

“Prof” Joe's Tutorial on

Linux (well Unix) basics

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What is Unix?

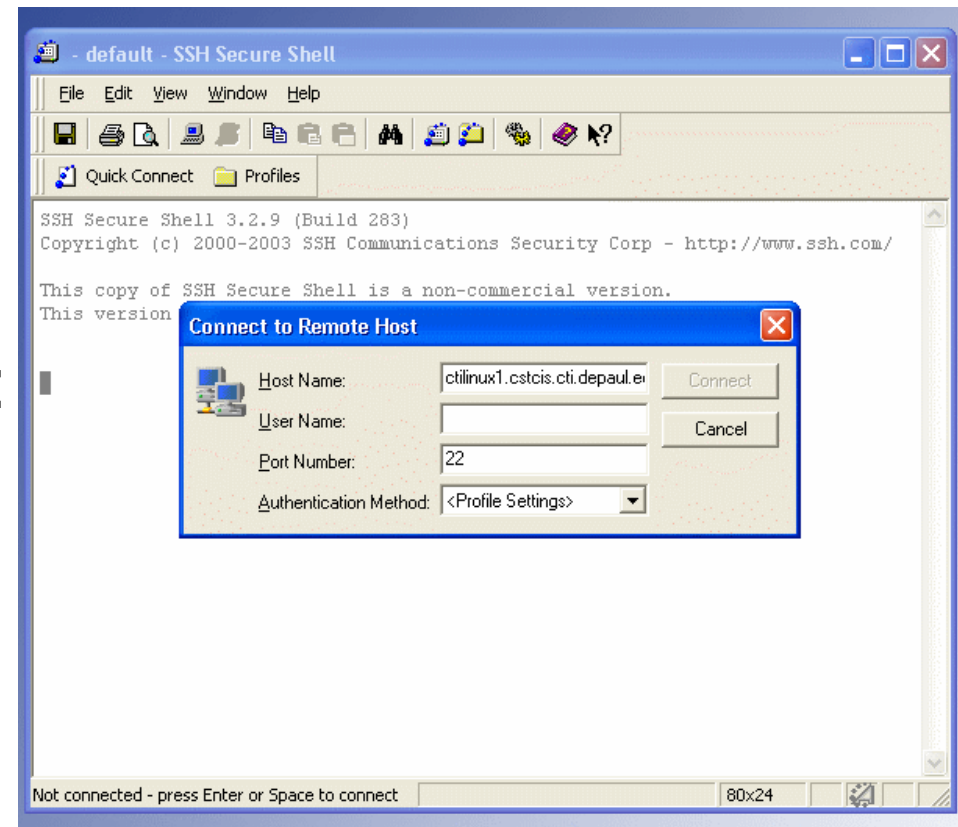
- Invented by ATT, has **a few common flavors**
 - **System V** (ATT)
 - **BSD** (University of California Berkeley)
 - **Linux** (Linus Torvalds/GNU Project)
 - **Solaris** (by Sun, now Oracle)
- Popularized at Universities in 1970s and 1980s
- Learned from OS's that came before it
 - Purposefully “stripped down” from complicated Multics
 - “***Each command should do one thing, and well***”
- **Influential**
 - Running Apple's OS X? ***It's Unix!***

Why use Unix?

- Relatively robust
- Relatively flexible
- Relatively general
- Has open source implementations:
 - Linux (of course)
 - OpenBSD
- Lets you see what is going on “under the hood”

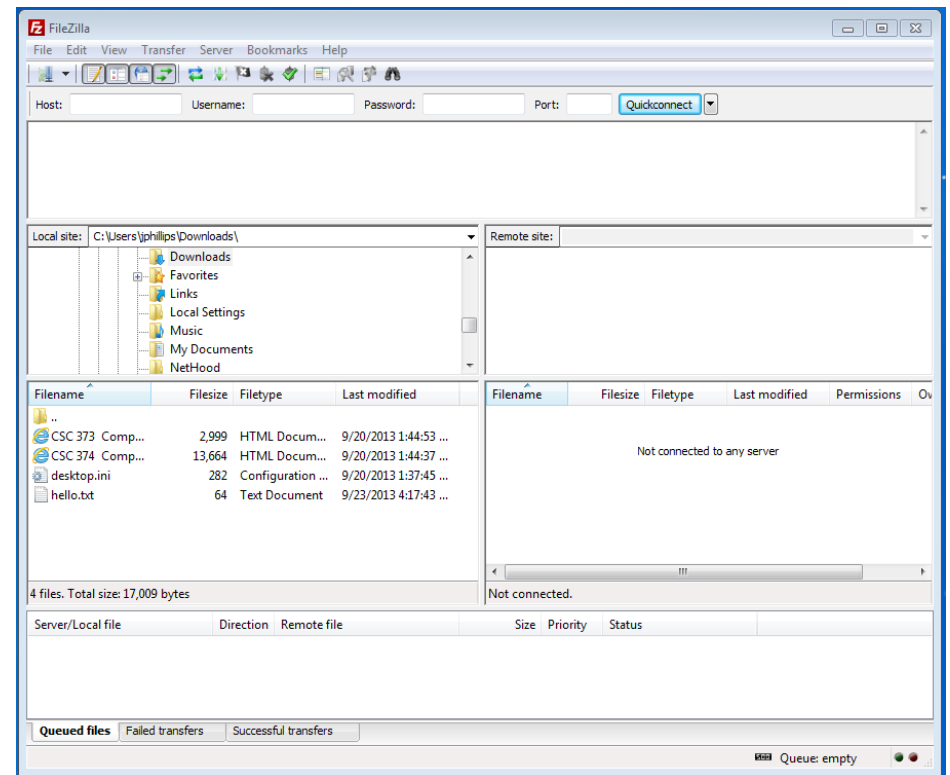
Logging in and exiting

- To start: use an ssh (Secure Shell) program like **putty**
 - free at
<http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html>
- Use **CampusConnect** username/passwd to login to one of:
140.192.36.184
140.192.36.185
140.192.36.186
140.192.36.187
- To stop: type **exit**
\$ **exit**



Transferring files

- Use an sftp (Secure File Transfer Program/Protocol) like **filezilla**
 - free at <https://filezilla-project.org/>
- **Hostname**: one of:
140.192.36.184
140.192.36.185
140.192.36.186
140.192.36.187
- **Username**: your Campus Connect
- **Password**: Don't tell me!
- **Port**: 22



Getting around

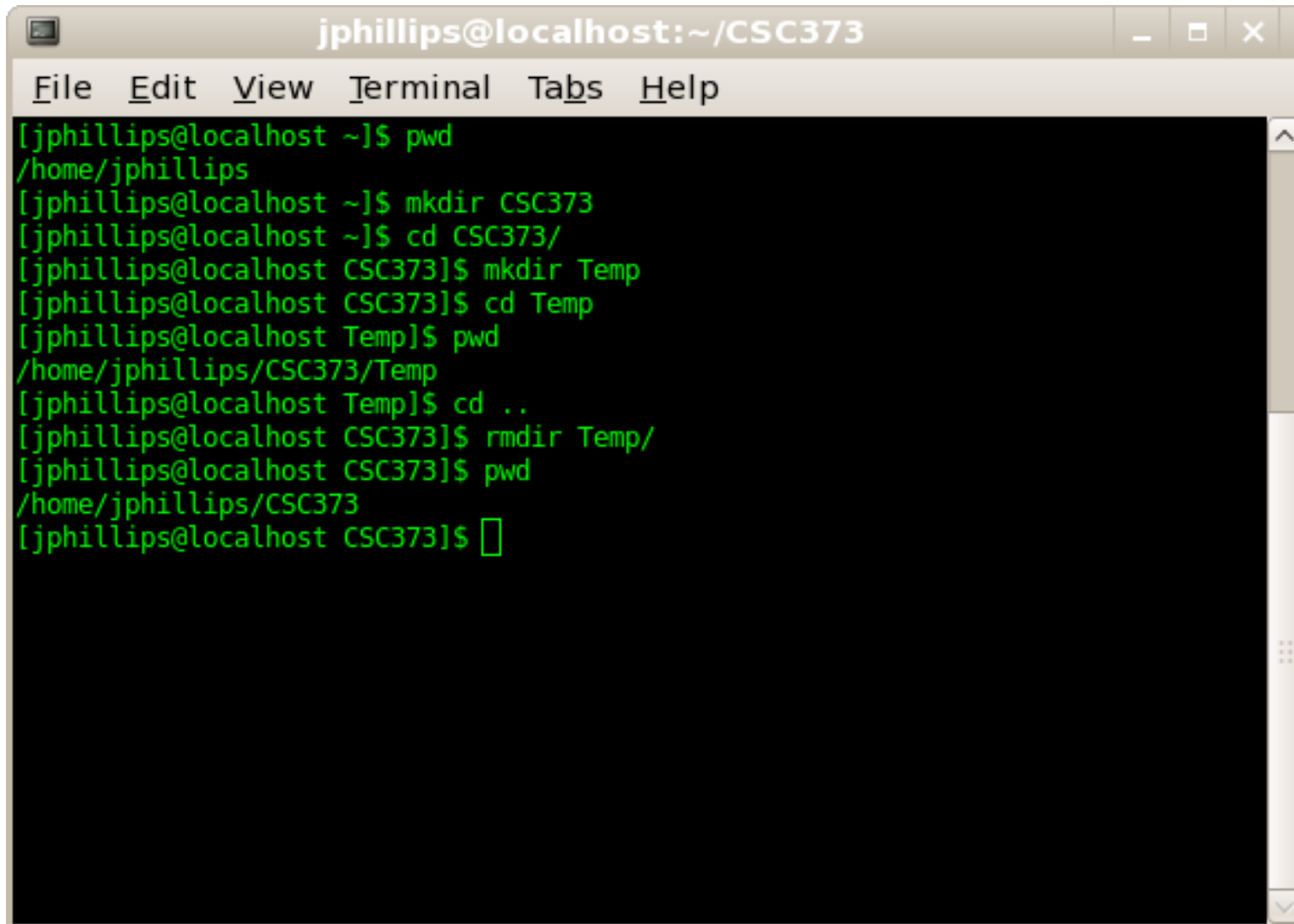
- Folders are called “*directories*”
 - They look like folders on GUIs like KDE or Gnome
 - *Use them*: They will organize your work for this class!
- Special directory names:

..	(two periods)	The parent of current directory
.	(one period)	The current directory
~	(tilde)	User's home directory
/	(forward slash)	Root directory

Also used separator for subdirectories
- Directory commands:

<code>mkdir dirName</code>	Make directory dirName
<code>cd dirName</code>	Change to dir dirName
<code>rmdir dirName</code>	Remove (delete) dirName
<code>pwd</code>	<u>P</u> rint <u>W</u> orking <u>D</u> irectory

Example



```
jphillips@localhost:~/CSC373
File Edit View Terminal Tabs Help
[jphillips@localhost ~]$ pwd
/home/jphillips
[jphillips@localhost ~]$ mkdir CSC373
[jphillips@localhost ~]$ cd CSC373/
[jphillips@localhost CSC373]$ mkdir Temp
[jphillips@localhost CSC373]$ cd Temp
[jphillips@localhost Temp]$ pwd
/home/jphillips/CSC373/Temp
[jphillips@localhost Temp]$ cd ..
[jphillips@localhost CSC373]$ rmdir Temp/
[jphillips@localhost CSC373]$ pwd
/home/jphillips/CSC373
[jphillips@localhost CSC373]$
```

Managing files

- Commands:

<code>ls</code>	<u>L</u> <u>i</u> <u>S</u> t files in current directory
<code>ls dirName</code>	<u>L</u> <u>i</u> <u>S</u> t files in dirName
<code>rm fileName</code>	<u>R</u> <u>e</u> <u>M</u> ove (delete) file dirName

- Wildcard chars for `ls` and `rm`:

<code>*</code>	Matches anything
<code>?</code>	Matches just one letter

Managing Files: the `cat` cmd

The (con)**cat**(enate) Unix command:

- Types `file1` to screen:

```
cat file1
```

- Types `file1 file2 . . . fileN` to screen:

```
cat file1 file2 . . . fileN
```

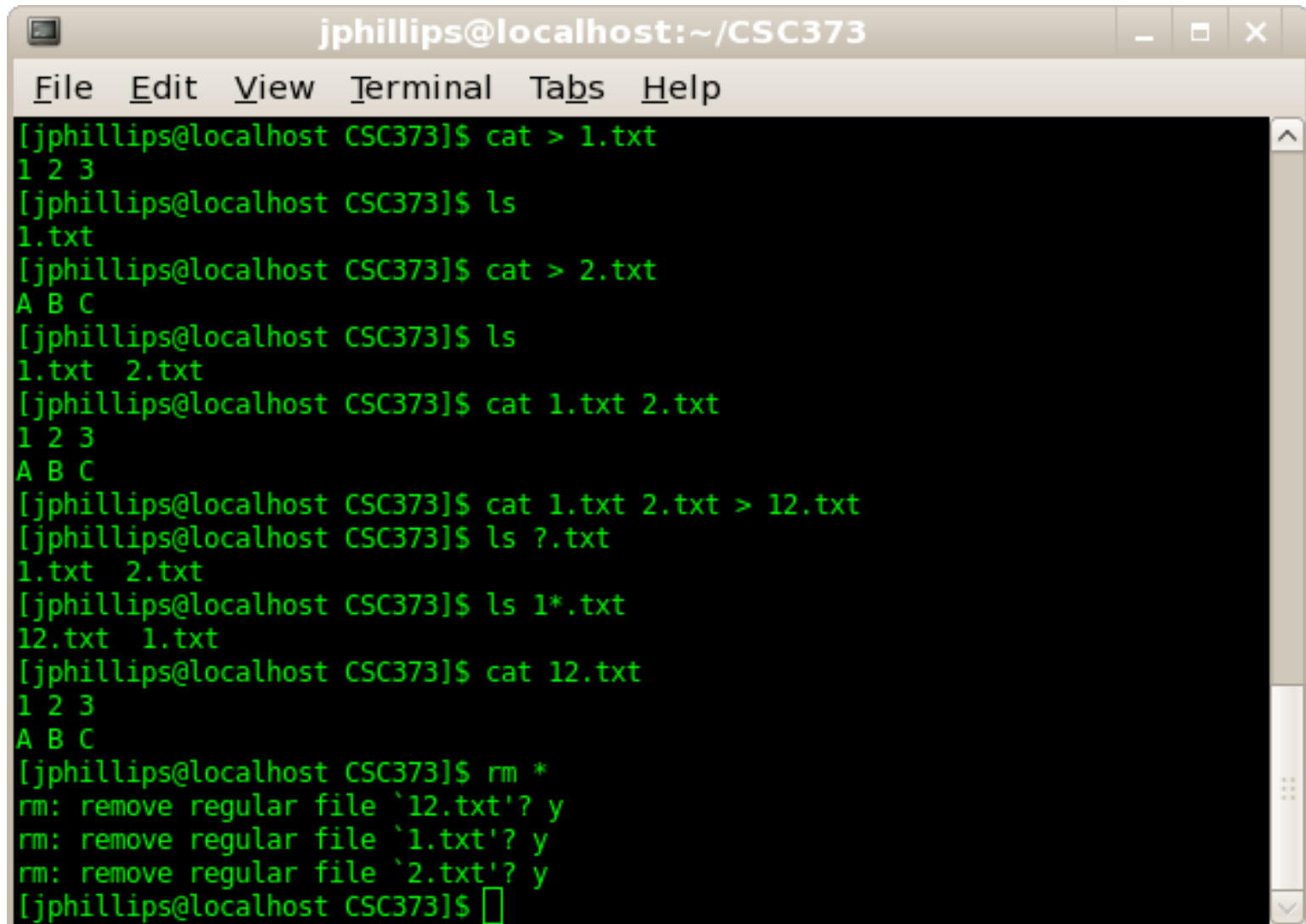
- Makes `outFile` the concatenation of `file1 file2 . . . fileN`:

```
cat file1 file2 . . . fileN > outFile
```

- Whatever you type on the keyboard goes into `outFile`. Stop with `Ctrl-D`. (An alternative to filezilla)

```
cat > outFile
```

Example

A terminal window titled 'jphillips@localhost:~/CSC373' with a menu bar (File, Edit, View, Terminal, Tabs, Help). The terminal shows a sequence of commands and their outputs: creating '1.txt' with '1 2 3', listing files, creating '2.txt' with 'A B C', listing files again, concatenating '1.txt' and '2.txt' into '12.txt', listing files with wildcards, and finally removing all three files with 'rm *'.

```
jphillips@localhost:~/CSC373
File Edit View Terminal Tabs Help
[jphillips@localhost CSC373]$ cat > 1.txt
1 2 3
[jphillips@localhost CSC373]$ ls
1.txt
[jphillips@localhost CSC373]$ cat > 2.txt
A B C
[jphillips@localhost CSC373]$ ls
1.txt 2.txt
[jphillips@localhost CSC373]$ cat 1.txt 2.txt
1 2 3
A B C
[jphillips@localhost CSC373]$ cat 1.txt 2.txt > 12.txt
[jphillips@localhost CSC373]$ ls *.txt
1.txt 2.txt
[jphillips@localhost CSC373]$ ls 1*.txt
12.txt 1.txt
[jphillips@localhost CSC373]$ cat 12.txt
1 2 3
A B C
[jphillips@localhost CSC373]$ rm *
rm: remove regular file `12.txt'? y
rm: remove regular file `1.txt'? y
rm: remove regular file `2.txt'? y
[jphillips@localhost CSC373]$
```

Editing files

- Most popular Unix editors:

emacs

- Very powerful
- For big, multi-file projects

vi

- Very flexible
- For big files
- See Joe's vi tutorial

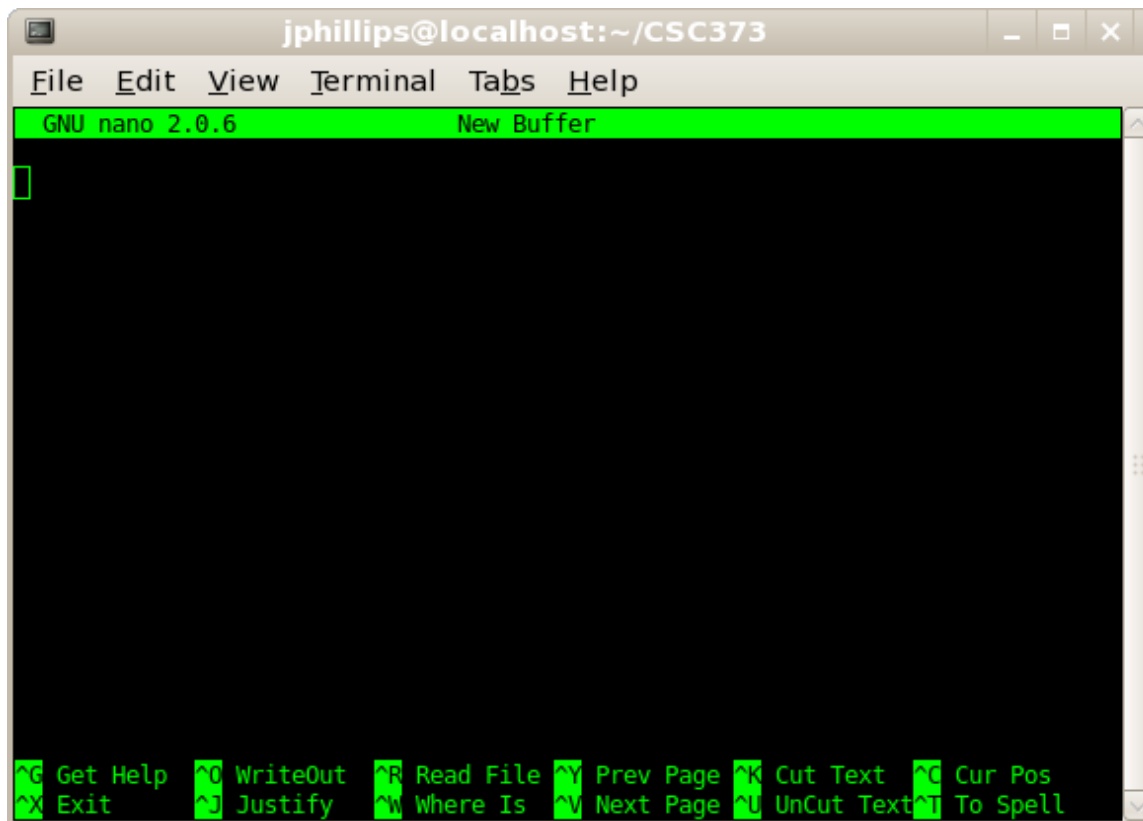
- Serious hackers should learn both
- For the **lazy**, I recommend **nano**

nano filename

nano

Commands at bottom:

- Most important:
- Ctrl-X (exit)
- Ctrl-O (Write file)
- Ctrl-R (Read file)
- Ctrl-K (Del line)
- Ctrl-U (Paste line)



The screenshot shows the nano text editor running in a terminal window. The window title is 'jphillips@localhost:~/CSC373'. The menu bar includes 'File', 'Edit', 'View', 'Terminal', 'Tabs', and 'Help'. Below the menu bar, a green status bar displays 'GNU nano 2.0.6' and 'New Buffer'. The main editing area is black with a green cursor at the top left. At the bottom, a green status bar lists various keyboard shortcuts: ^G Get Help, ^O WriteOut, ^R Read File, ^Y Prev Page, ^K Cut Text, ^C Cur Pos, ^X Exit, ^J Justify, ^W Where Is, ^V Next Page, ^U UnCut Text, and ^T To Spell.

Compiling Files, 1

- Let's compile and run a file:
 - Type this file (either with `cat`, `nano` or `vi`)

```
#include          <stdio.h>
#include          <stdlib.h>

int      main      ()
{
    printf("Hello world!\n");
    return(EXIT_SUCCESS);
}
```

Compiling Files, 2

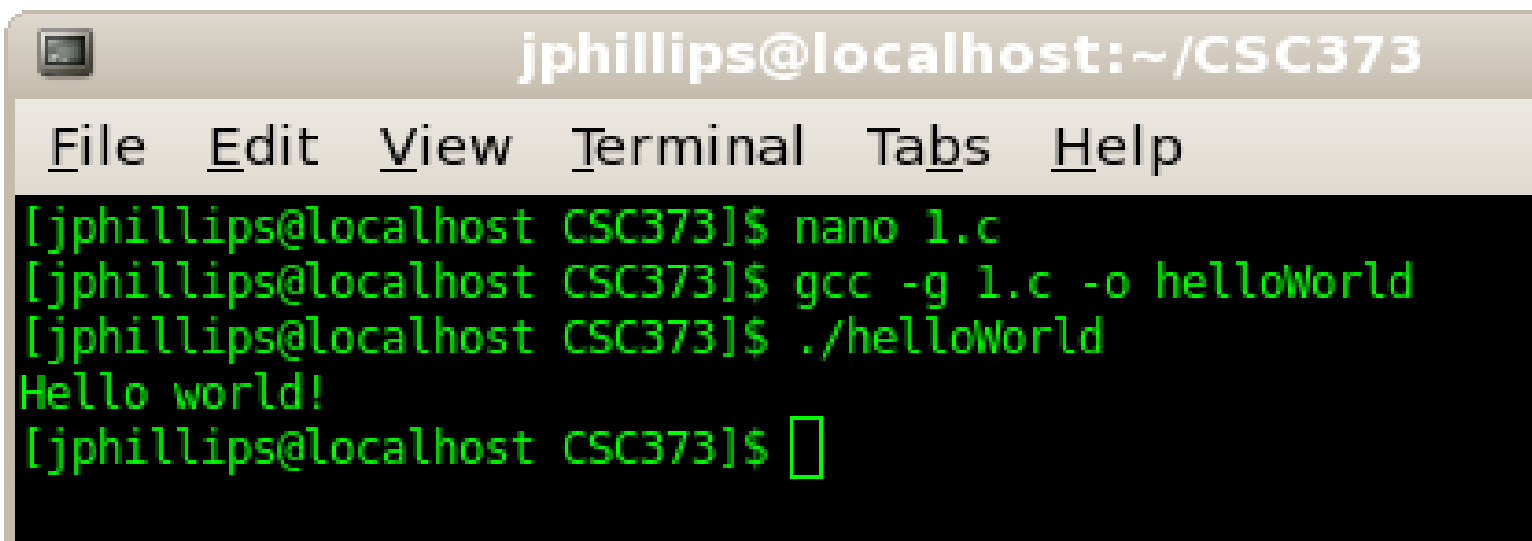
- Compiling:

`gcc source.c -g -o executable`

Run Gnu C Compiler on `source.c` with debugging info (`-g`) output (`-o`) to file `executable`.

- Running:

`./executable`



```
jphillips@localhost:~/CSC373
File Edit View Terminal Tabs Help
[jphillips@localhost CSC373]$ nano 1.c
[jphillips@localhost CSC373]$ gcc -g 1.c -o helloWorld
[jphillips@localhost CSC373]$ ./helloWorld
Hello world!
[jphillips@localhost CSC373]$
```