Lecture02: Overview of C
9/17/2012

Slides modified from Yin Lou, Cornell CS2022: Introduction to C

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Administrative things

- Office hours (Instructor & TAs) are on the course webpage
  - http://mll.csie.ntu.edu.tw/course/comp_prog_f12/
- Assignment #1 is on the course webpage due next week.

- Does everyone registered for the course have an account?
- Please email your studentID to the TA.

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Today's Do List

- Review last week
- Variable declaration
- printf()
- scanf()
- In-class practice exercises
- Introduce the Judge system (for submitting your assignments)

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Review: Hello World

what is #include <stdio.h>? a library of functions
what are main() and printf()? called functions
function: a set of code enclosed in { … } that takes some inputs, perform some operation, and produces output;
example: rect_area(height, width) = height * width
more about how to define and write functions next week

```
#include <stdio.h>

int main()
{
    printf("Hello World :)\n");
    return 0;
}
```

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Review: Compile and Run in CodeBlocks

- Run CodeBlocks
- Create a new project
  - File → New → Project
  - Select "Console application"
  - Click C → Next
  - Type in Project title: (e.g., "hello")
  - Click finish
- Open and edit the main.c
  - File → Open
  - Find "main.c"
- Compile and run
  - Build → Build and Run

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What Happened?

- Compile (Build → Build)
  - Compile "main.c" to machine code named "hello.exe"
- Run (Build → Run)
  - Execute the program "hello.exe"

```
main.c  (Hello World)

include <stdio.h>  /* printf() is declared in this header file. */

int main()  /* Main point of execution */
{
        printf("Hello World\n");  /* Output "Hello World" to console */
        return 0; /* Tell OS the program terminates normally */
}
```

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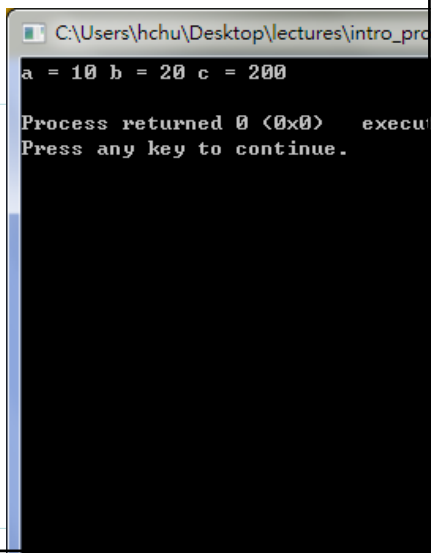
main.c: Variables

a name for a place in memory that stores a value
what is computer memory?
each variable must have a type
C punctuations: ; , { } ( ) " "
arithmetic (math) operators: + - * / =

```
#include <stdio.h>

int main()
{
    int a;
    int b, c;
    a = 10;
    b = 20;
    c = a * b;
    printf("a = %d b = %d c = %d\n", a, b, c);
    return 0;
}
```

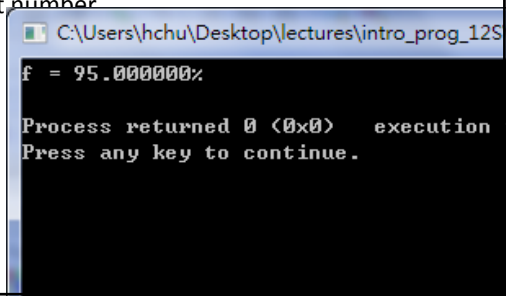


printf()

print (output) data on the user screen
must specify each type of the output data in the format string
what's the format string?

- printf(format string, val1, val2);
  - format string can include placeholders that specify how the arguments val1, val2, etc. should be formatted
  - %c : format as a character
  - %d : format as an integer
  - %f : format as a floating-point number
  - %% : print a % character
- Examples

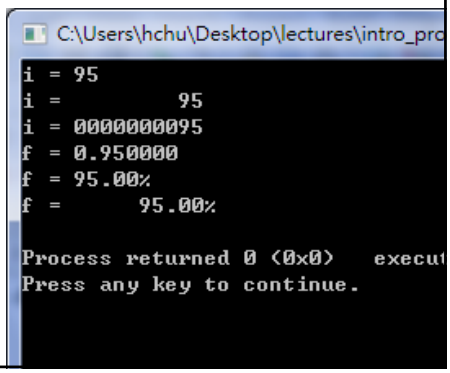
```
double f = 0.95;
printf("f = %f%%\n", f * 100);
```



Even more on printf()

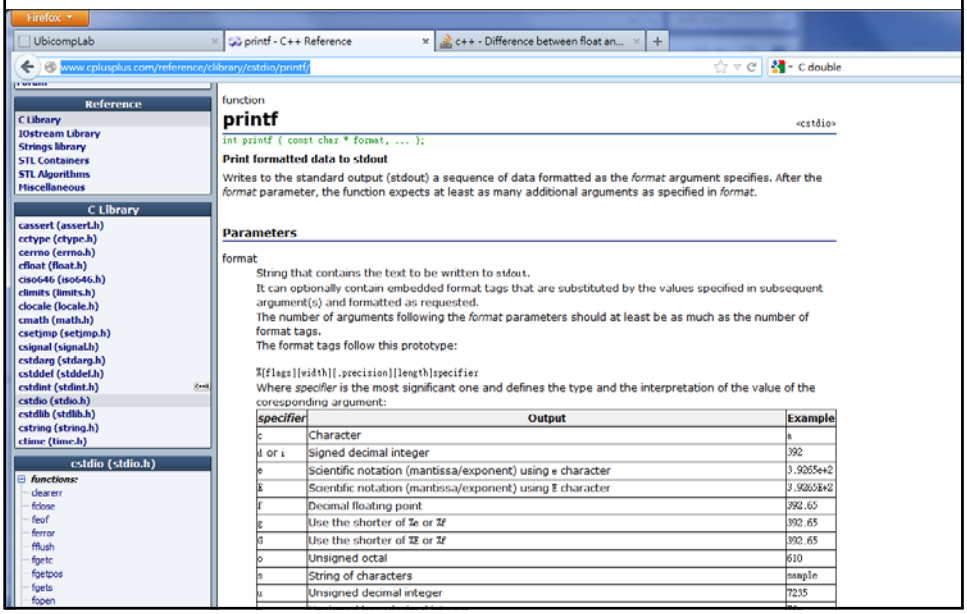
- Placeholders can also specify widths and precisions
  - %10d : add spaces to take up at least 10 characters
  - %010d : add zeros to take up at least 10 characters
  - %.2f : print only 2 digits after decimal point
  - %5.2f : print only 2 digits after decimal point, add spaces to take up 5 chars
- Examples

```
int i = 95;
double f = 0.95;
printf("i = %d\n", i);
printf("i = %10d\n", i);
printf("i = %010d\n", i);
printf("f = %f\n", f);
printf("f = %.2f%%\n", f * 100);
printf("f = %10.2f%%\n", f * 100);
```



Even more on printf() format string

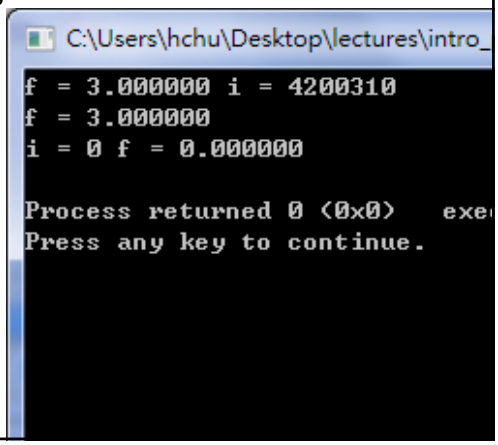
http://www.cplusplus.com/reference/clibrary/cstdio/printf/



Warning about printf

- printf is powerful, but potentially dangerous
- What does this code output?

```
int i = 90;
double f = 3;
printf("f = %f i = %d\n", f);
printf("f = %f\n", f, i);
printf("i = %d f = %f\n", f, i);
```

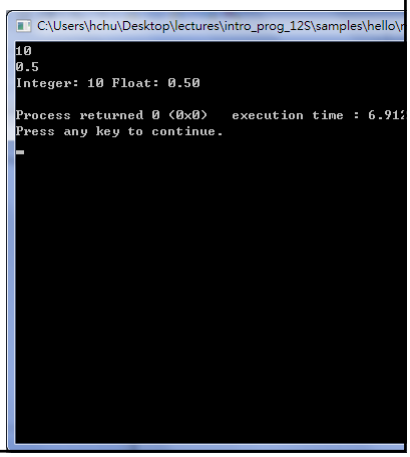


main.c: scanf

read data from user input
again must specify the type for the input data in the format string
note the '&' in front of the variable (called the address operator – a bit complicated to explain right now, so just remember to use it in scanf)

```
#include <stdio.h>

int main()
{
    int i;
    double f;
    scanf("%d", &i);
    scanf("%lf", &f);
    printf("Integer: %d Float: %2.2f\n", i, f);
    return 0;
}
```



In-Class Exercise #1

- Write a program that calculates travel reimbursement for a pizza delivery person at a rate of NT$6.97 per kilometer. Your program should interact with the user in the following manner: **(It is okay not to get the program right the first time. Look at the compilation errors and fix them.)**

KILOMETER REIMBURSEMENT CALCULATOR
Enter beginning odometer readings=> 13505.2
Enter ending odometer reading=> 13810.6
You traveled 305.4 kilometers. At $6.97 per kilometer,
Your reimbursement is $2128.63

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In-Class Exercise #2

- Write a program that ask for two numbers and output the results of four arithmetic operations (+, -, *, /). Below shows the sample output.

enter a> **5**
enter b> **2**
a+b = 7
a-b = 3
a*b = 10
a/b = 2

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After you are done with in-class exercises, start the assignment #1.

TA will talk about the judge system

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