IT ENTREPRENEURSHIP

Introduction to logic, Programming and Entrepreneurship

Slides by Taha Rushain

What is Logic?

- “a system or set of principles underlying the arrangements of elements in a computer or electronic device so as to perform a specified task.”

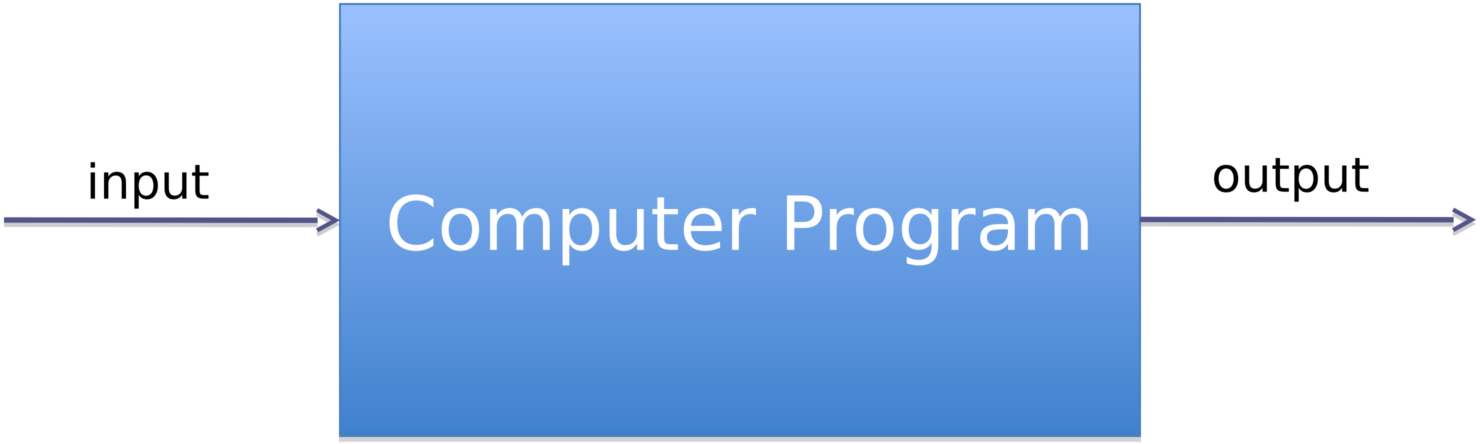
Einstein’s Riddle

- http://www.kongregate.com/games/sheldonx/einsteins-riddle

Computer Program

- Computer program are **instructions** for a computer
- Computer executes the program in CPU
- Program has an executable form
- Computer program gets **input** from the user
- Computer program can generate information to the user, this information is called **output**

Input and Output



Designing, Implementing and Testing

- Specification ("What we are suppose to implement?")
  - □ 1) Design the program
    - Structure, Algorithms, Architecture
  - □ 2) Implement according to the design
    - Implement using some programming language
  - □ 3) Test the program
    - Is the program the same than in specification?

Specification

- Before implementing, one must know **what to implement**
- Specification is very important
  - □ What is the possible input and output of the program?
- If specification contains errors, it's very hard to correct the program...

Designing Computer Program

- Architecture
- UML Diagrams (If OO)
- Data Structures
- Algorithms

Compiling and Running Programs

Implementing Programs

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Computer and Operating System

- The basic parts of the computer
  - Processor, RAM, Hard Drive, input and output devices….
- The instructions you give to the processor are given in **machine language**
- Operating system hosts the programs

Machine Language

- Computer program is just instructions to the CPU
- These instructions are given only in **machine language,** and this is the only language that the CPU understands
- Machine language **is very hard to implement**

Computer Language

- Because machine language is so hard to implement, programmers do not use it
- Instead of using **machine language**, programmers use some **high level (compiler) language…**
- … but the computer **does not** understand **anything but the machine language!**
- **Compiler** comes to the rescue!
  - □ Compiler *translates high level language to machine language*

Miscommuni

0101010101110
1111101010101
0101101010101
010101010101

?

I just wanna a program that would calculate my body mass index? Okay?

Solution

0101010101110
1111101010101
0101101010101
010101010101

Compiler

```
int weight;
int height;
cin >> weight;
cin >> height;
...
```

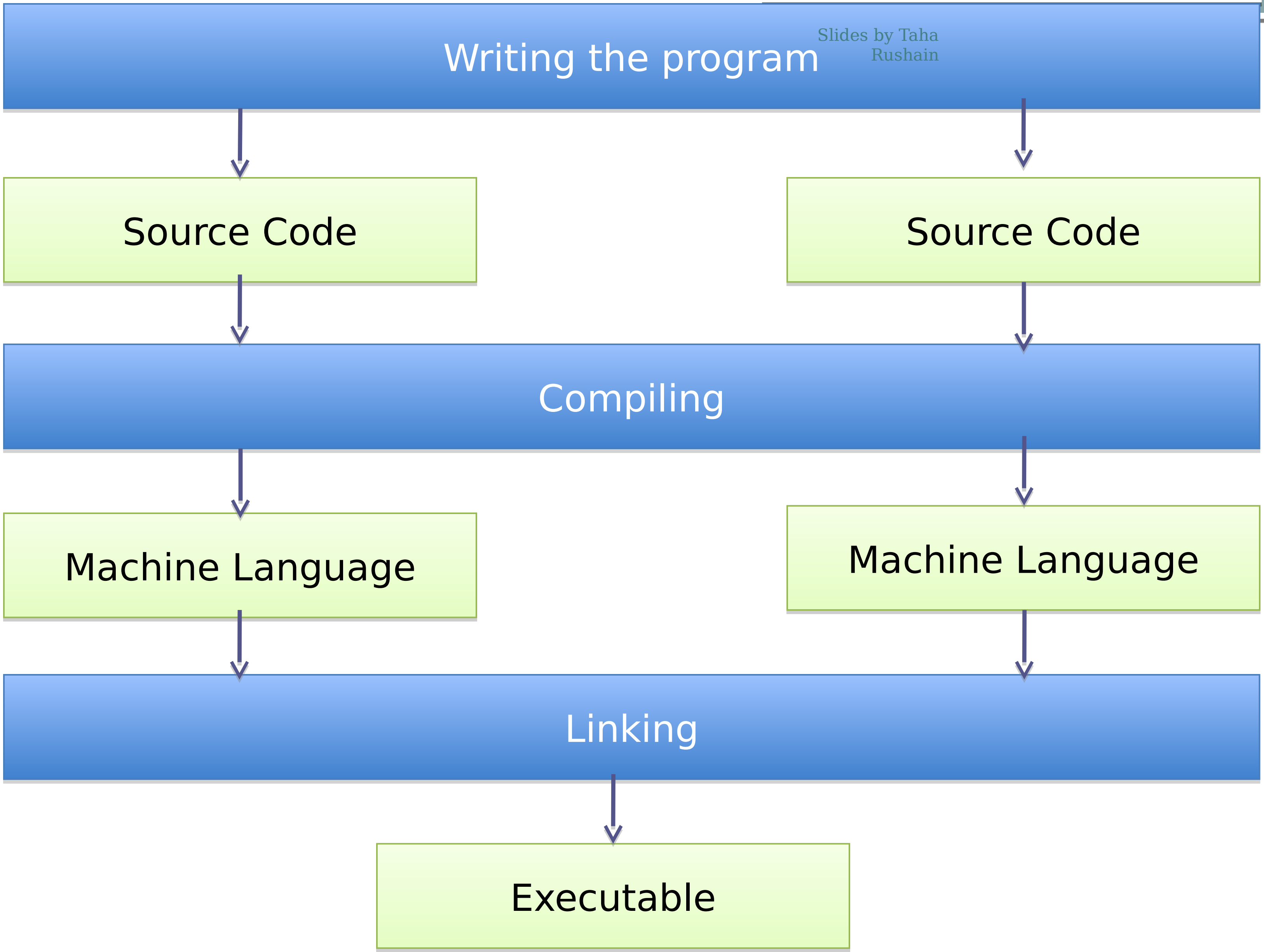
I wanna a BMI app. (but I don't want the results)

Programming Languages

- There are many high level languages
  - □ C, C++, C#, Perl, PHP, Java, Smalltalk, Objective-C
- Almost **all of these languages** have the same principals
- if, while, for, functions, methods…

Programming Environment

- The source code of the program is
  - □ Written
  - □ Compiled
  - □ (Linked)
- Into a computer program
- The source code is written with some text editor and it is compiled with some compiler



Writing the program

Source Code

Source Code

Compiling

Machine Language

Machine Language

Linking

Executable

Compiling Java Programs

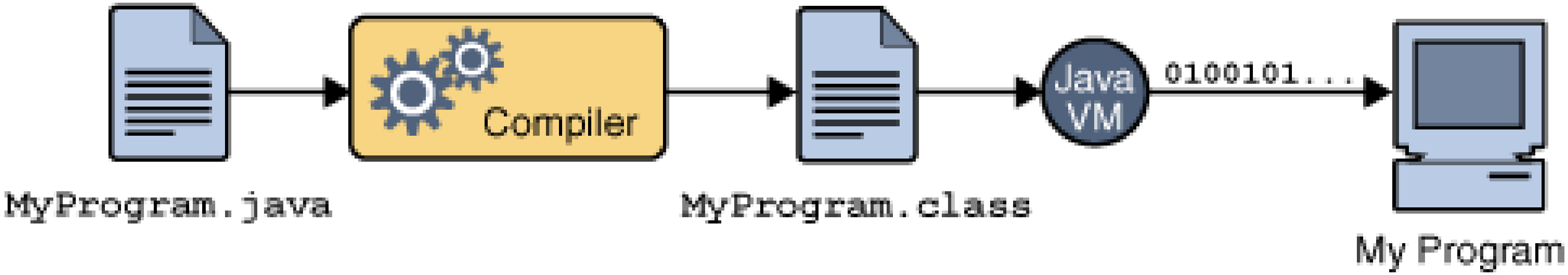
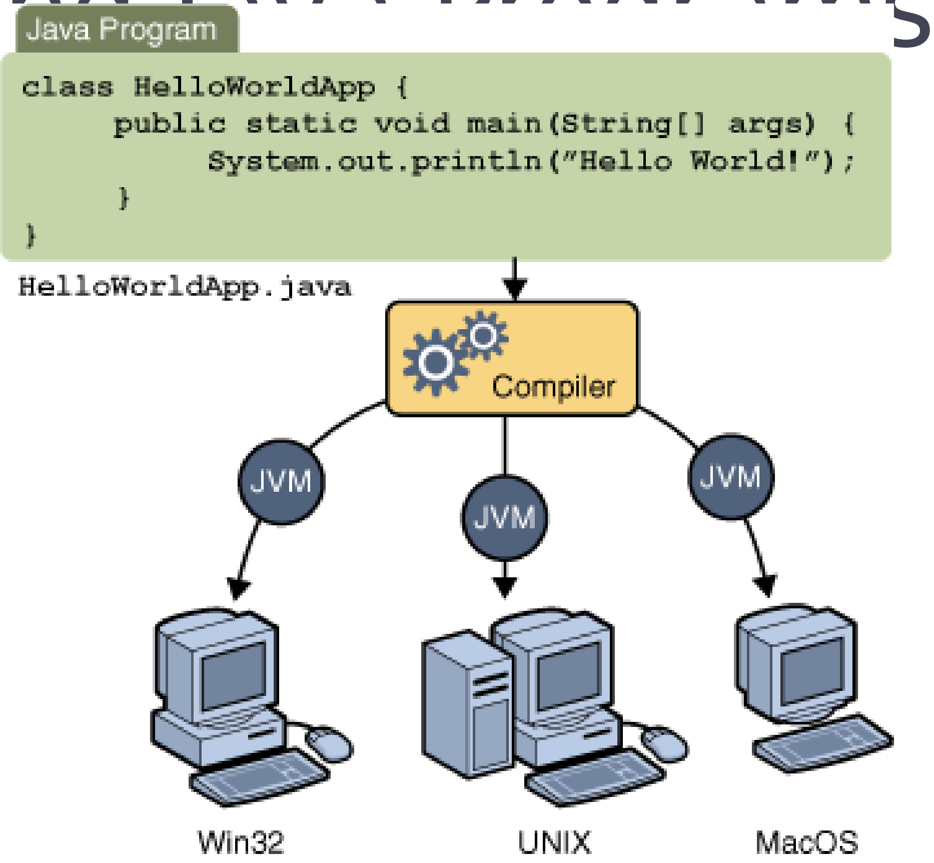


Image from *The Java Technology Phenomenon*
http://java.sun.com/docs/books/tutorial/getStarted/intro/definition.html

Compiling Java Programs



```
class HelloWorldApp {
     public static void main(String[] args) {
          System.out.println("Hello World!");
     }
}
```

Image from *The Java Technology Phenomenon*
http://java.sun.com/docs/books/tutorial/getStarted/intro/definition.html

ALGORITHMS

Algorithms

- Algorithm is a method for solving problem using instructions
- Algorithms can be written using pseudocode
- Pseudocode is intended for **human reading** rather than machine reading
- The use of natural language and structural convention of programming language

Pseudocode

- Pseudocode consists of
  - Clear natural human readable language
  - Three rules
    - sequence
    - choice (if)
    - repeat (while)

1. Sequence

- Sequence means that the given instructions are executed in the same order that they were given
  - □ print to the screen "What is your name?"
  - □ read the answer and store it into variable NAME
  - □ print to the screen "You have a funny name, "
  - □ print to the screen NAME
  - □ print to the screen "!"

2. Choice

- With choice, one can choose which instructions are executed

```
print to the screen "What is your name?"
read the answer and store it into variable NAME
if(NAME = "Jussi")
    print to the screen "What a stupid name!"
else
    print to the screen "Nice name you have!"
```

Example of Choice

```
print "What grade did you get?"
grade := getInput()
if(grade = 4)
   print "FAIL!";
else if(grade = 5)
   print "You are an idiot!";
else if(grade = 6)
   print "Lazy or and idiot?";
...
```

3. Repeat

- In repeat one executes instructions based on condition

```
while(there is food on the plate)
  Eat food
```

Example of Repeat

```
i := 0
while(i < 3)
    print "Hello World!"
    i := i + 1
```

Three basic rules

- **1) Sequence**
  - Get up from bed
  - Dress up
  - Go to the shower
  - Go to work
- **2) Choice**
  - If car is broken, go to work by bus. Otherwise go to work by car
- **3) Repeat**
  - Drink until the bottle is empty

Pseudocode Exercise

- Write an algorithm with pseudocode that asks from the user two numbers. If the sum of those numbers are greater than 12, program outputs "Big numbers you gave". Otherwise the program outputs "Small numbers you gave".