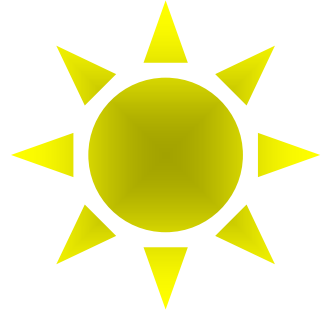


## 2. First C



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### Algorithm

- Recipe to solve the problem
- A sequence of steps that leads from starting point to a finished product
- Only by following the algorithm, one can solve the problem, even if one( he, she or computer) does not know the meaning the problem.
- Computer program is a series of instructions to make the computer follow the algorithm

### Algorithm and Program

algorithm to solve quadratic equation  $ax^2 + bx + c = 0$

a,b,c,D,x1, and x2 are floating point variables

accept a,b,c from the user

calculate  $b^2 - 4ac$  and set this value to D

if D is greater than or equal to 0

calculate  $(-b + \text{square root of } D) / 2a$  and

set this value to x1

calculate  $(-b - \text{square root of } D) / 2a$  and

set this value to x2

output x1 and x2 to the display

else

output " cannot solve" to the display

STOP

```
#include<stdio.h>
```

```
#include<math.h>
```

```
main()
```

```
{
```

```
double a,b,c,D,x1,x2;
```

```
scanf("%lf %lf %lf", &a, &b, &c );
```

```
D = b * b - 4 * a * c;
```

```
if( D >= 0. ){
```

```
    x1 = ( - b + sqrt(D) ) / 2 / a;
```

```
    x2 = ( - b + sqrt(D) ) / 2 / a;
```

```
    printf("%lf %lf",x1,x2);
```

```
} else {
```

```
    printf("cannot solve");
```

```
}
```

### 3 Types of Programs

- Source Codes ( files )
  - Follow certain language syntax such as C
  - Human readable
  - Machine and O/S independent
- Object Files
  - Source codes are compiled to machine languages
  - Object files
  - Machine readable but Not Human readable
  - Machine or OS dependent
- Executable files
  - Can execute ( program ) such as word.exe
  - Just type the name of the file to run

## The procedure to run program

- Compile
  - Check syntax and interpret to machine language
  - Source files to object files
  - `cc -c hello.c -> hello.obj or hello.o`
- Link
  - Link object files with other necessary code:  
I/O, libraries ( `printf`, `sqrt`, `fopen`, and users library – `jpegOpen` )
  - Link Object files and make executable file
  - `cc hello.o -> hello.exe`
- Run
  - `hello`

Hello, World

```
#include<stdio.h>
main()
{
    printf("Hello, World");
}
```

## Compiler and Interpreter

- Compiler
  - Compile
- Translate a program source code file ( \*.c ) to machine language.
- Create object files. ( \*.o or \*.obj )
  - Link
    - Link the object files with other object files or libraries referenced from the program.
    - make executable file.(a.out, \*.a, \*.exe )
- Interpreter
  - Compile one line to one line at run time

## C++ Compilers

- Windows XP, 2000, NT, 95
  - Microsoft Visual C++ 6.0
- UNIX
  - gcc
    - GNU C++ Compiler

## How to Compile, Link, and Execute

- Windows
  - Start Visual C++
    - Create New WORKSPACE ( DIP )
      - A workspace holds several projects : dip.dsw
    - Create New Project
      - A project have only one program: hello.prj
      - Select Win32 Console Application
      - Add to Current Workspace
      - Project maintains information on how to compile, link, and also it invokes compiler to compile only updated source code and etc.
    - Create C Source Code File
      - hello.c
      - Specify .c extension. ( not .cpp extension which is default )
      - The directory of the file can be anywhere but recommended at dip directory which was created with the dip workspace.
      - Write C program and save
      - If you have source code already, add the source file to the project

Digital Image

## How to Compile, Link, and Execute

- UNIX
  - make a source file with extension .c, for example sample1.c
    - editor vi, emacs, pico
    - vi sample1.c
  - compile and link
    - gcc sample1.c or gcc -o sample1.a sample1.c
  - execute program
    - a.out or sample1.a
  - Produce makefile for multiple source

## vi editor

- standard editor for UNIX
- To edit sample1.c vi sample1.c
- command
  - insert mode for typing i
  - open 1 line and insert mode o
  - escape from insert mode ESC
  - cursor moving h:left, l:right , j:down, k:up
  - delete line dd
  - save and exit ZZ
  - save :w
  - quit :q
  - force to quit :q!
  - undo u

Question?

Thank you for your kind attention

