

CE103 Algorithms and Programming I

Intro

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0.1 CE103 Algorithms and Programming I

0.2 Week-1 (Intro)

0.2.0.1 Fall Semester, 2021-2022 Download DOC¹, SLIDE², PPTX³

¹[ce103-week-1-intro.md_doc.pdf](#)

²[ce103-week-1-intro.md_slide.pdf](#)

³[ce103-week-1-intro.md_slide.pptx](#)

0.3 Brief Description of Course and Rules

We will first talk about,

1. Course Plan and Communication
2. Grading System, Homework,s and Exams

please read the syllabus carefully.

0.4 Computer Engineering Roles

- Software Development
 - Hardware Development
 - Network Organization and Management
 - Database Organization and Management
 - Hardware and Software Testing
 - Audit (Cyber Security, Policy etc.)
 - Etc.
-

0.5 Computer Engineering Areas

- Computer Vision
 - Social
 - Analytics
 - Mobility
-

- IoT
 - Security
 - Web-Scale IT
 - Cloud
-

- Smart Machines
 - Pervasive
 - Fintech
 - Etc.
-

0.6 Our focus is Software Development

for this reason, we will focus on software-based road-maps

we can use common developer road maps from

<https://roadmap.sh/>

0.7 What will you see in the roadmap?

- Frontend⁴
- Backend⁵
- DevOps⁶
- DBA⁷

and more⁸

0.8 Also, you need soft skills

- Excellent written and oral communication skills, including public speaking and presenting
 - Decisiveness under pressure and strong critical thinking skills
 - Willingness to work off-core-hours, when necessary, to deploy software or upgrade hardware
-

0.9 If you need more information about your profession

Visit Job Search Web Portals and Look at Requirements to Understand What is Real Life Need

- <https://www.kariyer.net/>
 - <https://www.yenibiris.com/>
 - <https://www.secretcv.com/>
 - <https://www.linkedin.com/>
 - Etc.
-

0.10 Using Google

⁴<https://roadmap.sh/frontend>

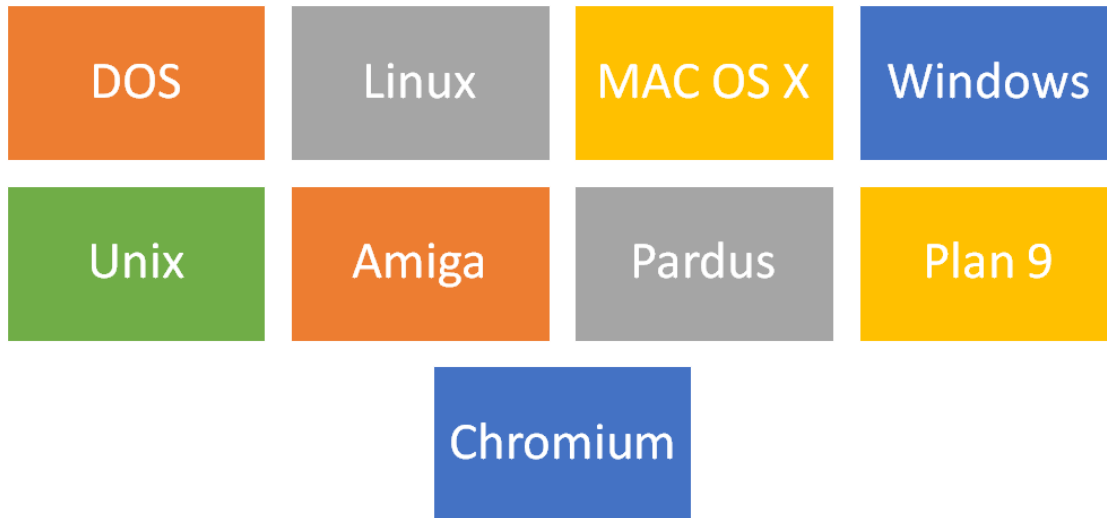
⁵<https://roadmap.sh/backend>

⁶<https://roadmap.sh/devops>

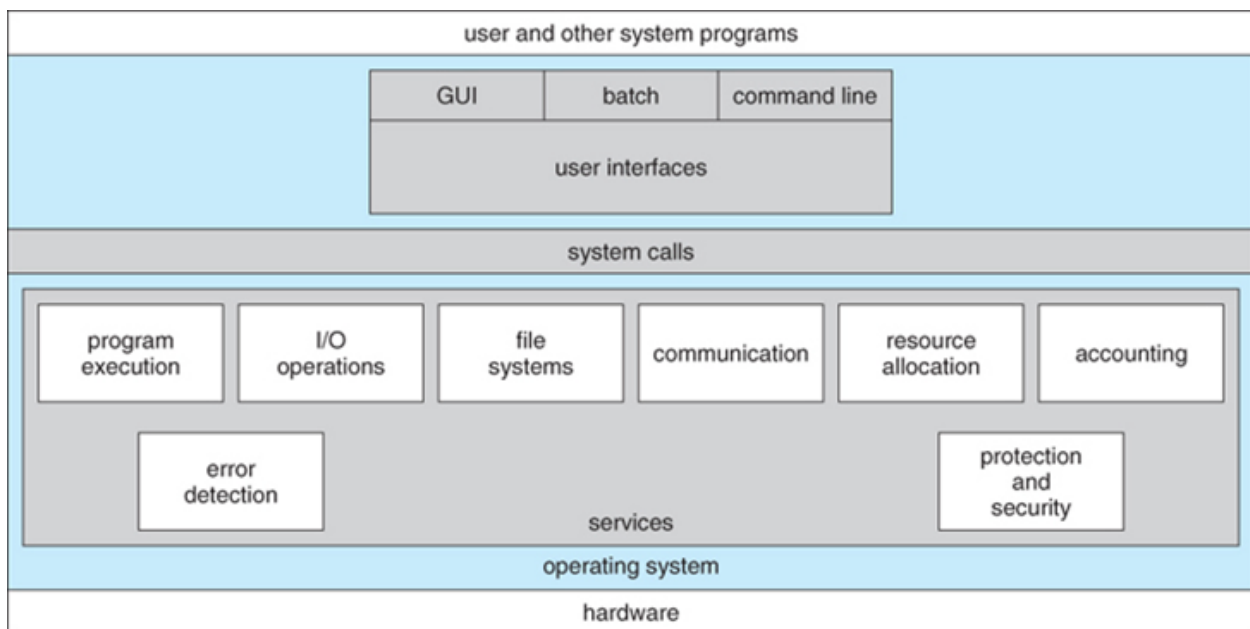
⁷<https://roadmap.sh/postgresql-dba>

⁸<https://roadmap.sh/>

0.11 Operating System List



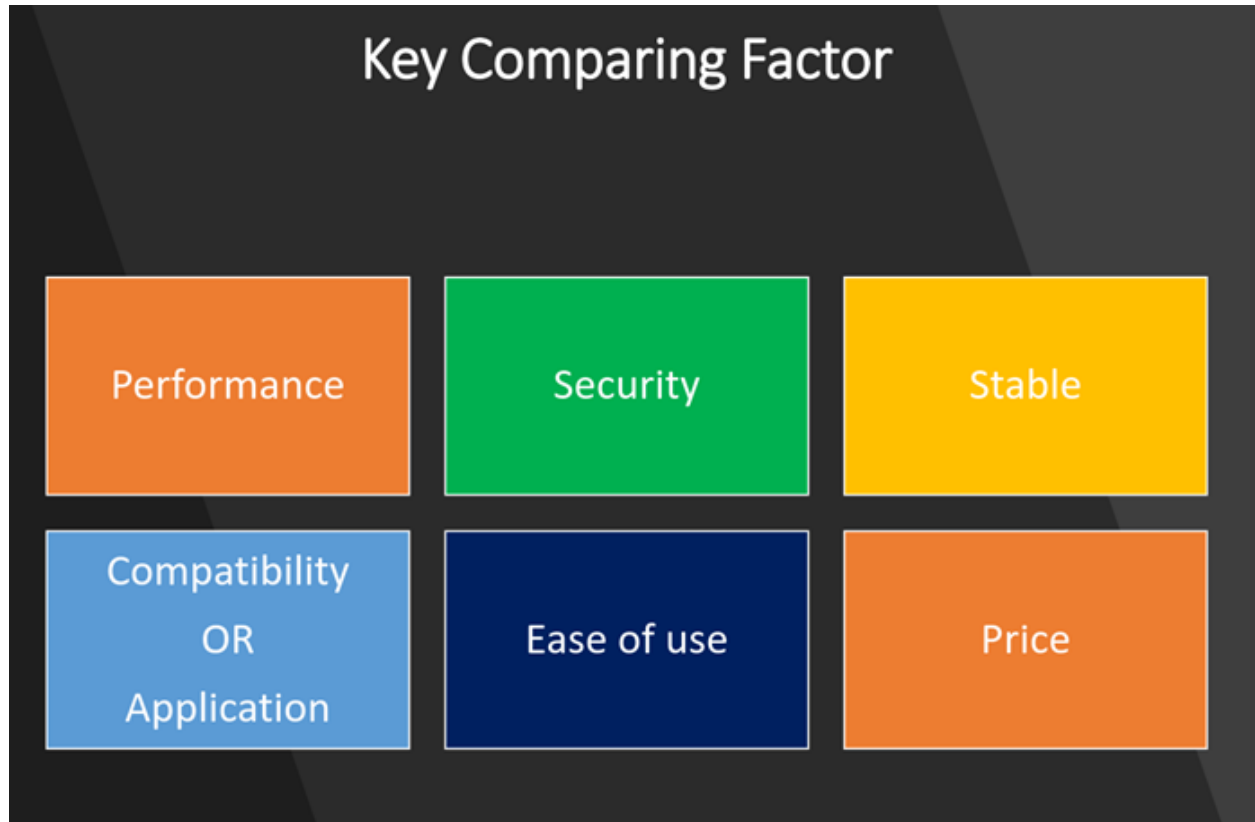
0.12 Operating System Architecture



reference⁹

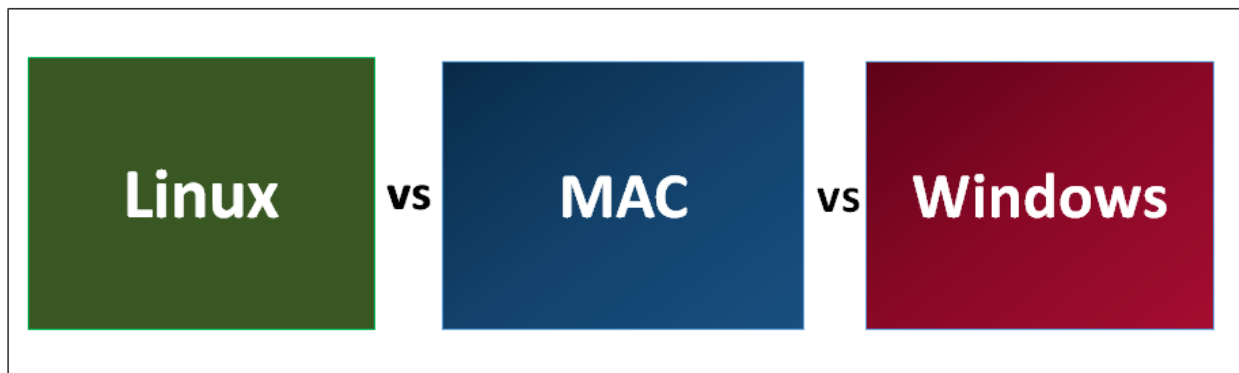
⁹https://www.cs.uic.edu/~jbell/CourseNotes/OperatingSystems/2_Structures.html

0.13 Operating Systems Key Comparing Factor



reference¹⁰

0.14 Operating System Comparisons



reference¹¹

¹⁰<https://www.slideshare.net/quanhan503/comparing-windows-vs-mac-vs-linux>

¹¹<https://www.educba.com/linux-vs-mac-vs-windows/>

#1. Basic Difference and History

Windows



Windows was first released in 1985. It was supposed to be graphical user interface on top of MS DOS. All features of MS DOS were later integrated in Windows 95 release. It was a huge success in and led to Windows transition.

MAC



This operating system from Apple stands older than Windows. It was first released in 1978. It began as a graphical user interface right from its inception. In 2005 the design and structure of MAC OS was changed to Intel x86 based architecture.

Linux



It was initially developed in Finnish University. It was released in 1991 and designed for GNU developers. GNU developers later integrated it into Linux. It is open to consumers and everyone can use as per their specifications.

#2. File Structure

Windows



Windows follows a directory structure to store the different kinds of files of the user. It has logical drives and cabinet drawers. It also has folders. Some common folders like documents, pictures, music, videos and downloads. All these files can be stored in these folders and also new folders can be created. It also has files which can be a spreadsheet or any application program. It can have extensions as .txt, .jpg etc. In addition to this Windows also provides recycle bin where all deleted files can be stored. Recycle bin can be configured to increase its size.

MAC



The file structure of MAC is commonly known as MAC OS X. If you go to dig into your MAC's hard disk through finder you will see many directories. The root directory of MAC may encounter when they visit their own MAC book. You can explore the file system and directory structure by going to directories like /Application, /Developer, /sbin, /tmp, etc.

Linux



Linux has a completely different file structure from Windows and MAC. It was developed with a different code base. It stores data in the form of tree. There is a single file tree and all your drives are mounted over this tree.

#3. Registry

Windows



Windows registry is a master database which is used to store all settings on your computer. It is responsible to store all user information with its passwords and device related information. The registry also has an editor which allows you to view all keys and values or even drivers if necessary.

MAC



MAC stores all application settings in a series of .plist files which have the various preferences folder in MAC. This .plist file contains all properties in either plain text or binary format. These are stored at: /Library/Preferences folder.

Linux



Linux also does not have a specific registry of its own. All application settings are stored on program basis under the different users in the same hierarchy format of the files being stored. There is not centralized database for storing these details and so periodic cleaning is also not required.

#4. Interchangeable Interfaces

Windows



Windows interface was not interchangeable until Windows 8. Windows XP had some improvements but not par. Start menu, task bar, system tray and Windows explorer.

MAC



MAC has facility to bridge virtual network interfaces. This can be done by going to system preferences and managing the interfaces.

Linux



Linux is easy to switch interfaces. You can switch the environment without having to carry all installations. There are utilities like GNOME and KDE which help in catering these needs. They help in focusing on different aspects.

#5. Command Terminal

Windows



A terminal or command prompt is a black box ideally used to execute commands. It is also called Windows Command Processor. It is used to execute commands and different batch files. It can also be used for administrative functions and trouble shoot and solve all windows issues.

MAC



MAC provides a console as a terminal application. It has console, command line, prompt and terminal. Command line is used to type your commands. Prompt will provide you some information and also enable you to run commands. Terminal is the actual interface which will provide the modern graphical user interface as well. You can find terminal at: Applications -> Utilities.

Linux



Linux also provides a terminal. You can find terminal at: Applications -> System or Applications -> Utilities. In addition to this there is also shell prompt. The most common shell used in bash. It defines how the terminal will behave and look when it is run.

0.15 Intro to the Internet

Internet Address (IP)

Google IP4 Address

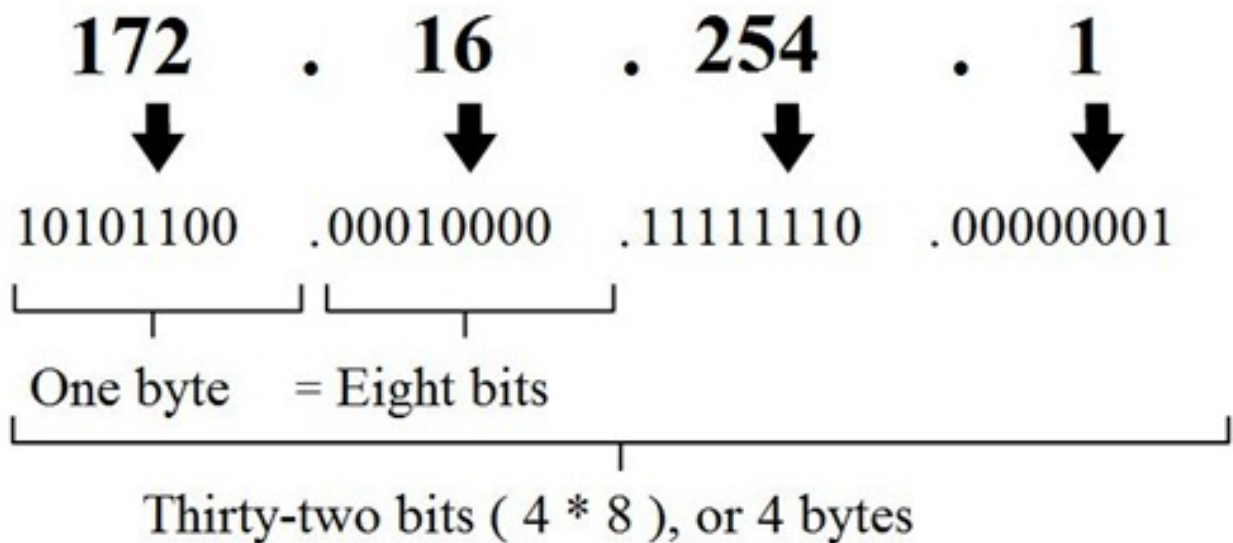
216.58.216.164

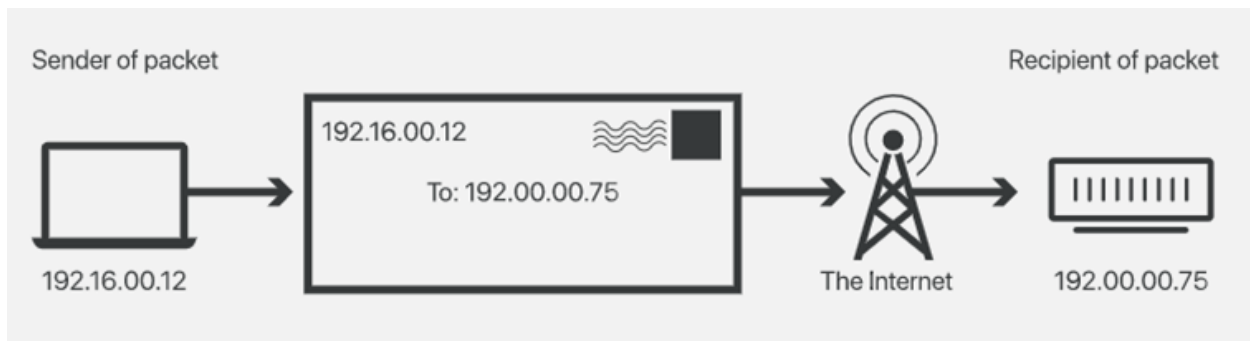
Google IP6 Address

2607:f8b0:4005:805::200e

ComputerHope.com

An IPv4 address (dotted-decimal notation)





0.17 What is Port?

In computer networking¹², a port is a communication endpoint. At the software level, within an operating system¹³, a port is a logical construct that identifies a specific process¹⁴ or a type of network service¹⁵. A port is identified for each transport protocol¹⁶ and address combination by a 16-bit unsigned number¹⁷, known as the port number. The most common transport protocols that use port numbers are the Transmission Control Protocol¹⁸ (TCP) and the User Datagram Protocol¹⁹ (UDP).

reference²⁰

¹²https://en.wikipedia.org/wiki/Computer_networking

¹³https://en.wikipedia.org/wiki/Operating_system

¹⁴[https://en.wikipedia.org/wiki/Process_\(computing\)](https://en.wikipedia.org/wiki/Process_(computing))

¹⁵https://en.wikipedia.org/wiki/Network_service

¹⁶https://en.wikipedia.org/wiki/Transport_protocol

¹⁷https://en.wikipedia.org/wiki/Unsigned_number

¹⁸https://en.wikipedia.org/wiki/Transmission_Control_Protocol

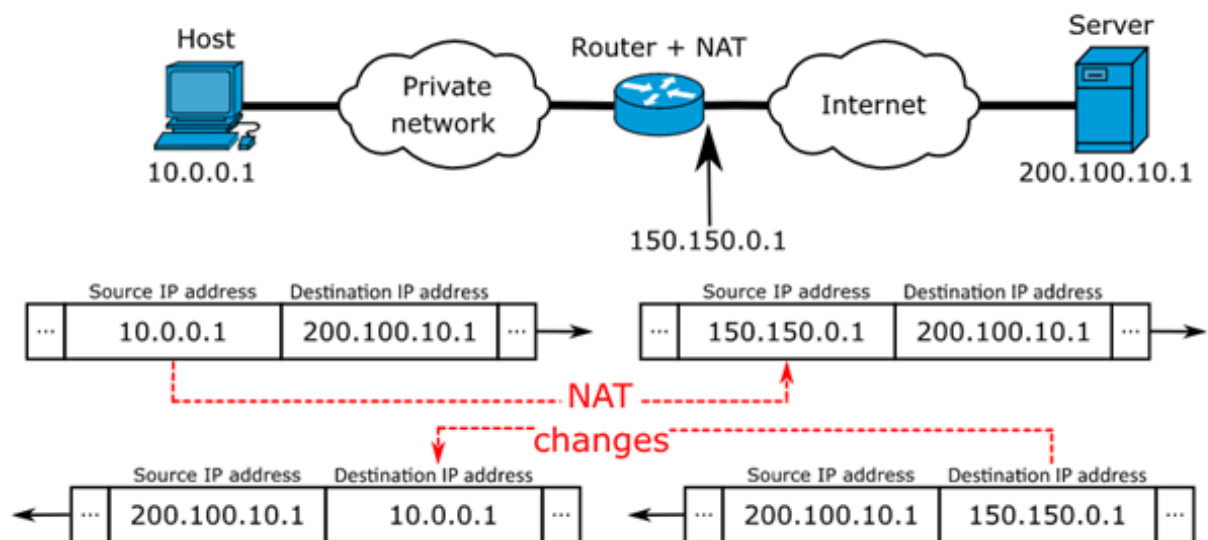
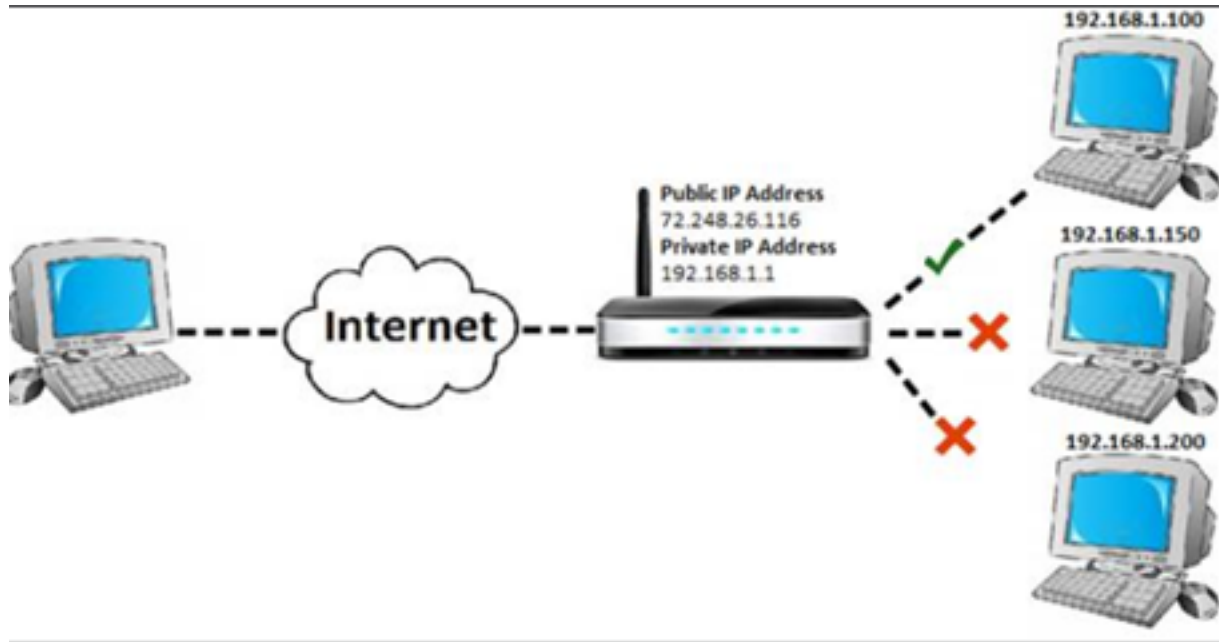
¹⁹https://en.wikipedia.org/wiki/User_Datagram_Protocol

²⁰[https://en.wikipedia.org/wiki/Port_\(computer_networking\)](https://en.wikipedia.org/wiki/Port_(computer_networking))

Common port numbers

Number	Assignment
20	File Transfer Protocol (FTP) Data Transfer
21	File Transfer Protocol (FTP) Command Control
22	Secure Shell (SSH) Secure Login
23	Telnet remote login service, unencrypted text messages
25	Simple Mail Transfer Protocol (SMTP) E-mail routing
53	Domain Name System (DNS) service
67, 68	Dynamic Host Configuration Protocol (DHCP)
80	Hypertext Transfer Protocol (HTTP) used in the World Wide Web
110	Post Office Protocol (POP3)
119	Network News Transfer Protocol (NNTP)
123	Network Time Protocol (NTP)
143	Internet Message Access Protocol (IMAP) Management of digital mail
161	Simple Network Management Protocol (SNMP)
194	Internet Relay Chat (IRC)
443	HTTP Secure (HTTPS) HTTP over TLS/SSL

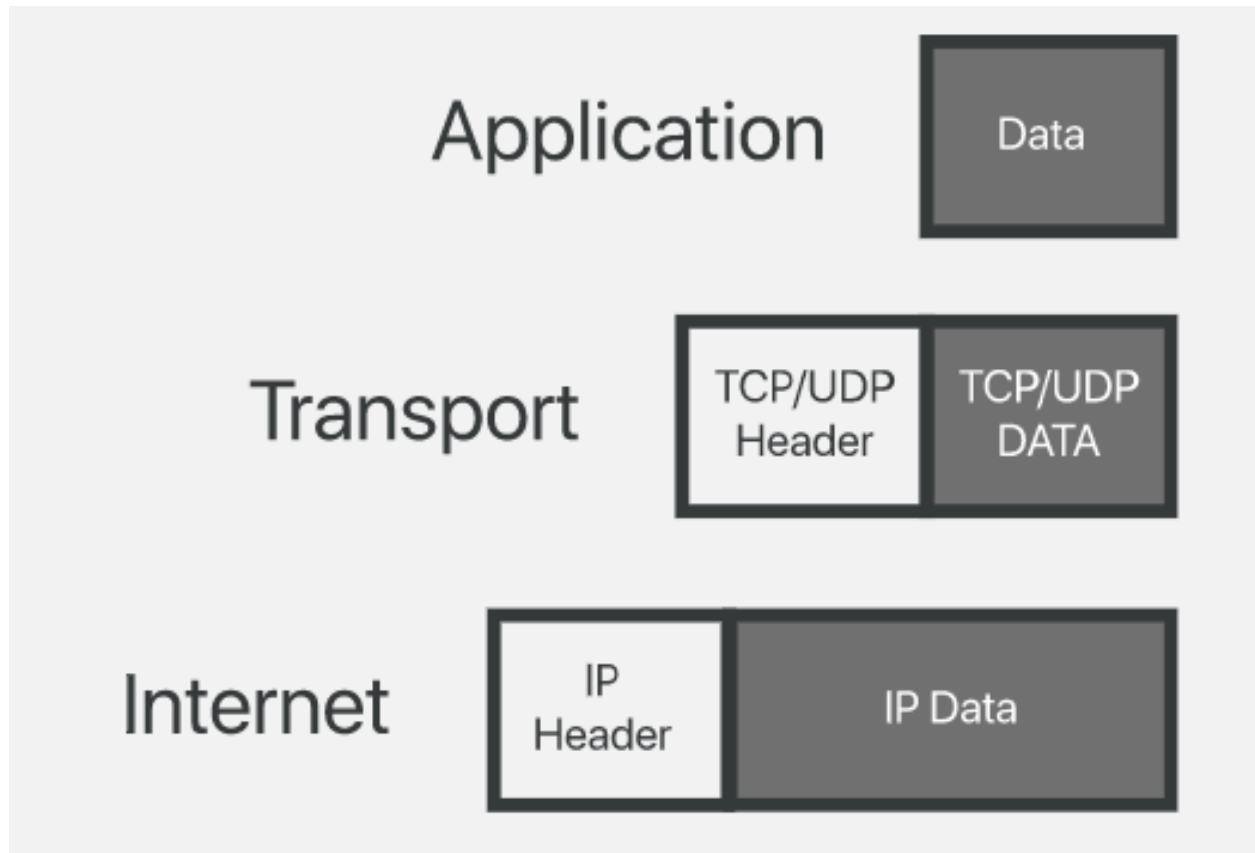
0.18 What is Port Forwarding and NAT



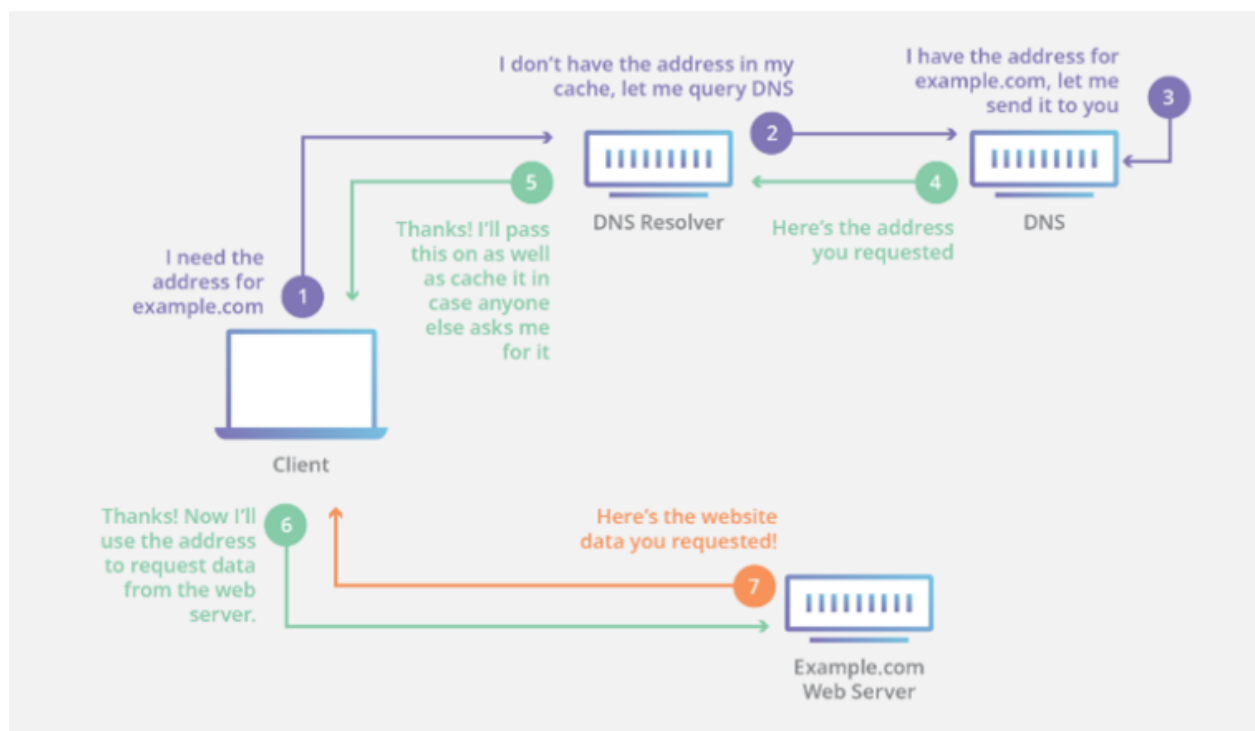
<https://www.networkantics.com/sonicwall-port-forwarding/>

https://en.wikipedia.org/wiki/Network_address_translation

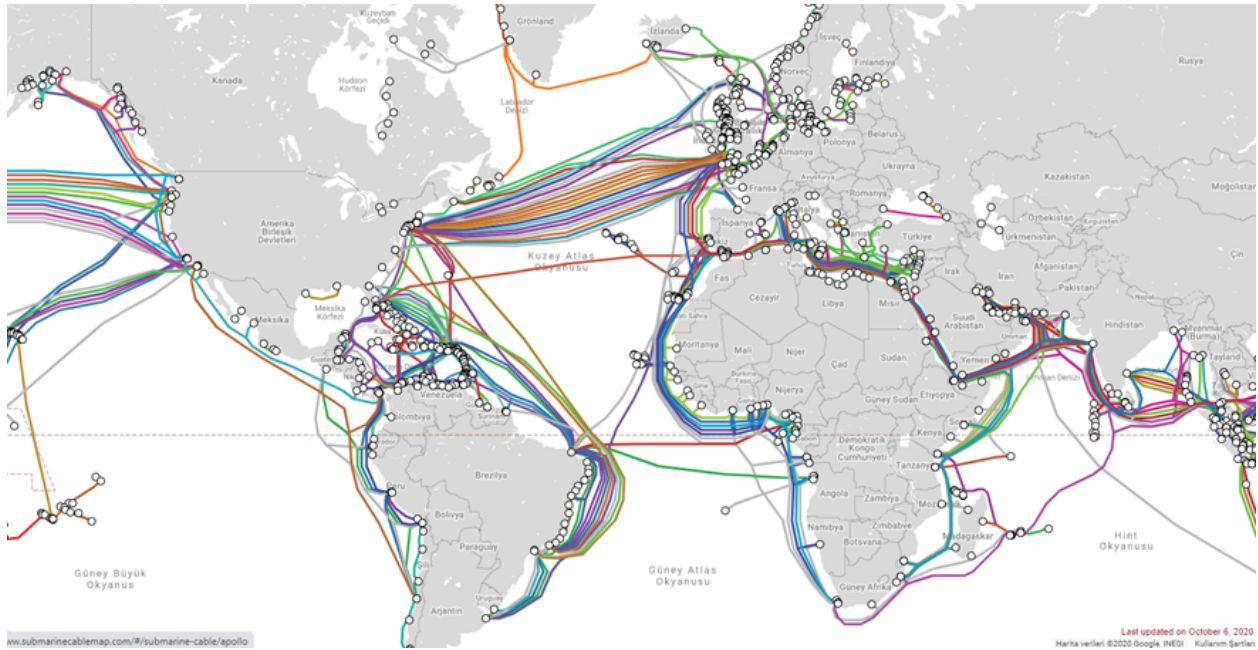
0.19 What is Internet Packet (IP)



0.20 What is Domain Name Server (DNS)?



0.21 The Submarine Cable Map



<https://www.submarinecablemap.com/>

0.22 Introduction to the command line interface

Reference Books

Bash Notes For Professionals²¹ Linux Notes For Professionals²² PowerShell Notes For Professionals²³

0.23 What is the command line?

The window, which is usually called the **command line** or **command-line interface**, is a text-based application for viewing, handling, and manipulating files on your computer. It's much like Windows Explorer or Finder on the Mac, but without the graphical interface. Other names for the command line are:

`cmd`, `CLI`, `prompt`, `console` or `terminal`

While there are many commands you can use with CLI, they all fall into two categories:

- The commands that handle the processes
- The commands that handle the files

reference²⁴

²¹[files/BashNotesForProfessionals.pdf](#)

²²[files/LinuxNotesForProfessionals.pdf](#)

²³[files/PowerShellNotesForProfessionals.pdf](#)

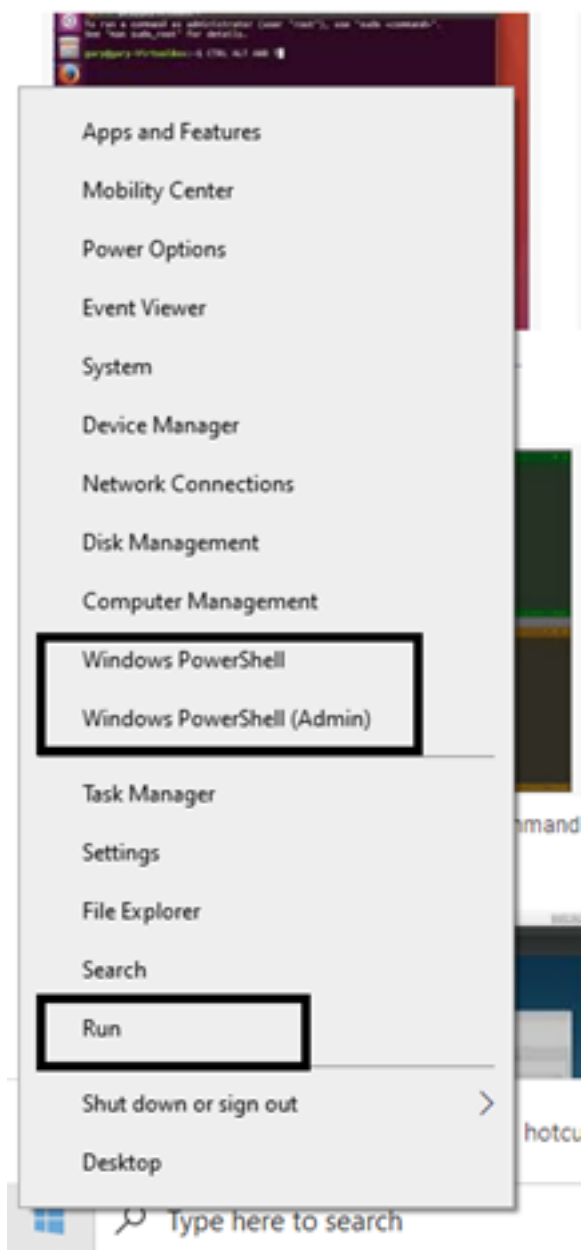
²⁴https://tutorial.djangogirls.org/en/intro_to_command_line/

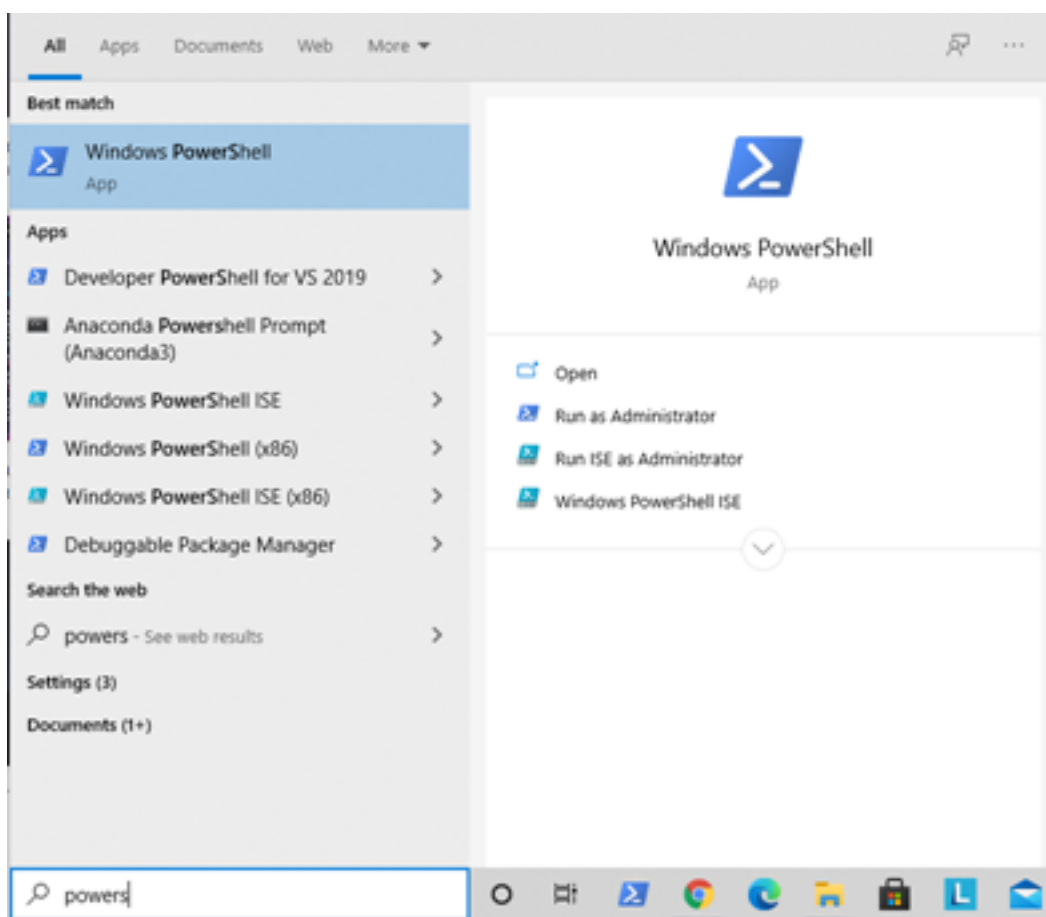
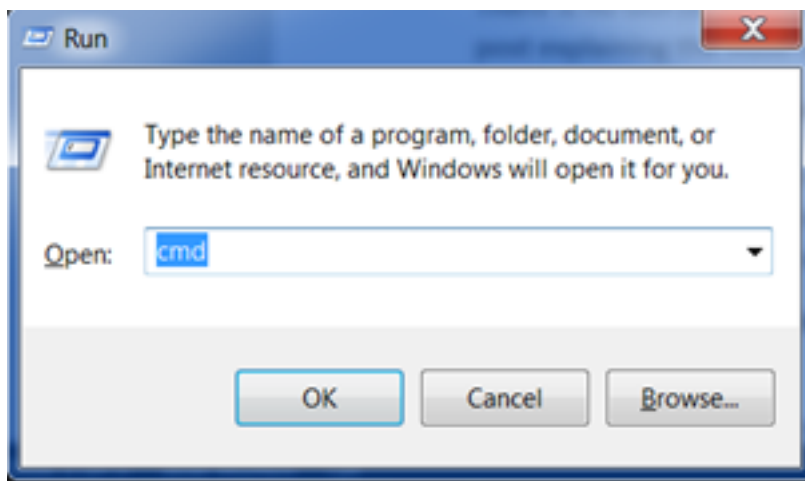
0.24 Why Would You Use CLI over GUI?

-
- **Less Resource** It is not a secret that the text-based program needs very little resources of your computer. This means that with CLI you can do similar tasks with minimum resources.
-
- **High Precision** You can use a specific command to target specific destinations with ease. As long as you don't type the wrong command, it will work like a charm. Once you learn the basics, writing syntax is not as hard as you might think.
-
- **Repetitive Tasks** Friendly GUI has developed well over the years. But, the operating system may not give you all the menus and buttons to perform all tasks. One of the reasons is safety. This leaves you overwhelmed if you have to do repetitive tasks. For example, when you have to handle hundreds of files within a folder, CLI enables you to use a single command to do automate the repetition easily.
-
- **Powerful** Most operating systems today prevent you from messing up the system's core process. Windows has system protection and MacOS has SIP (System Integrity Protection). You won't be able to perform certain tasks which are system protected. However, with CLI, you will have full control over your system.
-

0.25 Open the command-line interface (Windows)

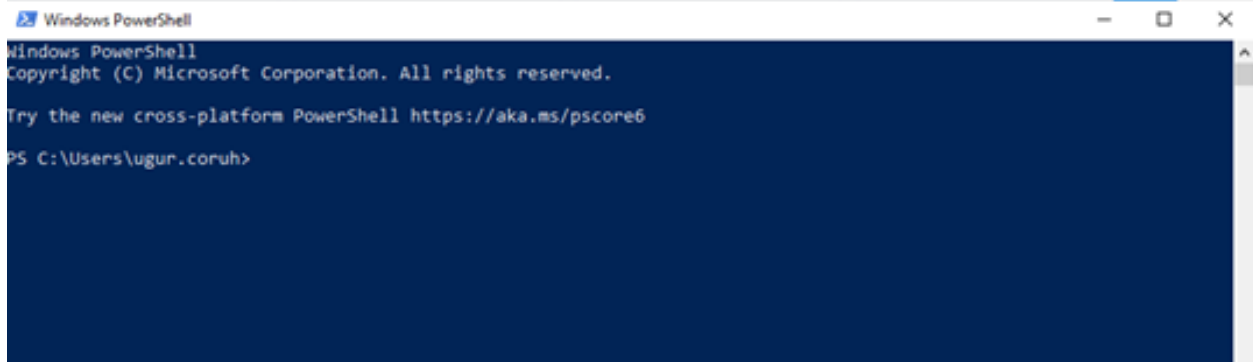
- Go to the Start menu or screen, and enter "Command Prompt" in the search field.
 - Go to Start menu → Windows System → Command Prompt.
 - Go to Start menu → All Programs → Accessories → Command Prompt.
 - Go to the Start screen, hover your mouse in the lower-left corner of the screen, and click the down arrow that appears (on a touch screen, instead flick up from the bottom of the screen). The Apps page should open. Click on Command Prompt in the Windows System section.
 - Hold the special Windows key on your keyboard and press the "X" key. Choose "Command Prompt" from the pop-up menu.
 - Hold the Windows key and press the "R" key to get a "Run" window. Type "cmd" in the box, and click the OK key.
-







A screenshot of a Windows Command Prompt window. The title bar shows the path `C:\WINDOWS\system32\cmd.exe`. The window contains the following text: `Microsoft Windows [Version 10.0.19041.572]
(c) 2020 Microsoft Corporation. All rights reserved.
C:\Users\ugur.coruh>`

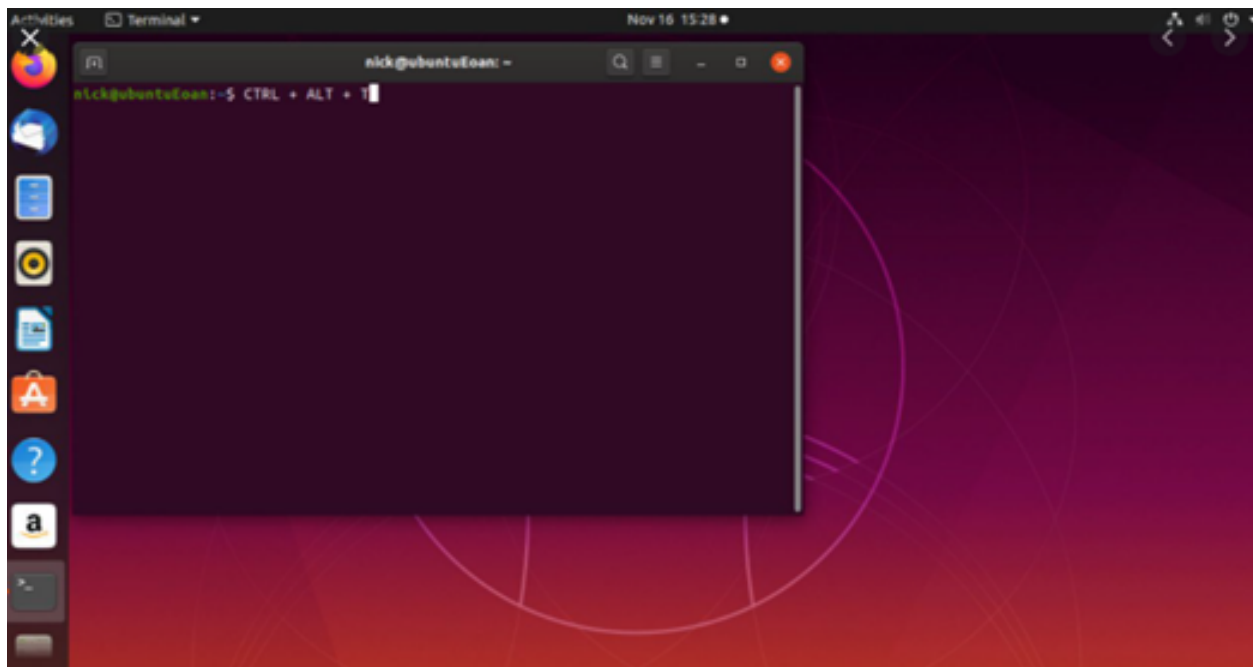


A screenshot of a Windows PowerShell window. The title bar shows `Windows PowerShell`. The window contains the following text: `Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.
Try the new cross-platform PowerShell https://aka.ms/pscore6
PS C:\Users\ugur.coruh>`

0.26 Open the command-line interface (Linux)

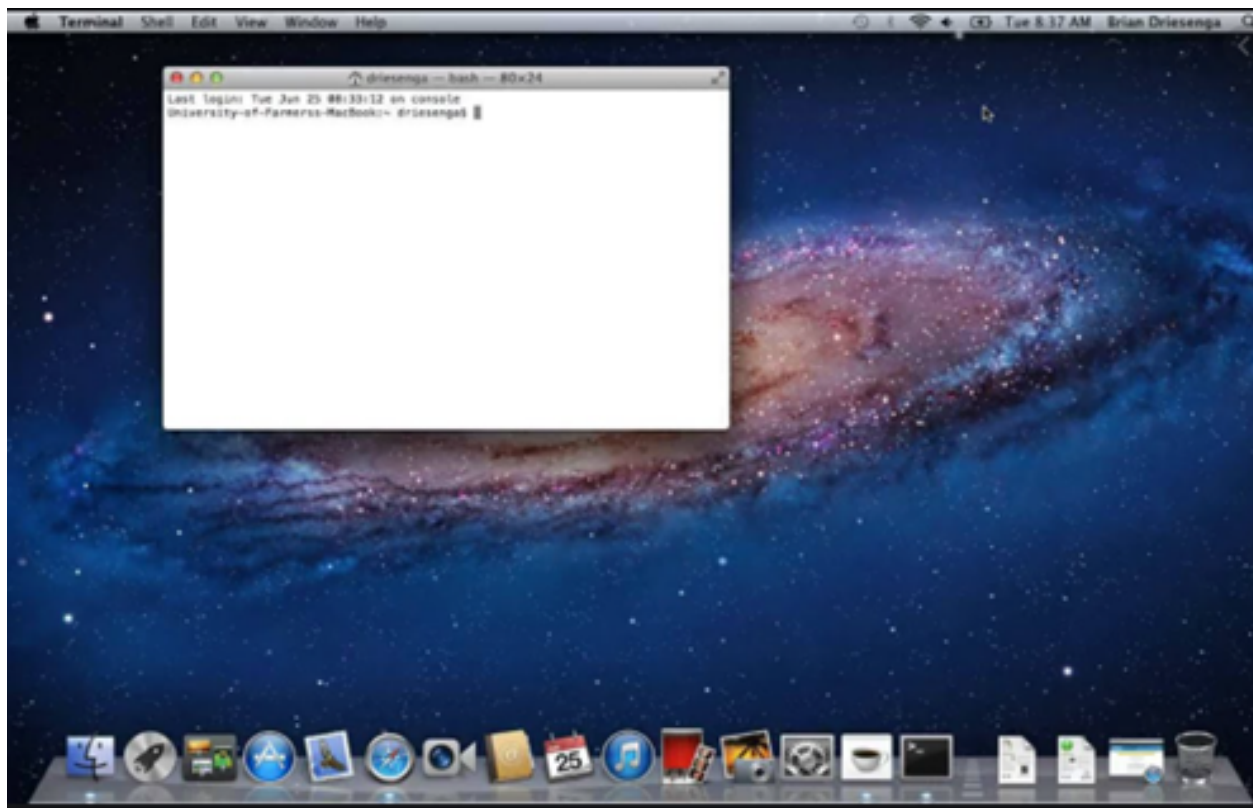
It's probably under

- Applications → Accessories → Terminal,
 - or
 - Applications → System → Terminal, but that may depend on your system. If it's not there, you can try to Google it. :)
-



0.27 Open the command-line interface (MacOS)

- Go to Applications → Utilities → Terminal



0.28 Reference

Network_address_translation

GitHub - kamranahmedse/developer-roadmap: Roadmap to becoming a web developer in 2021²⁵

GitHub - jwasham/coding-interview-university: A complete computer science study plan to become a software engineer.²⁶

GitHub - sindresorhus/awesome: Awesome lists about all kinds of interesting topics²⁷

²⁵<https://github.com/kamranahmedse/developer-roadmap>

²⁶<https://github.com/jwasham/coding-interview-university>

²⁷<https://github.com/sindresorhus/awesome>