ADVANCED PROGRAMMING: C#

LECTURE 01: INTRODUCTION

Some slides are borrowed from Dr. Shahriar Bijani
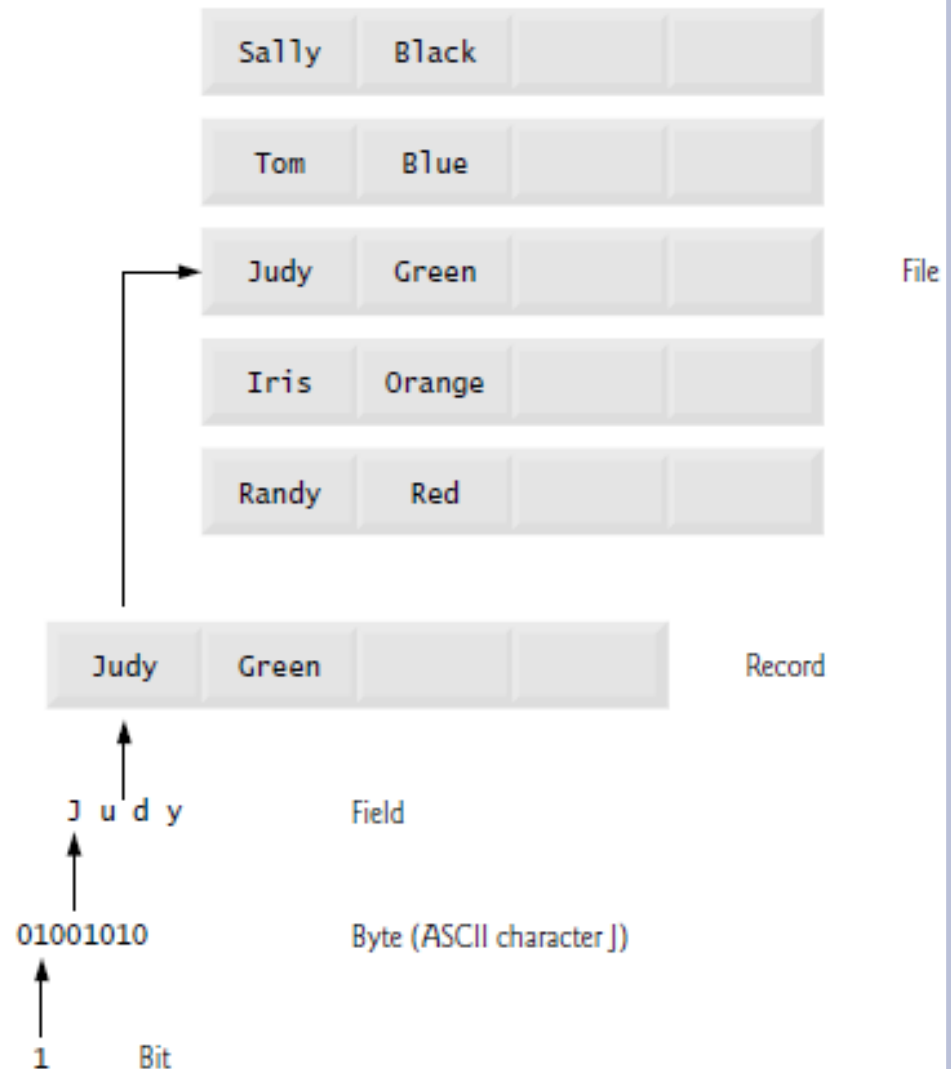
REFERENCE

- **<u>Visual C# 2012 How to Program</u>**, Paul Deitel & Harvey Deitel, 5th Edition, Prentice Hall.

DATA HIERARCHY

- **Bit**
- **Character (Byte)**
- **Field**
  - a group of characters that have a meaning
- **Record**
  - Several related fields
- **File**
  - A group of related records.
  - contains arbitrary data in arbitrary formats.

Sally	Black		
Tom	Blue		
Judy	Green		
Iris	Orange		
Randy	Red		

File

Judy	Green		

Record

J u d y   Field

01001010   Byte (ASCII character J)

1   Bit

DATA HIERARCHY

- **Database**
  - A collection of data organized for easy access and manipulation
  - In *relational database,* data is stored in simple *tables.* A *table* includes records and fields.
- **Big Data**
  - Approximately 2.5 quintillion bytes (2.5 *exabytes*) of data are created daily!

Unit	Bytes	Which is approximately
1 kilobyte (KB)	1024 bytes	10^3 (1024 bytes exactly)
1 megabyte (MB)	1024 kilobytes	10^6 (1,000,000 bytes)
1 gigabyte (GB)	1024 megabytes	10^9 (1,000,000,000 bytes)
1 terabyte (TB)	1024 gigabytes	10^{12} (1,000,000,000,000 bytes)
1 petabyte (PB)	1024 terabytes	10^{15} (1,000,000,000,000,000 bytes)
1 exabyte (EB)	1024 petabytes	10^{18} (1,000,000,000,000,000,000 bytes)
1 zettabyte (ZB)	1024 exabytes	10^{21} (1,000,000,000,000,000,000,000 bytes)

PROGRAMMING LANGUAGES

- **Machine Languages**

- **Assembly Languages**

- **High-Level Languages**

  - *Compilers and Interpreters*

C# Programming Language

- In 2000,Microsoft announced the **C#** programming language.
- C# is an object-oriented programming language.
- C# has roots in the C, C++ and Java.

- **C#**
  - **Object-Oriented Programming**
  - **Event-Driven Programming**
  - **Visual Programming**
  - **Internet and Web Programming** (ASP.NET)
  - **Synchronous/asynchronous programming**

OTHER LANGUAGES

Some other key modern programming languages:

- **C** (1972)
  - Implemented by Dennis Ritchie at Bell Lab.
  - Development language of the UNIX operating system
- **C++** (early 1980s)
  - An extension of C,
  - Developed by Stroustrup in the early 1980s at Bell Lab.
  - *Object-oriented programming*
- **Objective C** (early 1980s)
  - Another object-oriented language based on C.
  - the key programming language for the Mac OS X (desktop)and all iOS-based devices (such as iPhones and iPads)

OTHER LANGUAGES

- **Java** (early 1990s)
  - Sun Microsystems (now part of Oracle) developed the C++-based object-oriented programming language.
  - A key goal of Java: to write programs that will run on a great variety of computer systems
  - Microsoft developed C# as a competitive language to Java.

Microsoft's .NET

- In 2000,Microsoft announced its **.NET initiative** (www.microsoft.com/net),

- Vision: using the Internet and the web in the development, engineering, distribution and use of software.

- Instead of forcing you to use a single programming language, .NET permits you to create apps in *any* **.NET-compatible language** (such as C#, Visual Basic, Visual C++ , F#, J#,….).

- It includes ASP.NET technology.

MICROSOFT'S .NET

- **.NET Framework Class Library**:

    - Helps you to build large C# apps quickly and easily.

    - Thousands of valuable *prebuilt* classes

MICROSOFT'S .NET: CLR

○ **Common Language Runtime (CLR)**

- CLR is a **virtual machine (VM)**

- executes .NET programs and provides functionality to make them easier to develop and debug
  Two compilations:

  ❖ the code is compiled into **Microsoft Intermediate Language** (**MSIL**). The MSIL for an app's components is placed into the app's *executable file.*

  ❖ When the app executes, another compiler (known as the **just-in-time compiler** or **JIT compiler**) translates the MSIL in the executable file into machine-language code (for a particular platform).

  ❖ The machine-language code executes on that platform.

MICROSOFT'S .NET: CLR

- Why two compilations?

  - **Platform Independence**

    - If the .NET Framework exists and is installed for a platform, that platform can run *any* .NET program.

    - Code written once can be used on another type of computer without modification

  - **Language Interoperability**

    - software components written in different .NET languages are all compiled into MSIL, the components can be combined to create a single unified program.

    - .NET Framework is language independent

.NET FRAMEWORK

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

.NET Framework

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

Common Language Runtime		
Managed applications	Common Type System	Intermediate Language

Operating System and Hardware		
Windows 2000/2003	Windows XP	Other Operating Systems