



# CS 1550

Lab 1 – Linux/Shell  
Basic commands Introduction

Teaching Assistant  
Maher Khan

(Slides credited to Henrique Potter)

# Recitation TA – Office Hours

---

- Tuesday
  - 2:00pm - 5:00pm
- Friday
  - 1:00pm – 4:00pm
- Office: SenSq 5802

# Recitation slides

- On GitHub:  
[https://github.com/maher460/Pitt\\_CS1550\\_recitation\\_materials](https://github.com/maher460/Pitt_CS1550_recitation_materials)

# CS 1550 – Introduction to Operating Systems

---

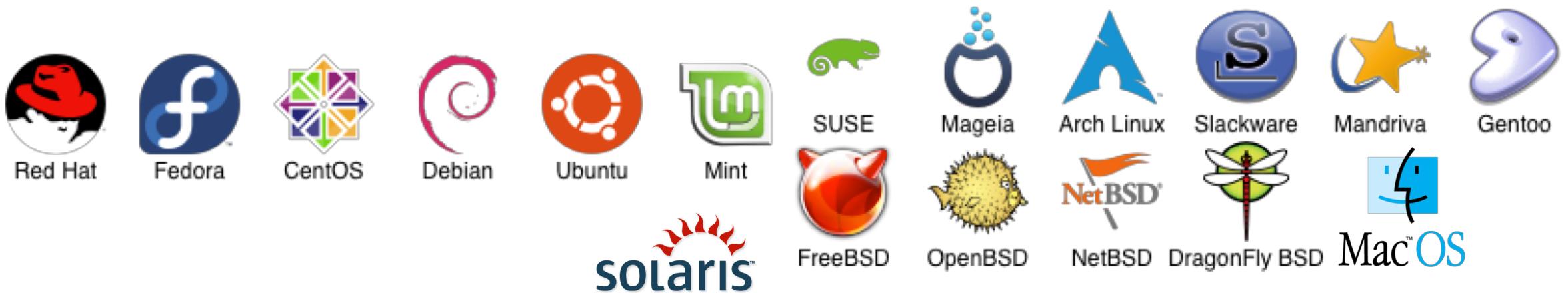
- Common operating systems abstractions and mechanisms



# CS 1550 – Introduction to Operating Systems

---

- Common operating systems abstractions and mechanisms
- Will provide basic knowledge common to many modern Operating Systems



# Projects

---

- Projects have to run in the **thoth server**
  - **thoth.cs.pitt.edu**

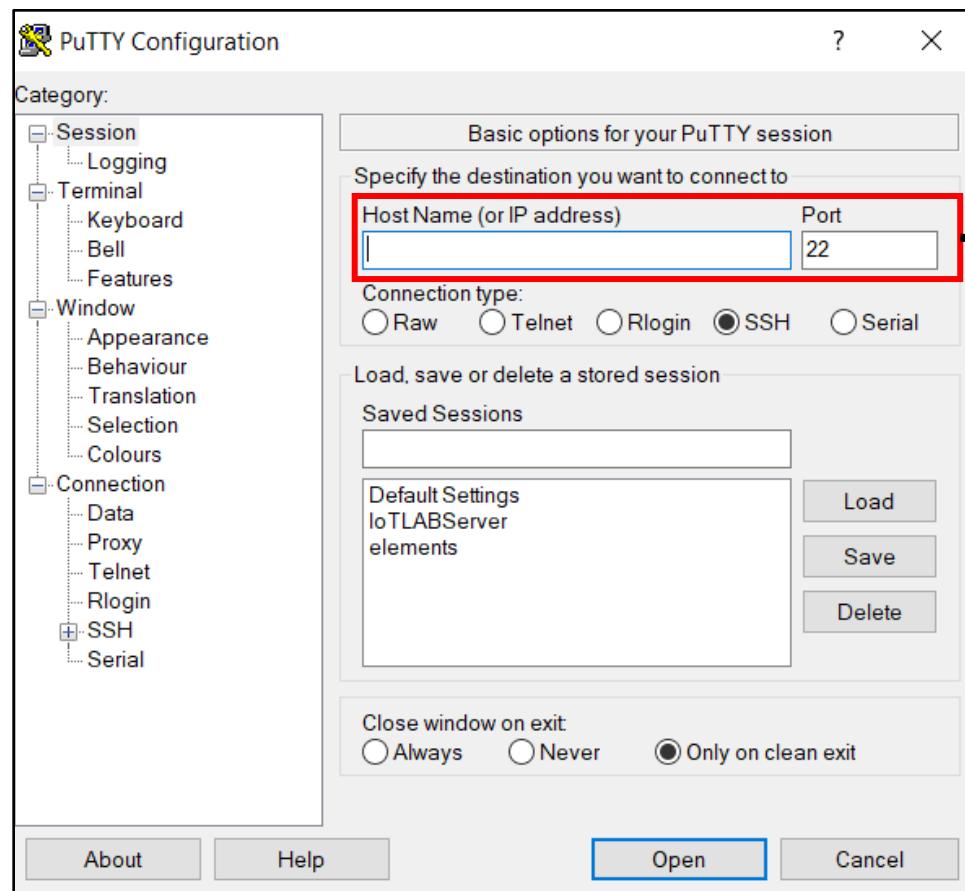
# SSH Clients

---

- Windows
  - **Putty**
- MacOS/Ubuntu
  - **Terminal**

# Windows - Putty

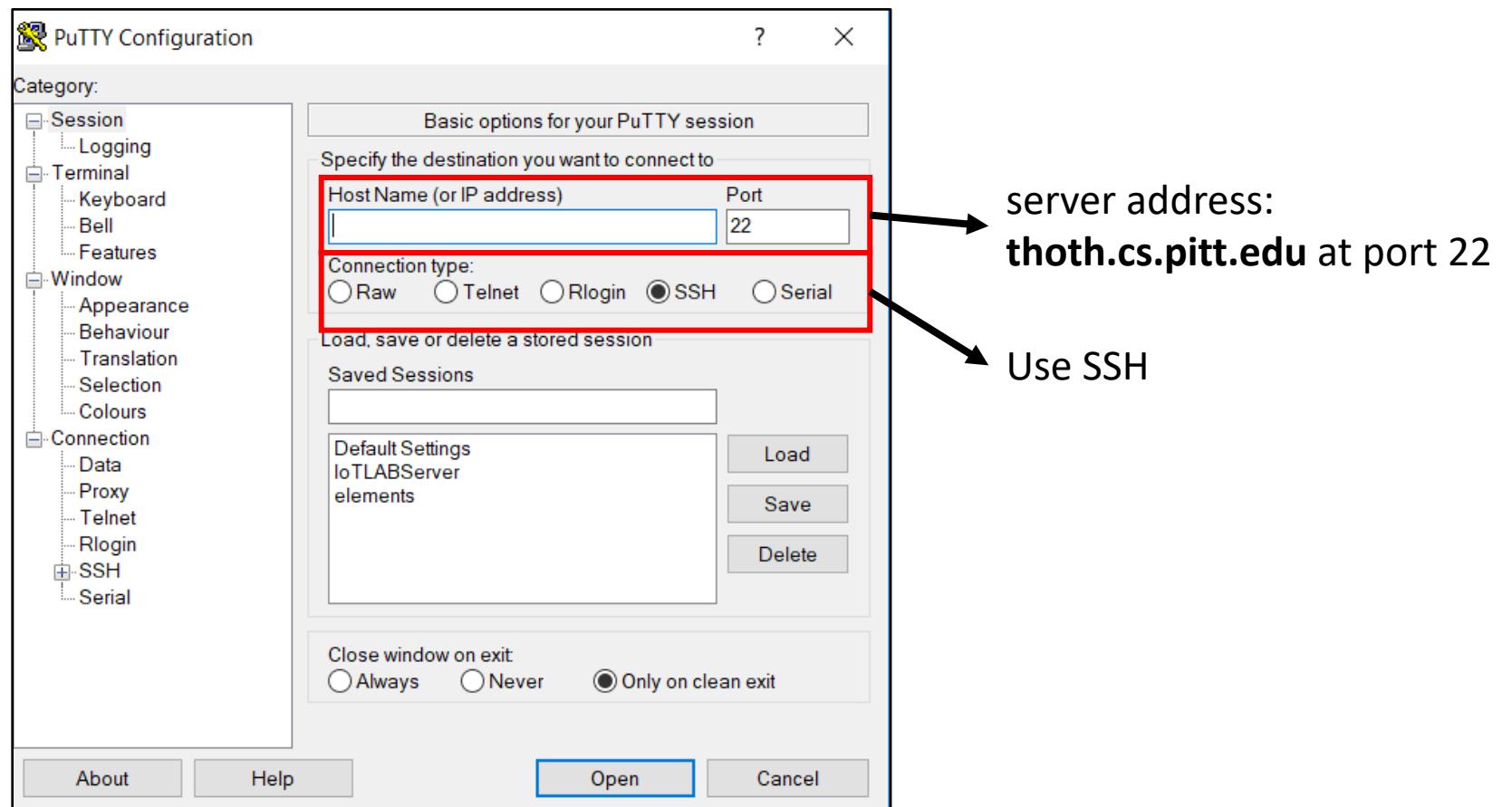
- Download from [www.putty.org](http://www.putty.org)



server address:  
**thoth.cs.pitt.edu** at port 22

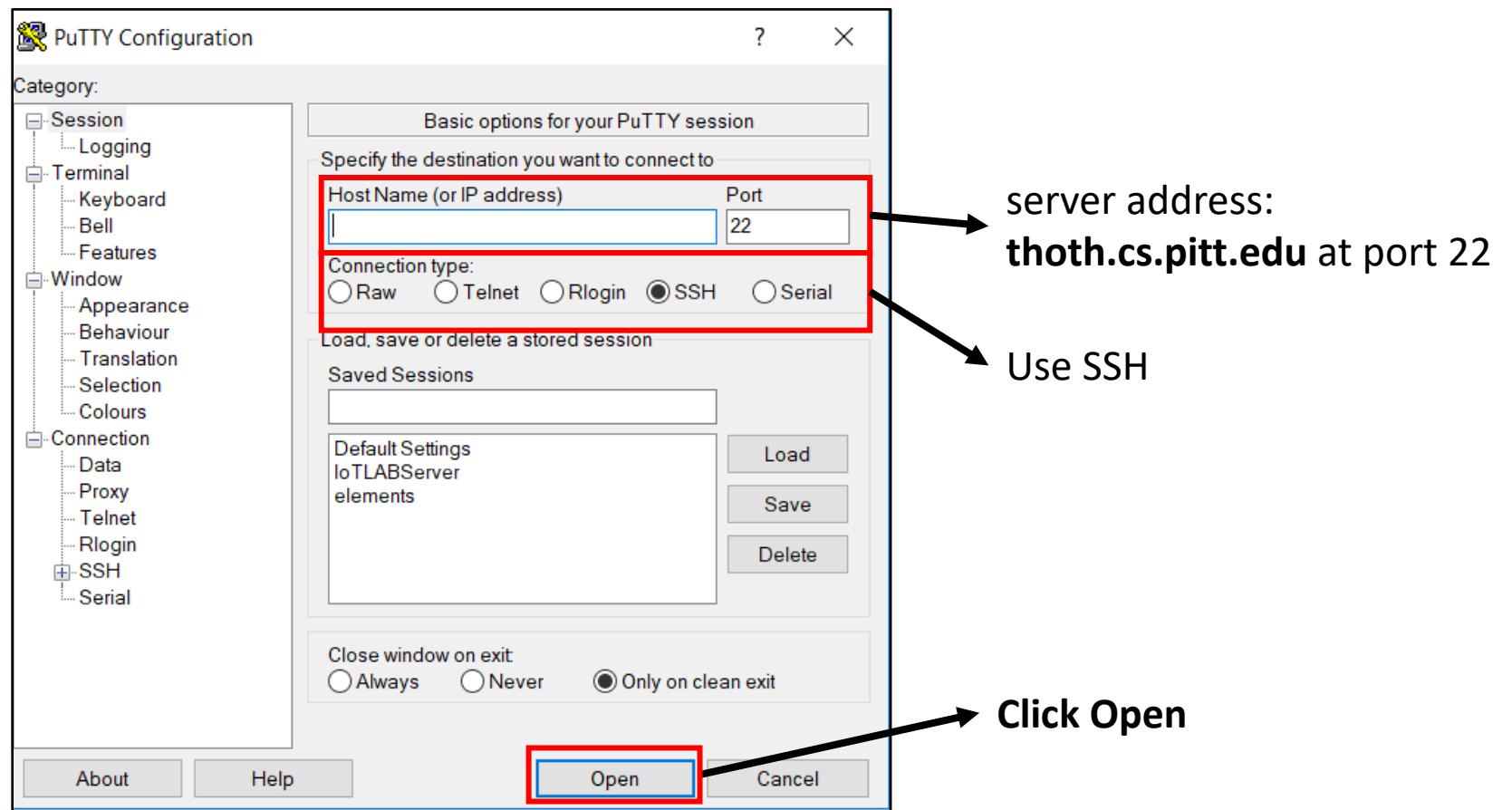
# Windows - Putty

- Download from [www.putty.org](http://www.putty.org)



# Windows - Putty

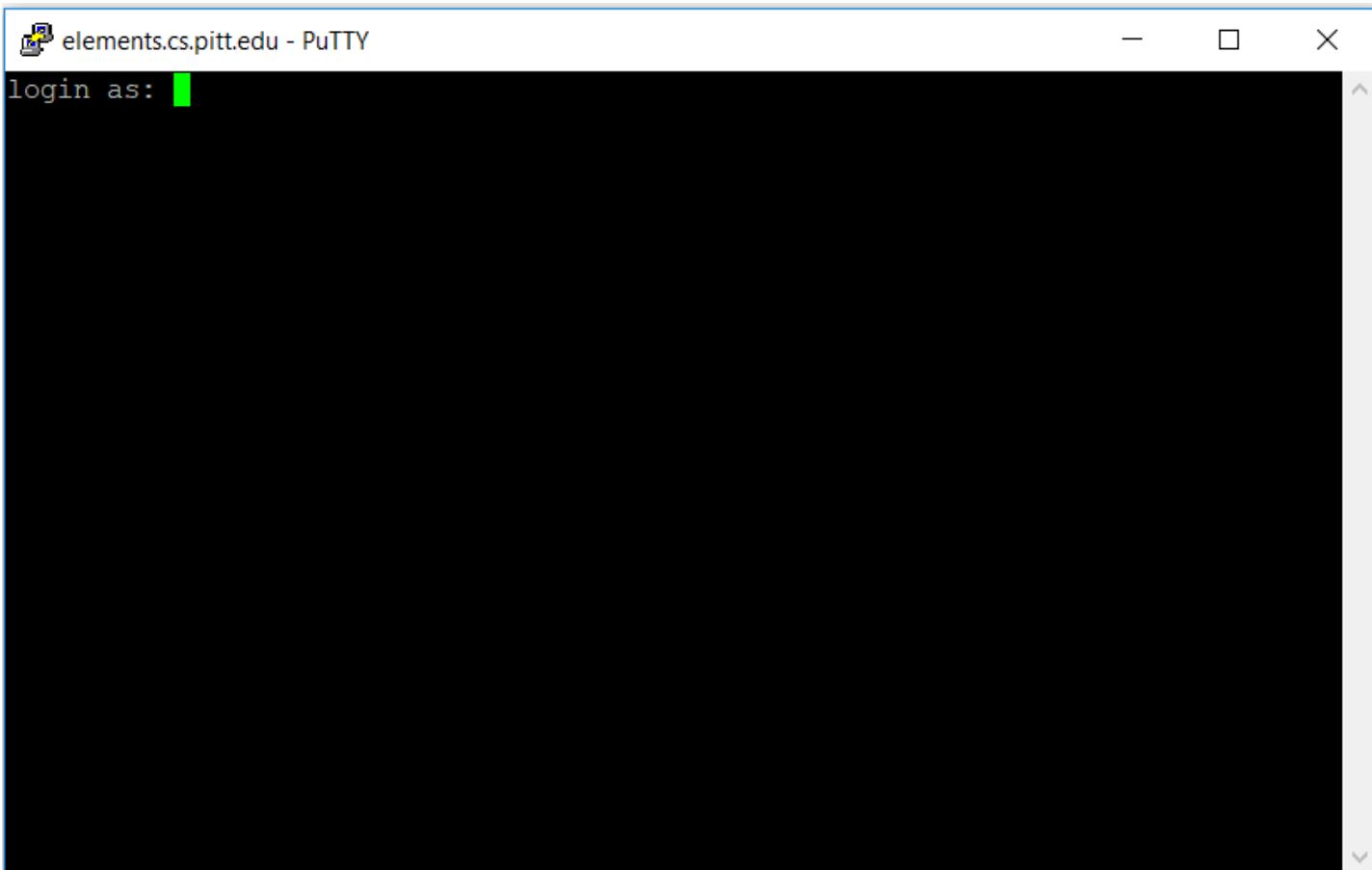
- Download from [www.putty.org](http://www.putty.org)



# Windows - Putty

---

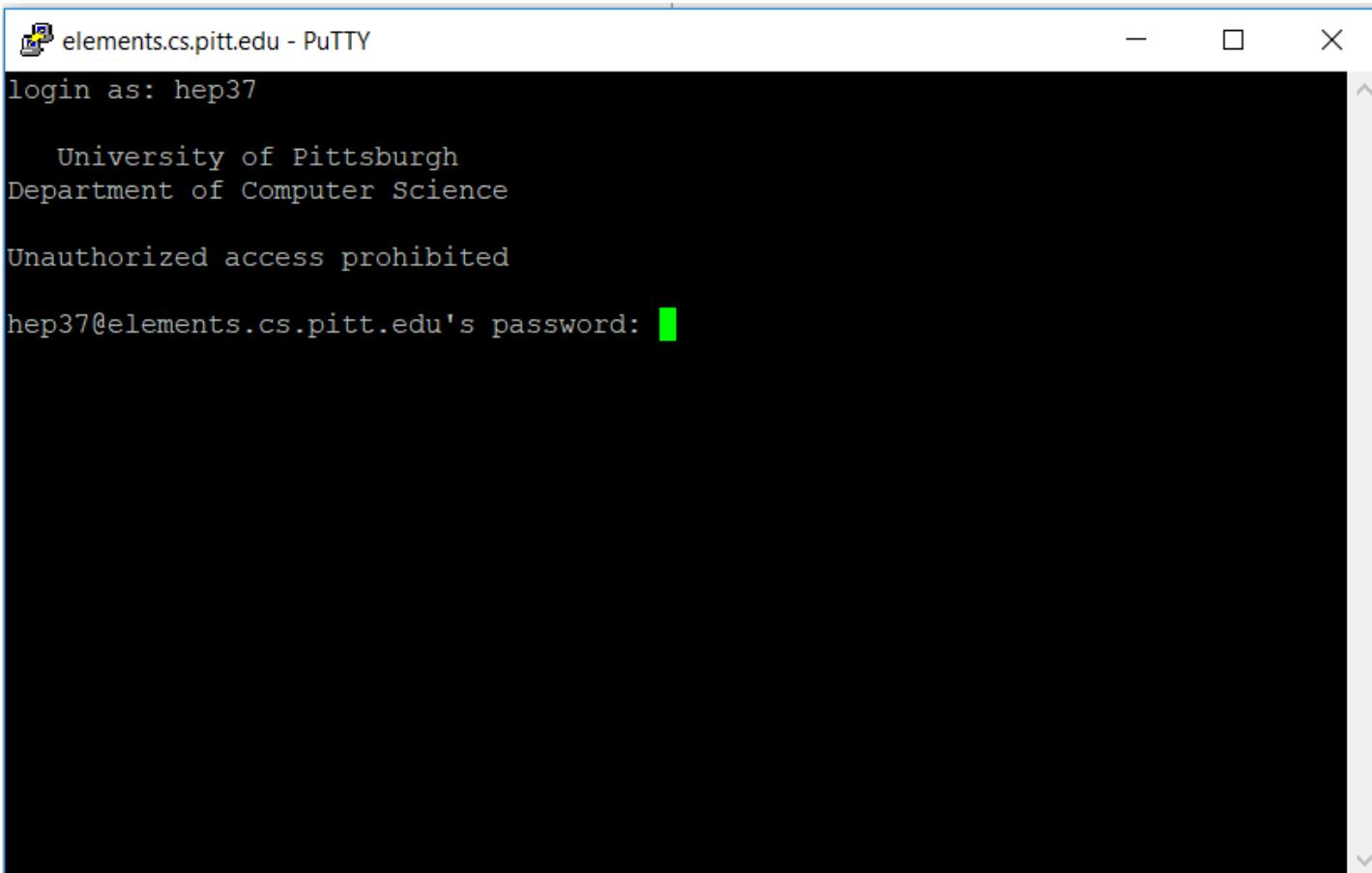
- Download from **www.putty.org**



# Windows - Putty

---

- Download from **www.putty.org**



# MacOS/Ubuntu - Terminal

---

- Go to **Applications > Utilities**, and open **Terminal**.

# MacOS/Ubuntu - Terminal

---

- Go to **Applications > Utilities**, and open **Terminal**.

```
henrique in ~home-laptop->$
```

# MacOS/Ubuntu - Terminal

---

- Go to **Applications > Utilities**, and open **Terminal**.

```
henrique in ~home-laptop->$ ssh user@IPaddress:port
```

# MacOS/Ubuntu - Terminal

---

- Go to **Applications > Utilities**, and open **Terminal**.

```
henrique in ~home-laptop->$ ssh user@IPaddress:port
```

call ssh command

on this IP:Port

server address:  
**elements.cs.pitt.edu** at port 22

# MacOS/Ubuntu - Terminal

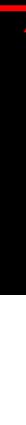
---

- Go to **Applications > Utilities**, and open **Terminal**.

```
henrique in ~home-laptop->$ ssh hep37@thoth.cs.pitt.edu:22
```



call ssh command



on this IP:Port

# MacOS/Ubuntu - Terminal

---

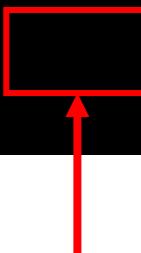
- Go to **Applications > Utilities**, and open **Terminal**.

```
henrique in ~home-laptop->$ ssh hep37@thoth.cs.pitt.edu:22
```

```
University of Pittsburgh  
Department of Computer Science
```

```
Unauthorized access prohibited
```

```
hap44@elements.cs.pitt.edu's password:
```



**Just type and press enter, no cursor will show**

# Basic Linux Shell commands

---

- Once into a elements machine
  - Read, create directories and files
  - Compile C/C++ code
  - Whatever program/service you install or the OS already offers

# Basic Linux Shell commands

---

- Check Current Directory - **pwd**



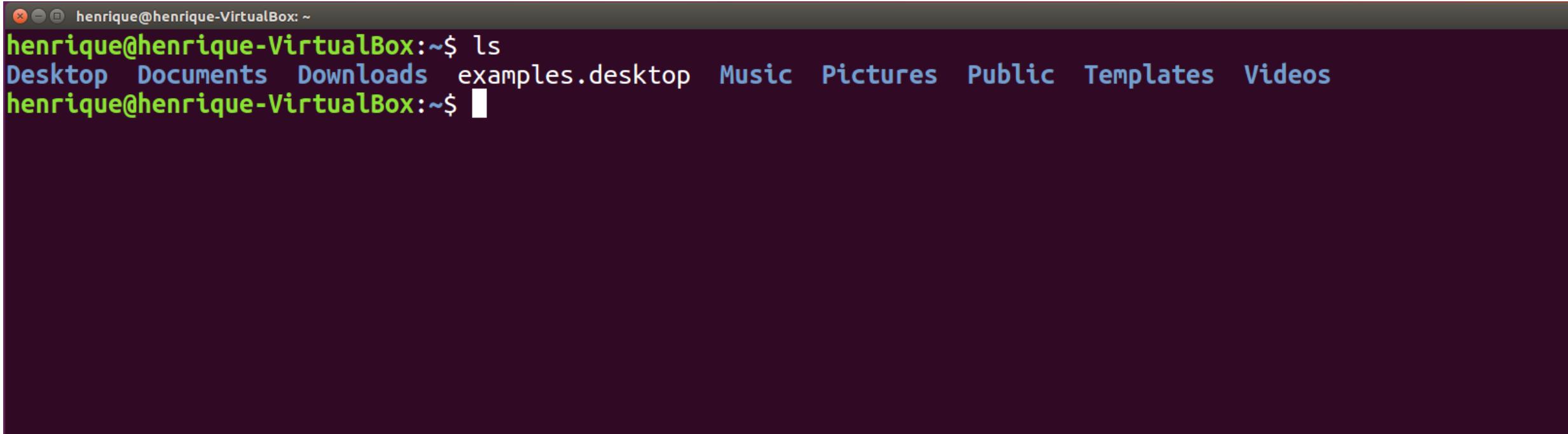
A screenshot of a terminal window titled "henrique@henrique-VirtualBox: ~". The window shows the command "pwd" being run, which outputs the path "/home/henrique". The terminal has a dark background with light-colored text and standard window controls at the top.

```
henrique@henrique-VirtualBox:~$ pwd
/home/henrique
henrique@henrique-VirtualBox:~$
```

# Basic Linux Shell commands

---

- List directories - ls



A screenshot of a terminal window titled "henrique@henrique-VirtualBox: ~". The window contains the following text:

```
henrique@henrique-VirtualBox:~$ ls
Desktop Documents Downloads examples.desktop Music Pictures Public Templates Videos
henrique@henrique-VirtualBox:~$ █
```

The terminal has a dark background with light-colored text. The prompt "henrique@henrique-VirtualBox:~\$ " is at the top, followed by the command "ls" and its output. A cursor icon "█" is visible at the end of the command line.

# Basic Linux Shell commands

---

- Create/Remove directory – **mkdir/rmdir**

```
henrique@henrique-VirtualBox:~$ mkdir temp
henrique@henrique-VirtualBox:~$ ls
Desktop  Documents  Downloads  Music  Pictures  Public  some_text.txt  temp  Templates  Videos
henrique@henrique-VirtualBox:~$
```

# Basic Linux Shell commands

---

- Create/Remove directory – **mkdir/rmdir**

```
henrique@henrique-VirtualBox:~$ mkdir temp
henrique@henrique-VirtualBox:~$ ls
Desktop Documents Downloads Music Pictures Public some_text.txt temp Templates Videos
henrique@henrique-VirtualBox:~$ rmdir temp
henrique@henrique-VirtualBox:~$ ls
Desktop Documents Downloads Music Pictures Public some_text.txt Templates Videos
henrique@henrique-VirtualBox:~$
```

# Basic Linux Shell commands

---

- Remove files – **rm**

```
henrique@henrique-VirtualBox:~$ mkdir temp
henrique@henrique-VirtualBox:~$ ls
Desktop Documents Downloads Music Pictures Public some_text.txt temp Templates Videos
henrique@henrique-VirtualBox:~$ rmdir temp
henrique@henrique-VirtualBox:~$ ls
Desktop Documents Downloads Music Pictures Public some_text.txt Templates Videos
henrique@henrique-VirtualBox:~$ rm some_text.txt
henrique@henrique-VirtualBox:~$ ls
Desktop Documents Downloads Music Pictures Public Templates Videos
henrique@henrique-VirtualBox:~$ █
```

# Basic Linux Shell commands

---

- Copy files from anywhere to anywhere – **cp**

A screenshot of a Linux terminal window titled "henrique@henrique-VirtualBox: ~/Desktop". The terminal shows the following session:

```
henrique@henrique-VirtualBox:~$ ls
Desktop  Documents  Downloads  Music  Pictures  Public  some_text.txt  Templates  Videos
henrique@henrique-VirtualBox:~$ cp some_text.txt Desktop/
henrique@henrique-VirtualBox:~$ cd Desktop/
henrique@henrique-VirtualBox:~/Desktop$ ls
some_text.txt
henrique@henrique-VirtualBox:~/Desktop$
```

The command `cp some_text.txt Desktop/` is highlighted with a red rectangle. Two red arrows point from two white boxes at the bottom to this rectangle. The left box contains the text "From here" and the right box contains the text "to here".

From here

to here

# Basic Linux Shell commands

---

- Move files from anywhere to anywhere – **mv**

**mv <current path> <new path>**

**mv some\_text.txt Desktop/**

# Environment variables

---

- Environment variables can hold textual information stored within the system that can be used by OS programs
  - ***env*** – Lists all of the environment variables in the shell
  - ***printenv*** – Prints all (if no environment variable is specified) of environment variables and definitions of the current environment
  - ***export*** – Assigns or defines an environment variable
  - ***unset*** – Deletes the environment variable

# The Makefile

---

- Small programs
  - single file

# The Makefile

---

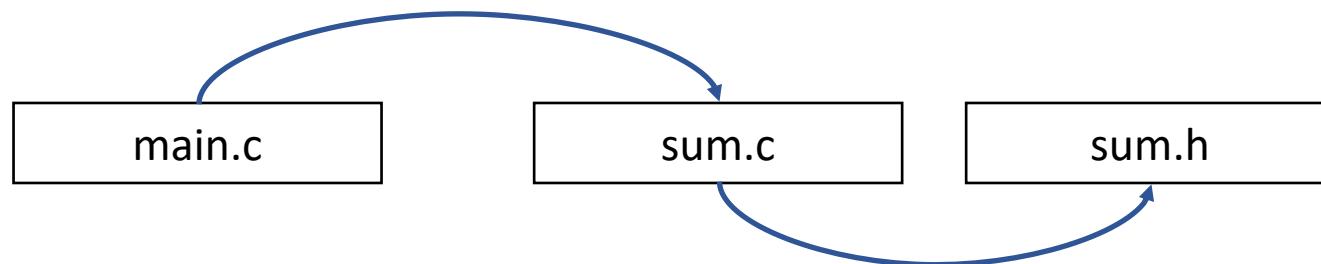
- Small programs (easy to compile)
  - single file

```
~home-laptop->$ gcc main.c -o calculator
```

# The Makefile

---

- Small programs (easy to compile)
  - single file
- Bigger programs
  - multiple files



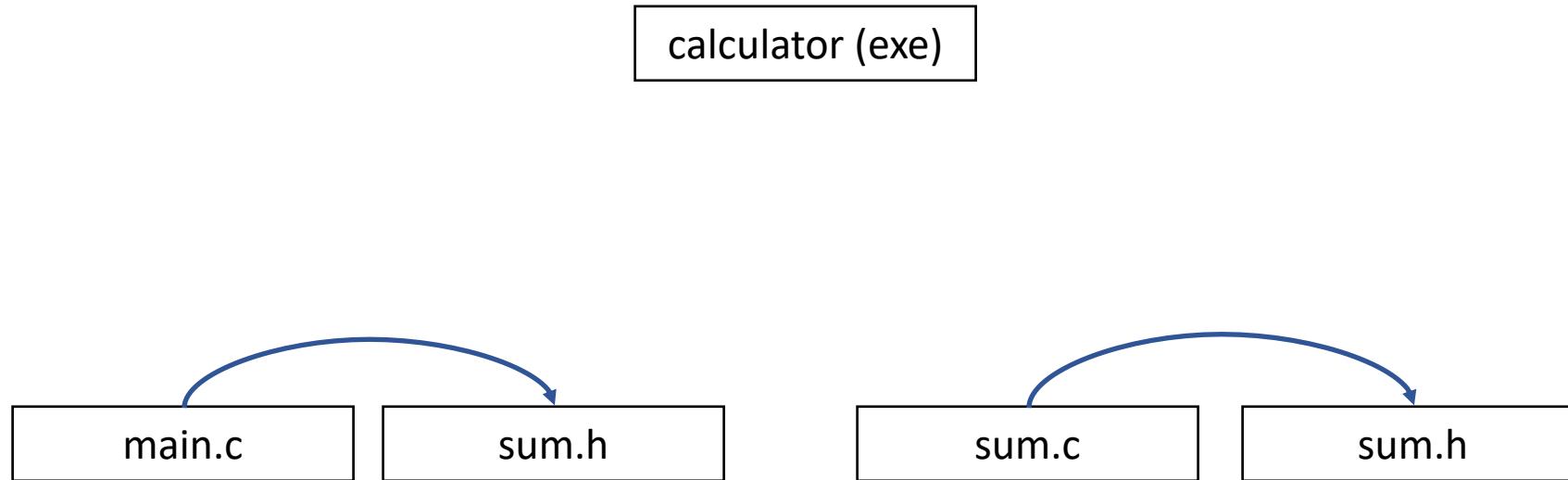
# The Makefile

---

calculator (exe)

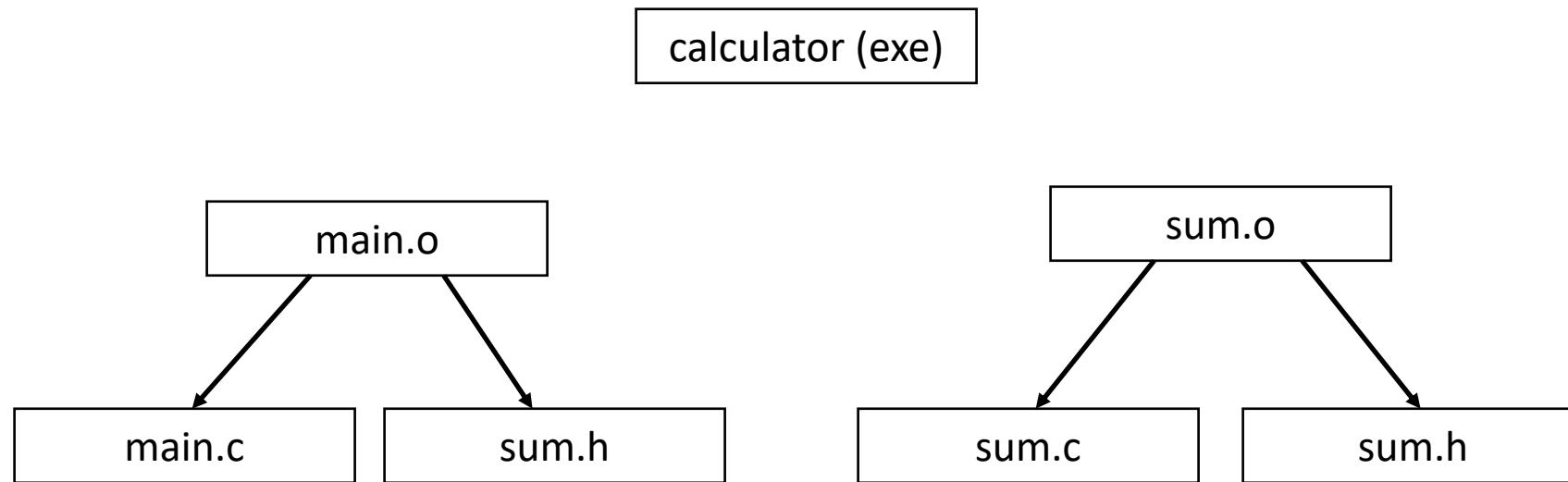
# The Makefile

---



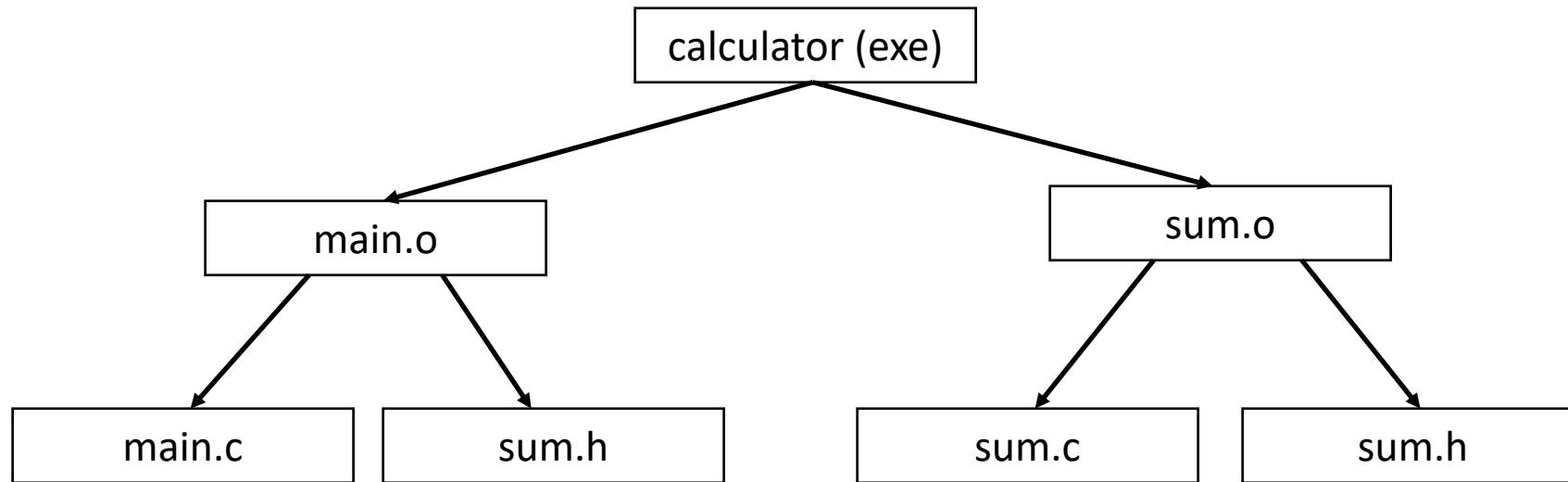
# The Makefile

---



# The Makefile

---



# The Makefile

---

```
calculator: main.o sum.o  
        gcc -o calculator main.o sum.o
```

# The Makefile

---

```
calculator: main.o sum.o  
        gcc -o calculator main.o sum.o
```

```
main.o: main.c sum.h  
        gcc -c main.c
```

# The Makefile

---

```
calculator: main.o sum.o  
        gcc -o calculator main.o sum.o
```

```
main.o: main.c sum.h  
        gcc -c main.c
```

```
sum.o: sum.c sum.h  
        gcc -c sum.c
```

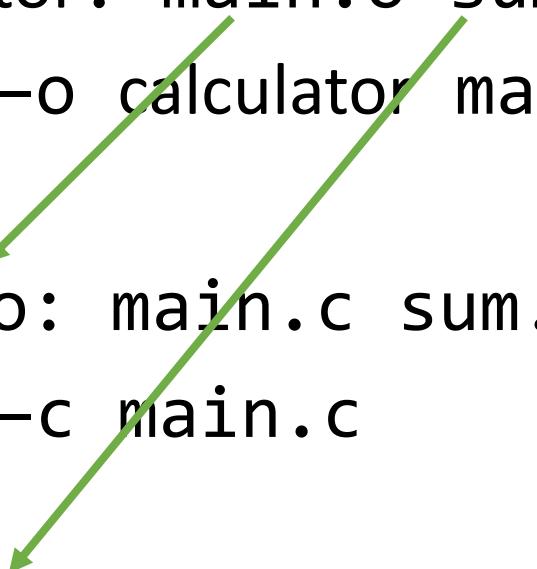
# The Makefile

---

```
calculator: main.o sum.o  
        gcc -o calculator main.o sum.o
```

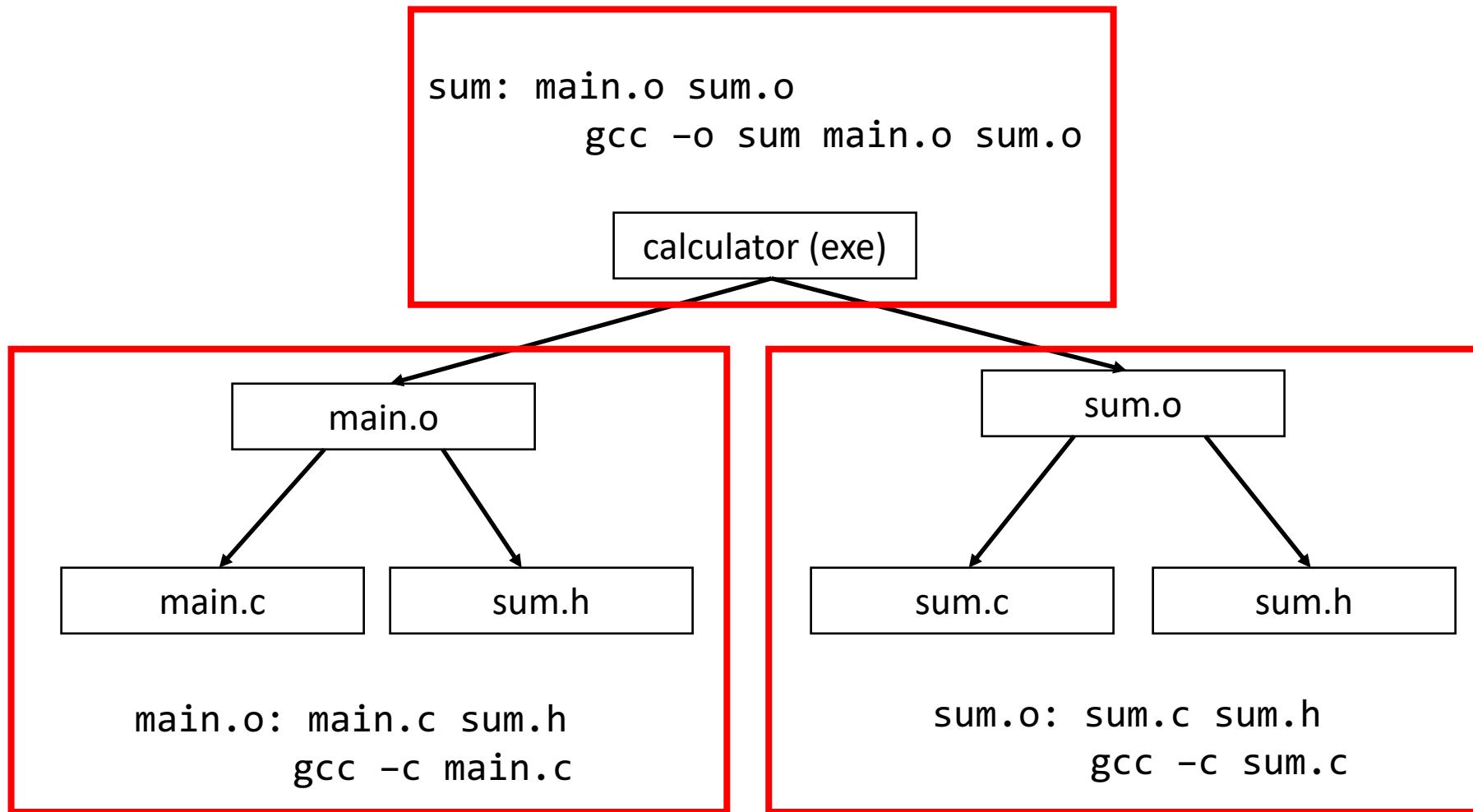
```
main.o: main.c sum.h  
        gcc -c main.c
```

```
sum.o: sum.c sum.h  
        gcc -c sum.c
```



# The Makefile

---

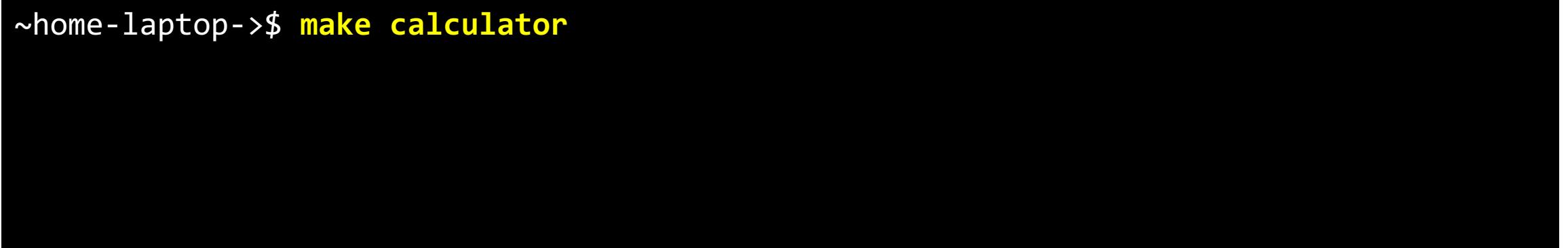


# The Makefile

---

- Running “make”

```
~home-laptop->$ make calculator
```



# The Makefile

---

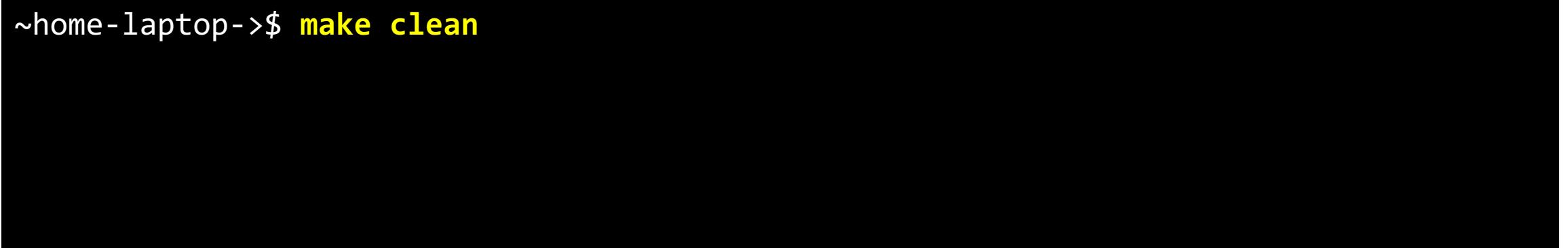
```
calculator: main.o sum.o
    gcc -o calculator main.o sum.o
main.o: main.c sum.h
    gcc -c main.c
sum.o: sum.c sum.h
    gcc -c sum.c
clean:
    -rm -f *.o
```

# The Makefile

---

- Running “make”

```
~home-laptop->$ make clean
```

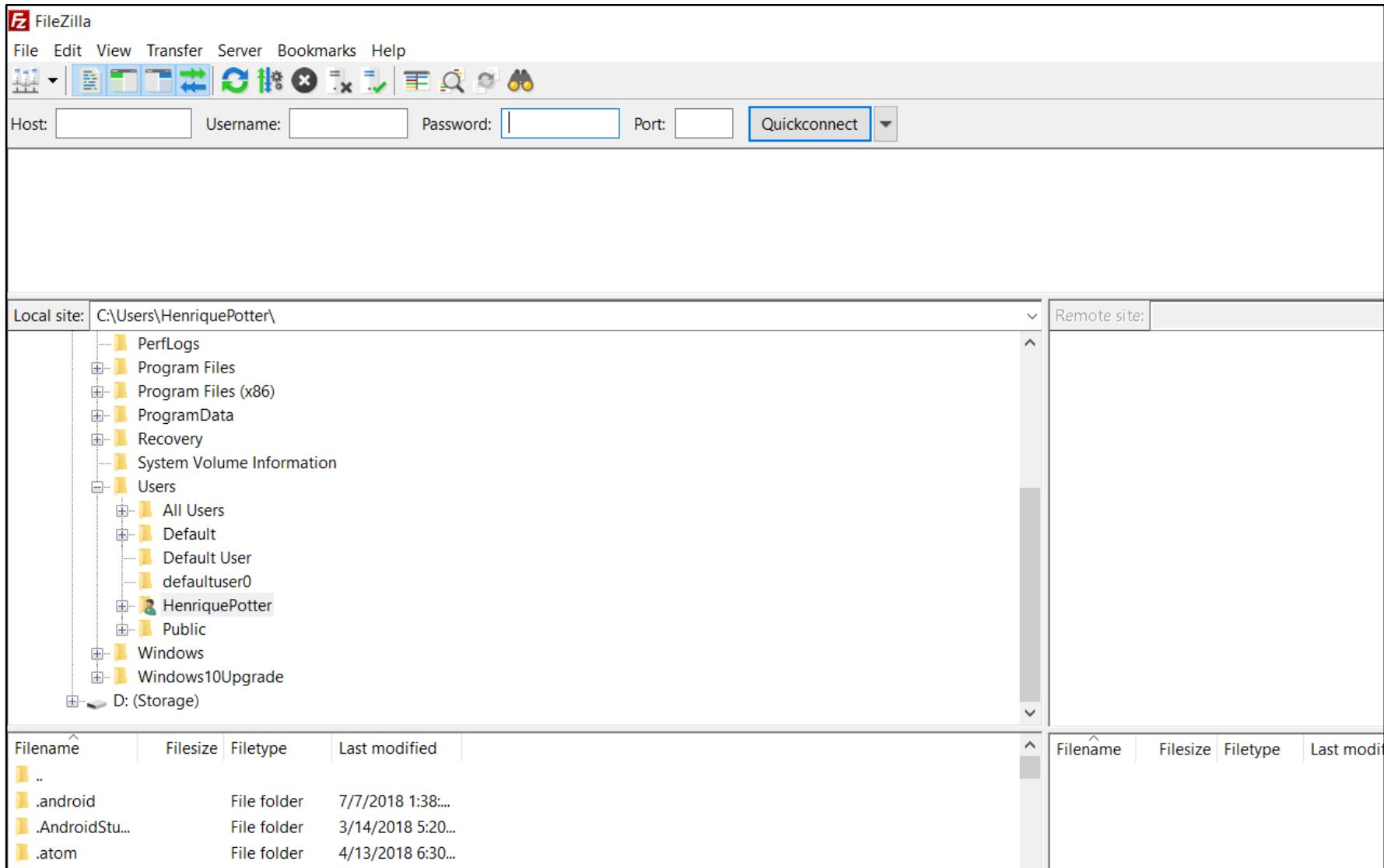


# GUI based FTP Clients

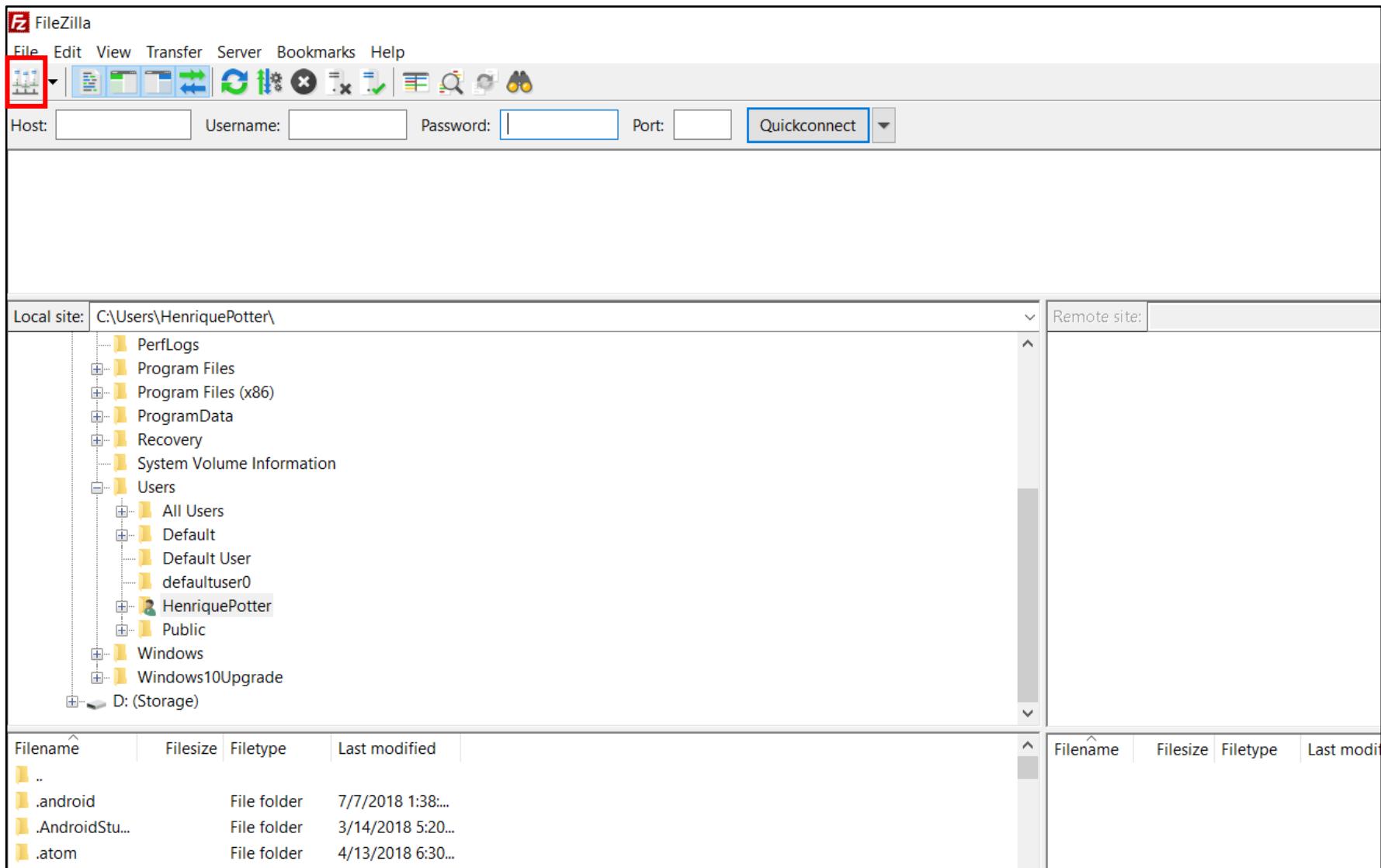
---

- FileZilla – Windows/MacOS
  - Copy files with drag and drop
  - Create directories
  - Delete files

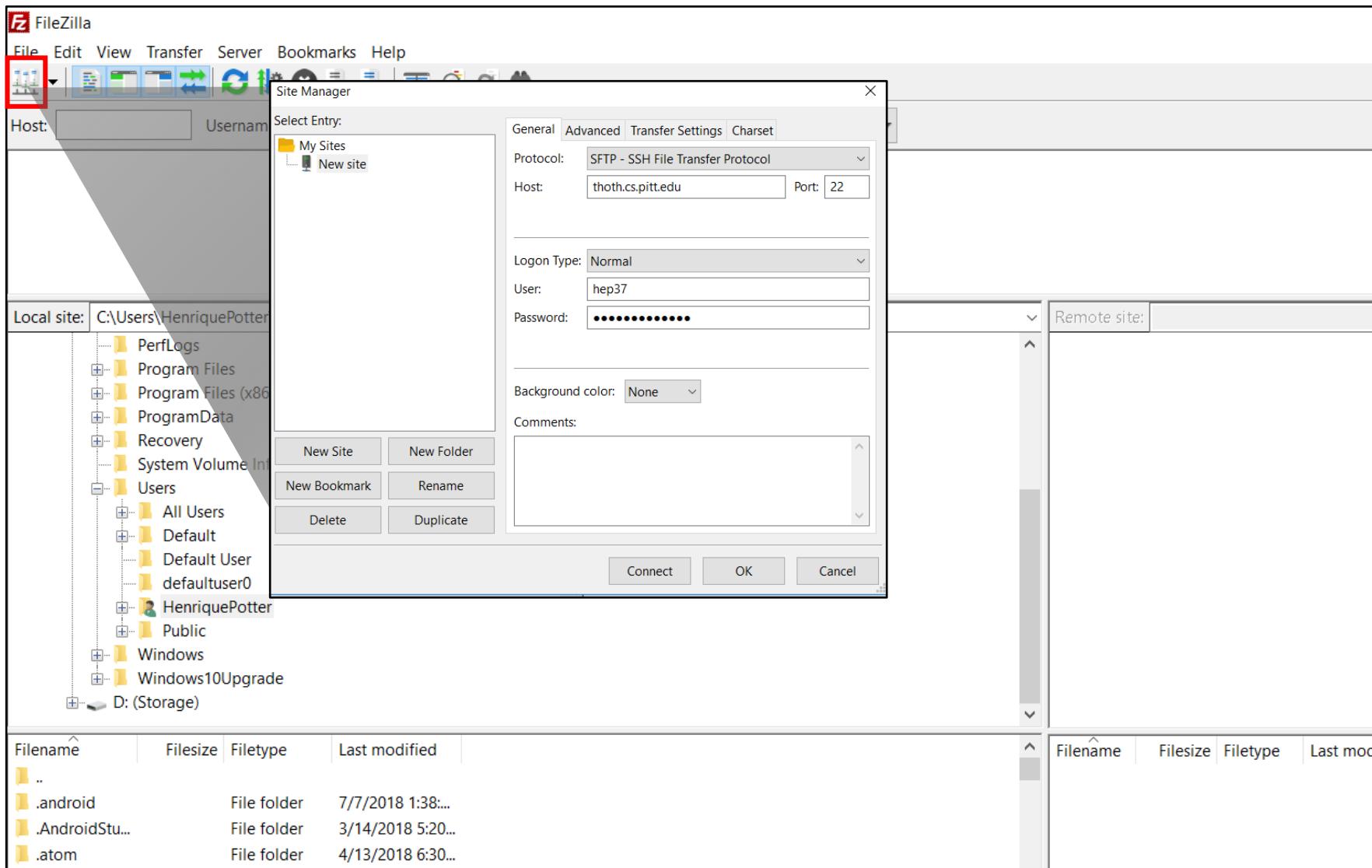
# GUI based FTP Clients



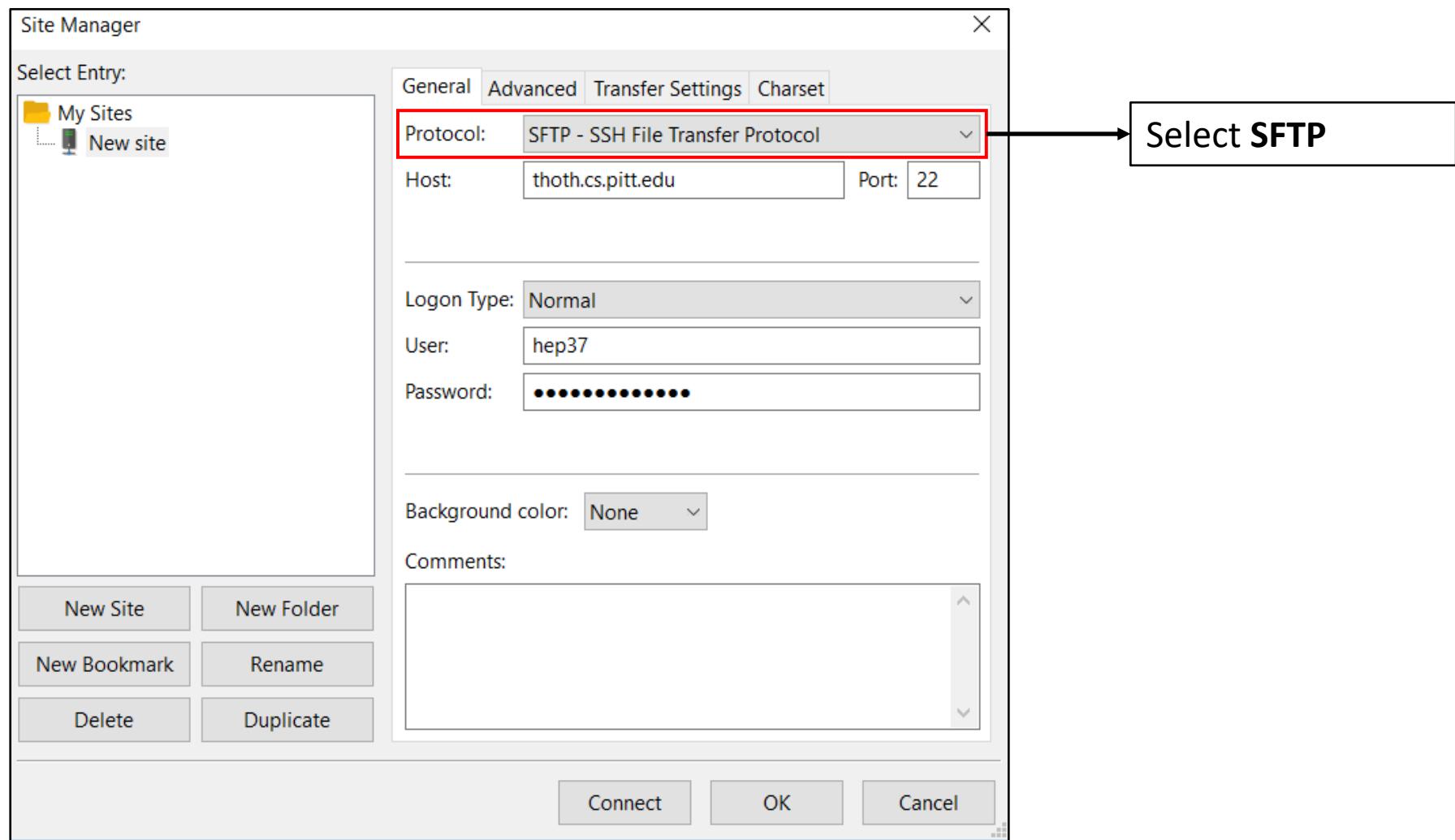
# GUI based FTP Clients



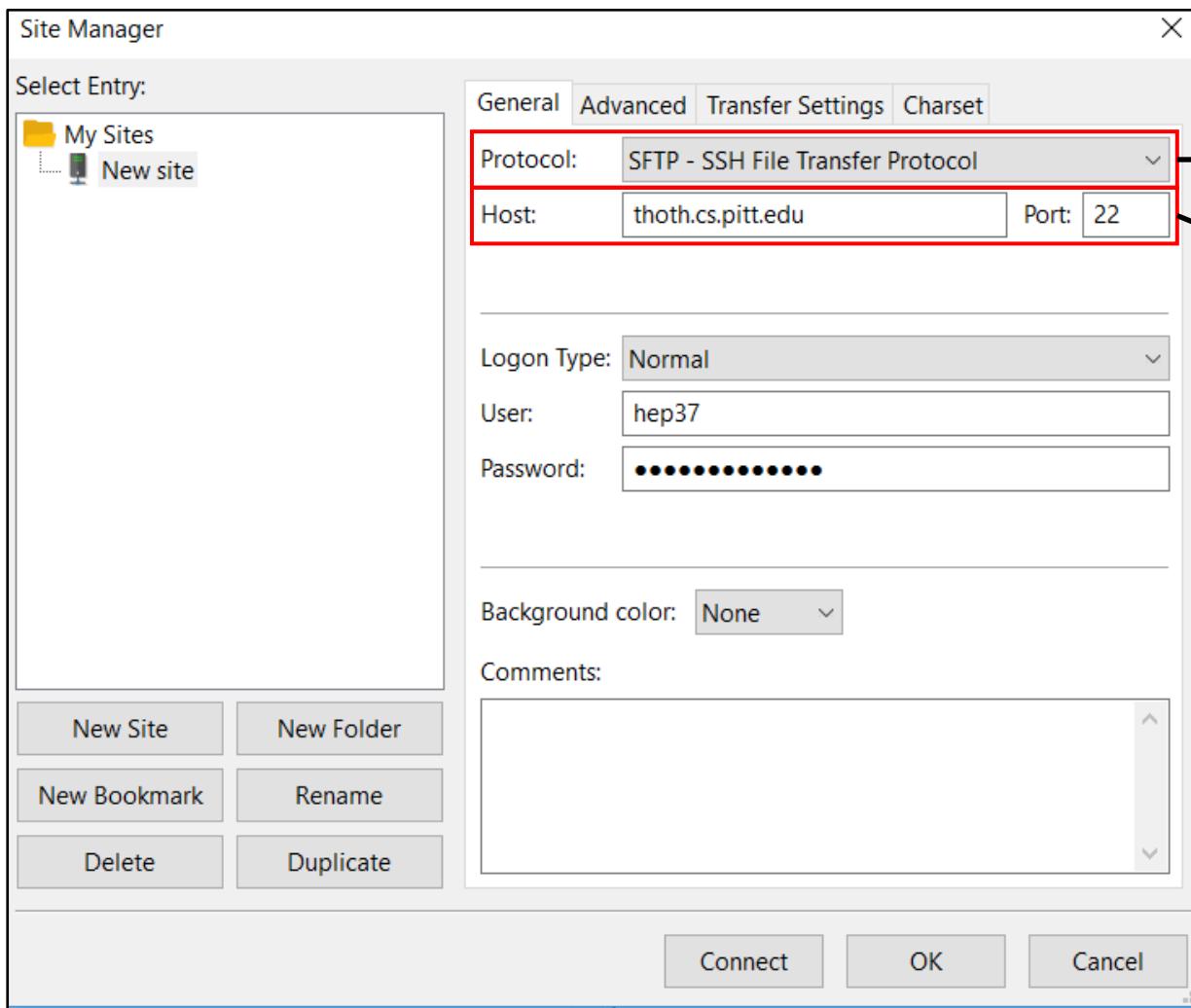
# GUI based FTP Clients



# GUI based FTP Clients



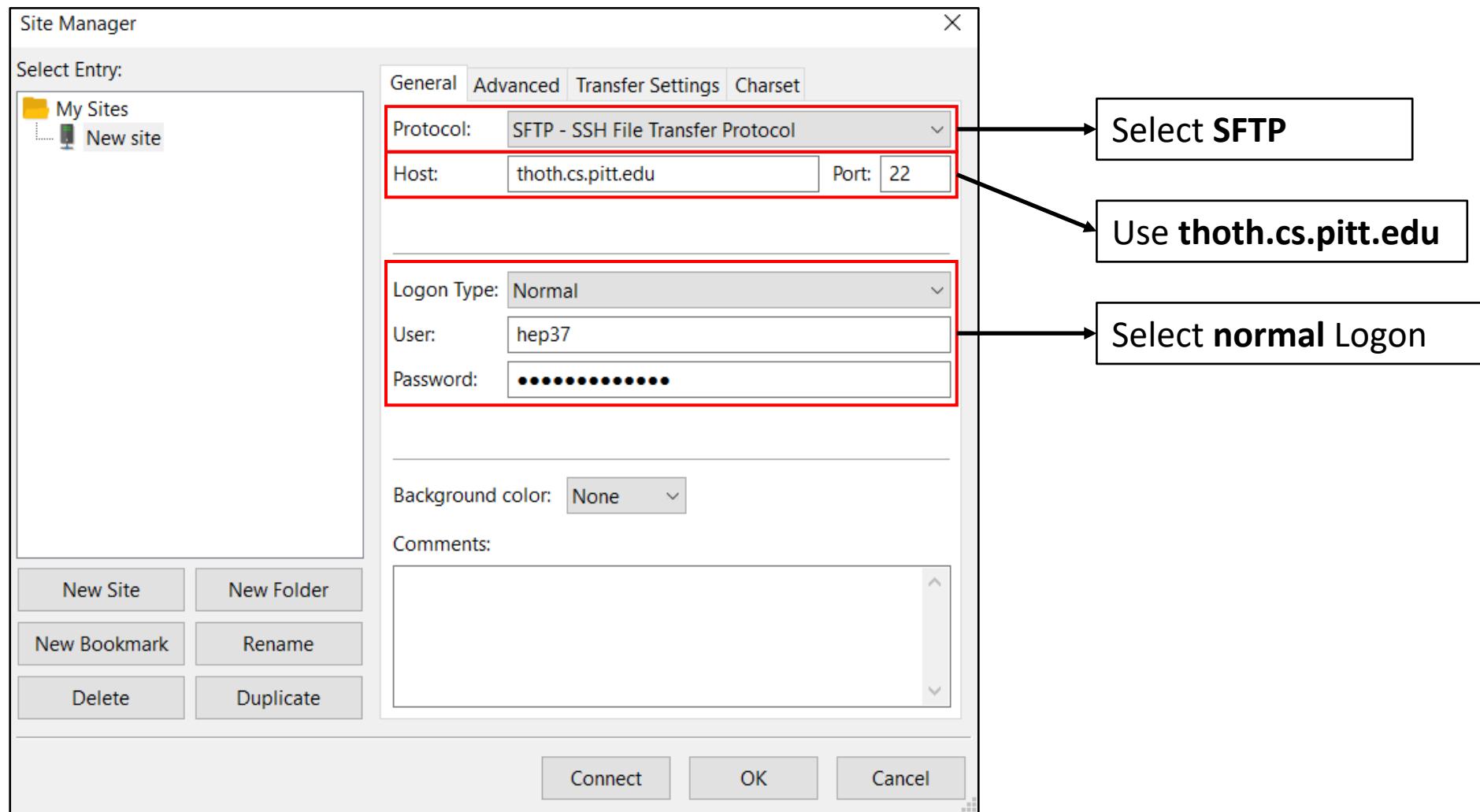
# GUI based FTP Clients



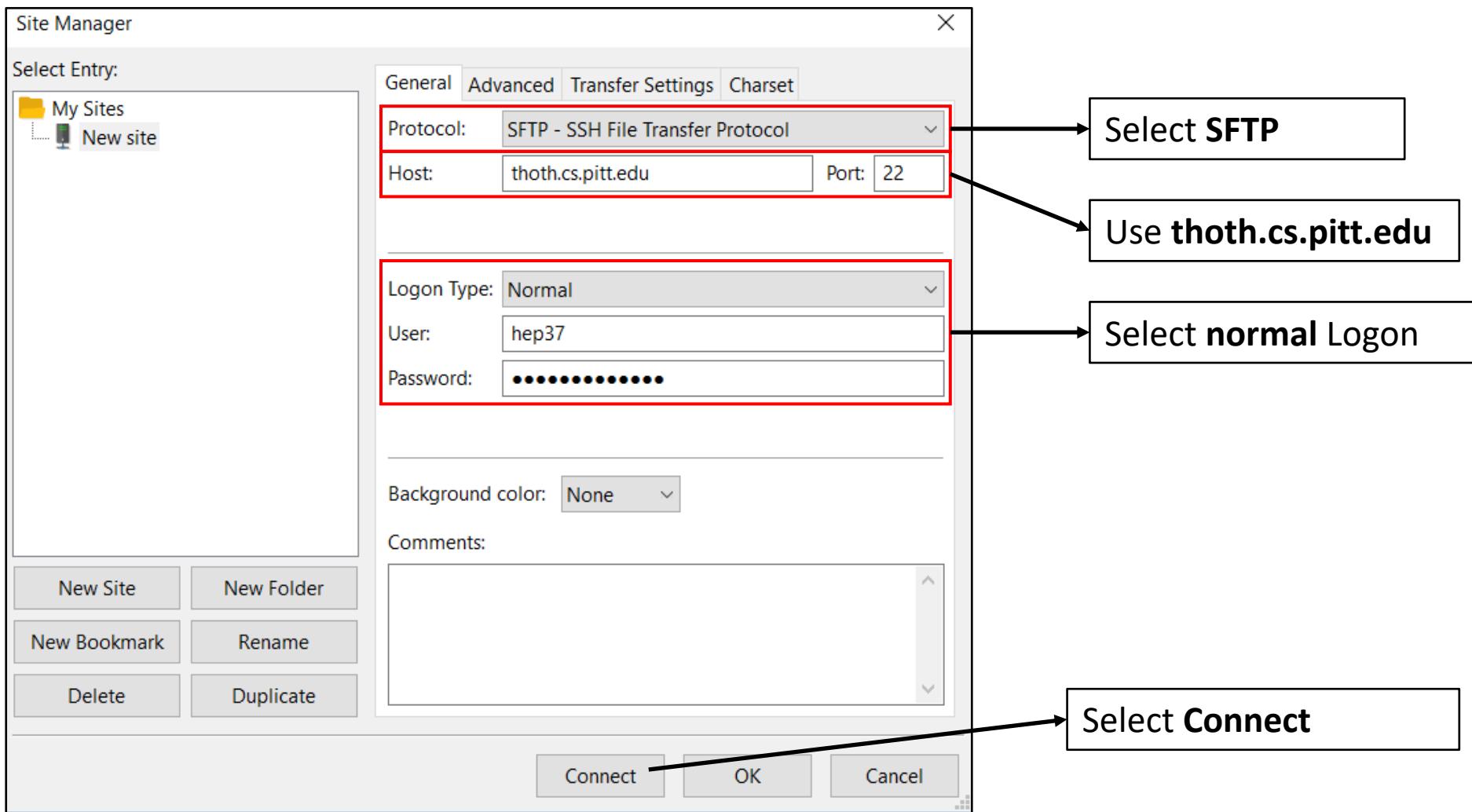
Select SFTP

Use thoth.cs.pitt.edu

# GUI based FTP Clients



# GUI based FTP Clients





# CS 1550

Lab 1 – Linux/Shell  
Basic commands Introduction

Teaching Assistant  
Maher Khan

(Slides credited to Henrique Potter)