

COMSW 1003-1

Introduction to Computer Programming in **C**

Lecture 2

Spring 2011 Instructor: Michele Merler

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

Announcements

- Exercise1 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 problemsolving 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 \longrightarrow 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) <u>http://www.columbia.edu/acis/software/fugu/</u> <u>http://download.cnet.com/Fugu/3000-2155</u> 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

- Xming and Putty to SSH and visualization
 - <u>http://sourceforge.net/projects/xming/</u>
 - <u>http://www.chiark.greenend.org.uk/~sgtatham/putty/download</u>
 <u>.html</u>
- WinSCP for data transfer
 - <u>http://winscp.net/eng/download.php#download2</u>

- Notepad++ for editing (can be used in combination with WinSCP)
 - <u>http://notepad-plus-plus.org/</u>

- Launch Xming
- Open a session in putty with Host Name – cunix.cc.columbia.edu



• Make sure the X11 option of the SSH category is enabled

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• Use WinScp to transfer files

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• Use WinScp to transfer files

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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

Run compiled program (executable)

- 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
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Run compiled program (executable)

Display all types of warnings, not only errors

Specify name of the executable

- gcc Wall o myProgram myProgram.c
- ./myProgram

Run compiled program (executable)

Assignment

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