Lecture 9:
Basics of Programming

Dept. of CSE, ULAB

Index

Programming

- Programming
  - Computers Programming is how you get computers to solve problems
  - Computer programs (or software) are what make computers work. Without software, modern computers are just complicated machines for turning electricity into heat.
  - It’s software on your computer that runs your operating system, browser, email, games, movie player – just about everything.

Programming Language

- Programming Language
  - Computers understand instructions that are written in a specific syntactical form called a programming language. A programming language provides a way for a programmer to express a task so that it could be understood and executed by a computer.
  - Some of the popular Programming languages are Python, C, C++, Java, etc.

Programming Language

- Programming Language
  - English is a natural language. It has words, symbols and grammatical rules.
  - A programming language also has words, symbols and rules of grammar.
  - The grammatical rules are called syntax.
  - Each programming language has a different set of syntax rules.

Why so many Programming Languages

- Programming Language
  - Why does some people speak French or English or Bangla ?
  - Programming languages have evolved over time as better ways have been developed to design them.
  - First programming languages were developed in the 1950s
  - Since then thousands of languages have been developed
  - Different programming languages are designed for different types of programs.

Levels of Programming Languages

High-level program

```
class Triangle {
  ...
  float surface()
    return b*h/2;
  }
```

Low-level program

```
LOAD r1,b
LOAD r2,h
MUL r1,r2
DIV r1,#2
RET
```

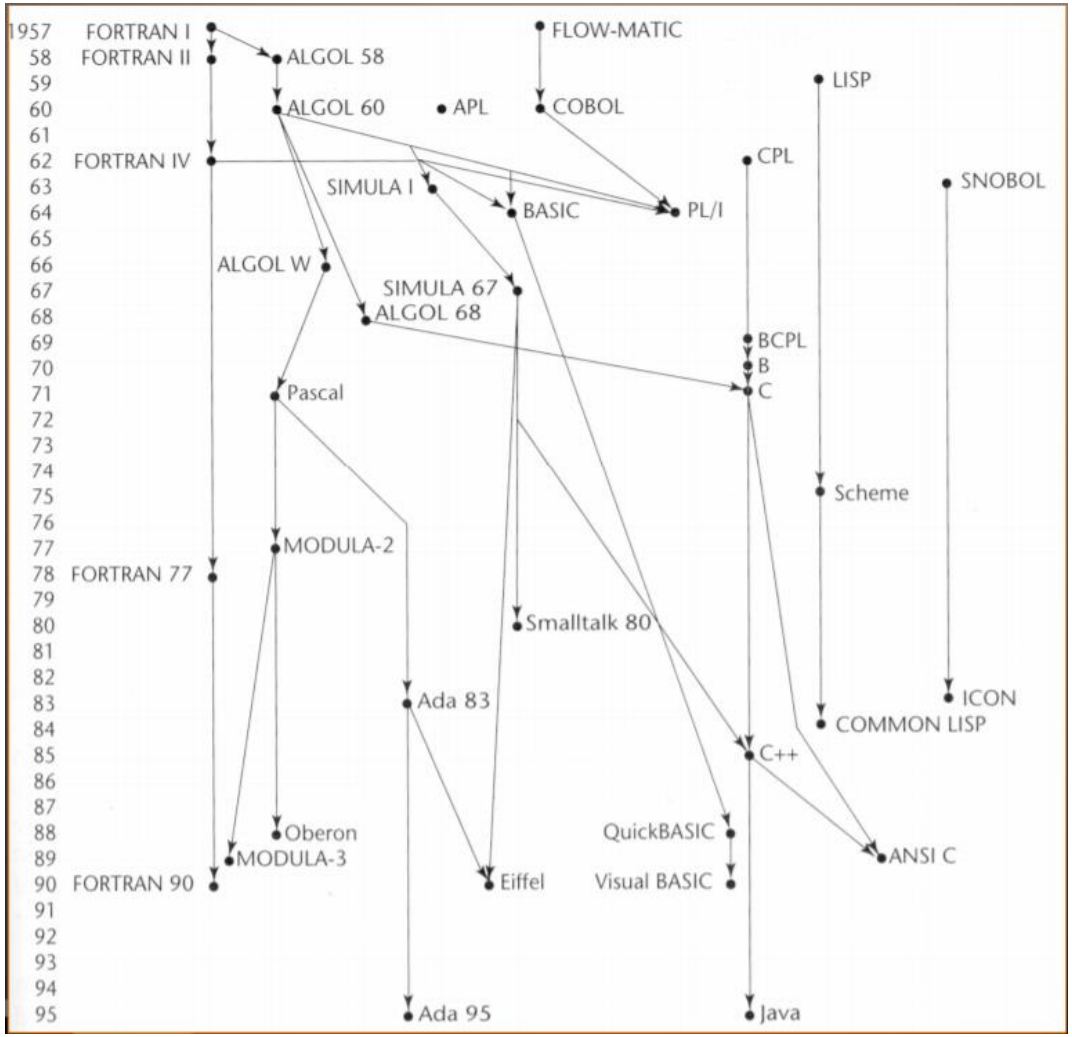
Executable Machine code

```
0001001001000101
0010010011101100
10101101001...
```

Types of Programming Languages

- First Generation Languages → Machine language
- Second Generation Languages → Assembly languages
- Third Generation Languages → Programs written in source code which must be translated into machine language using Compiler, Example: C and C++
- Fourth Generation Languages
- Fifth Generation Languages

Languages family tree



Programming Languages

Two broad groups

- Traditional programming languages
  - Sequences of instructions
- Object-oriented languages
  - Objects are created rather than sequences of instructions

Programming Languages

Traditional Programming Language

- C
  - Developed by Bell Laboratories in the early 1970s.
  - Often used for system programs

Object Oriented Programming Language

- C ++
  - It is C language with additional features.
  - Widely used for developing system and application software.
  - Graphical user interfaces can be developed easily with visual programming tools
- Java
  - An object-oriented language similar to C++ that eliminates lots of C++'s problematic features

Compiler and IDE

- Compiler
  - A compiler is a program that translates a source program written in some high-level programming language (such as Java, C) into low level machine code
- IDE
  - Integrated Development Environment (IDE) provides an environment to create, build and test a software application
  - It consists of a code editor, compiler and a debugger with a Graphical User Interface (GUI).

Compiler and IDE

- An IDE can provide visual cues. Keywords, words that have special meaning are highlighted with different colors.

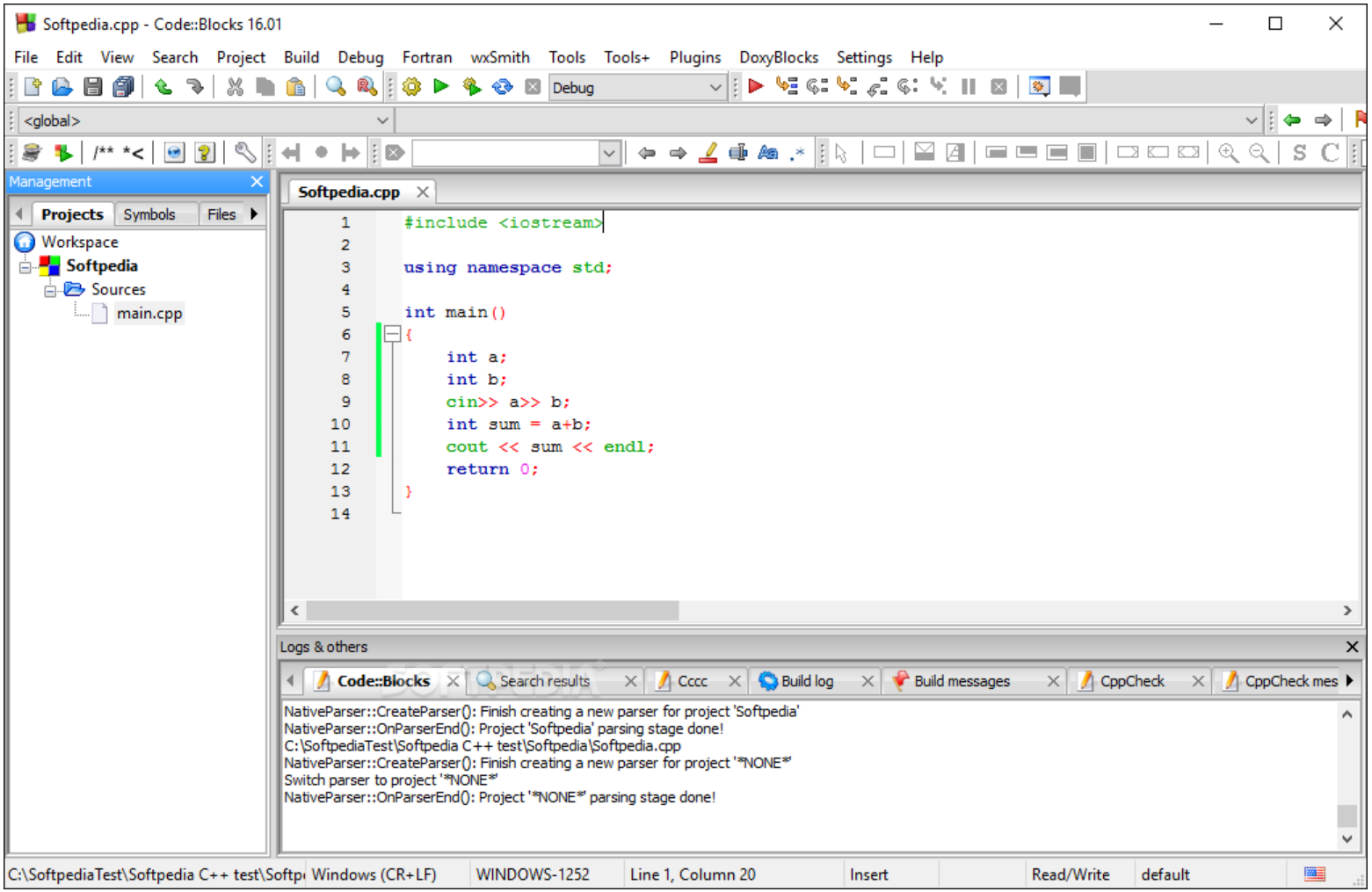
```
// without syntax highlighting

public class NiceDay {
  public static void main(String[] args) {
    System.out.println("It's a nice day out!");
  }
}
```

```
// with syntax highlighting

public class NiceDay {
  public static void main(String[] args) {
    System.out.println("It's a nice day out!");
  }
}
```

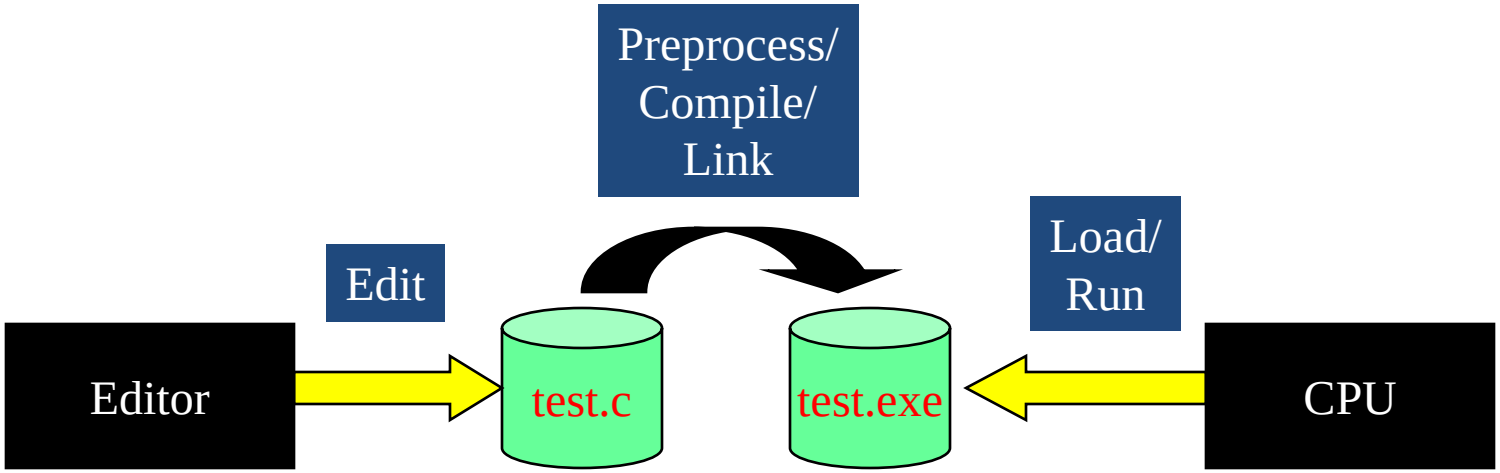
Code::Blocks



https://sourceforge.net/projects/codeblocks/files/Binaries/17.12/Windows/codeblocks-17.12-setup.exe/download

C Programming Language

C Programming Environment



First C Program


```
/* My first simple C program */

#include <stdio.h>

void main ()

{

      printf ("Hello World");

}
```

Comments

All C programs have a main function; they also start at main

Function to print to screen

message to print

End of statement

Braces indicate start and end of main

Let’s look into various parts of C program

*/Comments */	Comment can be used anywhere in the program to add info about program
#include<stdio.h>	stdio is standard for input / output, that notify the compiler to include the **header file** stdio.h in the program before compiling the source-code.
void main()	Main function: which is the default entry point for every C program and the void in front of it indicates that it does not return a value.
Braces	Two curly brackets “{…}” are used to group all statements together.
printf()	It is a function in C, which prints text on the screen.

Semicolons

- Each statement must be ended with a semicolon.
- Given below are two different statements −

```
int var = 10;
printf("The value is = %d", var);
```

Header File

- Each header file contains information (or declarations) for a particular group of functions:
  - **stdio.h** header file contains declarations of standard input and output functions
  - **math.h** header file contains declarations of mathematical functions
- To use any function we need to include header file using #include
- If we want to print message on screen then we have to use **printf()** function and then we have to include **stdio.h** header file

First C Program


```
/* My first simple C program */

#include <stdio.h>

void main ()

{

      printf ("Hello World");

}
```

Comments

All C programs have a main function; they also start at main

Function to print to screen

message to print

End of statement

Braces indicate start and end of main

Thank You