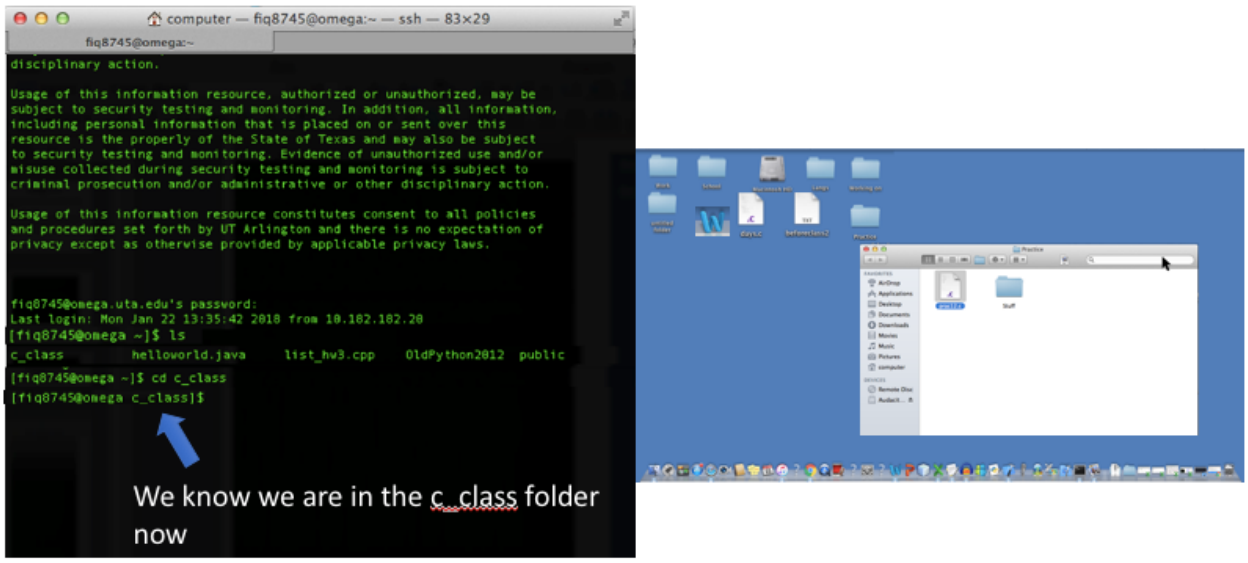
# Additional Omega/Virtual Machine info:

## Omega:

Ill talk about three main topics (remember in the intro lectures, I go over the concept of it):
-Beginning navigation around Omega (using the command line)
-Writing a program on Omega
-Sending files between your local computer and Omega

### Beginning navigation around Omega:

Note: remember from the intro lecture that there is NO GUI on Omega…which means the only we can navigate using the command line by typing in text commands. For example, when we are used to clicking on our desktop with the to open a folder and see its contents, we have to use a text command when we have no GUI:




Some good basic starting commands would be:

ls-see contents of current directory
cd-change directories
pwd-see your current location
rm-remove a file
mkdir-make a folder
clear-clear the screen
cat-view a file
mv-move a file
cp-copy a file

NOTE: you can use the up and down arrows to see previously used commands, tab to autocomplete when typing in a command…there are also other shortcuts you can do-LOOK IT UP!!

```
(base) Computers-Air:~ computer$ ssh fiq8745@omega.uta.edu   log in using ssh from your computer
```

```
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fiq8745@omega.uta.edu's password:
Last login: Thu Aug 26 09:45:37 2021 from 129.107.157.50
*****************************************************************************
      U N I V E R S I T Y   O F   T E X A S   A T   A R L I N G T O N
*****************************************************************************
    ____  ____ ___  ___  ____ ____ _ | Red Hat Enterprise Linux 5.11       |
   / __ \/ __ `__ \/ _ \/ __ `/ __ `/ | release 5.11 (Tikanga)              |
  / /_/ / / / / / /  __/ /_/ / /_/ /  | Intel Xeon CPU E5-2699 v4 @ 2.20GHz |
  \____/_/ /_/ /_/\___/\__, /\__,_/   | Processors: 4   RAM: 16GB           |
                     /____/           ***************************************

  Omega(Ω) is available for UTA student academic use. It is a general
  purpose UNIX server suitable for learning software development.

  For more information about Omega, visit https://go.uta.edu/omega

  Available tools: gcc/g++/gfortran 4.1.2, Python 2.4.3, PHP 5.1.6,
    ruby 1.8.5, mysql 14.14, SQL*Plus 11.2.0.4, SML 110.74, Sonnet 16.56
    Mathematica 7.0/8.0, perl 5.8.8, Java 1.6.0r20, cmake 2.6p4

  News:
    * Apr  1, 2020 - Omega is not accessible from Internet. It is accessible to
                     on-campus and VPN users. For more information on the VPN,
                     vist http://go.uta.edu/vpn

  OIT Help Desk Self Service is available: https://go.uta.edu/sn
*****************************************************************************
[fiq8745@omega ~]$ ls  See all items…note that when you first login, you are on your Omega “desktop”
1310C           fact.c       HelloWorld.class   mail     public_html
1320C           fiba.c       HelloWorld.java    Mail     tracer
anotherfile.txt  folder1      Info        nums.txt
Dustin.txt      Folderstuff  lightstuff.txt     Programs
[fiq8745@omega ~]$ cd 1310C Open another folder
[fiq8745@omega 1310C]$ pwd  See your current location
/home/f/fi/fiq8745/1310C
[fiq8745@omega 1310C]$ ls  See all items in your current location
a.out  helloworld.c
[fiq8745@omega 1310C]$ rm a.out  remove a file
[fiq8745@omega 1310C]$ ls
helloworld.c
[fiq8745@omega 1310C]$ cd ..  move up one directory level
[fiq8745@omega ~]$ ls
1310C           fact.c       HelloWorld.class   mail     public_html
1320C           fiba.c       HelloWorld.java    Mail     tracer
anotherfile.txt  folder1      Info        nums.txt
Dustin.txt      Folderstuff  lightstuff.txt     Programs
[fiq8745@omega ~]$ mkdir newfolder1  make a new folder
[fiq8745@omega ~]$ ls
1310C           fact.c       HelloWorld.class   mail       Programs
1320C           fiba.c       HelloWorld.java    Mail       public_html
anotherfile.txt  folder1      Info        newfolder1  tracer
Dustin.txt      Folderstuff  lightstuff.txt     nums.txt
[fiq8745@omega ~]$ rmdir newfolder1  delete that new folder
[fiq8745@omega ~]$ ls
```

```
1310C           fact.c       HelloWorld.class    mail     public_html
1320C           fiba.c       HelloWorld.java     Mail     tracer
anotherfile.txt  folder1      Info        nums.txt
Dustin.txt      Folderstuff  lightstuff.txt      Programs
[fiq8745@omega ~]$ exit
logout
```

**Remember:**

1. YOU CAN LOOK UP ADDITIONAL COMMANDS! There are many different ones!
2. You can also navigate your own computer with the command line. You can look up things like: mac terminal commands, windows command prompt commands

    -Terminal is how we access our computer without a GUI on a Mac

    -Command prompt is how we access our computer without a GUI on Windows

## Writing a program in Omega:

- You can use any editor present on Omega to create a program on Omega
    - I personally like to use an editor called vim
    - You can also use nano, emacs, pico
- Once a program is created, you can open it with any editor you would like to use
    - If you create a program on vim, you can later open it with nano if you would like
- Side note: you can make any sort of text file with the editors-you don't have to make a program
- Once you are logged into Omega, simply enter the editor name you want to use
    - I will use vim
- If you want to open an existing file, include that file name with the editor name:
    - vim existingfile.c
- If you want to create a new file, include that name with the editor name:
    - vim newfile.c

# Creating a Program

**If you are using vim, make sure to type i to get to insert mode**

```
#include <stdio.h>

int main (int argc, char **argv)
{
        printf("Hello world!");
}
~
~
~
~
~
~
~
~
~
~
~
~
-- INSERT --                                    8,1           All
```

**Type your program into the editor**

```
#include <stdio.h>

int main (int argc, char **argv)
{
        printf("Hello world!");
}
~
~
~
~
~
~
~
~
~
~
~
~
                                                8,0-1         All
```

(does not say insert)

**Press escape to exit insert mode (this it the mode you start in- you pushed i in the beginning to get to insert mode)**

```
#include <stdio.h>

int main (int argc, char **argv)
{
        printf("Hello world!");
}
~
~
~
~
~
~
~
~
~
~
~
~
                                                    8,0-1         All
```

(does not say insert)

**Press escape to exit insert mode (this it the mode you start in- you pushed i in the beginning to get to insert mode)**

**Once I exit the vim editor, I can open my file (called classcode1.c in this example) with another editor. I will use the nano editor**

**I simply type: nano classcode1.c**

```
  GNU nano 1.3.12            File: classcode1.c

#include <stdio.h>

int main (int argc, char **argv)
{
        printf("Hello world!");
}

                          [ Read 11 lines ]
^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^T To Spell
```

**You can type vim –help to get help on using vim**
***Note: you can do this with the other editors also**

```
[fiq8745@omega ~]$ vim -help
VIM - Vi IMproved 7.0 (2006 May 7, compiled Jul 10 2012 08:48:09)

usage: vim [arguments] [file ..]       edit specified file(s)
   or: vim [arguments] -               read text from stdin
   or: vim [arguments] -t tag          edit file where tag is defined
   or: vim [arguments] -q [errorfile]  edit file with first error

Arguments:
   --                   Only file names after this
   -v                   Vi mode (like "vi")
   -e                   Ex mode (like "ex")
   -s                   Silent (batch) mode (only for "ex")
   -d                   Diff mode (like "vimdiff")
   -y                   Easy mode (like "evim", modeless)
   -R                   Readonly mode (like "view")
   -Z                   Restricted mode (like "rvim")
   -m                   Modifications (writing files) not allowed
   -M                   Modifications in text not allowed
   -b                   Binary mode
   -l                   Lisp mode
```

Final note: Google is your friend. If you get stuck, you can always look up things like:
"vim commands"
"how to exit from pico"
"save file in nano"
"pico tutorial"

## Sending files between your computer and Omega:

Simple example showing file transfers between your computer and Omega (more involved example afterwards):

```
(base) Computers-MacBook-Air:C computer$ sftp fiq8745@omega.uta.edu     login using sftp, NOT ssh

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fiq8745@omega.uta.edu's password:
Connected to omega.uta.edu.
sftp> put practice.c     taking the file practice.c from my desktop and moving it omega desktop
Uploading practice.c to /home/f/fi/fiq8745/practice.c
practice.c                                                    100%  964    38.8KB/s   00:00

sftp> exit  exiting omega connection using sftp
```

```
(base) Computers-MacBook-Air:C computer$ ssh fiq8745@omega.uta.edu  omega connection login using ssh

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fiq8745@omega.uta.edu's password:
Last login: Wed Jan 20 15:28:19 2021 from 129.107.158.126
*****************************************************************************
      U N I V E R S I T Y   O F   T E X A S   A T   A R L I N G T O N
*****************************************************************************
    ____  ____ ___  ___  ____  ____ _ | Red Hat Enterprise Linux 5.11       |
   / __ \/ __ `__ \/ _ \/ __ `/ __ `/ | release 5.11 (Tikanga)              |
  / /_/ / / / / / /  __/ /_/ / /_/ /  | Intel Xeon CPU E5-2699 v4 @ 2.20GHz |
  \____/_/ /_/ /_/\___/\__, /\__,_/   | Processors: 4   RAM: 16GB           |
                      /____/          ************************************

  Omega(Ω) is available for UTA student academic use. It is a general
  purpose UNIX server suitable for learning software development.

  For more information about Omega, visit https://go.uta.edu/omega

  Available tools: gcc/g++/gfortran 4.1.2, Python 2.4.3, PHP 5.1.6,
    ruby 1.8.5, mysql 14.14, SQL*Plus 11.2.0.4, SML 110.74, Sonnet 16.56
    Mathematica 7.0/8.0, perl 5.8.8, Java 1.6.0r20, cmake 2.6p4

  News:
    * Apr  1, 2020 - Omega is not accessible from Internet. It is accessible to
                     on-campus and VPN users. For more information on the VPN,
                     vist http://go.uta.edu/vpn

  OIT Help Desk Self Service is available: https://go.uta.edu/sn
*****************************************************************************
[fiq8745@omega ~]$ ls  looking at my omega desktop
1310C            example1.c     Folderstuff   Mail             practice.c     Programs
[fiq8745@omega ~]$ vim practice.c    opening this file in the vim editor
```

```
  else
  {
    fscanf(fp,"%s %d %s %d %s %d ",line[0],&all_people[0],line[1],&all_people[1],line[2],&all_people[2]);
    return 1;
  }
}


void write_file(char filename[],int all_people[])
{
  int i,total=0;
  FILE* fp=fopen(filename,"w");
  fprintf(fp,"--Total people on this train: \n");

  for(i=0;i<3;i++)
  {
    fprintf(fp,"%d. %d\n",i+1,all_people[i]);
    total++;
  }

  fprintf(fp,"Total=%d",total);

}


int main(int argc, char** argv)
{
  printf("NEW LINE!!!!!!!");
  int all_people[3];
  int n=get_train_info("train2.txt", all_people);

  if(n)
  {
    write_file("output.txt",all_people);
  }

  printf("Exiting...\n");
}
-- INSERT --                                                    49,29          Bot
```

*file opened in vim*

```
[fiq8745@omega ~]$ exit
logout  logout of omega with ssh connection

Connection to omega.uta.edu closed.
(base) Computers-MacBook-Air:C computer$ sftp fiq8745@omega.uta.edu  login using sftp, NOT ssh

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privacy except as otherwise provided by applicable privacy laws.



fiq8745@omega.uta.edu's password:
Connected to omega.uta.edu.
sftp> get practice.c  sending the file named practice.c from omega desktop to my local desktop
Fetching /home/f/fi/fiq8745/practice.c to practice.c
/home/f/fi/fiq8745/practice.c                                   100%  993    30.0KB/s   00:00

sftp> exit  leaving omega connection, going back to my own local desktop
(base) Computers-MacBook-Air:C computer$ gcc practice.c  compiling on my own desktop
(base) Computers-MacBook-Air:C computer$ ./a.out
```

```
NEW LINE!!!!!!!Exiting...  Notice the line I added in Omega is now visible when running on my computer
(base) Computers-MacBook-Air:C computer$
```

## Additional notes about sending files between Omega and your machine:

### Using sftp:

*Transferring files between your computer and Omega*

```
Computers-MacBook-Air:Desktop computer$ sftp fiq8745@omega.uta.edu   logging with sftp, not ssh

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and procedures set forth by UT Arlington and there is no expectation of
privacy except as otherwise provided by applicable privacy laws.



fiq8745@omega.uta.edu's password:
Connected to omega.uta.edu.
sftp> pwd  this command allows you to see the current working directory (my Omega desktop)-anything
 you send here will go here
Remote working directory: /home/f/fi/fiq8745
sftp> lpwd  this command allows you to see the local working directory (my computer desktop-local)-
 anything you send here will go here
Local working directory: /Users/computer/Desktop
sftp> ls    looking at what is currently on my Omega desktop
1320C                Info                 Mail                 Programs
a.out                customer.txt         folder1              mail
main.c               neighborhood.c       popcorn.c            practice.c
practice.cpp         problem_header.h     public_html          song1.txt.txt
stuff.cpp            tracer
sftp> lls    looking at what is currently on my computer desktop (local)
Books
CompStuff.xlsx
Current Lectures
Food
intro.pptx
sftp> get neighborhood.c  get command puts a file from the remote machine (Omega) to the local machine
 (my computer).  Note it goes to the whatever local directory you are currently in (I am currently on
 my desktop, so it goes there.  You can change the local working directory by using the lcd command)
Fetching /home/f/fi/fiq8745/neighborhood.c to neighborhood.c
/home/f/fi/fiq8745/neighborhood.c                   100%  412     6.5KB/s   00:00
sftp> get popcorn.c example.c  note you can also send a file with a diff name (here I am renaming
 popcorn.c to example.c when sending
Fetching /home/f/fi/fiq8745/popcorn.c to example.c
/home/f/fi/fiq8745/popcorn.c                        100%  423    12.2KB/s   00:00
sftp> put intro.pptx  put command sends a file from your local machine to the connected machine (so I
 am sending intro.pptx from my computer desktop to the Omega desktop)
Uploading intro.pptx to /home/f/fi/fiq8745/intro.pptx
intro.pptx                                          100%   33KB 237.6KB/s   00:00
sftp> ls  now you can see intro.pptx on Omega
1320C                Info                 Mail                 Programs
a.out                customer.txt         folder1              intro.pptx
```

```
mail                    main.c                  neighborhood.c       popcorn.c
practice.c              practice.cpp            problem_header.h     public_html
song1.txt.txt           stuff.cpp               tracer
sftp> get -r 1320C  you can also send complete directories (not just individual files) by using the
 flag -r (here I am sending the directory/folder 1320C)
Fetching /home/f/fi/fiq8745/1320C/ to 1320C
Retrieving /home/f/fi/fiq8745/1320C
Retrieving /home/f/fi/fiq8745/1320C/Class2
/home/f/fi/fiq8745/1320C/Class2/ingredients.c       100% 1124    26.8KB/s   00:00
/home/f/fi/fiq8745/1320C/Class2/theater.c           100% 1601    37.2KB/s   00:00
/home/f/fi/fiq8745/1320C/Class2/a.out               100% 7763   109.0KB/s   00:00
Retrieving /home/f/fi/fiq8745/1320C/Class1
/home/f/fi/fiq8745/1320C/Class1/popcorn.c           100%  649    16.7KB/s   00:00
/home/f/fi/fiq8745/1320C/Class1/a.out               100% 7310   115.3KB/s   00:00
100% 7191   130.0KB/s   00:00
sftp> exit  exit Omega
(base) Computers-MacBook-Air:Desktop computer$
```

*example of putting and getting from different directories (different from our current working directory-we specify where we want to put it)*

```
sftp> pwd
Remote working directory: /home/f/fi/fiq8745/1320C current working directory on remote machine Omega:
 1320C folder
sftp> lpwd
Local working directory: /Users/computer/Desktop/Teach/Programs/C current working directory on local
 machine (my computer): C folder
sftp> ls
Class0  Class1  Class2
sftp> ls Class0  looking at what is in the Class0 directory
Class0/a.out    Class0/blankfile.c    Class0/grades.c
sftp> get Class0/grades.c /Users/computer/Desktop copying the file grades.c from inside the Class0
 folder (remember we are in the 1320C folder, not the Class0 folder so we have to use the path to get
 grades.c).  Notice we are also specifying the desktop on the local machine (since I am currently in
 another folder)
Fetching /home/f/fi/fiq8745/1320C/Class0/grades.c to /Users/computer/Desktop/grades.c
/home/f/fi/fiq8745/1320C/Class0/grades.c                                    100%  428    12.0KB/s   00
 :00
sftp> ls Class1 looking at what is in the Class1 directory
Class1/a.out      Class1/popcorn.c
sftp> put /Users/computer/Desktop/program2.c /home/f/fi/fiq8745 copying the file on my desktop called
 program2.c (remember our current working directory is not the desktop, it is in the C folder, so we
 need to specify the path).  We are copying it to our Omega desktop (once again, it is not our current
 working directory so I have to specify the path)
Uploading /Users/computer/Desktop/program2.c to /home/f/fi/fiq8745/program2.c
/Users/computer/Desktop/program2.c                                          100%  167     9.0KB/s   00
 :00
sftp> ls .. program2.c is now on my Omega desktop (note that .. means one directory up)
../1320C              ../FoodSide.csv       ../Info               ../Mail               ../Programs

../a.out              ../customer.txt       ../folder1            ../intro.pptx         ../mail

../main.c             ../neighborhood.c     ../popcorn.c          ../practice.c         ../practice.cp
 p
../problem_header.h   ../prog.c             ../program2.c         ../program3.c         ../program4.c

../public_html        ../runthis            ../song1.txt.txt      ../stuff.cpp          ../tracer

sftp> bye
```

*Look up commands to do more things!*

## Using scp:

*You can also send files using the command scp, but I always prefer to use sftp (what I just showed…also you will be logged in with ssh in this example)*

**PC users (not using Windows 10):**
https://www.uta.edu/oit/cs/files/sftp/putty/filezilla.php

Download Filezilla-the instructions given on the webpage are self-explanatory.

---

**Mac users/Windows 10 users:**
Directly type in a command into the terminal. You can use scp or sftp-I will show you scp today and sftp next class.

**1. Files from Omega to your computer (make sure you are on your computer not logged into Omega):**
scp your_username@remotehost.edu:foobar.txt /some/local/directory

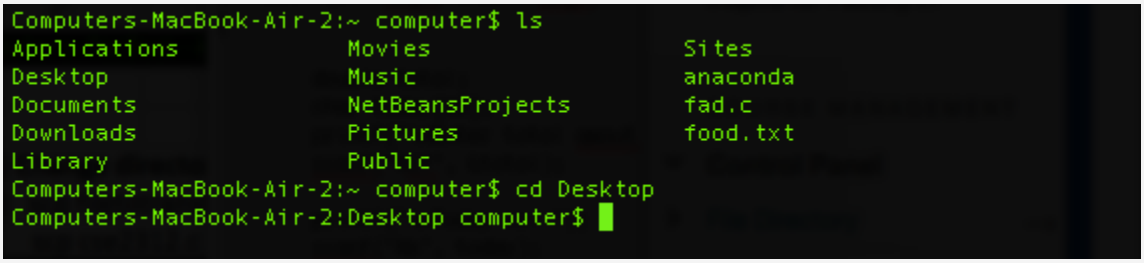
*Example:*
scp fiq8745@omega.uta.edu:practice.c ~computer/Desktop/

I am transferring the file practice.c from Omega to my Desktop. Note *computer* is my username on my computer-change this to your own username.
---

**2. Files from your computer to Omega (make sure you are on your computer not logged into Omega):**
scp foobar.txt your_username@remotehost.edu:foobar.txt

*Example:*
scp tvshows.c fiq8745@omega.uta.edu:tvshows.c

This will transfer tvshows.c to your Omega desktop-make sure you are in the same area as your file you are sending. For example, tvshows.c is on my Desktop, so I am sending while I am on my Desktop. Remember that using terminal on mac is the non-gui version of your computer-just like Omega. You can navigate around your computer on terminal using the same commands like cd and ls (see picture below):




I used cd to get to my Desktop of my computer-you can see I'm on my desktop in the last line because it says Desktop before computer$. I can say ls to show everything on my desktop-same idea as Omega.

**I ADVISE YOU GUYS TO DO ALL THE THINGS I DID TO UNDERSTAND IT!!!**

# Virtual Machine:

~Main points:

-Just think that you are running another computer within your computer

-This computer within your computer has both a GUI and non-GUI way to interact with it (much like your normal computers)…in fact, just think of it as a normal computer

-The way to transfer files between your actual computer and this virtual machine is through a shared folder (please refer to the website given to you on the intro slides for setting all this up)

*Note: you could also email yourself your code (or anything really) and just check your email on the VM…*

-Everything else is pretty much the same idea as what we have covered for your computer and/or Omega:

-You can write your code on either an editor (using the command line like on your computer/Omega OR one like Atom) or an IDE

-You can compile your code manually on the command line (like what you do on the command line of your computer/Omega

-etc

~Long story short: just treat it like any other computer! ☺

---

I created this program on an editor (Atom) on my computer:

practice.c — ~/Desktop/School/Teach/Programs/C

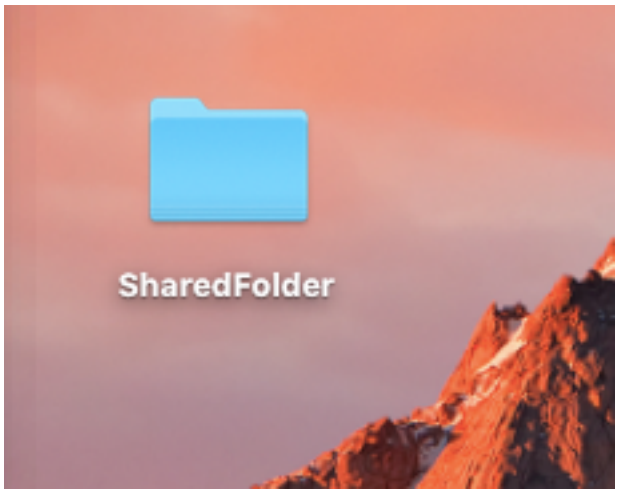
practice.c | practice.cpp

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

typedef float money;
typedef int STUDENT_ID;

int main(int argc, char**argv)
{
  money lunch=atof(argv[1]);

  STUDENT_ID ahmad=100;
  STUDENT_ID yahia=101;

  if (lunch<4.50)
  {
    printf("ID number: %d gets to eat lunch!\n",ahmad);
  }

  else
  {
    printf("ID number: %d gets to eat lunch!\n",yahia);
  }
}
```

Running the program on my computer (on the command line):

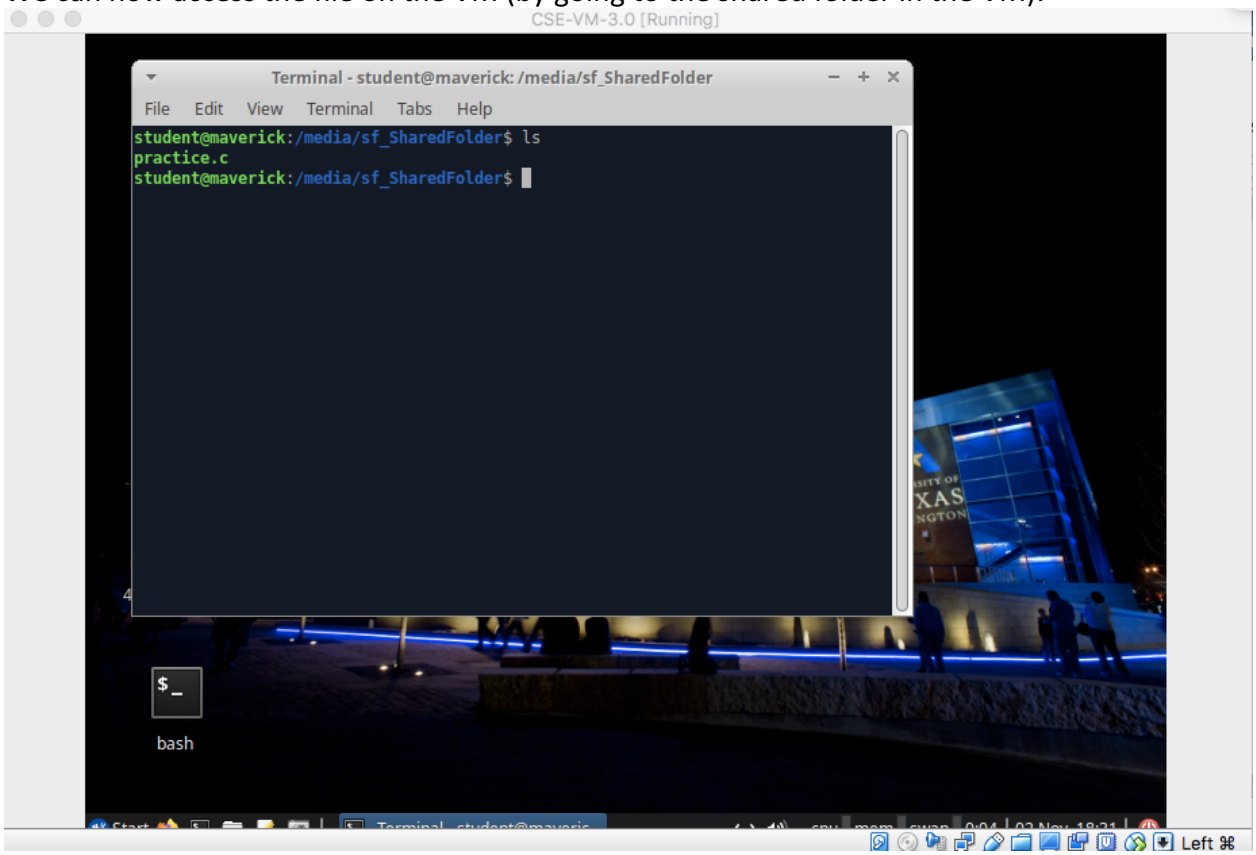
```
C computer$ ./a.out 10.99
ID number: 101 gets to eat lunch!
(base) Computers-MacBook-Air:C computer$
```

Save the file into the shared folder so we can then access it on the VM:

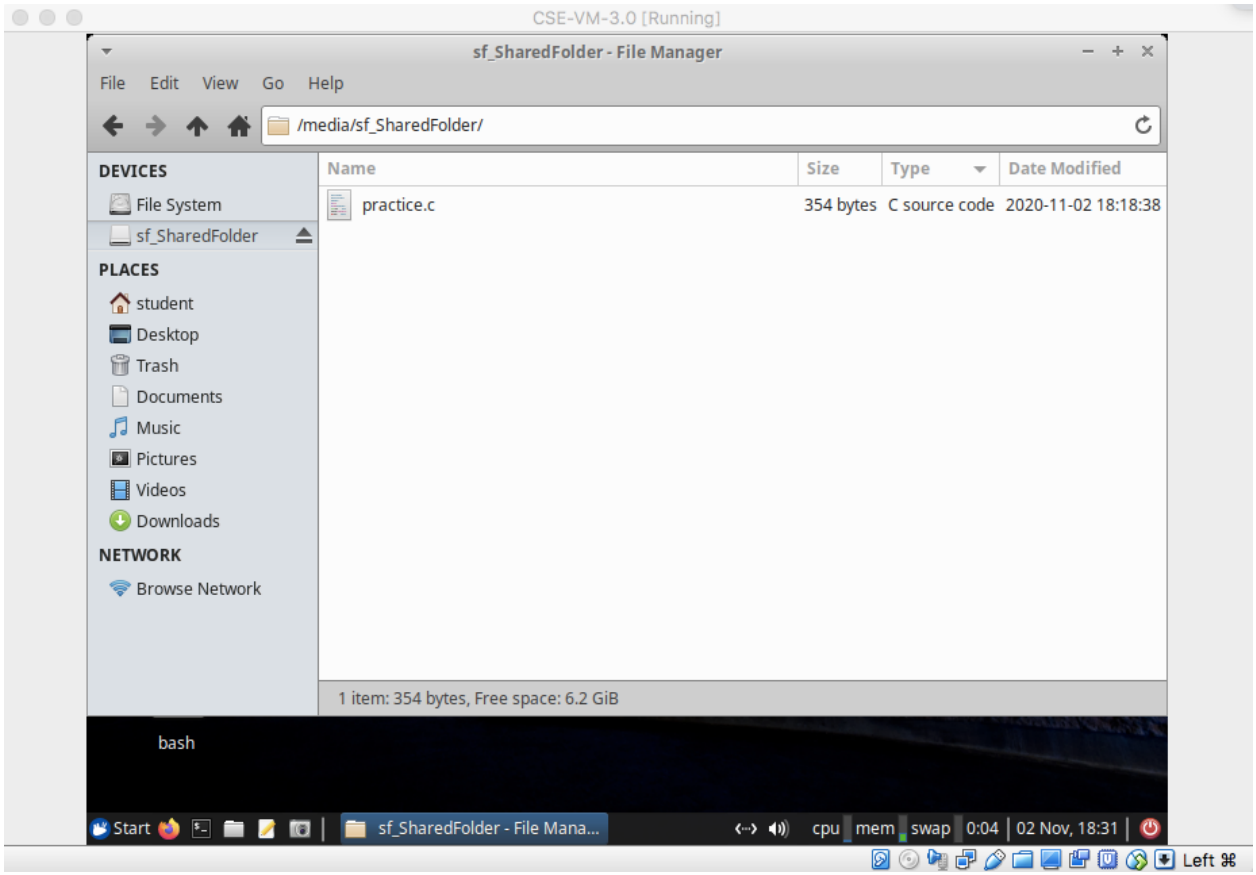



*This is on my actual computer desktop*

We can now access the file on the VM (by going to the shared folder in the VM):

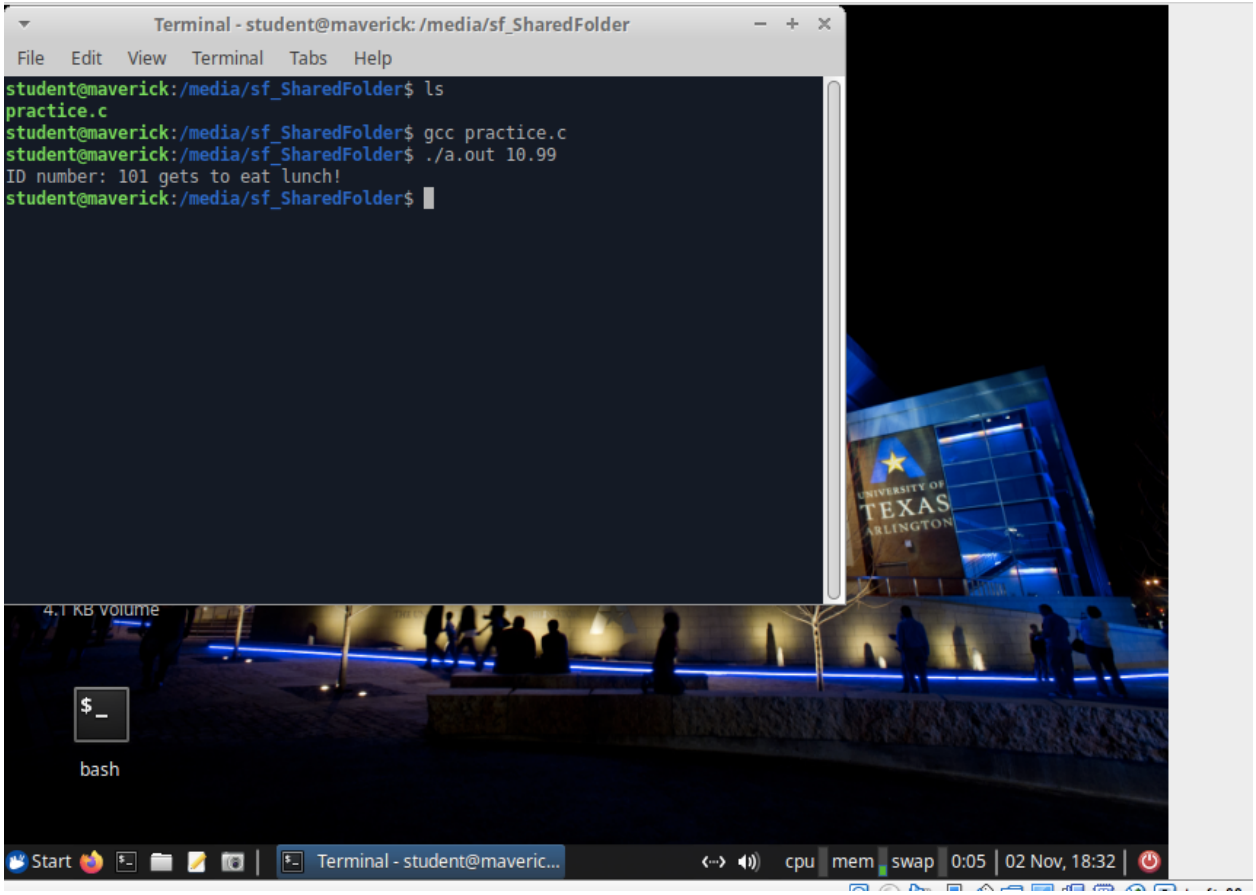



*Shared folder on the VM (on the command line)*

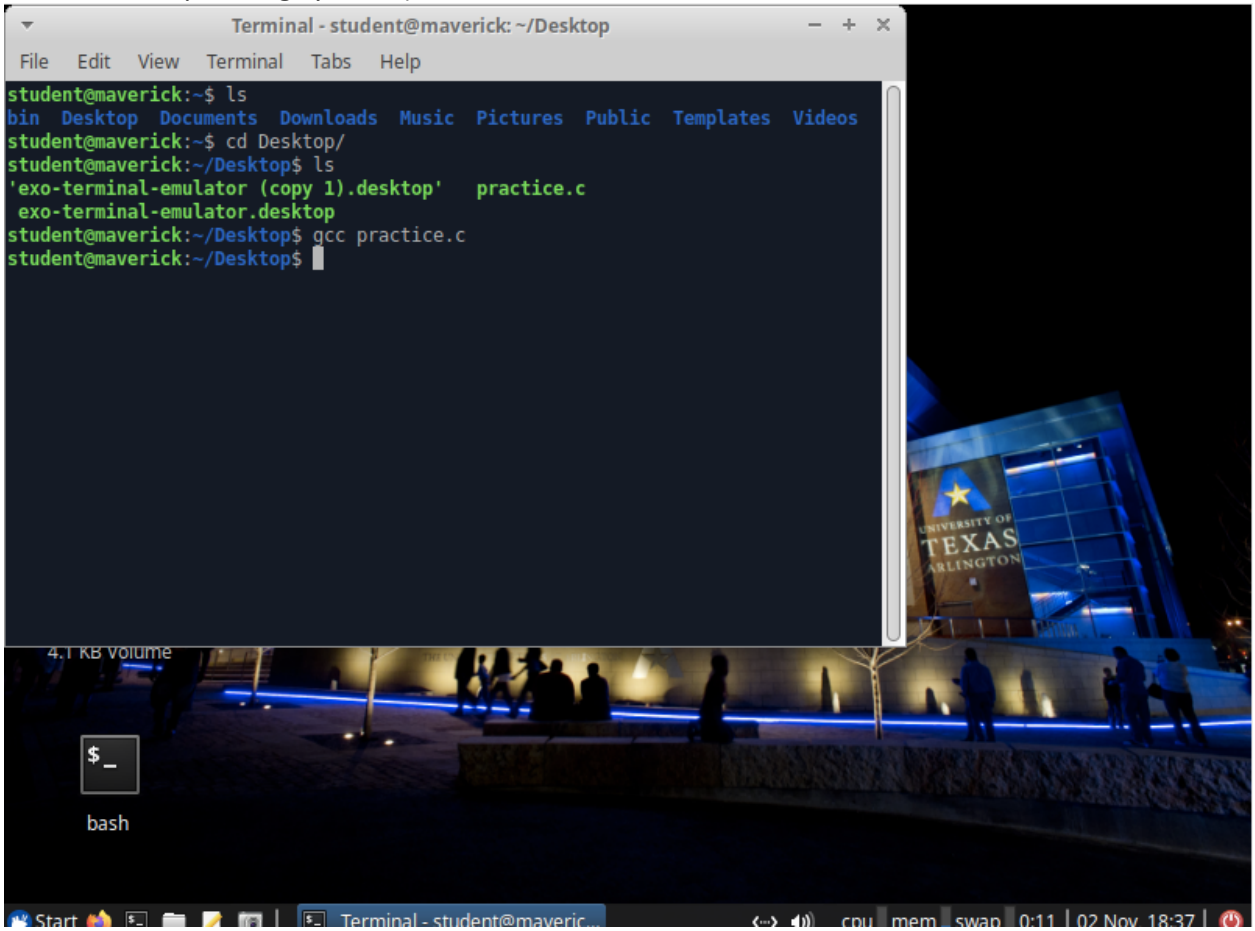



*Shared folder on VM (using a GUI)*

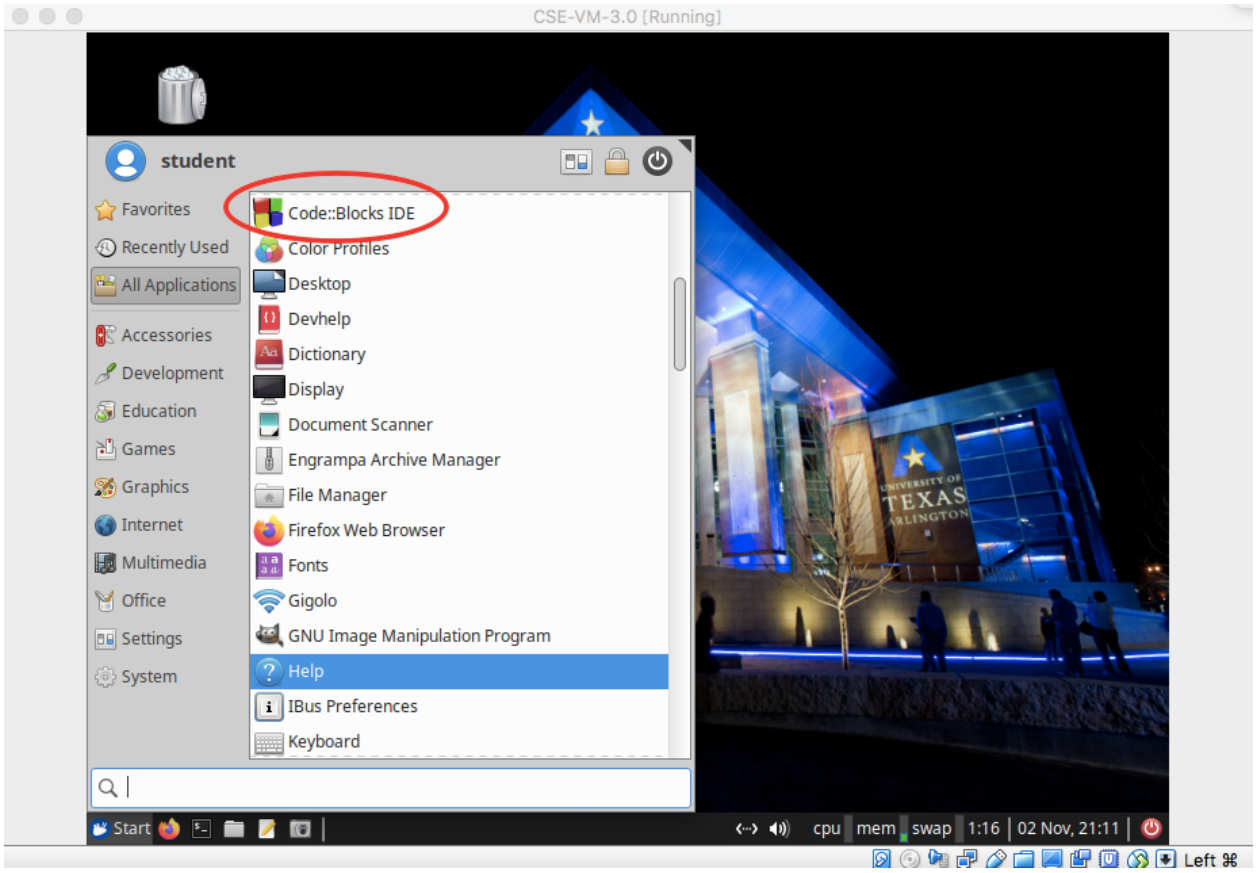
You can now compile your program (remember GCC is already downloaded on the VM):

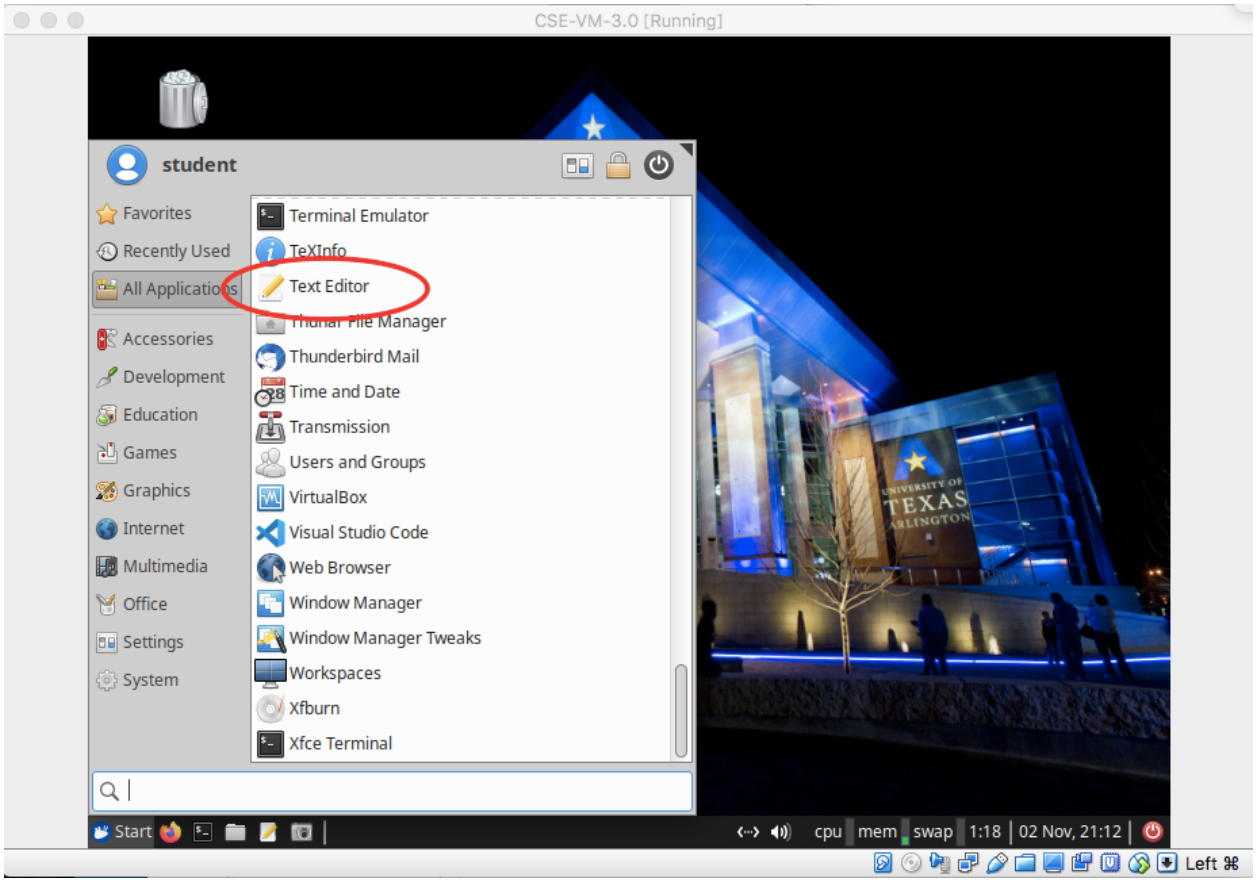


You can also move the file out of the shared folder to the desktop and compile it there (note that the commands that you used to move around Omega can also be used on the VM since they both are using Linux-based operating systems):

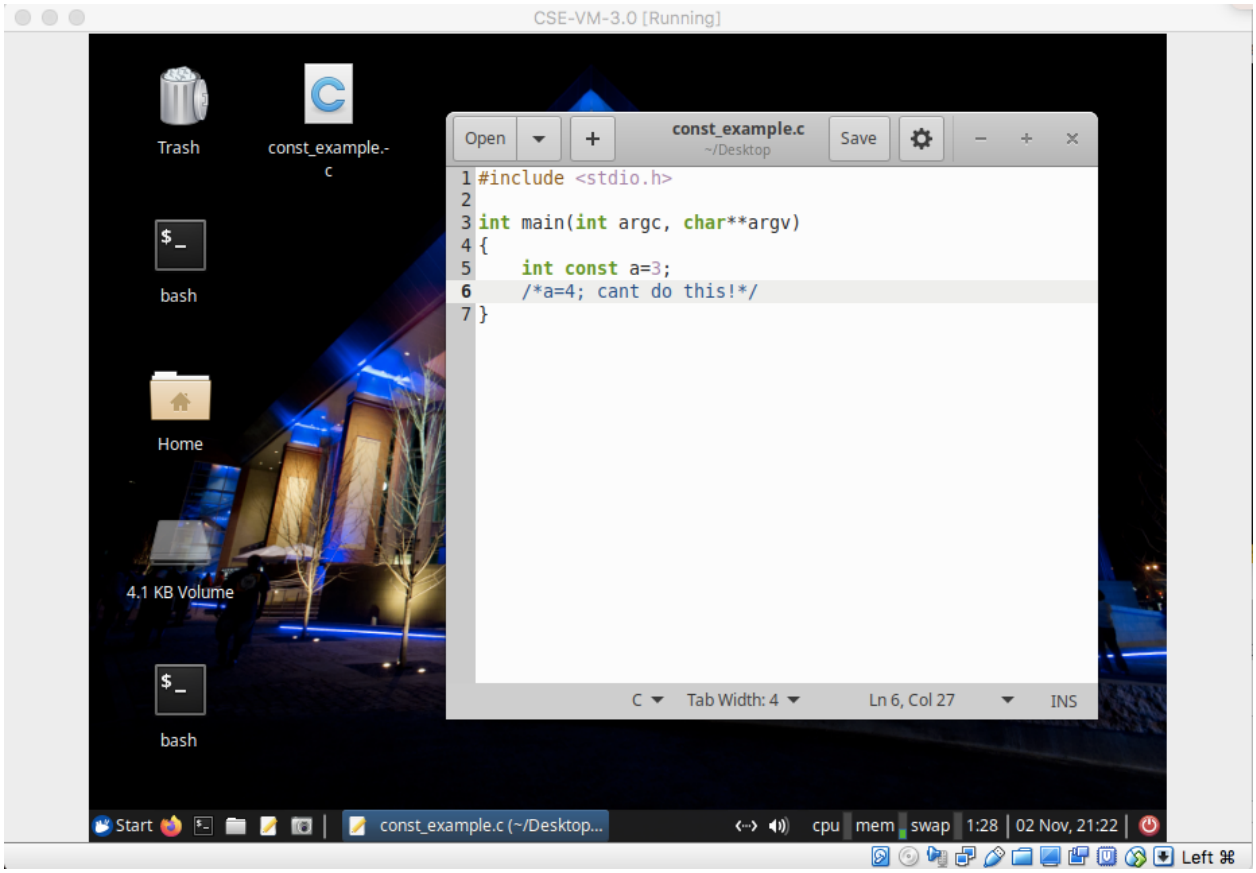



- **Files created on your VM just to be run on the VM**
  - **You can use an editor or an IDE**
    - **Codeblocks is already downloaded**
    - **There are editors on there also**
    - **You can download something else if you want**

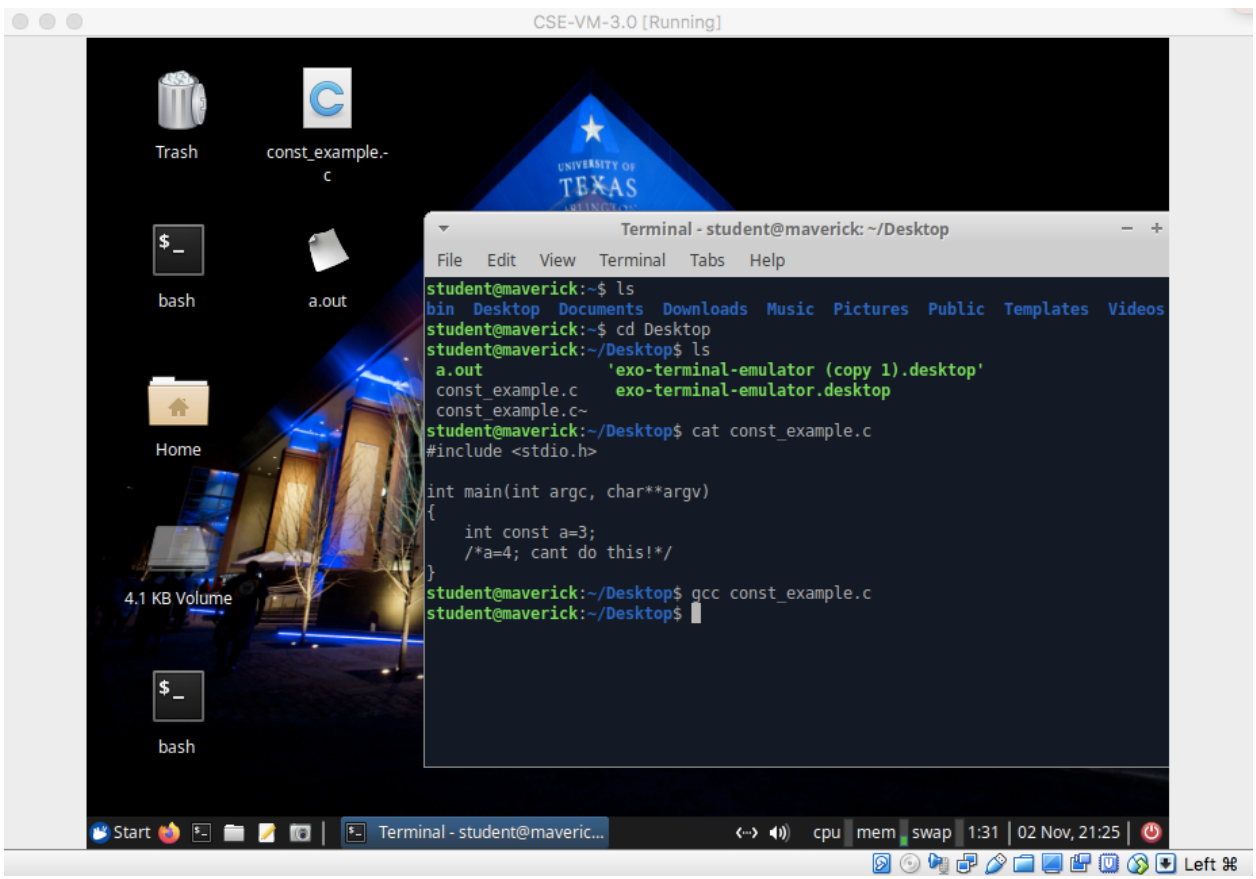



I'm just going to use Text Editor

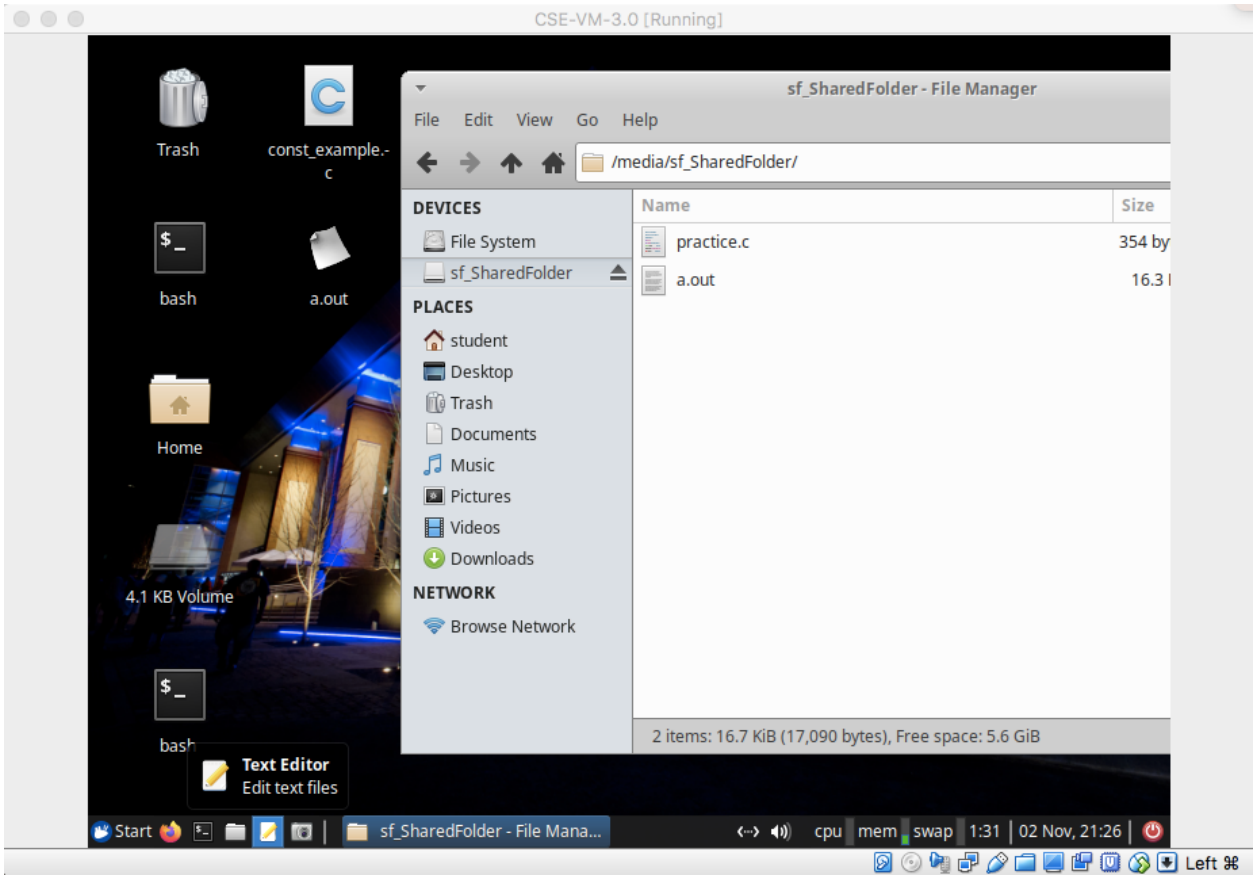



I typed up a small program and saved it on the desktop.

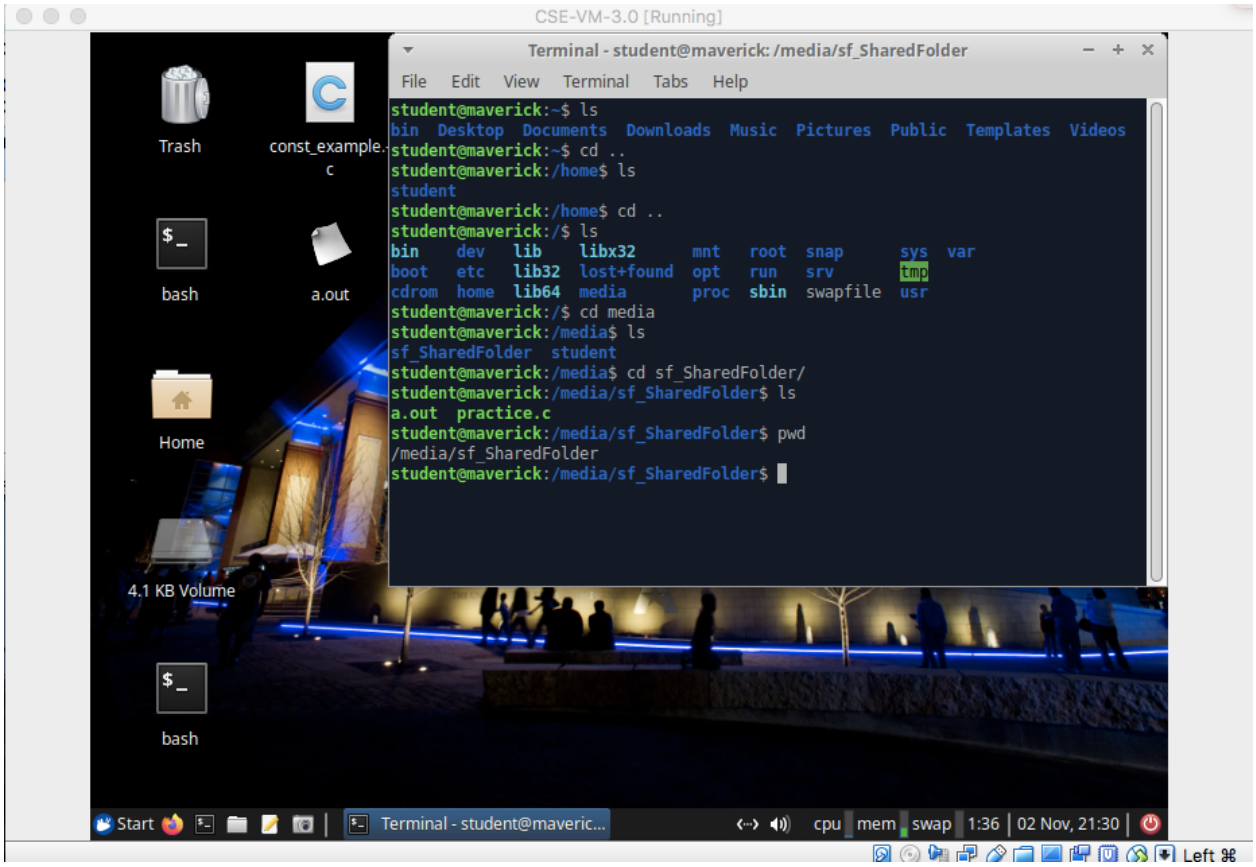


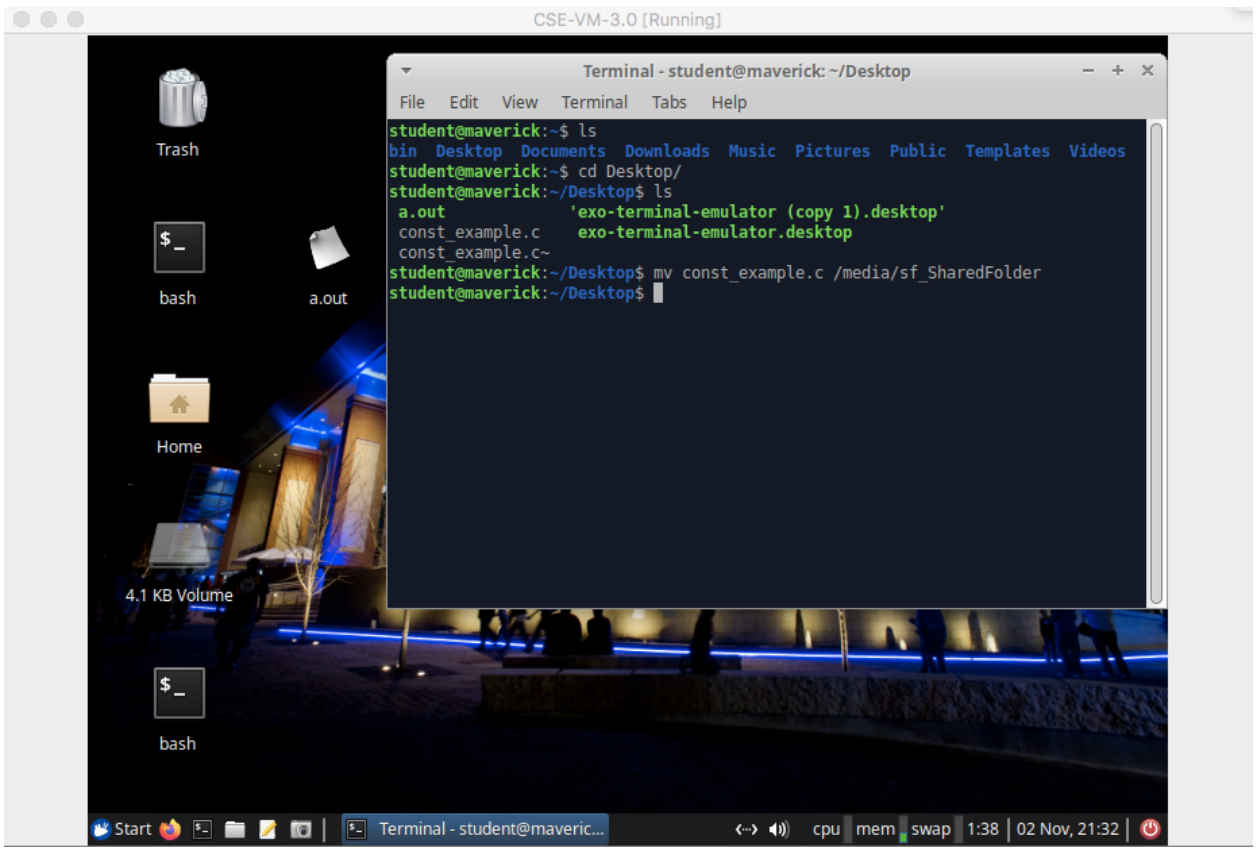

you can compile and run your program on the command line. *Note: cat is a command you can use to see the contents of a file*

- **Finally, note that you can put files you created on the VM in shared folder on the VM to access on your machine**
    - **You can drag and drop (using the GUI) the file to the shared folder OR the command line**
    - **Think of the VM as like a gateway between your computer and the VM on your computer!**




Using the GUI




Using the command line

Note that a lot of the commands we were using in Omega also work in the VM. You can also use editors like *nano* and *vi* (*vi* is *vim* editor's older cousin…)

Once again, all of this is an introduction-there are so many more commands and editors and things you can do (with both Omega, command line in general and VM)