**Objectives**

1. Research information about software for a specific operating system (OS) environment. You will be assigned one of the operating systems form the list below. You will also be provided with a list of topics to investigate.
2. Organize your rough research information into a list of topics, sub-topics and facts. This process will involve identifying sub-topics, rearranging your rough research notes, and selecting (or highlighting) interesting facts.
3. Report a summary of your research in the form of a “concept map”. Use the PowerPoint template provided as a starting point. The concept map should only include the best and most interesting information from your organized research notes.
4. Your concept map can be created using: Smart Ideas, Prezi, PowerPoint or other similar applications.

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**Step 1 – Organized Research**

Research information about your assigned operating system (OS) environment.

* Guide your research according to the suggested topic list below
* Feel free to copy-and-paste as long as you keep track of your bibliographic references.
* Do not be too picky or concerned about formatting as you will organize this information later in step 2
* Select things that look interesting and don’t forget to include graphics images as well
* Upload your rough research notes to your repository when you are done.

Topic A – Application Software

Provide a summary of most important user application software targeted by this operating system and how it is similar to and deferent from standard PC software. Suggested sub-topics include:

* User (client) or network (server) applications

Linux is the best-known and most-used open source operating system. As an operating system, Linux is software that sits underneath all of the other software on a computer, receiving requests from those programs and relaying these requests to the computer’s hardware.

* Batch (run without user input) or interactive (user focused) processing

Processes carry out tasks within the operating system. A program is a set of machine code instructions and data stored in an executable image on disk and is, as such, a passive entity; a process can be thought of as a computer program in action. Linux is a multiprocessing operating system.

* Off-the-shelf (purchased) or custom developed applications

In many ways, Linux is similar to other operating systems you may have used before, such as Windows, OS X, or iOS. Like other operating systems, Linux has a graphical interface, and types of software you are accustomed to using on other operating systems, such as word processing applications, have Linux equivalents. In many cases, the software’s creator may have made a Linux version of the same program you use on other systems. If you can use a computer or other electronic device, you can use Linux. But Linux also is different from other operating systems in many important ways. First, and perhaps most importantly, Linux is open source software. The code used to create Linux is free and available to the public to view, edit, and—for users with the appropriate skills—to contribute to. Linux is also different in that, although the core pieces of the Linux operating system are generally common, there are many distributions of Linux, which include different software options. This means that Linux is incredibly customizable, because not just applications, such as word processors and web browsers, can be swapped out. Linux users also can choose core components, such as which system displays graphics, and other user-interface components.

* Programming environment and languages supported

Linux is fast becoming popular, especially with the declining use of Windows, and to promote Linux and fight towards achieving the desired use of Linux on desktop, Linux programmers and software developers are putting in more effort and hard work in developing desktop applications that will match applications on Windows and Mac OS X desktops.

- C/C++

- Java

- Python

- Shell

- JavaScript/GitHub Electron

Topic B – Hardware

Provide a summary of the hardware targeted by this operating system and how it is similar to and deferent from standard PC hardware. Suggested sub-topics include:

* Speed of processors / memory

- Linux is far faster than Windows. That's old news. It's why Linux runs 90 percent of the world's top 500 fastest supercomputers, while Windows runs 1 percent of them. What's new "news" is that an alleged Microsoft operating system developer recently admitted that Linux is indeed much faster, and explained why that's the case.

- The alleged Microsoft developer opened by saying, "Windows is indeed slower than other operating systems in many scenarios, and the gap is worsening. The cause of the problem is social. There's almost none of the improvement for its own sake, for the sake of glory, that you see in the Linux world."

- Linux outperforms Windows in many areas, because the Linux development and contribution process is conducive to incremental improvements. When IBM, Intel, Redhat, or some independent developer makes an improvement, the GPL license often requires them to share it. Windows, on the other hand, has a smaller developer pool that is not receptive to outside code, and is market-driven (scarce developer time shouldn't be spent fixing what isn't broken).

* Capacity of memory / attached disks

- On Linux, there are commands for almost everything, because the gui might not be always available. When working on servers only shell access is available and everything has to be done from these commands. So today we shall be checking the commands that can be used to check memory usage on a Linux system. Memory include RAM and swap.

- It is often important to check memory usage and memory used per process on servers so that resources do not fall short and users are able to access the server. For example a website. If you are running a webserver, then the server must have enough memory to serve the visitors to the site. If not, the site would become very slow or even go down when there is a traffic spike, simply because memory would fall short. Its just like what happens on your desktop PC.

* Is it designed for home / office / corporate data center / industrial use

- Linux was originally developed for personal computers based on the Intel x86 architecture, but has since been ported to more platforms than any other operating system. ... Because of the dominance of Android on smartphones, Linux has the largest installed base of all general-purpose operating systems.

* Is it designed for client / server / network use

- Linux is based on Unix, an operating system developed in the 1970s and which is still used heavily today, especially to run the Internet. Linux is used both to run parts of the Internet, as well as to run small and large networks in corporations, offices and homes.

- Linux makes very efficient use of the system's resources. ... Linux runs on a range of hardware, right from supercomputers to watches.

Topic C – User Interface

Provide a summary of the user interface and input devices targeted by this operating system and how it is similar to and deferent from a standard PC. Suggested sub-topics include:

* Does it support a windowed environment, command line, or network users

- There’s no one true desktop environment for Linux. Unlike competing operating systems like Windows, Linux users have a choice of many different desktop environments, all with their own styles and strengths. You can install one of these desktop environments after installing your Linux distribution and switch between desktop environments from the login screen. You can also choose to install a Linux distribution that comes with the desktop environment.

* Does it support multiple users at a time or single users

- Unix and Linux support multiple user accounts on a single system. Linux works much the same as Unix in this regard and can be used as a server allowing multiple simultaneous users, Unix and Linux support multiple user accounts on a single system

* Does it support multiple applications or a single application at a time

- Embedded development is much different than desktop application development. But the ability to use the same Linux source code across multiple applications makes Linux the operating system of choice for the development and integration of Linux.

* Does it get rebooted (powered on / off) or is it always on

- To reboot the Linux system from a terminal session, sign to the “root” account. Then type “ sudo reboot ” to reboot the box. Wait for some time and the Linux server will reboot itself.

Topic D – Device Management

Provide a summary of the devices (disks, printers, etc.) and memory managed by this operating system and how it is similar to and deferent from a standard PC. Suggested sub-topics include:

* What types of disk drives and file systems does it support

- The SCSI, or Small Computer System Interface, was developed in the early 1980’s and was used extensively for connecting hard drives as well as other devices. Originally supporting data transfer rates of 5MB/s, it is now capable of supporting data rates of up to 640MB/s. Up to seven devices may be attached to a single SCSI channel, and the cable length can be significantly longer allowing for much more flexibility. SCSI devices are more expensive than IDE/PATA or SATA devices

* What type of input devices does it support

- Standard Input Definition. Standard input, often abbreviated stdin, is the source of input data for command line programs (i.e., all-text mode programs) on Linux and other Unix-like operating systems. ... A command is an instruction given by a user to tell a computer to do something, such as run a program

* What type of output devices does it support

- In Linux/Unix, everything is a file. Regular file, Directories, and even Devices are files. Every File has an associated number called File Descriptor (FD). Your screen also has a File Descriptor. When a program is executed the output is sent to File Descriptor of the screen, and you see program output on your monitor. If the output is sent to File Descriptor of the printer, the program output would have been printed.

Topic E – Security

Provide a summary of the security features provided by this operating system and how it is similar to and deferent from a standard PC. Suggested sub-topics include:

* What types of user accounts and user permissions does it support
* How does it protect against conflicts / interference between legitimate application processes
* How does it protect against malicious software
* How does it support software updates and security updates

- The core reason you don’t need an antivirus on Linux is that very little Linux malware exists in the wild. Malware for Windows is extremely common. Shady advertisements push nasty software that is practically malware, file-sharing sites are full of infected programs, and malicious individuals target security vulnerabilities to install Windows malware without your permission. With this in mind, using an antivirus program on Windows is an important layer of protection.

- Antivirus software isn’t entirely useless on Linux. If you are running a Linux-based file server or mail server, you will probably want to use antivirus software. If you don’t, infected Windows computers may upload infected files to your Linux machine, allowing it to infect other Windows systems.

- The antivirus software will scan for Windows malware and delete it. It isn’t protecting your Linux system – it’s protecting the Windows computers from themselves.

Topic F – Network Connectivity

Provide a summary of the network connectivity provided by this operating system and how it is similar to and deferent from a standard PC. Suggested sub-topics include:

* Is the computer stand-alone or part of a larger network

- When your Linux server seems to be offline or otherwise inaccessible, you should always be able to log in with the web console at your UpCloud control panel or through a VNC connection. Once logged in, test your server’s internet connection using ping and a public IP address such as Google’s public DNS server, which is most likely to reply provided your internet connection works.

* What type of network and internet connections does it provide

- In the world of technology computer networks have increased the efficiency and speed of the systems and the IP has made it possible for computers across the globe to communicate easily. Learn how these advantages can help you and how networking and Internet are used in Red Hat Linux.

- The communications facilities linking computers are continually improving, allowing faster and more economical connections. The earliest computers were unconnected stand-alone machines. To transfer information from one system to another, you had to store it in some form (usually magnetic tape, paper tape, or punch cards—called IBM or Hollerith cards), carry it to a compatible system, and read it back in. A notable advance occurred when computers began to exchange data over serial lines, although the transfer rate was slow (hundreds of bits per second). People quickly invented new ways to take advantage of this computing power, such as e-mail, news retrieval, and bulletin board services. With the speed of today's networks, it is normal for a piece of e-mail to cross the country or even travel halfway around the world in a few seconds.

* Does it provide other services such as backup, firewall, etc.

- The Internet is a loosely administered network of networks (an internetwork) that links computers on diverse LANs around the globe. An internet is a generic network of networks that may share some parts in common with the public Internet. It is the Internet that makes it possible to send an e-mail message to a colleague thousands of miles away and receive a reply within minutes. A related term, intranet, refers to the networking infrastructure within a company or other institution. Intranets are usually private; access to them from external networks may be limited and carefully controlled, typically using firewalls

**Step 2 – Concept Map**

Create a “concept map” as a final report of your organized research.

* Use the diagram in the introduction as a starting point.
* You should have six (6) first level topics from “Application Software”   
  to “Network Connectivity”
* Each first level topic should have at least three (3) sub-topics
* Each sub-topic should be supported by a number of facts / items of interest

Select the best and most interesting information from your organized research.

* Summarize and edit your information to fit on the concept map.

Upload your Research Notes and Concept Map to your GitHub Repository

* Your concept map can be created using: Smart Ideas, Prezi, PowerPoint or other   
  similar applications.
* Option1: Create and upload a PDF of your concept map
* Option2: Include a link to your Concept Map in your Student Questions
  + Make sure that your link is Sharable so Mr. Nestor can open your map

**Appendix A**

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| **Operating System** | **Student 1** | **Student 2** |
| Ubuntu  (Linux) |  |  |
| z/OS  (IBM) |  |  |
| Solaris  (Oracle) |  |  |
| HP-UX  (Hewlett Packard) |  |  |
| Windows NT  (Windows Server) |  |  |
| Red Hat Enterprise (IBM Summit) |  |  |
| QNX  (Blackberry) |  |  |
| VxWorks  (Wind River) |  |  |
| AOSP  (Android Alphabet) |  |  |
| Ubuntu  (Linux) |  |  |
| z/OS  (IBM) |  |  |
| Solaris  (Oracle) |  |  |
| HP-UX  (Hewlett Packard) |  |  |
| Windows NT  (Windows Server) |  |  |
| Red Hat Enterprise (IBM Summit) |  |  |
| QNX  (Blackberry) |  |  |
| VxWorks  (Wind River) |  |  |
| AOSP  (Android Alphabet) |  |  |
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