CPSC 240 Computer Organization and Assembly Language

First Program

Hello World

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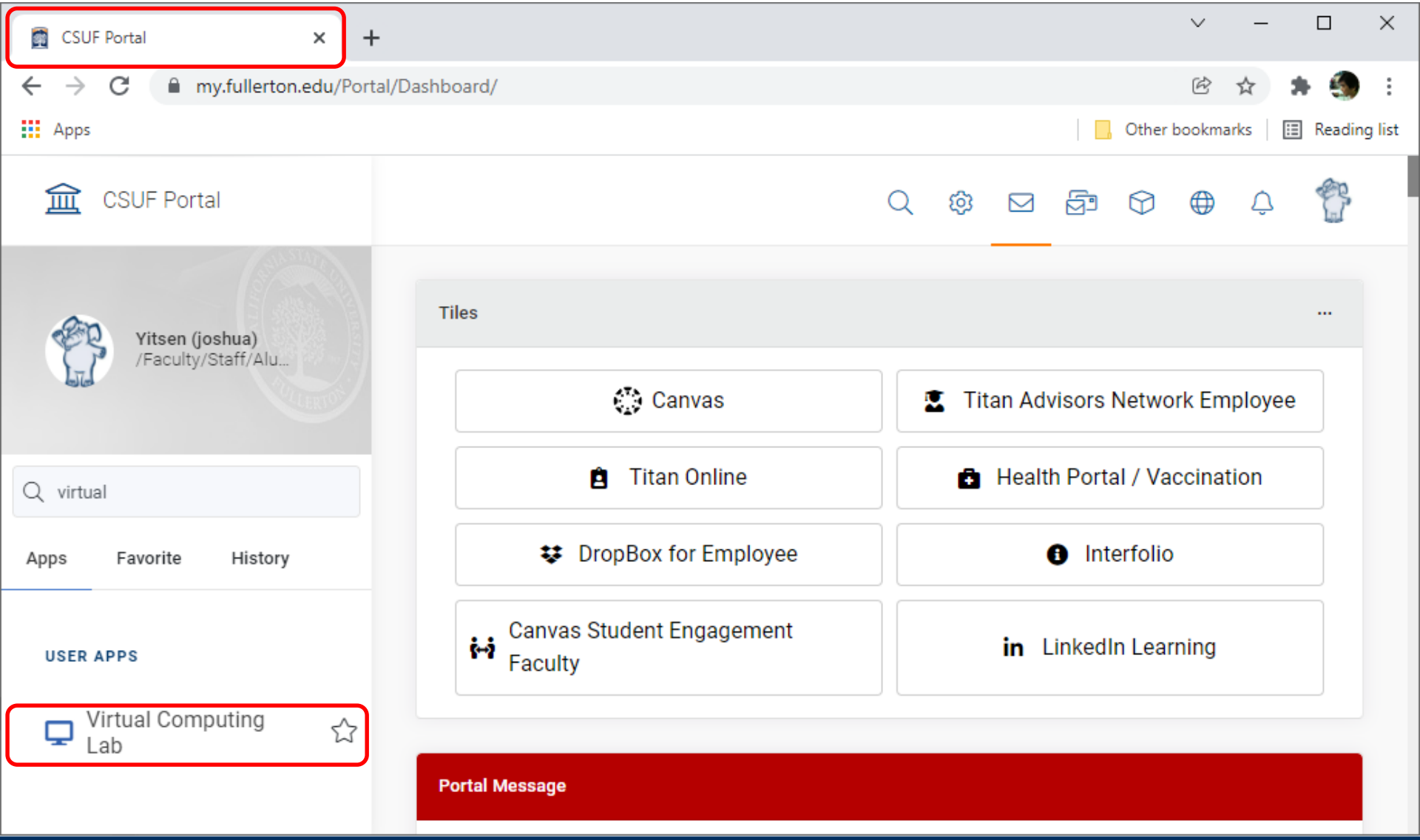
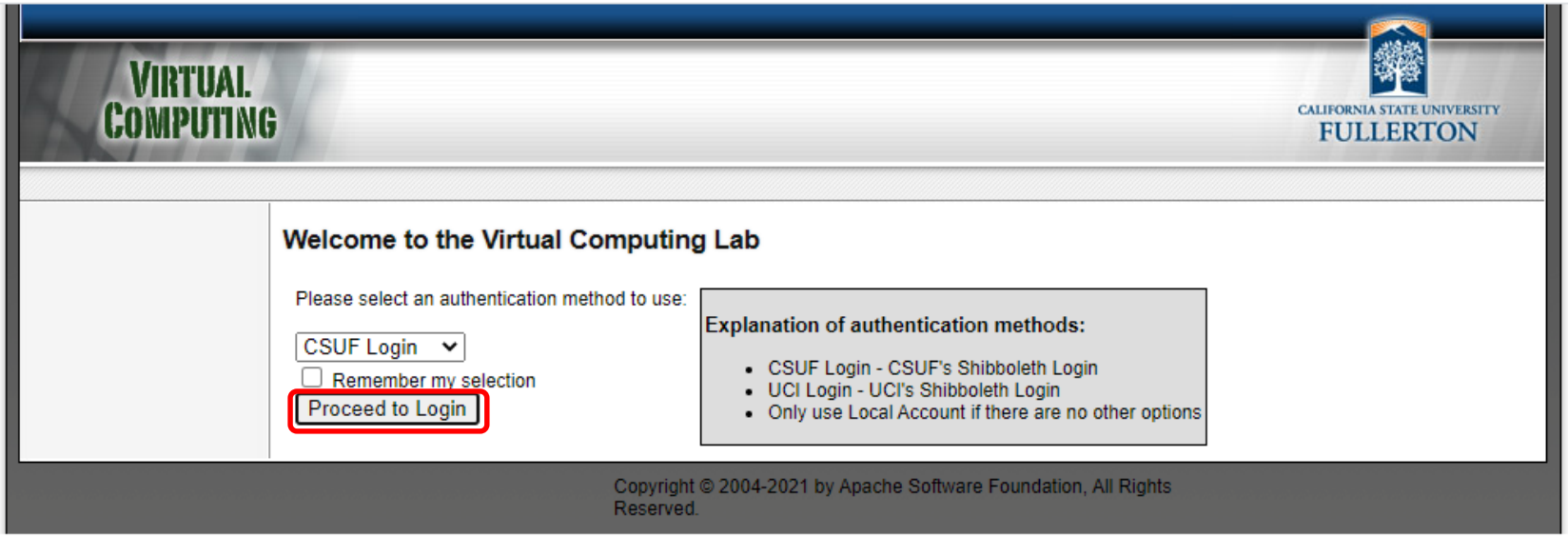
Open Ubuntu Tuffix on VCL

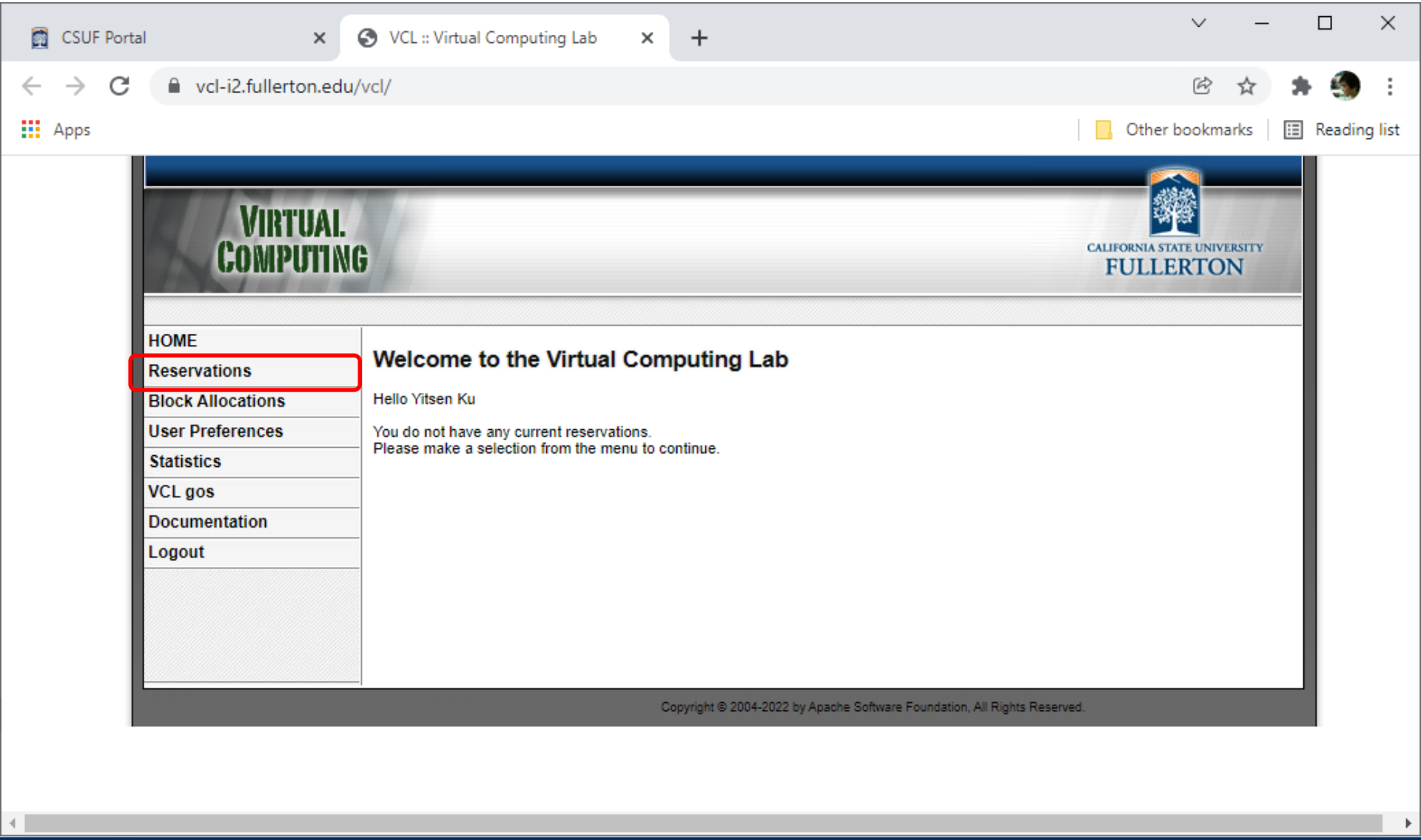
a. Search "Virtual" in Portal, and click "Virtual Computing Lab".



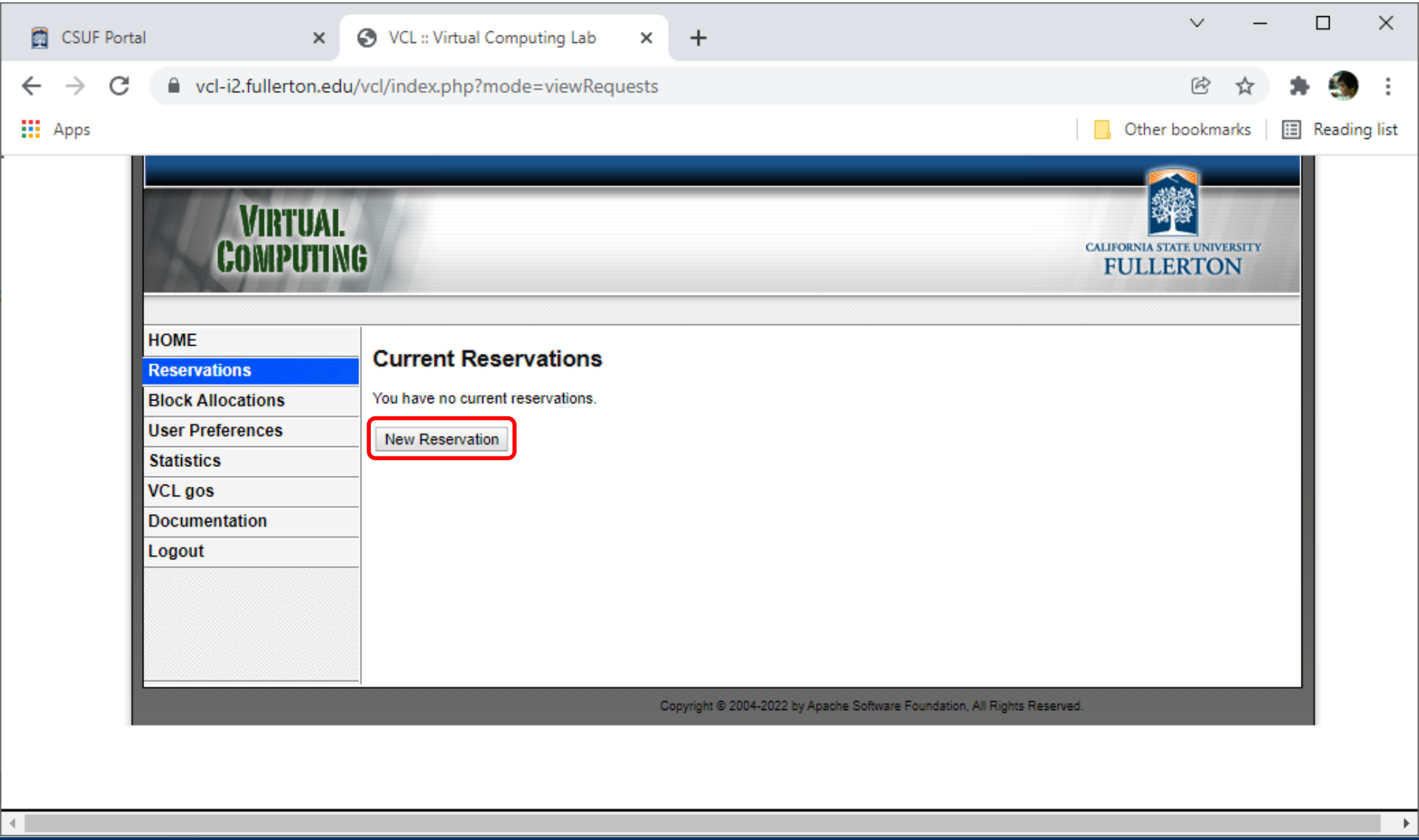
b. Click "Proceed to Login" in the Virtual Computing Lab.



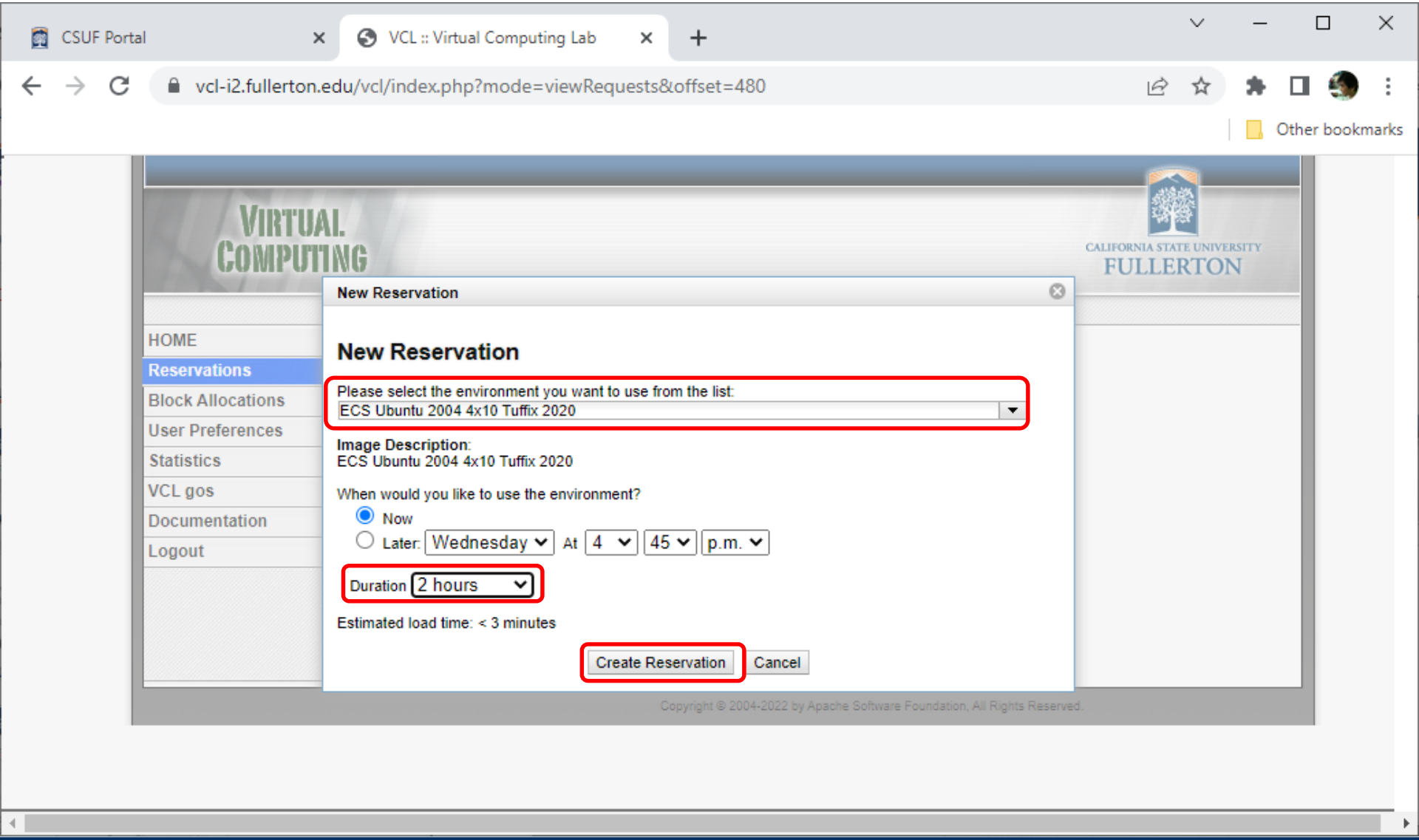
c. Select "Reservations" in the Virtual Computing Lab.



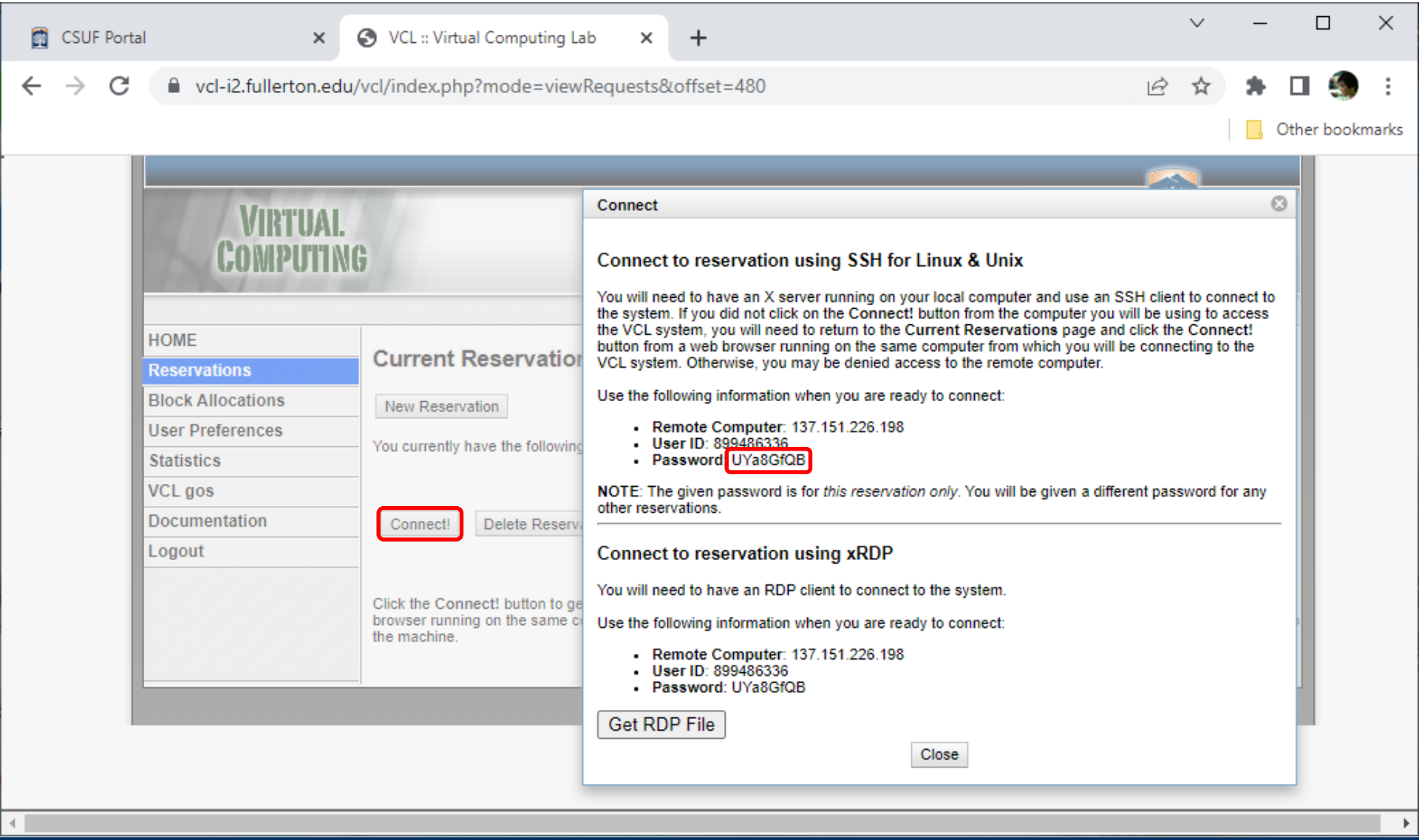
d. Click "New Reservation" button to open New Reservation dialog.



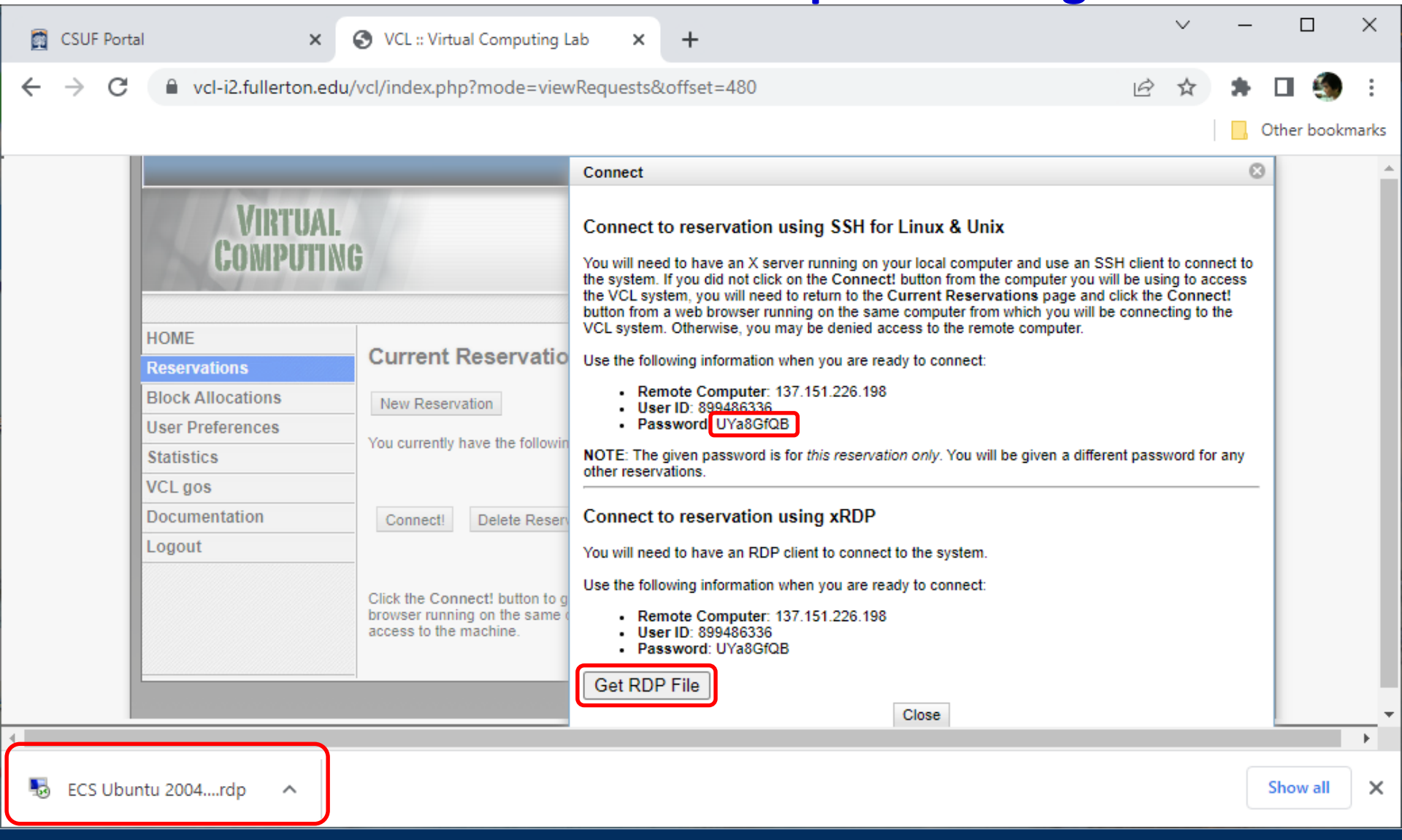
e. Select "ECS Ubuntu 2004 4x10 Tuffix 2020" and select "Duration=1/2/4 hours". Click "Create Reservation" button.



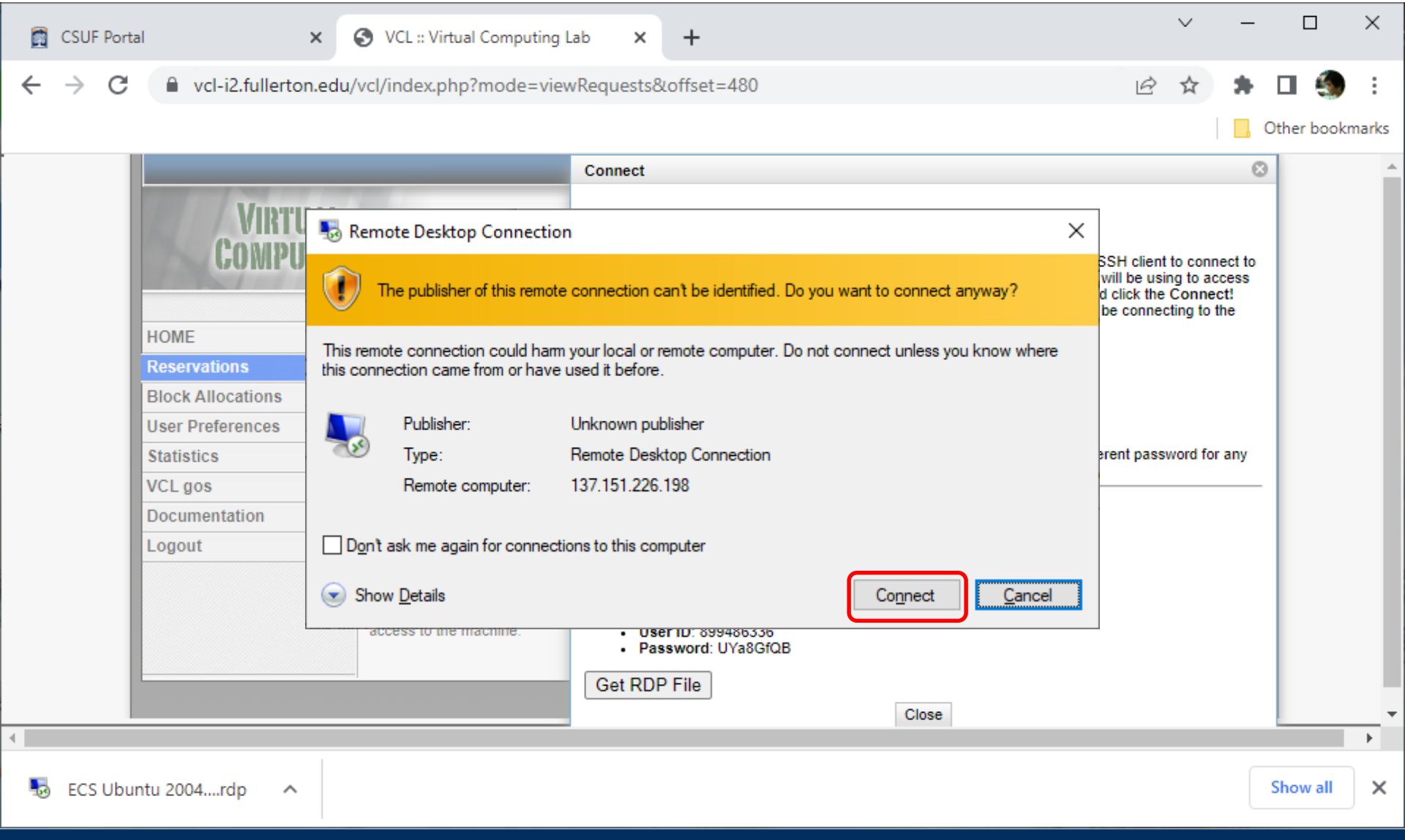
f. Click "Connect!" to open "Connect" dialog.



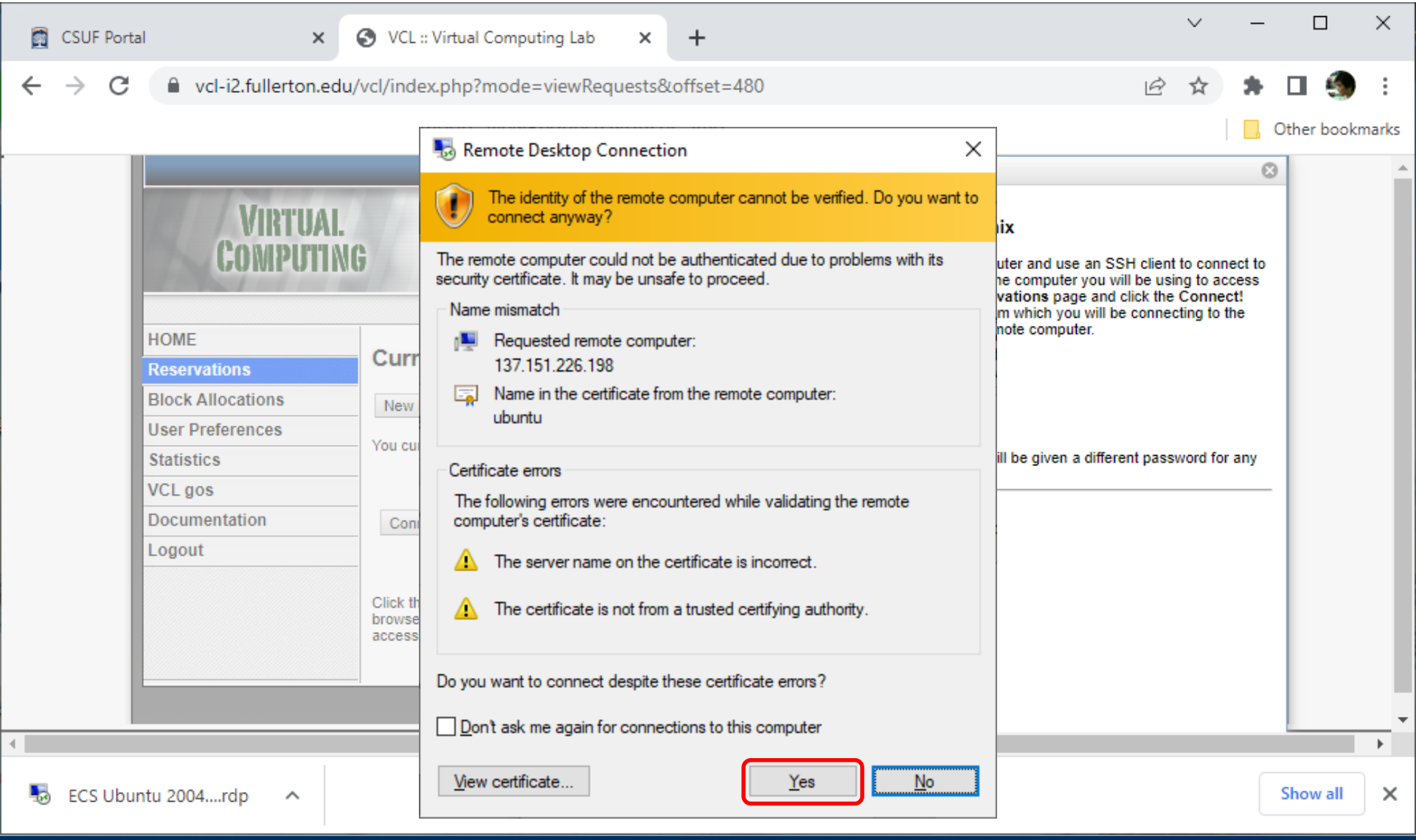
g. Click "Get RDP file" button, and then Click the " ECS Ubuntu 2004 4x10 Tuffix 2020.rdp" file to log in.



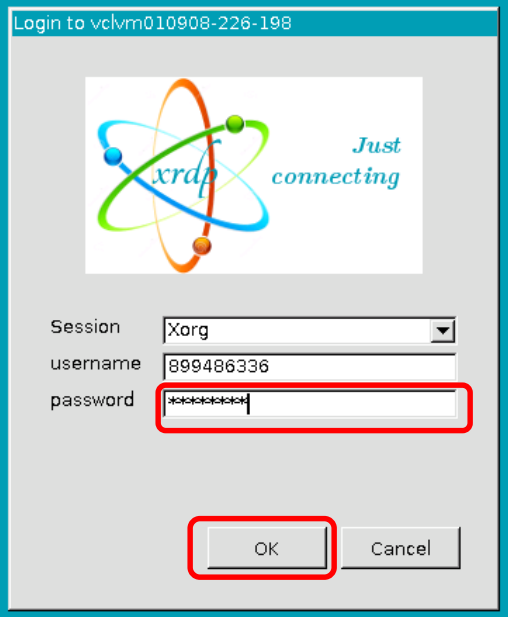
h. Click the "Connect" button to continue.



i. Click the "Yes" button to continue.

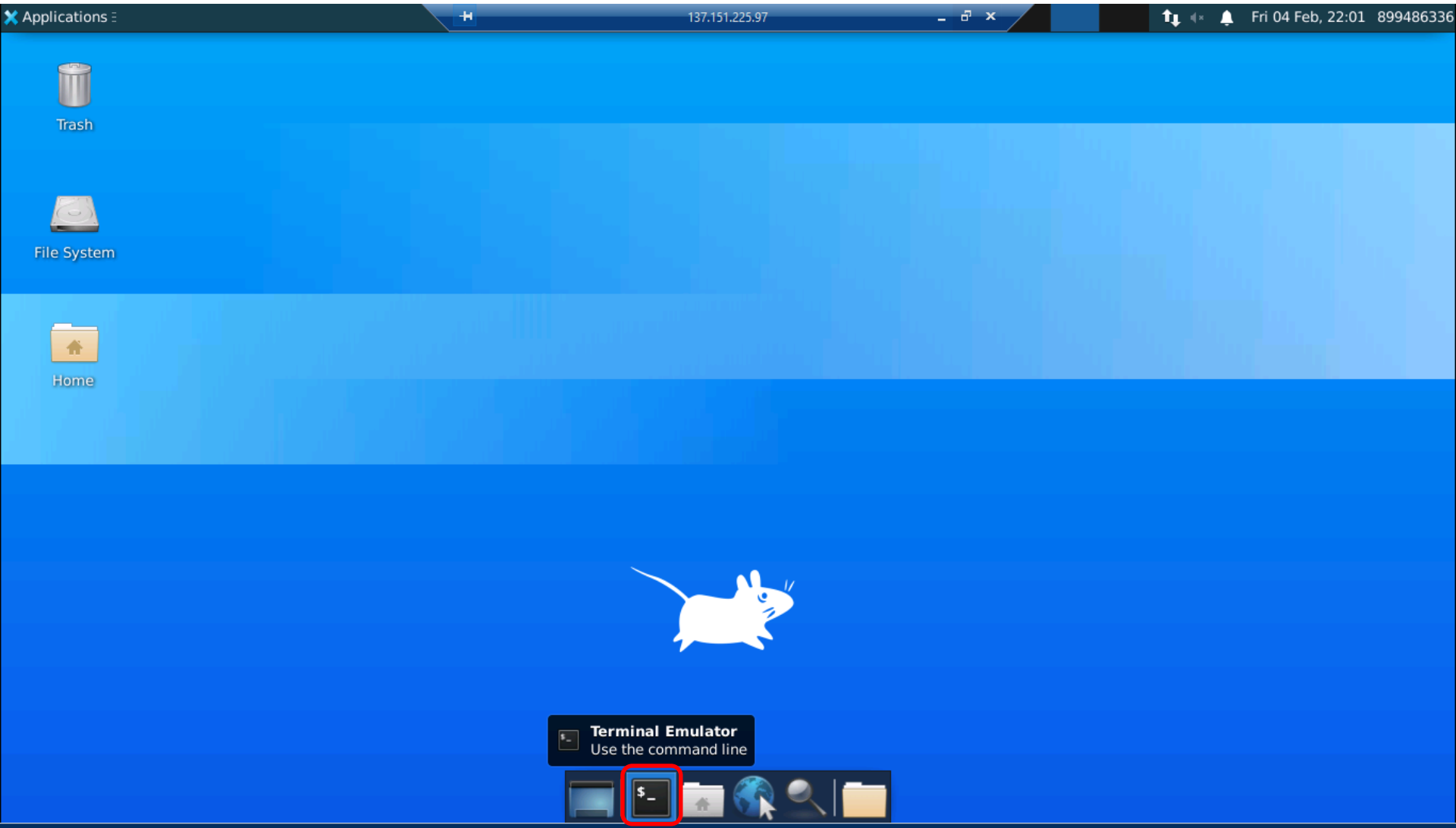


j. Input password and click the "OK" button to continue.

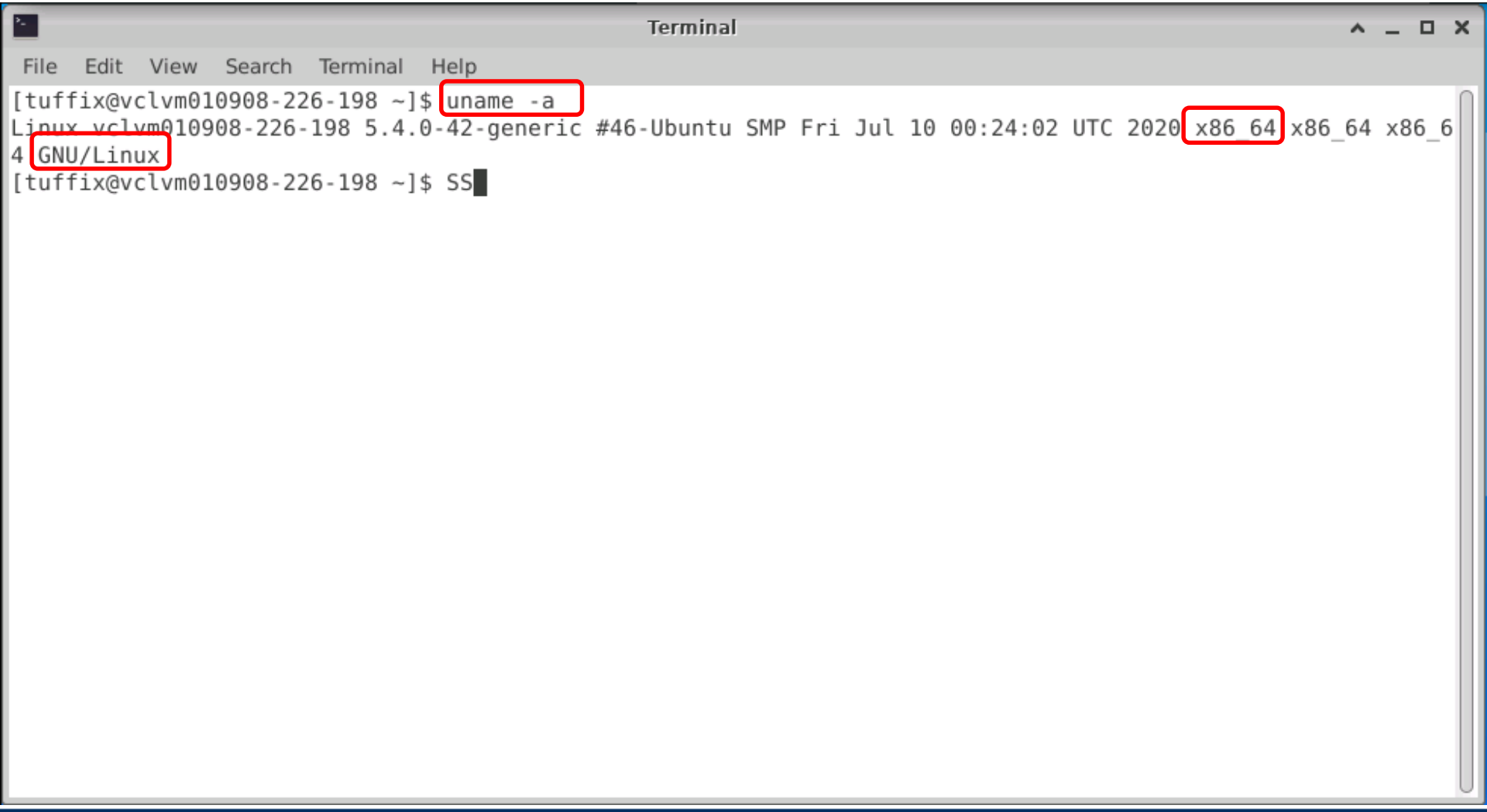


Create New Program

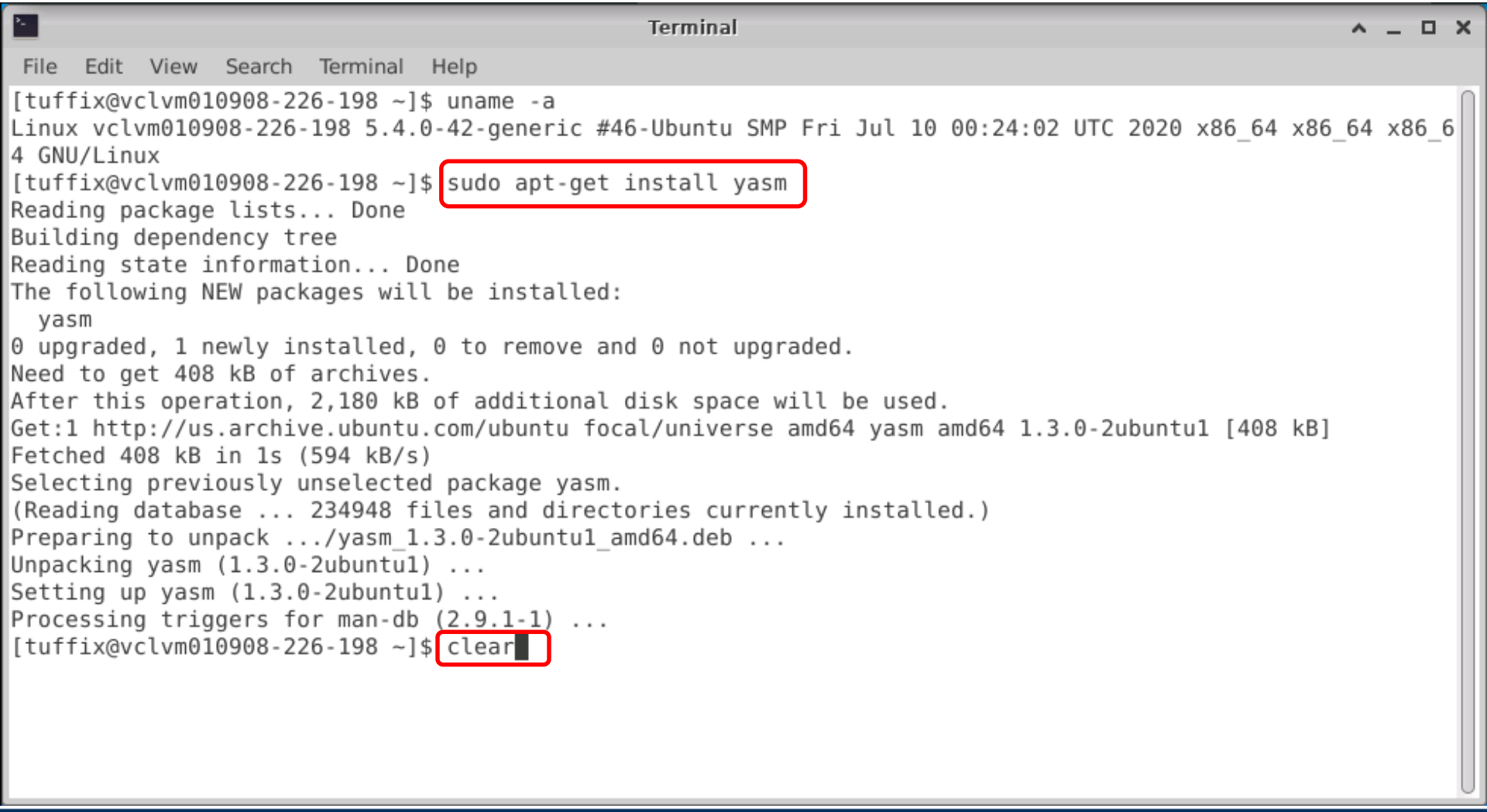
a. Click the "Terminal Emulator" to open the "Terminal Emulator" window.



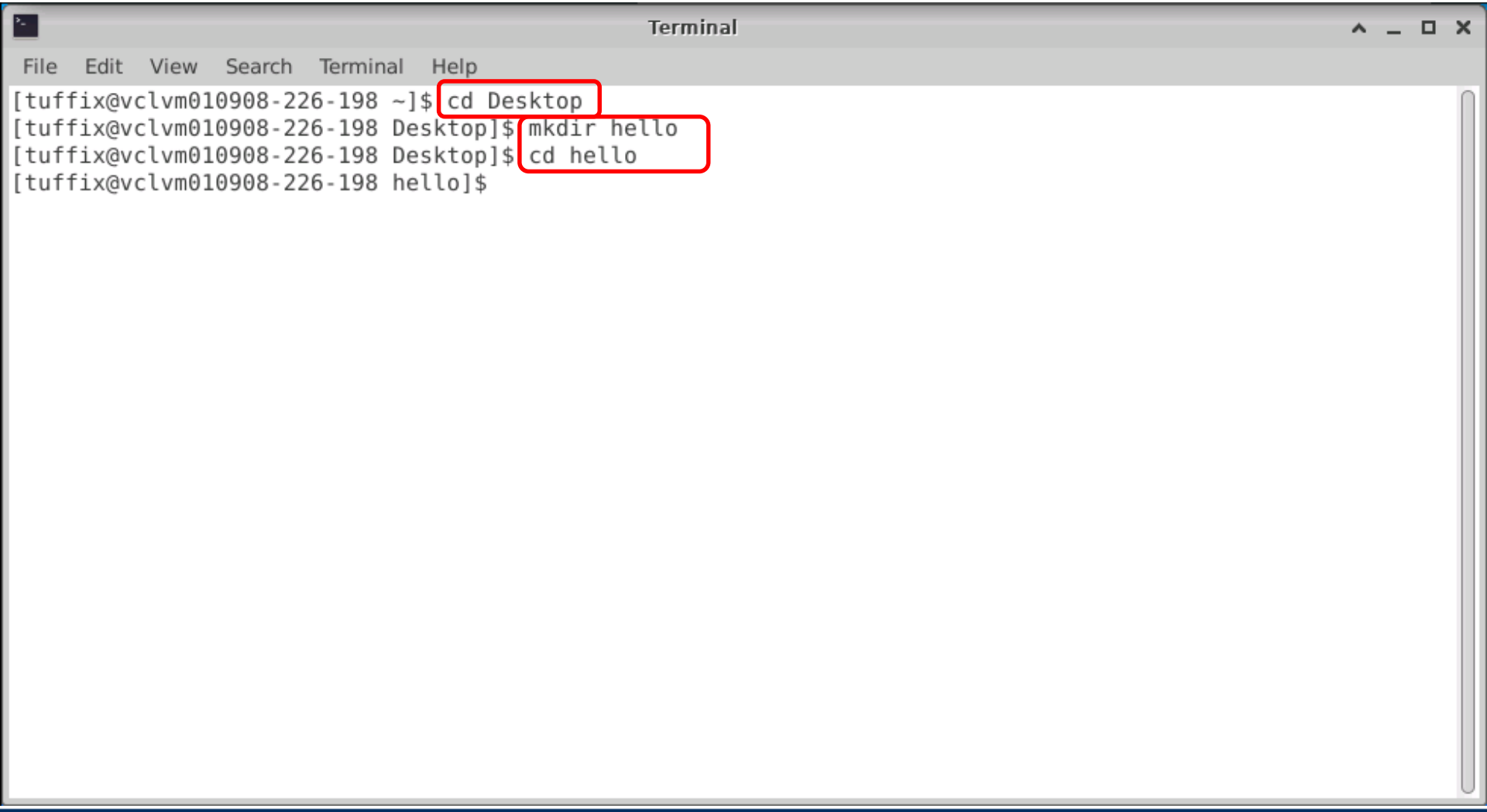
b. Input "uname -a" to check the system.
The message shows the system is "x86_64 GNU/Linux".



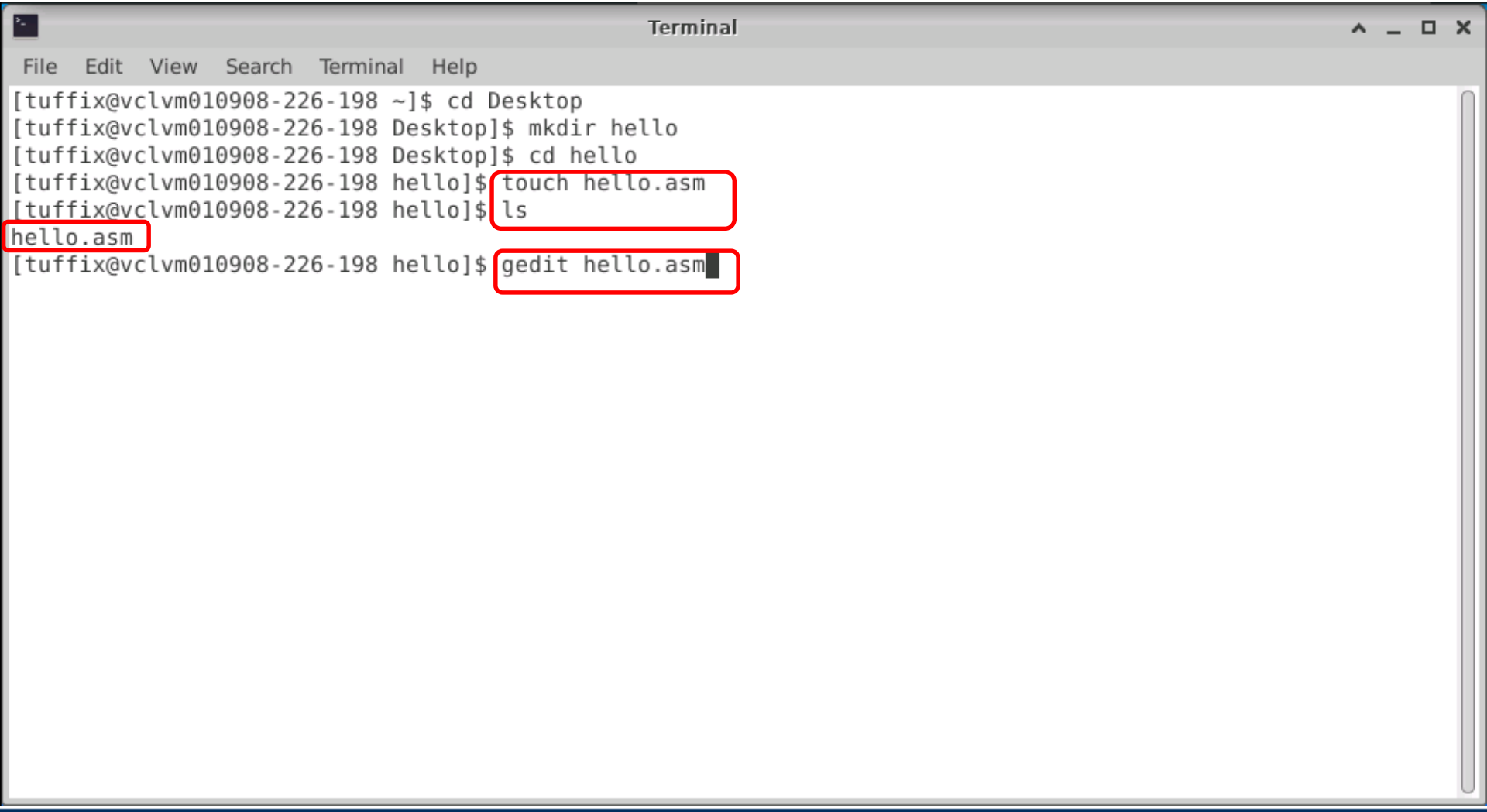
c. Input the "sudo apt-get install yasm" command to install "yasm" assembler. Input "clear" command to clear the window.



d. Input "cd Desktop" to change directory to "Desktop". Input "mkdir hello" to create "hello" folder. Input "cd hello" to change directory to "Desktop/hello".

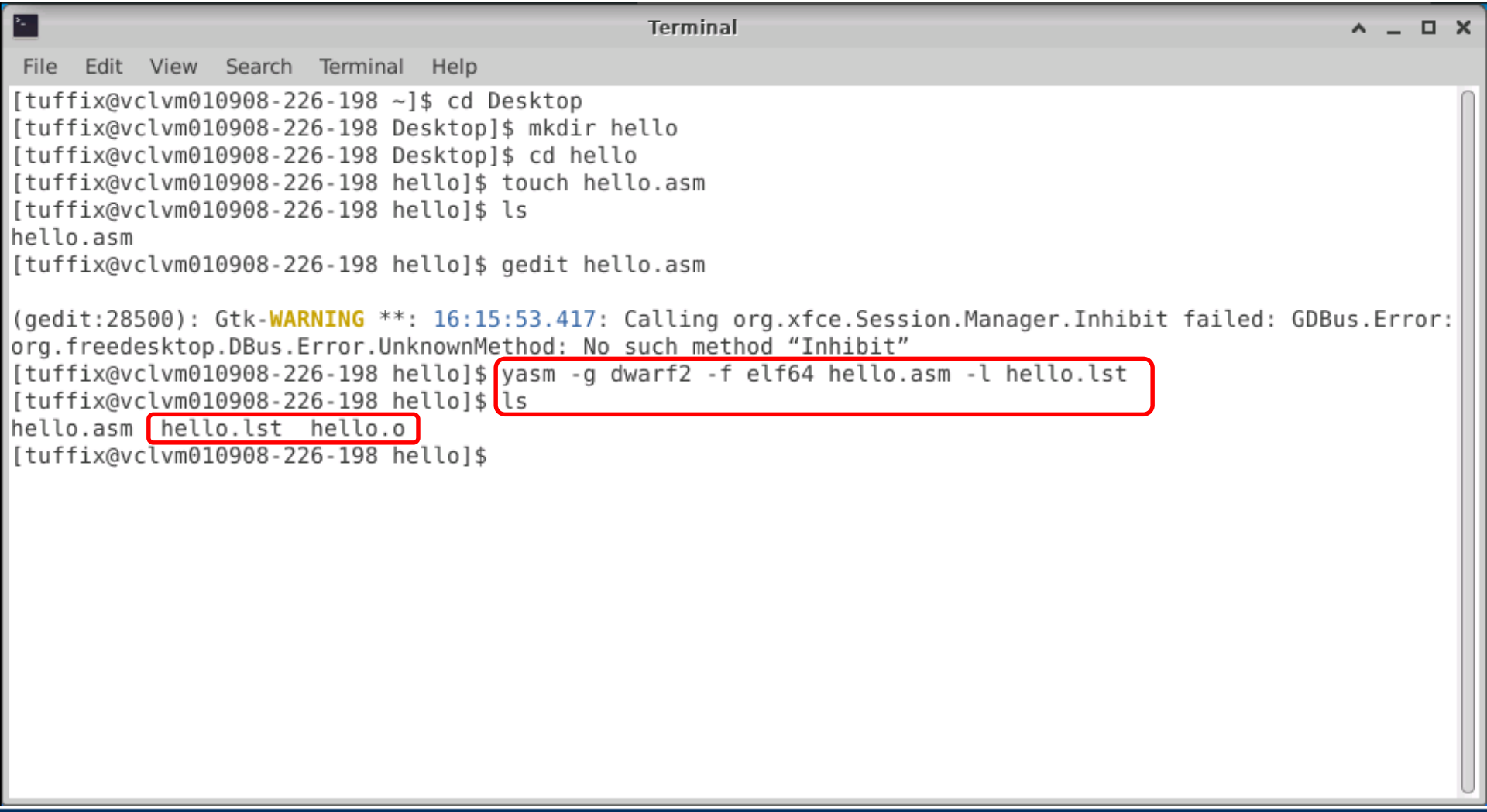


d. Input "touch hello.asm" to create "hello.asm" file. Input "ls" to show the file in the "hello" folder. Input "gedit hello.asm" to edit "hello.asm" file.

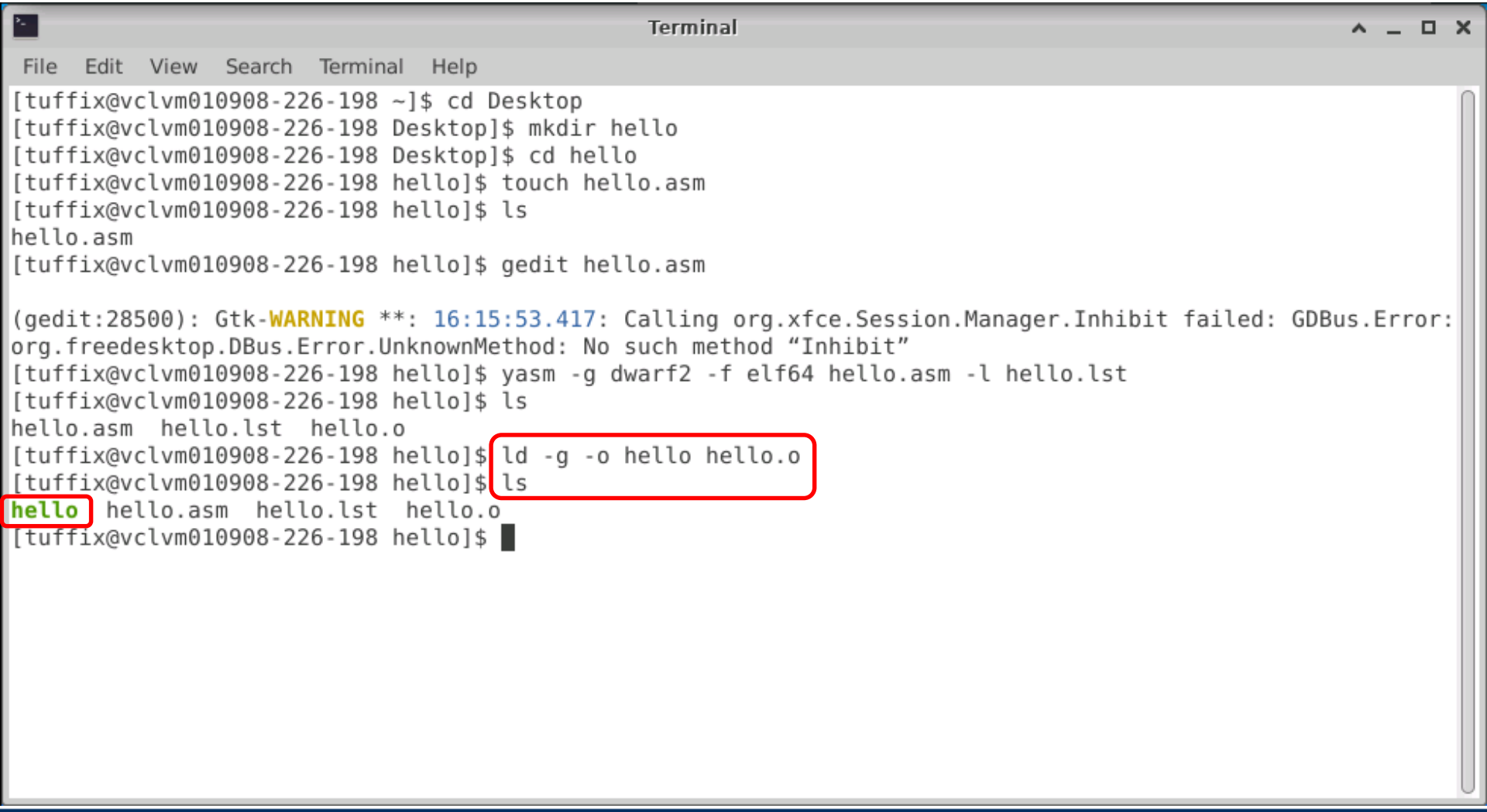


e. Input the program as follows:
Click "Save" button to save the program to "hello.asm".
Click "X" to return to "Terminal Emulator".

f. Input "yasm -g dwarf2 -f elf64 hello.asm -l hello.lst" command to run the assembler and generate "hello.lst" and "hello.o" files. Input "ls" to check the directory.



g. Input "ld -g -o hello hello.o" command to run the linker and generate "hello" files. Input "ls" to check the "Desktop" directory.



h. Input "./hello" command to execute the "hello" file and display the execution result of "hello, World!".

Terminal

File Edit View Search Terminal Help

```
[tuffix@vclvm010908-226-198 ~]$ cd Desktop
[tuffix@vclvm010908-226-198 Desktop]$ mkdir hello
[tuffix@vclvm010908-226-198 Desktop]$ cd hello
[tuffix@vclvm010908-226-198 hello]$ touch hello.asm
[tuffix@vclvm010908-226-198 hello]$ ls
hello.asm
[tuffix@vclvm010908-226-198 hello]$ gedit hello.asm

(gedit:28500): Gtk-WARNING **: 16:15:53.417: Calling org.xfce.Session.Manager.Inhibit failed: GDBus.Error:
org.freedesktop.DBus.Error.UnknownMethod: No such method “Inhibit”
[tuffix@vclvm010908-226-198 hello]$ yasm -g dwarf2 -f elf64 hello.asm -l hello.lst
[tuffix@vclvm010908-226-198 hello]$ ls
hello.asm  hello.lst  hello.o
[tuffix@vclvm010908-226-198 hello]$ ld -g -o hello hello.o
[tuffix@vclvm010908-226-198 hello]$ ls
hello  hello.asm  hello.lst  hello.o
[tuffix@vclvm010908-226-198 hello]$ ./hello
Hello, World!
[tuffix@vclvm010908-226-198 hello]$
```

i. Input "nano hello.lst" command to open "hello.lst" file.

Terminal

File Edit View Search Terminal Help

```
[tuffix@vclvm010908-226-198 ~]$ cd Desktop
[tuffix@vclvm010908-226-198 Desktop]$ mkdir hello
[tuffix@vclvm010908-226-198 Desktop]$ cd hello
[tuffix@vclvm010908-226-198 hello]$ touch hello.asm
[tuffix@vclvm010908-226-198 hello]$ ls
hello.asm
[tuffix@vclvm010908-226-198 hello]$ gedit hello.asm

(gedit:28500): Gtk-WARNING **: 16:15:53.417: Calling org.xfce.Session.Manager.Inhibit failed: GDBus.Error:
org.freedesktop.DBus.Error.UnknownMethod: No such method “Inhibit”
[tuffix@vclvm010908-226-198 hello]$ yasm -g dwarf2 -f elf64 hello.asm -l hello.lst
[tuffix@vclvm010908-226-198 hello]$ ls
hello.asm  hello.lst  hello.o
[tuffix@vclvm010908-226-198 hello]$ ld -g -o hello hello.o
[tuffix@vclvm010908-226-198 hello]$ ls
hello  hello.asm  hello.lst  hello.o
[tuffix@vclvm010908-226-198 hello]$ ./hello
Hello, World!
[tuffix@vclvm010908-226-198 hello]$ gedit hello.lst
```

j. The GNU nano will display the "hello.lst" file. Click "X" to return to "Terminal Emulator".

Open + hello.lst ~/Desktop/hello Save

```
1     1                                  %line 1+1 hello.asm
2     2
3     3
4     4
5     5
6     6                                  [section .data]
7     7 00000000 48656C6C6F2C20576F-      text db "Hello, World!", 10
8     8 00000000 726C64210A
9     9
10    10                                 [section .text]
11    11                                 [global _start]
12    12
13    13                                 _start:
14    14 00000000 48C7C001000000          mov rax, 1
15    15 00000007 48C7C701000000          mov rdi, 1
16    16 0000000E 48C7C6[00000000]        mov rsi, text
17    17 00000015 48C7C20E000000          mov rdx, 14
18    18 0000001C 0F05                    syscall
19    19
20    20 0000001E 48C7C03C000000          mov rax, 60
21    21 00000025 48C7C700000000          mov rdi, 0
22    22 0000002C 0F05                    syscall
```

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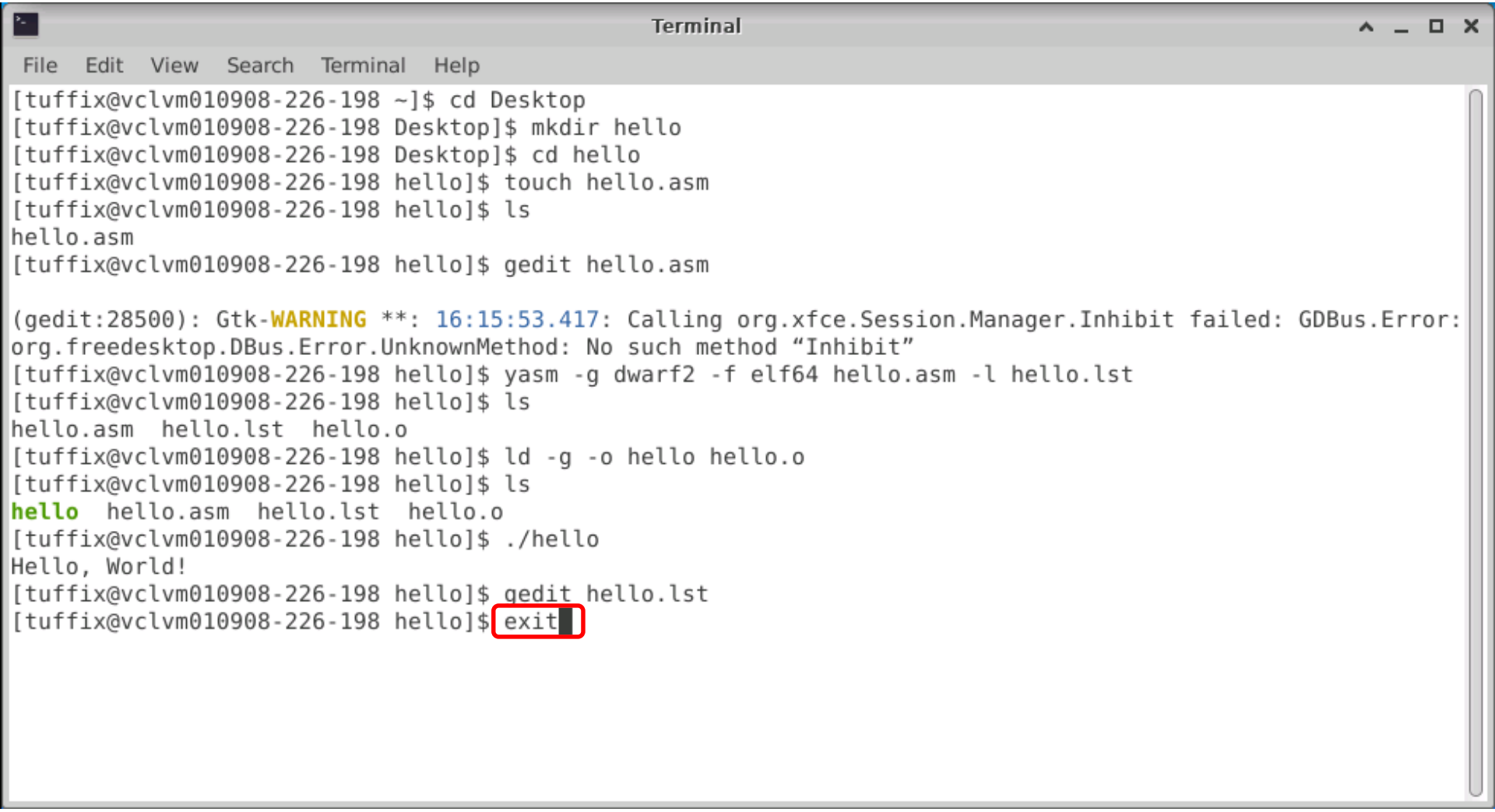
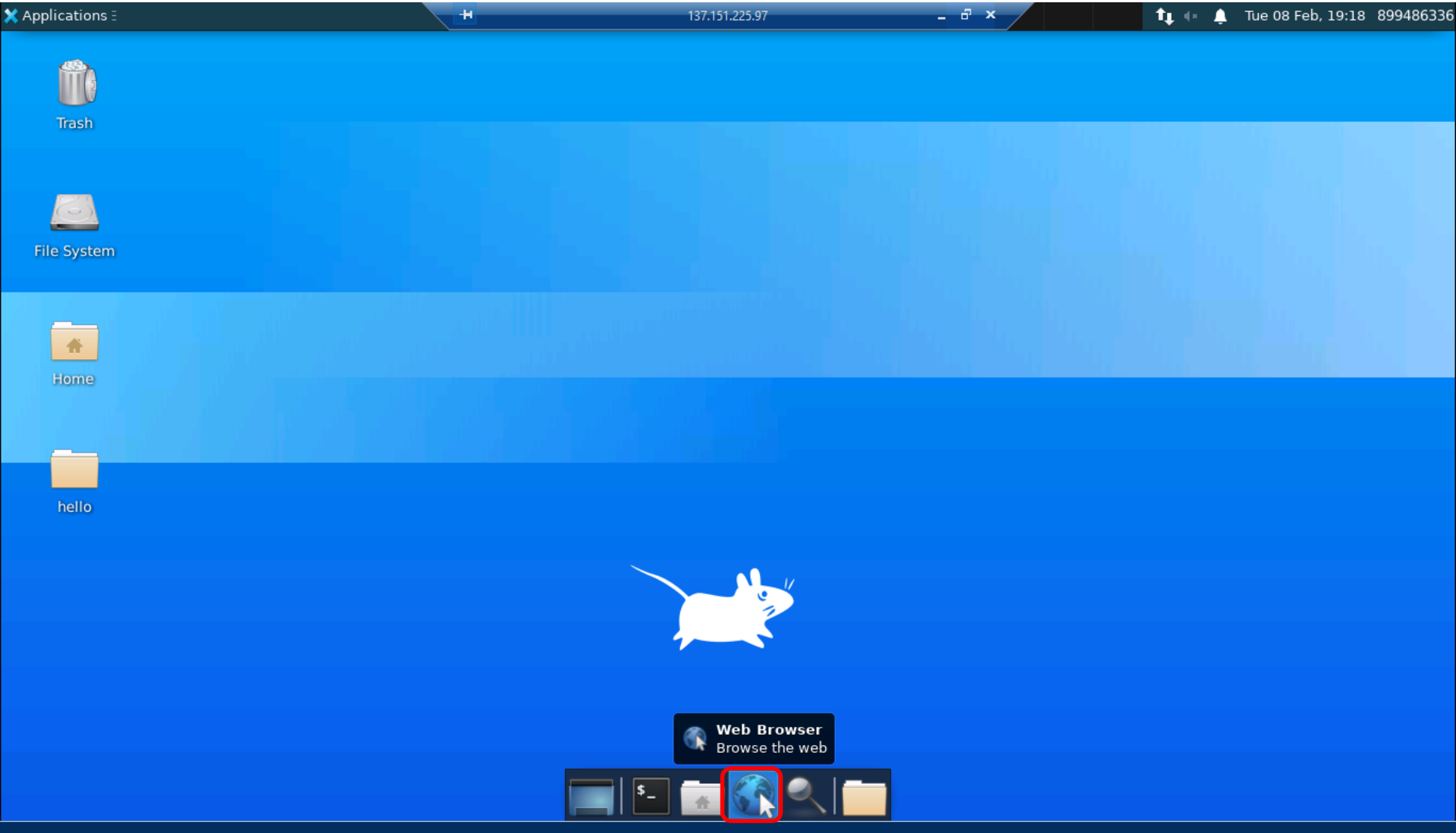
k. Input "exit" to close the "Terminal Emulator" and return to the "Desktop".



Upload Program

Optional

a. Switch to "Desktop" and click on "Web Browser" to open "Web Browser".



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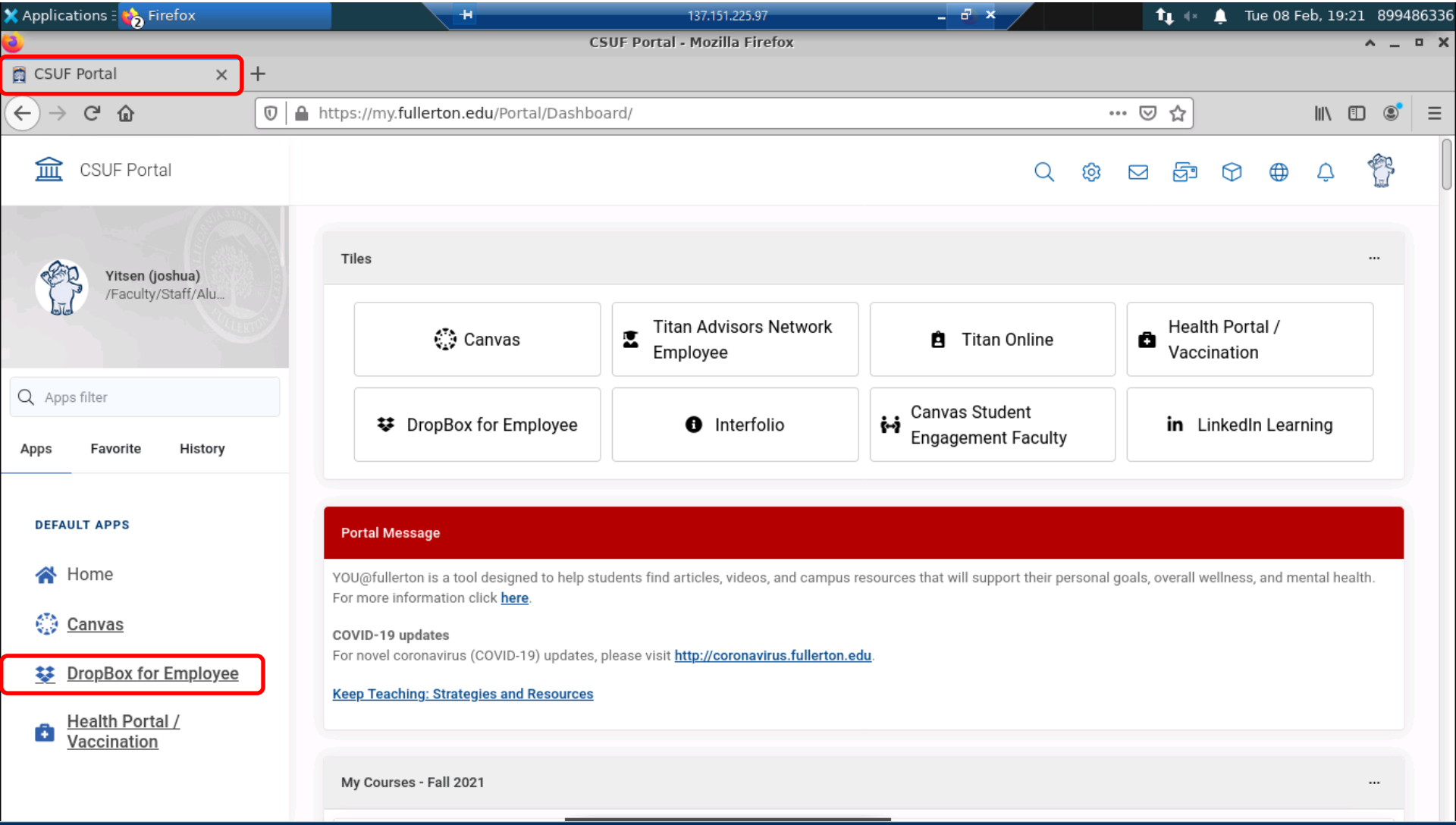
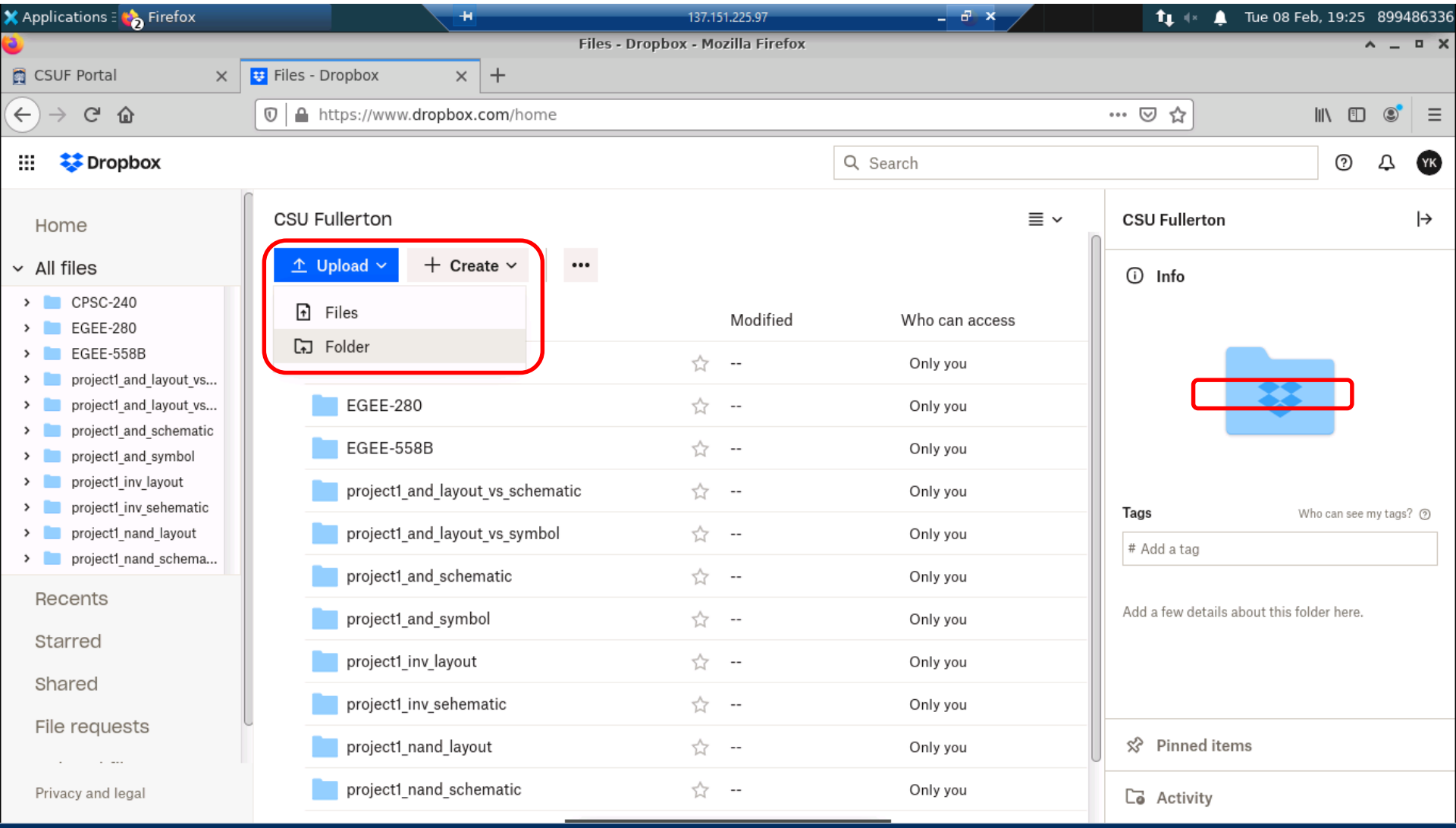
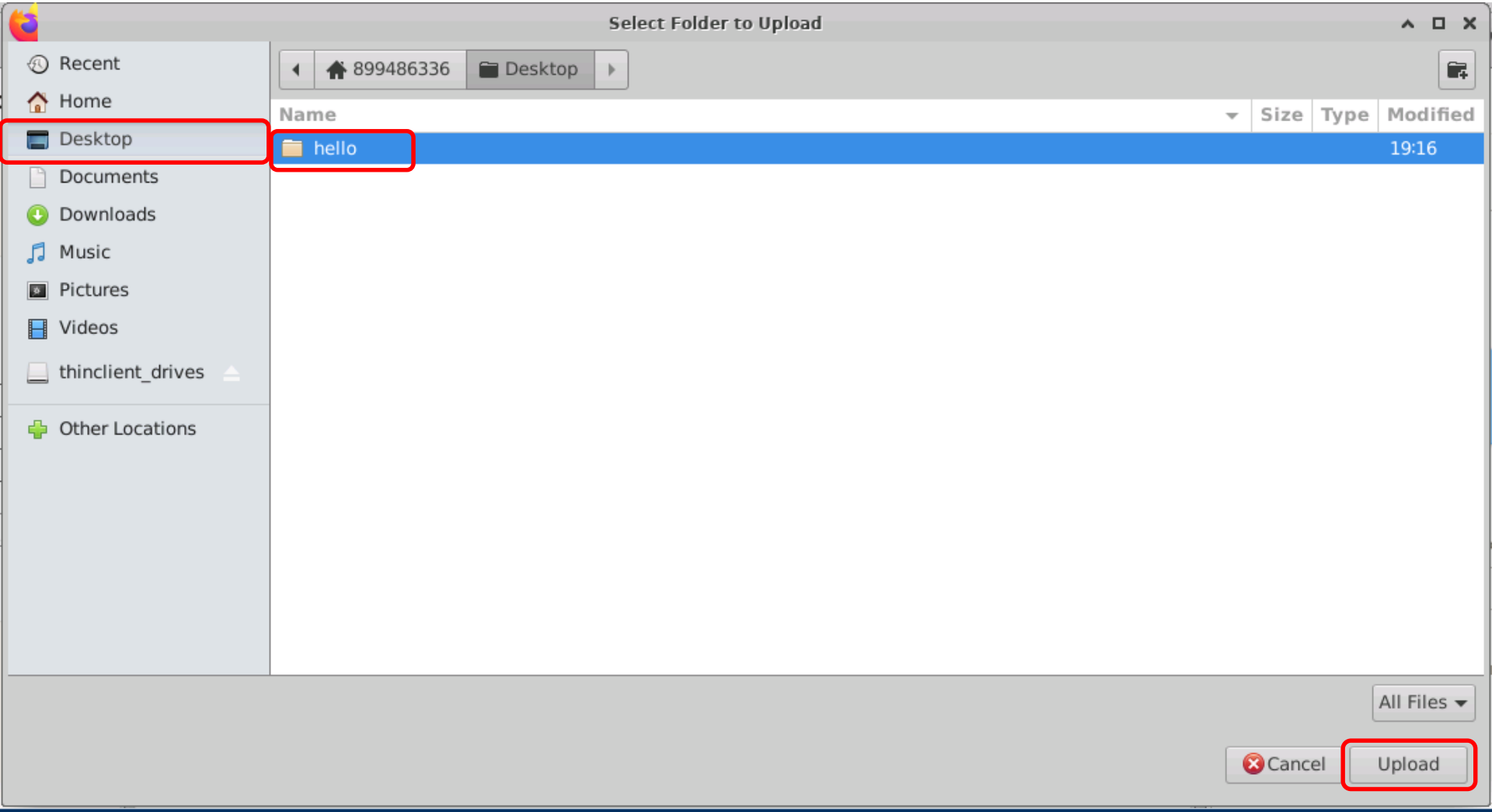
b. Open "CSUF portal" and click on the "DropBox"



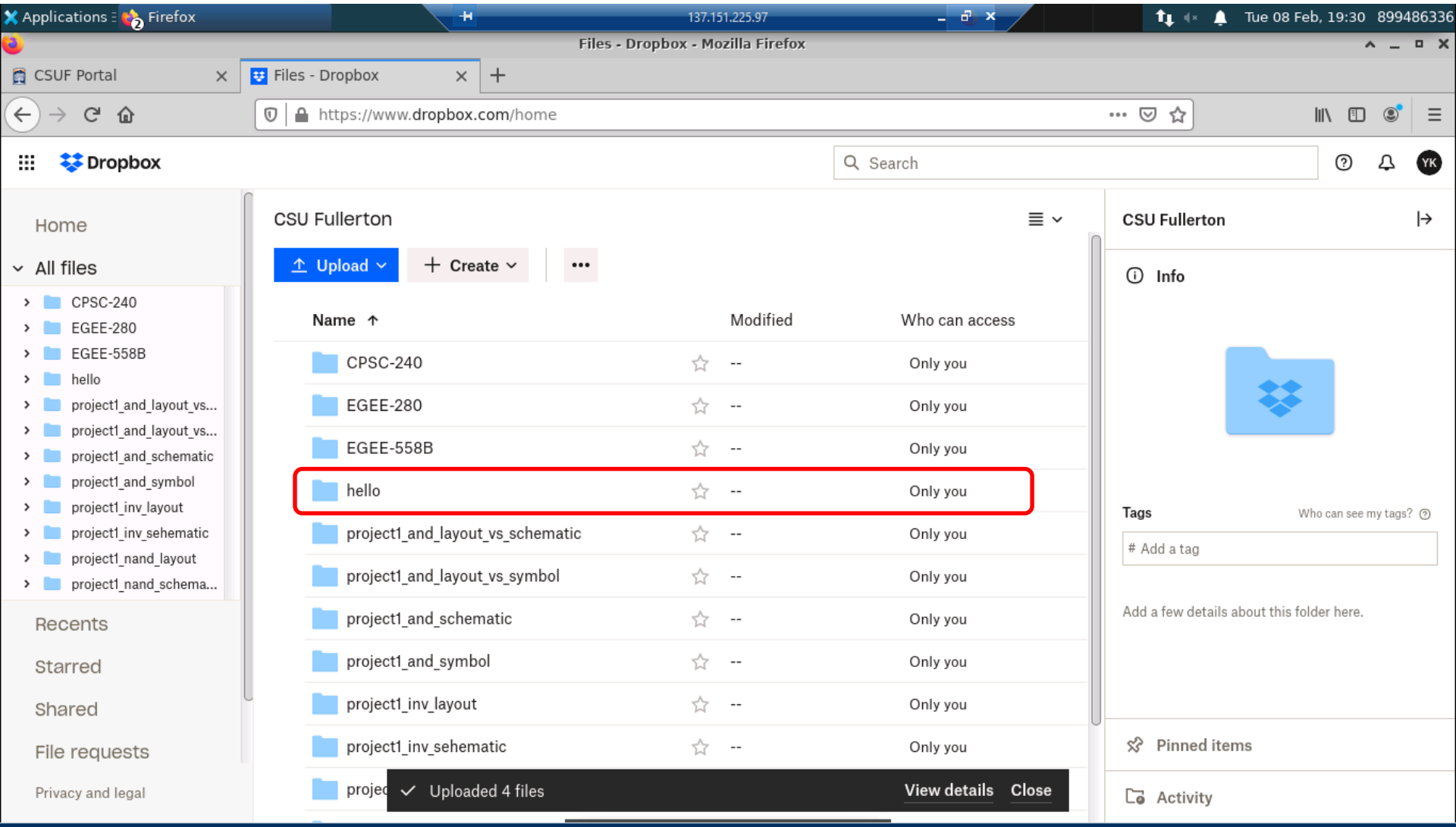
c. Click the "Upload/folder" on the Dropbox page



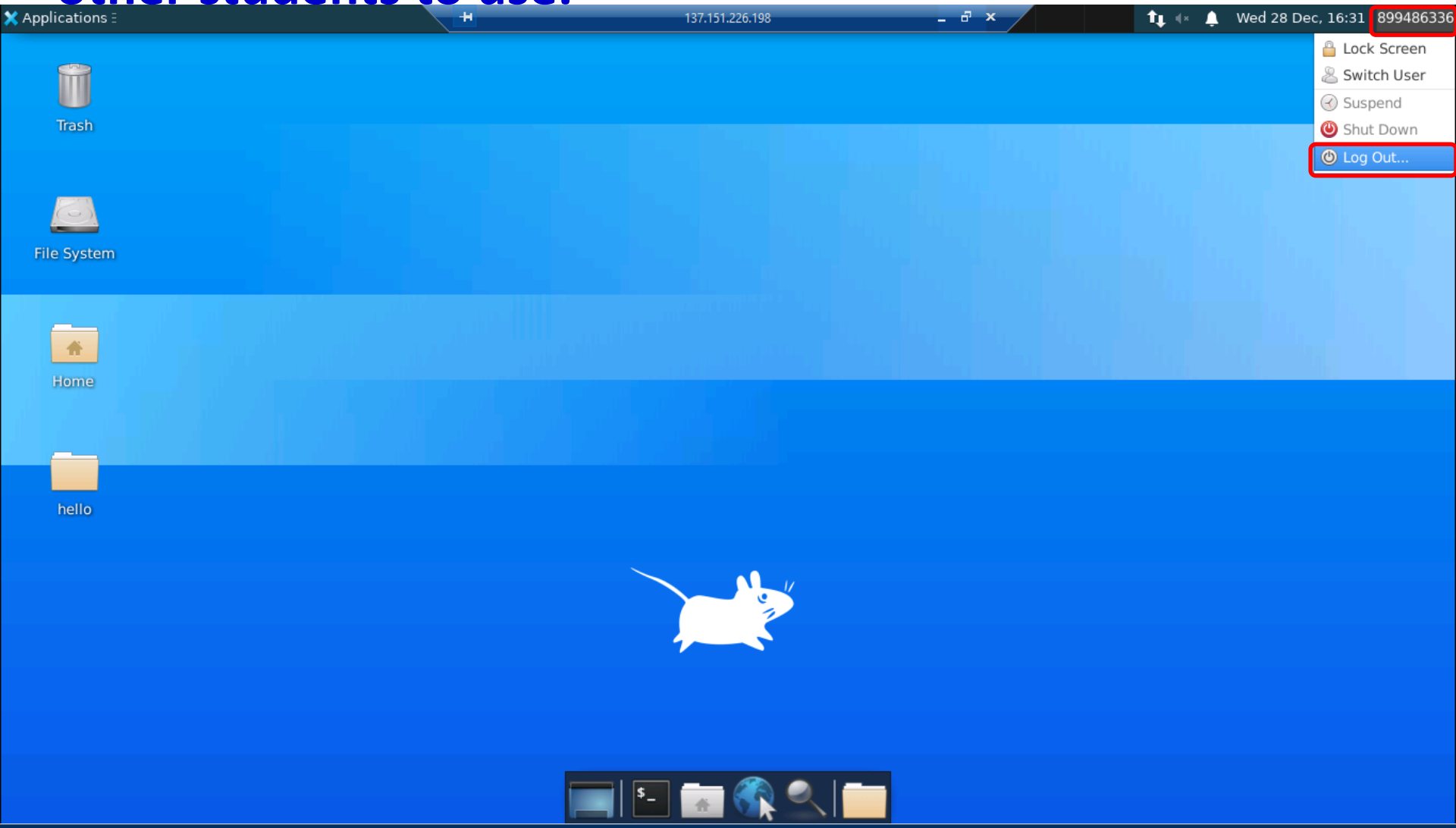
d. Select the "hello" folder on the Desktop and click the "Upload" button to continue...



e. The "hello" folder has been uploaded to Dropbox.



I. Click the "CWID" and select "Log Out..." to terminate the "Remote Desktop" connection and free up bandwidth for other students to use.



Thanks