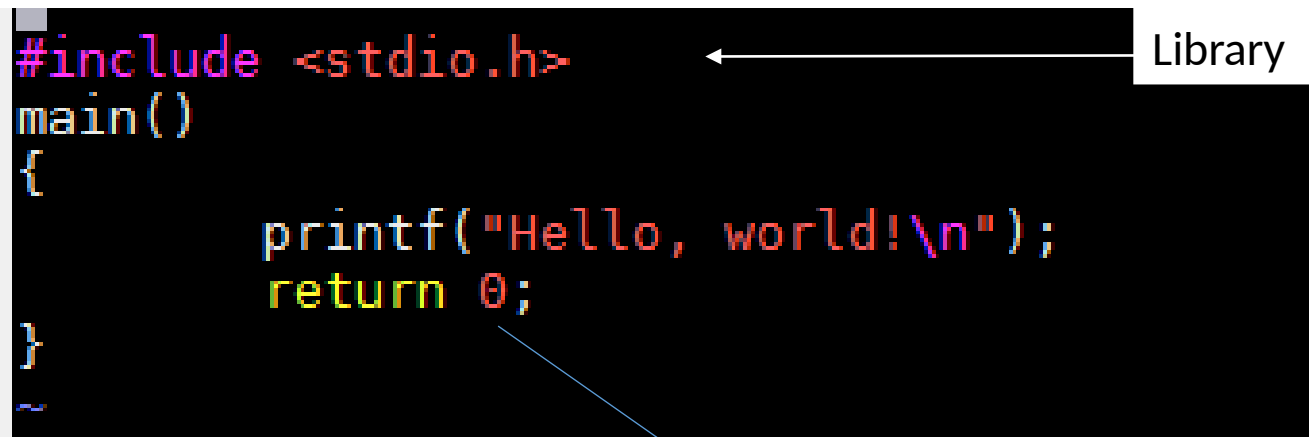# Introduction to C programming

- C is fast
  - Low-level programming language


- In C we need to:
  - Declare and initialize our variables (including type)
  - Explicitly print the results
  - Compile our code


- Your program is run from the terminal

# Hello world

- Example code: startup1.c

```c
#include <stdio.h>
main()
{
        printf("Hello, world!\n");
        return 0;

}
~
```

Library

Returns 0 if code is correctly executed

# Compile the code

- Gnu Compiler Collection (gcc)

```
gcc hello.c -o hello –lm
```

Your C code

Output file name

Include math library

- Run the code

```
./hello
```

# Variables

```c
/*Program for doing something */
#include <math.h>
#include <stdio.h>
#include <stdlib.h>
#include <time.h>

main()
{
        int a=2,b=3; //Declare and initiate
        int n=pow(10,3); //Declare and initiate
        double x; //Declare
        double f=0; //Declare and initiate
        int i; //Counter of the loop has to be initiated
        for(i=0; i<n; i++)
        {
                x=(a*i)/b; //do something
                f+=x; //add to f
        }

        printf("The value of f is %f \n",f);
        return 0;
}
```

Types: char, int, float, double

# Printing results

Variable name

```
printf("The value of f is %f \n",f);
```

What will be printed

New line

Floating point number

%s    string
%d    integer
%f     float
%E    floating in scientific notation

# Generating random numbers

```c
/*Generate n random numbers and print to stdout*/
#include <math.h>
#include <stdio.h>
#include <stdlib.h>

int main()
{
        int n=10, i;
        double x;
        int myseed;

        myseed=125365454; //own seed
        srand48(myseed); //Make a new seed for the random number generator
        for(i=0; i<n; i++)
        {
                x=drand48(); //generate a random number
                printf("Random number %i: %f\n",i,x); //print random number
        }
        return 0;
}
```

The *drand48()* and *erand48()* functions return non-negative, double-precision, floating-point values, uniformly distributed over the interval [0.0 , 1.0].

# Output

Random number 0: 0.940938

Random number 1: 0.183880

Random number 2: 0.298904

Random number 3: 0.699814

Random number 4: 0.162401

Random number 5: 0.722669

Random number 6: 0.352047

Random number 7: 0.608764

Random number 8: 0.358690

Random number 9: 0.389977

# Set a new seed before the loop

```c
/*Generate n random numbers and print to stdout*/
#include <math.h>
#include <stdio.h>
#include <stdlib.h>

int main()
{
        int n=10, i;
        double x;
        int myseed;

        myseed=time(NULL); //new seed each time
        srand48(myseed); //Make a new seed for the random number generator
        for(i=0; i<n; i++)
        {
                x=drand48(); //generate a random number
                printf("Random number %i: %f\n",i,x); //print random number
        }
        return 0;
}
```