

Get Smart: With Java Programming



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Computer Science

System.out.println("WELCOME TO THIS COURSE\n");

1. INTRODUCING THE FOLLOWING CONCEPTS:
(INPUT/ PROCESS /OUTPUT)
2. DEALING WITH VARIABLES
(DECLARING, INITIALIZING, ASSIGNING VALUES)
3. DISPLAYING OUTPUT ON THE SCREEN
(Print)
4. DEALING WITH DIFFERENT EQUATIONS

Exercise 1

FIND THE INPUT , PROCESS, AND OUTPUT FOR EACH OF THE FOLLOWING:



PART A) This program prints the area of a circle

Area of a circle

$$A = \pi r^2$$

Radius Enter value



Part B) A program that displays 5% of the amount the user has in his account
(e.g. If the amount is \$100 then 5% of the amount = 5)

Part C) A program that multiplies a number with the same number squared
(e.g. If the number is 5, then our result will equal to 5*25)

Exercise 2

TIME TO CODE ...

Start a new project in NetBeans or any IDE

Project Name:



KEEP
CALM
AND
LOVE
PROGRAMMING

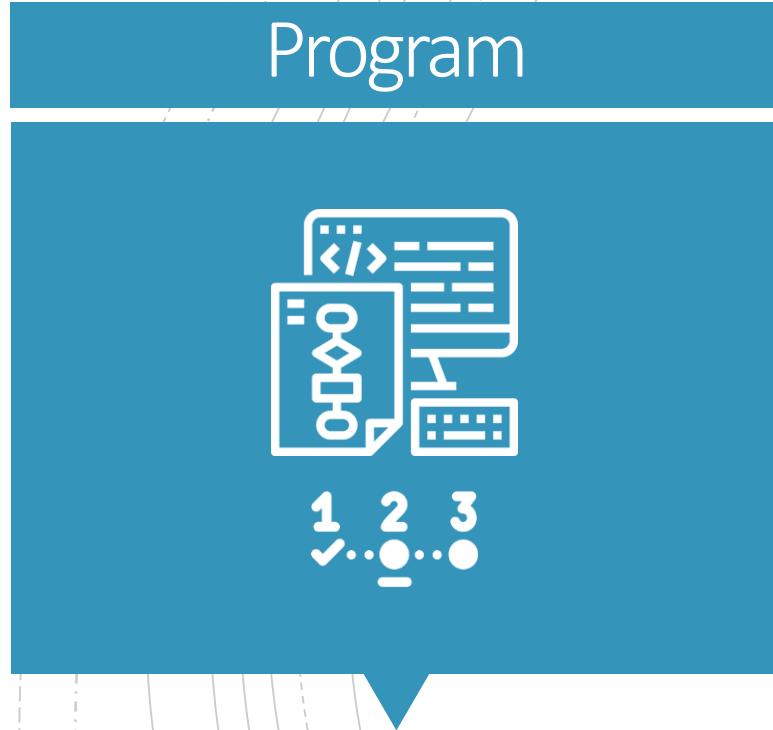
...BEFORE WE START...

```
    window.scroll(0, element.clientHeight + 0.02);
    window.scroll(0, scrollHeight);
}
```

What is a program?

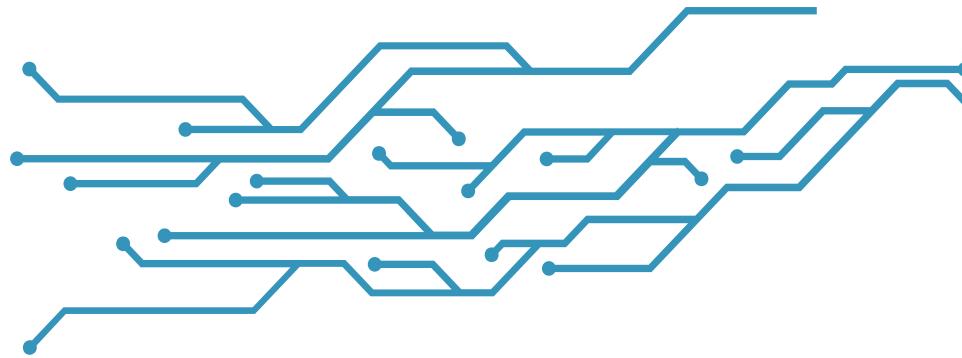
Program vs software/application



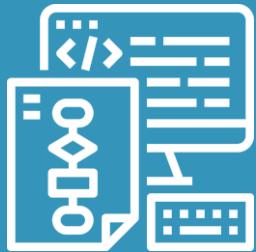


Computers can be
programmed to do a wide
variety of things (tasks)

**A program is a set of instructions that a computer follows to perform a task.
(FAST & ACCURATE)**



Program



1 2 3
✓ · ·

The more complex the instructions, the more complex the result!

If you've ever cooked using a recipe before, you can think of yourself as the computer and the recipe's author as a programmer.

The recipe author provides you with a set of instructions which you read and then follow.

Programming is a way to “instruct the computer to perform various tasks”

The instructions could be of various types.

For example single instructions:

- Adding 2 numbers,
- Store some information

Or it can be a sequence of multiple instructions.

For example:

- Analyzing certain data from twitter before elections
- Calculating the average bitcoin value over the last 5 years.
- Simulating a certain product before it is physically created
- sometimes predicting the spread of a certain virus



Why should you bother about coding?

You must be wondering why does one need a computer for adding numbers? Or even for simple interest calculation?

After all, even an 8th standard kid can easily do such things even over large numbers.

What is programming used for? What benefits do computers offer?



Why should you bother about coding?

You must be wondering - why does one need a computer for adding numbers? Or even for simple interest calculation? After all, even an 8th standard kid can easily do such things even over large numbers.
What is programming used for? What benefits do computers offer?

Computers are fast and accurate:

an addition of 2 numbers which could be as big as a billion each takes hardly a nanosecond

That means that in 1 second, a computer can perform about a billion additions.

Computers can work 24x7:

Computers can work 24x7 without getting exhausted. So, if you have a task that is big enough, you can without worries allocate it to a computer by programming it and sleep peacefully.



Human

- Thinks creatively
- Communicates through inference
- Detects patterns to make sense of world
- Inconsistent
- Can get bored

Computer

- No creativity (follows given instructions)
- Limited hard-wired knowledge
- Calculates information quickly
- Consistent
- Does not lose focus



**WEBSITES
PROMOTE YOU
24/7: NO EMPLOYEE
WILL DO THAT.**

PAUL COOKSON

Why do you need to know how to program?

Short answer: in order to be able to tell a computer what you want it to do.

BUT WHY??????

Using Programming, you can **create** your own games, your personal blog/profile page, a social networking site like Facebook or an e-commerce platform like Amazon!

Won't that be fun?

Imagine creating your own app and putting it on Play Store and getting thousands and thousands of downloads!



Why do you need to know how to program?

Short answer: in order to be able to tell a computer what you want it to do.

BUT WHY??????

Programming is the **backbones of today's technology companies** like Google, Facebook, Microsoft, Apple, Amazon, and many others, are giant computer programs written by a collaboration of thousands of skilled programmers.

If you have the right business, knowing programming can help you create the next big tech company.



Why do you need to know how to program?

Short answer: in order to be able to tell a computer what you want it to do.

BUT WHY??????

Computer Programmers are **paid extremely well** almost all across the world. Top programmers in Silicon Valley make millions of dollars every year.



Programs: Prime number , Converters, Square Area

>> COMBINE SEVERAL PROGRAMS & MAYBE ADD A GUI<<

Applications: Ms Word, Games, Chrome, Zoom, Facebook

Software is a collection of several programs

- Application software
- Programming Software. a set of tools to aid developers in writing programs.
- System Software. act as a base for application software

Examples of programming software: compilers, linkers, debuggers, interpreters and text editors.

Examples of system software: device drivers, disk formatters, and utilities helping the computer to operate more efficiently.

- I can honestly say that coding is one of the most enjoyable things I do.
- It combines logical thinking with creativity,
- and at the end, you will have made something.
 - Something that the world has never seen.
 - Something that could make your life easier or more enjoyable.
 - Something that could make loads of people's lives easier and more enjoyable.

- It's like making a crazy-beautiful custom motorbike in your garage, without needing the garage or spending a cent on the components.
- This is what motivates most people.
 - The creating part.
 - The making part
- There are no limits on your imagination

Programmer



A programmer, (software developer):
Is a person with skills necessary to
- design,
- create,
- and test
computer programs.

1 2 3
✓ ...

What is a programming language?



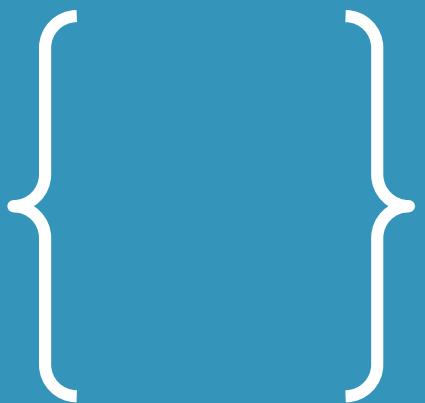
Human Language vs Programming language:

Human Language: a way of communicating between humans

**Programming language: a way of communicating with the computer
or a vocabulary and set of grammatical rules for instructing a computer to
perform specific tasks**



Language



- Any language is made up of
 - A set of characters & special symbols (alphabets, digits)
 - Words
 - Sentences
 - Grammar

Each language has its own rules, known as syntax, that must be followed when writing a program.

A language's syntax rules dictate things such as how key words, operators, and punctuation characters can be used.

A syntax error occurs if the programmer violates any of these rules.

Computers can only execute the code in binary form.

```
00010111110100  
100010100101011  
111100001000101  
01010011111000  
101010110001011  
111010001000101  
100011110001001  
111111111111111
```

Because a computer cannot understand a source program, a source program must be translated into machine code for execution.

```
public static void main(String[] args) {  
    if (args.length > 0) {  
        greeting(args[0]);  
    } else {  
        greeting();  
    }  
}
```

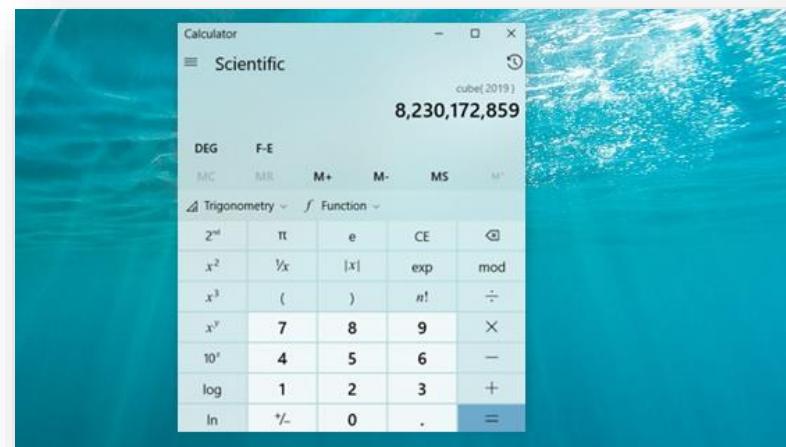
The translation can be done using another programming tool called an interpreter or a compiler.

So Programming is basically to:

“Instruct the computer”



Why do you need to know how to program?





How the program works?



What are algorithms



Memory concepts



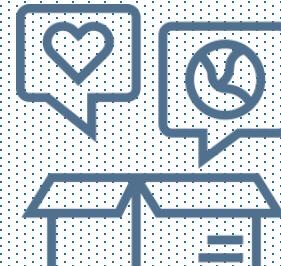
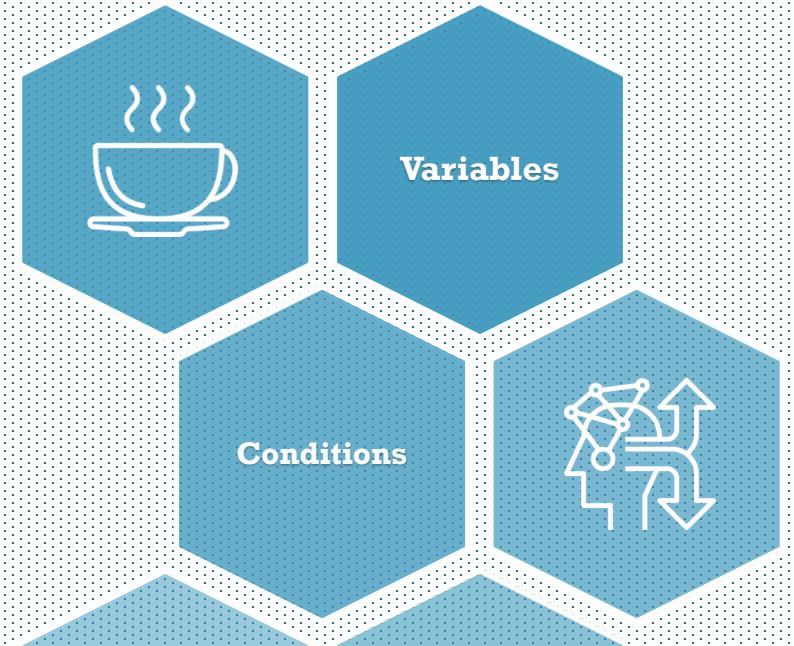
Programming structure's



Basic programming concepts



Questions & Additional content



Java: How To Program



According to Oracle, Java runs on 3 billion devices worldwide, which makes Java one of the most popular programming languages.

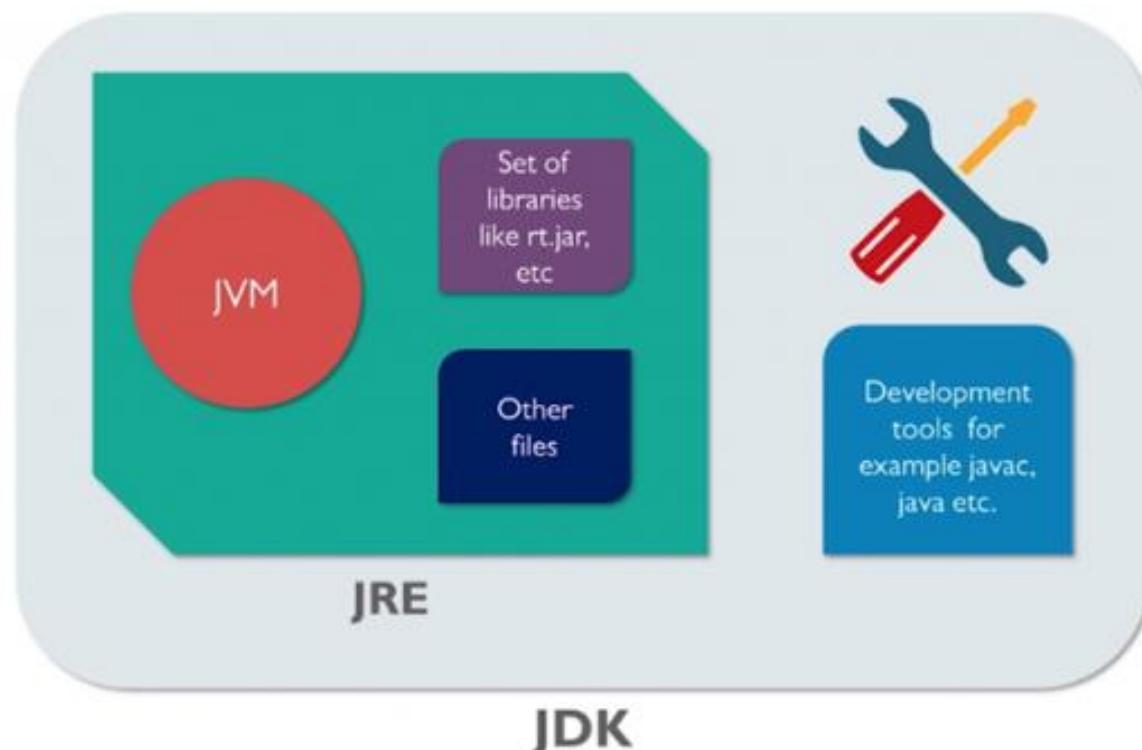
THE TOOLS WE NEED

Java Development Kit (JDK)

It has everything the JRE has, but also the compiler and tools (like javadoc and jdb – Java Debugger ([testing and monitoring](#))).

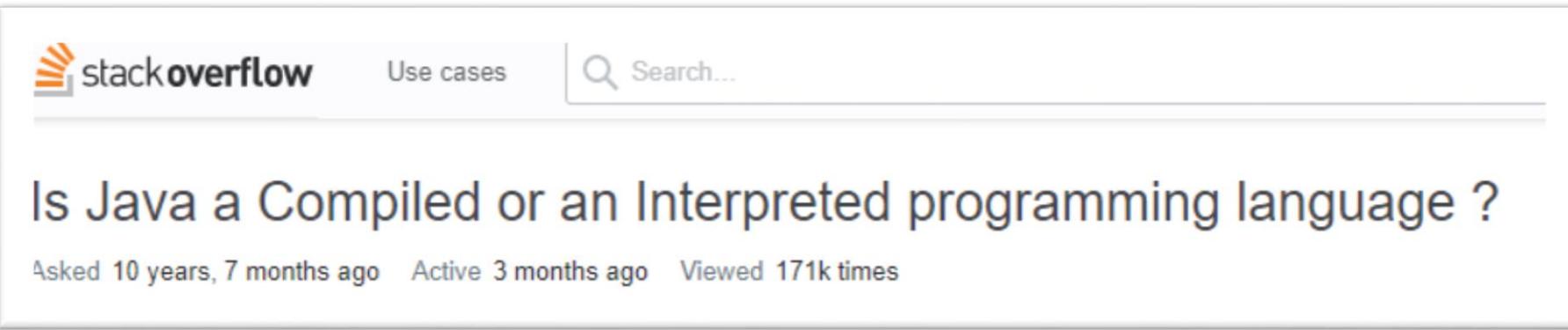
It is capable of creating and compiling programs.

In other programming languages, the compiler produces machine code for a particular system. However, Java compiler produces code for a Virtual Machine known as Java Virtual Machine.



Compiler

Compilers are components that translate programming language into a form machines can process, such as binary code.



The image shows a screenshot of a Stack Overflow search results page. At the top left is the Stack Overflow logo. To its right are links for "Use cases" and a search bar with the placeholder "Search...". Below this, a question is displayed in large, bold, dark font: "Is Java a Compiled or an Interpreted programming language ?". Underneath the question, the following metadata is shown in smaller text: "Asked 10 years, 7 months ago" (in grey), "Active 3 months ago" (in blue), and "Viewed 171k times" (in blue).

```
1110110010000110100100011100101  
1111010001000101110001110001000  
000000000000000000000000000000010  
000001011111000100010111000111  
100010110000000000000000000000000  
0100010100111011111010001000101  
100010110001010101111011111000  
010001010000001111100001000101  
1111010001000101100010111110100  
1000100111110000100010100101011  
0100010110001011111100001000101  
1111010001000101001010011111000  
1000101111110000101010110001011  
1101011010001001111010001000101  
10001001111010001100011110001001  
10001001111111111111111111111111
```



NetBeans is an IDE ... so what is an IDE?



Integrated development environment



Programming language support

Key Benefits of Integrated Development Environments

Easier to navigate the source code

Code completion capabilities

Automatically checks for errors

Refactoring (mistake-free renaming changes)

Integrations and plugins



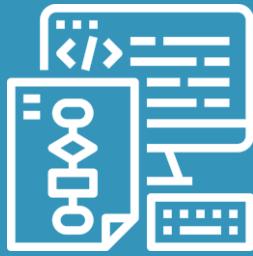
Skills Needed to Become a Junior Developer

- ✓ Mastering Deep Problem Solving Skills
- ✓ Understanding each concept (DON'T MEMORIZE)
- ✓ Work on LONG projects



IT'S TIME TO DIGITIZE YOUR IDEAS

Algorithms



1 2 3
...
...
...

An algorithm is a step by step method of solving a problem

You can think of an algorithm as a recipe that describes the exact steps needed for the computer to solve a problem or reach a goal ...

In computers the word for a recipe is a procedure, and the ingredients are called inputs, and finally you get to see the results (ready meal), which are called outputs.



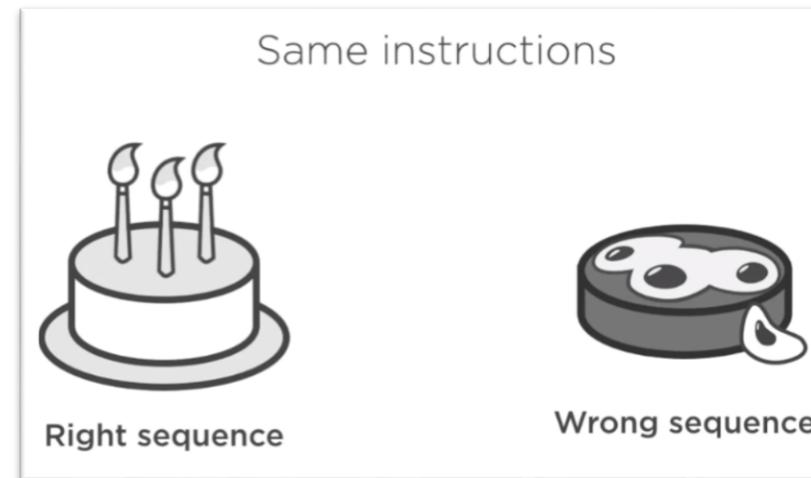
Algorithms



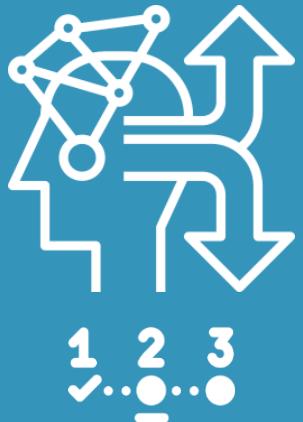
An algorithm is a step by step method of solving a problem

what makes a good algorithm?

- Efficient
- Fast
- Stable
- Simple



Algorithms



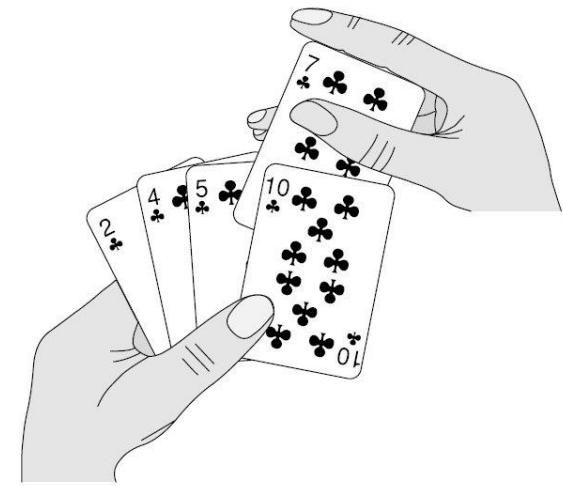
An algorithm is a step by step method of solving a problem

More details ...

For example an algorithm that sorts the playing cards...
Someone may come up with a faster algorithm than another ...

The simple sort algorithm

1. Get a hand of unsorted cards
2. Compare unsorted cards
3. Select the smallest unsorted card
4. Move this card to the sorted hand
5. Repeat steps 2 through 4 until the unsorted hand is empty
6. Stop

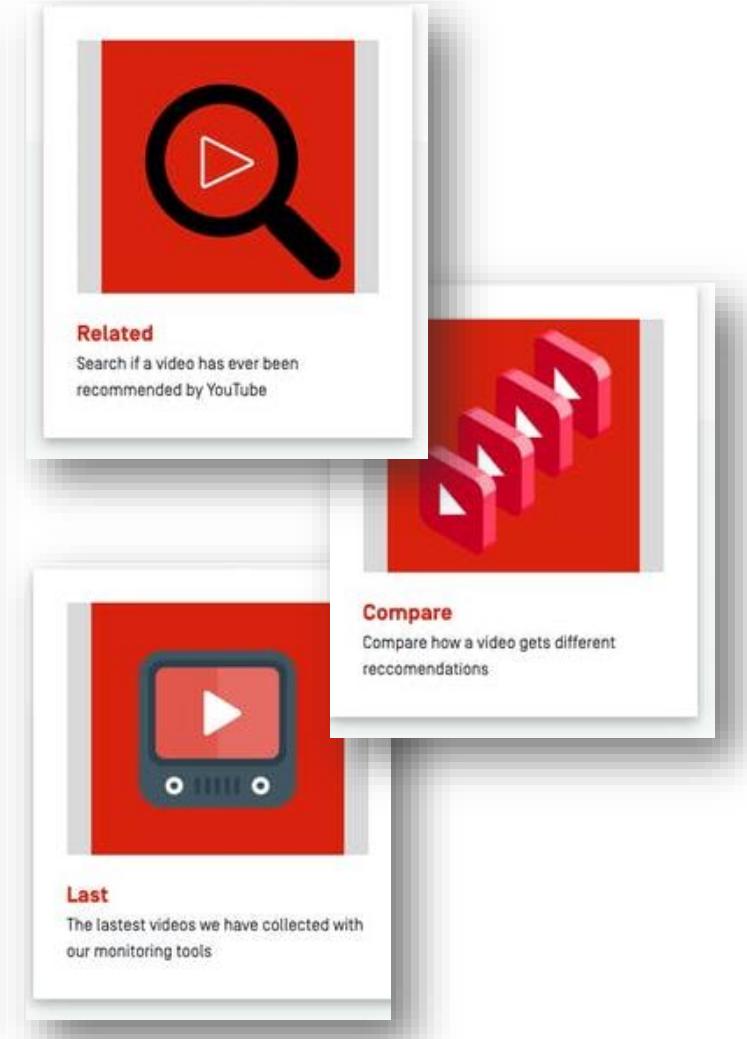
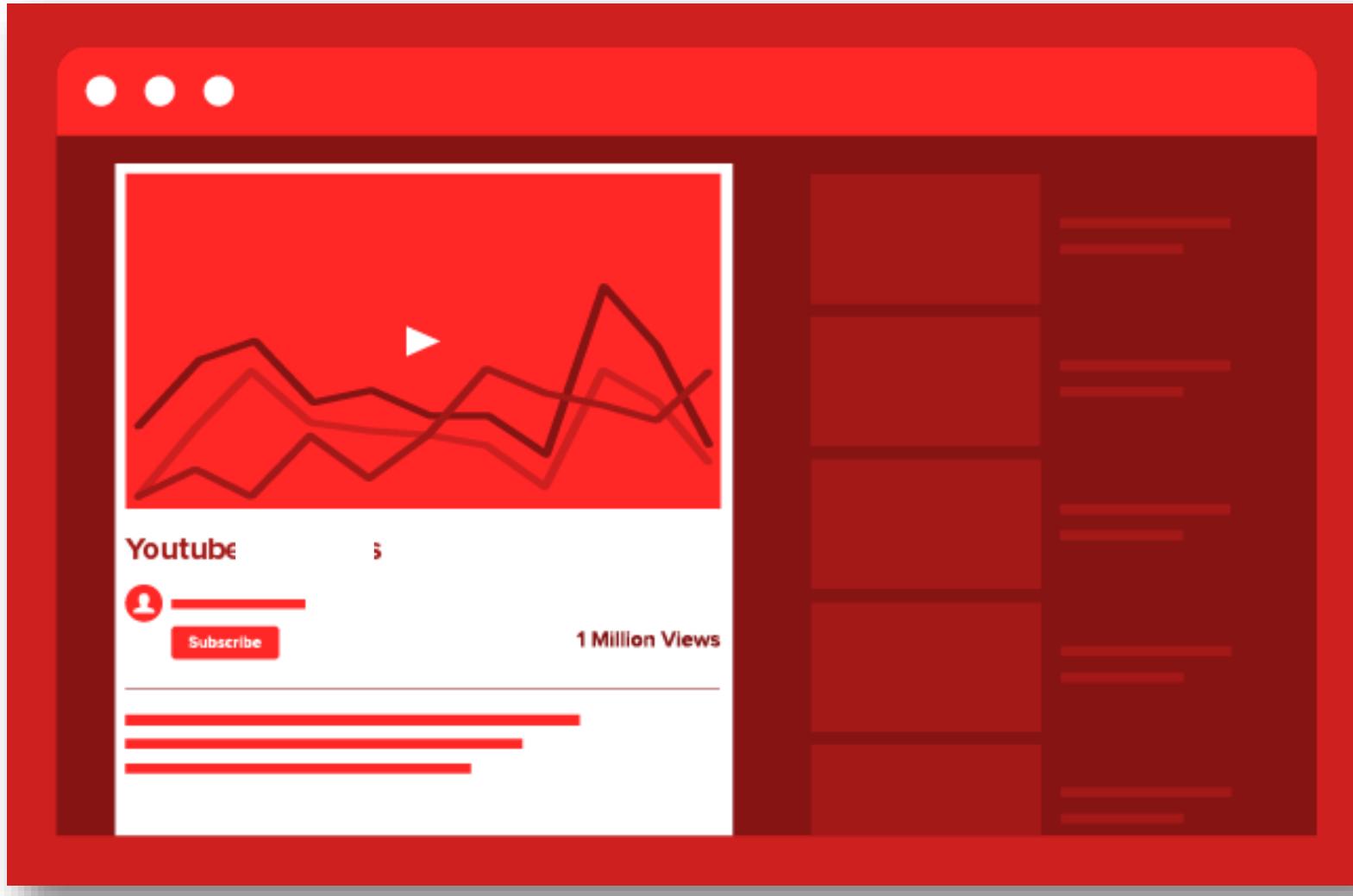


Can you give an example of an algorithm?



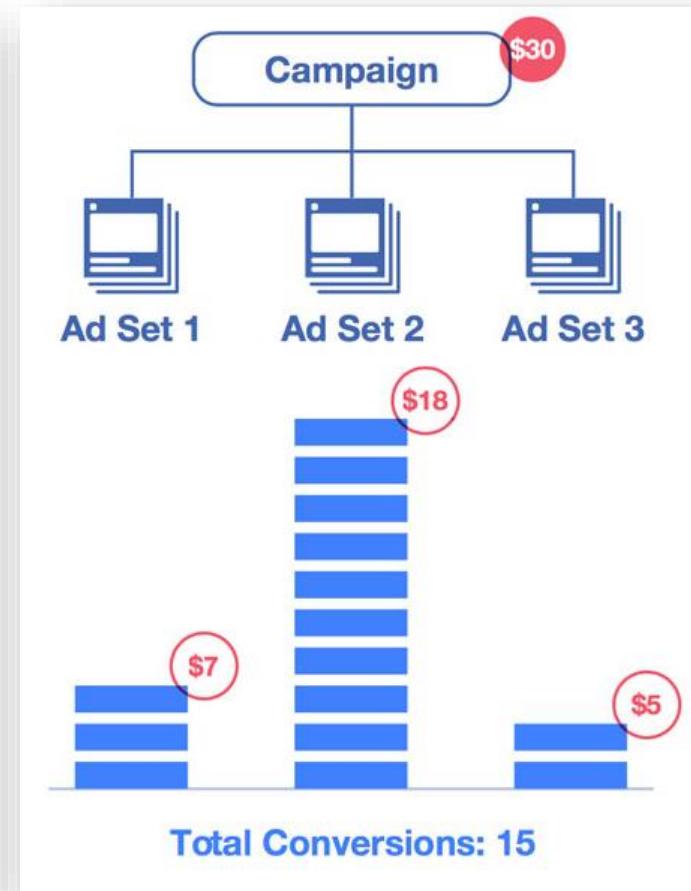
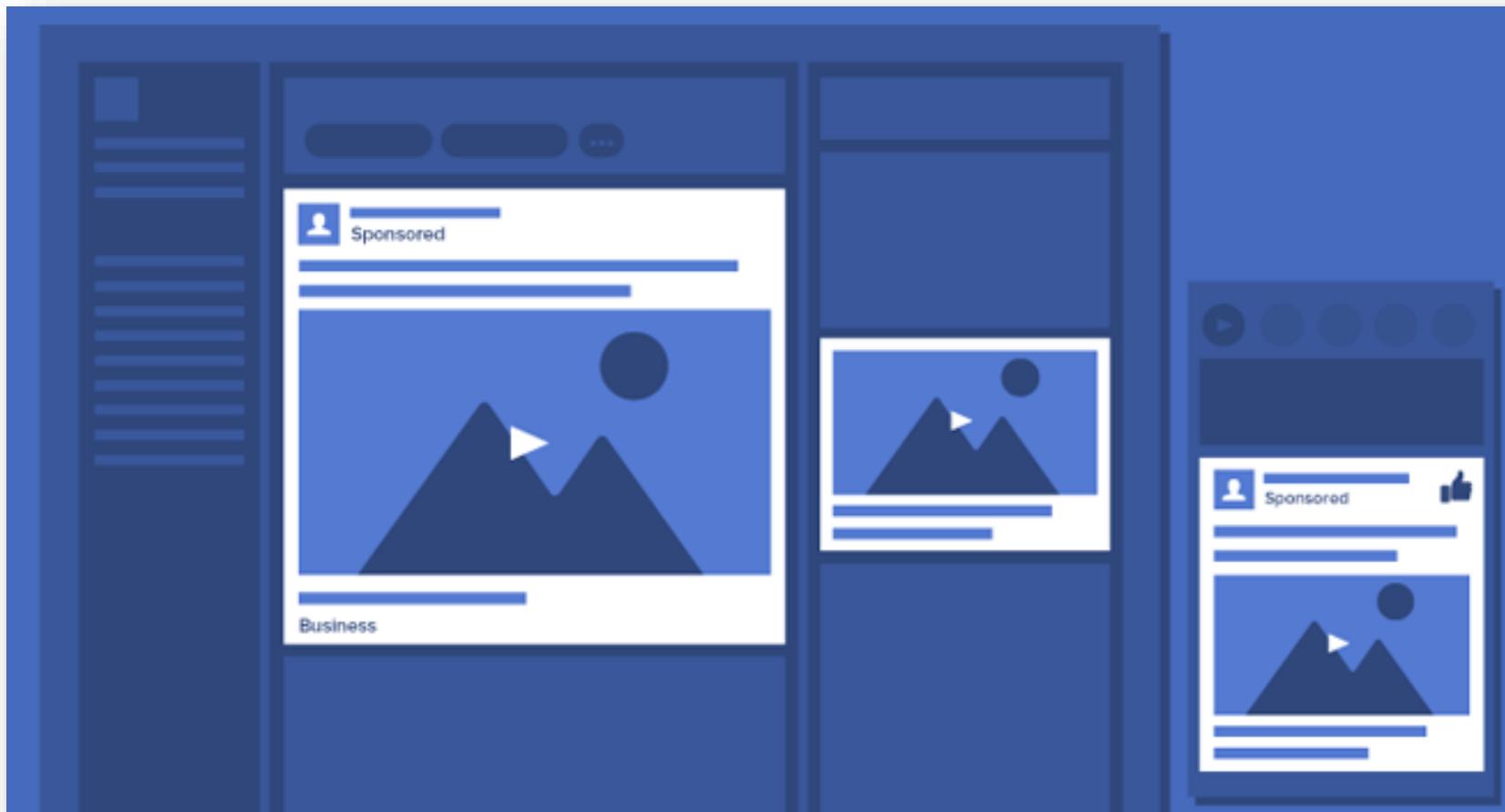
Youtube Algorithm

Video Suggestions



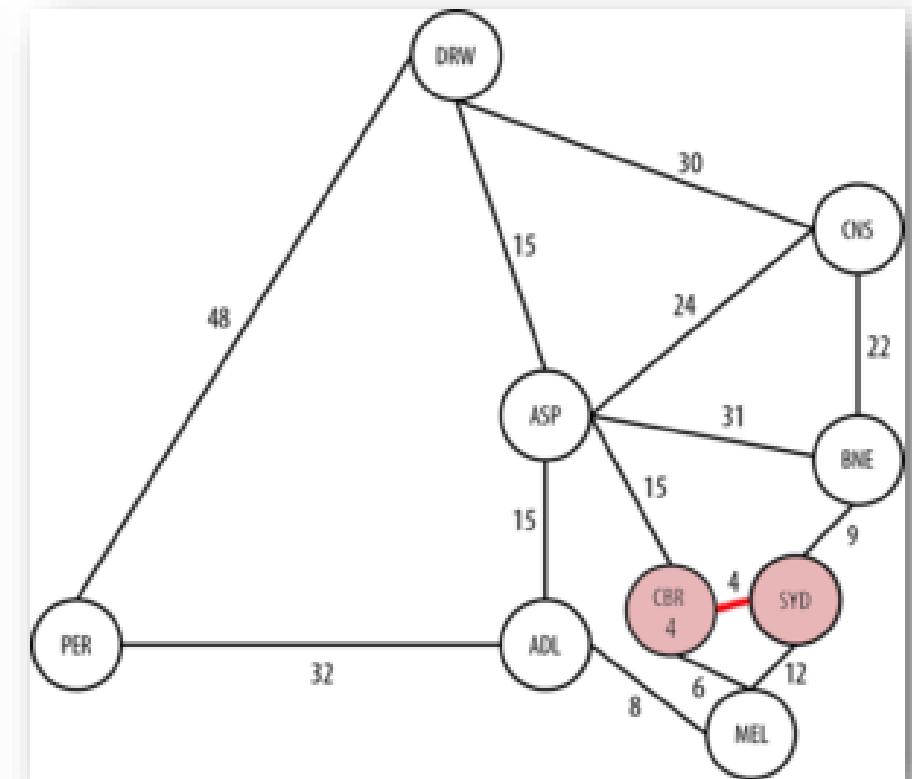
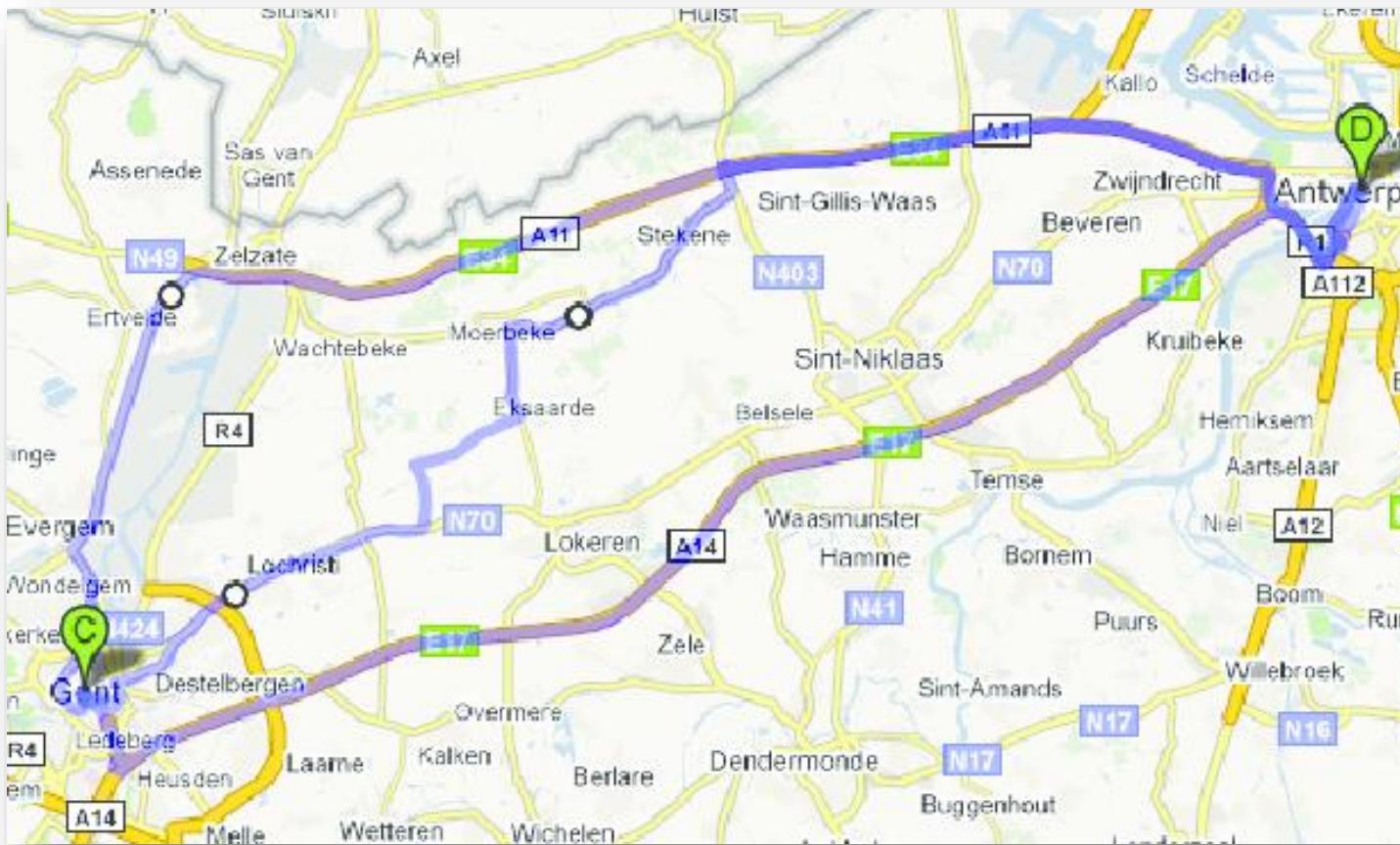
Facebook Algorithm

Relevant Ads



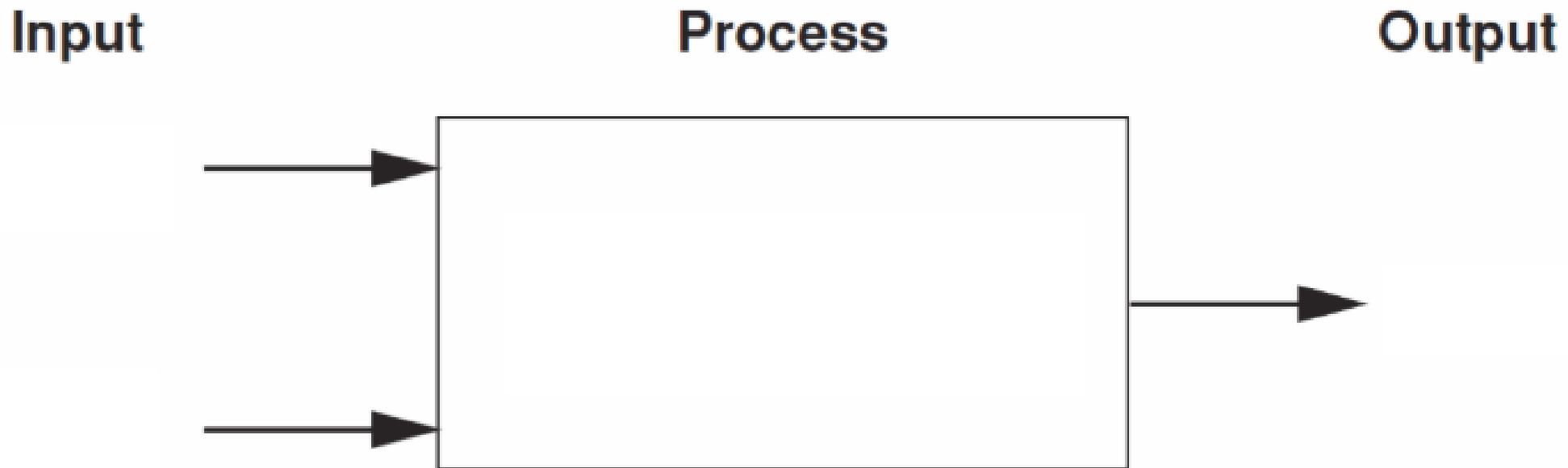
Google Maps Algorithm

Shortest Path \ Fastest Path



Computer programs typically follow 3 steps

- **Input is received**
- **Some process is performed on the input**
- **Output is produced**



Some Basic Concepts

Input – is data that a program receives

Output – data that is generated and displayed

When a program receives data, it stores it in variables, which are named storage locations in memory.

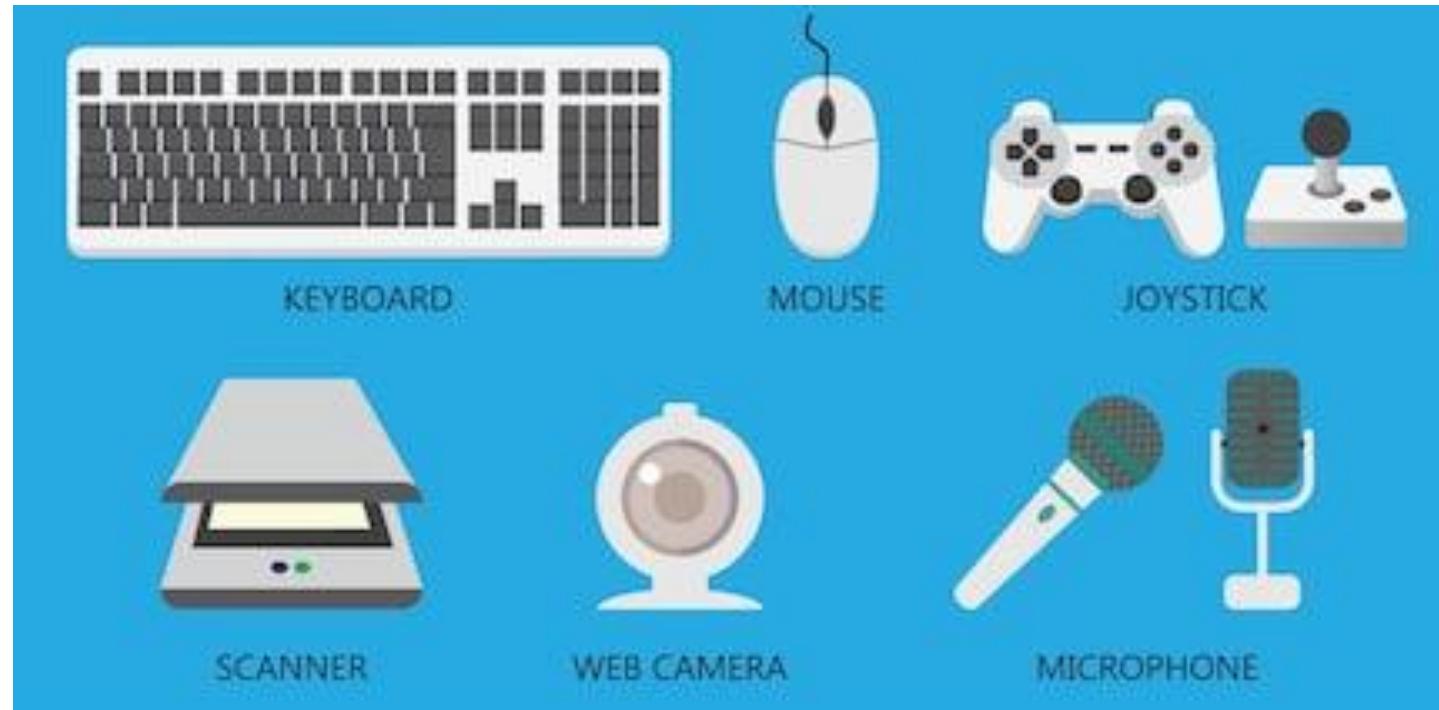
Determine the program's requirements as follows:

1. **Input:** identify the pieces of data that the program needs to read as input.

What information is needed to be processed?

What information do we need from the user?

Decide the names of the variables for those pieces of data, and their data types.



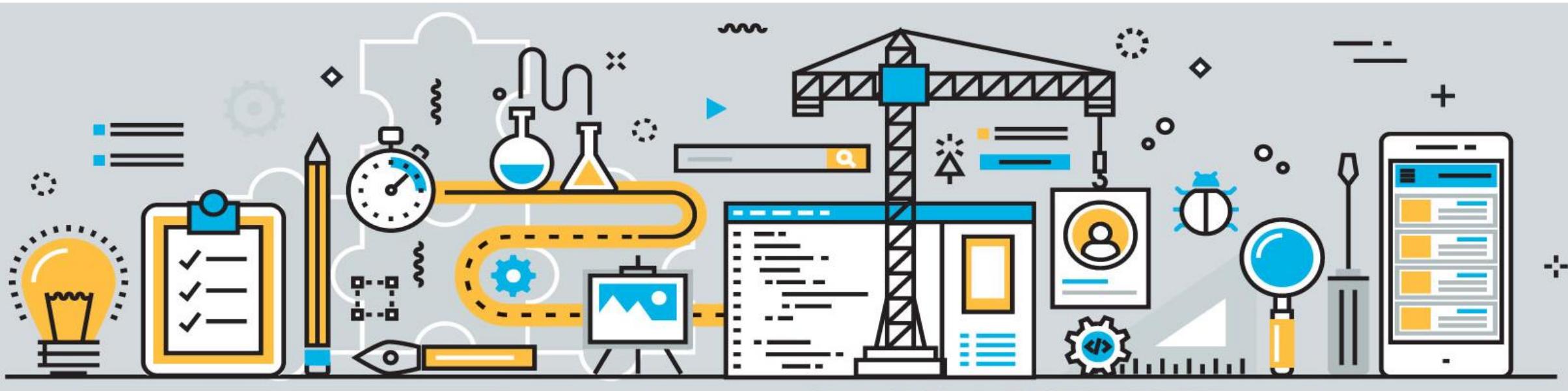
Determine the program's requirements as follows:

2. Process: Determine the calculations and/or other instructions that must be performed on the input, or for the output.

What must the program do with the input that it will read?

What data must be processed before output?

At this time, decide the names and data types of any variables needed to hold the results of calculations.



Determine the program's requirements as follows:

3. Output: What output must the program produce?

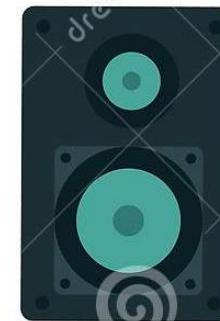
In most cases, it will be the results of the program's calculations and/or other processes.



MONITOR



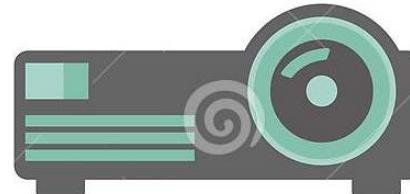
PRINTER



SPEAKER



HEADPHONE



PROJECTOR

Examples on Input, Process, Output

Input



Process



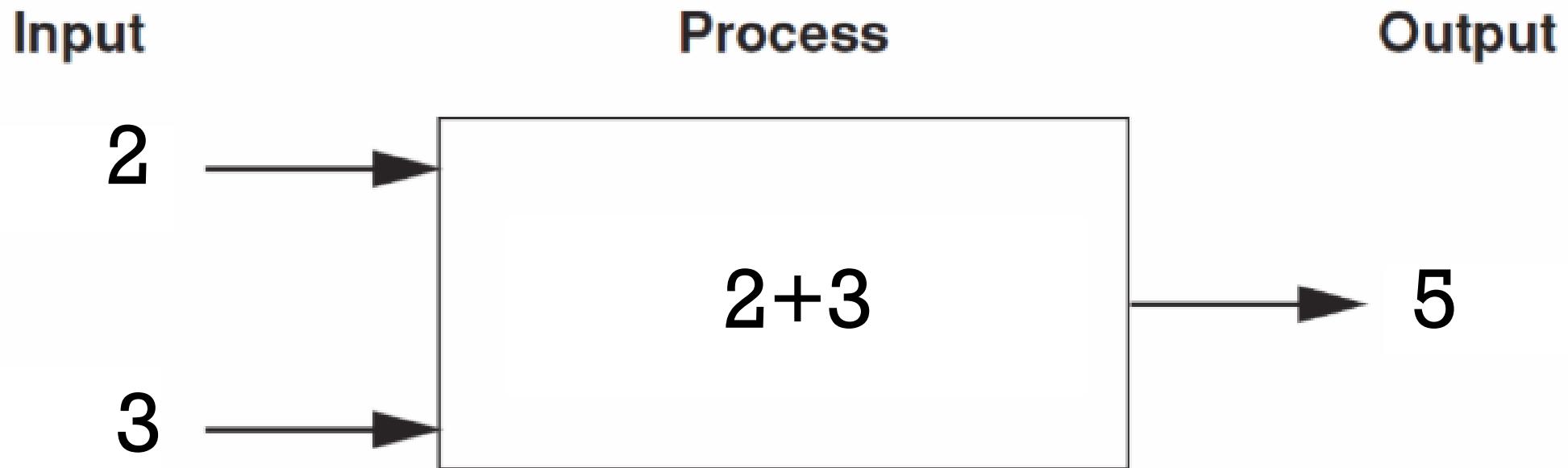
Output



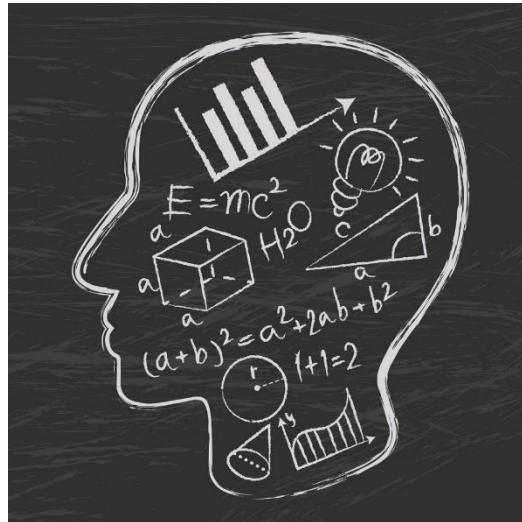
SUM OF 2 AND 3

$$\text{Banana} + \text{Apple} = \boxed{}$$

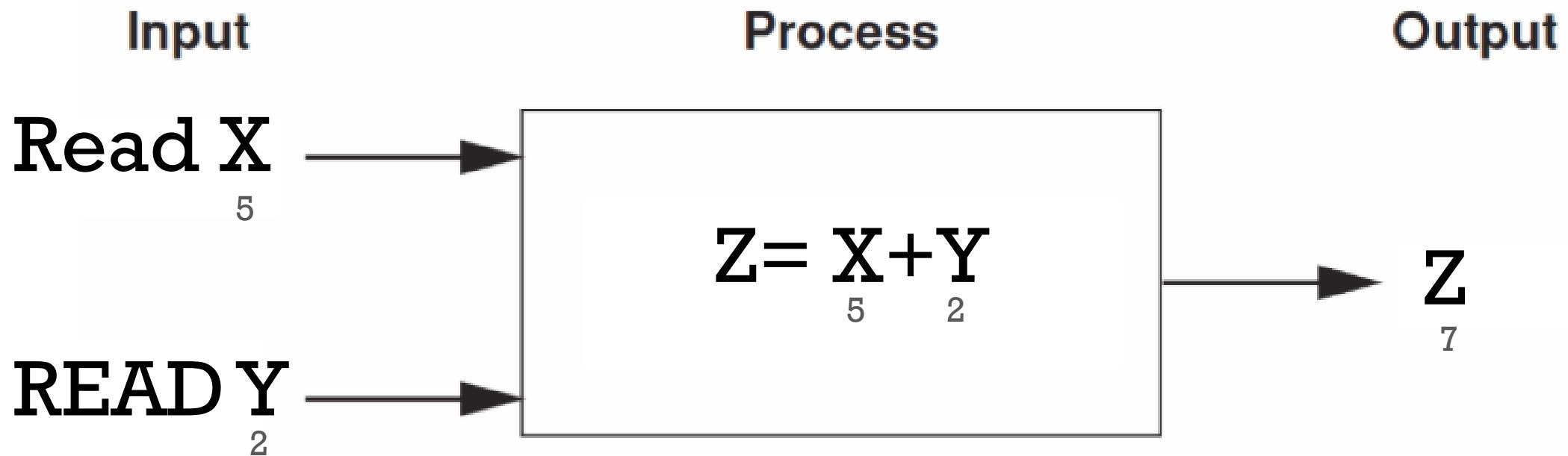
2 bananas + 3 apples = □



SUM OF ANY 2 NUMBERS



SUM OF ANY 2 NUMBERS



$$\begin{aligned} z &= f(x,y) \\ f(x,y) &= x + y \\ z &= x+y \end{aligned}$$

Similar approach for:

Multiplication *
Division (quotient) /
Reminders %

▪

▪



Calculate Current Age

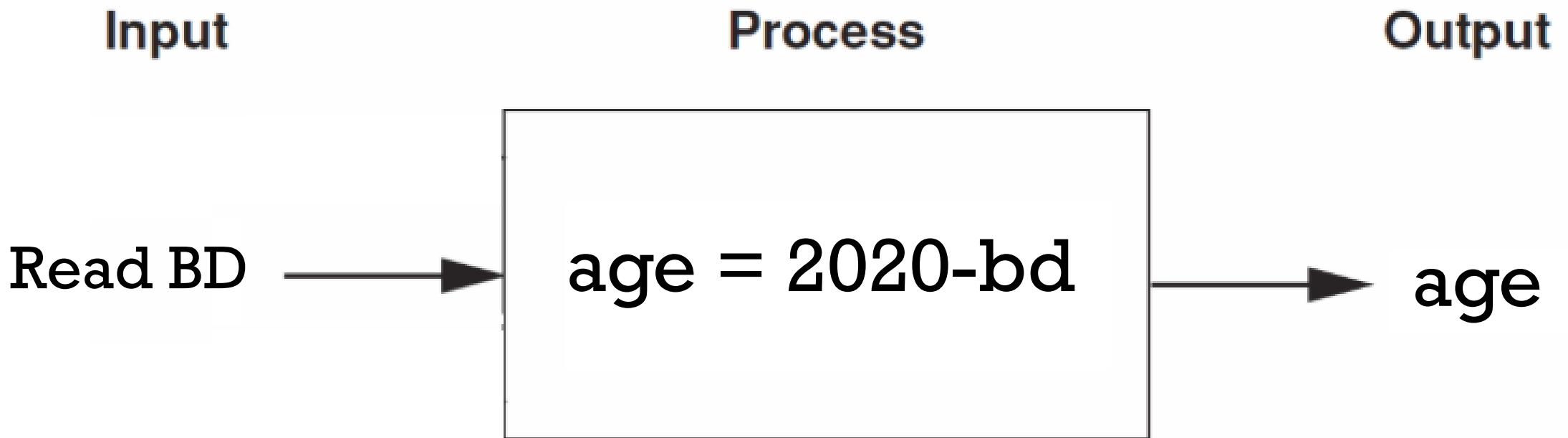
INPUT : 1997

OUTPUT : Your Age is : 23

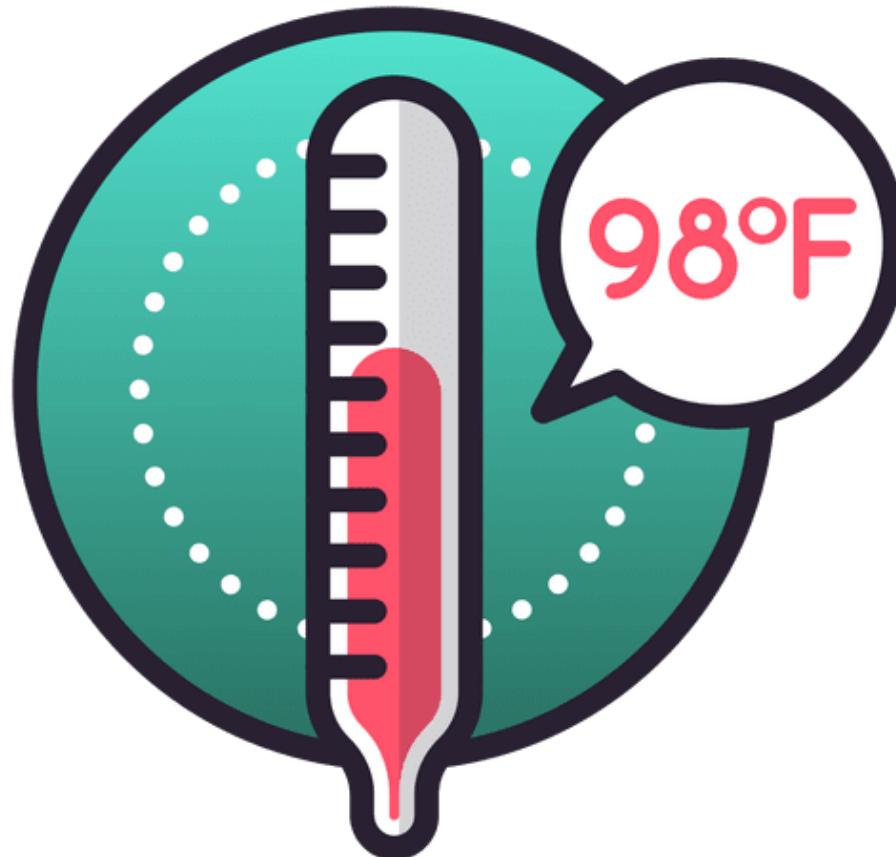
INPUT : 1945

OUTPUT : Your Age is : 75

Calculate Current Age

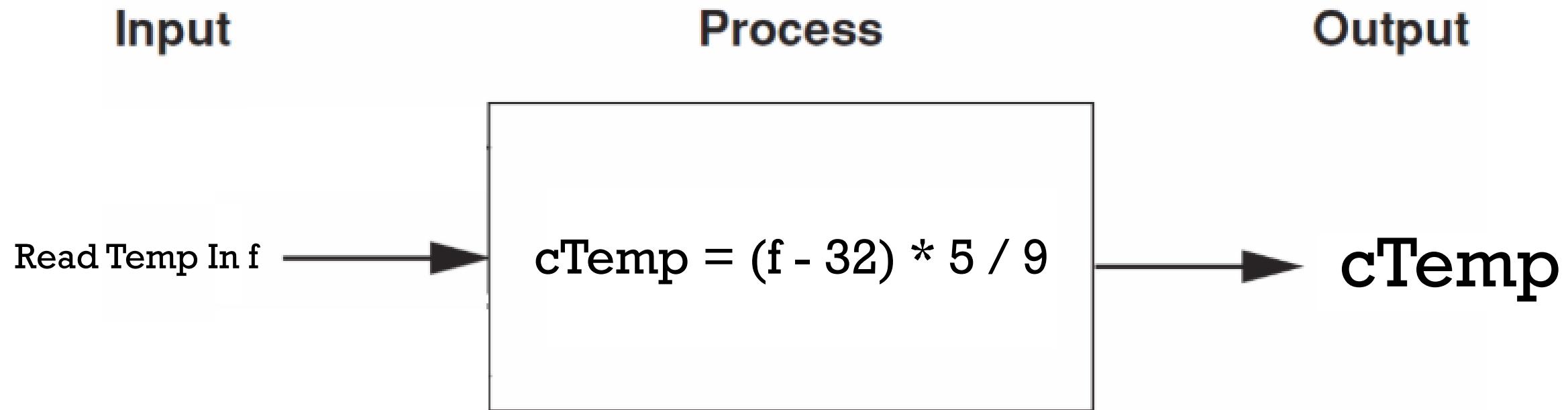


Convert From Fahrenheit to Celsius



$$(f - 32) * 5 / 9$$

Convert From Fahrenheit to Celsius



Similar approach when converting:

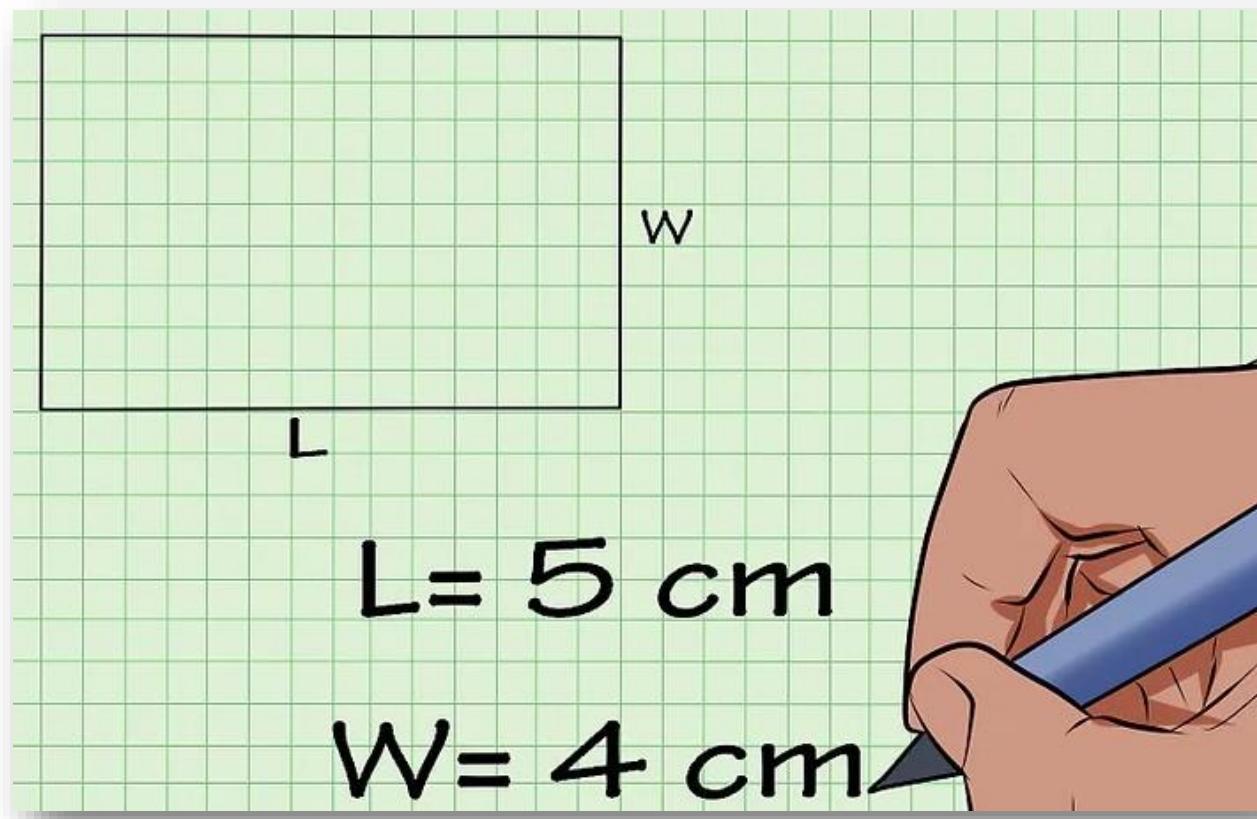
KM \leftrightarrow M

KG \leftrightarrow G

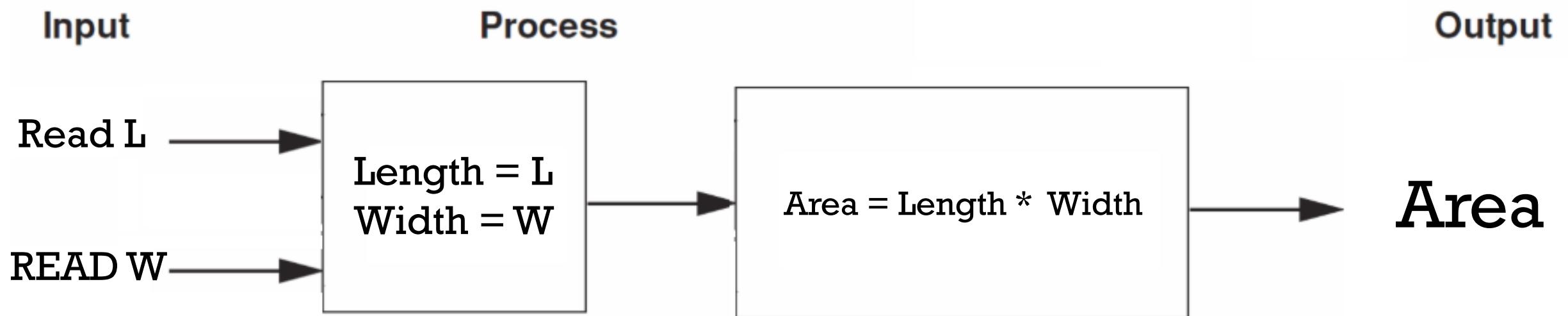
▪

▪

Area Of A Rectangle



Area Of A Rectangle



Similar approach for any mathematical equation

Area of a circle

Circumference of a circle

Pythagorean theorem

▪

▪

Electricity Bill

Calculate the total price

Units consumed

Price (Per Unit)

Additional Fees (5JD's)

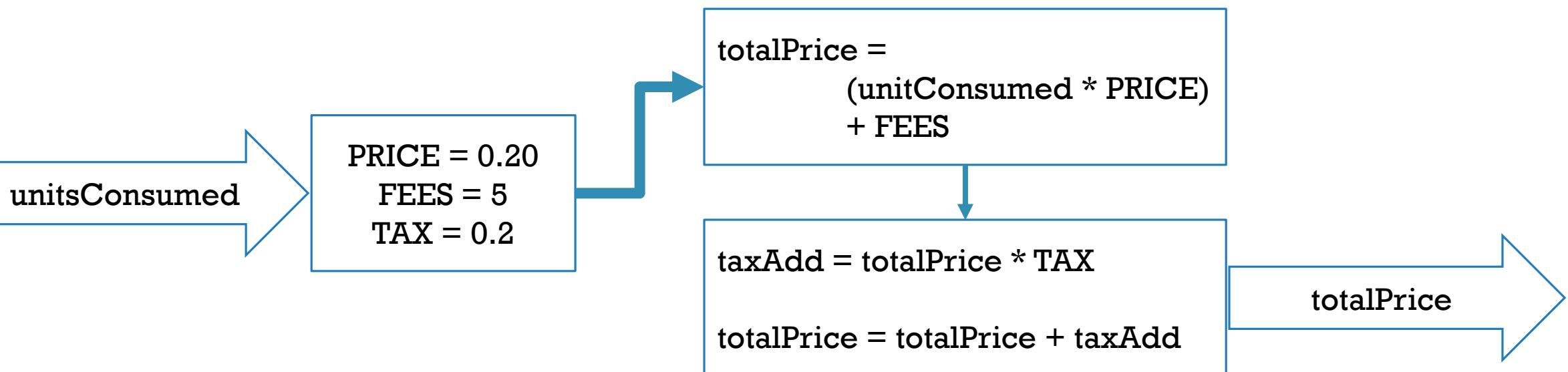
Tax (20% of the total bill including the additional fees)

Electricity Bill

Input

Process

Output



IN CLASS TASK:

**GIVE A EXAMPLE OF A
INPUT – PROCESS – OUTPUT
PROGRAM**

Input

Process

Output



(x)

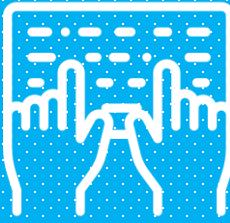
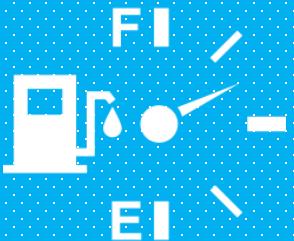
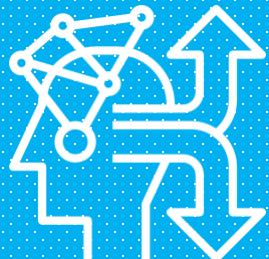
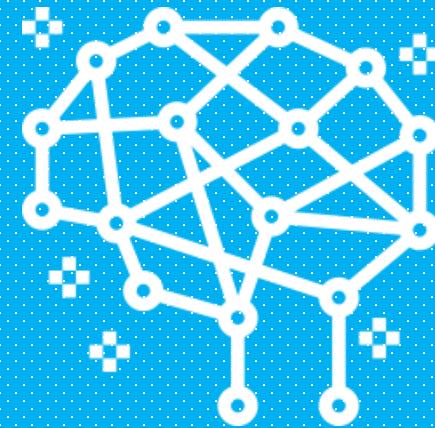
VARIABLES

Loops

ARATHMATIC

CONDITIONAL

INPUT/OUTPUT



...NEXT...



MY FIRST JAVA PROGRAM