

- **Program** - a set of instructions that tells PC how to behave, what to do and derive at a solution to a particular problem

- Steps of program development:

define → analyze → develop → write → test )

↳ debug → document

- Byte code in Java - code generated by a Java compiler

- Basic data types in Java:

↳ byte (8b)      ↳ long (64b)      ↳ boolean (1b)      (8 types)  
↳ short (16b)      ↳ float (32b)      ↳ char  
↳ int (32b)      ↳ double (64b)

- Algorithms must be:

↳ precise      ↳ logical      ↳ concise

- Algorithm - a set of logically sequenced instructions that allows to find the solution to the problem

- **Linker / Loader** - a program that brings together separately compiled modules of a program into a form of language that is suitable for execution

- **Assembler** - module that converts assembly language into machine language

- What "final" means - non-access modifier used for classes, attributes and methods, which makes them non-changeable (impossible to inherit or override)
  - it's useful when you want a variable to always store the same value, like PI
- What is the task of "program counter"
  - is a register in computer processor that contains the address (location) of the instruction being executed at the current time. Each instruction gets fetched, the program counter increases its stored value by 1. After each instruction fetched, the program counter points to the next instruction in the sequence.

### Difference between "public" and "private" methods

- private method can only be used inside of its parent method or module
- public method can be used inside or outside of its

### • Explain how the program compilation in Java promotes platform independency

- a Java compiler (platform specific) is used to generate a bytecode file. This file can be interpreted by JVM (platform specific). JVM can interpret all bytecode files (generated by different compilers)

"Compile once, run everywhere"

## Runtime vs. Syntax Error

- Runtime error = error that occurs while program is running
- Syntax error = error that is detected while compiling,  
(e.g. missing ;)

## Explain pass-by-value

- The method parameter values are copied to another variable and then the copied object is passed.  
Changing value in the method does not affect the original parameter

## What is "tracing" and why is it useful?

- Code tracing is a method in which the programmer uses paper and pencil to hand trace the execution of the program/code segment in order to track variables values as they change during execution and so determine the output of the code.

It's useful to find mistakes or when the program doesn't work as we predicted.

## What is an assembler? When would we use assembly programming?

- In the compilation and running process, the assembler translates the assembly language (produced

by compiler) into machine language

- Programming in assembler allows:
  - ↳ microscopic view of tasks
  - ↳ manual management of data movement
  - ↳ machine specific
- In practice, assembly programming is only used for ultra-high performance requirements of small subroutines.

Why is recursion inefficient and how to tackle this problem?

- Recursion runs much slower than iterative one (loops). The main reason is re-calculating values (already computed ones). A common example is the calculation of Fibonacci sequence. To calculate the 5th value, we need to calculate values of 4<sup>th</sup> and 3<sup>rd</sup> which were previously calculated to build the sequence.
- To solve this, we can use caching. This technique consists in the storage of already computed values in the memory (in array) so remember them and re-use them when needed.

Lazy evaluation

- Evaluation strategy which delays the evaluation of an expression until its value is needed.

## "Dangling else"

```
if(c1)
if(c2)
if(c3)
else
Statement;

```
if(c1)
{
    if(c2)
        if(c3)
}
else
Statement;
```


```

- A problem where else doesn't know to which if it belongs  $\Rightarrow$  solution: using {} to separate nested conditionals

