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CONCEPTS OF PROGRAMMING

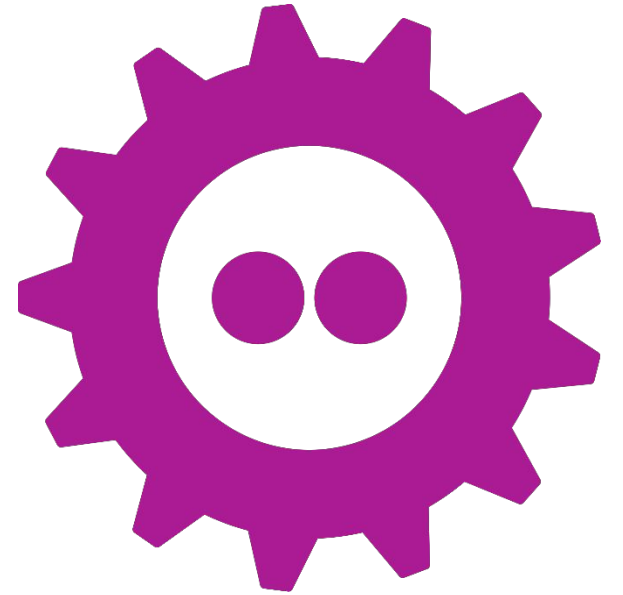
Java Pre-Bootcamp

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Plan

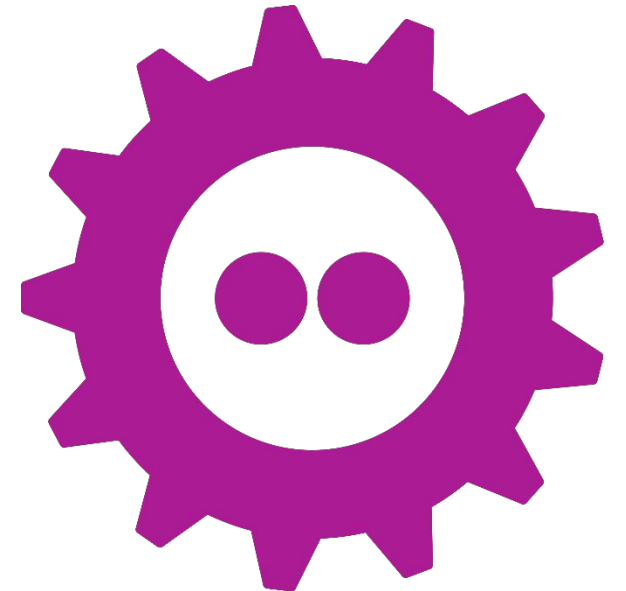
- What is Programming?
- What is Programming language?
- Low-level programming language
- High-level programming language
- What is a Program?
- Hello world!



What is programming?

- Programming is the art and science of translating a set of ideas into a program - a list of instructions a computer can follow
- Programming is a way to “instruct the computer to perform various tasks”.
- 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.

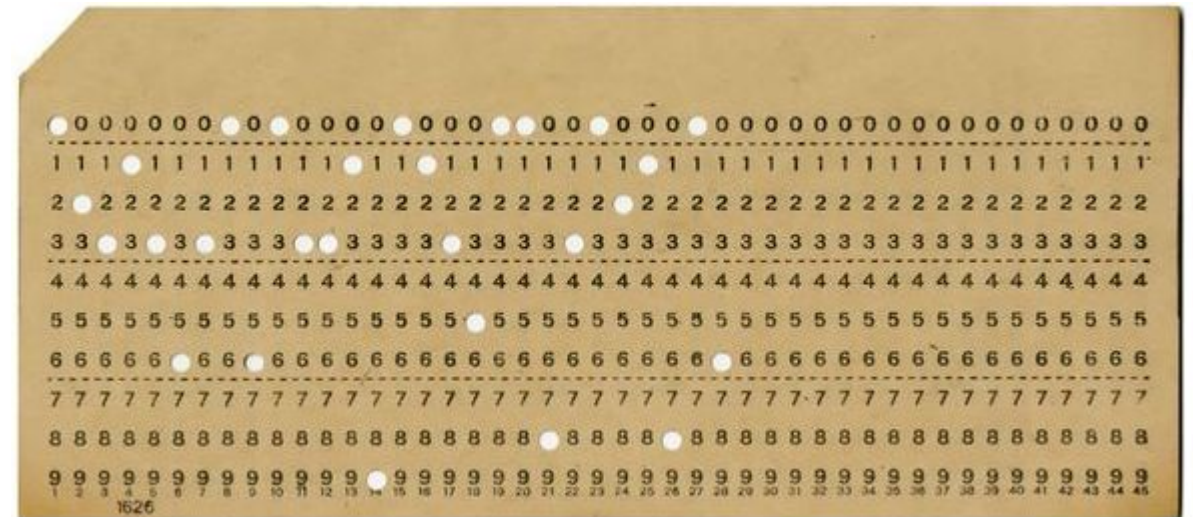
```
x = 5
y = 3
z = x + y
print z
```



What is programming language

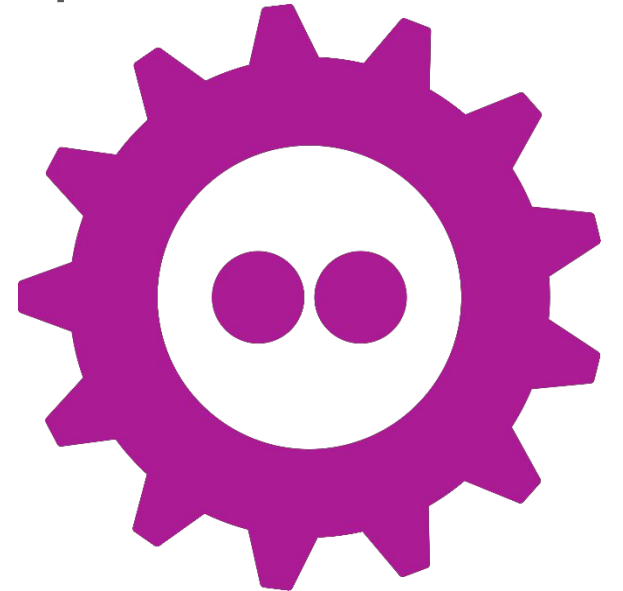
- A programming language is a formal language that specifies a set of instructions that can be used to produce various kinds of output.
- Second-generation programming languages served to make the program much more human-readable.

Example:
Punched cards



Low-level programming language

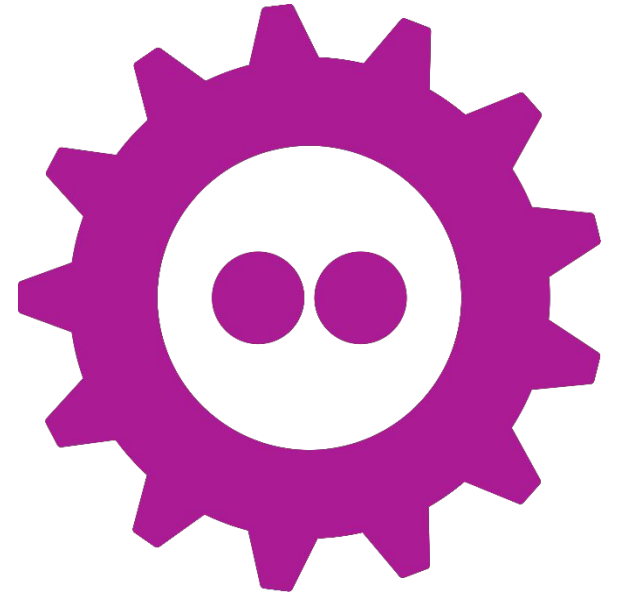
- A low-level language is a programming language that provides little or no abstraction of programming concepts and is very close to writing actual machine instructions.
- Assembly is a low level programming language
- Machine code is the only language a computer can process directly without a previous transformation.
- C (medium level)



High-level programming language

- Is a programming language with strong abstraction from the details of the computer (much more human-readable).
- Examples:
 - **Java**
 - **C#**
 - **Javascript**
 - **C++**
 - **Ruby**
- Code (Java):

```
double deductTax(double money) {  
    double tax = 0.20;  
    return money – (money*tax);  
}
```



Example

High-level program

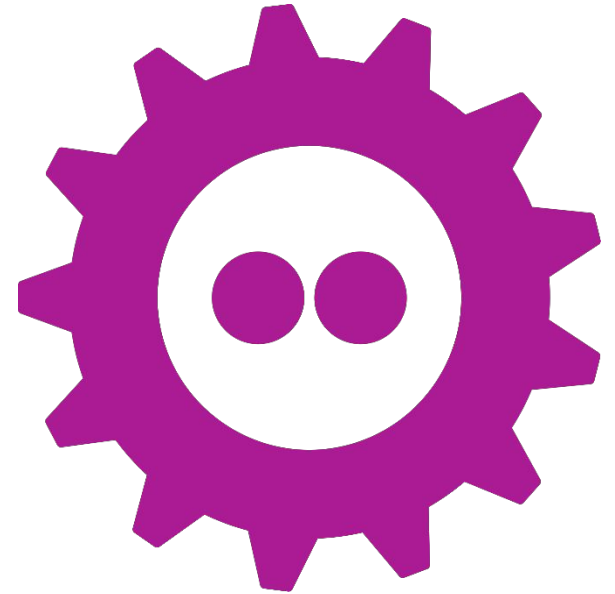
```
class Triangle {  
    ...  
    float surface()  
        return b*h/2;  
}
```

Low-level program

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

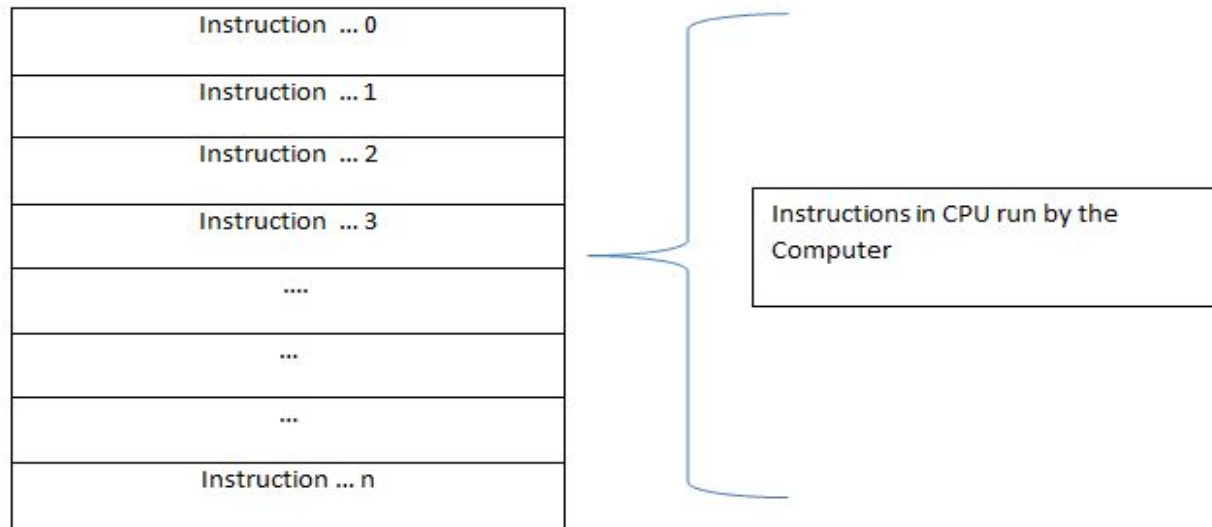
Executable Machine code

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



What is a program?

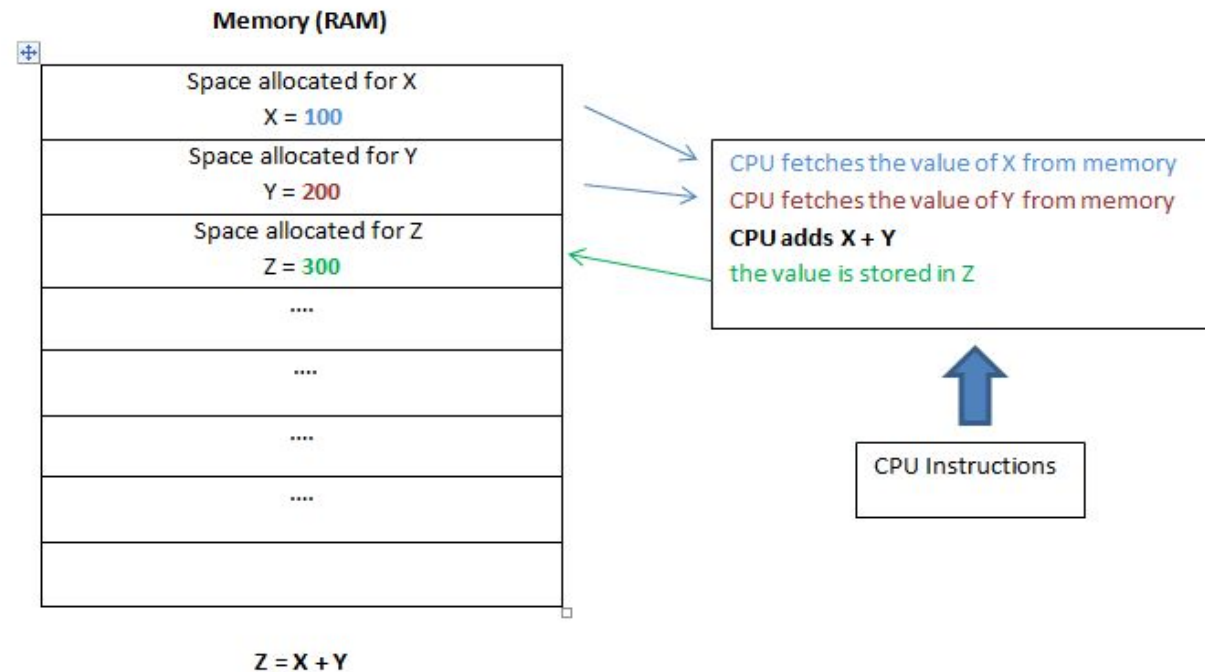
A program is a set of instructions that the computer executes.
(To be more precise, a program is a set of instructions loaded in the CPU that the CPU executes to achieve an outcome).



A Program is mainly a set of instructions

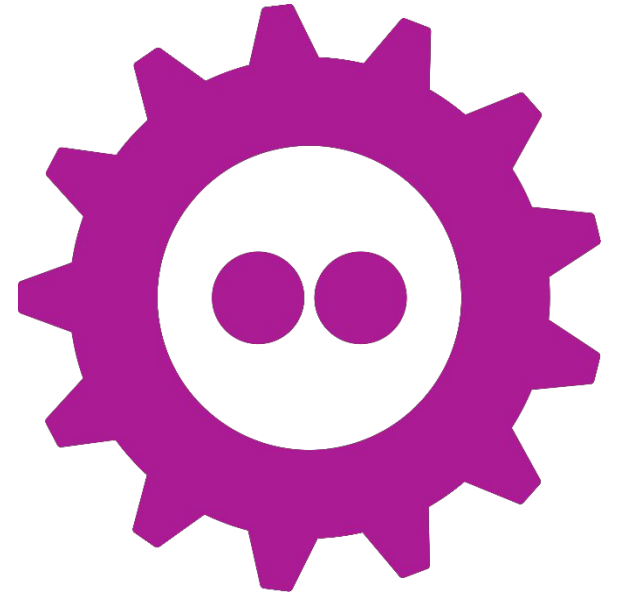
What is a program?

When we write $Z = X + Y$
we are telling the computer to fetch the value of X and Y from RAM,
add them in the CPU and then store the result in another space
called Z.



What does a programmer do?

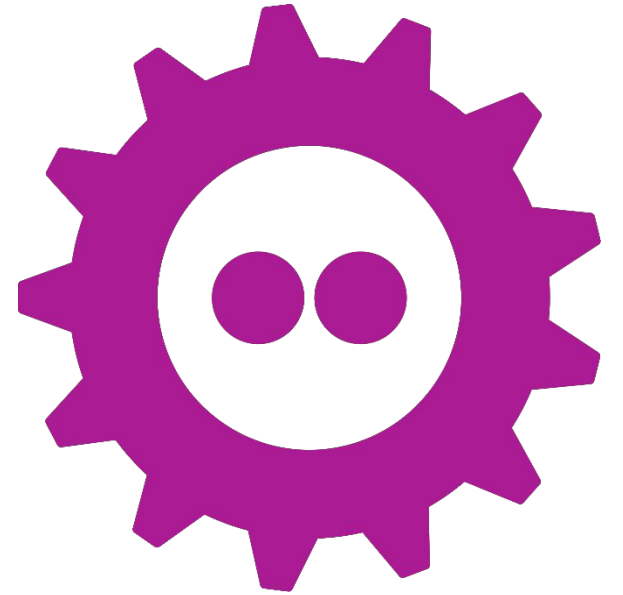
- Gather task requirements (not always the programmer's job, but often is)
- Investigation, analysis and brainstorming
- Break a problem down into the smaller pieces
- Implementation (writing code)
- Testing
- Improving it (maintenance and bug-fixes)



Hello world!

- A "Hello, World!" is a computer program that outputs "Hello, World!" to a user.
- Being a very simple program in most programming languages, it is often used to illustrate the basic syntax of a programming language.

```
public class HelloWorld {  
    public static void main(String[] args) {  
        // Prints "Hello, World" to the terminal window.  
        System.out.println("Hello, World");  
    }  
}
```



END

