COMSW 1003-1

Introduction to Computer Programming in C

Lecture 2

Spring 2011

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http://www1.cs.columbia.edu/~merler/comsw1003-1.html
Announcements

• Exercise 1 is out

• We have a TA!
  Gaurav Agarwal
  – MS student in CS department
  – **Email**: ga2310@columbia.edu
  – **Office Hours**: Tuesday 11am-12pm in Mudd 122A (TA room)
What is a Program?

• A Program is a sequence of instructions and computations
• We’ll be designing programs in this course.
• These programs will be based on algorithms
• An Algorithm is a step-by-step problem-solving procedure
Example

• Add 3 large numbers
  ▪ $453 + 782 + 17,892$

• Hard to do all at once
  ▪ Solution: “divide and impera”!
  ▪ $(453 + 782) + 17,892 = $
  ▪ $1,235 + 17,892 = 19,127$

• Algorithms help us divide and organize complex problems into sub-problems which are easier to solve (bottom-up approach)
What is C?

• Programming language developed by Dennis Ritchie in 1972 at AT&T Bell labs

• Why is it named “C”? Well... the B programming language already existed!

• C is one of the high level programming language with the lowest level of abstraction

• Low to be close to assembly and machine language fast!
• High to be programmable by humans without (too many) headaches
CUNIX

• CUNIX refers to the Columbia Unix environment

• For you: place where you develop your programs!
Accessing CUNIX remotely

- **Secure Shell** or **SSH** is a network protocol that allows data to be exchanged using a secure channel between two networked devices.

- The **SCP** protocol is a network protocol that supports file transfers.
Code Developing Tools – Linux and Mac

• Open terminal

• SSH to cunix.cc.columbia.edu
  
  ssh yourUNI@cunix.cc.columbia.edu

• Data transfer: scp or get/put
  – Copying file to host:
    
    scp SourceFile user@host:directory/TargetFile
  
  – Copying file from host:
    
    scp user@host:/directory/SourceFile TargetFile

For MAC: use FUGU (graphical data transfer tool)

http://www.columbia.edu/acis/software/fugu/
http://download.cnet.com/Fugu/3000-2155_4-26526.html
Code Developing Tools – Linux and Mac

To use windowing environment:

Mac users need only start **X11** (found in the Utilities folder) and log in to the X11 terminal like this:

```
ssh -X username@cunix.cc.columbia.edu
```

- Linux users: see X-Windows section in CUNIX tutorial
Code Developing Tools - Windows

• Xming and Putty to SSH and visualization
  – http://sourceforge.net/projects/xming/

• WinSCP for data transfer
  – http://winscp.net/eng/download.php#download2

• Notepad++ for editing (can be used in combination with WinSCP)
  – http://notepad-plus-plus.org/
Code Developing Tools - Windows

- Launch Xming
- Open a session in putty with Host Name
  - cunix.cc.columbia.edu
Code Developing Tools - Windows

• Make sure the X11 option of the SSH category is enabled
Code Developing Tools - Windows

• Use WinScp to transfer files
Code Developing Tools - Windows

- Use WinScp to transfer files
Code Developing Environment

CUNIX Tutorial
Compiling your C code

- **GCC**: **GNU Compiler Collection**
- When you invoke GCC, it normally does preprocessing, compilation, assembly and linking

  - **Basic Command**
    - `gcc myProgram.c`
    - `./a.out`

  - **More advanced options**
    - `gcc -Wall -o myProgram myProgram.c`
    - `./myProgram`
Compiling your C code

- GCC: **GNU Compiler Collection**
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  - **Basic Command**
    - `gcc myProgram.c`
    - `./a.out`

    **Display all types of warnings, not only errors**
    - `gcc -Wall`
    - `o myProgram` myProgram.c
    - `./myProgram`

    **Specify name of the executable**
    - Run compiled program (executable)

    **Run compiled program (executable)**
Assignment

• Read PCP Ch 1
• Read PCP Ch 2, pages 11 to 15, 33