TCSS 462/562: (Software Engineering for) Cloud Computing
Fall 2025

School of Engineering and Technology
University of Washington – Tacoma

Tutorial 1 – Introduction to Linux

Disclaimer: Subject to updates as corrections are found

Version 0.10

Scoring: 20 pts maximum

The purpose of this tutorial is to introduce Linux and BASH scripting environment. Open-source distributions of Linux such as Ubuntu and SUSE are broadly used in cloud computing as the guest operating system on virtual machines (VMs) and as the host operating system for cloud services. Linux provides cost savings as there are often no licensing costs for launching many Linux-based VM instances in the cloud. This enables tremendous savings when the number of VM instances is scaled up for hosting an application (e.g. to 100 or more). Linux has even become quite popular on the Microsoft Azure cloud.

Article describing Microsoft adoption of Linux on the Azure cloud:
https://www.zdnet.com/article/microsoft-developer-reveals-linux-is-now-more-used-on-azure-than-windows-server/

Linux is the preferred environment to work with Cloud provider APIs (from AWS, Azure, Google, etc.)

To complete this tutorial, first gain access to an Ubuntu Linux environment by installing a local Ubuntu Virtual Machine.

The recommended approach is to install Oracle VirtualBox (free), and then download Ubuntu 24.04 LTS (iso file) to create an Ubuntu Virtual Machine.

Oracle VirtualBox can be downloaded here:
https://www.virtualbox.org/

Click on the link for your host operating system, and follow any installation instructions.

The Ubuntu 24.04 LTS ISO file can be downloaded here:
https://ubuntu.com/download/desktop/thank-you?version=24.04.3&architecture=amd64&lts=true
or
https://opencolo.mm.fcix.net/ubuntu-releases/24.04.3/ubuntu-24.04.3-desktop-amd64.iso

Another download approach is to obtain Ubuntu using a bit torrent stream by downloading (OPTIONAL):
https://releases.ubuntu.com/24.04/ubuntu-24.04.3-desktop-amd64.iso.torrent

If unfamiliar with BitTorrent, a popular mechanism for downloading and sharing large files, read the Wikipedia page here: https://en.wikipedia.org/wiki/BitTorrent
The BitTorrent classic or web client can be downloaded from here:
https://www.bittorrent.com/downloads/complete/classic/

If wanting additional help installing Oracle Virtual Box, try searching the internet for installation instructions using search engines such as bing or google, or try finding a video with instructions at video.google.com.

Here are two helpful **videos**:

Introduction to Oracle VirtualBox for creating Virtual Machines: https://youtu.be/VZJ6KZUc25M

Two videos on how to install Ubuntu 24.04 on Windows 11 Oracle VirtualBox:
https://youtu.be/DhVjgI57Ino

https://youtu.be/8uYjoBh21IU

(legacy video) Installing Ubuntu 22.04 on Windows 10 Oracle VirtualBox: https://youtu.be/zHwFtyxJsog

And here are written instructions for installing Ubuntu 22.04 on Oracle VirtualBox for Windows:

OLD Instructions for installing Ubuntu 22.04 on Windows VirtualBox:
https://trendoceans.com/install-ubuntu-on-virtualbox/

For written instructions for installing Ubuntu 24.04 on Windows VirtualBox, consider asking an LLM such as Chat GPT for step-by-step instructions.

MAC Resources:

Video on how to install Ubuntu 24.04 using UTM on M1 Mac:
https://youtu.be/JrNS3brSnmA

Video on how to install Ubuntu 24.04 using VMware Fusion on M1 Mac:
https://youtu.be/kDosGTdwqO0

Another option is Parallels on M1 Mac, but it is not free, but there is a student edition:
https://www.parallels.com/landingpage/pd/education/
Video on how to install Ubuntu 22.04 on Mac with Parallels*: https://youtu.be/1vht7h3EQtc

* - note for Mac users, UTM or Parallels is recommended for virtual machines
A port of Virtual Box for M1/M2/3 macs is now available on the Oracle website:
https://www.virtualbox.org/

Virtual Box 7.2 (free) can be installed on both Intel and Apple Silicon Macs:
https://www.virtualbox.org/wiki/Downloads

After VirtualBox is installed, a Ubuntu 24.04 VM can be installed on an Intel Mac.

Instructions including how to install Virtual Box Guest Additions:

When working with Virtual Machines, the base operating system (e.g. Windows 10/11) on your laptop that hosts the virtual machine is called the **host operating system.** The operating system used by the VM is called the **guest operating system.**

Many people will use the following configuration:
Guest operating system (VM) = Ubuntu 24.04 LTS
Host operating system = Windows 10/11 or Mac OSX

Once your VM is installed, it is highly recommended to install the Ubuntu 24.04 VirtualBox "Guest Additions". These guest additions provide important features such as sharing clipboards between the host and the guest, as well as file system sharing, and mouse pointer integration.

Download the Virtual Box Guest Additions ISO file.
This will be called "VBoxGuestAdditions_(*version-number*).iso", where (version-number) is the version of Virtual Box installed on your host computer. (i.e. your laptop, desktop, etc.)

For Virtual Box 7.2.2 Guest Additions, download:
https://download.virtualbox.org/virtualbox/7.2.2/VBoxGuestAdditions_7.2.2.iso

For example, if using Virtual Box 7.1.0 on your host computer, the file to download is:
https://download.virtualbox.org/virtualbox/7.1.0/VBoxGuestAdditions_7.1.0.iso

If using Virtual Box 6.1.50 on your host computer, the file to download is:
https://download.virtualbox.org/virtualbox/6.1.50/VBoxGuestAdditions_6.1.50.iso

If using another version of Virtual Box, search for the version, and download the file from here:
https://download.virtualbox.org/virtualbox/

Once you have downloaded the ISO file, follow the instructions for installing the guest additions onto your Ubuntu 24.04 Virtual Box VM as in the articles:

https://linuxconfig.org/installing-virtualbox-guest-additions-on-ubuntu-24-04

https://www.linuxtechi.com/install-virtualbox-guest-additions-on-ubuntu-24-04/

Please do yourself a favor, and do not go the entire quarter without installing the guest additions.
Be sure to enable the **shared clipboard** on any VMs you create on Virtual Box. Select your VM in Virtual Box, and click on settings. On the general tab, under Advanced, set the clipboard to "bidirectional".
For Ubuntu, the shared clipboard requires Guest Additions to be installed.

Leveraging your newly created Linux VM, please review sections 1 – 12 of the online Linux tutorial:

Linux Tutorial:
https://ryanstutorials.net/linuxtutorial/

While reviewing the tutorial, try practicing some of the commands described.
After reviewing the tutorial, complete an online quiz on Canvas that is based on the online tutorial. If already familiar with Linux, it may be sufficient to skip some tutorial sections or review just some portions.

Tutorial Sections include:

1. The Command Line
2. Basic Navigation
3. More About Files
4. Manual Pages
5. File Manipulation
6. VI – Text Editor
7. Wildcards
8. Permissions
9. Filters
10. Grep and regular expressions
11. Piping and Redirection
12. Process Management
13. Scripting
14. Cheat Sheet

Tutorial 1 Quiz

For the quiz, it is required to test each of the Linux commands relevant to answering the quiz questions using your Linux system.

Use the Linux "**`script`**" command to capture your Linux session where you test each of the Linux commands for answering the quiz questions in Canvas. Submission of a complete script file will be worth 50% of the quiz points.

To start recording your session, using the script command as follows:

```
script tutorial1.output
```

At the conclusion, type '**`exit`**' to finish recording.
Upload the tutorial1.output file to Canvas.

At the conclusion of the online Linux tutorial, please complete the tutorial 1 quiz on Canvas for TCSS 462/562.