IS1201: Programming & Problem Solving

2. C Programming

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Algorithm

- It is a formula, a recipe or a step by-step procedure to be followed in order to obtain the solution to a problem.
- To be useful as a basis for writing program.
- The algorithm must;
  - Arrive at a correct solution within a finite time.
  - Be clear, precise and unambiguous.
  - Be in a format which lends itself to an elegant implementation in a programming language.

Control Structures

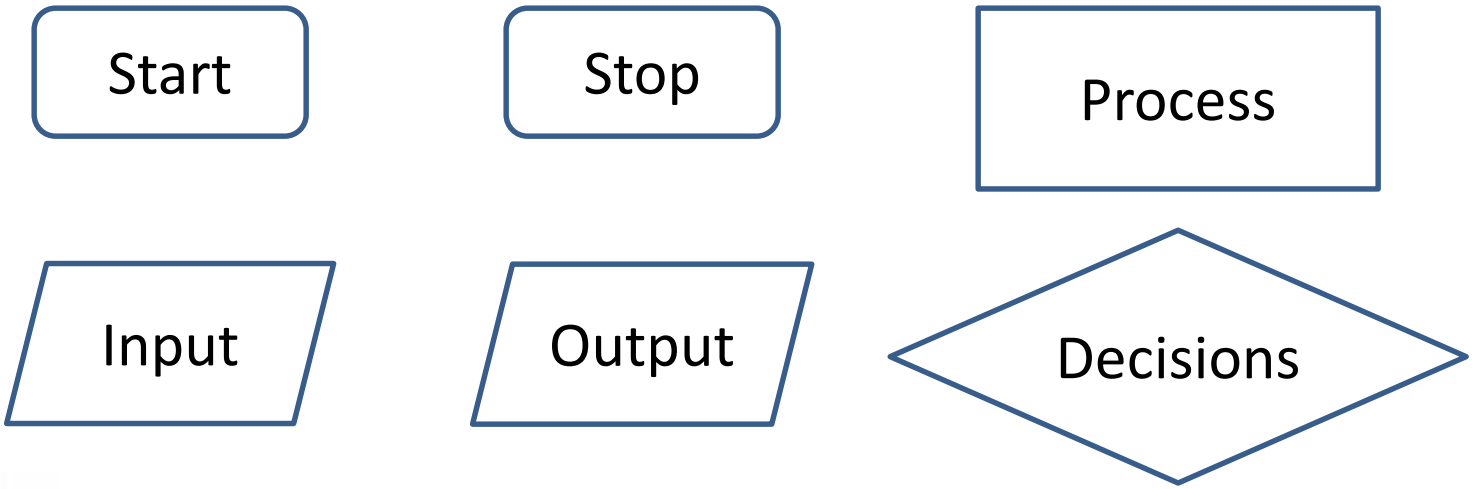
- The key to elegant algorithm design lies in limiting the control structures to only three constructs.

1. Sequence
2. Iteration
3. Selection

Flow Charts

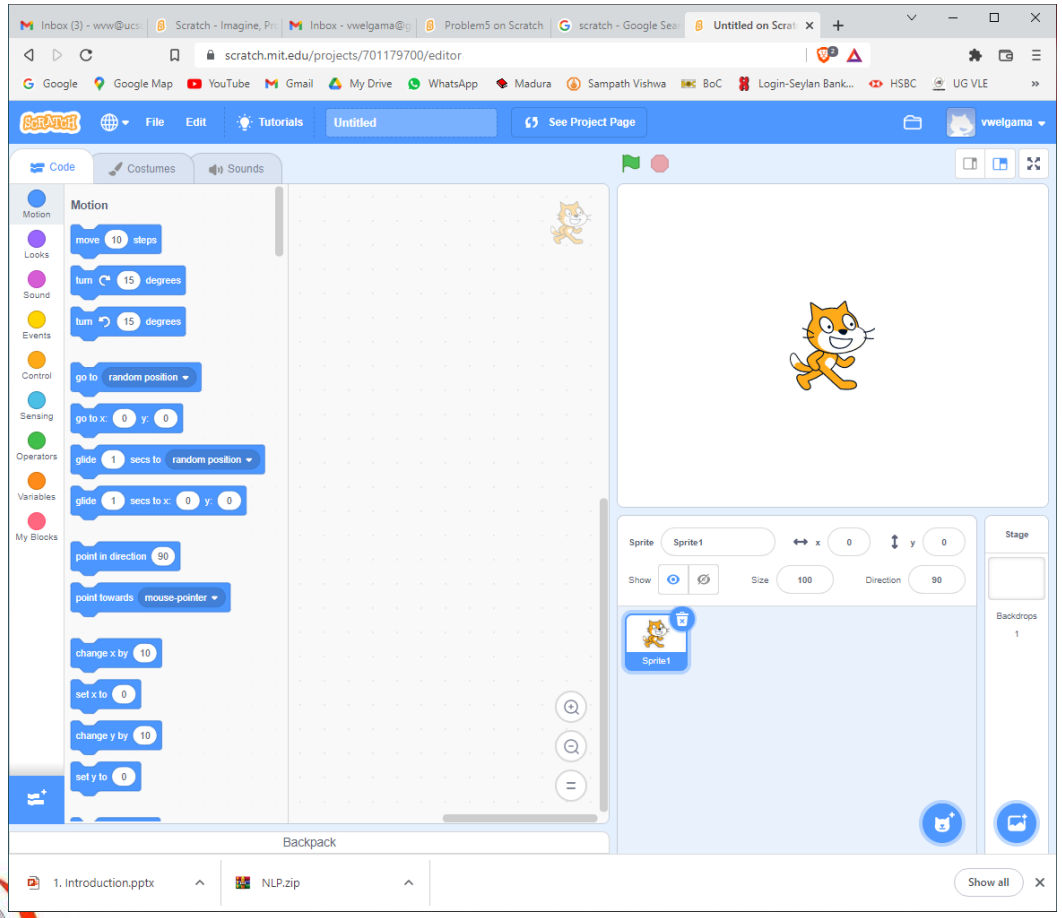
- Flow charts can be used as a way of expressing algorithms.

- Note that there are standard symbols to indicate:



SCRATCH

Scratch.mit.edu



Scratch

High-level programming language

Scratch is a high-level block-based visual programming language and website aimed primarily at children as an educational tool for programming, with a target audience of ages 8 to 16. Users on the site, called Scratchers, can create projects on the website using a block-like interface. Wikipedia

Influenced: ScratchJr

OS: Microsoft Windows, macOS, Linux (via renderer), HTML5, iOS, iPadOS, and Android

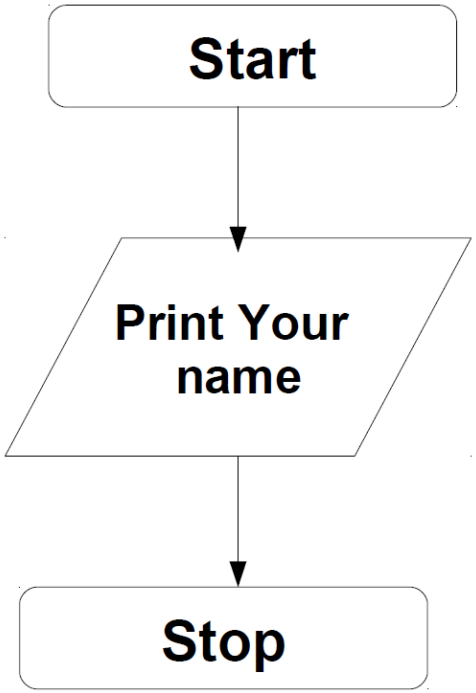
License: GPLv2 and Scratch Source Code License

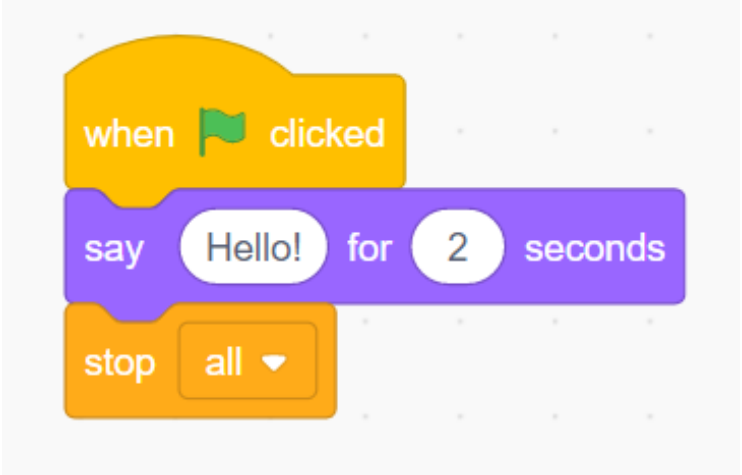
Filename extensions: .scratch (Scratch 0.x); *.sb, *.sprite (Scratch 1.x); *.sb2, *.sprite2 (Scratch 2.0); *.sb3, *.sprite3 (Scratch 3.0)

Paradigm: Event-driven, block-based programming language

Problem 1:

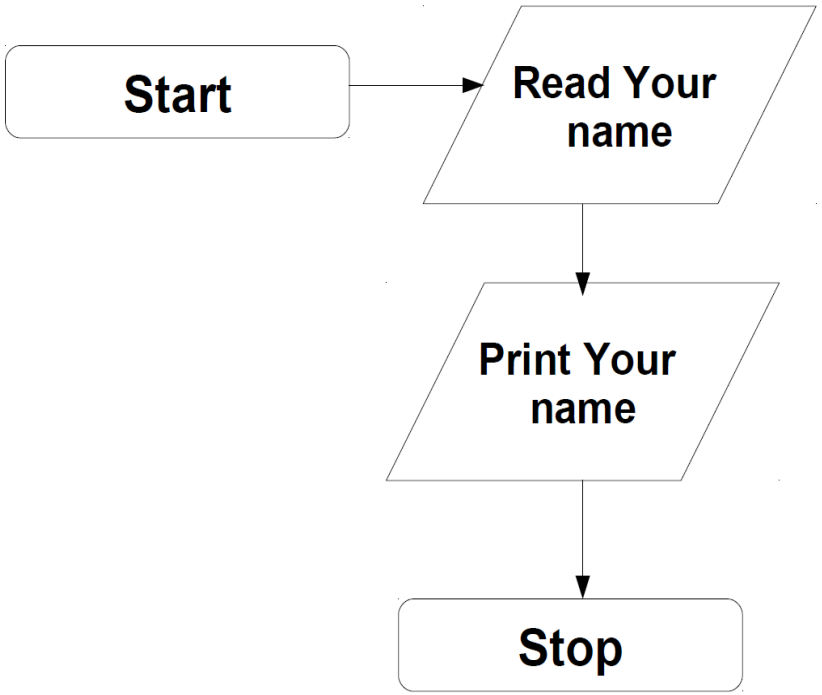
Write a program to print your name.

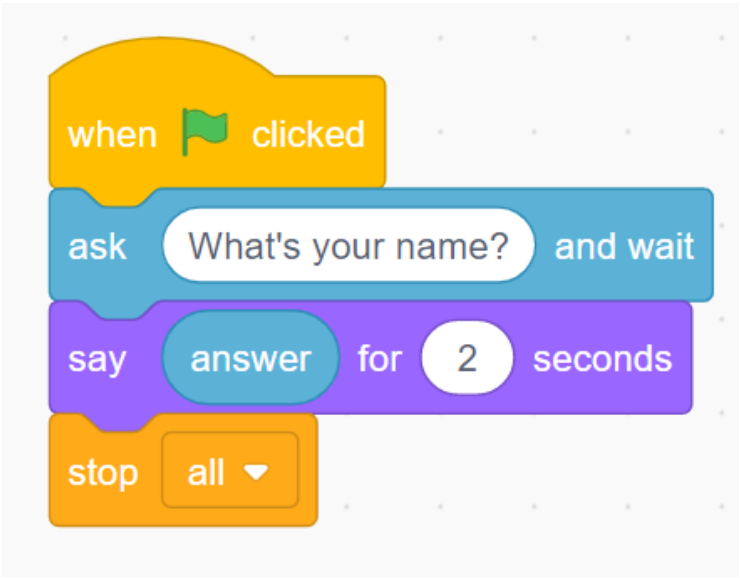




Problem 2:

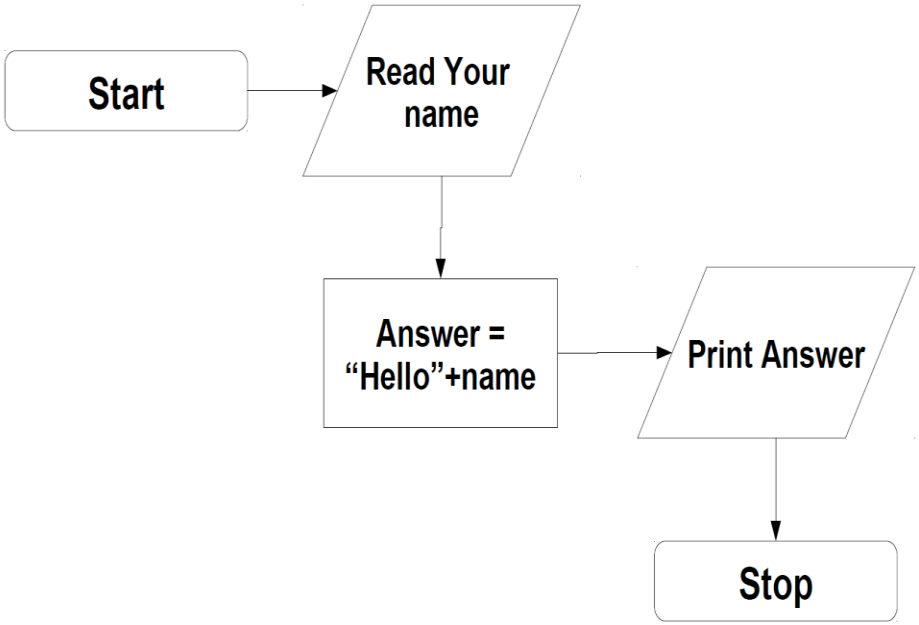
Write a program to read and print your name.

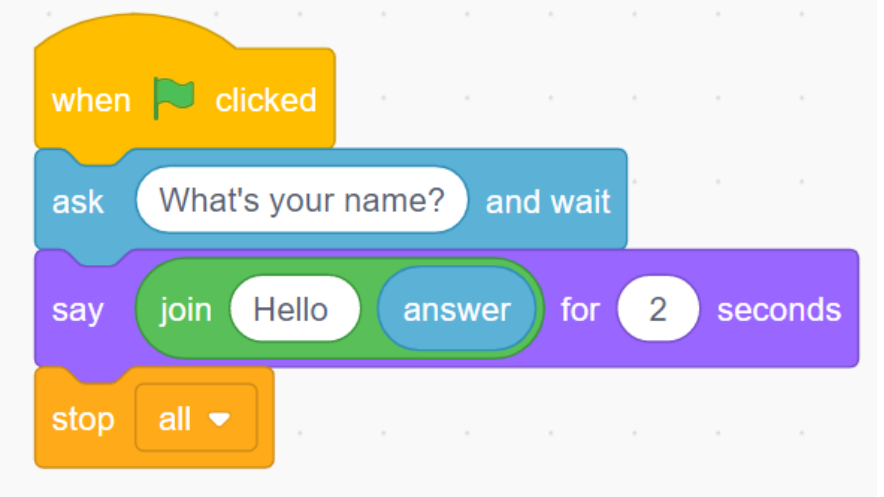




Problem 3:

Write a program to read and say “Hello” to your name

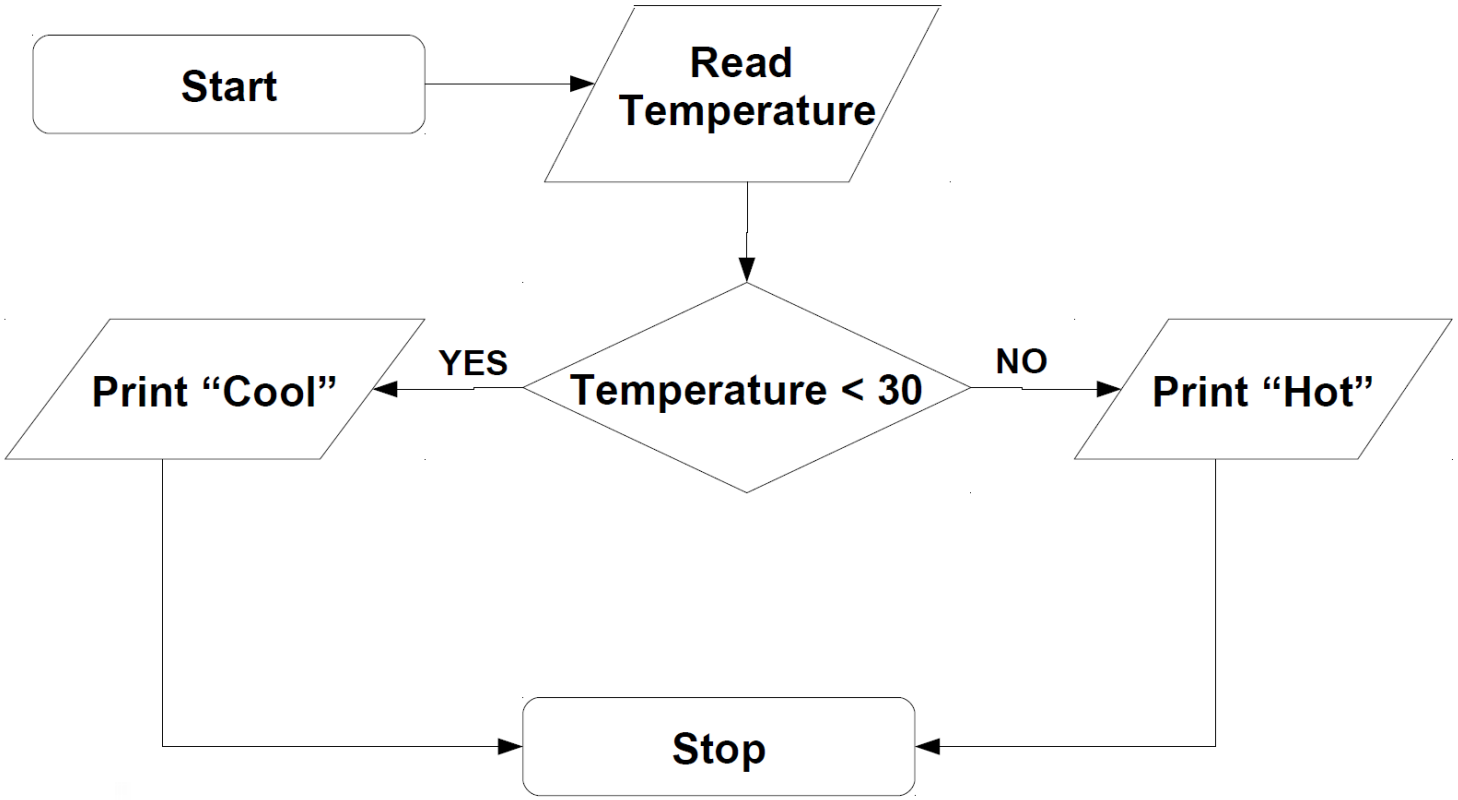




Problem 4:

Write a program to read temperature and print “Cool” or “Hot”

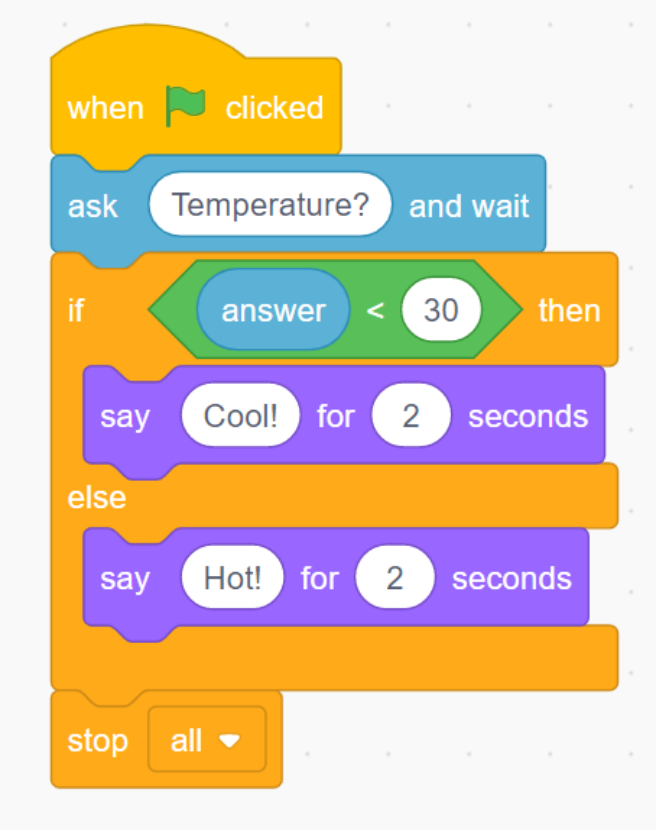
- If temperature is less than 30: Cool Otherwise: Hot



Problem 4:

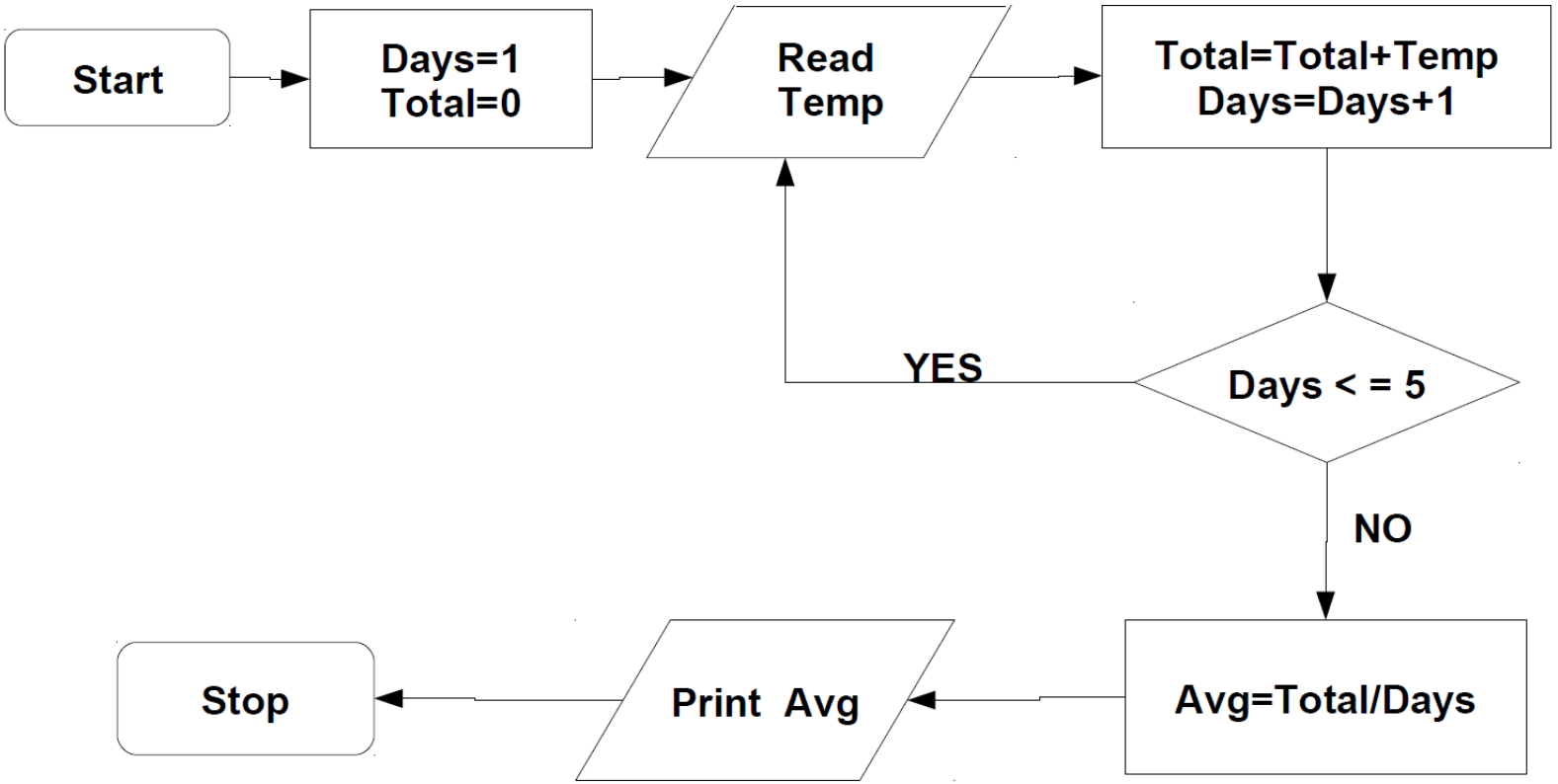
Write a program to read temperature and print “Cool” or “Hot”

- If temperature is less than 30: Cool Otherwise: Hot



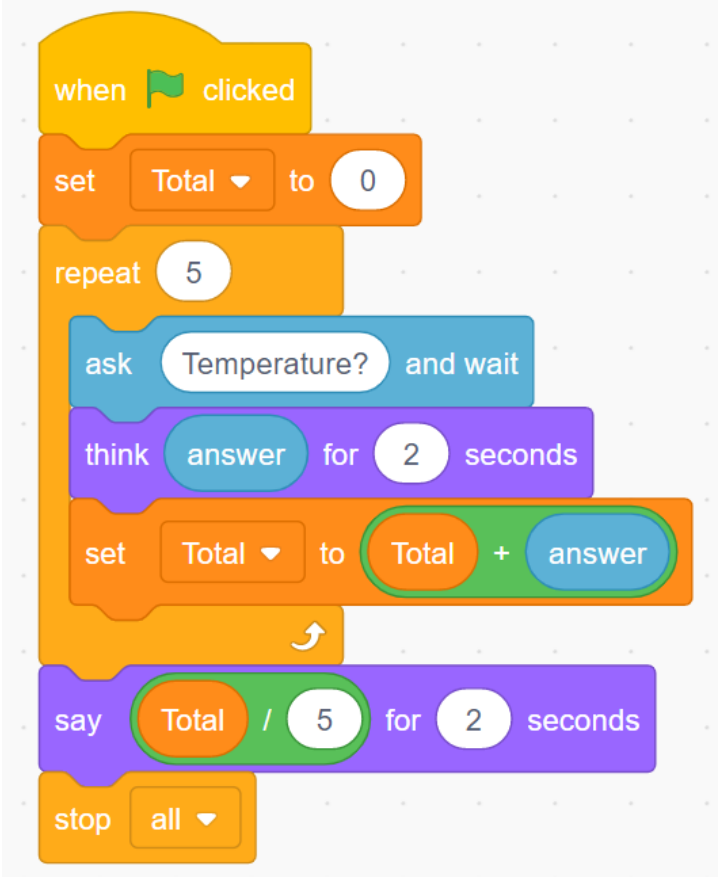
Problem 5:

Read temperature for 5 days and print average.



Problem 5:

Read temperature for 5 days and print average.



Program Paradigm

- Programming paradigm refers to how a program is written in order to solve a problem.
- Different programming paradigms are;
  1. Imperative paradigm (Fortan, Pascal, C)
  2. Functional paradigm (scala)
  3. Logic paradigm (prolog)
  4. Object-Oriented paradigm (java, C++, Python)

Programming Languages

- Low level languages
  - Machine language, Assembly language
- Middle level languages
  - Fortran, C, Pascal
- High level languages
  - C++, Python, Java, PHP

We will learn C!

- Why?

Why C?

1. Middle level language
   - You will understand how a computer works.
2. Compiled language
   - fast
3. Machine independent
   - portable
4. Basic concepts of programming
   - You will find it much easier to learn other programming languages.
5. Nothing can beats C by performance
   - OS like Windows, Linux are still written in C
6. Opportunity to work on open source projects that impact millions of people.

About…

- C is a very powerful general-purpose programming language.
- It is fast, portable and available in all platforms.
- C language used for wide range of applications from Operating systems like Windows, Unix and iOS to software that is used for creating 3D movies.
- C programming is highly efficient.
  - That's the main reason why it's very popular despite being more than 40 years old.
- If you are new to programming, C is a good choice to start your programming journey.

History!

- BCPL:
  - **Stands for:** Basic Combined Programming Language
  - **Purpose:** to write compilers for the other programming languages
  - **By:** Mr. Martin Richards
  - **At:** AT & T Bell labs (founded by Alexander Graham Bell, USA)
  - **Year:** 1966
  - **New Features:** introducing {} to group set of statements instead of BEGIN, END
  - **Limitations:** follow too low level coding styles, not suitable for developing large software applications.
  - **Influenced to:** B programming language

History!

- B programming language:
  - **Stands for:** 1st character of the BCPL
  - **Purpose:** to reincarnate BCPL language and write system programs
  - **By:** Mr. Ken Thompson
  - **At:** AT & T Bell labs
  - **Year:** 1969
  - **Limitations:** not quite suitable to implement UNIX OS, not suitable for developing moderately complex applications.
  - **Influenced to:** C programming language

History!

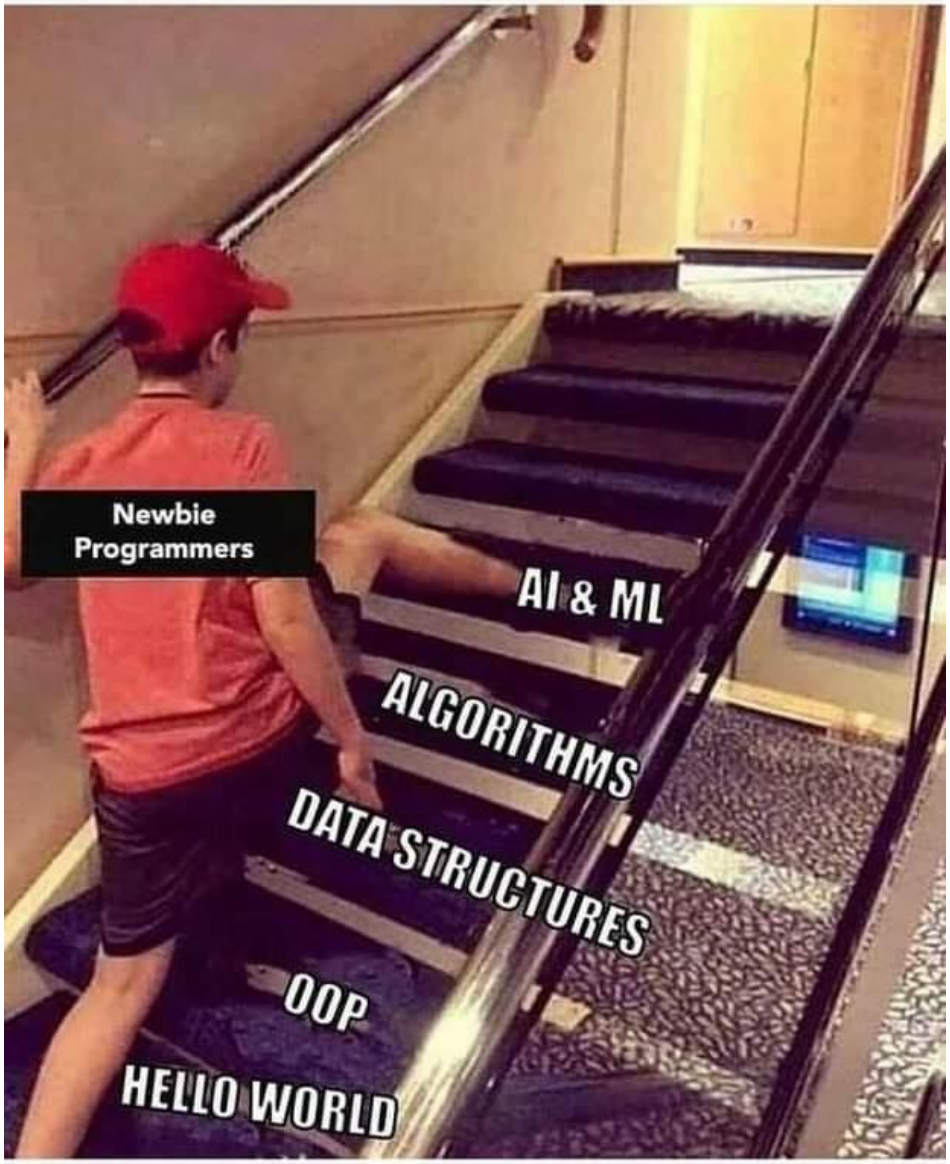
- C programming language:
  - **Stands for:** 2nd character of the BCPL
  - **Purpose:** re-implement the UNIX operating system
    - UNIX OS was written on assembly level language
  - **By:** Mr. Dennis Ritchie, Mr. Stephen C. Johnson
  - **At:** AT & T Bell labs
  - **Year:** 1972
  - **New Features:** B with data types.
  - **Limitations:** not suitable to represent real world entities and solve most of the real world problems
  - **Influenced to:** CPP (C with Classes, hence C++)

History!

- **1983:**
  - ANSI (American National Standards Institute) established standard specification for C.
- **1989:**
  - Based on the standard specification, IEEE release new C version with the name ANSI C, standard C or C89.
- **1990:**
  - ISO (International Organization for Standardization) adopted ANSI C standard and named C90.
- **Dec 2011:**
  - Stable and standard of C language has been released with the name C11.

Acknowledgment

- https://www.programiz.com/c-programming


Newbie Programmers
AI & ML
ALGORITHMS
DATA STRUCTURES
OOP
HELLO WORLD

When you start coding in a new language without reading the documentation

Your 1st C Program…

```c
#include <stdio.h>

int main() {
    printf("Hello C!\n");
    return 0;
}

```