

cse15l-lab-reports

CSE 15L Fall 2022 Lab Report 1

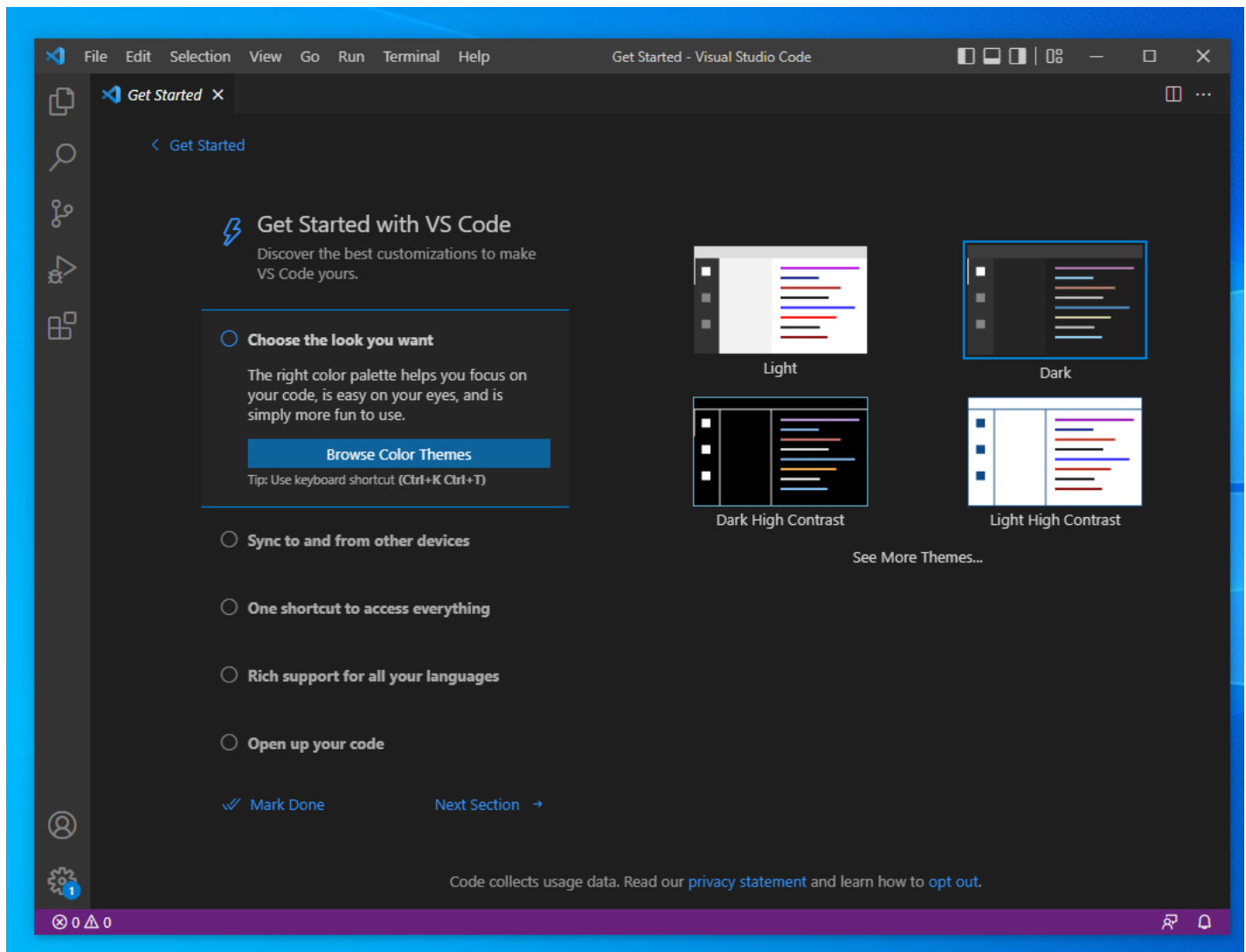
Hello and welcome to lab reports for CSE 15L. This week we will learn how to remotely connect to a server using ssh and the basic stuff you can do with it.

Installing Visual Studio Code

To install visual studio code, follow the given link and the instructions given on the website to install the software onto your personal computer. Visual studio code is a great code editor that will make our lives a lot easier when trying to code.

[Install Visual Studio Code](#)

Once you have installed VS Code, it should look something like this.



Remotely Connecting

Now that you have VS Code installed click on terminal at the top of your app and open a new terminal, this is what we will be using to connect to the remote servers.

First, install open ssh using [Install OpenSSH](#).

Next, type in the following command in your vs code terminal: `ssh cs15lfa22zz@ieng6.ucsd.edu`

You should get a message like this

```
ssh cs15lfa22zz@ieng6.ucsd.edu
The authenticity of host 'ieng6.ucsd.edu (128.54.70.227)' can't be established.
RSA key fingerprint is SHA256:ksruYwhnYH+sySHnHATLUHngrPEyZTD1/1x99wUQcec.
Are you sure you want to continue connecting (yes/no/[fingerprint])?
```

Type in yes to proceed.

```
# Now on remote server
```

```
Last login: Sun Jan  2 14:03:05 2022 from 107-217-10-235.lightspeed.sndgca.sbcglobal.net  
quota: No filesystem specified.
```

```
Hello cs15lfa22zz, you are currently logged into ieng6-203.ucsd.edu
```

```
You are using 0% CPU on this system
```

Cluster Status

Hostname	Time	#Users	Load	Averages
ieng6-201	23:25:01	0	0.08,	0.17, 0.11
ieng6-202	23:25:01	1	0.09,	0.15, 0.11
ieng6-203	23:25:01	1	0.08,	0.15, 0.11

```
Sun Jan 02, 2022 11:28pm - Prepping cs15lfa22
```

It should look something like this.

Note: The code snippets here are taken from [course website](#). Pictures of me doing the exact same thing are included below.

Note: You will probably need to reset your account password to login.

```
cs15lfa22] cs15lfa22bd@ieng6-203.ucsd.edu:/home/linux/ieng6/cs15lfa22/cs15lfa22bd
Microsoft Windows [Version 10.0.19044.2006]
(c) Microsoft Corporation. All rights reserved.

H:\>ssh cs15lfa22bd@ieng6.ucsd.edu
Password:
Last failed login: Wed Sep 28 14:34:22 PDT 2022 from its-cseb260-27.ucsd.edu on ssh:notty
There were 6 failed login attempts since the last successful login.
Last login: Tue Jun  7 17:22:03 2022 from 99-101-8-159.lightspeed.sndgca.sbcglobal.net
Attempting to create directory /home/linux/ieng6/cs15lfa22/cs15lfa22bd/perl5
===== NOTICE =====
Authorized use of this system is limited to password-authenticated
usernames which are issued to individuals and are for the sole use of
the person to whom they are issued.

Privacy notice: be aware that computer files, electronic mail and
accounts are not private in an absolute sense. You are responsible
for adhering to the ETS Acceptable Use Policies, which you can review at:
https://blink.ucsd.edu/faculty/instruction/tech-guide/policies/ets-acceptable-use-policies.html
=====

*** Problems, Suggestions, or Feedback ***

For help requests, please create a ticket at:
https://support.ucsd.edu/its

You may also report issues, suggestions, or feedback by e-mailing root on any system:
mail -s "Your subject here" root
Type your message - Ctrl+D to send

*** Access our Linux ssh terminals or remote desktops via a web browser at: ***
https://linuxcloud.ucsd.edu

All accounts must be enrolled in Duo for access. No VPN required.

-----

Hello cs15lfa22bd, you are currently logged into ieng6-203.ucsd.edu

You are using 0% CPU on this system

Cluster Status
Hostname      Time      #Users  Load  Averages
ieng6-201     14:35:01   14  0.62,  0.32,  0.17
ieng6-202     14:35:01   14  0.15,  0.15,  0.11
ieng6-203     14:35:01   13  0.13,  0.08,  0.12

Wed Sep 28, 2022  2:36pm - Prepping cs15lfa22
[cs15lfa22bd@ieng6-203]:~:1$
```

Trying Some Commands

```

[cs15lfa22] cs15lfa22bd@ieng6-203.ucsd.edu:/home/linux/ieng6/cs15lfa22/cs15lfa22bd
Hostname      Time      #Users  Load  Averages
ieng6-201    14:35:01    14  0.62, 0.32, 0.17
ieng6-202    14:35:01    14  0.15, 0.15, 0.11
ieng6-203    14:35:01    13  0.13, 0.08, 0.12

Wed Sep 28, 2022  2:36pm - Prepping cs15lfa22
[cs15lfa22bd@ieng6-203]:~:1$ ls
perl5
[cs15lfa22bd@ieng6-203]:~:2$ mkdir CS15L
[cs15lfa22bd@ieng6-203]:~:3$ cd CS15L
[cs15lfa22bd@ieng6-203]:CS15L:4$ mkdir Labs
[cs15lfa22bd@ieng6-203]:CS15L:5$ cd Labs
[cs15lfa22bd@ieng6-203]:Labs:6$ mkdir week1
[cs15lfa22bd@ieng6-203]:Labs:7$ cd ~
[cs15lfa22bd@ieng6-203]:~:8$ ls -lat
total 112
drwxr-s--- 3 cs15lfa22bd ieng6_cs15lfa22 4096 Sep 28 14:40 CS15L
drwxr-s--- 7 cs15lfa22bd ieng6_cs15lfa22 4096 Sep 28 14:39 .
-rw-r--r-- 1 cs15lfa22bd ieng6_cs15lfa22 1317 Sep 28 14:36 .modulesbegenv
-rw-r----- 1 cs15lfa22bd ieng6_cs15lfa22 0 Sep 28 14:36 .motd
drwxr-sr-x 2 cs15lfa22bd ieng6_cs15lfa22 4096 Sep 28 14:36 perl5
drwxr-sr-x 3 cs15lfa22bd ieng6_cs15lfa22 4096 Sep 28 14:36 .local
drwxr-sr-x 3 cs15lfa22bd ieng6_cs15lfa22 4096 Sep 28 14:36 .config
drwxr-sr-x 3 cs15lfa22bd ieng6_cs15lfa22 4096 Sep 28 14:36 .cache
drwxr-sr-x 462 cs15lfa22 ieng6_cs15lfa22 36864 Sep 28 08:06 ..
-rwxr-x--- 1 cs15lfa22bd ieng6_cs15lfa22 290 Sep 8 16:11 .zshrc
-rwxr-x--- 1 cs15lfa22bd ieng6_cs15lfa22 481 Sep 8 16:11 .zshenv
-rwxr-x--- 1 cs15lfa22bd ieng6_cs15lfa22 1931 Sep 8 16:11 .zprofile
-rwxr-x--- 1 cs15lfa22bd ieng6_cs15lfa22 1961 Sep 8 16:11 .profile
-rwxr-x--- 1 cs15lfa22bd ieng6_cs15lfa22 837 Sep 8 16:11 .procmailrc
-rwxr-x--- 1 cs15lfa22bd ieng6_cs15lfa22 431 Sep 8 16:11 .login
-rwxr-x--- 1 cs15lfa22bd ieng6_cs15lfa22 155 Sep 8 16:11 .locallogin
-rwxr-x--- 1 cs15lfa22bd ieng6_cs15lfa22 1692 Sep 8 16:11 .kshrc
-rwxr-x--- 1 cs15lfa22bd ieng6_cs15lfa22 1931 Sep 8 16:11 .cshrc
-rwxr-x--- 1 cs15lfa22bd ieng6_cs15lfa22 1721 Sep 8 16:11 .bashrc
-rwxr-x--- 1 cs15lfa22bd ieng6_cs15lfa22 975 Sep 8 16:11 .bash_profile
[cs15lfa22bd@ieng6-203]:~:9$ ls -a
. .bash_profile .cache .cshrc .local .login .motd .profile .zshenv CS15L
.. .bashrc .config .kshrc .locallogin .modulesbegenv .procmailrc .zprofile .zshrc perl5
[cs15lfa22bd@ieng6-203]:~:10$ ls CS15L
Labs
[cs15lfa22bd@ieng6-203]:~:11$ ls /home/linux/ieng6/cs15lfa22/cs15lfa22ag
ls: cannot open directory /home/linux/ieng6/cs15lfa22/cs15lfa22ag: Permission denied
[cs15lfa22bd@ieng6-203]:~:12$ cp home/linux/ieng6/cs15lfa22/public/hello.txt
cp: missing destination file operand after 'home/linux/ieng6/cs15lfa22/public/hello.txt'
Try 'cp --help' for more information.
[cs15lfa22bd@ieng6-203]:~:13$ cp home/linux/ieng6/cs15lfa22/public/hello.txt ~/
cp: cannot stat 'home/linux/ieng6/cs15lfa22/public/hello.txt': No such file or directory
[cs15lfa22bd@ieng6-203]:~:14$ cp /home/linux/ieng6/cs15lfa22/public/hello.txt ~/
[cs15lfa22bd@ieng6-203]:~:15$ cat /home/linux/ieng6/cs15lfa22/public/hello.txt
Hi! Welcome to CSE15L Fall 22
[cs15lfa22bd@ieng6-203]:~:16$ cat ~/hello.txt
Hi! Welcome to CSE15L Fall 22
[cs15lfa22bd@ieng6-203]:~:17$

```

Here:

Ls -lat also tells you when you made the files. Ls is for listing files, mkdir is to make a new directory, cd is to change the current working directory, ~ is the home directory location -lat are modifiers to Ls for example -a shows all files, even hidden ones, cp is to copy and cat is to print out the raw text version of the given file.

In the last few commands, first we copy over hello.txt from the public directory under cs15lfa22 to our home directory which is ~. Next, we check the contents of hello.txt in its original location using

cat and cross reference it to the copied version of hello.txt in our home directory ~ to make sure it is the same.

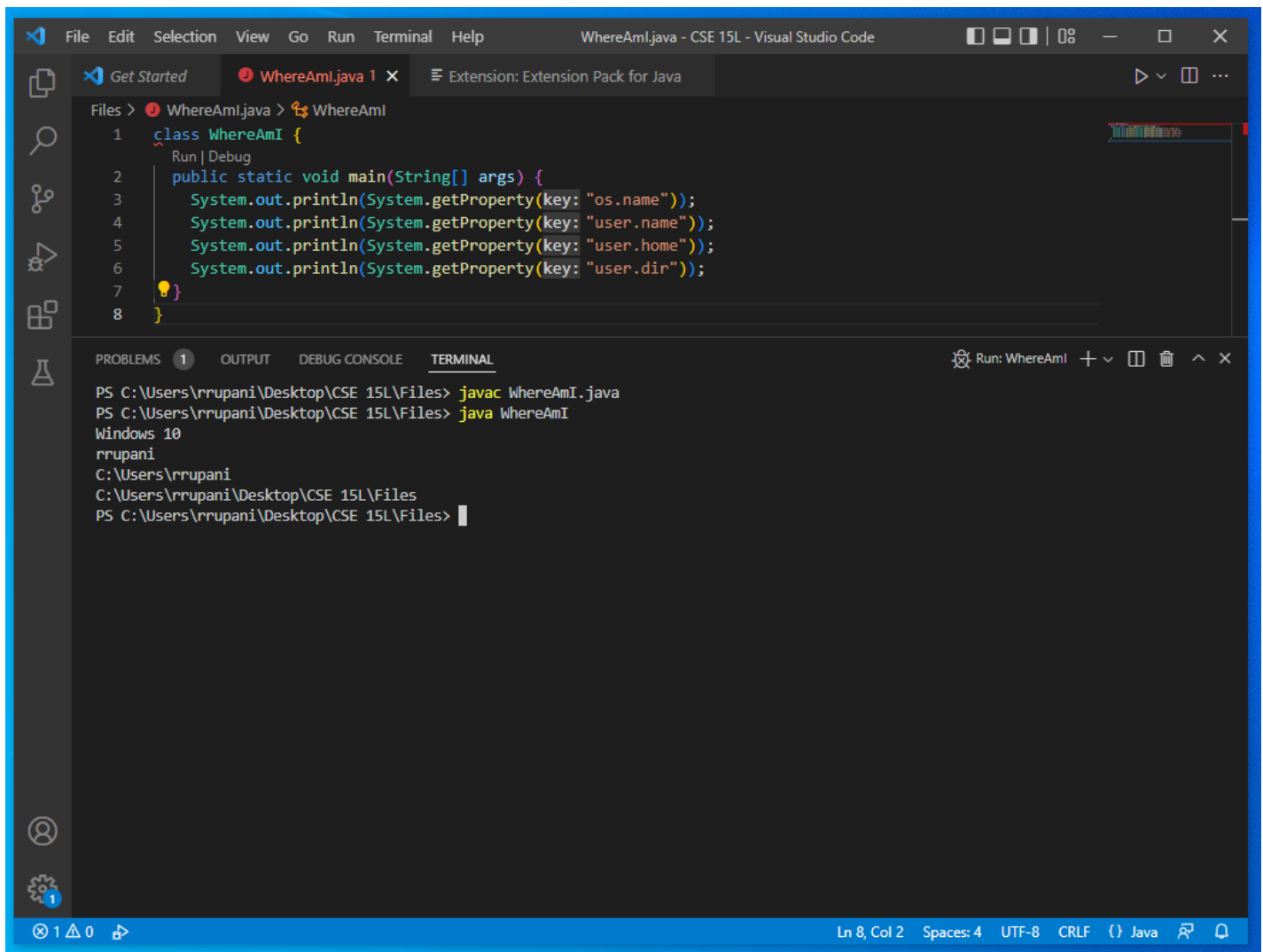
Moving Files with scp

First, let's create a java file that gives us the current system information that it is running on and where it is at in the system (local location)

```
WhereAmI.java
class WhereAmI {
    public static void main(String[] args) {
        System.out.println(System.getProperty("os.name"));
        System.out.println(System.getProperty("user.name"));
        System.out.println(System.getProperty("user.home"));
        System.out.println(System.getProperty("user.dir"));
    }
}
```

Run the file using

```
javac WhereAmI.java
java WhereAmI
```



The screenshot shows the Visual Studio Code editor with a file named `WhereAmI.java` open. The code is as follows:

```
1 class WhereAmI {  
2     public static void main(String[] args) {  
3         System.out.println(System.getProperty(key: "os.name"));  
4         System.out.println(System.getProperty(key: "user.name"));  
5         System.out.println(System.getProperty(key: "user.home"));  
6         System.out.println(System.getProperty(key: "user.dir"));  
7     }  
8 }
```

The terminal at the bottom shows the execution of the program:

```
PS C:\Users\rrupani\Desktop\CSE 15L\Files> javac WhereAmI.java  
PS C:\Users\rrupani\Desktop\CSE 15L\Files> java WhereAmI  
Windows 10  
rrupani  
C:\Users\rrupani  
C:\Users\rrupani\Desktop\CSE 15L\Files  
PS C:\Users\rrupani\Desktop\CSE 15L\Files>
```

Now, let's use `scp` to copy this file from our local computer to the remote server.

Use the following command

```
scp WhereAmI.java cs15lfa22zz@ieng6.ucsd.edu:~/
```

You will need to enter your ssh password as `scp` uses ssh and then it should be copied from your local computer to the remote server.

Try running the java file on your local computer and the remote server to see the difference and prove that `scp` has worked!

```

PS C:\Users\rrupani\Desktop\CSE 15L> cd Files
PS C:\Users\rrupani\Desktop\CSE 15L\Files> javac WhereAmI.java
PS C:\Users\rrupani\Desktop\CSE 15L\Files> java WhereAmI
Windows 10
rrupani
C:\Users\rrupani
C:\Users\rrupani\Desktop\CSE 15L\Files
PS C:\Users\rrupani\Desktop\CSE 15L\Files> scp WhereAmI.java cs15lfa22bd@ieng6.ucsd.edu:~/CS15L/Labs/week1/
Password:
scp: /home/linux/ieng6/cs15lfa22/cs15lfa22bd/CS15L/Labs/week1/: No such file or directory
PS C:\Users\rrupani\Desktop\CSE 15L\Files> scp WhereAmI.java cs15lfa22bd@ieng6.ucsd.edu:~/CS15L/Labs/week1/
Password:
WhereAmI.java                               100% 297   35.9KB/s   00:00
PS C:\Users\rrupani\Desktop\CSE 15L\Files> ssh cs15lfa22bd@ieng6.ucsd.edu
Password:
Last login: Wed Sep 28 15:04:44 2022 from its-cseb260-27.ucsd.edu
Hello cs15lfa22bd, you are currently logged into ieng6-203.ucsd.edu

```

You are using 0% CPU on this system

Cluster Status

Hostname	Time	#Users	Load	Averages
ieng6-201	15:10:01	16	0.08,	0.16, 0.16
ieng6-202	15:10:01	17	1.08,	0.72, 0.38
ieng6-203	15:10:01	19	0.45,	0.21, 0.14

```

Wed Sep 28, 2022 3:11pm - Prepping cs15lfa22
[cs15lfa22bd@ieng6-203]:~:18$ cd CS15L/Labs/week1
[cs15lfa22bd@ieng6-203]:week1:19$ javac WhereAmI.java
[cs15lfa22bd@ieng6-203]:week1:20$ java WhereAmI
Linux
cs15lfa22bd
/home/linux/ieng6/cs15lfa22/cs15lfa22bd
/home/linux/ieng6/cs15lfa22/cs15lfa22bd/CS15L/Labs/week1
[cs15lfa22bd@ieng6-203]:week1:21$ █

```

```

PS C:\Users\rrupani\Desktop\CSE 15L\Files> ssh cs15lfa22bd@ieng6.ucsd.edu
Last login: Wed Sep 28 15:23:36 2022 from its-cseb260-27.ucsd.edu
Hello cs15lfa22bd, you are currently logged into ieng6-203.ucsd.edu

```

You are using 0% CPU on this system

Cluster Status

Hostname	Time	#Users	Load	Averages
ieng6-201	15:25:01	20	0.07,	0.10, 0.13
ieng6-202	15:25:01	22	0.03,	0.10, 0.20
ieng6-203	15:25:01	20	0.75,	0.28, 0.17

```

Wed Sep 28, 2022 3:29pm - Prepping cs15lfa22
[cs15lfa22bd@ieng6-203]:~:24$ cd CS15L/Labs/week1
[cs15lfa22bd@ieng6-203]:week1:25$ javac WhereAmI.java
[cs15lfa22bd@ieng6-203]:week1:26$ java WhereAmI
Linux
cs15lfa22bd
/home/linux/ieng6/cs15lfa22/cs15lfa22bd
/home/linux/ieng6/cs15lfa22/cs15lfa22bd/CS15L/Labs/week1
[cs15lfa22bd@ieng6-203]:week1:27$ █

```


Setting an SSH Key

It can get quite tedious and cumbersome to have to type in the ssh password again and again. Instead you can set up an SSH key to skip this step every single time you login on scp a file onto a remote computer.

Run the command: `ssh-keygen`

It should ask for a prompt on where to save the file, just press enter to save yourself the hassle and note down the file path for later.

It should've created 2 files on your pc, the public and private RSA keys in the `.ssh` directory.

Next, lets copy the public key onto the remote server:

```
ssh cs15lfa22zz@ieng6.ucsd.edu
<Enter Password>
mkdir .ssh
exit
```

The above commands should create a hidden `.ssh` directory on the remote server, now you just copy the public key onto this directory.

Use this command to copy it: `scp /Users/<username>/.ssh/id_rsa.pub`
`cs15lfa22zz@ieng6.ucsd.edu:~/ .ssh/authorized_keys`

Once you are done with this, you should be able to ssh and scp without having to enter the password every time.

```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL powershell + v [] [] ^ x

PS C:\Users\rrupani\Desktop\CSE 15L\Files> ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (C:\Users\rrupani/.ssh/id_rsa): C:\Users\rrupani/.ssh/id_rsa
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Passphrases do not match. Try again.
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in C:\Users\rrupani/.ssh/id_rsa.
Your public key has been saved in C:\Users\rrupani/.ssh/id_rsa.pub.
The key fingerprint is:
SHA256:MELIXwWIRNTNNH1QBtVrLipgyotwb3fhPqtSd5qnwt0 ad\rrupani@its-cseb260-27
The key's randomart image is:
+---[RSA 3072]-----+
|=*..o*B*+.          |
|  +0 +=. .          |
|   ...+ .           |
|    .. o o          |
|      S             |
| o   .....         |
|= o  o.o.*          |
|+o oo.+ = E         |
|...oo.++B          |
+----[SHA256]-----+
PS C:\Users\rrupani\Desktop\CSE 15L\Files>
```

```

| 0 .....
| = 0 0.0.*
| +0 00.+ = E
| ....00.++B
+----[SHA256]-----+
PS C:\Users\rrupani\Desktop\CSE 15L\Files> ssh-add
Error connecting to agent: No such file or directory
PS C:\Users\rrupani\Desktop\CSE 15L\Files> ssh cs15lfa22bd@ieng6.ucsd.edu
Password:
Last login: Wed Sep 28 15:11:03 2022 from its-cseb260-27.ucsd.edu
Hello cs15lfa22bd, you are currently logged into ieng6-203.ucsd.edu

You are using 0% CPU on this system

Cluster Status
Hostname    Time    #Users  Load  Averages
ieng6-201   15:20:01  19  0.24, 0.14, 0.14
ieng6-202   15:20:01  17  0.02, 0.15, 0.25
ieng6-203   15:20:01  17  0.07, 0.06, 0.10

Wed Sep 28, 2022 3:23pm - Prepping cs15lfa22
[cs15lfa22bd@ieng6-203]:~:22$ mkdir .ssh
[cs15lfa22bd@ieng6-203]:~:23$ exit
logout
Connection to ieng6.ucsd.edu closed.
PS C:\Users\rrupani\Desktop\CSE 15L\Files> scp C:/Users/rrupani/.ssh/id_rsa.pub cs15lfa22bd@ieng6.ucsd.edu:~/.ssh/authorized_k
eys
Password:
Password:
Password:
cs15lfa22@ieng6.ucsd.edu's password:
Permission denied, please try again.
cs15lfa22@ieng6.ucsd.edu's password:
Received disconnect from 128.54.70.238 port 22:2: Too many authentication failures
Disconnected from 128.54.70.238 port 22
lost connection
PS C:\Users\rrupani\Desktop\CSE 15L\Files> scp C:/Users/rrupani/.ssh/id_rsa.pub cs15lfa22bd@ieng6.ucsd.edu:~/.ssh/authorized
_keys
Password:
id_rsa.pub                                100% 580    1.8KB/s   00:00
PS C:\Users\rrupani\Desktop\CSE 15L\Files>

```

```

PS C:\Users\rrupani\Desktop\CSE 15L\Files> ssh cs15lfa22bd@ieng6.ucsd.edu
Last login: Wed Sep 28 15:29:11 2022 from its-cseb260-27.ucsd.edu
Hello cs15lfa22bd, you are currently logged into ieng6-203.ucsd.edu

```

You are using 0% CPU on this system

Cluster Status

Hostname	Time	#Users	Load	Averages
ieng6-201	15:30:01	18	0.08,	0.10, 0.13
ieng6-202	15:30:01	21	0.13,	0.10, 0.17
ieng6-203	15:30:01	22	0.05,	0.16, 0.14

```

Wed Sep 28, 2022 3:31pm - Prepping cs15lfa22
[cs15lfa22bd@ieng6-203]:~:28$

```

Optimizing Remote Running

To optimize commands you are planning to run on the remote server, there are a few tricks that you can use.

First, you can write your commands in "" after the ssh command to directly run them on the remote server after you login.

For example: `ssh cs15lfa22zz@ieng6.ucsd.edu "ls; cd dir1"` This will log into your cs15l account using ssh and then list all the files and folders in the home directory after which it will change directory to dir1

Next, you can use semicolons to run multiple commands on the same line.

For example: `cp WhereAmI.java OtherMain.java; javac OtherMain.java; java WhereAmI` This will copy WhereAmI.java to OtherMain.java, compile OtherMain.java and then run WhereAmI.class.

Lastly, you can use the up arrow key to go to the previous command that you have used.

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS C:\Users\rrupani\Desktop\CSE 15L> ssh cs15lfa22bd@ieng6.ucsd.edu "ls"
CS15L
hello.txt
perl5
PS C:\Users\rrupani\Desktop\CSE 15L> cd Files
PS C:\Users\rrupani\Desktop\CSE 15L\Files> cp WhereAmI.java OtherMain.java; javac OtherMain.java; java WhereAmI
Windows 10
rrupani
C:\Users\rrupani
C:\Users\rrupani\Desktop\CSE 15L\Files
PS C:\Users\rrupani\Desktop\CSE 15L\Files> |
```