PHP Programming Training

Computer Basics

By Umasankar Natarajan B.E., M.B.A, PMP®

Objectives

- Make you expect in the following topics
  - Data Representation
  - Number System
  - Programming Languages
  - Compiler, Assembler, Debugger
  - IDE and Editor

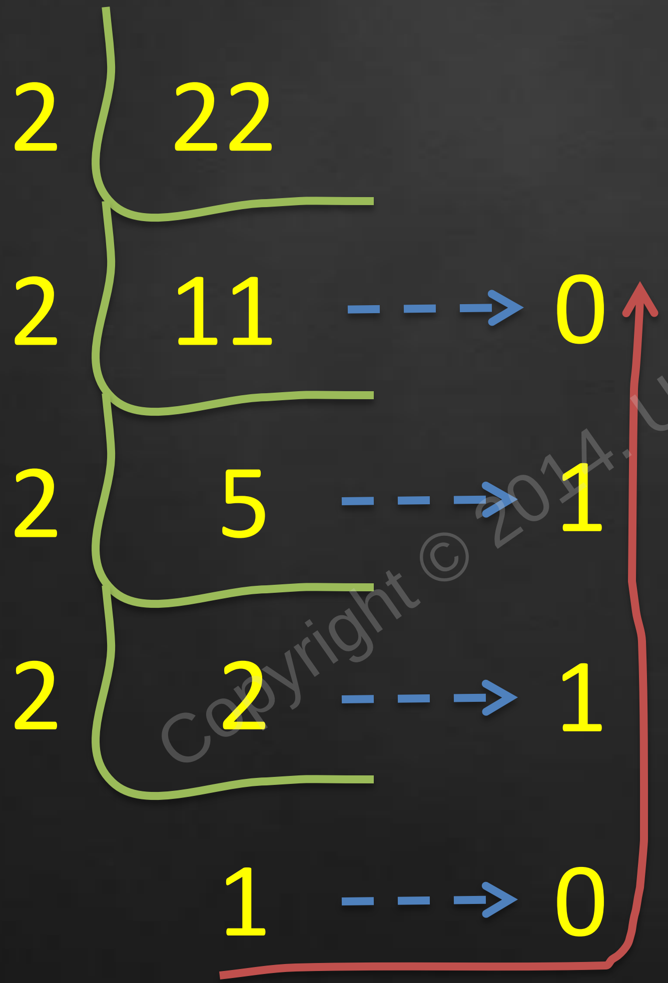
Data Representation

Bit	-	Binary Digit
1 Byte	=	8 Bits
1 Kilo Byte(1KB)	=	1024 Bytes
1 Mega Byte (1MB)	=	1024 Kilo Bytes
1 Giga Byte(1GB)	=	1024 Mega Bytes
1 Tera Byte (1TB)	=	1024 Giga Bytes

Number System

- A number can be represented with different base values.
- Decimal numbers - number system with the numbers in the base 10
- Decimal number has values 0,1,2,3,4,5,6,7,8,9
- Binary numbers - number system with the numbers in the base 2
  Used in computer
- Binary number has values 0,1
- Octal numbers - number system with the numbers in the base 8
- Octal number has values 0,1,2,3,4,5,6,7
- 3 binary digits group together to form an Octal number
- Hexadecimal numbers - number system with the numbers in the base 16
- Hexadecimal number has values 0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,F
- 4 binary digits group together to form a Hexadecimal number

Decimal to Binary



2 | 22

2 | 11 ---> 0

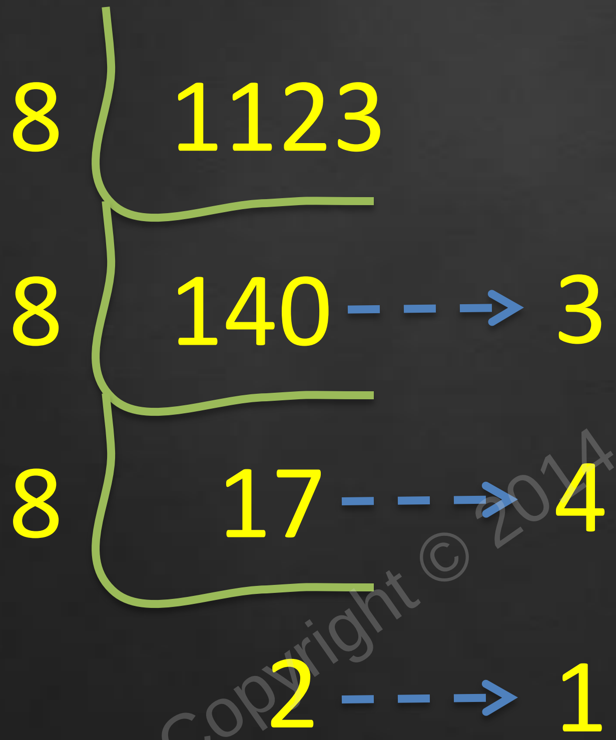
2 | 5 ---> 1

2 | 2 ---> 1

1 ---> 0

Binary Number for 22 is 10110

Decimal to Octal



8 | 1123

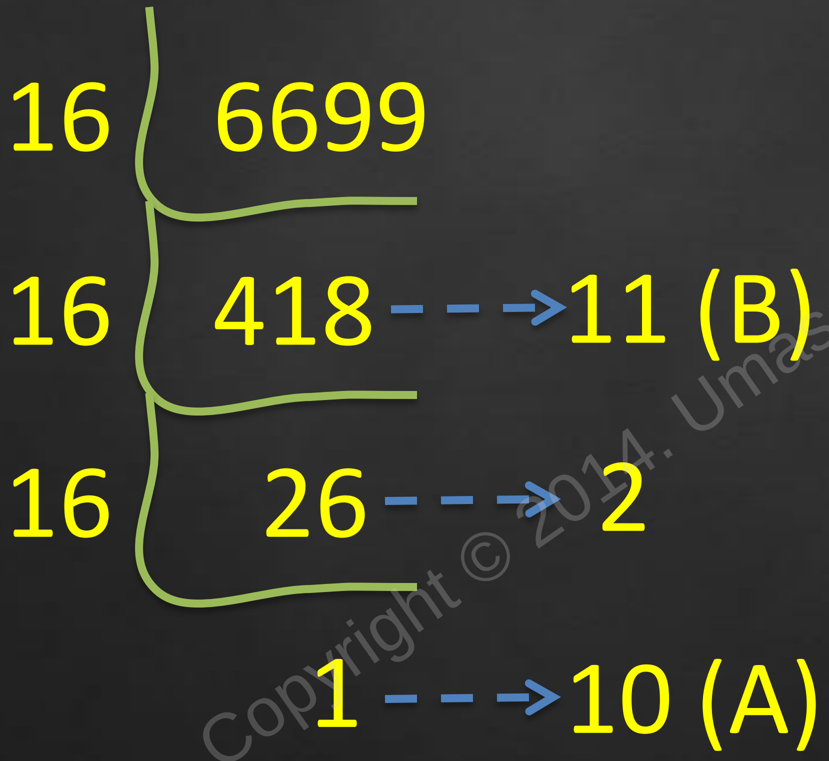
8 | 140 → 3

8 | 17 → 4

2 → 1

Binary Number for 1123 is 2143

Decimal to Hexadecimal



16 6699

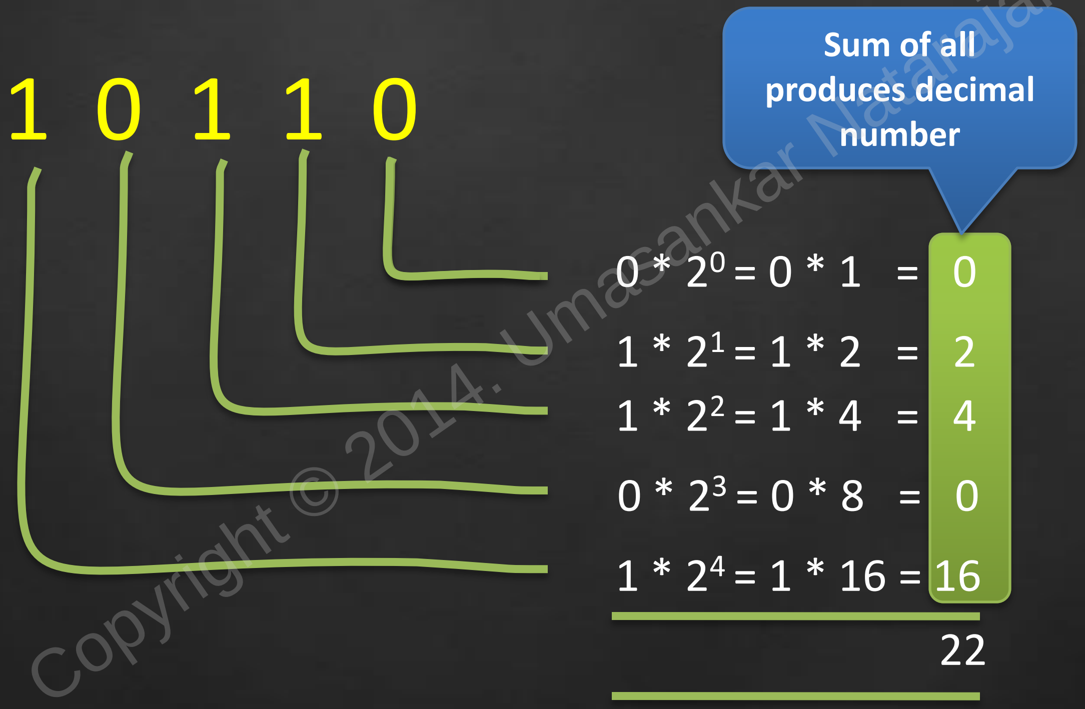
16 418 ---> 11 (B)

16 26 ---> 2

1 ---> 10 (A)

Binary Number for 6699 is 1A2B

Binary to Decimal



1 0 1 1 0

Sum of all produces decimal number

$0 * 2^0 = 0 * 1 = 0$

$1 * 2^1 = 1 * 2 = 2$

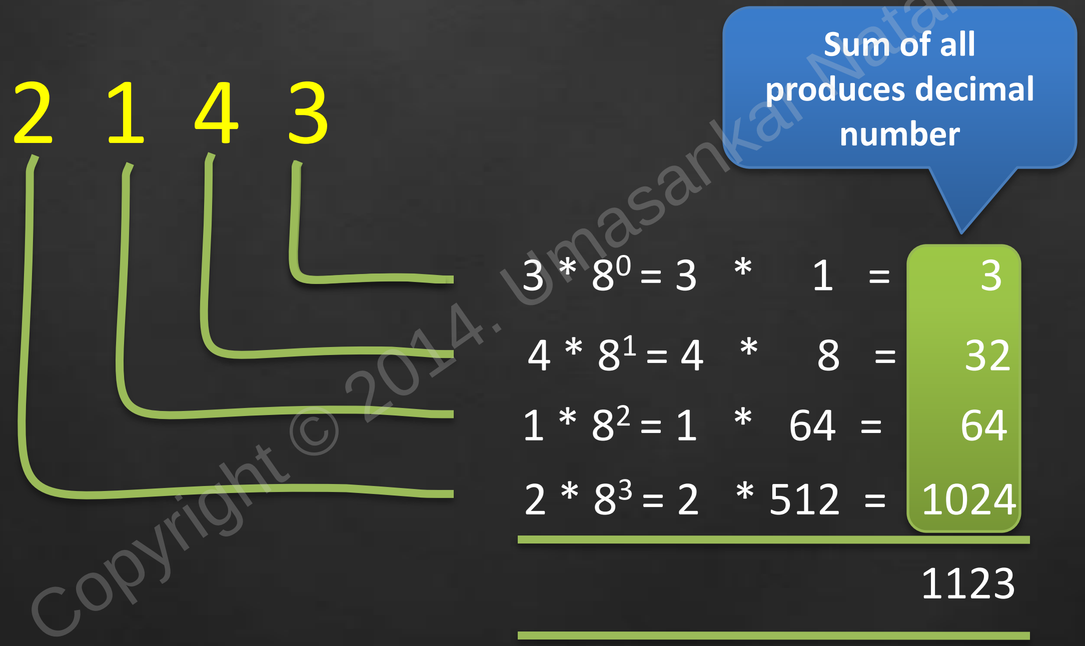
$1 * 2^2 = 1 * 4 = 4$

$0 * 2^3 = 0 * 8 = 0$

$1 * 2^4 = 1 * 16 = 16$

22

Octal to Decimal



2 1 4 3

Sum of all produces decimal number

$3 * 8^0 = 3 * 1 = 3$

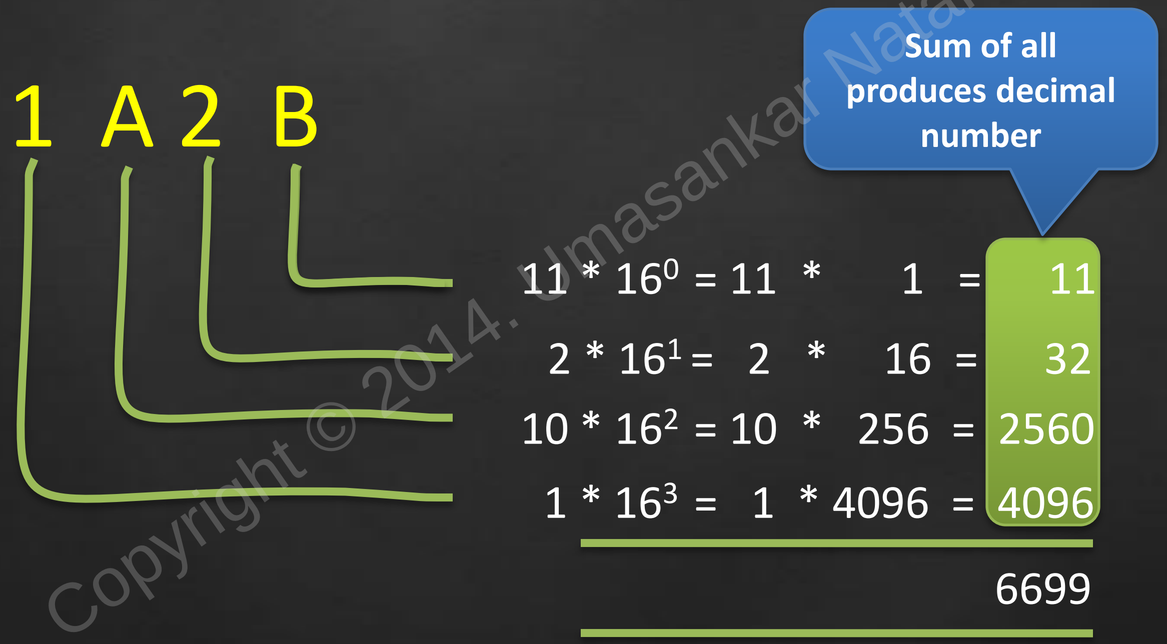
$4 * 8^1 = 4 * 8 = 32$

$1 * 8^2 = 1 * 64 = 64$

$2 * 8^3 = 2 * 512 = 1024$

1123

Hexadecimal to Decimal



1 A 2 B

Sum of all produces decimal number

$11 * 16^0 = 11 * 1 = 11$

$2 * 16^1 = 2 * 16 = 32$

$10 * 16^2 = 10 * 256 = 2560$

$1 * 16^3 = 1 * 4096 = 4096$

6699

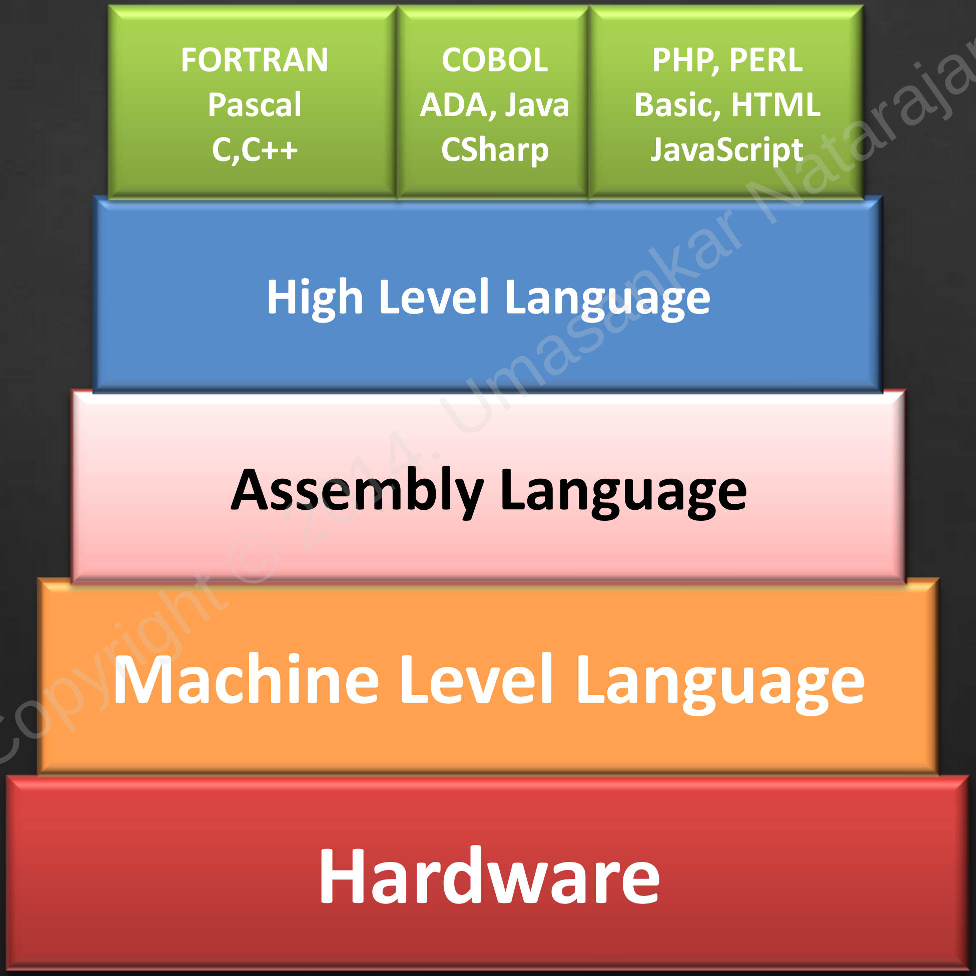
Programming Languages

- Language
  - ✓ Language is method of communication.
- Programming Language
  - ✓ A programming language is a formal constructed language designed to communicate instructions to a machine, particularly a computer.
  - ✓ A programming language is a computer language programmers use to develop applications, scripts, or other set of instructions for a computer to execute.
  - ✓ Programming languages can be used to create programs to control the behavior of a machine or to express algorithms.
- Example
  - ✓ FORTRAN, COBOL, Pascal, C, C++, Java, CSharp
  - ✓ BASIC, PHP, JavaScript, HTML, PERL
- Program
  - ✓ A program is a series of human understandable computer instructions that can be read by a compiler/interpreter and linker, and translated into machine code, that a computer can understand and run it.
  - ✓ A vocabulary and set of grammatical rules for instructing a computer to perform specific tasks
- Instruction
  - ✓ Instruction is the list of all the basic commands

Generation languages

- First generation languages(1GL) are low-level languages that are machine language.
- Second generation languages(2GL) are also low-level languages that consist of assembly languages.
- Third generation languages(3GL) are high-level languages.
- Fourth generation languages(4GL) are languages that consist of statements similar to statements in a human language. Fourth generation languages are commonly used in database programming and scripts.
- Fifth generation languages(5GL) are programming languages that contain visual tools to help develop a program. Languages used for artificial intelligence and neural networks. Example Visual Basic.

Programming Languages Hierarchy



FORTRAN
Pascal
C,C++

COBOL
ADA, Java
CSharp

PHP, PERL
Basic, HTML
JavaScript

High Level Language

Assembly Language

Machine Level Language

Hardware

Programming Languages Hierarchy

- ## High Level Language
  - ✓ High Level Language is an advanced computer programming language that isn't limited by the computer, designed for a specific job, and is easier to understand.
  - ✓ The main advantage of high-level languages over low-level languages is that they are easier to read, write, and maintain. Ultimately, programs written in a high-level language must be translated into machine language by a compiler or interpreter
- ## Low Level Language
  - ✓ Low Level Language is a programming language that is more arcane and difficult to understand. Example of low-level language is assembly languages.
- ## Machine Language (machine code or object code)
  - ✓ Machine Language is a collection of binary digits or bits that the computer reads and interprets. Machine language is the only language a computer is capable of understanding.
- ## Assembly Language (ASL)
  - ✓ Assembly Language is a low-level programming language used to interface with computer hardware. Assembly language uses structured commands as substitutions for numbers allowing humans to read the code easier than looking at binary. Although easier to read than binary, assembly language is a difficult language and is usually substituted for a higher language.
- ## Scripting Language
  - ✓ Scripting language is a high-level programming language that is interpreted by another program at runtime rather than compiled.
  - ✓ Advantages of a scripts
    - ▪ Open source, allowing users to view and edit the script if needed. Does not require the file to be compiled, but may be able to be if needed.
    - ▪ Easy to port between different operating systems.
    - ▪ Much faster to develop than an actual program. Some individuals and companies write scripts as a prototype for actual programs.
- ## Compiled Language
  - ✓ Programming Language that allows the computer to run and understand the program without the need of the programming software used to create it

English Language vs Programming Languages

English Language	Programming Languages
Alphabets	Alphabets, Numbers,_
Word (Group of Alphabets)	Identifiers (Group of Alphabets, Numbers,_ Keywords, Variable Names, Function Names, Class Names, File Names)
Sentence (Group of Words)	Statements / Instructions (Group of Identifiers, Operators, Commands)
Paragraph (Group of Sentences)	Functions / Methods / Subroutines / Procedures (Collection of Statements / Instructions)
Page (Group Paragraphs)	File / Module (Collection of Functions / Methods / Subroutines / Procedures)
Book (Collection of Pages)	Project (Collection of File / Module)
Library (Collection of Books)	Workspace (Collection of Projects)
Grammar	Syntax
Grammatical mistake will change meaning of the sentence	Syntax error will not allow to execute the instruction
Typo error will allow to get the meaning of the sentence, sometimes get wrong meaning	Logic error will allow to execute the instruction. But unexpected result will be occurred

Text Editor

- Text Editor is any word processing program that lets a user enter, change, store, and usually print text.
- Typically, a text editor provides an "empty" display screen (or "scrollable page") with a fixed-line length and visible line numbers. You can then fill the lines in with text, line by line..
- Example
  - ✓ Notepad++
  - ✓ Flash Develop
  - ✓ Sublime Text
  - ✓ IntelliJ IDEA
  - ✓ VIM
  - ✓ Haxe

Compiler

- Compiler is a software which translates high-level language into low-level instructions.
- Example
  - ✓ C, C++
- High-level language - Source code
- Machine Language - Object code
- Advantage
  - ✓ Faster execution
  - ✓ Uses less memory
- Disadvantages
  - ✓ For any changes, including bug fixes, requires recompile each time

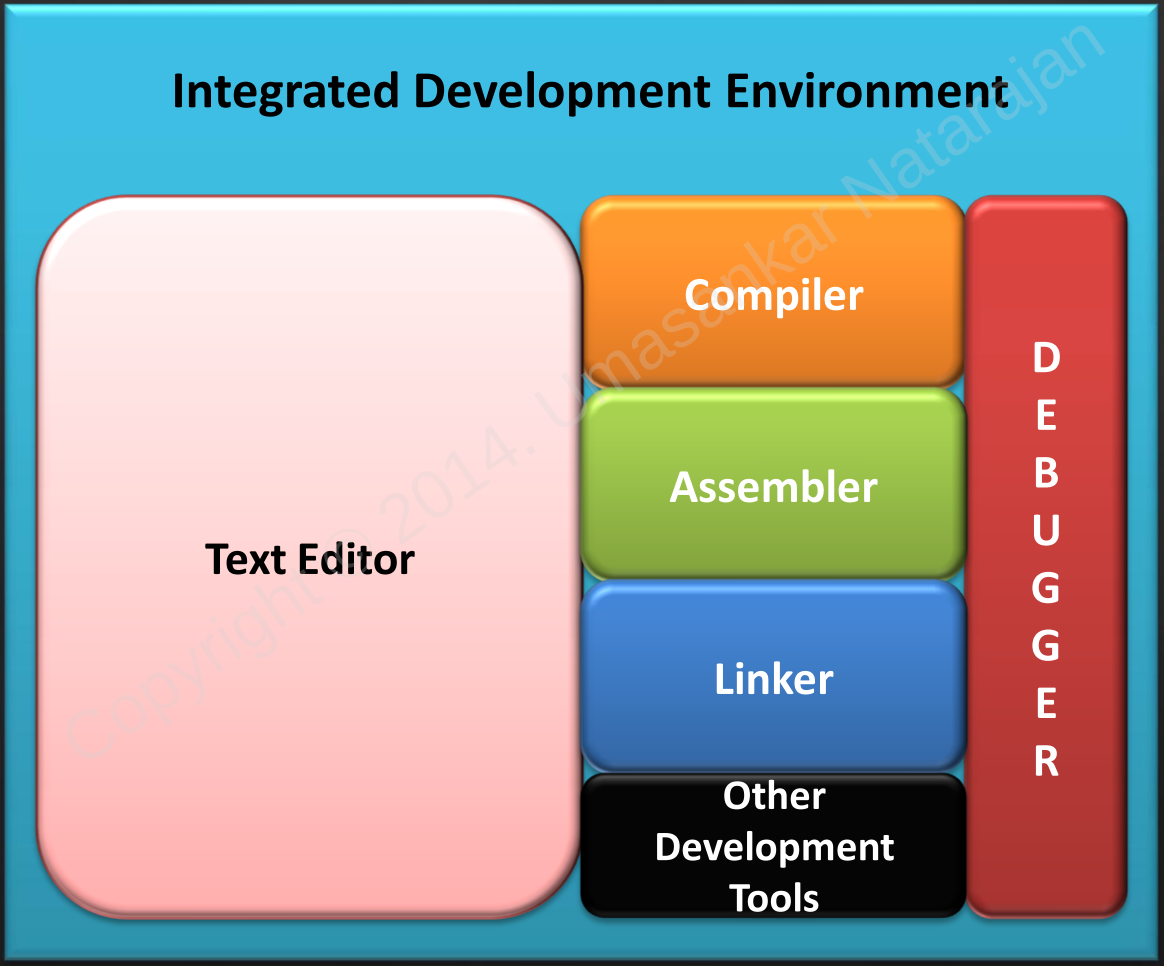
Interpreter

- Interpreter is a software which translates source code instructions into machine language and executes it one statement at a time.
- Most of the scripting language executed using interpreter
- Example of scripting language
  - ✓ Basic, PHP, JavaScript
- Advantage
  - ✓ Faster testing and code modification
- Disadvantages
  - ✓ Longer to execute, particularly bad for loops
  - ✓ Uses more memory

Debugger

- Debugger or debugging tool is a computer program that is used to test and debug other programs (the "target" program).
- The code to be examined might alternatively be running on an instruction set simulator (ISS), a technique that allows great power in its ability to halt when specific conditions are encountered but which will typically be somewhat slower than executing the code directly on the appropriate (or the same) processor.
- Some debuggers offer two modes of operation—full or partial simulation.

Integrated Development Environment



Integrated Development Environment

- Integrated Development Environment (IDE) is a programming environment that has been packaged as an application program, typically consisting of a code editor, a compiler, an assembler, a debugger, version control and a graphical user interface (GUI) builder.
- IDE is a graphical user interface (GUI)-based workbench designed to aid a developer in building software applications with an integrated environment combined with all the required tools at hand.
- The IDE may be a standalone application or may be included as part of one or more existing and compatible applications.
- IDE facilitates application development.
- An IDE supports single or multiple languages.
- Improve the productivity by providing similar interfaces for other related components and reduces the time taken to learn the language.
- Example
  - ✓ Visual Studio
  - ✓ Eclipse
  - ✓ Netbeans
  - ✓ HIDE (Haxe IDE)

Strength and Weakness of IDE & Text Editor

- IDE Strength
  - ✓ Integrated testing
  - ✓ Compilation
  - ✓ Breakpoints/stepping through code
  - ✓ Integration with other services (database views), automated class diagrams
- IDE Weaknesses
  - ✓ Large memory footprint
  - ✓ Cost
- Text Editor Strength
  - ✓ Fast
  - ✓ Easy to extend (macros, plugins)
  - ✓ Text edit functions (Ex: sublime text 2 unending keyboard shortcuts)
- Text Editor Weaknesses
  - ✓ Need to use another service to compile
  - ✓ Low support for code completion (intellisense features)

References

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