

MSc III Sem – Life Sciences

Course – Bioinformatics

Number System and Language

The Language of a Computer

- Uses digital signals
 - all 0's and 1's (binary)
 - bits (**BI**nary **digi**Ts)
- Data and commands stored in binary
 - 8 bits in a byte
 - ASCII character (American Standard Code for Information Interchange) stored in a byte
 - Integers stored in 2 or 4 bytes

Programming Languages

- Early computers programmed in machine languages
 - All binary numbers
- Assembly language used mnemonic codes
 - Codes translated into machine language by a program called the "assembler"

Assembly Language	Machine Language
LOAD	100100
STOR	100010
MULT	100110
ADD	100101
SUB	100011

decimal	hexadecimal	binary
0	0	0000
1	1	0001
2	2	0010
3	3	0011
4	4	0100
5	5	0101
6	6	0110
7	7	0111
8	8	1000
9	9	1001
10	A	1010
11	B	1011
12	C	1100
13	D	1101
14	E	1110
15	F	1111

Binary Language:

basic language of computation

<https://www.rapidtables.com/convert/number/decimal-to-binary.html>

High-Level Language Programs

1. Source program created with an editor
2. Source code translated into machine language by compiler
 - results in a .obj file (object code)
3. Linker combines common library routines with object code
 - Results in a .exe file (executable code)
4. Loader brings executable code into memory and it is run

Examples of High Level Languages

- **FORTRAN** – (FORmula TRANslator) used for scientific computing.
- **ALGOL** – (ALGORithmic Language)
- **COBOL** (Common Business Orientated Language) used for commercial programming.
- **BASIC** – (Beginner's All-Purpose Symbolic Instruction Code) – a learning language.
- **PASCAL** – A well-structured teaching language.
- **C, C+, C++, C*** - Evolved from Algol.
- **JAVA** – Popular language used for teaching programming
- ...and others

```
PROGRAM HELLOFX.BAS
10 REM HELLOFX.BAS
// the 15 REM Make sure we're in text mode:
20 GRAPHICS 0

public class ReadFromConsole {

    private static void process(String str) {
        System.out.println(" processing... > " + str + "\n");
    }

    private static void doReadFromStdin() {
        try {
            BufferedReader inStream = new BufferedReader (
                new InputStreamReader (System.in)
            );

            DATA
            String inLine = "";

            WORK:
            01 1
            01 1
            01 1
            while ( !(inLine.equalsIgnoreCase("quit"))
                &&
                !(inLine.equalsIgnoreCase("exit")) ) {
                System.out.print("prompt> ");
                inLine = inStream.readLine();
                process(inLine);
            }

            PROC:
            } catch (IOException e) {
                System.out.println("IOException: " + e);
            }
        }
    }
}
```

HTML

- ..stands for **HyperText Markup Language**.
- is used to develop **web pages**. A web page is really a **program** written in HTML with instructions for the web browser telling it how to display the page.
- **Hyperlinks** can be used for navigation between web pages.
- **Multimedia** objects can be embedded in a web page.

HTML

```
<body bgcolor="blue">  
<table>  
  <tr>  
    <td><font face="arial" color="red">Ronaldo's</font></td>  
    <td><font face="arial" color="white">First Page</font></td>  
  </tr>  
  <tr>  
    <td></img></td>  
  </tr>  
</table>  
<a href="page2.htm">Page 2</a>  
</body>
```

Visual Languages

- **Visual Languages** allow the programmer to manipulate objects visually on a form, and set their layout and properties.
- Often used to create Microsoft Windows Applications.
- **Examples** : Visual Basic, Visual C#, Delphi.

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