

Activity No. 14	
SSH Key-Based Authentication and GIT Setup	
Name: Canoy Hail B.	Date Performed: 11/9/2025
Course Code: CPE 201A	Date Submitted: 11/12/2025
Course Title: Computer System Administration and Troubleshooting	Instructor: Engr. Jimlord M. Quejado
1. Objective/s:	
This activity aims to demonstrate students' ability to configure secure SSH key-based authentication and perform version control operations using Git and GitHub.	
2. Intended Learning Outcome/s:	
<p>By the end of this activity, the students should be able to:</p> <ul style="list-style-type: none"> • Analyze how SSH key-based authentication provides secure access. • Evaluate the setup of SSH and Git configuration. • Create and manage a Git repository using SSH connection. 	
3. Discussion:	
<p>Part 1: Discussion</p> <p>It is assumed that you are already done with the last Activity (Laboratory Activity 9 Install Linux in a Virtual Machine and Explore the GUI).</p> <p>Provide screenshots for each task.</p> <p>It is also assumed that you have VMs running that you can SSH but require a password. Our goal is to remotely login through SSH using a key without using a password. In this activity, we create a public and a private key. The private key resides in the local machine while the public key will be pushed to remote machines. Thus, instead of using a password, the local machine can connect automatically using SSH through an authorized key.</p> <p>What Is ssh-keygen?</p> <p>Ssh-keygen is a tool for creating new authentication key pairs for SSH. Such key pairs are used for automating logins, single sign-on, and for authenticating hosts.</p> <p>SSH Keys and Public Key Authentication</p> <p>The SSH protocol uses public key cryptography for authenticating hosts and users. The authentication keys, called SSH keys, are created using the keygen program.</p> <p>SSH introduced public key authentication as a more secure alternative to the older .rhosts authentication. It improved security by avoiding the need to have passwords stored in files and eliminated the possibility of a compromised server stealing the user's password.</p>	

However, SSH keys are authentication credentials just like passwords. Thus, they must be managed somewhat analogously to usernames and passwords. They should have a proper termination process so that keys are removed when no longer needed.

Part 2: Discussion

Provide screenshots for each task.

Set up Git

At the heart of GitHub is an open-source version control system (VCS) called Git. Git is responsible for everything GitHub-related that happens locally on your computer. To use Git on the command line, you'll need to download, install, and configure Git on your computer. You can also install GitHub CLI to use GitHub from the command line. If you don't need to work with files locally, GitHub lets you complete many Git-related actions directly in the browser, including:

- Creating a repository
- Forking a repository
- Managing files
- Being social

4. Procedures:

Task 1: Create an SSH Key Pair for User Authentication

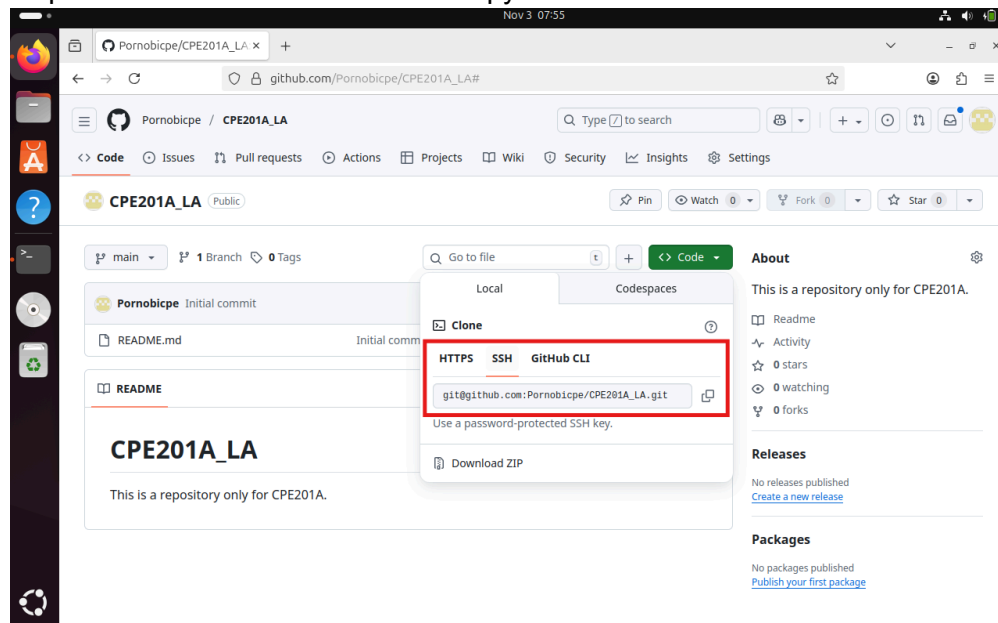
1. Open VirtualBox and start your Ubuntu virtual machine.
2. Log in using your username and password.
3. Open the Terminal.
4. Generate an SSH key pair by typing the following command and pressing Enter:
`ssh-keygen`
5. Navigate to the SSH directory:
`cd ~/.ssh`
6. List the files in the directory:
`ls`
Look for a file ending with .pub this is your public key.
7. Display the contents of your public key file (replace id_rsa.pub with your actual filename if different):
`cat id_rsa.pub`
8. Copy the entire output: this is your SSH public key, which you can use for authentication.

Task 2: Copying the Public Key to Remote Servers

1. Open your GitHub account in a web browser.
2. Click on your profile icon (upper-right corner) and go to Settings.
3. In the left sidebar, select SSH and GPG keys.
4. If there is an existing SSH key, you may delete it first.
5. Click the "New SSH key" button.
6. Enter CPE201A as the Title.
7. In the Key field, paste the SSH public key that you copied from the terminal in Task 1.
8. Click "Add SSH key" to save your new key.

Task 3: Set up the Git Repository

1. On the local machine, verify the version of your git using the command `which git`. If a directory of git is displayed, then you don't need to install git. Otherwise, to install git, use the following command: `sudo apt install git`
2. After the installation, issue the command `which git` again. The directory of git is usually installed in this location: `user/bin/git`.
3. The version of git installed in your device is the latest. Try issuing the command `git --version` to know the version installed.
4. Using the browser in the local machine, go to www.github.com.
5. Sign up in case you don't have an account yet. Otherwise, login to your GitHub account.
 - a. Create a new repository and name it as `CPE201A_yourname`, and add description "This repository is only for CPE201A". Check Add a README file and click Create repository.
 - b. Clone the repository that you created. In doing this, you need to get the link from GitHub. Browse to your repository as shown below. Click on the Code drop down menu. Select SSH and copy the link.



- c. Issue the command `git clone` followed by the copied link. For example, `git clone git@github.com:Pornobicpe/CPE201A_yourname.git`. When prompted to continue connecting, type `yes` and press enter.
- d. To verify that you have cloned the GitHub repository, issue the command `ls`. Observe that you have the `CPE201A_yourname` in the list of your directories. Use `CD` command to go to that directory and `LS` command to see the file `README.md`.
- e. Use the following commands to personalize your git.
 - `git config --global user.name "Your Name"`
 - `git config --global user.email yourname@email.com`
 - Verify that you have personalized the config file using the command `cat ~/.gitconfig`
- f. Edit the `README.md` file using `nano` command. Provide any information on the markdown file pertaining to the repository you created. Make sure to write out or save the file and exit.

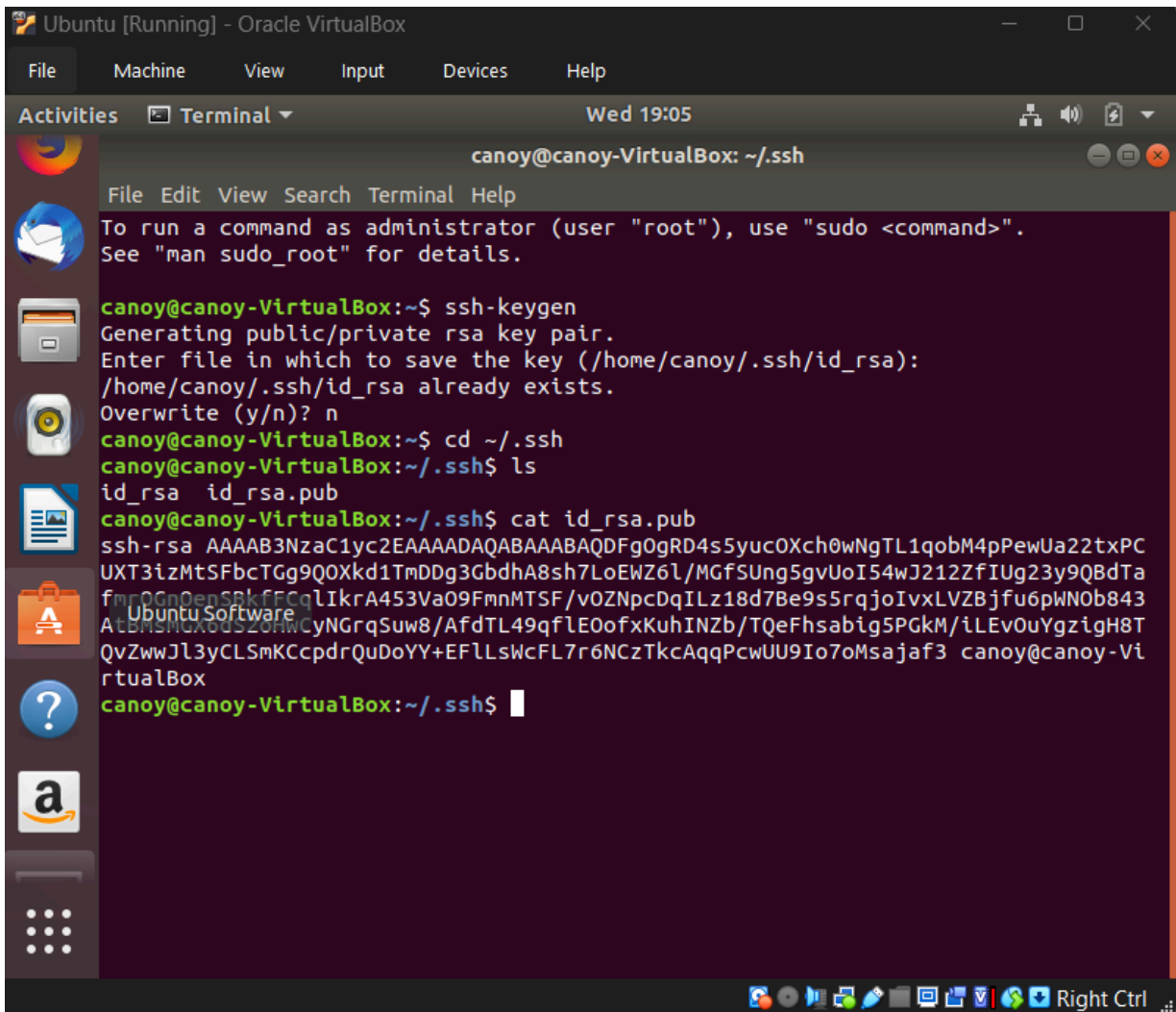
- g. Use the git status command to display the state of the working directory and the staging area. This command shows which changes have been staged, which haven't, and which files aren't being tracked by Git. Status output does not show any information regarding the committed project history. What is the result of issuing this command?
- h. Use the command git add README.md to add the file into the staging area.
- i. Use the command git commit -m "your message" to create a snapshot of the staged changes along the timeline of the Git projects history. The use of this command is required to select the changes that will be staged for the next commit.
- j. Use the command git push <remote><branch> to upload the local repository content to GitHub repository. Pushing means to transfer commits from the local repository to the remote repository. As an example, you may issue git push origin main.
- k. On the GitHub repository, verify that the changes have been made to README.md by refreshing the page. Describe the README.md file. You can notice how long was the last commit. It should be some minutes ago and the message you typed on the git commit command should be there. Also, the README.md file should have been edited according to the text you wrote.

5. Outputs:

```
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

canoy@canoy-VirtualBox:~$ ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/home/canoy/.ssh/id_rsa):
/home/canoy/.ssh/id_rsa already exists.
Overwrite (y/n)? y
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/canoy/.ssh/id_rsa.
Your public key has been saved in /home/canoy/.ssh/id_rsa.pub.
The key fingerprint is:
SHA256:5bpEIBAdkFGWzJKQ90IJUr3SLv51Nd+w7paWYablFzE canoy@canoy-VirtualBox
The key's randomart image is:
+---[RSA 2048]---+
|o+*%+o          |
|..=O*           |
|O. +... .       |
|+ + O. . O      E|
| o O   S + . o   |
| . . . O O=+.    |
| . . . + *O+..   |
| . . O ...* .    |
| .. . +O.        |
+----[SHA256]-----+
canoy@canoy-VirtualBox:~$ cd ~/.ssh
canoy@canoy-VirtualBox:~/.ssh$ ls
id_rsa  id_rsa.pub
```

```
canoy@canoy-VirtualBox:~/ssh$ cat id_rsa.pub
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQDFgOgRD4s5yucOXch0wNgTL1qobM4pPewUa22txPC
UXT3izMtSFbcTgG9Q0Xkd1TmDDg3GbDhA8sh7LoEWZ6l/MGfSung5gvUoI54wJ212ZfIUg23y9QBdTa
fmrOGn0enSBkfFCqLIkrA453Va09FmnMTSF/v0ZNpcDqILz18d7Be9s5rqjoIvxLVZBjfu6pWNOb843
AtBmSmGX6dS2oHwCyNGrqSuw8/AfdTL49qfLE0ofxKuhINZb/TQeFhsabig5PGkM/iLEvOuYgzigH8T
QvZwwJl3yCLSmKCCpdrQuDoYY+EFLLSwcFL7r6NCzTkAqqPcwUU9Io7oMsajaf3 canoy@canoy-Vi
rtualBox
canoy@canoy-VirtualBox:~/ssh$
```



The screenshot shows an Ubuntu [Running] - Oracle VirtualBox window. The terminal window is titled 'canoy@canoy-VirtualBox: ~/ssh'. The terminal output shows the user running 'ssh-keygen', which generates a public/private RSA key pair. The user then runs 'cd ~/.ssh' and 'ls', showing the files 'id_rsa' and 'id_rsa.pub'. Finally, the user runs 'cat id_rsa.pub', displaying the public key content. The terminal window has a menu bar with 'File', 'Edit', 'View', 'Search', 'Terminal', and 'Help'. The system clock shows 'Wed 19:05'. The bottom of the window shows a taskbar with various icons and a 'Right Ctrl' label.

```
canoy@canoy-VirtualBox: ~/ssh
File Edit View Search Terminal Help
Wed 19:05
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

canoy@canoy-VirtualBox:~$ ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/home/canoy/.ssh/id_rsa):
/home/canoy/.ssh/id_rsa already exists.
Overwrite (y/n)? n
canoy@canoy-VirtualBox:~$ cd ~/.ssh
canoy@canoy-VirtualBox:~/ssh$ ls
id_rsa  id_rsa.pub
canoy@canoy-VirtualBox:~/ssh$ cat id_rsa.pub
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQDFgOgRD4s5yucOXch0wNgTL1qobM4pPewUa22txPC
UXT3izMtSFbcTgG9Q0Xkd1TmDDg3GbDhA8sh7LoEWZ6l/MGfSung5gvUoI54wJ212ZfIUg23y9QBdTa
fmrOGn0enSBkfFCqLIkrA453Va09FmnMTSF/v0ZNpcDqILz18d7Be9s5rqjoIvxLVZBjfu6pWNOb843
AtBmSmGX6dS2oHwCyNGrqSuw8/AfdTL49qfLE0ofxKuhINZb/TQeFhsabig5PGkM/iLEvOuYgzigH8T
QvZwwJl3yCLSmKCCpdrQuDoYY+EFLLSwcFL7r6NCzTkAqqPcwUU9Io7oMsajaf3 canoy@canoy-Vi
rtualBox
canoy@canoy-VirtualBox:~/ssh$
```

Activities Terminal Wed 19:07

canoy@canoy-VirtualBox: ~/.ssh

File Edit View Search Terminal Help

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

```
canoy@canoy-VirtualBox:~$ ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/home/canoy/.ssh/id_rsa):
/home/canoy/.ssh/id_rsa already exists.
Overwrite (y/n)? n
canoy@canoy-VirtualBox:~$ cd ~/.ssh
canoy@canoy-VirtualBox:~/.ssh$ ls
id_rsa id_rsa.pub
canoy@canoy-VirtualBox:~/.ssh$ cat id_rsa.pub
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQDFg0gRD4s5yucOXch0wNgTL1qobM4pPewUa22txPC
UXT3izMtSFbcTGg9Q0Xkd1TmDDg3GbdhA8sh7LoEWZ6l/MGfSung5gvUoI54wJ212ZfIUg23y9QBdTa
fmrOGn0enSBkfFCqLIkrA453Va09FmnMTSF/v0ZNpcDqILz18d7Be9s5rqjoIvxLVZBjfu6pWN0b843
AtBMsmGX6dS2oHwCyNGrqSuw8/AfdTL49qfLE0ofxKuhINZb/TQeFhsabig5PGKM/iLEvOuYgzigH8T
QvZwwJl3yCLSmKCCpdrQuDoYY+EFLLsWcFL7r6NCzTkCAqqPcwUU9Io7oMsajaf3 canoy@canoy-Vi
rtualBox
canoy@canoy-VirtualBox:~/.ssh$ cat ~/.ssh/id_rsa.pub
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQDFg0gRD4s5yucOXch0wNgTL1qobM4pPewUa22txPC
UXT3izMtSFbcTGg9Q0Xkd1TmDDg3GbdhA8sh7LoEWZ6l/MGfSung5gvUoI54wJ212ZfIUg23y9QBdTa
fmrOGn0enSBkfFCqLIkrA453Va09FmnMTSF/v0ZNpcDqILz18d7Be9s5rqjoIvxLVZBjfu6pWN0b843
AtBMsmGX6dS2oHwCyNGrqSuw8/AfdTL49qfLE0ofxKuhINZb/TQeFhsabig5PGKM/iLEvOuYgzigH8T
QvZwwJl3yCLSmKCCpdrQuDoYY+EFLLsWcFL7r6NCzTkCAqqPcwUU9Io7oMsajaf3 canoy@canoy-Vi
rtualBox
canoy@canoy-VirtualBox:~/.ssh$
```

hailluuuu (hailluuuu)
Your personal account

Go to your personal profile

- Public profile
- Account
- Appearance
- Accessibility
- Notifications
- Access
- Billing and licensing
- Emails
- Password and authentication
- Sessions
- SSH and GPG keys

SSH keys

New SSH key

There are no SSH keys associated with your account.

Check out our guide to [connecting to GitHub using SSH keys](#) or [troubleshoot common SSH problems](#).

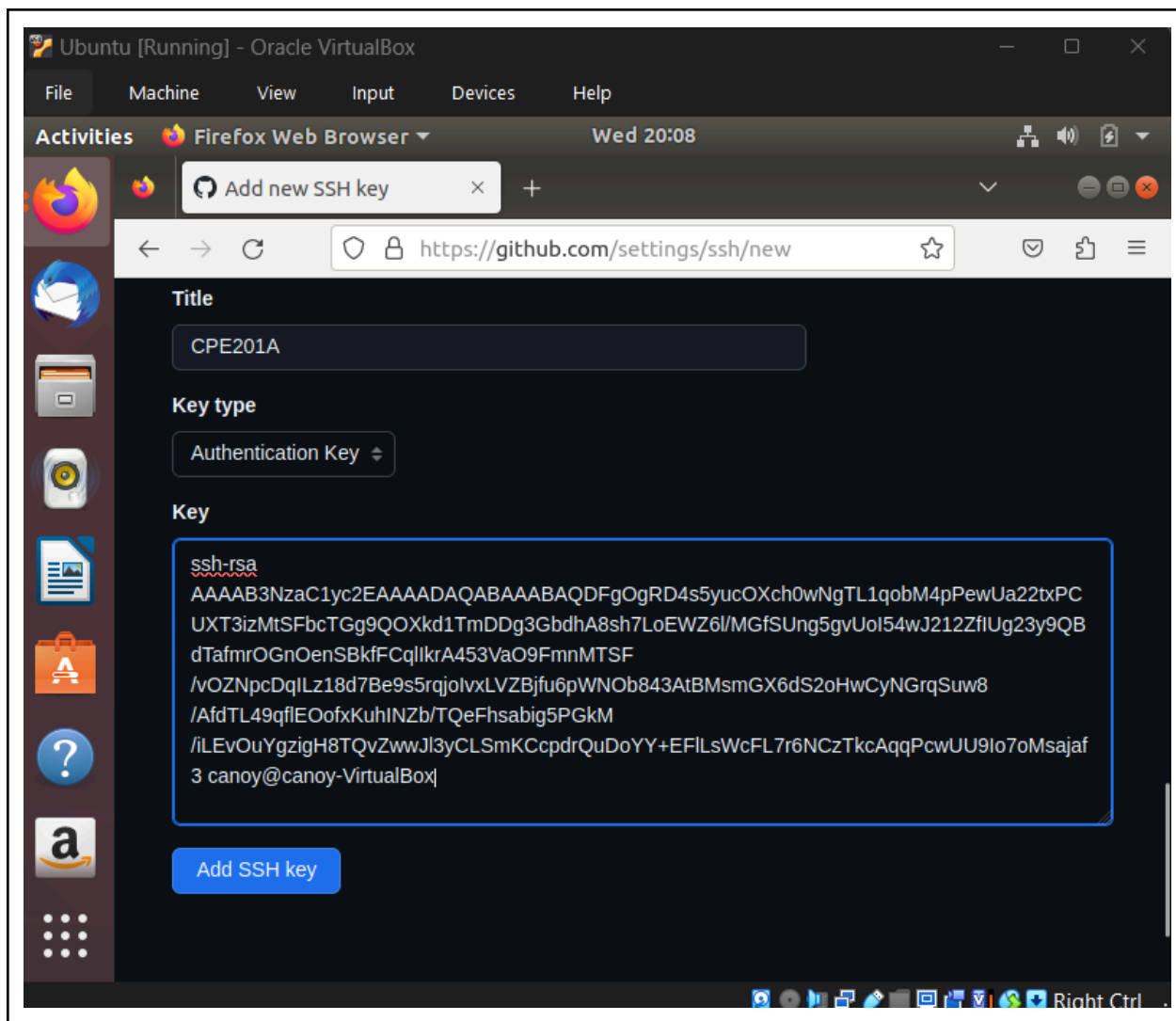
GPG keys

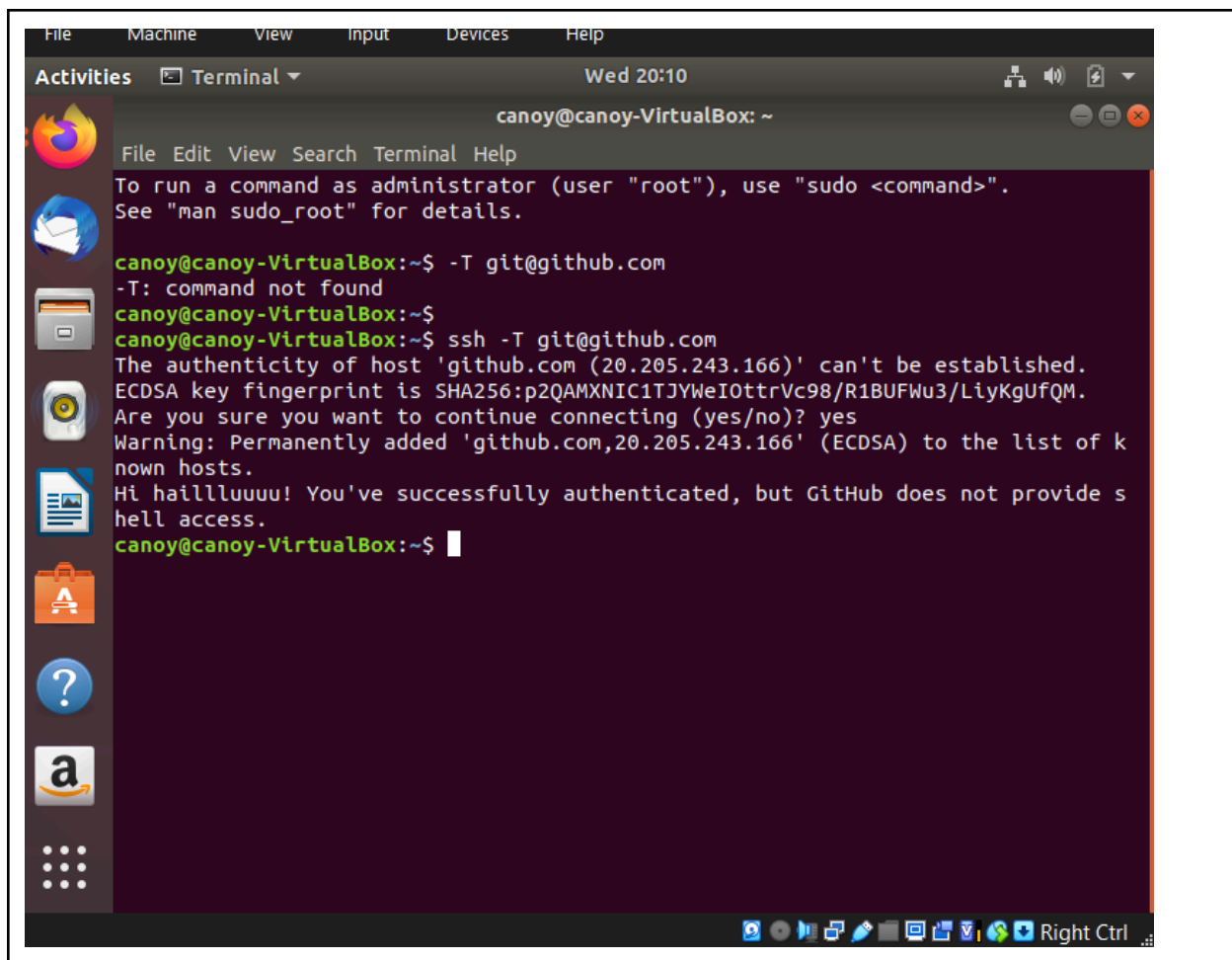
New GPG key

There are no GPG keys associated with your account.

Learn how to [generate a GPG key and add it to your account](#).

Vigilant mode

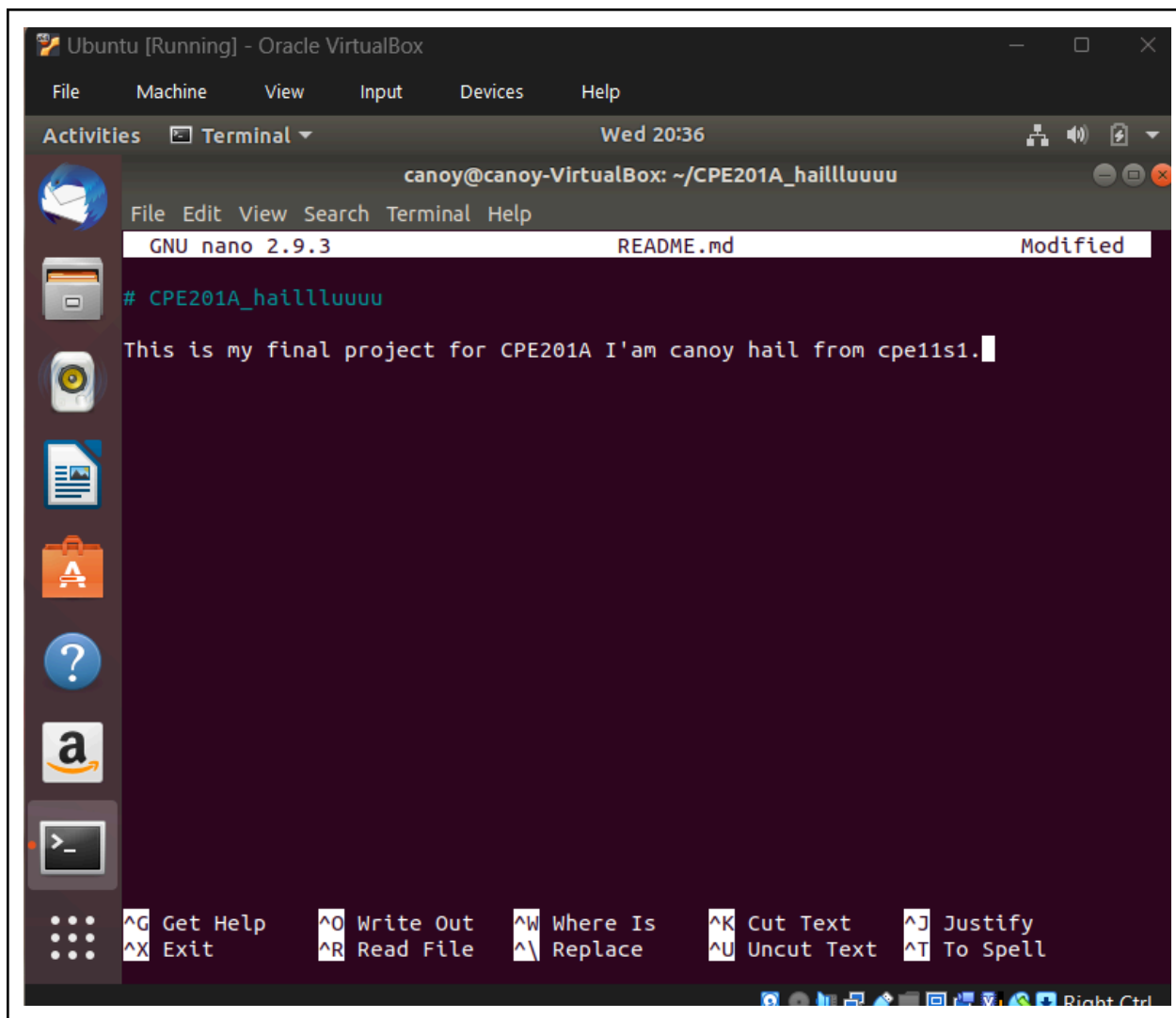


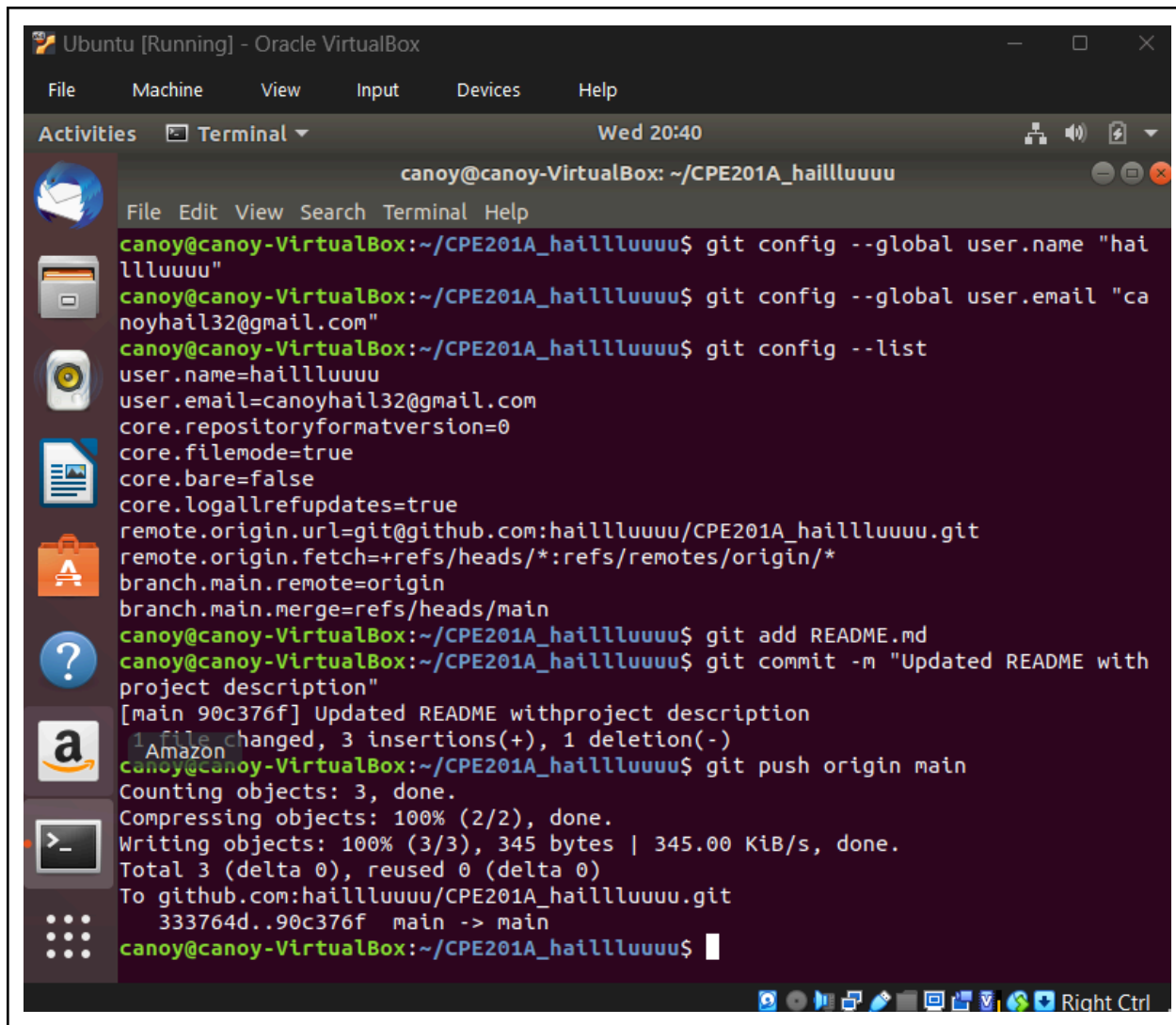



```
File      Machine  View      Input      Devices    Help
Activities  Terminal  Wed 20:27

canoy@canoy-VirtualBox: ~/CPE201A_haillluuuu
File Edit View Search Terminal Help
Setting up liberror-perl (0.17025-1) ...
Setting up git (1:2.17.1-1ubuntu0.18) ...
Processing triggers for man-db (2.8.3-2) ...
canoy@canoy-VirtualBox:~$ git --version
git version 2.17.1
canoy@canoy-VirtualBox:~$ git clone git@github.com:haillluuuu/CPE201A_haillluuu
u.git
Cloning into 'CPE201A_haillluuuu'...
ERROR: Repository not found.
fatal: Could not read from remote repository.

Please make sure you have the correct access rights
and the repository exists.
canoy@canoy-VirtualBox:~$ git clone git@github.com:haillluuuu/CPE201A_haillluuu
u.git
Cloning into 'CPE201A_haillluuuu'...
remote: Enumerating objects: 3, done.
remote: Counting objects: 100% (3/3), done.
remote: Total 3 (delta 0), reused 0 (delta 0), pack-reused 0 (from 0)
Receiving objects: 100% (3/3), done.
canoy@canoy-VirtualBox:~$ git clone git@github.com:haillluuuu/CPE201A_haillluuu
u.git
fatal: destination path 'CPE201A_haillluuuu' already exists and is not an empty
directory.
canoy@canoy-VirtualBox:~$ cd CPE201A_haillluuuu
canoy@canoy-VirtualBox:~/CPE201A_haillluuuu$ ls
README.md
canoy@canoy-VirtualBox:~/CPE201A_haillluuuu$
```

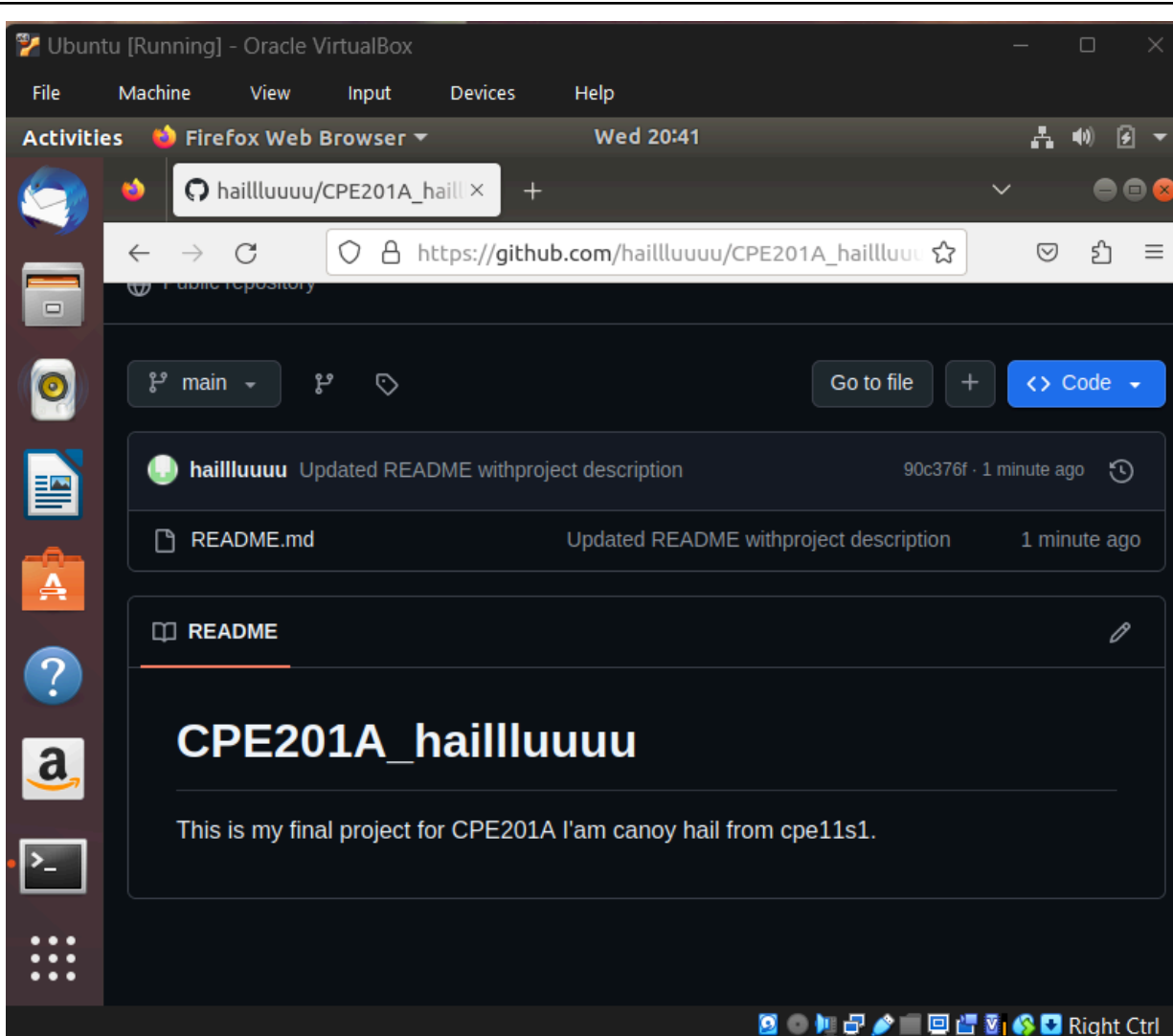




The image shows a terminal window titled "Ubuntu [Running] - Oracle VirtualBox". The window has a menu bar with "File", "Machine", "View", "Input", "Devices", and "Help". Below the menu bar is a toolbar with "Activities", "Terminal", and a clock showing "Wed 20:40". The terminal itself has a title bar "canoy@canoy-VirtualBox: ~/CPE201A_haillluuuu" and a menu bar with "File", "Edit", "View", "Search", "Terminal", and "Help". The terminal output shows the following commands and their results:

```
canoy@canoy-VirtualBox:~/CPE201A_haillluuuu$ git config --global user.name "haillluuuu"
canoy@canoy-VirtualBox:~/CPE201A_haillluuuu$ git config --global user.email "canoyhail32@gmail.com"
canoy@canoy-VirtualBox:~/CPE201A_haillluuuu$ git config --list
user.name=haillluuuu
user.email=canoyhail32@gmail.com
core.repositoryformatversion=0
core.filemode=true
core.bare=false
core.logallrefupdates=true
remote.origin.url=git@github.com:haillluuuu/CPE201A_haillluuuu.git
remote.origin.fetch=+refs/heads/*:refs/remotes/origin/*
branch.main.remote=origin
branch.main.merge=refs/heads/main
canoy@canoy-VirtualBox:~/CPE201A_haillluuuu$ git add README.md
canoy@canoy-VirtualBox:~/CPE201A_haillluuuu$ git commit -m "Updated README with project description"
[main 90c376f] Updated README withproject description
1 file changed, 3 insertions(+), 1 deletion(-)
canoy@canoy-VirtualBox:~/CPE201A_haillluuuu$ git push origin main
Counting objects: 3, done.
Compressing objects: 100% (2/2), done.
Writing objects: 100% (3/3), 345 bytes | 345.00 KiB/s, done.
Total 3 (delta 0), reused 0 (delta 0)
To github.com:haillluuuu/CPE201A_haillluuuu.git
333764d..90c376f  main -> main
canoy@canoy-VirtualBox:~/CPE201A_haillluuuu$
```

The terminal window also features a sidebar on the left with icons for various applications, including a file manager, a terminal, a web browser, and a terminal window. The bottom of the window shows a taskbar with icons for the applications and a "Right Ctrl" button.



6. Conclusions/Learnings/Analysis:

- In this activity, I activated and set up SSH authentication and connected my ubuntu virtual machine to GitHub, allowing me to be able to put commands on terminal and it will direct the command to ubuntu. I installed and configured Git cloned my repository, edited readme file and pushed the changes back in GitHub. This activity was really challenging for me because my laptop keep on crashing, lagging or other bugs, But I researched online to fix it and it did, but the lag is still there. This activity really helped me a lot because I learned new things and explore both Ubuntu and GitHub more which I can use in future purposes.

7. Assessment Rubric:

TIP Rubric E (1) (1)

Criteria	Ratings		Pts
Performance Indicators 1. Apply appropriate techniques, skills, and modern tools to perform a discipline-specific engineering task.	4 pts Very Satisfactory Applies the most appropriate modern technique in performing discipline-specific engineering task exceeding the requirements.	0 pts No Marks	4 pts
Performance Indicators 2. Demonstrate skills in applying different techniques and modern tools to solve engineering problems.1. Apply appropriate techniques, skills, and modern tools to perform a discipline-specific engineering task.	4 pts Very Satisfactory Applies the most appropriate modern technique in performing discipline-specific engineering task exceeding the requirements.	0 pts No Marks	4 pts
Performance Indicators 3. Recognize the benefits and constraints of modern engineering tools.Demonstrate skills in applying different techniques and modern tools to solve engineering problems.1. Apply appropriate techniques, skills, and modern tools to perform a discipline-specific engineering task.	4 pts Very Satisfactory Applies the most appropriate modern technique in performing discipline-specific engineering task exceeding the requirements.	0 pts No Marks	4 pts

Total Points: 12