C Programming Basics

Basics of the C Programming Language

- C is a programming language invented (derived from B, actually) to be a low-level language for system programming purpose.

- It is general purpose.
- The code itself is compact.
- C is a **procedural** language (also called a **functional** language). This distinguishes it from (later invented) object-oriented languages.
- **NO OBJECTS. NO METHODS ON OBJECTS.**

C is a **procedural** language …

- In a procedural language, **procedures** (also called **functions** or **subroutines**) are the equivalent of an object-oriented language's **methods**.

- In C, we call them **functions**. They operate on **parameters** (which are often variables).

A Simple C Program

```
#include <stdio.h>
#define MAX 100

void main() {
        int x;
        x = 1;
        while (x <= MAX) {
                printf("%d\n", x);
                x++;
                }
        }
```

main() & printf()

- #include <stdio.h> in the source code is similar to Java's

  import java.io.*;
- **main()** is the name of a function. It is the same as the main method in a Java class.
- **printf()** is also the name of a function. It can do much the same as Java's System.out.print();

Output with printf

- To print a character string, supply the string (contained in double quotes) as a parameter to printf. This string is called the ***format string***.
  - The two-character sequence **\n** displays a newline, and
  - the two-character sequence **\t** displays a tab.
- To print an int, embed the sequence %d in the format string, and include an integer expression as a second parameter.
  - The sequence %d is called a ***conversion specification***.
  - The value of the expression will be displayed in place of the %d.

The same program done a little bit differently **...**

```
#include <stdio.h>
void main() {
   int x;
   for (x = 1; x <= 100; x++) {
        printf("%d\n", x);
        }
   }
```

Input with scanf

- To read an int
  - supply **scanf** with a format string containing the conversion specification %d, and
  - include an int variable preceded by an ampersand (**&**) as the second parameter

```
int day, year;
char monthname[20];

scanf("%d %s %d", &day, monthname, &year);
```

Exercise

- Write a C program that performs the following:
  - Prompt the user to enter day-month-year in this format: 16 Feb 2007
  - Print out what has been entered by the user
  - Repeat this process 10 times

C program compilation, linking & execution

- high-level language source code --> compiler (a program) --> assembly language --> assembler --> machine code

- Once we have machine code:
- machine code--> linking and loading (program) --> program code execution (program)