**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
* Batch (run without user input) or interactive (user focused) processing
* Off-the-shelf (purchased) or custom developed applications
* Programming environment and languages supported
* Pre-installed user apps and off the shelf programs: Spotify, Skype, VLC Player, Firefrox, Atom (hackable text editor), Slack (team comm/collab program), Chrome/Chromium, PyCharm, Telegram
* Server applications:
* Supported languages: Python, JavaScript, C++, etc

<https://ubuntu.com/desktop/features>

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
* Capacity of memory / attached disks
* Is it designed for home / office / corporate data center / industrial use
* Is it designed for client / server / network use
* 2 GHz dual core processor
* 4 GiB RAM (system memory)
* 25 GB of hard-drive space (or USB stick, memory card or external drive but see LiveCD ifyfor an alternative approach)
* VGA capable of 1024x768 screen resolution
* Either a CD/DVD drive or a USB port for the installer media
* [Internet access](https://help.ubuntu.com/community/Synaptic/PackageDownloadScript) is helpful
* It is made for office and home use
* It is designed for client and server use as well

<https://help.ubuntu.com/community/Installation/SystemRequirements>

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
* Does it support multiple users at a time or single users
* Does it support multiple applications or a single application at a time
* Does it get rebooted (powered on / off) or is it always on
* Linux Ubuntu is similar to Windows, it has a very similar user interface
* There is a few minor differences however
* Windowed environment
* It supports 1 user using the computer at a time
* It supports multiple applications at a time
* You can reboot or power it off, however, the PC can stay on always

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
* What type of input devices does it support
* What type of output devices does it support
* Supports HDD, SSD, Flash
* Supports various  file systems
* Can be built on a partition basis
* VFAT, ext2, ext3, ext4 and Reiser file systems can co-exist on the same Linux system, along with several other file systems and raw partitions.
* The ext2, ext3, ext4 file systems are robust. ext2 was the default file system under the 2.2 kernel. ext3 is simply the enhanced ext2 filesystem with a journaling feature. ext3 is the default filesystem for RHEL 3 and 4. ext4 was developed as the successor of ext3. It provides features for large filesystems, performance, increased limits, and reliability.
* Oracle Cluster File System (OCFS) is a shared file system designed specifically for Oracle Real Application Cluster (RAC). OCFS eliminates the requirement for Oracle database files to be linked to logical drivers. OCFS volumes can span one shared disk or multiple shared disks for redundancy and performance enhancements.
* OCFS2 is the next generation of the Oracle Cluster File System for Linux. It is an extent based, POSIX compliant file system. Unlike the previous release (OCFS), OCFS2 is a general-purpose file system that can be used for shared Oracle home installations making management of Oracle Real Application Cluster (RAC) installations even easier.
* XFS is designed for high scalability and provides near native I/O performance even when the file system spans multiple storage devices

In summary, the recommended filesystems are:

1. **Single node**: Any filesystem that is supported by the Linux vendor. Note that any filesystem issues are need to be resolved by the Linux vendor.
2. **Multi-node (RAC)**: OCFS, raw, NFS-based storage systems (e.g. NetApp)

* It supports many output devices. Speakers, printers, monitors, etc

<https://www.thegeekdiary.com/supported-and-recommended-file-systems-on-linux/>

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
* There are three basic types of Linux user accounts: administrative (root), regular, and service.
* The Linux administrative root account is automatically created when you install Linux, and it has administrative privileges for all services on Linux Operating System. The root account is also known as superuser
* Regular users have the necessary privileges to perform standard tasks on a Linux computer such as running word processors, databases, and Web browsers. They can store files in their own home directories. Since regular users do not normally have administrative privileges, they cannot accidentally delete critical operating system configuration files.
* Services such as Apache, Squid, mail, games, and printing have their own individual service accounts. These accounts exist to allow each of these services to interact with your computer.
* Each user on a Red Hat Enterprise Linux system is assigned a unique user identification number, also known as a UID. UIDs below 500 are reserved for system users such as the root user and service users.
* A [user group](http://www.omnisecu.com/gnu-linux/redhat-certified-engineer-rhce/introduction-to-linux-user-group.php) is a group of one or more users. A user can be a member of more than one group. In Red Hat Enterprise Linux, when a user is added, a private user group (primary group) is created—meaning that a user group of the same name is created and that the new user is the sole user in that group.
* Linux does not have many malicious software or viruses made to attack it
* Therefore an antivirus is not crucial, though it is still a good to have, because some malicious software for Linux does exist
* Infected Windows computers may upload  the virus to a Linux system, though the antivirus will scan the Windows file and kill the virus
* It is not protecting the Linux system, it is protecting the Windows computer from itself
* Linux gets frequent software and security updates

<http://www.omnisecu.com/gnu-linux/redhat-certified-engineer-rhce/introduction-to-linux-user-administration.php>

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
* What type of network and internet connections does it provide
* Does it provide other services such as backup, firewall, etc.
* It is part of a larger network
* When Linux system seems to be offline or otherwise unaccessible, always be able to log in with the web console at UpCloud control panel or through a VNC connection
* Once logged in, test the server’s internet connection using ping and public IP address such as Google’s public DNS server, which is most likely to reply provided your internet connection works
* It provides Ethernet, Wi-Fi, LAN, WAN, Broadcast, Point-to-Point, Switched and many more
* Ethernet (wired) and Wi-Fi (wireless) are the most common internet connection types
* It provides services such as backup and firewalls
* Computer firewalls separate computers from malicious and unwanted users
* A *firewall* prevents certain types of traffic from entering or leaving a network
* A firewall might prevent traffic from your *IP* address from leaving the network and prevent anyone except users from select domains from using ftp to retrieve data from the network.

**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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