Introduction to computer and programming

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What is Computer?

- The word computer comes from the word “compute”, which means, “to calculate”.
- A computer is an electronic device that can perform arithmetic operations at high speed and it can process data, pictures, sound and graphics.
- It can solve highly complicated problems quickly and accurately.

Advantages of Computer

- Speed
  - It can calculate millions of expression within a fraction of second.
- Storage
  - It can store large amount of data using various storage devices.
- Accuracy
  - It can perform the computations at very high speed without any mistake.
- Reliability
  - The information stored in computer is available after years in same form. It works 24 hours without any problem as it does not feel tiredness.
- Automation
  - Once the task is created in computer, it can be repeatedly performed again by a single click whenever we want.
- Multitasking
  - It can perform more than one tasks/operations simultaneously.

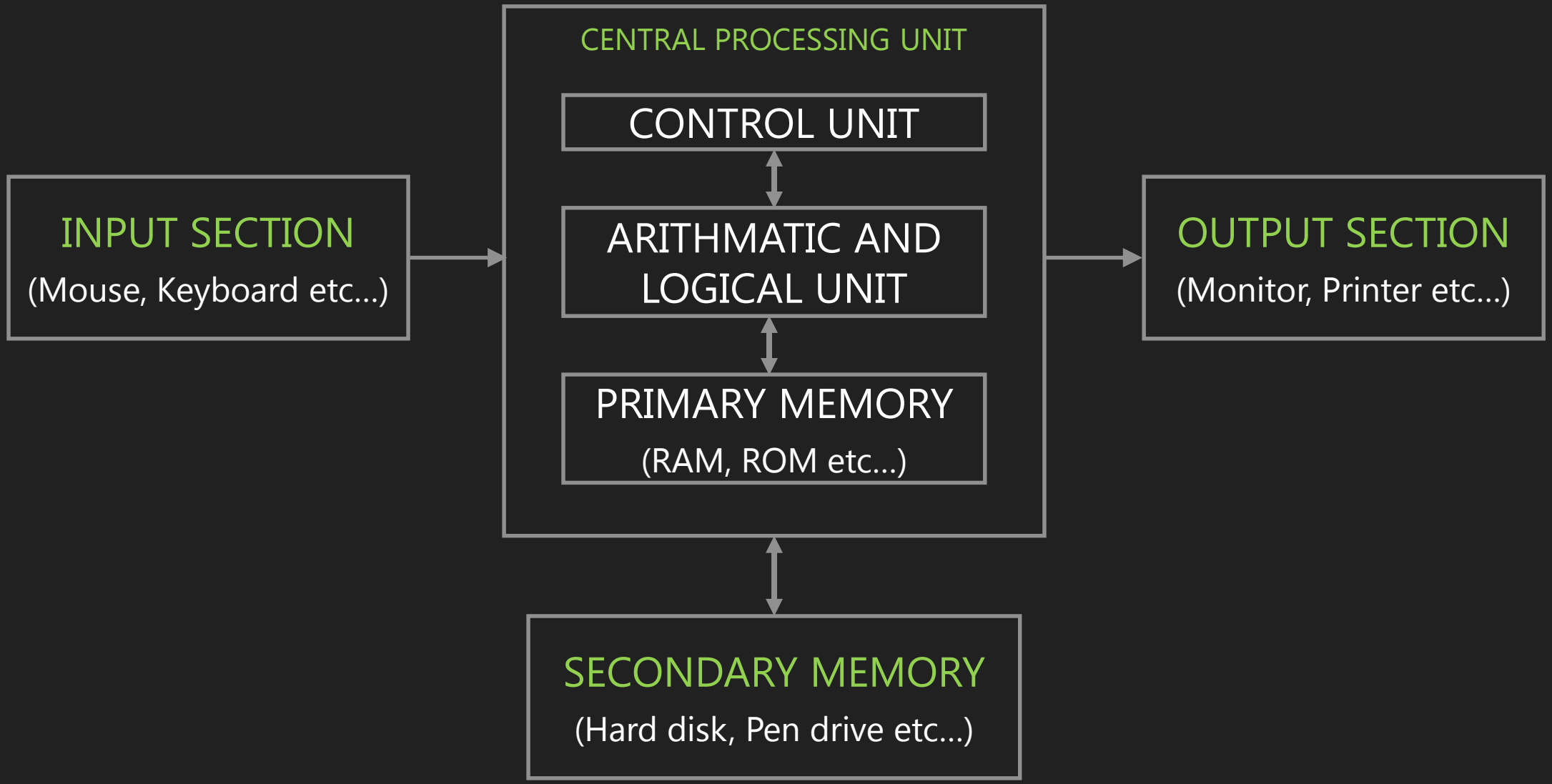
Disadvantages of Computer

- Lake of intelligence
  - It can not think while doing work.
  - It does not have natural intelligence.
  - It can not think about properness, correctness or effect of work it is doing.
- Unable to correct mistake
  - It can not correct mistake by itself.
  - So if we provide wrong or incorrect data then it produces wrong result or perform wrong calculations.

Block Diagram of Computer

- It is a pictorial representation of a computer which shows how it works inside.
- It shows how computer works from feeding/inputting the data to getting the result.

Block Diagram of Computer



Block diagram of computer (Input Section)

- The devices used to enter data in to computer system are called input devices.
- It converts human understandable input to computer controllable data.
- CPU accepts information from user through input devices.
- Examples: Mouse, Keyboard, Touch screen, Joystick etc…

Block diagram of computer (Output Section)

- The devices used to send the information to the outside world from the computer is called output devices.
- It converts data stored in 1s and 0s in computer to human understandable information.
- Examples: Monitor, Printer, Plotter, Speakers etc…

Block diagram of computer (Central Processing Unit (CPU))

- It contains electronics circuit that processes the data based on instructions.
- It also controls the flow of data in the system.
- It is also known as brain of the computer.
- CPU consists of,
  - Arithmetic Logic Unit (ALU)
    - It performs all arithmetic calculations such as add, subtract, multiply, compare, etc. and takes logical decision.
    - It takes data from memory unit and returns data to memory unit, generally primary memory (RAM).
  - Control Unit (CU)
    - It controls all other units in the computer system. It manages all operations such as reads instruction and data from memory.
  - Primary Memory
    - It is also known as main memory.
    - The processor or the CPU directly stores and retrieves information from it.
    - Generally currently executing programs and data are stored in primary memory.

Block diagram of computer (Secondary Memory)

- Secondary memory is also called Auxiliary memory or External memory.
- It is Used to store data permanently.
- It can be modified easily.
- It can store large data compared to primary memory. Now days, it is available in Terabytes.
- Examples: Hard disk, Floppy disk, CD, DVD, Pen drive, etc…

What is Hardware?

- Hardware refers to the physical parts of a computer.
- The term hardware also refers to mechanical device that makes up computer.
- User can see and touch the hardware components.
- Examples of hardware are CPU, keyboard, mouse, hard disk, etc…

What is Software?

- A **set of instruction** in a logical order **to perform a meaningful task** is called program and **a set of program** is called software.
- It tell the hardware how to perform a task.
- Types of software
  - System software
    - It is designed to operate the computer hardware efficiently.
    - Provides and maintains a platform for running application software.
    - Examples: Windows, Linux, Unix etc.
  - Application software
    - It is designed to help the user to perform general task such as word processing, web browser etc.
    - Examples: Microsoft Word, Excel, PowerPoint etc.

Categories of System Software

- Operating system
  - It controls hardware as well as interacts with users, and provides different services to user.
  - It is a bridge between computer hardware and user.
  - Examples: Windows XP, Linux, UNIX, etc…
- System support software
  - It makes working of hardware more efficiently.
  - For example drivers of the I/O devices or routine for socket programming, etc…
- System development software
  - It provides programming development environment to programmers.
  - Example: Editor, pre-processor, compiler, interpreter, loader, etc…

Categories of Application Software

- General purpose software
  - It is used widely by many people for some common task, like word processing, web browser, excel, etc…
  - It is designed on vast concept so many people can use it.
- Special purpose software
  - It is used by limited people for some specific task like accounting software, tax calculation software, ticket booking software, banking software etc…
  - It is designed as per user's special requirement.

Compiler, Interpreter and Assembler

- Compiler translates program of higher level language to machine language. It converts whole program at a time.
- Interpreter translates program of higher level language to machine language. It converts program line by line.
- Assembler translates program of assembly language to machine language.

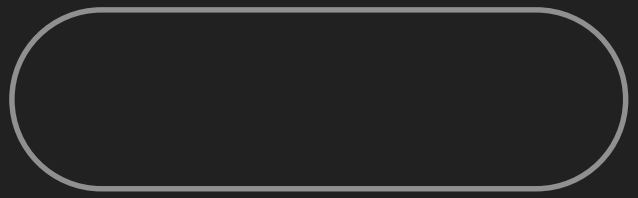
Types of Computer Languages

- Machine level language OR Low level language
  - It is language of 0's and 1's.
  - Computer directly understand this language.
- Assembly language
  - It uses short descriptive words (MNEMONIC) to represent each of the machine language instructions.
  - It requires a translator knows as assembler to convert assembly language into machine language so that it can be understood by the computer.
  - Examples: 8085 Instruction set
- Higher level language
  - It is a machine independent language.
  - We can write programs in English like manner and therefore easier to learn and use.
  - Examples: C, C++, JAVA etc…

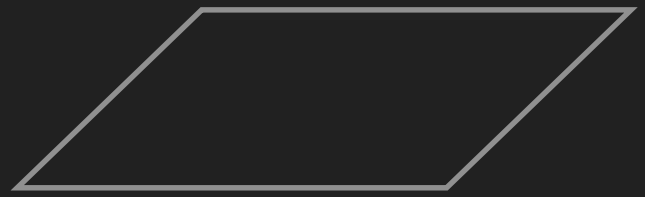
Types of Computer Languages

Flowchart	Algorithm
Flowchart is a pictorial or graphical representation of a program.	Algorithm is a finite sequence of well defined steps for solving a problem.
It is drawn using various symbols.	It is written in the natural language like English.
Easy to understand.	Difficult to understand.
Easy to show branching and looping.	Difficult to show branching and looping.
Flowchart for big problem is impractical.	Algorithm can be written for any problem.

Symbols used in Flowchart

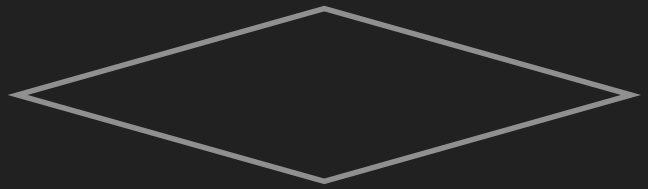


Start / Stop

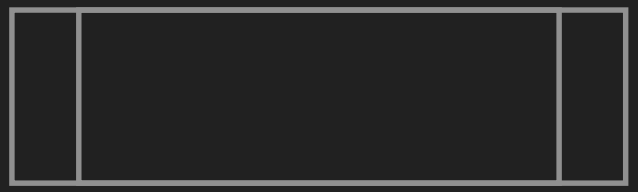


Input / Output

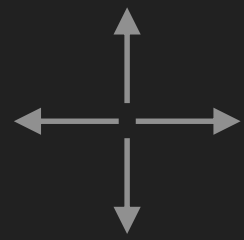
Process



Decision Making

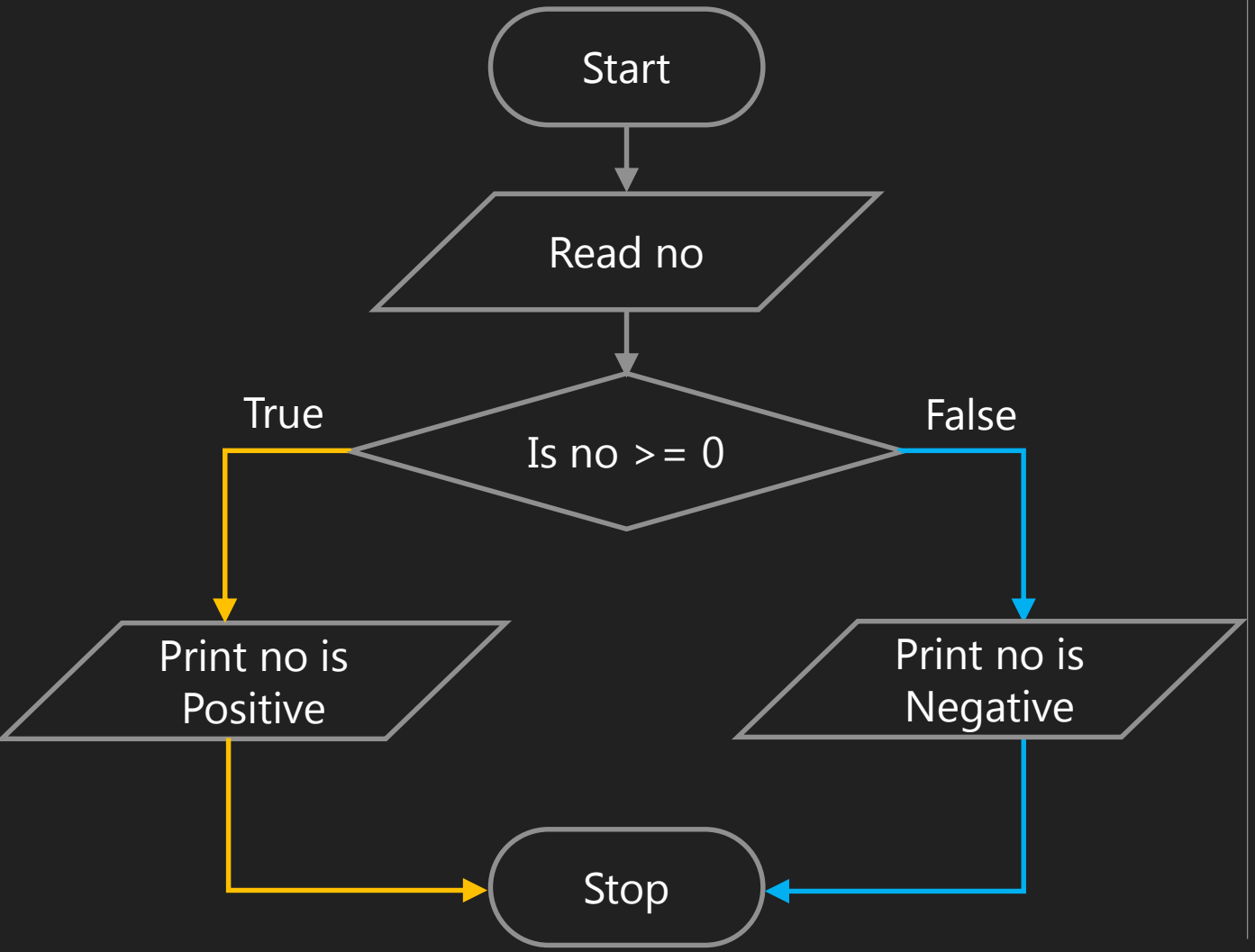


Subroutine



Arrows

Number is positive or negative



Step 1: Read no.

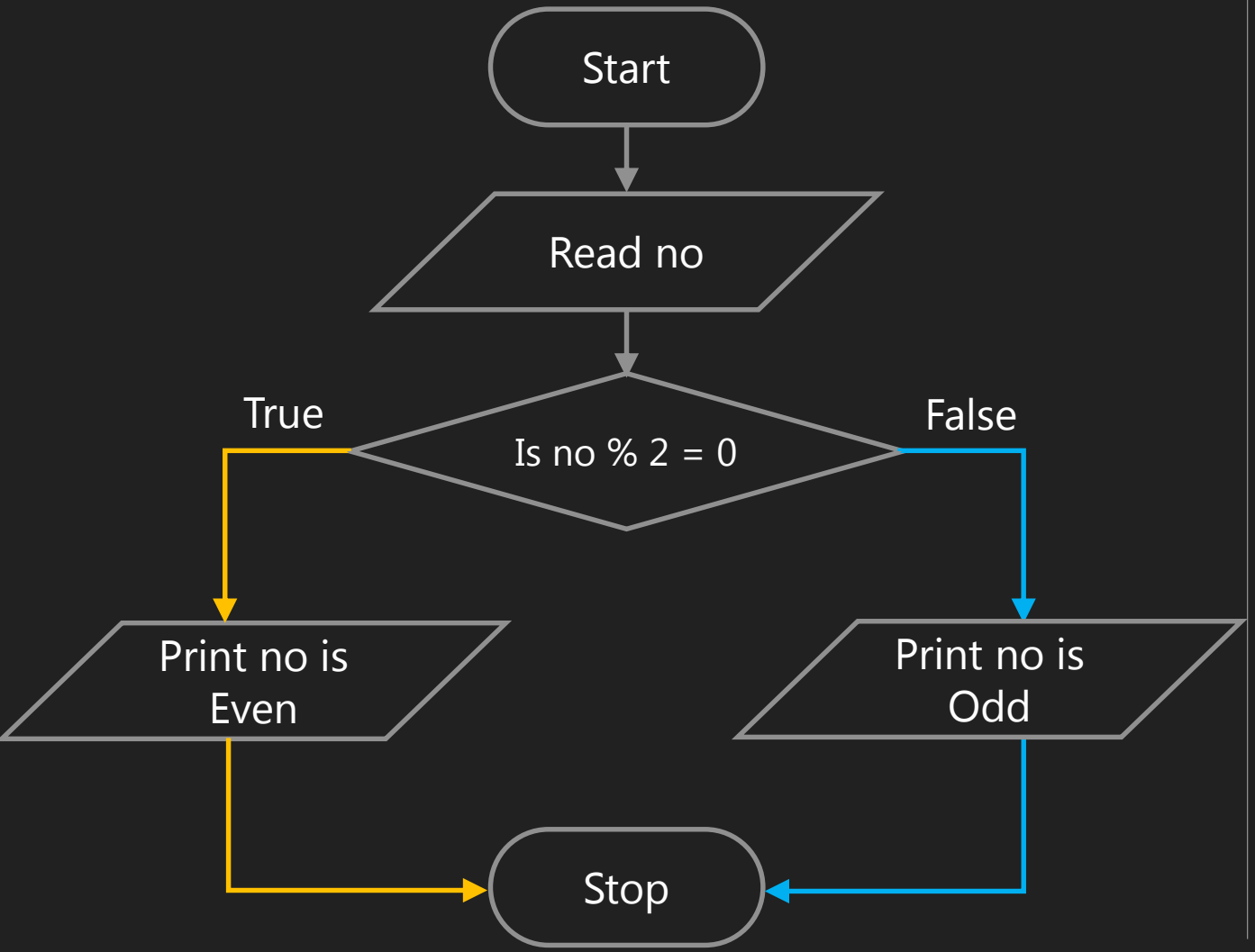
Step 2: If no is greater than equal zero, go to step 4.

Step 3: Print no is a negative number, go to step 5.

Step 4: Print no is a positive number.

Step 5: Stop.

Number is odd or even



Step 1: Read no.

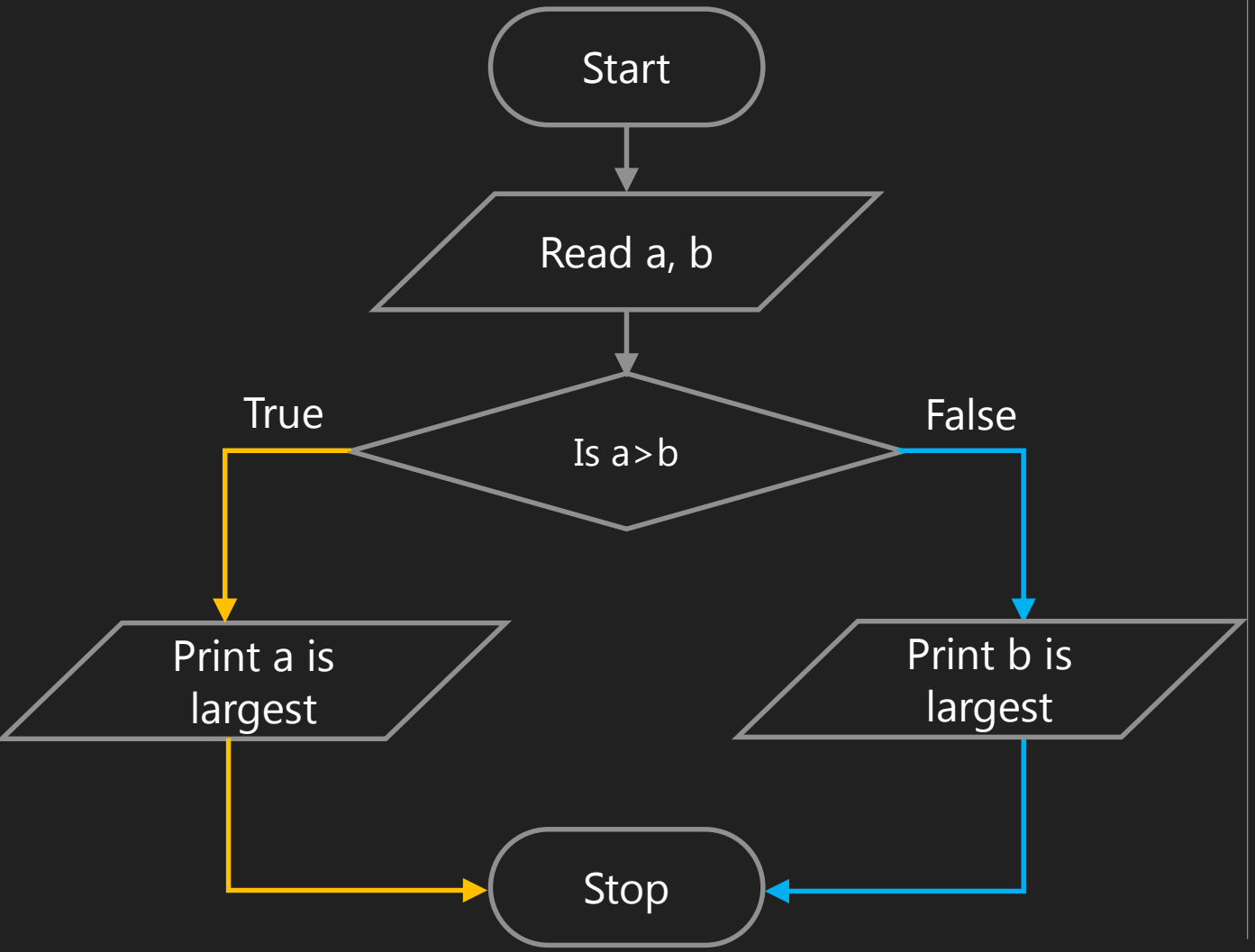
Step 2: If no mod 2 = 0, go to step 4.

Step 3: Print no is a odd, go to step 5.

Step 4: Print no is a even.

Step 5: Stop.

Largest number from 2 numbers



Step 1: Read a, b.

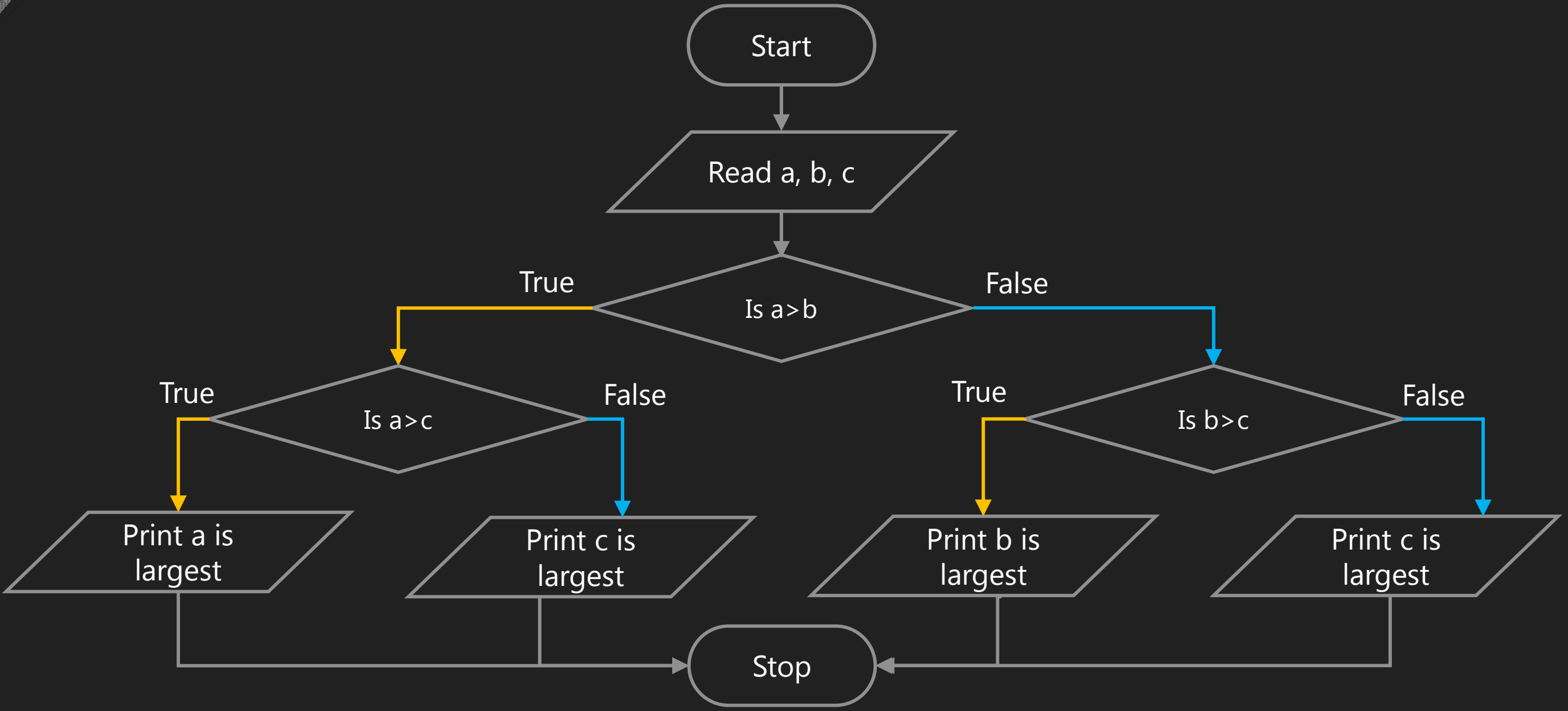
Step 2: If a>b, go to step 4.

Step 3: Print b is largest number, go to step 5.

Step 4: Print a is largest number.

Step 5: Stop.

Largest number from 3 numbers (Flowchart)



Largest number from 3 numbers (Algorithm)

Step 1: Read a, b, c.

Step 2: If a>b, go to step 5.

Step 3: If b>c, go to step 8.

Step 4: Print c is largest number, go to step 9.

Step 5: If a>c, go to step 7.

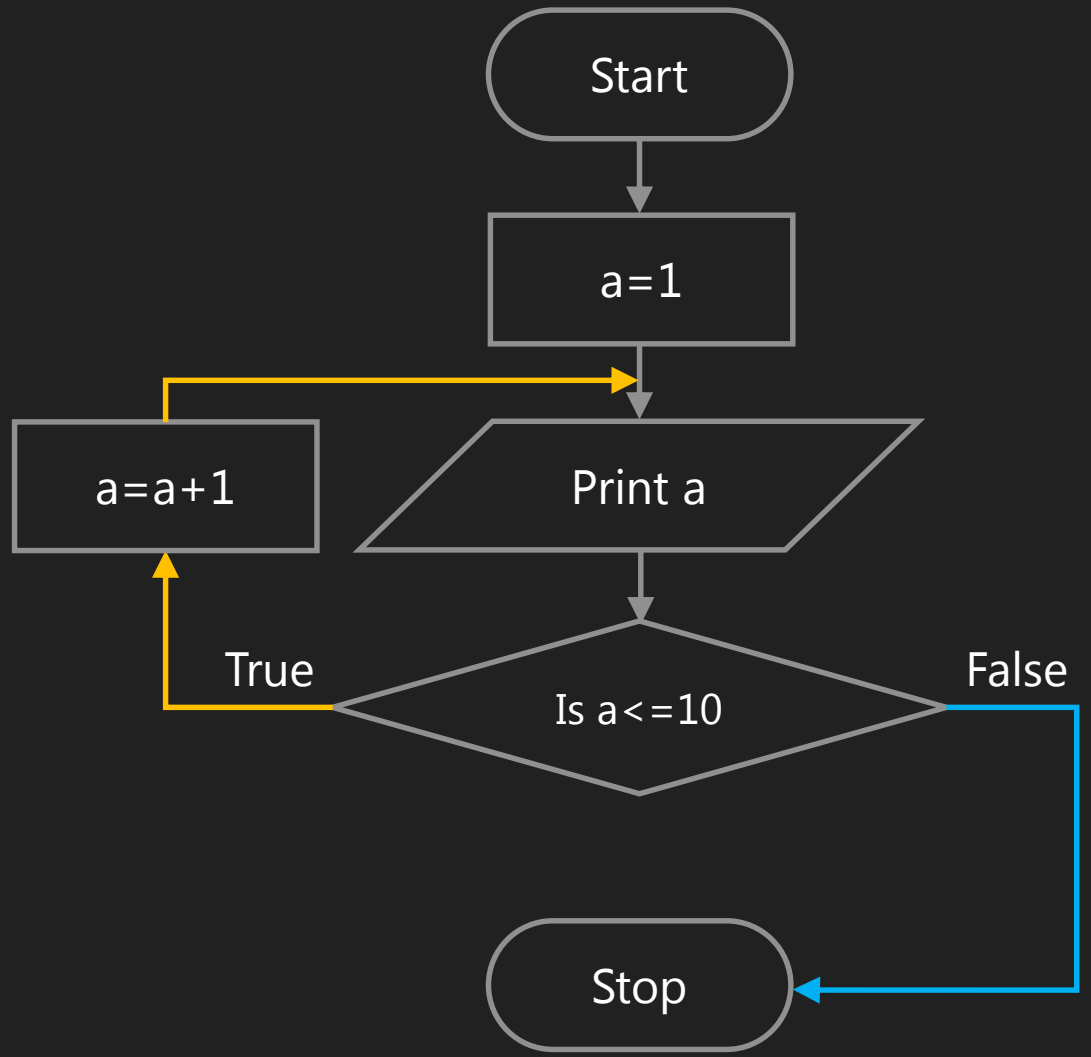
Step 6: Print c is largest number, go to step 9.

Step 7: Print a is largest number, go to step 9.

Step 8: Print b is largest number.

Step 9: Stop.

Print 1 to 10



Step 1: Initialize a to 1.

Step 2: Print a.

Step 3: Repeat step 2 until a<=10.

Step 3.1: a=a+1.

Step 4: Stop.

Thank you