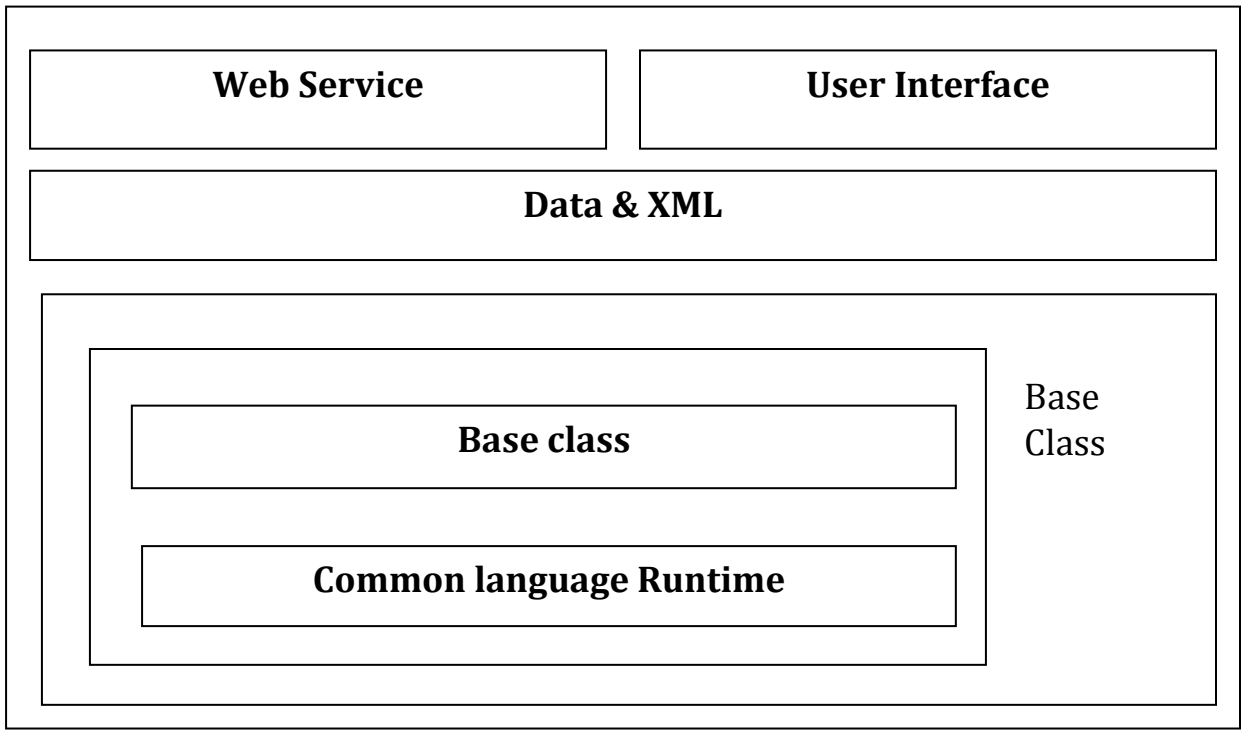
Q1] diagrammatically explain .NET Framework?



I. The above framework starts from memory management and component loading level and goes all the way up to multiple ways of rendering user and program interface.

II. At the base CLR (Common language runtime)

It is heart of the .net framework (or basic building block of framework)

It is the engine that drives key functionality.

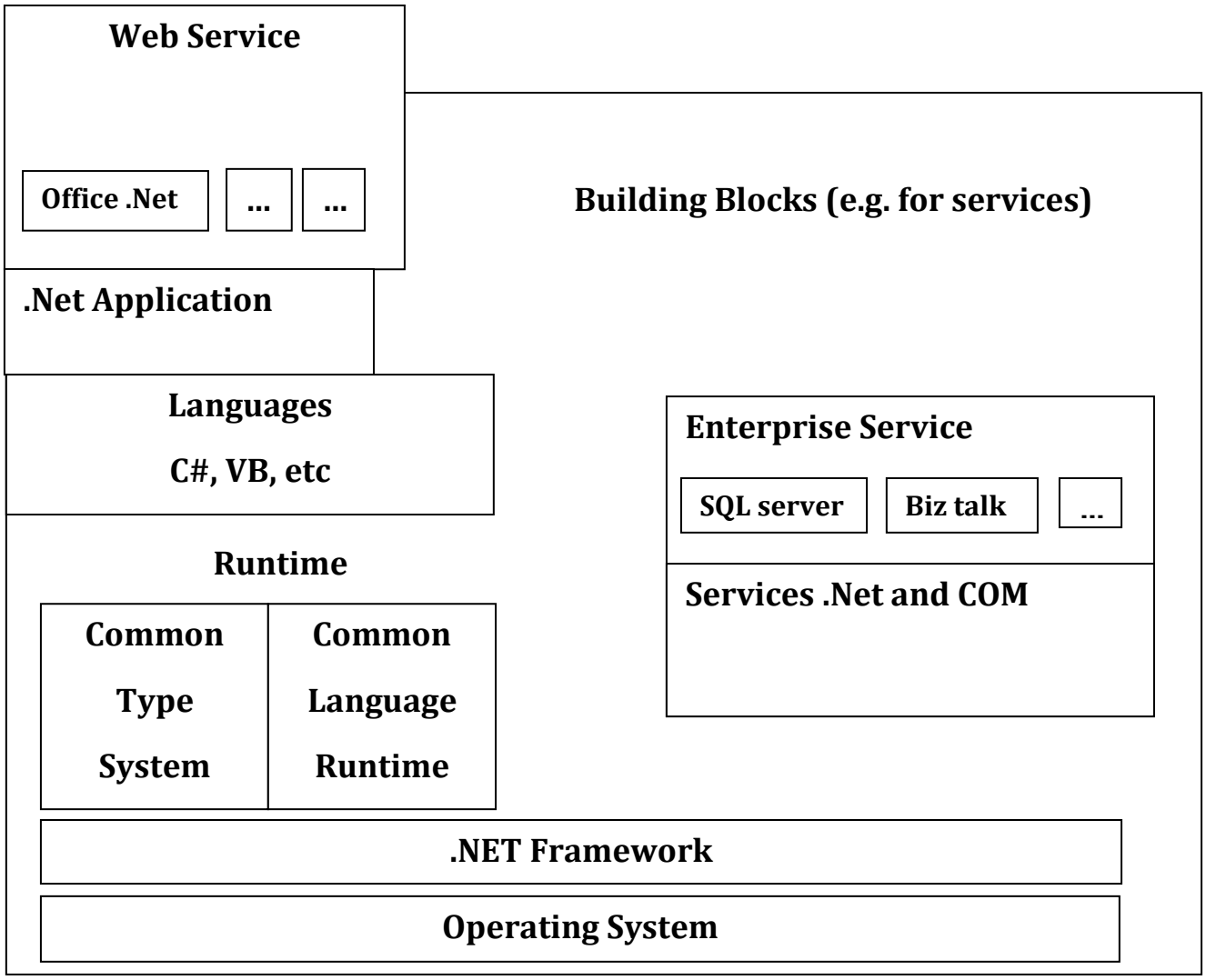
It includes common data type, Standard interface conversion, Allocation and management of memory.

CLR also does reference tracking for objects and handling garbage collection.

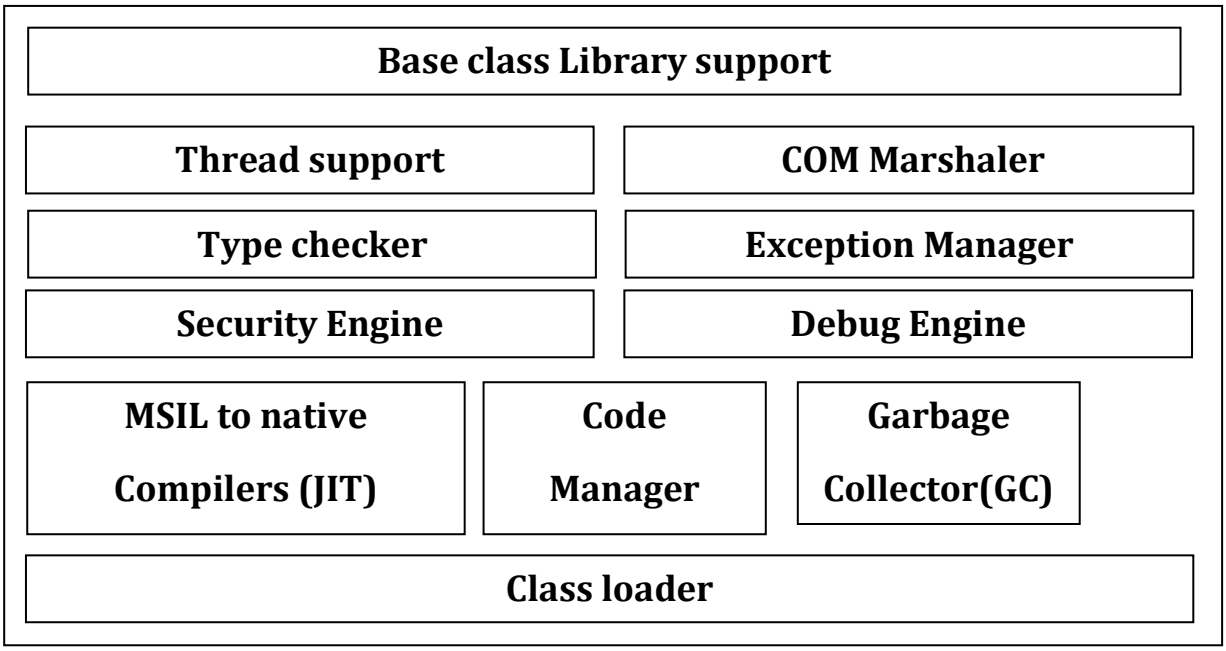
III. The middle layer includes the next generation of standard system services such as class that manage data & XML.

IV. These services are brought under control of the framework, making them universal available and making their usages across the language.
V. The top layer includes user and program interface.

.Net and .Net Framework



Common Language Runtime



Q2] List and briefly explain different building block services.

Answer-

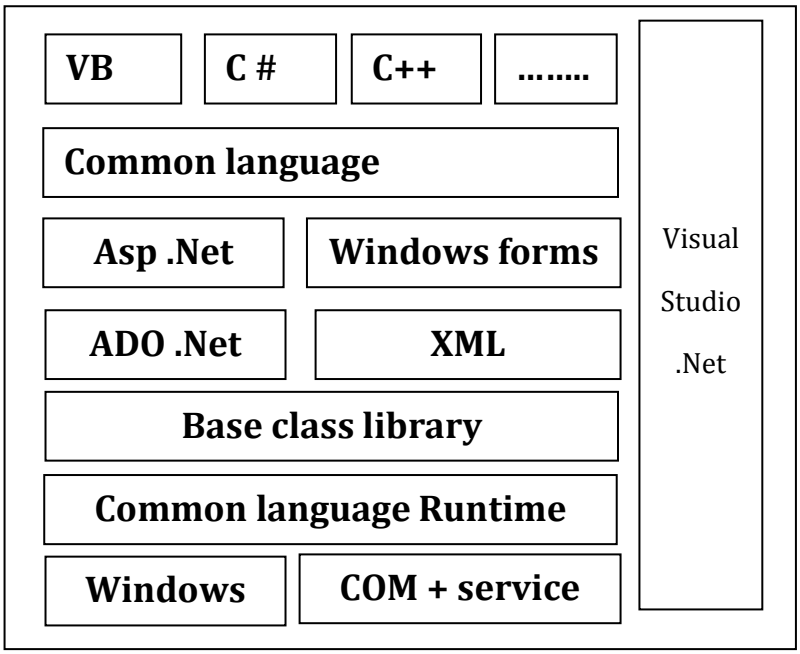
I. Microsoft is putting together dizzying array of resources that enable you to deliver a .Net solution.
II. Collectively these resources are known as .Net building blocks.
III. Which support everything from VS .Net to windows 2000, XP(the o.s. that host net solutions which will move on to windows NT in feature)

The building block of .Net

1) .Net Framework
2) .Net Enterprise servers
3) .Net building block services
4) Visual studio .Net

1).***Net Framework***

a) It is set of system services, classes and data types that enhance developer productivity and give easier access to set of functionality provided by window.
b) The .Net framework handles many of low level plumbing details that are required for components to work together and to scale that enhance the developer productivity.
c) It handles memory Management as well as introduces high level of thread set so that crash on application is negligible.
d) That's why .Net Framework allows developer to concentrate on building application than concentrating on low level errors because this partistake are by .Net Framework.
e) The diagram of .Net Framework is shown as follows.



I) Common language runtime(CLR) :-

It handles memory management, garbage collection and build around CTS to define common type system for all language and also support metadata and assembly language.

II) Base class library

Rich set of functional base classes that may be inherited and executed by other classes in framework.
For example: - System.io
It provides serialization to and from different IO device such as files and stream.

III) Extended class libraries

These classes extended from base class library and design to make it easier and faster to develop specific type of application.
For example:- Asp .Net
It includes classes for developing web services.

IV) Common language specification (CLS)

It specifies set of rules that .Net language must follow.

V) Multiple programming languages.

.Net framework provides one platform and united model for several languages.VB.Net, C++ .Net, C# .Net, some of many languages that are available for coding in .Net.

VI) Visual studio .Net

It is an IDE (Integral Development Environment) for coding with .Net framework
It provides tools for accessing each part of framework.

VII) Windows and COM + Service

Technically it is not part of .Net framework but they are requirement for today .Net framework SDK.

2). ***Net Enterprise server***

I) *Windows 2000 advanced server:-*
It provides platform for .Net server software as well as .Net applications
For developing enterprise level applications Microsoft recommended windows 2000 advanced server.

II) *Application server 2000*
It provides management of application to improve their scalability and availability.

III) *SQL server 2000*
It provides database support including data storage, analysis and indexing.

IV) *Exchange server 2000*
It provides real time communication service including email.

V) *Host Integration server 2000*
It provides integration with host system.

VI) *Internet security and acceleration server*

It provides Internet connectivity including firewall management.

VII) *Commerce server 2000*
Enables development of e-commerce sites.

VIII) *Biz Talk server 2000*
This provides business to business communication and enables data translation between application and business.

3).Net Building block service

It includes following

I. *Authentication*
IT enables developers to authenticate user behind the scenes and give them access to provide content without bothering them to log on manually every time.

II. *Notification and Messaging*
It provides integrated messaging capabilities for any device including instant messaging and email.
For example: - chatting, email facility

III. *Directory and search*

This service provides searching facility for yellow pages and white pages and finding information about .Net language.

IV. *Calendar*
This service provides time management and scheduling service for your application.

V. *XML store*
The data is stored as XML application and is delivered using SOAP.

4) Visual studio .Net

i. It provides all .Net features which support by .Net framework.
ii. It is an IDE (Integrated development Environment) this is newest version of Microsoft development toolkit.
iii. It supports multiple programming languages including VB, VC++ and c#
iv. The key features of visual studio .Net are.
    a. Full integration with .Net framework
    b. Integrated development environment
    c. Mixed language development including cross language debugging.

d. Rapid application feature for application development.
e. Visual debugging across project including stored procedure.

Q3] Write short note on

a. Common language runtime

b. Common type system

Answer-

a) Common language runtime

i. It provides run time execution environment for .Net application
ii. The code which runs under control of CLR called managed code.
iii. Because CLR defines rules for these languages.
iv. CLR work with another two another framework services to define rules for .Net language.

Common Type system

It defines standard references and value type that are supported in the .Net framework.

Common language Specification

It defines rules that .Net language must follow.

b) *Common type system*

i. It defines standard object oriented data type and value type that are supported by all .Net programming languages.
ii. It provides unified programming model and supports multiple languages.
iii. Windows API functions accept in input data type that may exist in vc++ but not in VB.
iv. This forces the developer to approximate the data type and call the API function with closest type that they can declare.
v. It is an important feature in .Net frameworks.

Q4] Write a note on Design goal of CLR.

Answer-
The deign goal of CLR are as follow

1) Simplify development
   i. Define standards that promote code reuse.
   ii. Provide broad range of services including memory management and garbage collection.
2) Simplify application deployment
   i. Components use metadata instead of registration
   ii. Support side by side, multiple component versions.
   iii. Command line deployment(X copy) and uninstall

3) Support multiple languages
   i. Define common type systems that are used by all .Net languages.

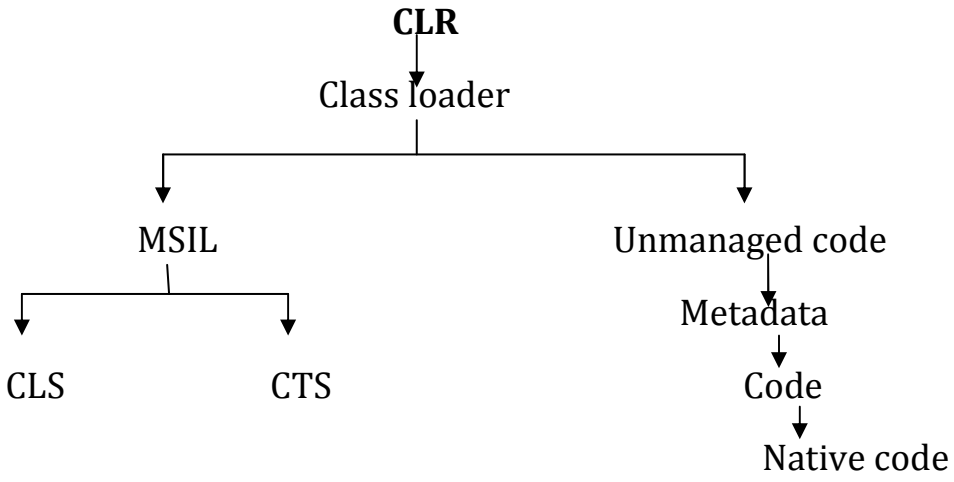
4) Enable conversions of programming models
   i. Build languages and tools on common framework
   For example- Asp .Net, VB .Net and c# have access o some base class.

Q5] List and explain various primitive data types used in .Net

Data Type	Size in Bytes	Description	Type
Byte	1	8-bit unsigned integer	System. Byte
Char	2	16-bit Unicode characters	System. Char

Integer	4	32-bit signed integer	System.Int32
Double	8	64-bit floating point variable	System. Double
Long	8	64-bit signed integer	System.Int64
Short	2	16-bit signed integer	System.Int16
Single	4	32-bit floating point variable	System. Single
String	Varies	Non-Numeric Type	System. String
Date	8		System. Date
Boolean	2	Non-Numeric Type	System. Boolean
Object	4	Non-Numeric Type	System. Object
Decimal	16	128-bit floating point variable	System. Decimal

Q6] Write a note on Architecture of CLR



I. CLR is designed to provide robust and secure environment for executing managed code.
II. It is build around CTS which guarantee type safety.
III. The CLR provides a number of runtime support service using VES(Virtual execution system)
IV. VES is responsible for implementing and enforcing the CTS.
V. It is design to run managed code the code that support the CTS.

The components of CLR are as follows

1. Class loader.
2. MSIL(Microsoft Intermediate Language)
3. MSIL to native code.
4. Memory management and garbage collection.
5. Profiling and debugging.
6. Unmanaged code.
   There is also some specification component.
7. Verification of type safety according to CTS.
8. Stack walker.
9. Co-Instance Execution

1) class loader

i. It loads class in to the memory before execution.
ii. It provides important integrity cheeks on code before it is complied and executed.
iii. It runs cheeks to ensure type safety which greatly improves code stability at runtime.

2) Microsoft Intermediate language.

i. It is generalized instruction set that can be interpreted by wide range of compliers from different programming languages.
ii. It is generated by VES and it walk through code stack.
iii. It is also referenced to as compiler intermediate language because it is not fully complied binary code.
iv. The CLR delegates the task of creating binary code from MSIL to platform specific compilers.

3) MSIL to native code.

The MSIL code must be converted to native before iti s deployed and executed on target machine.

There are two types of compiler.

I. *Just In Time(JIT)Compiler*
It is an optimized compiler that analyses MSIL and convert it to native code as needed.
JIT compiler takes into a count when there is no need of native code all the time.

II. *Traditional compilers*
The assembly is entering converted to native code and loaded as single instruction set.
It is less optimized than JIT compiler, they must compile an entire assembly all at once.

4) Type safety verification using CTS

i. It is very important issue to prevent runtime errors or application crashes when code is compiling.
ii. Type safety must be verified and it is effort between CLR and VES.

5) Stack Walker

i. The CLR must be able to stress the stack heap of managed code at runtime.

ii. The CLR accomplish this using an API called code manager.

iii. The code manager support following services
   a) Garbage collection
   b) Execution.
   c) Security.
   d) Debugging and profiling.

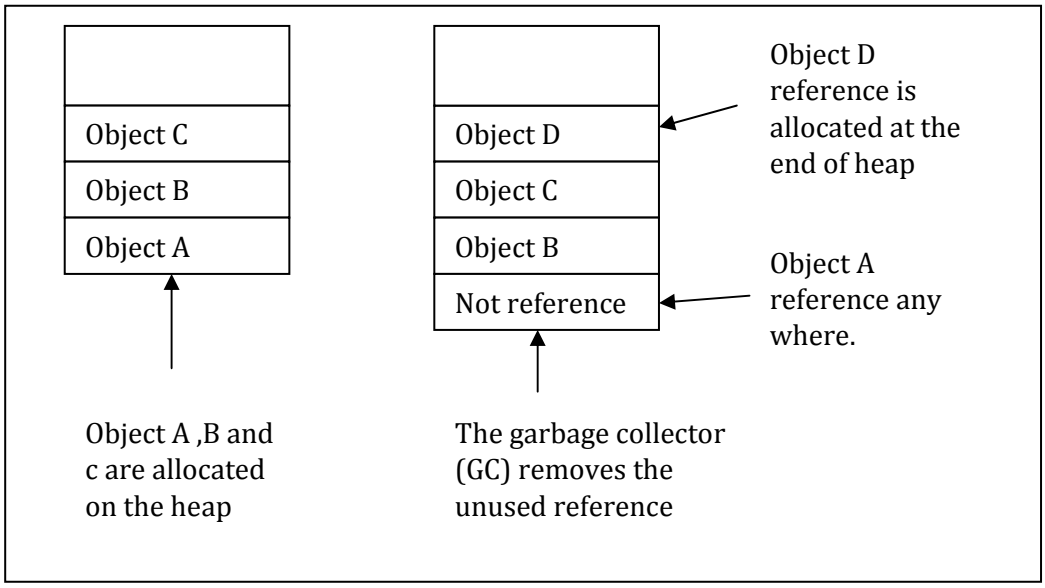
6) Memory management and garbage collection

i. CLR allocates memory for reference type using managed heap.

ii. It is reversed chunk of memory that can be dynamically subdivided and allocated in to smaller regions.

iii. Managed code is designed to work with reference type

iv. The following figure shows managed heap and garbage collection of work.



v. Garbage collector is continuously checking managed and removing unused reference.
vi. The CLR tracks information about runtime application including reference counts.
vii. The GC works with CLR to determine which reference are actively being used by running application and which may be released.
viii. In .Net GC is entirely response for realizing objects and typically you will not need overwrite automatic garbage collection with explicit class to release reference.
ix. The .Net provides destructor for releasing object reference that are disposing and closed method.
x. Which are primary intended to use with unmanaged code and resource.
xi. The system object class also support finalize method for GC process.

7) Version and co-instance execution

i. The .Net framework removes the need to have compiled plumbing that was associated with COM components
ii. .Net allows multiple versions of same assembly to exist side by side in the same directory.
iii. It uses an application configuration XML file which is present at location where executable and assembly is present.
iv. We can edit this file to bind executable to alternative version and location of assembly.
v. The application configuration file is loaded in the same directory where executable is present in and is created when you compile an application.

8) Unmanaged code

i. The COM components are unmanaged and cannot be run directly by CLR but they evoke by CLR.
ii. CLR work with MSIL (Microsoft intermediate language) not native code directly.
iii. For generating native code it is depend on JIT compilers
iv. COM components are already compiled into native code so the CLR can not work directly with them.
v. Therefore there is another mechanism require to allow COM components to interoperate with .Net component.
vi. Therefore .Net framework provides COM interoperate with .Net component.
vii. Therefore .Net framework provides COM interpretability service as follow.
    a) Provides the TlbTmp.exe utility to convert Com type libraries in to metadata which can import into .Net. This allows COM components to be invoked from .Net.
    b) Provides RegAsm.exe utility to generate COM type libraries for .Net assemblies. This allows .Net component to be invoke from COM+
    c) Uses the p/Invoke mechanism for making function calls and marshaling data types.

9) Debugging and profiling

Debugging:-

In this method program is debugging in CLR by converting code to MSIL to native code and then native code to user machine code.

Profiling:-

Then user defined languages (i.e. .Net) profiling this code and user can see their output on .Net window.

Q7] Explain goals of .Net

1) The .Net framework is intended to provide an environment that simplifies the development and deployment and execution of distribution application.
2) Microsoft presenting .Net platform for XML web services which will enable application to collaborate and to exchange data more easily.
3) Goal of .Net are
   i. Provide new development platform for internet and distributed application.
   ii. Simplifies application development and deployment.
   iii. Provides platform for building web services.
   iv. Improves interoperability and integration between system and application
   v. It provides universal access of application from any device.

Q8] Explain .Net application

1) The .net framework enables you to build any kind of application that you want.
2) The underlying technology of the .Net framework may have changed from COM based application and windows application .However what do not change are demands on the developer.
3) .Net framework provides developers with new technology that make it easier to build application.
4) There are several type of application.
   i. Windows forms application.
   ii. ASP .Net web application.
   iii. Windows service applications.
   iv. Windows forms controls.
   v. Web services.

i. Windows forms application

Windows forms provide the following useful features.

a. New form architecture
   An object oriented set of classes including the base form class. Custom forms may inherit directly from the base form class.
b. The control object model
   Set of windows controls for the user interface
   The .Net framework provides windows control that can be dropped on to windows forms to create your user interface
c. The event model
   Set of events, based on delegates, which are similar to call backs delegates allow you to develop more complex event handler.

ii. Windows form control

a. It is actively controls that are reusable component providing for user interface and are responsive to user events.
b. The .Net framework provides namespace called system windows forms control which inherits from base classes.
c. This includes the classes that provides the controls with it's user interface and event programming model.

iii. Windows service application

a. Windows service application are executable that run in independent windows sessions with no user interactions
b. It is formally known as NT services it provides functionality for large number of windows 2000 services, including MS-SQL server 2000,MS-commerce server 2000.
c. MS-developer will be must familiar with following service.
   - *Distributed Transaction co-ordinate*
     Co-ordinate transactions that are distributed across two or more database messages queues, file systems or another transaction protected resource manager.
   - *IIS Admin service*
     Allows administration of web and FTTP service through the internet information services.

- *SMTP(Simple mail transfer protocol)*
  Transports electronic mail across the network.

- *Task scheduler*
  Install, repair and removes software according to instructions contained in .MSI files

- *World wide web publishing services*
  Provides web connectivity and administration through IIS (Internet information services)

iv. Asp .Net web application

i. It is next generation platform for developing web application
ii. It is object oriented development environment. It provides following two programming model.

- Web forms
  It is analogous to windows form we can drag controls on to the form to provide user interface
  It supports event driven programming model also provides functionality of client side scripting.
- Web services
  It is remote application component that receives and respond to request using open standard protocol namely RPC cause over HTTP.

v. Web service

a. Asp .Net framework together provides classes and service for building web service components.
b. Web services are distributed business component that may functions as standalone applications.
c. The open standard foundation is supposed to allow array of different devices to access the same application.

Q9] Explain what is metadata.

i. Metadata is organized information that CLR uses to provide compile time and runtime services including
   - Loading of class files.
   - Debugging.
   - Object browsing.
   - MSIL translation to native code.

ii. Metadata is same as to the type library files that are generated for com component.

iii. The COM component type library file is separate from actual compiled DLL files.

iv. Metadata is stored as part of actual .Net component source code.

v. It is also part of compiled components known in .Net as assembly

vi. This form of component do not require registry entries

vii. Metadata contains structure description of part in an assembly language such as
   a) Description of assembly
      - Identify –Name, Version and culture
      - Dependencies
      - Security permission that the assembly require to run
   b) Description of the types
      - Base classes and infrastructure
   c) Custom attributes
      - Defined by user.
      - Defined by compiler
      - Defined by framework.

Q10] how does .Net overcome the limitation of windows and COM+

i. COM+ libraries are poorly organized .COM does not provide feature called component categories which allows you to define metadata information for component.

ii. It provide limited level of organization to class
iii. COM+ libraries are not easy to extend COM+ library do not support form of inheritance called interface inheritance which allow one class to deligate class to member another class.
iv. No united in another class library.
v. In which DNA each language provides it's own class library
vi. This creates inconsistency inequality between languages that code against the same OS.
vii. In complete windows API encapsulation windows API is not completely encapsulated within object oriented rappers which means that there is no consistent way to access full range of windows system functionality.
viii. To overcome from these limitations .Net framework provides following ways

a) Namespace
   - It is hierarchal structure of classes' interfaces which is organized in group related classes and keep groups of classes distinct
   - For example: - System. Drawing Namespace contains class related with drawing and generating shapes.
   - These are distinct and separate group of classes which is clearly identified by new space.

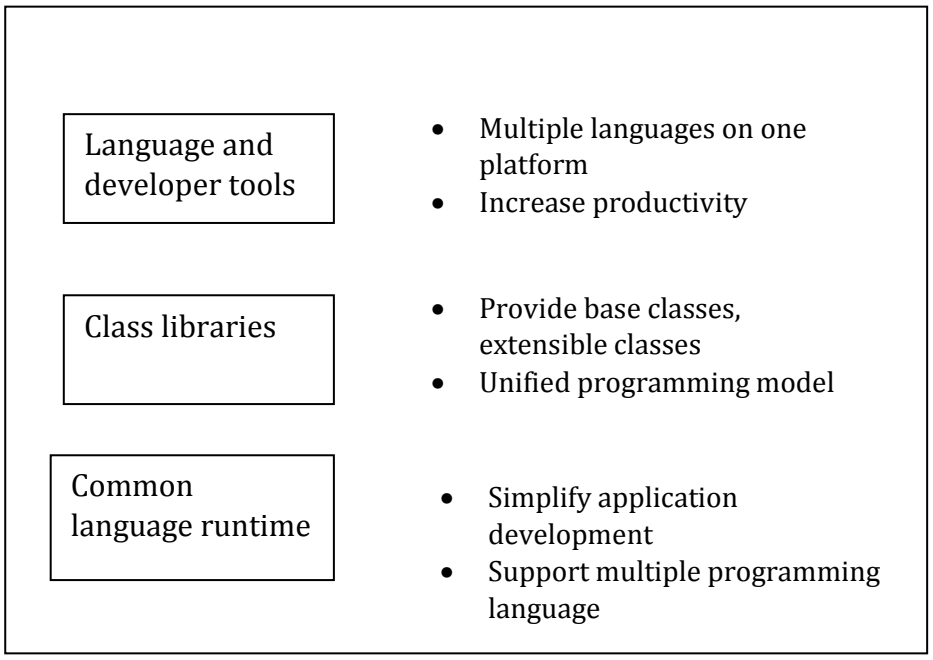
b) Unified programming framework:-
   - The .Net provides CTS that standalone data type across framework, which puts all language on an equal footing for use.

c) Object oriented
   - The .Net class framework provides extensible classes that may be manipulated using standard object oriented operations or concept including inheritance, overriding, and polymorphism.
   - .Net provides a boxing conversion that will convert primitive data types into object oriented reference type.

Q11] Highlights of .Net framework

Answer-

i. .Net frame work provides services, classes and tools that work together to provide new .Net development platform.
ii. Following figure presents block diagram of .Net framework



High level languages of .Net framework are

1) Common language runtime.
2) Class library.
3) Languages and developer tools.

1. Common language runtime

   It provides reliable, secure, execution environment and support multiple programming languages.

2. Class libraries

   It provides extensible classes that are used across all .Net complement languages

3. Languages and developer tools

Languages such as C++, VB, and JavaScript are included in .Net and their features are greatly extended.

Framework also includes new languages C#, VS .Net provide an IDE for .Net.