Introduction to C
Development Environment and Quick Get Started

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September 18, 2015

Assignment of C

1. Download and install a C compiler on your computer;
2. Write a program to print Fibonacci sequence.The length of output sequence is specified by the first command line parameter. (fibonacci.c)
3. Implement Smith-Waterman algorithm in C. Given that the cost of GAP, MATCH and MISMATCH is -1, 2 and 0.5, separately. Calculate the alignment of "ACGTGGCCTTGTGA" and "GGTGGGTCTTGTCG".

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C

C is widely used in various environments, including network programming, operating systems, implementing programming language, embedded devices, high performance numerical computing and so on.

In this course, all other programming languages, Java, Python, Perl and R, are based on the C programming language.

C is fundamental to modern computer software, including bioinformatics software.

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C Compilers

- gcc in GCC: GNU Compiler Collection
- Clang in LLVM
- Microsoft Visual C++
- Intel C++ Compiler
- Turbo C from Borland
- List: `https://en.wikipedia.org/wiki/List_of_compilers#C_compilers`

gcc

- http://gcc.gnu.org/
- GCC 5.2, GCC 4.9.3
- The GNU Compiler Collection includes front ends for C, C++, Objective-C, Fortran, Java, Ada, and Go, as well as libraries for these languages.

Clang

- http://clang.llvm.org/
- Supported by Apple
- The goal of the Clang project is to create a new C, C++, Objective C and Objective C++ front-end for the LLVM compiler.

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Linux

- GCC: Most linux distributions are shipped with GCC
- Clang: Pre-Built for Fedora, OpenSuSE, AArch and Ubuntu
- GCC is recommeded for Linux

Mac OS

- LLVM:
  - included in Command Line Tools OS X from Apple
  - download from
    `http://llvm.org/releases/download.html`

Windows

- Clang provides pre-built version for Windows
- GCC for windows is included in MinGW
  (`http://mingw.org/`)

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Hello World!

```c
#include <stdio.h>

int main(){

printf("Hello!\n");

int a = 1, b = 2;
printf("The sum of a and b is %i\n", a+b);

return 0; // return 0 to system

}
```

hello.c

Compile and Execute

```
gcc hello.c -o hello
./hello
Hello
```

Hello World!

```c
#include <stdio.h> // import library for I/O

int main(){ // define main function

printf("Hello!\n");   // print something to the screen

 int a = 1, b = 2;   // define two variables and assign values
printf("The sum of a and b is %i\n", a+b);
// print the sum of the two variables to the screen

return 0; // return 0 to system

}
```

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Variable and Data Type

- char
- int
- float
- double
- array
- pointer

variables.c

Operations

- +, , *, , %
- >, >=, <, <=
- ==, !=
- ++,
- !
- &&, ||

Puzzle

- 1.3 - 0.7 = 0.600000
- 1.3 - 0.7 == 0.6 is false
- 1.3 - 0.7 != 0.6 is true

Conditional Statements

- if-else
- switch

flow.c

loop statement

- while
- for
- break and continue

flow.c

Function

```
int add(int a, int b){
    return a+b;
}
```

function.c

Struct

```
struct point{
    int x;
    int y;
}
```

Next

Input/Output

stdio.h

- printf
- scanf
- fopen
- fprintf and fscanf

Math

math.h

- sin, cos, tan, asin ...
- exp, log, log10 ...
- pow, sqrt ...
- floor, ceil, fabs ...

math.c

String

string.h

- strcpy
- strcat
- strcmp
- strlen

Summary

Summary

1. C is fundamental to modern computer software.

2. Almost everything is based on C, including most programming languages.

3. C is a simple, cross-platform and efficient programming language.

4. C is widely used the development of various software, from small tools and big data systems.

Thanks!