.NET Framework

Overview, Architecture, Execution

What is the .NET Framework?

Developer Tools

Clients

Databases

ASP.NET Web Applications

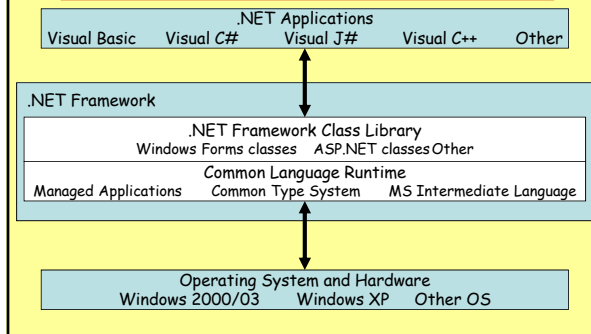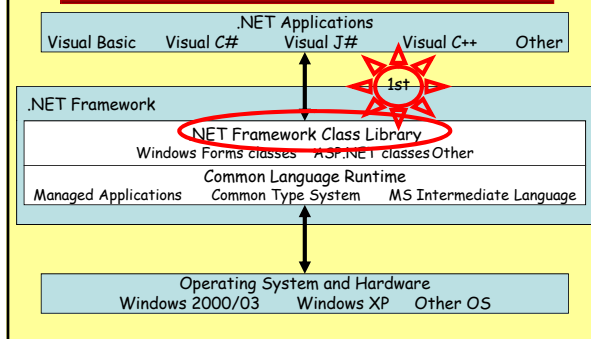XML Web Services

User Experiences
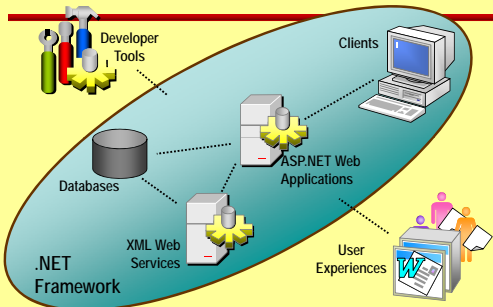
.NET Framework

.NET Framework

- A platform for developing and running applications and XML Web services
- Framework components
  - Common language runtime
  - Class libraries
  - ASP.NET

.NET Framework (Figure from Boehm)

.NET Applications				
Visual Basic	Visual C#	Visual J#	Visual C++	Other

.NET Framework

.NET Framework Class Library		
Windows Forms classes	ASP.NET classes	Other

Common Language Runtime		
Managed Applications	Common Type System	MS Intermediate Language

Operating System and Hardware		
Windows 2000/03	Windows XP	Other OS

.NET Framework (Figure from Boehm)

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1st

.NET Framework

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.NET Framework Class Library (FCL)

- Stores all classes and interfaces of the .NET language
- ASP.NET classes are used to develop Web Applications
- ADO.NET classes are used for database interactions
- Windows System.Forms classes are used for Windows applications
- Etc.

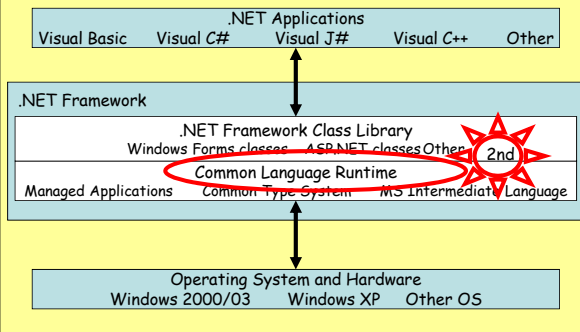## .NET FCL

- Library is organized hierarchically
- Related classes are organized into *Namespaces*
  - sections within the library that contain related classes, structures, enumerations, delegates, interfaces
  - *When you create a project in Visual Studio IDE, certain namespaces are assumed*
  - *Others must be imported*

Namespaces You May Use in This Class

- System.Web
- System.Data
- Others
- but not System.Windows

.NET Framework (Figure from Boehm)

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.NET Framework

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Common Language Runtime			2nd
Managed Applications	Common Type System	MS Intermediate Language	

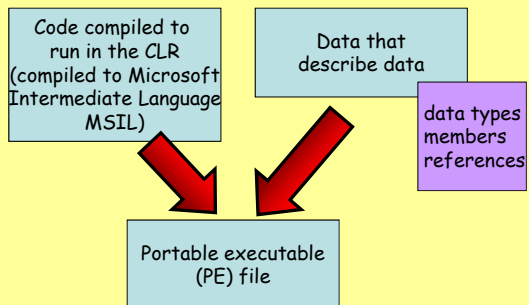| Operating System and Hardware		
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Common Language Runtime (CLR)

▷ Manages execution of applications developed in .NET

✖ Integrates components developed in different languages

✖ Handles Common Type System (common data types across all languages)

✖ Handles errors across languages

✖ Handles security

✖ Manages storage and destruction of objects

Types

▷ Types: classes, structures, enumerations, delegates, interfaces, data types

▷ Any element used in the *As* clause of a declaration

✖ Dim AnyName As SomeType

▷ **Value types** – 2 memory locations

✖ Make a copy in memory

▷ **Reference types** – 1 memory location
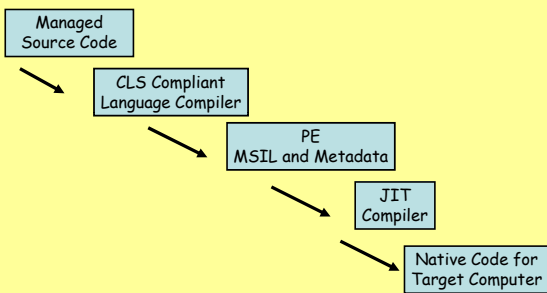
✖ Refer to the original by its memory location

Managed code and Metadata

Code compiled to run in the CLR (compiled to Microsoft Intermediate Language MSIL)

Data that describe data

data types
members
references

Portable executable (PE) file

Common Language Specification (CLS)

- Published standards that specify how a language that interacts with the CLR should behave

Using .NET CLR to Compile Programs

Managed Source Code

CLS Compliant Language Compiler

PE MSIL and Metadata

JIT Compiler

Native Code for Target Computer

ASP.NET

- **Active Server Pages** (ASP)
- A Web development environment that compiles applications written in .NET compatible languages
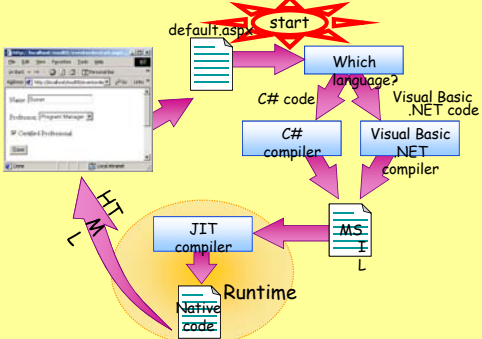- Uses CLR and managed code features
  - These are on the Web *server*

Deploying .NET *Windows* Applications

- Target computer must have .NET Framework or .NET Framework Redistributable (dotnetfx.exe)
- Deployment methods
  - XCopy deployment – copy necessary files to the target machine
  - Windows Installer technology – application ships with Windows

Deploying .NET Web Applications

- Web applications are published to a Web Folder on a web server running IIS
- The web server has to have the .NET framework installed
- Users access the application using a browser on a workstation and the URL of the web application
- Client computers can run any OS, any browser

Runtime Compilation and Execution

End of .NET Framework

Overview, Architecture,
Execution