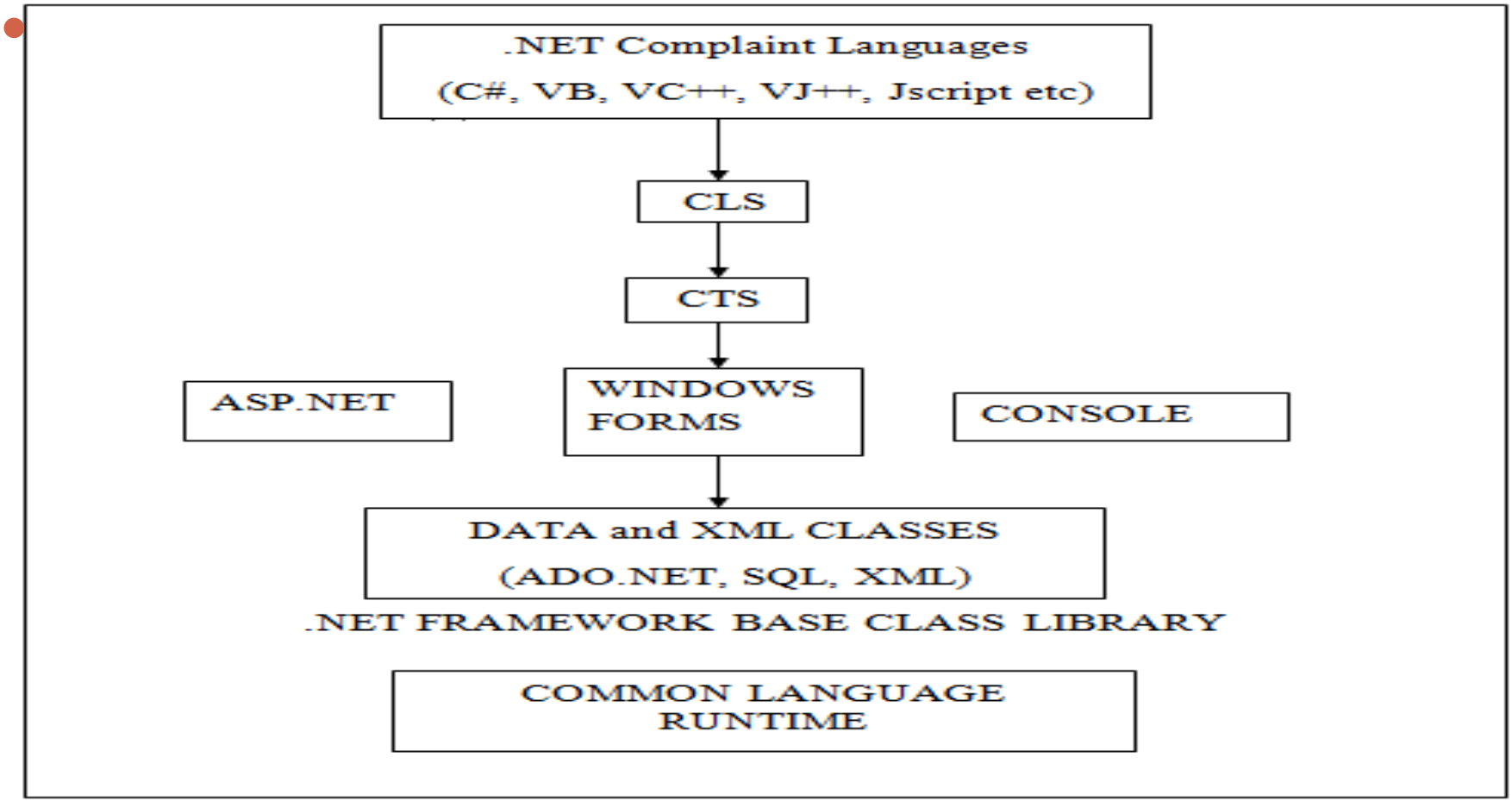
.NET ARCHITECTURE

.NET Architecture



Components Of .NET Architecture

- Three Components:
  - Common Language Runtime (CLR):
    - Similar to JVM of Java
    - Virtual machine component of framework
    - .NET program is monitored by CLR
  - Common Type System (CTS)
    - Manage data types supported by various .NET programming languages
    - Provide language interoperability
  - Framework Class Libraries (FCL)
    - Similar to class libraries of Java
    - Consists of various base classes used to support different services of framework

CLR

CTS

FCL

1. CLR

Common Language Runtime (CLR)

- It is an agent used to execution & verification of code
- Manage services like
  - Thread Management
  - Memory Management
  - Type Safety
  - Exception Handling
- Load MSIL (Microsoft Intermediate Language) code
  - MSIL code is similar to byte code of java
  - MSIL code consists of instructions for loading, storing, initializing & calling methods on objects
  - MSIL code also known as common Intermediate Language

Common Language Runtime (CLR)

- JIT (Just In Time) compiler of CLR compiles code into native Machine code for executing application
- CLR can execute code written in any language.
- CLR provide code access security & garbage collection
- CLR allows code created in one language can be communicated in other language
- CRL support common type system, meta data & common execution environment.
- Managed Code: targets the runtime
- Unmanaged Code: not target the runtime

CLR Architecture

- Components Of CLR

Exception Manager

Thread Support

Security Checker

Debug Engine

Code Manager

Type Checker

Class Loader

Garbage Collector

CLR Components

- Compiler & Class Loader
  - Compiler compile source code into intermediate code.
  - This code consists of MSIL & Meta Data
  - These are contained in Portable Executable (PE) file
  - Class Loader loads this data in runtime
- Code Manager
  - Manage the code during execution
  - Allocate memory to objects
- Exception Manager
  - Handle exception in both managed & unmanaged code

CLR Components

- Security Checker
  - Restricts access to system resources like
    - Hard Disk
    - MSIL Code
- Thread Support
  - Support multithreading
- Debug Engine
  - Find & remove the bugs from programs
- Type Checker
  - Datatype checking of variable

CLR Components

- Garbage Collector
  - Automatic garbage collection of object when object is no longer in use
  - Periodically check heap memory where objects get memory

2. CTS

Common Type System (CTS)

- Type refers to data types supported by programming languages
- Provide common type system for all languages
- CTS support object oriented concepts
  - So all types are objects
  - Share common data type
- Language Integration
  - Code of one language can be inherited by code in other language
- Better Performance
- Type Safety

Common Type System (CTS)

- Two main types supported by framework
  - Value Type
    - Primitive or Built In Data type
    - Passed In Methods By Value Method
    - Memory Allocated From Stack
  - Reference Type
    - Store Memory Address Of Variable Using Pointer
    - Passed In Methods By Reference Method
    - Stored In Heap

Common Type System (CTS)

- Common Language Specification (CLS)
  - CLS is subset of CTS
  - As per standard, code written in a CLS must be compliant with code written in another language.
  - Describe guidelines for defining .NET language
  - It compile code into Intermediate Language, so this code executed by CLR.

3. FCL

Framework Class Libraries (FCL)

- Collection Of Reusable, Manageable Classes & Interfaces
- Provide Support For System Services
- Act As Interface Between Application & Operating System
- Hierarchical Structure
- Namespace
  - Organization of class libraries according to their functionality called namespace
- All classes of library are object oriented & can be included in code of any .NET supported language

Class Libraries

- Integration Of 3rd Party Components
- Perform Different Tasks
  - Database Connectivity
  - String Handling
  - I/O Functionality
  - File Handling
- Library Split Into Two Parts:
  - Basic Class Library (BCL)
  - Framework Class Library (FCL)
    - FCL is superset of BCL

Class Libraries

Windows Form:

Consists of classes related to design, components, passing messages to user etc.

Web Form (ASP .NET):

Consists of classes related to caching, security, authentication, configuration..

XML:

Consists of classes related to XSLT, XPath, XQuery, Serialization.

Database (ADO .NET):

Consists of classes related to connection, command, retrieving data into reader & adapter, SQL types, executing procedures


THANK YOU