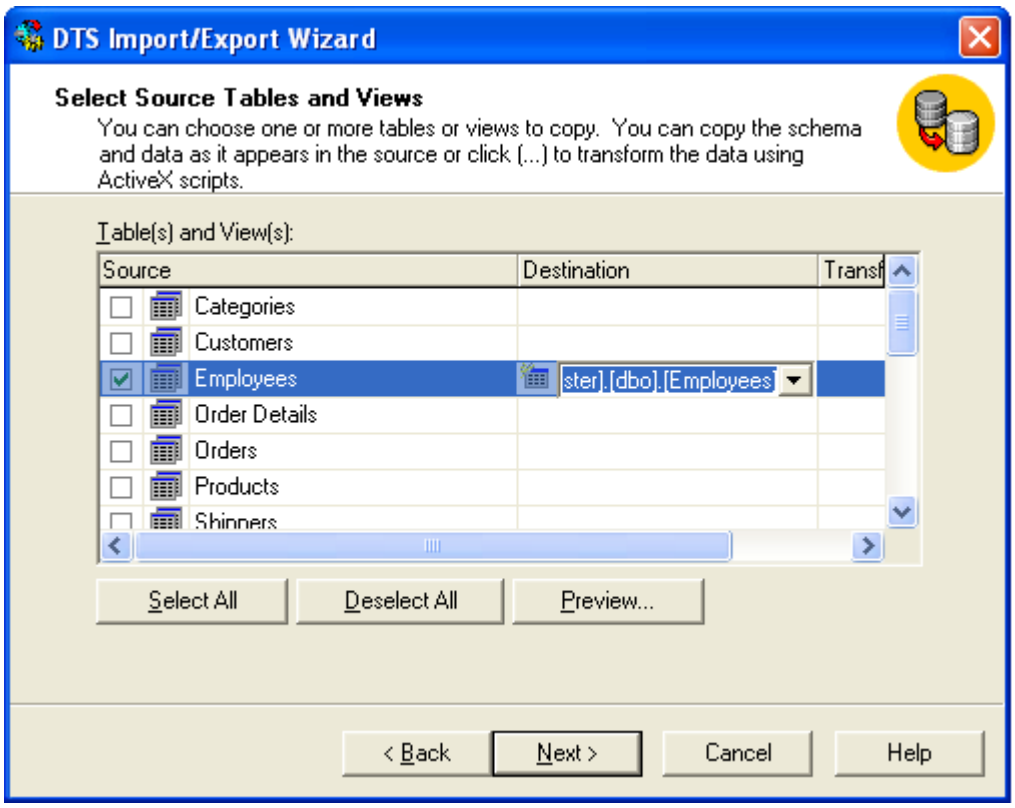


Figure :- 9.3 Load only the Employee table.

For simplicity sake we will only import the employee table as thats the only thing needed in our sample code.

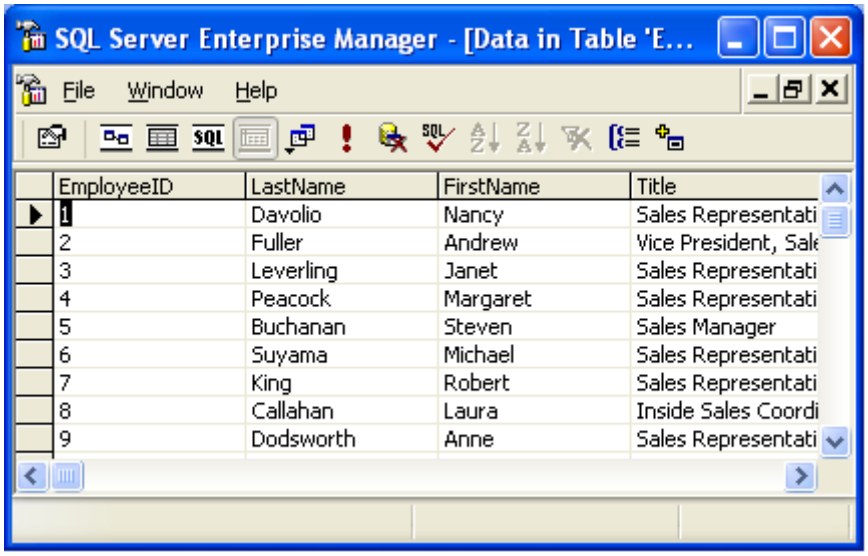


Figure :- 9.4 View of loaded Employee table

Now from interview point of view definitely you are not going to say the whole source code which is given in book.Interviewer expects only the broader answer of what are the steps needed to connect to SQL SERVER.For fundamental sake author has explained the whole source code.In short you have to explain the "LoadData" method in broader way.Following are the steps to connect to SQL SERVER :-

√ First is import the namespace "System.Data.SqlClient".

√ Create a connection object as shown in "LoadData" method.

```
With objConnection
      .ConnectionString = strConnectionString
      .Open()
End With
```

√ Create the command object with the SQL.Also assign the created connection object to command object. and execute the reader.

```
objCommand = New SqlCommand("Select FirstName from Employees")
            With objCommand
                .Connection = objConnection
                objReader = .ExecuteReader()
            End With
```

- √ Finally loop through the reader and fill the list box.If old VB programmers are expecting the movenext command it's replaced by Read() which returns true if there is any data to be read.If the .Read() return's false that means that it's end of datareader and there is no more data to be read.

```
Do While objReader.Read()
lstData.Items.Add(objReader.Item("FirstName"))
Loop
```

- √ Finally do not forget to close the connection object.

Note:- In "LoadData" you will see that connectionstring is stored in Web.config file and is loaded using "AppSettings.Item("ConnectionString")".While running this sample live on your database do not forget to change this connectionstring accordingly or else the source code will not run.

(B) How do we use stored procedure in ADO.NET and how do we provide parameters to the stored procedures?

ADO.NET provides the SqlCommand object which provides the functionality of executing stored procedures.

Note :- Sample code is provided in folder "WindowsSqlClientCommand".There are two stored procedures created in same database "Employees" which was created for the previous question.

CREATE PROCEDURE SelectByEmployee @FirstName nvarchar(200) AS

Select FirstName from Employees where FirstName like @FirstName + '%'

CREATE PROCEDURE SelectEmployee AS

Select FirstName from Employees

```
If txtEmployeeName.Text.Length = 0 Then
                objCommand = New SqlCommand("SelectEmployee")
            Else
```

```
                objCommand = New SqlCommand("SelectByEmployee")
                objCommand.Parameters.Add("@FirstName",
Data.SqlDbType.NVarChar, 200)
                objCommand.Parameters.Item("@FirstName").Value =
txtEmployeeName.Text.Trim()
            End If
```

In the above sample not lot has been changed only that the SQL is moved to the stored procedures.There are two stored procedures one os "SelectEmployee" which selects all the employees and the other is "SelectByEmployee" which returns employee name starting with a specific character.As you can see to provide parameters to the stored procedures we are using the parameter object of the command object.In such question interviewer expects two simple answers one is that we use command object to execute stored procedures and the parameter object to provide parameter to the stored procedure.Above sample is provided only for getting the actual feel of it.

(B) How can we force the connection object to close after my datareader is closed ?

Command method Executereader takes a parameter called as CommandBehavior where in we can specify saying close connection automatically after the Datareader is close.

pobjDataReader = pobjCommand.ExecuteReader(CommandBehavior.CloseConnection)

(B) I want to force the datareader to return only schema of the datastore rather than data ?

pobjDataReader = pobjCommand.ExecuteReader(CommandBehavior.SchemaOnly)

(B) How can we fine tune the command object when we are expecting a single row or a single value ?

Again CommandBehaviour enumeration provides two values SingleResult and SingleRow.If you are expecting a single value then pass "CommandBehaviour.SingleResult" and the query is optimized accordingly , if you are expecting single row then pass "CommandBehaviour.SingleRow" and query is optimized according to single row.

(B) Which is the best place to store connectionstring in .NET projects ?

Why have you changed so many jobs ? (Prepare a decent answer do not blame companies and individiuals for your frequent change)

Config files are the best place to store connection strings.If it's a web-based application "Web.config" file will be used and if it's a windows application "App.config" files will be used.

(B) What are steps involved to fill a dataset ?

Twist :- How can we use dataadapter to fill a dataset ?

Sample code is provided in "WindowsDataSetSample" folder in CD."LoadData" has all the implementation of connecting and loading to dataset.This dataset is finally binded to a ListBox.Below is the sample code.

```
 Private Sub LoadData()
        Dim strConnectionString As String
        strConnectionString = AppSettings.Item("ConnectionString")
        Dim objConn As New SqlConnection(strConnectionString)
        objConn.Open()
        Dim objCommand As New SqlCommand("Select FirstName from
Employees")
        objCommand.Connection = objConn
        Dim objDataAdapter As New SqlDataAdapter()
        objDataAdapter.SelectCommand = objCommand
        Dim objDataSet As New DataSet

    End Sub
```

In such type of question's interviewer is looking from practical angle , that have you worked with dataset and datadapters.Let me try to explain the above code first and then we move to what steps to say suring interview.

Dim objConn As New SqlConnection(strConnectionString)

objConn.Open()

First step is to open the connection.Again note the connection string is loaded from config file.

Dim objCommand As New SqlCommand("Select FirstName from Employees")

objCommand.Connection = objConn

Second step is to create a command object with appropriate SQL and set the connection object to this command.

Dim objDataAdapter As New SqlDataAdapter()

objDataAdapter.SelectCommand = objCommand

Third steps is to create the Adapter object and pass the command object to the adapter object.

objDataAdapter.Fill(objDataSet)

Fourth step is to load the dataset using the "Fill" method of the dataadapter.

lstData.DataSource = objDataSet.Tables(0).DefaultView

lstData.DisplayMember = "FirstName"

lstData.ValueMember = "FirstName"

Fifth step is to bind to the loaded dataset with the GUI.At this moment sample has listbox as the UI.Binding of the UI is done by using DefaultView of the dataset.Just to revise every dataset has tables and every table has views.In this sample we have only loaded one table i.e. Employees table so we are referring that with a index of zero.

Just say all the five steps during interview and you will see the smile in the interviewer's face.

(B)What are the various methods provided by the dataset object to generate XML?

Note:- XML is one of the most important leap between classic ADO and ADO.NET.So this question is normally asked more generally how can we convert any data to XML format.Best answer is convert in to dataset and use the below methods.

√ ReadXML

Read's a XML document in to Dataset.

√ GetXML

This is function's which return's a string containing XML document.

√ WriteXML

This write's a XML data to disk.

(B) How can we save all data from dataset ?

Dataset has “AcceptChanges” method which commits all the changes since last time “Acceptchanges” has been executed.

> *Note :- This book does not have any sample of Acceptchanges.I leave that to reader's as homework sample.But yes from interview aspect that will be enough.*

(B) How can we check that some changes have been made to dataset since it was loaded ?

> *Twist :- How can cancel all changes done in dataset ? , How do we get changed value dataset ?*

For tracking down changes Dataset has two methods which comes as rescue “GetChanges “and “HasChanges”.

GetChanges

Return's dataset which are changed since it was loaded or since Acceptchanges was executed.

HasChanges

This property indicate's has any change's been made since the dataset was loaded or acceptchanges method was executed.

If we want to revert or abandon all change's since the dataset was loaded use “RejectChanges”.

> *Note:- One of the most misunderstood things about these properties is that it tracks the changes of actual database.That's a fundamental mistake , actually the changes are related to only changes with dataset and has nothing to with changes happening in actual database.As dataset are disconnected and do not know anything about the changes happening in actual database.*

(B) How add/remove row's in “DataTable” object of “DataSet” ?

“Datatable” provides “NewRow” method to add new row to “DataTable”.”DataTable” has “DataRowCollection” object which has all rows in a “DataTable” object.Following are the methods provided by “DataRowCollection” object :-

Add

Add's a new row in DataTable

Remove

Remove's a "DataRow" object from "DataTable"

RemoveAt

Remove's a "DataRow" object from "DataTable" depending on index position of the "DataTable".

(B) What's basic use of "DataView" ?

"DataView" represent's a complete table or can be small section of row's depending on some criteria.It's best used for sorting and finding data with in "datatable".

Dataview has the following method's :-

Find

Take's a array of value's and return's the index of the row.

FindRow

This also takes array of values but returns a collection of "DataRow".

If we want to manipulate data of "DataTable" object create "DataView" (Using the "DefaultView" we can create "DataView" object) of the "DataTable" object. and use the following functionalities :-

AddNew

Add's a new row to the "DataView" object.

Delete

Deletes the specified row from “DataView” object.

(B) What’s difference between “DataSet” and “DataReader” ?

Note:- This is my best question and i expect everyone to answer it.

Following are the major difference between “DataSet” and “DataReader” :-

- √ “DataSet” is a disconnected architecture , while “DataReader” has live connection while reading data.So if we want to cache data and pass to a different tier “DataSet” forms the best choice and it has decent XML support.
- √ When application needs to access data from more than one table “DataSet” forms the best choice.
- √ If we need to move back while reading record’s , “datareader” does not support this functionality.
- √ But one of the biggest drawbacks of DataSet is speed.As “DataSet” carry considerable overhead because of relations,multiple tables etc speed is slower than “DataReader”.Always try to use “DataReader” whereever possible. , as it’s meant specially for speed performance.

(B) How can we load multiple tables in a DataSet ?

```
objCommand.CommandText = "Table1"

objDataAdapter.Fill(objDataSet, "Table1")

objCommand.CommandText = "Table2"

objDataAdapter.Fill(objDataSet, "Table2")
```

Above is a sample code which shows how to load multiple “DataTable” object’s in one “DataSet” object.Sample code shows two tables “Table1” and “Table2” in object ObjDataSet.

```
lstdata.DataSource = objDataSet.Tables("Table1").DefaultView
```

In order to refer “Table1” DataTable , use Tables collection of DataSet and the Defaultview object will give you the necessary output.

(B) How can we add relation's between table in a DataSet ?

```
Dim objRelation As DataRelation
objRelation=New
DataRelation("CustomerAddresses",objDataSet.Tables("Customer").Columns("Custid")
,objDataSet.Tables("Addresses").Columns("Custid_fk"))
objDataSet.Relations.Add(objRelation)
```

Relation's can be added between "DataTable" object's using the "DataRelation" object.Above sample code is trying to build a relationship between "Customer" and "Addresses" "Datatable" using "CustomerAddresses" "DataRelation" object.

(B) What's the use of CommandBuilder ?

CommandBuilder builds "Parameter" objects automatically.Below is a simple code which uses commandbuilder to load its parameter object's.

```
Dim pobjCommandBuilder As New OleDbCommandBuilder(pobjDataAdapter)
pobjCommandBuilder.DeriveParameters(pobjCommand)
```

Be careful while using "DeriveParameters" method as it needs a extra trip to the Datastore which can be very inefficient.

(B) What's difference between "Optimistic" and "Pessimistic" locking ?

In pessimistic locking when user wants to update data it locks the record and till then no one can update data.Other user's can only view the data when there is pessimistic locking.

In optimistic locking multiple user's can open the same record for updating , thus increase maximum concurrency.This is the most preferred way of locking practically.Now a days browser based application are very common and having pessimistic locking is not a practical solution.

(A) How many way's are there to implement locking in ADO.NET ?

Following are the ways to implement locking using ADO.NET :-

- √ When we call "Update" method of DataAdapter it handles locking internally.If the DataSet values are mot matching with current data in Database it raises Concurrency exception error.We can easily trap this error using Try..Catch block and raise appropriate error message to the user.
- √ Define a Datetime stamp field in the table.When actually you are firing the UPDATE SQL statements compare the current timestamp with one existing in the database.Below is a sample SQL which checks for timestamp before updating and any mismatch in timestamp it will not update the records.This is the best practice used by industries for locking.

```
Update table1 set field1=@test where LastTimeStamp=@CurrentTimeStamp
```

- √ Check for original values stored in SQL SERVER and actual changed values.In stored procedure check before updating that the old data is same as the current.Example in the below shown SQL before updating field1 we check that is the old field1 value same.If not then some one else has updated and necessary action has to be taken.

```
Update table1 set field1=@test where field1 = @oldfield1value
```

Locking can be handled at ADO.NET side or at SQL SERVER side i.e. in stored procedures.for more details of how to implementing locking in SQL SERVER read "What are different locks in SQL SERVER ?" in SQL SERVER chapter.

Note:- This is one of the favorite question's of interviewer , so cram it....When i say cram it i do not mean it.... i mean understand it.This book has tried to cover ADO.NET as much as possible , but indeterminist nature of ADO.NET interview question's makes it difficult to make full justice.But hope so that the above question's will make you quiet confident during interviews.

(A)How can we perform transactions in .NET?

The most common sequence of steps that would be performed while developing a transactional application is as follows:

- √ Open a database connection using the Open method of the connection object.
- √ Begin a transaction using the Begin Transaction method of the connection object. This method provides us with a transaction object that we will use later to commit or rollback the transaction. Note that changes caused by any queries executed before calling the Begin Transaction method will be committed to the database immediately after they execute.Set the Transaction property of the command object to the above mentioned transaction object.
- √ Execute the SQL commands using the command object. We may use one or more command objects for this purpose, as long as the Transaction property of all the objects is set to a valid transaction object.
- √ Commit or roll back the transaction using the Commit or Rollback method of the transaction object.
- √ Close the database connection.

(I)What's difference between Dataset. clone and Dataset. copy ?

Clone: - It only copies structure, does not copy data.

Copy: - Copies both structure and data.

(A)Can you explain the difference between an ADO.NET Dataset and an ADO Recordset?

There two main basic differences between recordset and dataset :-

- √ With dataset you an retrieve data from two databases like oracle and sql server and merge them in one dataset , with recordset this is not possible
- √ All representation of Dataset is using XML while recordset uses COM.
- √ Recordset can not be transmitted on HTTP while Dataset can be.

10. SQL SERVER

(B) What is normalization? What are different type of normalization?

Note :- A regular .NET programmer working on projects often stumbles in this question ,which is but obvious.Bad part is sometimes interviewer can take this as a very basic question to be answered and it can be a turning point for the interview.So let's cram it.

It is set of rules that has been established to aid in the design of tables that are meant to be connected through relationships. This set of rules is known as Normalization.

Benefits of Normalizing your database include:

- √ Avoiding repetitive entries
- √ Reducing required storage space
- √ Preventing the need to restructure existing tables to accommodate new data.
- √ Increased speed and flexibility of queries, sorts, and summaries.

Note :- During interview people expect to answer maximum of three normal forms and thats what is expected practically.Actually you can normalize database to fifth normal form.But believe this book answering three normal forms will put you in decent shape during interview.

Following are the three normal forms :-

First Normal Form

For a table to be in first normal form, data must be broken up into the smallest units possible.In addition to breaking data up into the smallest meaningful values, tables in first normal form should not contain repetitions groups of fields.

Customer id	Customer Name	City1	City2	Unit Price	Qty	Total
3243244	Shivprasad koirala	xyz	PQR	1	12	12$
3043244	Sanjana koirala	xcv	123	10	1	10$

Figure :- 10.1 Repeating groups example

For in the above example city1 and city2 are repeating.In order this table to be in First normal form you have to modify the table structure as follows.Also not that the Customer Name is now broken down to first name and last name (First normal form data should be broken down to smallest unit).

Customer id	First Name	Last Name	City	Unit Price	Qty	Total
3243244	Shivprasad	Koirala	xyz	1	12	12$
3243244	Shivprasad	koirala	PQR	1	12	12$
3043244	Sanjana	koirala	xcv	2	20	40$
3043244	sanjana	Koirala	123	2	20	40$

Figure :- 10.2 Customer table normalized to first normal form

Second Normal form

The second normal form states that each field in a multiple field primary keytable must be directly related to the entire primary key. Or in other words,each non-key field should be a fact about all the fields in the primary key.

In the above table of customer , city is not linked to any primary field.

Customer id	First Name	Last Name	City	Unit Price	Qty	Total
3243244	Shivprasad	Koirala	xyz	1	12	12$
3243244	Shivprasad	koirala	PQR	1	12	12$
3043244	Sanjana	koirala	xcv	2	20	40$
3043244	sanjana	Koirala	123	2	20	40$

Figure :- 10.3 Normalized customer table.

City id	City
1	xyz
2	PQR
3	xcv
4	123

Figure :- 10.4 City is now shifted to a different master table.

That takes our database to a second normal form.

Third normal form

A non-key field should not depend on other Non-key field.The field "Total" is dependent on "Unit price" and "qty".

Customer id	First Name	Last Name	City	Unit Price	Qty
3243244	Shivprasad	Koirala	xyz	1	12
3243244	Shivprasad	koirala	PQR	1	12
3043244	Sanjana	koirala	xcv	2	20
3043244	sanjana	Koirala	123	2	20

Figure :- 10.5 Fill third normal form

So now the "Total" field is removed and is multiplication of Unit price * Qty.

Note :- Fourth and Fifth normal form is left as a home work to users.

(B)What is denormalization ?

Denormalization is the process of putting one fact in numerous places (its vice-versa of normalization).Only one valid reason exists for denormalizing a relational design - to enhance performance.The sacrifice to performance is that you increase redundancy in database.

(B)What is a candidate key ?

A table may have more than one combination of columns that could uniquely identify the rows in a table; each combination is a candidate key. During database design you can pick up one of the candidate keys to be the primary key. For example, in the supplier table

supplierid and suppliername can be candidate key but you will only pick up supplierid as the primary key.

(B) What are different types of joins and whats the difference between them ?

INNER JOIN

Inner join shows matches only when they exist in both tables.Example in the below SQL there are two tables Customers and Orders and the inner join in made on Customers Customerid and Orders Customerid.So this SQL will only give you result with customers who have orders.If the customer does not have order it will not display that record.

```
SELECT Customers.*, Orders.* FROM Customers INNER JOIN Orders ON
Customers.CustomerID =Orders.CustomerID
```

LEFT OUTER JOIN

Left join will display all records in left table of the SQL statement.In SQL below customers with or without orders will be displayed. Order data for customers without orders appears as NULL values. For example, you want to determine the amount ordered by each customer and you need to see who has not ordered anything as well. You can also see the LEFT OUTER JOIN as a mirror image of the RIGHT OUTER JOIN (Is covered in the next section) if you switch the side of each table.

```
SELECT Customers.*, Orders.* FROM Customers LEFT OUTER JOIN Orders ON
Customers.CustomerID =Orders.CustomerID
```

RIGHT OUTER JOIN

Right join will display all records in right table of the SQL statement.In SQL below all orders with or without matching customer records will be displayed. Customer data for orders without customers appears as NULL values. For example, you want to determine if there are any orders in the data with undefined CustomerID values (say, after a conversion or something like it). You can also see the RIGHT OUTER JOIN as a mirror image of the LEFT OUTER JOIN if you switch the side of each table.

```
SELECT Customers.*, Orders.* FROM Customers RIGHT OUTER JOIN Orders
ON Customers.CustomerID =Orders.CustomerID
```

(I)What are indexes and What is the difference between clustered and nonclustered indexes?

Indexes in SQL Server are similar to the indexes in books. They help SQL Server retrieve the data quicker

There are clustered and nonclustered indexes. A clustered index is a special type of index that reorders the way records in the table are physically stored. Therefore table can have only one clustered index. The leaf nodes of a clustered index contain the data pages.

A nonclustered index is a special type of index in which the logical order of the index does not match the physical stored order of the rows on disk. The leaf node of a nonclustered index does not consist of the data pages. Instead, the leaf nodes contain index rows.

(A)How can you increase SQL performance ?

Following are tips which will increase your SQl performance :-

- √ Every index increases the time in takes to perform INSERTS, UPDATES and DELETES, so the number of indexes should not be very much. Try to use maximum 4-5 indexes on one table, not more. If you have read-only table, then the number of indexes may be increased.
- √ Keep your indexes as narrow as possible. This reduces the size of the index and reduces the number of reads required to read the index.
- √ Try to create indexes on columns that have integer values rather than character values.
- √ If you create a composite (multi-column) index, the order of the columns in the key are very important. Try to order the columns in the key as to enhance selectivity, with the most selective columns to the leftmost of the key.
- √ If you want to join several tables, try to create surrogate integer keys for this purpose and create indexes on their columns.

- √ Create surrogate integer primary key (identity for example) if your table will not have many insert operations.
- √ Clustered indexes are more preferable than nonclustered, if you need to select by a range of values or you need to sort results set with GROUP BY or ORDER BY.
- √ If your application will be performing the same query over and over on the same table, consider creating a covering index on the table.
- √ You can use the SQL Server Profiler Create Trace Wizard with "Identify Scans of Large Tables" trace to determine which tables in your database may need indexes. This trace will show which tables are being scanned by queries instead of using an index.

(A)What is the use of OLAP ?

OLAP is useful because it provides fast and interactive access to aggregated data and the ability to drill down to detail.

(A)What's a measure in OLAP ?

Measures are the key performance indicators that you want to evaluate. To determine which of the numbers in the data might be measures, a rule of thumb is: If a number makes sense when it is aggregated, then it is a measure.

(A)What are dimensions in OLAP ?

Dimensions are the categories of data analysis.For example, in a revenue report by month by sales region, the two dimensions needed are time and sales region.Typical dimensions include product, time, and region.

(A)What are levels in dimensions ?

Dimensions are arranged in hierarchical levels, with unique positions within each level. For example, a time dimension may have four levels, such as Year, Quarter, Month, and Day. Or the dimension might have only three levels, for example, Year, Week, and Day. The values within the levels are called members. For example, the years 2002 and 2003 are members of the level Year in the Time dimension.

(A)What are fact tables and dimension tables in OLAP ?

Twist :- can you explain the star schema for OLAP ?

The dimensions and measures are physically represented by a star schema.Dimension tables revolve around fact table. A fact table contains a column for each measure as well as a column for each dimension. Each dimension column has a foreign-key relationship to the related dimension table, and the dimension columns taken together are the key to the fact table.

(A)What is DTS?

DTS is used to pull data from various sources into the star schema.

(A)What is fillfactor ?

Twist :- When does plage split occurs ?

The 'fill factor' option specifies how full SQL Server will make each index page. When there is no free space to insert new row on the index page, SQL Server will create new index page and transfer some rows from the previous page to the new one. This operation is called page splits. You can reduce the number of page splits by setting the appropriate fill factor option to reserve free space on each index page. The fill factor is a value from 1 through 100 that specifies the percentage of the index page to be left empty. The default value for fill factor is 0. It is treated similarly to a fill factor value of 100, the difference in that SQL Server leaves some space within the upper level of the index tree for FILLFACTOR = 0. The fill factor percentage is used only at the time the index is created. If the table contains read-only data (or data that very rarely changed), you can set the 'fill factor' option to 100. When the table's data modified very often, you can decrease the fill factor to 70% or whatever you think is best.

(A)What is RAID and how does it work ?

Redundant Array of Independent Disks (RAID) is a term used to describe the technique of improving data availability through the use of arrays of disks and various data-striping methodologies. Disk arrays are groups of disk drives that work together to achieve higher data-transfer and I/O rates than those provided by single large drives. An array is a set of multiple disk drives plus a specialized controller (an array controller) that keeps track of how data is distributed across the drives. Data for a particular file is written in segments to the different drives in the array rather than being written to a single drive.

For speed and reliability, it's better to have more disks. When these disks are arranged in certain patterns and use a specific controller, they are called a Redundant Array of Inexpensive Disks (RAID) set. There are several numbers associated with RAID, but the most common are 1, 5 and 10.

RAID 1 works by duplicating the same writes on two hard drives. Let's assume you have two 20 Gigabyte drives. In RAID 1, data is written at the same time to both drives. RAID1 is optimized for fast writes.

RAID 5 works by writing parts of data across all drives in the set (it requires at least three drives). If a drive failed, the entire set would be worthless. To combat this problem, one of the drives stores a "parity" bit. Think of a math problem, such as 3 + 7 = 10. You can think of the drives as storing one of the numbers, and the 10 is the parity part. By removing any one of the numbers, you can get it back by referring to the other two, like this: 3 + X = 10. Of course, losing more than one could be evil. RAID 5 is optimized for reads.

RAID 10 is a bit of a combination of both types. It doesn't store a parity bit, so it's fast, but it duplicates the data on two drives to be safe. You need at least four drives for RAID 10. This type of RAID is probably the best compromise for a database server.

> *Note :- It's difficult to cover complete aspect of RAID in this book.It's better to take some decent SQL SERVER book for in detail knowledge , but yes from interview aspect you can probably escape with this answer.*

(B)What's the difference between DELETE TABLE and TRUNCATE TABLE commands?

Following are difference between them :-

- √ DELETE TABLE syntax logs the deletes thus making the delete operation slow.TRUNCATE table does not log any information but it logs information about deallocation of data page of the table.So TRUNCATE table is faster as compared to delete table.
- √ DELETE table can be rolled back while TRUNCATE can not be.
- √ DELETE table can have criteria while TRUNCATE can not.
- √ TRUNCATE table can not triggers.

(B)What are the problems that can occur if you do not implement locking properly in SQL SERVER ?

Following are the problems that occur if you do not implement locking properly in SQL SERVER.

Lost Updates

Lost updates occur if you let two transactions modify the same data at the same time, and the transaction that completes first is lost. You need to watch out for lost updates with the READ UNCOMMITTED isolation level. This isolation level disregards any type of locks, so two simultaneous data modifications are not aware of each other. Suppose that a customer has due of 2000$ to be paid.He pays 1000$ and again buys a product of 500$.Lets say that these two transactions are now been entered from two different counters of the company.Now both the counter user start making entry at the same time 10:00 AM.Actually speaking at 10:01 AM the customer should have 2000-1000+500 = 1500$ pending to be paid.But as said in lost updates the first transaction is not considered and the second transaction overrides it.So the final pending is 2000$+500$ = 2500$.....I hope the company does not loose the customer.

Non-Repeatable Read

Non-repeatable reads occur if a transaction is able to read the same row multiple times and gets a different value each time.Again, this problem is most likely to occur with the READ UNCOMMITTED isolation level. Because you let two transactions modify data at the same time, you can get some unexpected results. For instance, a customer wants to book flight , so the travel agent checks for the flights availability.Travel agent finds a seat and goes ahead to book the seat.While the travel agent is booking the seat , some other travel agent books the seat.When this travel agent goes to update the record , he gets error saying that “Seat is already booked”.In short the travel agent gets different status at different times for the seat.

Dirty Reads

Dirty reads are a special case of non-repeatable read. This happens if you run a report while transactions are modifying the data that you're reporting on. For example there is a customer invoice report which runs on 1:00 AM in afternoon and after that all invoices are sent to the respective customer for payments.Lets say one of the customer has 1000$

to be paid.Customer pays 1000$ at 1:00 AM and at the same time report is run.Actually customer has no money pending but is still issued a invoice.

Phantom Reads

Phantom reads occur due to a transaction being able to read a row on the first read, but not being able to modify the same row due to another transaction deleting rows from the same table. Lets say you edit a record in the mean time somebody comes and deletes the record , you then go for updating the record which does not exist....Panic.

Interestingly, the phantom reads can occur even with the default isolation level supported by SQL Server: READ COMMITTED. The only isolation level that doesn't allow phantoms is SERIALIZABLE, which ensures that each transaction is completely isolated from others. In other words, no one can acquire any type of locks on the affected row while it is being modified.

(B)What are different transaction levels in SQL SERVER ?

Twist :- what are different types of locks in SQL SERVER ?

Transaction Isolation level decides how is one process isolated from other process.Using transaction levels you can implement locking in SQL SERVER.

There are four transaction levels in SQL SERVER :-

READ COMMITTED

The shared lock is held for the duration of the transaction, meaning that no other transactions can change the data at the same time. Other transactions can insert and modify data in the same table, however, as long as it is not locked by the first transaction.

READ UNCOMMITTED

No shared locks and no exclusive locks are honored. This is the least restrictive isolation level resulting in the best concurrency but the least data integrity.

REPEATABLE READ

This setting disallows dirty and non-repeatable reads. However, even though the locks are held on read data, new rows can still be inserted in the table, and will subsequently be read by the transaction.

SERIALIZABLE

This is the most restrictive setting holding shared locks on the range of data. This setting does not allow the insertion of new rows in the range that is locked; therefore, no phantoms are allowed.

Following is the syntax for setting transaction level in SQL SERVER.

SET TRANSACTION ISOLATION LEVEL SERIALIZABLE

(I)What are different locks in SQL SERVER ?

Depending on the transaction level six types of lock can be acquired on data :-

Intent

The intent lock shows the future intention of SQL Server's lock manager to acquire locks on a specific unit of data for a particular transaction. SQL Server uses intent locks to queue exclusive locks, thereby ensuring that these locks will be placed on the data elements in the order the transactions were initiated. Intent locks come in three flavors: intent shared (IS), intent exclusive (IX), and shared with intent exclusive (SIX).

IS locks indicate that the transaction will read some (but not all) the resources in the table or page by placing shared locks.

IX locks indicate that the transaction will modify some (but not all) resources in the table or page by placing exclusive locks.

SIX locks indicate that the transaction will read all resources, and modify some(but not all) of them. This will be accomplished by placing the shared locks on the resources read and exclusive locks on the rows modified. Only one SIX lock is allowed per resource at one time; therefore, SIX locks prevent other connections from modifying any data in the resource (page or table), although they do allow reading the data in the same resource.

Shared

Shared locks (S) allow transactions to read data with SELECT statements. Other connections are allowed to read the data at the same time; however, no transactions are allowed to modify data until the shared locks are released.

Update

Update locks (U) are acquired just prior to modifying the data. If a transaction modifies a row, then the update lock is escalated to an exclusive lock; otherwise, it is converted to a shared lock. Only one transaction can acquire update locks to a resource at one time. Using update locks prevents multiple connections from having a shared lock that want to eventually modify a resource using an exclusive lock. Shared locks are compatible with other shared locks, but are not compatible with Update locks.

Exclusive

Exclusive locks (X) completely lock the resource from any type of access including reads. They are issued when data is being modified through INSERT, UPDATE and DELETE statements.

Schema

Schema modification locks (Sch-M) are acquired when data definition language statements, such as CREATE TABLE, CREATE INDEX, ALTER TABLE, and so on are being executed. Schema stability locks (Sch-S) are acquired when store procedures are being compiled.

Bulk Update

Bulk update locks (BU) are used when performing a bulk-copy of data into a table with TABLOCK hint. These locks improve performance while bulk copying data into a table; however, they reduce concurrency by effectively disabling any other connections to read or modify data in the table.

(I)Can we suggest locking hints to SQL SERVER ?

We can give locking hints that help's you override default decisions made by SQL Server. For instance, you can specify the ROWLOCK hint with your UPDATE statement to convince SQL Server to lock each row affected by that data modification. Whether it's

prudent to do so is another story; what will happen if your UPDATE affects 95% of rows in the affected table? If the table contains 1000 rows, then SQL Server will have to acquire 950 individual locks, which is likely to cost a lot more in terms of memory than acquiring a single table lock. So think twice before you bombard your code with ROWLOCKS.

(I)What is LOCK escalation?

Lock escalation is the process of converting a lot of low level locks (like row locks, page locks) into higher level locks (like table locks). Every lock is a memory structure too many locks would mean, more memory being occupied by locks. To prevent this from happening, SQL Server escalates the many fine-grain locks to fewer coarse-grain locks. Lock escalation threshold was definable in SQL Server 6.5, but from SQL Server 7.0 onwards it's dynamically managed by SQL Server.

(B)What are the different ways of moving data/ databases between servers and databases in SQL Server?

There are lots of options available, you have to choose your option depending upon your requirements. Some of the options you have are: BACKUP/RESTORE, detaching and attaching databases, replication, DTS, BCP, logshipping, INSERT...SELECT, SELECT...INTO, creating INSERT scripts to generate data.

(I)What are advantages of SQL 2000 over SQl 7.0 ?

- √ User-Defined Functions: User-Defined Functions (UDFs) -- one or more Transact-SQL statements can be used to encapsulate code for reuse. User-defined functions cannot make a permanent changes to the data or modify database tables. UDF can change only local objects for a UDF, such as local cursors or variables.
- √ Distributed Partitioned Views: Distributed partitioned views allow you to partition tables horizontally across multiple servers. So, you can scale out one database server to a group of database servers that cooperate to provide the same performance levels as a cluster of database servers. Due to distributed partitioned views, SQL Server 2000 now on the first place in the tpc-c tests.

- √ New Data Types: These include: bigint, an 8-byte integer type; sql_variant, a data type that allows the storage of data of different data types; and the table data type, which allows applications to store results temporarily for later use.
- √ INSTEAD OF and AFTER Triggers: There are INSTEAD OF and AFTER Triggers in SQL Server 2000. INSTEAD OF triggers are executed instead of the INSERT, UPDATE or DELETE triggering action. AFTER triggers are executed after the triggering action.
- √ Cascading Referential Integrity Constraints: There are new ON DELETE and ON UPDATE clauses in the REFERENCES clause of the CREATE TABLE and ALTER TABLE statements.The ON DELETE clause controls what actions are taken if you attempt to delete a row to which existing foreign keys point. The ON UPDATE clause defines the actions that are taken if you attempt to update a candidate key value to which existing foreign keys point.
- √ The ON DELETE and ON UPDATE clauses have two options:

  NO ACTION :-NO ACTION specifies that the deletion/update fail with an error.

  CASCADE :-CASCADE specifies that all the rows with foreign keys pointing to the deleted/updated row are also deleted/updated.
- √ 32 CPU and 64GB Memory Support: SQL Server 2000 Enterprise Edition running under Windows 2000 DataCenter can support up to 32 CPUs and up to 64GB of physical memory (RAM) on a computer.
- √ XML Support: SQL Server 2000 can use XML to insert, update, and delete values in the database, and the database engine can return data as Extensible Markup Language (XML) documents

(B)What is the difference between a HAVING CLAUSE and a WHERE CLAUSE?

You can use Having Clause with the GROUP BY function in a query and WHERE Clause is applied to each row before they are part of the GROUP BY function in a query.

(B) What is difference between UNION and UNION ALL SQL syntax ?

UNION SQL syntax is used to select information from two tables.But it selects only distinct records from both the table. , while UNION ALL selects all records from both the tables.

Note :- Selected records should have same datatype or else the syntax will not work.

(I)How can you raise custom errors from stored procedure ?

The RAISERROR statement is used to produce an ad hoc error message or to retrieve a custom message that is stored in the sysmessages table. You can use this statement with the error handling code presented in the previous section to implement custom error messages in your applications. The syntax of the statement is shown here.

RAISERROR ({msg_id |msg_str }{,severity ,state }

[,argument [,,...n]]))

[WITH option [,,...n]]

A description of the components of the statement follows.

msg_id :-The ID for an error message, which is stored in the error column in sysmessages.

msg_str :-A custom message that is not contained in sysmessages.

severity :- The severity level associated with the error. The valid values are 0–25. Severity levels 0–18 can be used by any user, but 19–25 are only available to members of the fixed-server role sysadmin. When levels 19–25 are used, the WITH LOG option is required.

state A value that indicates the invocation state of the error. The valid values are 0–127. This value is not used by SQL Server.

Argument, . . .

One or more variables that are used to customize the message. For example, you could pass the current process ID (@@SPID) so it could be displayed in the message.

WITH option, . . .

The three values that can be used with this optional argument are described here.

LOG - Forces the error to logged in the SQL Server error log and the NT application log.

NOWAIT - Sends the message immediately to the client.

SETERROR - Sets @@ERROR to the unique ID for the message or 50,000.

The number of options available for the statement make it seem complicated, but it is actually easy to use. The following shows how to create an ad hoc message with a severity of 10 and a state of 1.

```
RAISERROR ('An error occured updating the NonFatal table',10,1)

--Results--

An error occured updating the NonFatal table
```

The statement does not have to be used in conjunction with any other code, but for our purposes it will be used with the error handling code presented earlier. The following alters the ps_NonFatal_INSERT procedure to use RAISERROR.

```
USE tempdb

go

ALTER PROCEDURE ps_NonFatal_INSERT

@Column2 int =NULL

AS

DECLARE @ErrorMsgID int


INSERT NonFatal VALUES (@Column2)

SET @ErrorMsgID =@@ERROR

IF @ErrorMsgID <>0

 BEGIN

  RAISERROR ('An error occured updating the NonFatal table',10,1)

 END
```

When an error-producing call is made to the procedure, the custom message is passed to the client. The following shows the output generated by Query Analyzer.

(I) What is ACID fundamental and what are transactions in SQL SERVER ?

A transaction is a sequence of operations performed as a single logical unit of work. A logical unit of work must exhibit four properties, called the ACID (Atomicity, Consistency, Isolation, and Durability) properties, to qualify as a transaction:

Atomicity

- √ A transaction must be an atomic unit of work; either all of its data modifications are performed or none of them is performed.

Consistency

- √ When completed, a transaction must leave all data in a consistent state. In a relational database, all rules must be applied to the transaction's modifications to maintain all data integrity. All internal data structures, such as B-tree indexes or doubly-linked lists, must be correct at the end of the transaction.

Isolation

- √ Modifications made by concurrent transactions must be isolated from the modifications made by any other concurrent transactions. A transaction either sees data in the state it was in before another concurrent transaction modified it, or it sees the data after the second transaction has completed, but it does not see an intermediate state. This is referred to as serializability because it results in the ability to reload the starting data and replay a series of transactions to end up with the data in the same state it was in after the original transactions were performed.

Durability

- √ After a transaction has completed, its effects are permanently in place in the system. The modifications persist even in the event of a system failure.

(A) What is DBCC?

DBCC (Database Consistency Checker Commands) is used to check logical and physical consistency of database structure.DBCC statements can fix and detect problems.They are grouped in to four categories :-

- √ Maintenance commands like DBCC DBREINDEX , DBCC DBREPAIR etc , they are mainly used for maintenance tasks in SQL SERVER.
- √ Miscellaneous commands like DBCC ROWLOCK , DBCC TRACEOFF etc , they are mainly used for enabling row-level locking or removing DLL from memory.
- √ Status Commands like DBCC OPENTRAN , DBCC SHOWCONTIG etc , they are mainly used for checking status of the database.
- √ Validation Commands like DBCC CHECKALLOC,DBCC CHECKCATALOG etc , they perform validation operations on database.

Note :- Check MSDN for list of all DBCC commands , its very much possible specially during DBA interviews they can ask in depth individual commands.

Below is a sample screen in which DBCC SHOWCONTIG command is run.DBCC SHOWCONTIG is used to display fragmentation information for the data and indexes of the specified table.In the sample screen “Customer” table is checked for fragmentation information.If you look at the figure “Scan density” is 100 if everything is contigious in this image it is 95.36% which is decent percentage.So such type of useful information can be collected by DBCC command and database performance and maintenance can be improved.

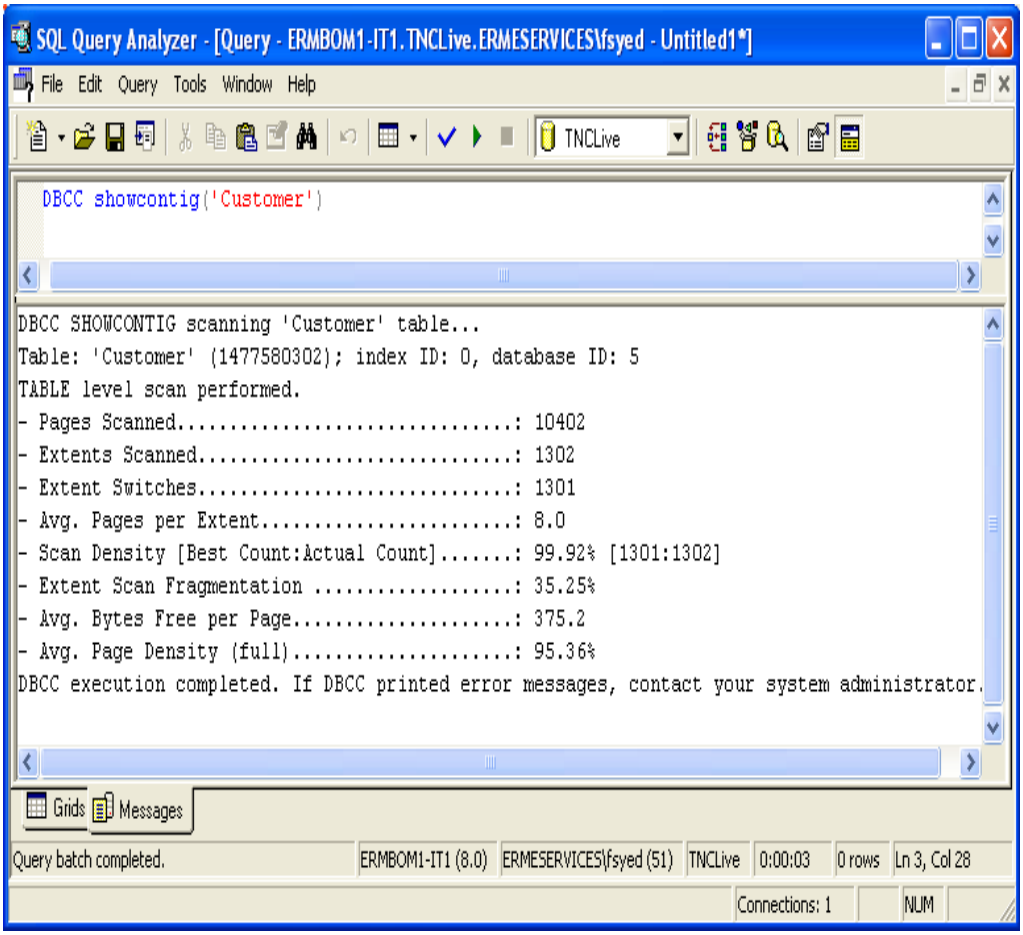


Figure :- 10.6 DBCC SHOWCONTIG command in action.

(A) What is purpose of Replication ?

Replication is way of keeping data synchronized in multiple databases.SQL server replication has two important aspects publisher and subscriber.

Publisher

Database server that makes data available for replication is called as Publisher.

Subscriber

Database Servers that get data from the publishers is called as Subscribers.

(A) What are different type of replication supported by SQL SERVER ?

There are three types of replication supported by SQL SERVER:-

Snapshot Replication.

Snapshot Replication takes snapshot of one database and moves it to the other database.After initial load data can be refreshed periodically.The only disadvantage of this type of replication is that all data has to copied each time the table is refreshed.

Transactional Replication

In transactional replication data is copied first time as in snapshot replication , but later only the transactions are synchronized rather than replicating the whole database.You can either specify to run continuously or on periodic basis.

Merge Replication.

Merge replication combines data from multiple sources into a single central database.Again as usual the initial load is like snapshot but later it allows change of data both on subscriber and publisher , later when they come on-line it detects and combines them and updates accordingly.

(I) What is BCP utility in SQL SERVER ?

BCP (Bulk Copy Program) is a command line utility by which you can import and export large amounts of data in and out of SQL SERVER database.

Below is a sample which shows BCP in action.

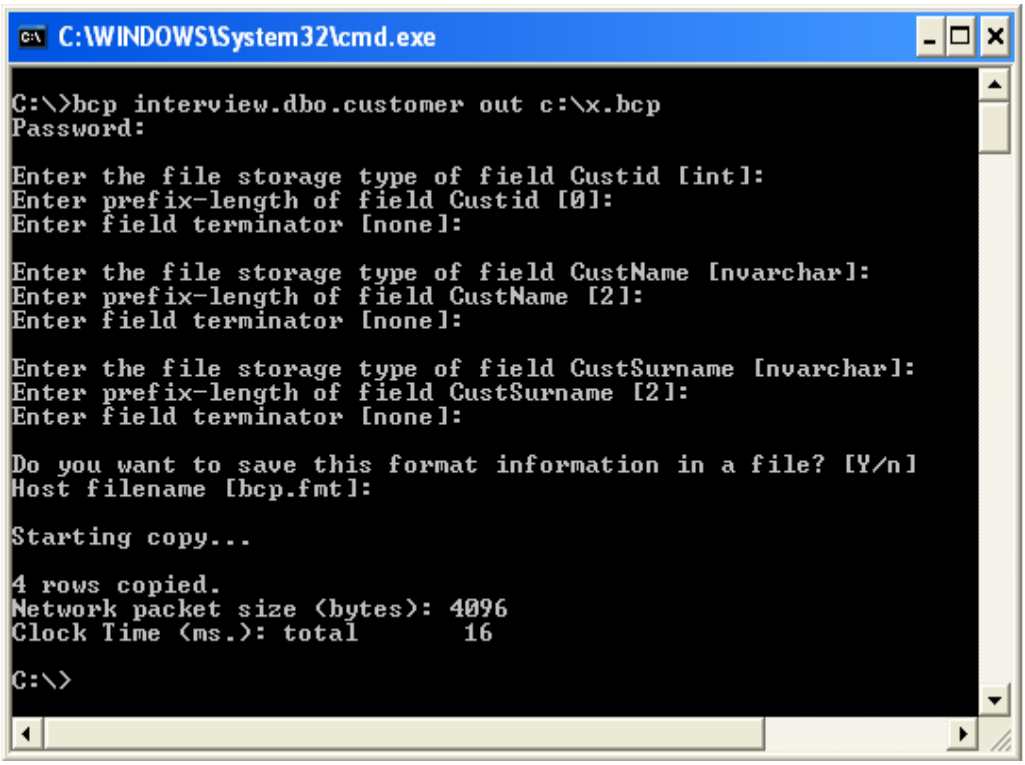


Figure :- 10.7 Export BCP utility in action

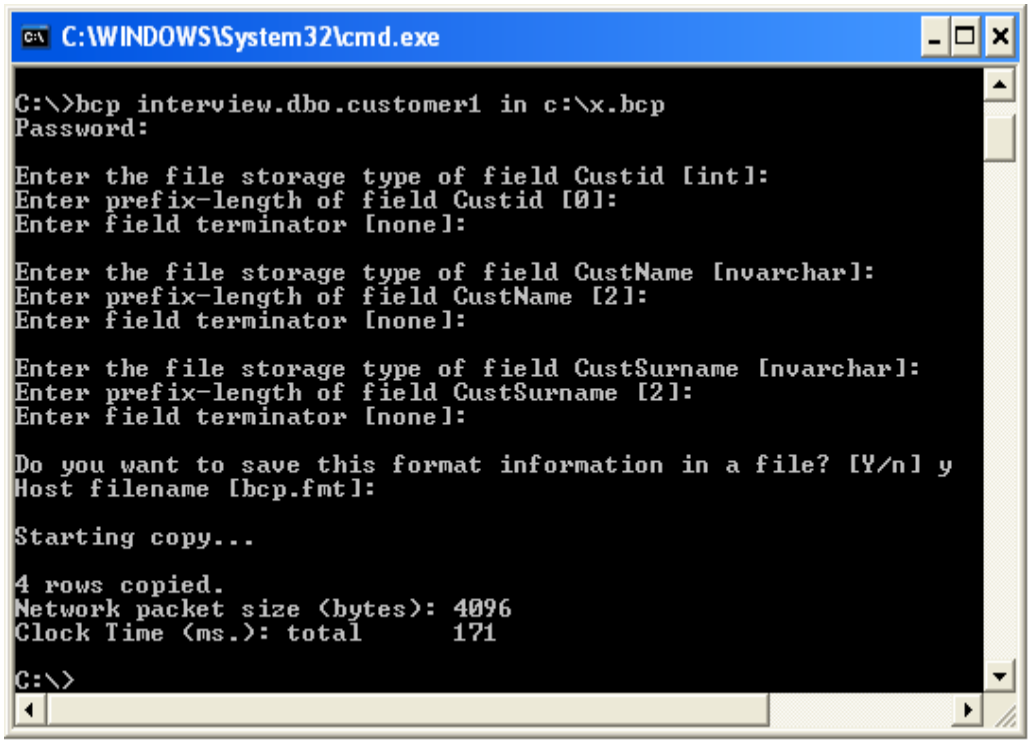


Figure :- 10.8 Import BCP utility in action

(I)What are different types of triggers in SQl SERVER 2000 ?

There are two types of triggers :-

√ INSTEAD OF triggers

INSTEAD OF triggers fire in place of the triggering action. For example, if an INSTEAD OF UPDATE trigger exists on the Sales table and an UPDATE statement is executed against the Salestable, the UPDATE statement will not change a row in the sales table. Instead, the UPDATE statement causes the INSTEAD OF UPDATE trigger to be executed, which may or may not modify data in the Sales table.

√ AFTER triggers

AFTER triggers execute following the SQL action, such as an insert, update, or delete.This is the traditional trigger which existed in SQL SERVER.

INSTEAD OF triggers gets executed automatically before the Primary Key and the Foreign Key constraints are checked, whereas the traditional AFTER triggers gets executed after these constraints are checked.

Unlike AFTER triggers, INSTEAD OF triggers can be created on views.

(A)If we have multiple AFTER Triggers on table how can we define the sequence of the triggers ?

If a table has multiple AFTER triggers, then you can specify which trigger should be executed first and which trigger should be executed last using the stored procedure sp_settriggerorder. All the other triggers are in an undefined order which you cannot control.

(A)What is SQl injection ?

It is a Form of attack on a database-driven Web site in which the attacker executes unauthorized SQL commands by taking advantage of insecure code on a system connected to the Internet, bypassing the firewall. SQL injection attacks are used to steal information from a database from which the data would normally not be available and/or to gain access to an organization's host computers through the computer that is hosting the database.

SQL injection attacks typically are easy to avoid by ensuring that a system has strong input validation.

As name suggest we inject SQL which can be relatively dangerous for the database. Example this is a simple SQL

```
SELECT email, passwd, login_id, full_name
  FROM members
 WHERE email = 'x'
```

Now somebody does not put "x" as the input but puts "x ; DROP TABLE members;". So the actual SQL which will execute is :-

```
SELECT email, passwd, login_id, full_name
  FROM members
 WHERE email = 'x'  ; DROP TABLE members;
```

Think what will happen to your database

11. UML

(B) What is UML?

The Unified Modeling Language (UML) is a graphical language for visualizing,specifying, constructing, and documenting the artifacts of a software-intensive system.UML provides blue prints for business process,System function,programming language statements,database schemas and reusable components.

(I) How many types of diagrams are there in UML ?

Twist :- Explain in short all types of diagrams in UML ?

There are nine types of diagrams in UML :-

Use case diagram:

They describe "WHAT" of a system rather than "HOW" the system does it.They are used to identify the primary elements and processes that form the system. The primary elements are termed as "actors" and the processes are called "use cases." Use Case diagrams shows "actors" and there "roles".

Class diagram:

From the use case diagram we can now go to detail design of system , for which the primary step is class diagram.The best way to identify classes is to consider all "NOUNS" in use cases as classes , "VERBS" as methods of classes, relation between actors can then be used to define relation between classes.The relationship or association between the classes can be either an "is-a" or "has-a" relationship which can easily be identified from use cases.

Object diagram:

An object is an instance of a class.Object diagram captures the state of classes in the system and their relationships or associations at a specific point of time.

State diagram:

A state diagram, as the name suggests, represents the different states that objects in the system undergo during their life cycle.Object change in response to certain simulation so

this simulation effect is captured in state diagram.So basically it has a initial state and final state and events that happen in between them.Whenever you think that some simulations are complicated you can go for this diagram.

Sequence diagram:

Sequence diagrams can be used to explore the logic of a complex operation, function, or procedure.They are called sequence diagrams because sequential nature is shown via ordering of messages.First message starts at the top and the last message ends at bottom.The important aspect of a sequence diagram is that it is time-ordered. This means that the exact sequence of the interactions between the objects is represented step by step. Different objects in the sequence diagram interact with each other by passing "messages".

Collaboration diagram:

A collaboration diagram groups together the interactions between different objects to fulfill a common purpose.

Activity diagram:

Activity diagram is typically used for business process modeling, for modeling the logic captured by a single use case , or for visualizing the detailed logic of a business rule.Complicated process flows in the system are captured in the activity diagram.Similar to a state diagram, an activity diagram also consists of activities, actions, transitions, initial and final states, and guard conditions.But difference is state diagrams are in context of simulation while activity gives detail view of a business logic.

Deployment diagram:

Deployment diagrams show the hardware for your system, the software that is installed on that hardware, and the middleware used to connect the disparate machines to one another.It shows how the hardware and software work together to run a system.In one line its shows the deployment view of the system.

Component diagram:

The component diagram represents the high-level parts that make up the system.From .NET angle point of view they form the "NAMESPACES".This diagram depicts, at a

high level, what components form part of the system and how they are interrelated.Its shows the logical grouping of classes or group of other components.

> *Note :- The best way to remember all the blocks of UML is "Serve cool SOUP during church ceremony" that covers State chart,Class diagrams,Sequence diagram,Object diagram,Use Case diagram,Package diagram,Deployment diagram,Collaboration diagram,Component diagram:.*

(B) What are advantages of using UML?

> *Twist: - What is Modeling and why UML ?*

As the name suggest UNIFIED MODELING LANGUAGE.Modelling has been around for years, not only in software field but also in other trades like civil, mechanical etc. Example in civil engineering drawing the main architecture built of diagram is a model by itself.Modelling makes complex and huge system to break up in to simple and discrete pieces that can be individually understood. Example simple flowchart drawing is modeling.

There are two main advantages of modeling:-

- √ Readability: - Representing your whole architecture in flowchart, class diagrams, ER diagrams etc makes your project more readable. Especially when programmer's change jobs handover becomes easier. More the project is not readable more the dependencies.
- √ Reusability: - After the system is more readable and broken down to pieces, it becomes easier to identify redundant and similar modules. Thus increasing reusability.

So why UML, well different language's have different ways of coding and syntaxes. In order to bring all languages in one roof UML is in to picture. As the term comes in UNIFIED, it unifies all disparate languages in one roof so that can be understood by people who are working on some other platforms.

(A)What's the sequence of UML diagrams in project?

> *Twist: - How did you implement UML in your project?*

First let me say some fact about this question, you can not implement all the nine diagrams given by UML in one project; you can but can be very rare scenario. The way UML is implemented in project varies from project to project and company to company.

Second very important point to remember is normally all diagrams are not implemented in project , but some basic diagrams are important to have in order that project is readable. When we talk about project's every project have phases example (Requirement's phase, design phase, coding phase etc etc).As every phase of the software cycle proceeds these diagrams come in picture. Some diagrams span across multiple phases.

> *Note: - If you want to have a detail about software life cycle look out for chapter "Project Management".*

Normally following are different basic phases:-

Requirement phase (Use Case Diagrams , Activity diagrams)

Requirement phase is the phase where you normally gather requirement and Use Cases are the best things to make explanation of the system. In requirement phase you can further make complicated Use Cases more simple and easy to understand by using activity diagrams, but I do not see it as must in every project. If the Use cases are really complicated go for a Activity diagram. Example CRUD (creates, read, update and delete) operation use cases have no significance for making activity diagrams. So in short the outcome UML documents from requirement phase will be Use Case and Activity diagram documents (Activity diagram documents will only be there if there are complicated Use Cases to be simplified).

> *Just a small Twist: - Do I need all UML diagrams in a project?*
>
> *Note: - This question is specially asked to know have you actually used UML. I have seen many guys trying to give some jack of all answer's saying "YES". Beware it's a trap.*

Not all diagrams are needed in project example: - Activity diagrams will only be needed when you want some simplified look of a complicated use case.

Design phase (Class diagrams , object diagrams , Component diagrams , Collaboration diagrams , Deployment diagrams, Sequence diagrams)

Design phase is the phase where you design your technical architecture of your project. Now again in this you do not use all UML documents of a project.

But the next document after the Use Case document will be the Component diagram. Component diagrams form a high level classification of the system. So after "Use Cases" just try to come out with a high level classification / grouping of related functionalities.

This should be compulsory diagram as outcome of this document will form "NAMESPACES" structure of .NET project.

Ok now once your high level grouping is done you can go ahead with class diagrams. Especially from Use Case you get the "NOUNS" and "VERBS" which can form the class name and the method name respectively. From my point of view class diagrams should be compulsory in projects.

Object diagrams are not compulsory it depends on how complicated your project. Object diagrams show's the relation between instances of class at runtime. In short it captures the state and relation of classes at any given moment of time. Example you have class which creates objects of different classes, it's like a factory. In class diagram you will only show that it as a simple class with a method called as "CreateObject".But in object diagrams actually you will show the types of instances creates from that object.

Collaboration diagrams mainly depict interaction between object to depict a some purpose. I find this diagram to be more useful than Object diagrams as they are addressed for some purpose. Example "Login Process" which will use "Login object", "User Object" etc to fulfill the login purpose. So if you find the process very complicated go for this diagram. I see as a thumb rule if there is a activity diagram which shows some serious complicated scenarios I will like to go for this diagram inorder to simplify the explanation.

State chart diagram is again created if your project requires it. If your project has some complicated start and end states to show then this diagram is most useful. Recently I was making a call center project where the agent phone pickup and hang state has to be depicted. So my first state was when agent picks up the phone and the final stage was when agent hangs the phone, in between process was very complicated, which can only be shown by using state chart diagrams.

Sequence diagrams are needed if some sequence is complicated. Do not confuse sequence diagrams with Activity diagram, Activity diagram's map to a Use Case while sequence diagrams show object interaction in sequence.

Deployment diagrams are again not a compulsory requirement. It shows the hardware and software deployment of your system. If you really have leisure in your project go for it or if you want to make the client smile seeing some diagrams.

Implementation phase / Coding phase (Class diagrams for reverse

engineering , Other diagrams for validity check)

In this phase mostly class diagrams are re-engineered with the source code. But other diagrams are also present for validity check example state chart diagrams will be used in case to check that the both activity between those states are following the proper logic. If some things have to be changed then again there is iteration backward to the Requirement phase.

Testing phase

This phase mostly goes for the testing department. I am not talking about preparing UTP plans but SITP plans. Where the testing department will look at all diagrams to prepare a test plan and execute it. Example it will see the Use Case document to see the business rules, it will see the activity diagram and sequence diagrams to see the proper flow of modules. If some things are not proper there is iteration back to the Design phase.

Roll out and close over phases.

All document just to recheck the things are proper example are all modules deployed according to the deployment diagrams, are all business rules in Use Cases satisfied.

Let's revise following are the points:-

- √ Not all diagrams are compulsory.
- √ The minimum diagrams according to software life cycle phases are :-

  Requirement phase: - Use Case Diagrams

  Design Phase: - Component diagrams, Class diagrams

  Implementation phase: - All diagrams derived from pervious phases specially class diagram for reverse engineering.

  Testing phase: - All diagrams derived from requirement and design phases for verification and preparing test plans.

  Roll out and close over phase: - All document derived from Design phase and requirement phases.

Below is a sample figure which shows all the documents in relevant phases.

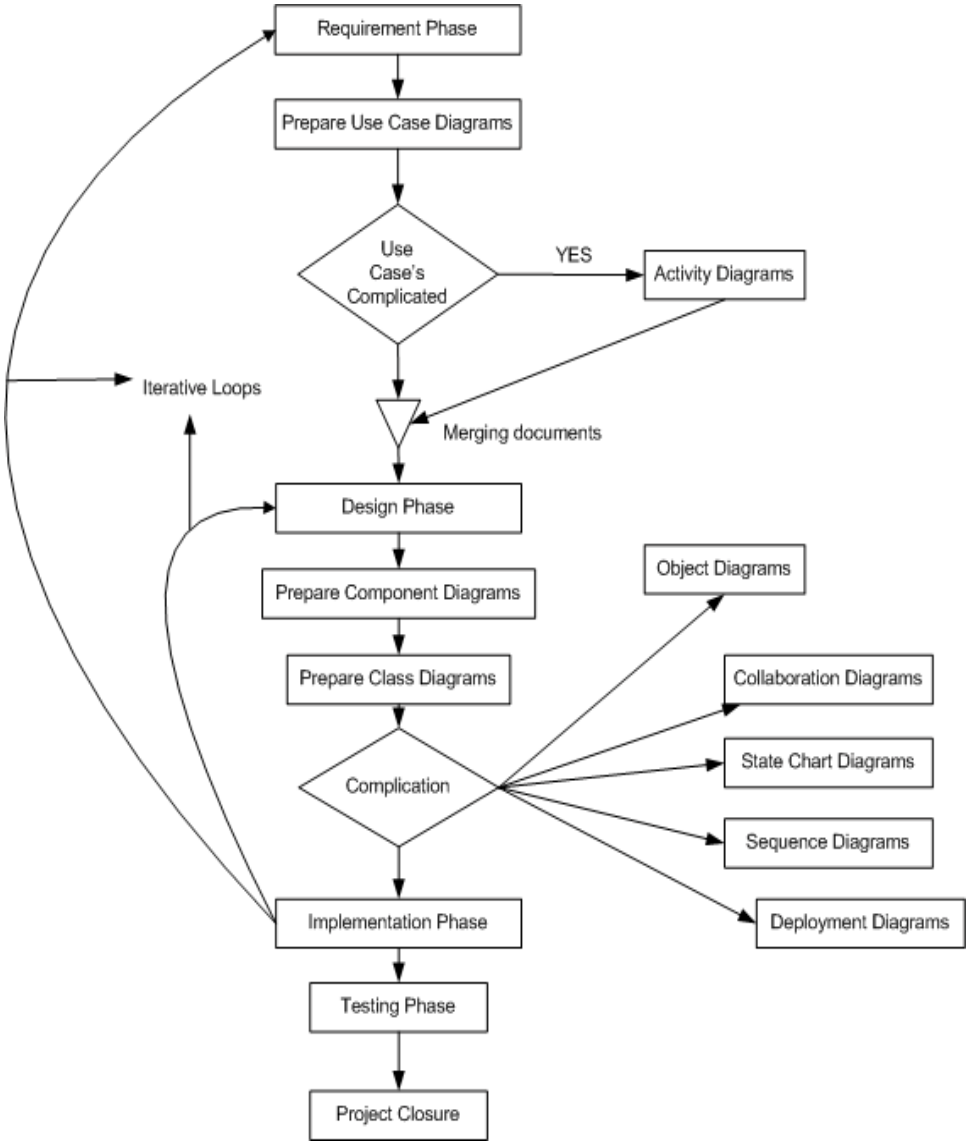


Figure :-11.1 Phase mapping with UML documents

Note:- This book will now attempt to describe every element of a UML diagram.But it's advisable that install any decent UML tool and do a small practice of one or two diagrams which will make you comfortable during interview.

(A)Give a small brief explanation of all Elements in activity diagrams?

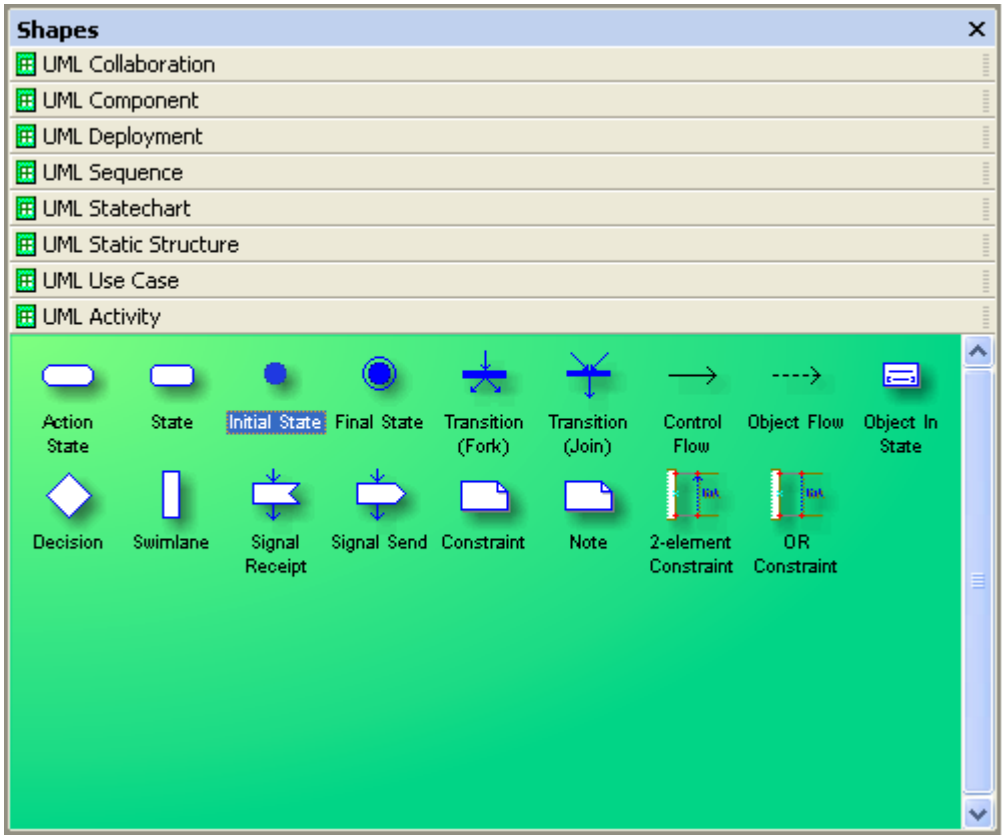


Figure :- 11.2 Elements of Activity Diagram

Action State :- It is a type of state that has an internal action and one outgoing event that completes the internal action.

State :- It's a condition when following events occur:-

- √ Object satisfies a condition.
- √ Or performs a action.
- √ Or waits for a event to happen.

Initial State:- It represents a state before any event occurs.

Final State:- Represents completion of an activity.

Transition Fork::- Denotes beginning of parallel path activities.

Transition Join: - Denotes merging of parallel path activities.

Control Flow: - Represents relationship between two states and actions. In short it indicates that an object in one state is entering some other state.

Object Flow: - Connects an object flow state to control flow or action state.

Object in State: - Indicates an object state after manipulation by multiple activities.

Decisions: - Defines if there are any condition's in the path.

Swim Lanes: - Assigns responsibility to action states.

Signal receipt Shape: - Used to replace an event label on a transition.

Signal Send Shape: - Used to replace an event label on a transition.

Constraint: - Condition's that must be maintained true in order the system is valid.

2-Element Constraint: - It shows a constraint on two classes or associations.

OR constraint: - It shows an OR constraint on two classes or associations.

(A) Explain Different elements of a collaboration diagram ?

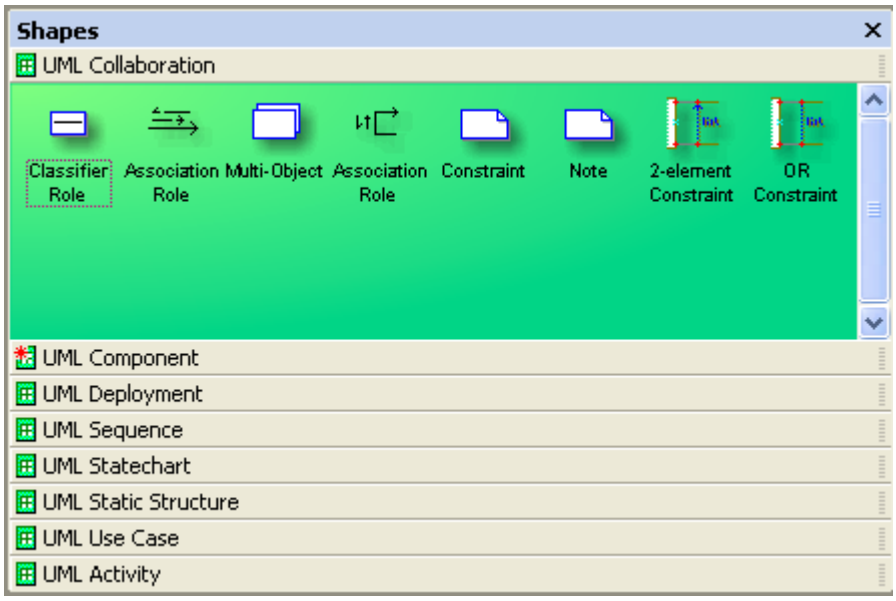


Figure :- 11.3 Elements of Collaboration Diagrams

Classifier Role :- It classifies a role.

Association Role :- It shows relation between two classifier roles.

Multi-Object :- It used to show operation related to entire set of objects rather than on a single object.

Constraint :- Condition's which must be maintained as true in order that system is valid.

2-Element Constraint: - It shows a constraint on two classes or associations.

OR constraint: - It shows an OR constraint on two classes or associations.

(A) Explain Component diagrams ?

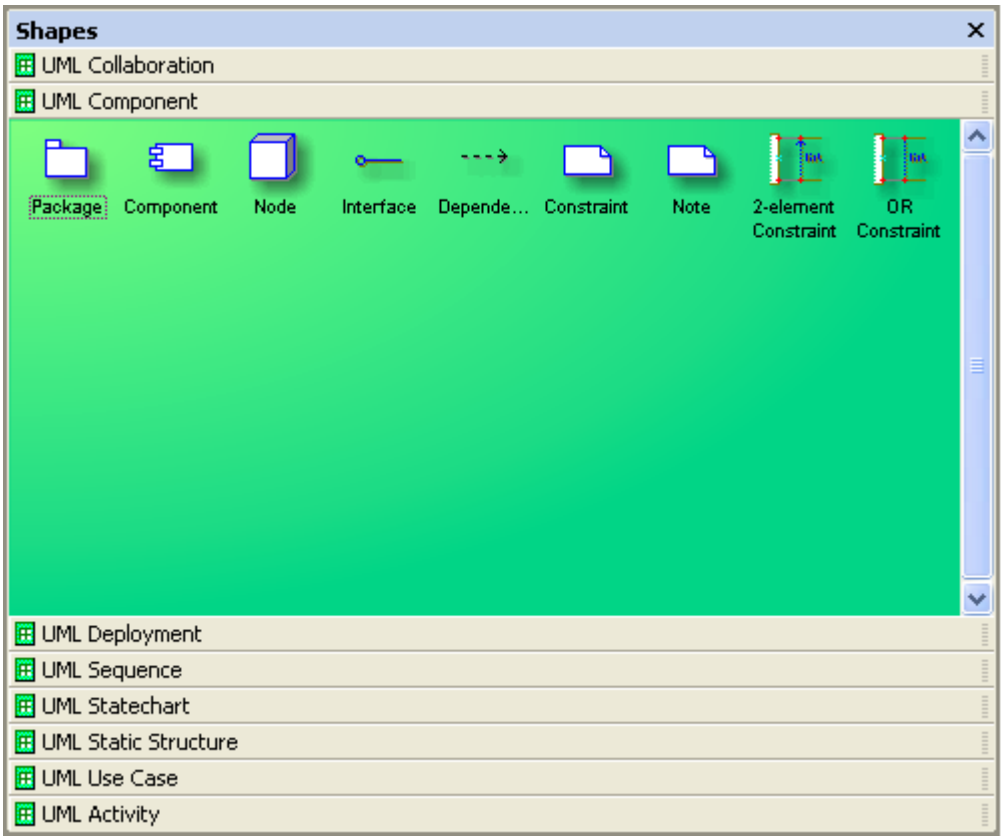


Figure :- 11.4 Elements of component diagrams

Package: - It logically groups element of a UML model.

Component: - It's the actual implementation or physical module of a UML system.

Node: - A physical system which represents a processing resource.Example PC or a host machine.

InterFace :- It specifies the externally operations of a class, component, package, or other element without specifying internal structure.

Dependency :- Shows relationship between two elements.

2-Element Constraint: - It shows a constraint on two classes or associations.

OR constraint: - It shows an OR constraint on two classes or associations.

(A) Explain all parts of a deployment diagram?

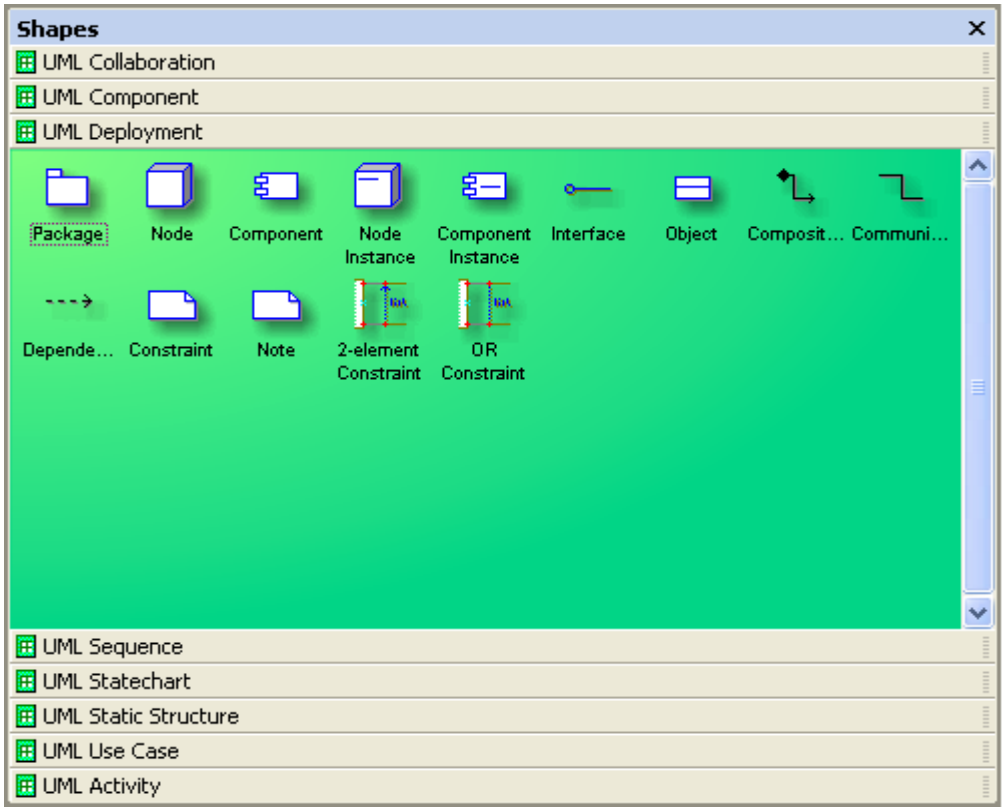


Figure : - 11.5 Elements of Deployment Diagram

Package: - It logically groups element of a UML model.

Node: - A physical system which represents a processing resource. Example PC or a host machine.

Component: - It's the actual implementation or physical module of a UML system.

Node instance: - It's a runtime physical instance of a processing resource.

Component Instance: - It represents an implementation unit that has identity at run time and can contain objects. A component could be contained within a node instance.

InterFace :- It specifies the externally operations of a class, component, package, or other element without specifying internal structure.

Object: - Instance of a class.

Composition shape: - It is a form of aggregation that indicates that a part may belong to only one element or life time of the element.

Communication: - How an actor Dependency: - Shows relationship between two elements.

2-Element Constraint: - It shows a constraint on two classes or associations.

OR constraint: - It shows an OR constraint on two classes or associations.

(A) Describe various components in sequence diagrams?

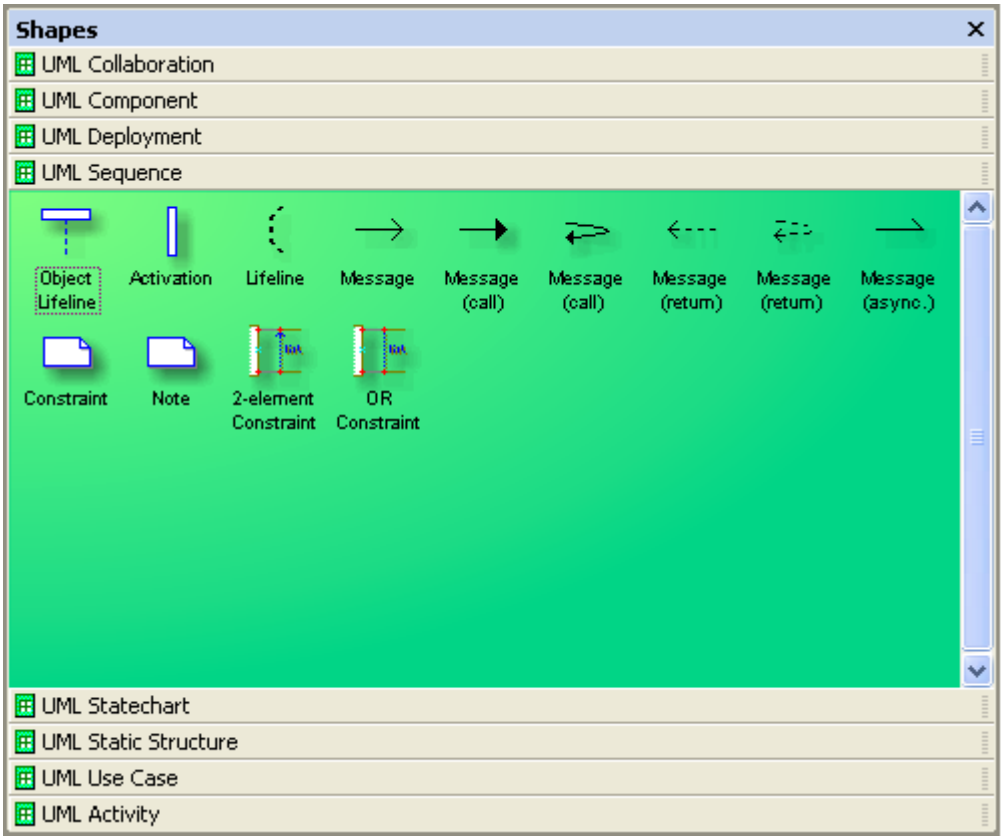


Figure :-11.6 Elements of Sequence diagrams

Object lifeline: - It represents the lifetime of object creation and its destruction. If the object is created or destroyed during the time period the diagram represents, then the lifeline stops or starts at the appropriate point. An object's destruction is marked with a large X.

Activation: - It's time period during which actor is performing a action.

Lifeline :- This say's that there exist some condition on the object lifetime.

Message: - It shows communication between objects that conveys information and results in an action.

Message (call):- Its same like message but also conveys some information and results in action.

All messages have same definition as the Message (Call) given above.

2-Element Constraint: - It shows a constraint on two classes or associations.

OR constraint: - It shows an OR constraint on two classes or associations.

(A) What are the element in State Chart diagrams ?

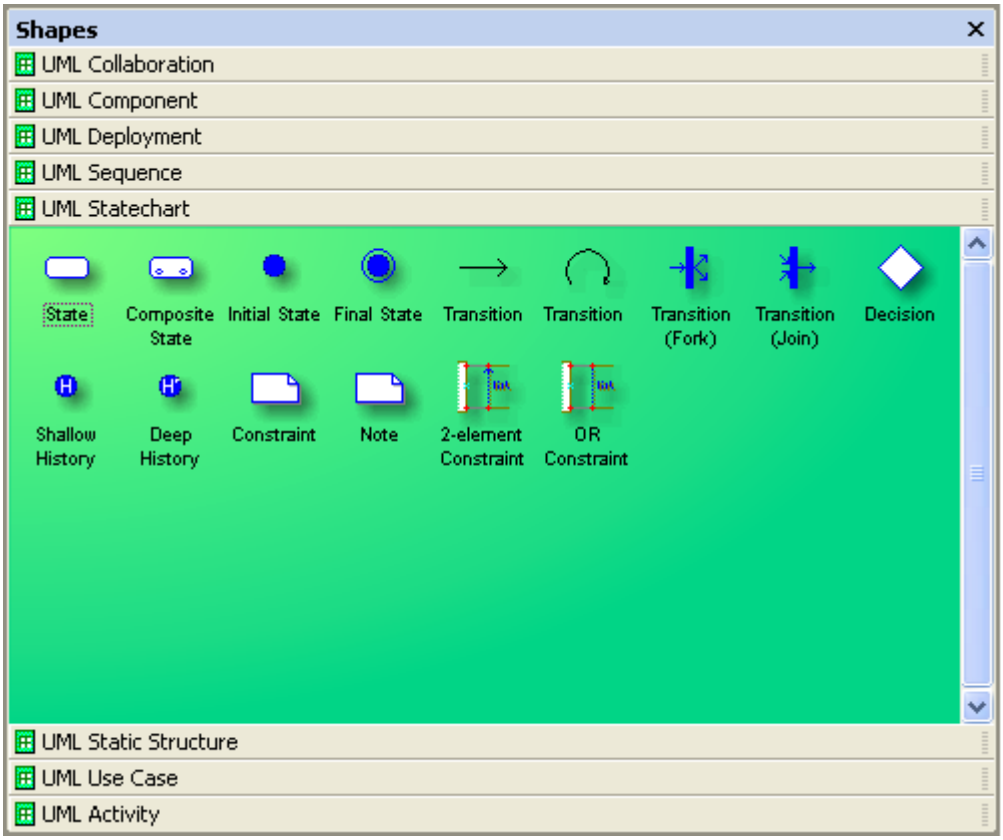


Figure :- 11.7 Elements of State Chart Diagrams

State: - It's a condition when following events occur:-

- √ Object satisfies a condition.
- √ Or performs a action.
- √ Or waits for a event to happen.

Composite State :- It has one or more substates.

Initial State: - It represents a state before any event occurs.

Final State: - Represents completion of an activity.

Transition :- Shows the change of one state to other.

Transition Fork: - Denotes beginning of parallel path activities.

Transition Join: - Denotes merging of parallel path activities.

Decision: - Indicates condition to move to different states.

Shallow History: - Represents the state last visited. When a transition to the indicator fires, an object resumes the state it last had at the same level as the history indicator.

Deep history: A deep history allows you to return from whatever sub-state,

whereas a shallow one only remembers the initial state of a composite state.

2-Element Constraint: - It shows a constraint on two classes or associations.

OR constraint: - It shows an OR constraint on two classes or associations.

(A)Describe different elements in Static Chart diagrams ?

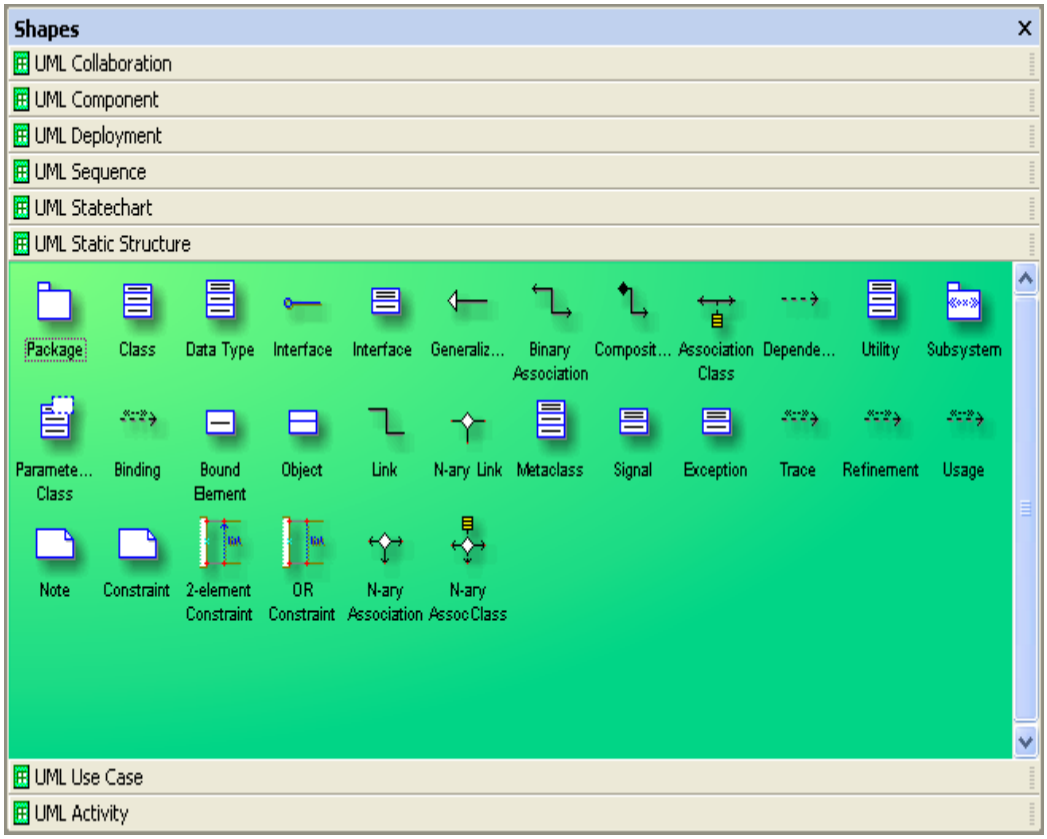


Figure :- 11.8 Elements of Static diagrams

Package: - It logically groups element of a UML model.

Class: - They describe set of objects with similar structure, behavior, and relationships.

Data Type :- A data type is an instance of the DataType metaclass defined in the UML metamodel. A data type declares a type of class attribute. That type is available as a string you can include when you define attributes for other elements in a model.

Interface :- It specifies the externally operations of a class, component, package, or other element without specifying internal structure.

Generalization: - generalization is a relationship between a specific element and a general element, such that the specific element is fully consistent with the general element and includes additional information (such as attributes and associations). For example, the classes Car, Bike, Cycle can all be specific elements of a more general abstract class element named vehicle.

Binary Association: - It's a relationship between two classes.

Composition: - A composition is a form of aggregation that indicates that a part may belong to only one whole and that the lifetime of the whole determines the lifetime of the part.

Dependency: - Shows relationship between two elements.

Utility : - Whatever Attributes and operations you define for a utility become global variables and procedures.

Subsystem: - It is a package that contains the contents of the entire system or an entire model within the system.

Parameterized class: - It is a template that describes a class with one or more unbound formal parameters.

Binding: - Binding is a kind of dependency that indicates a binding of parameterized class, or template, parameters to actual values to create a bound, or no parameterized, element.

Bound element : - Parameters of the parameterized class are bound to actual values.

Object: - Represents instance of a class.

Link: - Represents Links between objects.

N-ary Link: - represents link between n objects.

Meta-Class: - Whose instances are classes.

Signal: - Specifies stimulus between classes for which there is no reply. It is a generalizable element defined independently of the classes handling the signal.

Exception: - Signal raised because of bad execution.

Trace: - Indicates historical relationship between two elements.

Refinement: - Refinement is a kind of dependency that indicates a historical or derivation relationship between two elements with a mapping between them.

Usage : - Usage is a kind of dependency that indicates that one element requires the presence of another element for its correct implementation or functioning.

2-Element Constraint: - It shows a constraint on two classes or associations.

OR constraint: - It shows an OR constraint on two classes or associations.

(A)Explain different elements of a Use Case ?

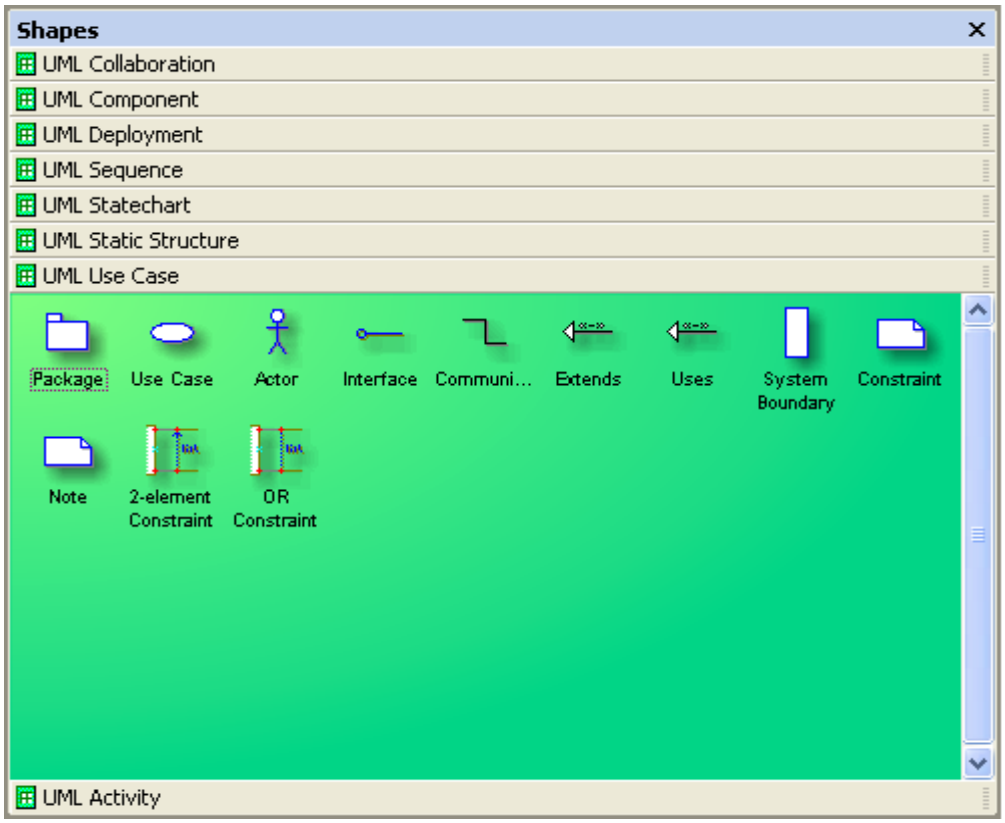


Figure :-11.9 Different Elements of Use Case

Package: - It logically groups element of a UML model.

Use Case :- It represents a set of events.

Actor : - Role played by an outside object.

Interface :- It specifies the externally operations of a class, component, package, or other element without specifying internal structure.

Communication: - How an actor Dependency shows relationship between two elements.

Extends: - Indicates that the elements come in parent child relationship where one element inherits other elements behavior.

Uses: - Here one element uses the other elements behavior.The main difference between Extends and Uses is a “Is a” and “Has a” relationship.” Is a “relationship defines a child parent relationship. Example “XYZ” is a child of “PQR”.”Has a” relationship defines an aggregation relationship that “XYZ” has a “BLUE SHIRT”.

System boundary: - Indicates the system boundary of a Use case.

2-Element Constraint: - It shows a constraint on two classes or associations.

OR constraint: - It shows an OR constraint on two classes or associations.

Twist: - What’s difference between Activity and sequence diagrams?(I leave this to the readers)

12. Project Management

Note:- This topic is meant specially for .NET programmer's who are looking for better position rather than simple programmer jobs.Project management is not everybody's cup of tea.I have seen 10 year good decent technical guys do not get this position easily.But street smart programmers with average technical guys do really good.How much ever i try to cover this topic in this book.....it has so many variation's that it's really difficult to predict every scenario of project management interview.But definitely i will try to cover the basic's by which you can atleast get a feel of what is asked.

(B) What is project management?

Applying knowledge,skills,tools,techniques in project and deliver project deliverables is a short definition of project management.Its's basically managing project time , cost and scope.

(A) Is spending in IT project's constant through out the project?

Note:- It's a tricky question , to know how much depth you have regarding costing of projects.

Normally in initial stage of project's (requirement and design phase) the cost is very less (As you need maximum is business analyst and architecture), but as the project proceeds cost factor starts increasing.The cost is maximum in coding phase (this is where you require programmers , project leads and project manager).Later when the project is in testing and acceptance phase cost is less as we will need only one or two programmers for removing bugs , than the whole team.

 ** Never give anything extra to a customer , it comes at a price---This is one of decent quote's that can impress during project management interviews.*

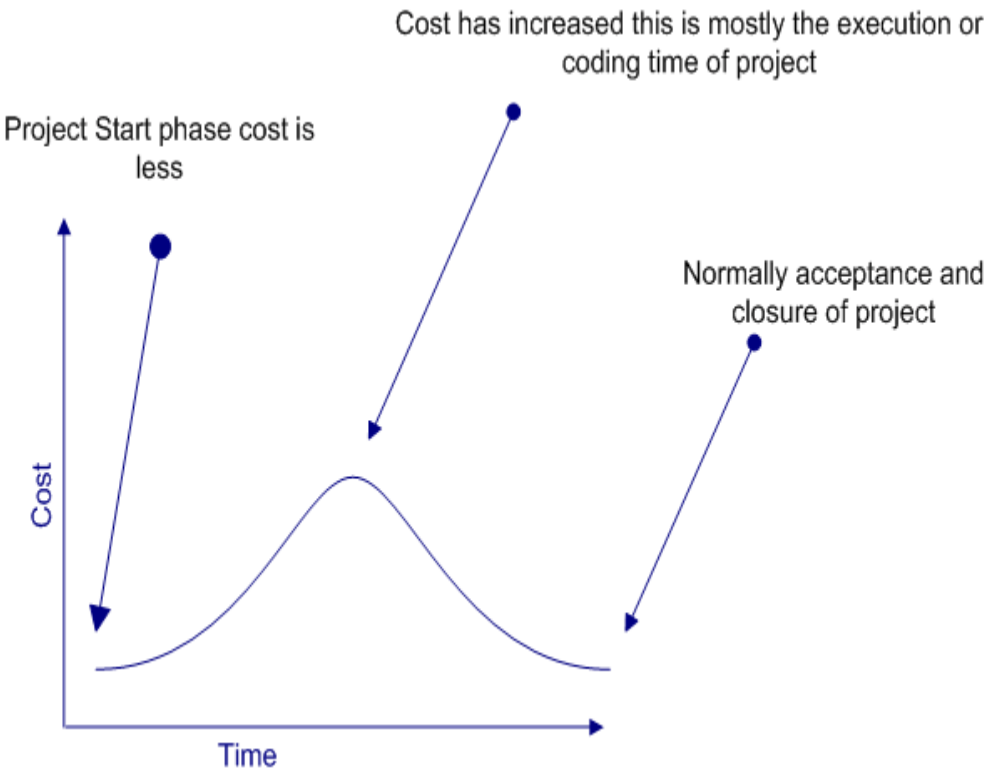


Figure :- 12.1 Graph showing cost variation in project.

(B) Who is a stakeholder ?

A stakeholder is anyone who has something to gain or lose as a result of the completion or failure of this project or phase

Note:- It's not only the end customer the stakeholder .Project managers , Project Lead , even programmers , testing department etc.. are stake holders of project.So during project management interview whenever you refer stakeholder's be clear about the terminology.

(B) Can you explain project life cycle ?

Twist :- How many phases are there in software project ?

** Every project started should have end in mind or else projects in loop will end no where.Start a project with a end in mind.*

** A successful projects has very tight cordination between stakeholder's and project team*

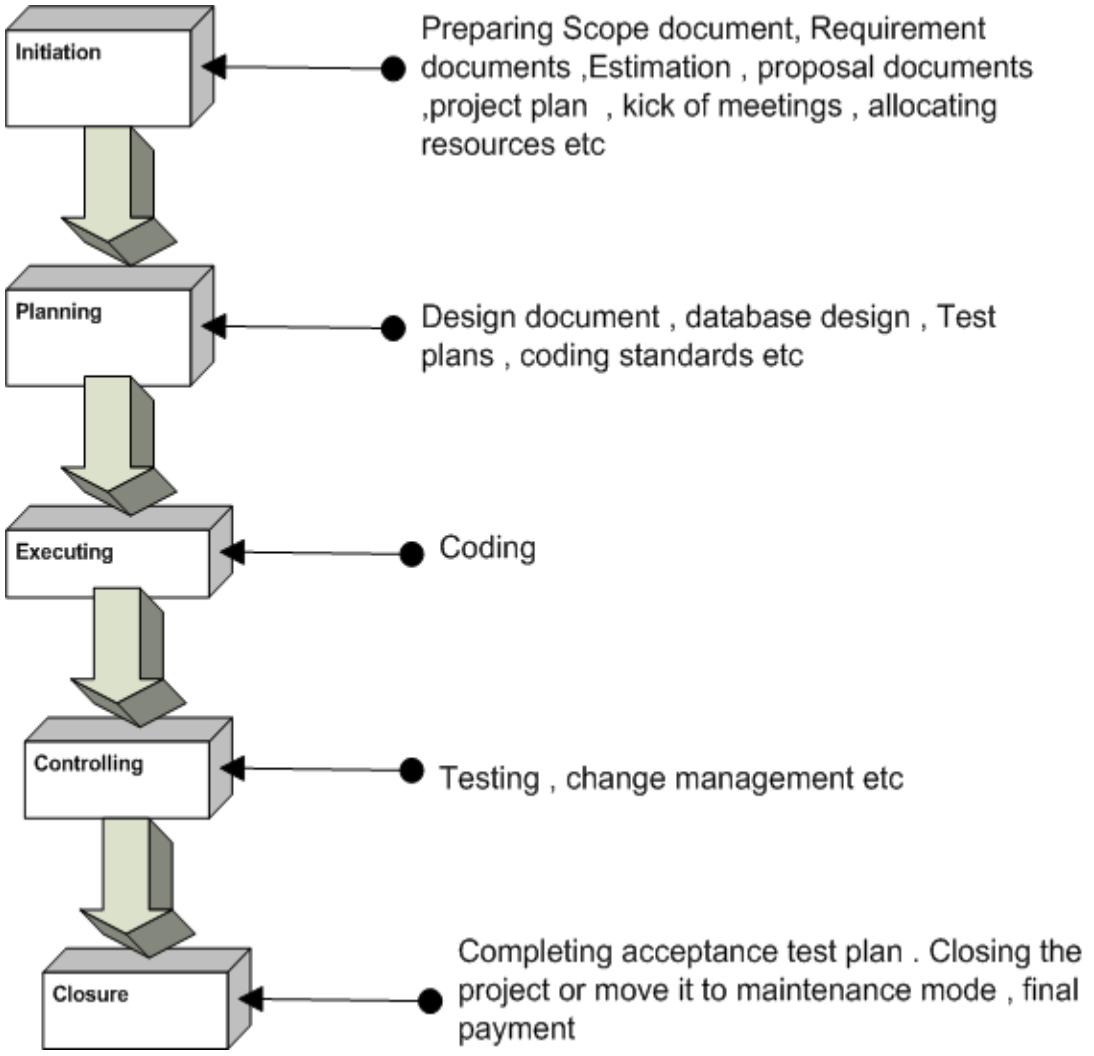


Figure :- 12.2 Life cycle of a project

There are five stages of any project initiating, planning, executing, controlling, and closeout.These are very general phases and change according to domain.Example when

writing a book i will have following mapping's initiating(contacting publishers,getting copy right etc.), planning(Table of contents of book ,Number of chapters , tool to use,chapter wise deadlines etc), executing(Actually writing the book), controlling(proof reading , language checks , page alignments etc), and closeout(Finally printing and on the shelf for sale).So this classification is at very broader level , for software development the above figure shows the mapping.

During Software project management interview expected answer is requirement phase, design phase ,coding phase , testing phase and project closure.But you can just impress the answer by giving a general answer and then showing the mapping.

(B) Are risk constant through out the project ?

** Never say that risk is high through out the project.*

Risk is high at the start of project's , but by proper POC (Proof of concept) risk is brought in control.Good project manager's always have proper risk mitigation plan at the start of project.As the project continues one by one risk is eliminated thus bringing down the risk.

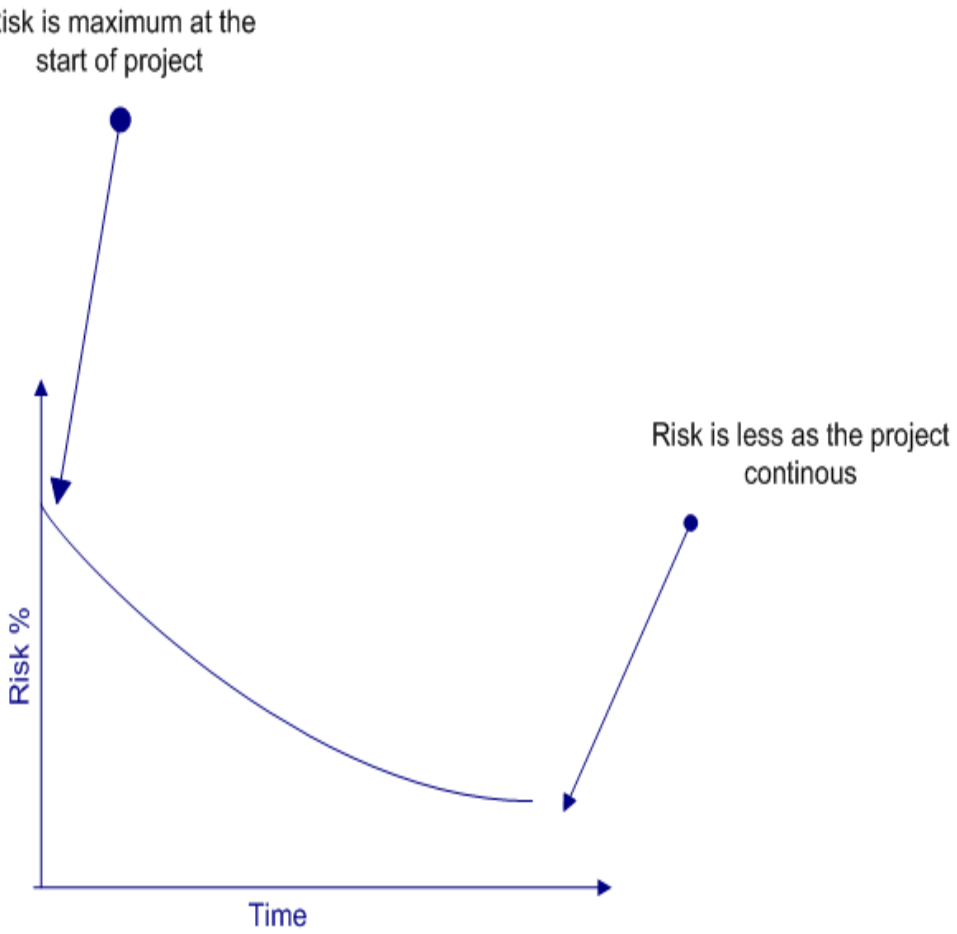


Figure :-12.3 Risk % according to project phases

(A)Can you explain different software development life cycles ?

Note:- This questions is asked to test that as a project manager do you have a know how of all the project life cycles.In PMP (Project management plan) you have to specify saying which

software development model you will follow. Definitely depending on client and project scenarios it's the project manager's responsibility to choose a development cycle.

SDLC (System Development Life Cycle) is overall process of developing information systems through multistep process systems from investigation of initial requirements through analysis, design, implementation and maintenance. The days are gone when one COBOL programmer used to analyze, test and implement software systems. Systems have become complex, huge team members are involved, architects, analyst, programmers, testers, users etc. To manage this number of SDLC models have been created.

Following are popular models which are listed:-

- √ Waterfall Model.
- √ Spiral Model.
- √ Build and Fix model.
- √ Rapid prototyping Model.
- √ Incremental Model.

This section we will go in to fair depth of different SDLC models.

Water Fall Model

This is the oldest model. It has sequence of stages; output of one stage becomes input of other.

Following are stages in Waterfall model:-

- √ System Requirement: - This is initial stage of the project where end user requirements are gathered and documented.
- √ System Design: - In this stage detail requirements, screen layout, business rules, process diagram, pseudo code and other documentations are prepared. This is first step in technical phase.
- √ Implementation: - Depending on the design document actual code is written here.
- √ Integration and Testing: - All pieces are brought together and tested. Bugs are removed in this phase.

√ Acceptance, Installation and Deployment: - This is final stage where software is put in production and runs actual business.

√ Maintenance: - This is least glamorous phase which runs forever. Code Changes, correction, addition etc are done in this phase.

Waterfall is suited for low risk in areas of User Interface and performance requirements, but high risk in budget and schedule predictability and control. Waterfall assumes that all requirements can be specified in advance. But unfortunately requirement grows and changes through various stages, so it needs feedback from one stage to other.

Spiral Model

Spiral Model removes the drawback of waterfall model, by providing emphasis to go back and reiterate earlier stages a number of times as project progresses. On broader level it's a series of short waterfall cycles, each producing an early prototype representing a part of entire project. It also helps demonstrate a Proof of Concept at early software life cycle.

Build and Fix Model

This is the most way free-lancers work Write some code and keep modifying it until the customer is happy. This approach can be quite dangerous and risky.

Rapid Prototyping Model

This model is also called as Rapid Application Development. The initial emphasis is on creating prototype that looks and acts like the desired product. Prototype can be created by using tools which is different from those used for final product. Once the prototype is approved, its discarded and real software development is started from scratch. The problem with this model is that sometimes the prototype moves ahead to become the final live product which can be bad from design point of view. It's a effective model but can have higher costing than other models as you require programmers during the initial phase of the software cycle.

Incremental Model

In this model we divide products in to builds, where section of product are created and tested separately. Here errors are found in requirement phase itself, user feedback is taken for each stage and code is tested after it's written.

(B) What is triple constraint triangle in project management ?

Figure :- 12.4 Project Management Triangle

Project Management triangle is depicted as Cost,Schedule and scope.These three aspect form the sides of triangle and the customer is the center point.As customer is always concerned about Cost,Scope and Schedule , so in order to get customer satisfaction project manager should deliver all scope in propose schedule and cost.

If we want to disturb any one of the legs then the other two legs get affected. Example If customer increases the scope then other two sides of the triangle also get affected a lot.

> *Note:- During project management interview's it's rare that you will be asked directly about constraint triangle.But when you are asked about what are the main factors that affect customer satisfaction you can refer this triangle.*

(B)What is a project baselines ?

It define a logical closure of any deliverable or cycle.Example you have completed the requirement phase with sign off from the client on the requirement document.So you put a baseline and say that further any changes to this document is a change request. Versioning of source code is one type of baseline.

(B)What is effort variance?

Effort Variance = (Actual effort – Estimated Effort) / Estimated Effort.

(B)How is normally a project management plan document organized ?

PMP document forms the bible of a project.It has normally these sections :-

- √ Project summary
- √ Project organization hierarchy
- √ WBS / Activity list to be performed with schedule.
- √ Work product identification (In short who will do what)
- √ Project schedule(GANNT chart or PERT chart).
- √ Estimated Cost and completion.
- √ Project requirements.
- √ Risk identification.
- √ Configuration management section.
- √ Quality section.
- √ Action Item status.

(I)How do you estimate a project?

There many techniques available for estimating a project:-

- √ Function points
- √ Use Case points
- √ WBS etc etc.

(B)What is CAR (Causal Analysis and Resolution)?

The basic purpose of CAR is to analyze all defects, problems and good practices/positive triggers in projects, perform a root cause analysis of the same, identify respective corrective and preventive actions and track these to closure. The advantage of CAR is that root causes are scientifically identified and their corrective and preventive actions are carried out. CAR needs to be performed at project initiation, all phase and project ends and on a monthly basis. Fishbone diagram is one of the ways you can do CAR.

(B) What is DAR (Decision Analysis and Resolution) ?

Decision Analysis and Resolution is to analyze possible decisions using a formal evaluation process that identifies alternatives against established criteria.

Example in a project you are said to use third party tools so you will not depend on only one tool but evaluate three to four more tools so that in case of problems you have alternatives.This is called as DAR

(B) What is a fish bone diagram ?

Twist:- What is Ishikawa diagram ?

Dr. Kaoru Ishikawa, invented the fishbone diagram. Therefore, can be also referred as Ishikawa diagram.

Fishbone diagram is a analysis diagram which provides a systematic way of looking at effects and the causes that create or contribute to those effects.Because of the function of the fishbone diagram, it may be referred to as a cause-and-effect diagram. The design of the diagram looks much like the skeleton of a fish. Therefore, it is often referred to as the fishbone diagram.

Fishbone diagram helps in categorizing potential causes of problems or issues in an orderly way and in identifying root causes.

Below is a sample fish bone diagram which shows why a project dead line was not met.The middle arrow is the main problem “Deadline not met”.Then we start analyzing other problems which has led to this problem.Example There is client problem -- as he is always changing the requirement -- this is caused because the company did not sign the SRS --- and this happened as proper project management procedures where not at place.So to solve this problem we either appoint a project manager or give training on project management to senior team members.

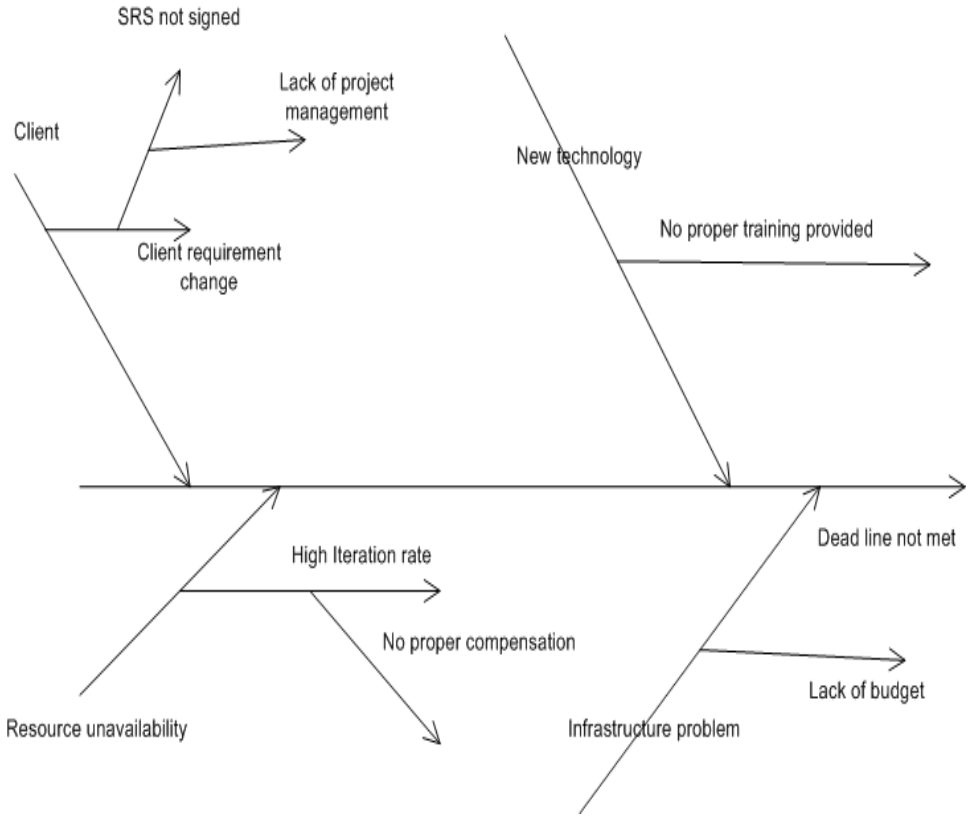


Figure :- 12.5 Sample fish bone diagram

(B) What is pareto principle ?

Twist :- What is 80/20 principle ?

Pareto principle also paraphrased as 80/20 principle is simple effective problem tackling way in management.It says that 20% of your problem lead to other 80 % of problems. So rather than concentrating on the 80% of problem if you concentrate on 20% of problems you can save lot of trouble.So in pareto you analyze the problems and only concentrate on 20% of your vital problems.In projects the first 10% and the last 10% of project form the vital part of project.

(B)How do you handle change request?

Normally change request are handled by preparing a Impact analysis document and then doing re-estimation. Example you have a ongoing project , which has a customer table. Now customer wants that customer to also have addresses assigned to it. So you normally raise a change request and then do a impact analysis of the same. Depending on the impact you estimate and let know the client about the financial aspect of the project. Once client sign off or the upper management agrees to the change request you move ahead with implementation.

(I)What is internal change request?

Internal change request are not normally billable change request , it has no financial gains from the client. Example your architecture division of your company has said in mid of the project that the architecture has to be modified. Definitely this has nothing to with the client , but you make changes to it this is called as Internal change request.

(B)What is difference between SITP and UTP in testing ?

UTP (Unit Test Plan) are done at smallest unit level or in stand alone mode. Example you have Customer and invoicing module. So you will do test on Customer and Invoice module independently. But later when we want test both customer and invoice in one set we integrate them and test it. So that's is SITP (System Integration Test Plan)

UTP can be done using NUNIT. Unit testing is done normally by developers and System testing is done normally by testing department in integration mode.

(B)What are the software you have used for project management?

Many companies have there own software defined. There are many project management software available at this moment in market but this can vary from company to company , worst it can very from project to project. But Microsoft project is the most used software at this moment.So just brush your skills on Microsoft project , its used heavily across industry.

(I)What are the metrics followed in project management?

Twist: - What metrics will you look at in order to see the project is moving successfully?

Most metric sets deal with a variation of these attributes and are chosen to help project managers gain insight into their product (size, software quality, rework), process (rework, software quality) and project (effort, schedule).

But below is a broader classification :-

Project Management Metrics

milestone metrics

- √ number of milestones
- √ number of proved requirements per milestone
- √ controlling level metrics

risk metrics

- √ probability of resources availability
- √ probability of the requirements validity
- √ risk indicators (long schedules, inadequate cost estimating, excessive paperwork, error-prone modules, canceled projects, excessive schedule pressure, low quality, cost overruns, greeping

user requirements, excessive time to market, unused or unusable software, unanticipated acceptance criteria, hidden errors)

- √ application risk metrics

workflow metrics

- √ walkthrough metrics
- √ traceability metrics
- √ variance metrics

controlling metrics

- √ size of control elements
- √ structure of control elements
- √ documentation level
- √ tool application level

management database metrics

- √ data quality metrics
- √ management data complexity
- √ data handling level (performance metrics)
- √ visualization level
- √ safety and security metrics

Quality Management Metrics

customer satisfaction metrics

- √ characteristics size metrics
- √ characteristics structure metrics
- √ empirical evaluation metrics

- √ data presentation metrics

review metrics

- √ number of reviews in the process
- √ review level metrics
- √ review dependence metrics
- √ review structure metrics
- √ review resources metrics

productivity metrics

- √ actual vs. planned metrics
- √ performance metrics
- √ productivity vs. quality metrics

efficiency metrics

- √ time behavior metrics
- √ resources behavior metrics
- √ actual vs. planned metrics

quality assurance metrics

- √ quality evaluation metrics
- √ error prevention metrics
- √ measurement level
- √ data analysis metrics

Configuration Management Metrics

change control metrics

- √ size of change
- √ dependencies of changes
- √ change interval metrics
- √ revisions metrics

version control metrics

- √ number of versions
- √ number of versions per customer
- √ version differences metrics
- √ releases metrics (version architecture)
- √ data handling level

Note:- Following are some questions who do not have a specific answer and vary from person to person or are out of the scope of book.This book will list down the questions just go through them.

(B)You have people in your team who do not meet there deadlines or do not perform what are the actions you will take ?

Twist :- Two of your resources have conflict's between them how would you sort it out ?

In such kind of question they want to see your delegation skills. The best answer to this question is a job of a project manager is managing projects and not people's problems , so i will delegate this work to HR or upper authority.... Thanks to my Project Manager for this beautiful answer.

(B)How do you start a project?

Left to the readers

(B)How did you do resource allocations?

Left to the readers

(I) How do you do code reviews ?

The way code reviews are done change from person to person and also company to company.But the normal was is when a project is started project people define there architecture , coding standards etc etc in there design document.So before starting the code review you will have go through the standards defined in the project.

(A)What is CMMI ?

It's beyond the scope to dicuss this topic.

(A)What is Six Sigma ?

It's beyond the scope to dicuss this topic.

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