COMSW 1003-1

Introduction to Computer Programming in C

Lecture 2

Spring 2011

Instructor: Michele Merler

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 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)
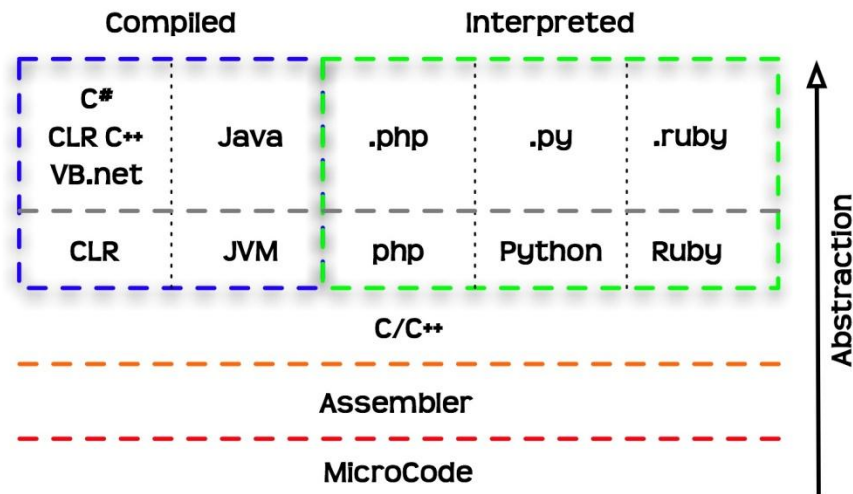
What is C?

- 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!
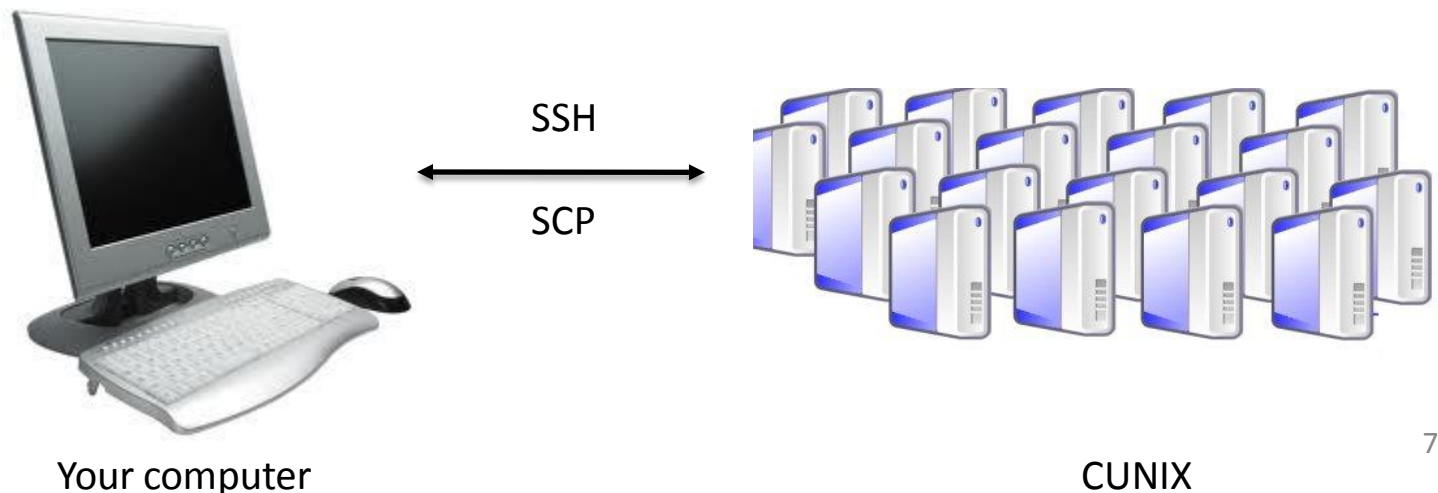- High to be programmable by humans without (too many) headaches

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**

SSH

SCP

Your computer

CUNIX

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

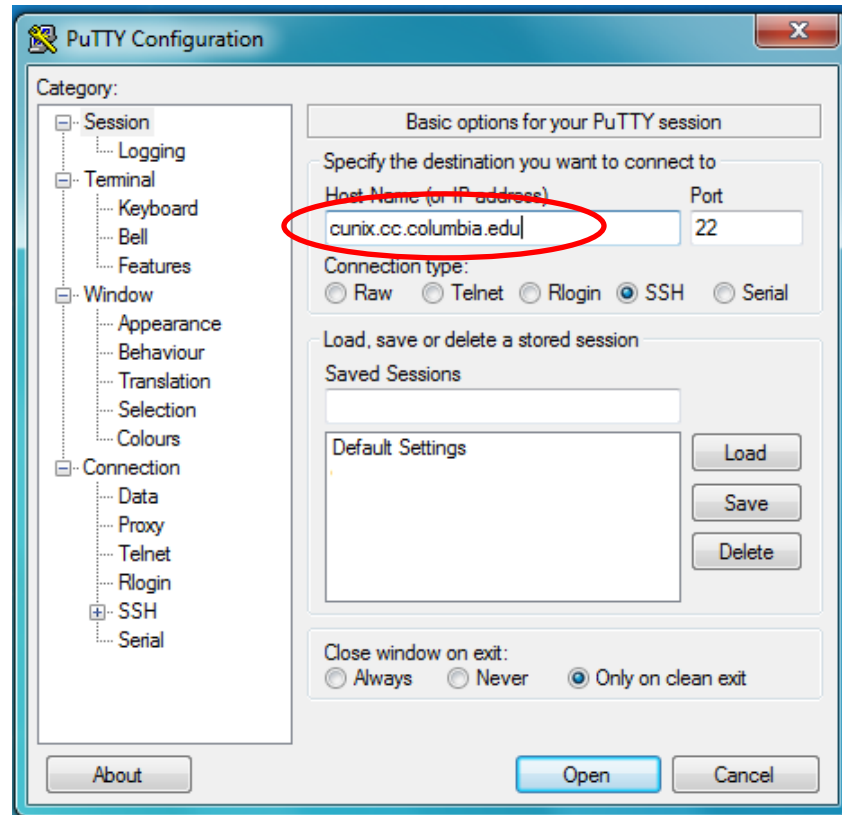- Linux users: see X-Windows section in CUNIX tutorial

Code Developing Tools - Windows

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

  - http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html

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

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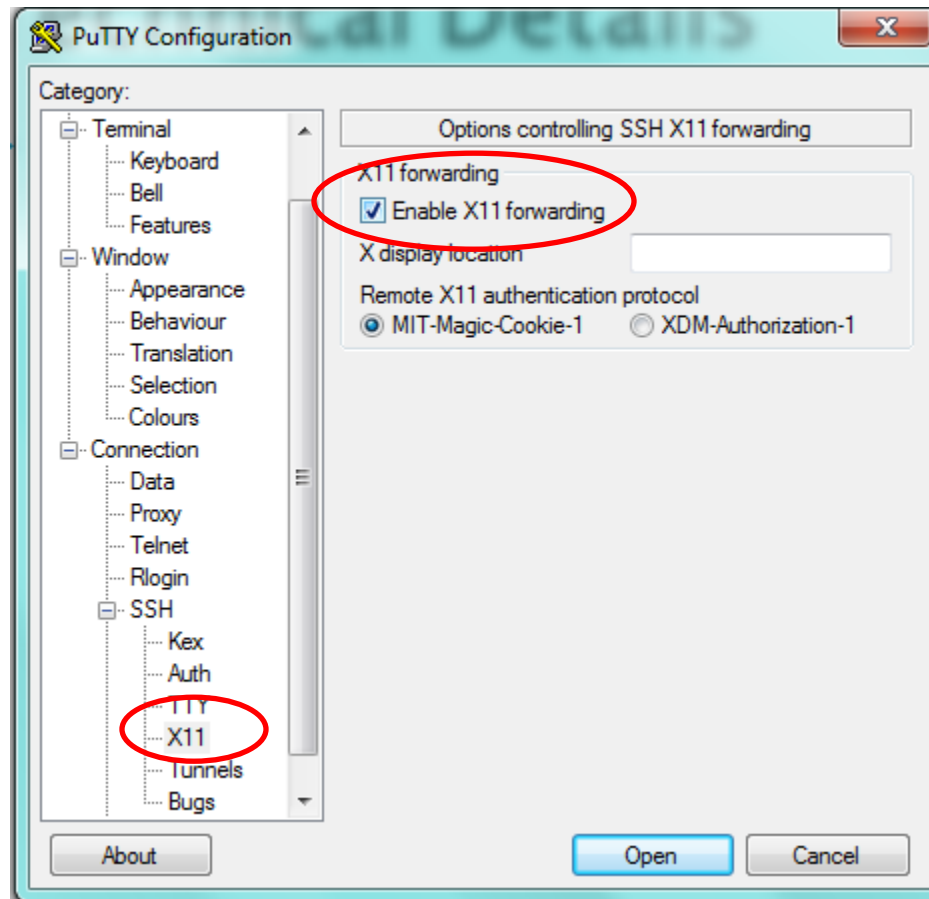 - http://notepad-plus-plus.org/

Code Developing Tools - Windows

- Launch Xming

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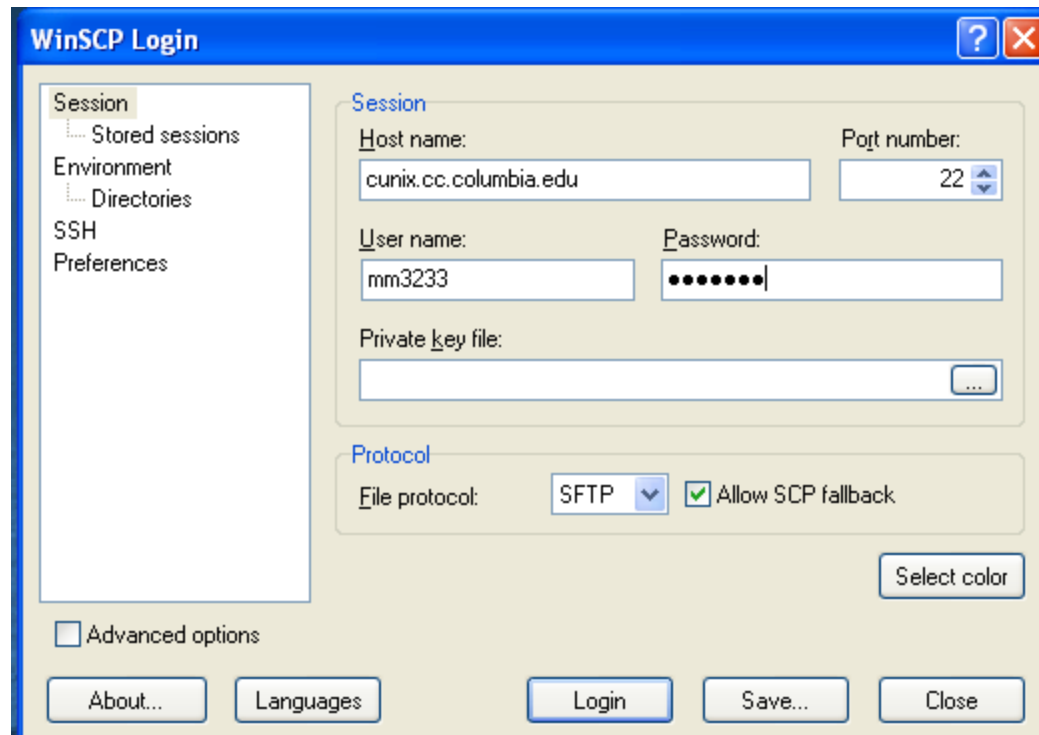 - cunix.cc.columbia.edu

Code Developing Tools - Windows

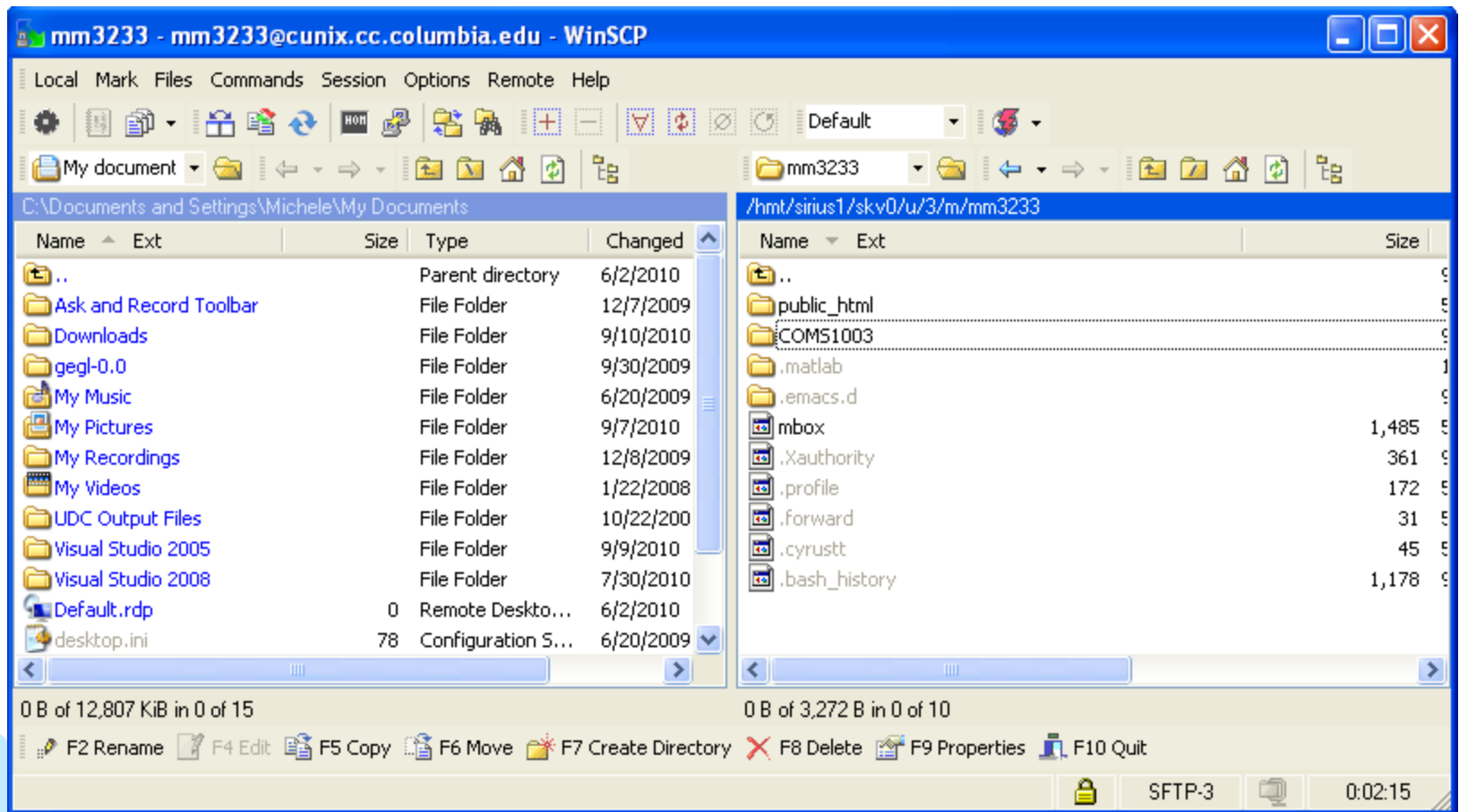- Make sure the X11 option of the SSH category is enabled

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   Run compiled program (executable)

  – More advanced options

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

Compiling your C code

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- When you invoke GCC, it normally does preprocessing, compilation, assembly and linking

  – Basic Command
    - gcc myProgram.c
    - ./a.out

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