**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 of: Windows, Mac OS, Linux. 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.

Your assigned operating system is:

* Windows (safe marking)
* Mac OS (bonus marking)
* Linux (double bonus marking)
* IOS (double bonus marking)
* Android (double bonus marking)

The concept map template can be downloaded from the “Topic A” folder on the class GitHub repository.

**Step 1 – Rough Research**

Research information about the software for 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 – Productivity & Application Software**

**Evernote**

Price: Free / $7.99-$14.99 per month

Evernote is a powerful note taking app. It's been among the most popular apps in its class for years and it has the chops to warrant such praise. It features audio, text, picture, and various other types of notes. There are also excellent organization features, cross-device syncing, collaboration features, and more. There isn't a lot wrong with it. However, you do pay for all of those features. A base plan goes for $7.99 per month with the full experience going for $14.99 per year. Google Keep is another excellent note taking app that is entirely free if you want such an option as well.

**Google Drive**

Price: Free

The Google Drive suite of productivity apps. They're all fantastic. First, you’ll have Google Drive, a cloud storage app with support for literally all file types. On top of that, you have Google Keep, Docs, Sheets, and Slides. These let you take notes and do office oriented work. Finally, you have Google Photos where you can easily store and view photos and videos you've taken with your smartphone. Combined, these apps cover virtually any need regarding file sharing, file storage, office apps, note taking apps, and even photo storage. Businesses are going to the cloud every day and now you can too with relative ease. You can purchase additional Google Drive space if you need it.

https://www.androidauthority.com/best-productivity-apps-for-android-217650/

**Topic B – Entertainment & Media Software**

Google Play Music for Android

From [Google:](https://download.cnet.com/android/Google/3260-20_4-78250-1.html)

Google Play Music provides free, ad-supported radio for what you're doing, how you're feeling, or what you want to hear. Instantly start radio stations based on songs, artists, or albums, or browse by genre, mood, activity, decade, and more. Bring your own music collection with you by uploading 50, 000 of your own songs; then listen to them across Android, iOS, and the web, for free. Subscribe to get on-demand access to millions of songs and download anything to listen even when you're not connected - or sign up for the family plan on Android to provide access for up to six family members for one low price. Plus, subscriptions come with membership to YouTube Red, so you can enjoy YouTube ad-free, in the background, and offline. Free features: Radio curated by experts for anything you want to hear. Store up to 50, 000 songs from your personal music collection. Discover and subscribe to podcasts. Smart recommendations based on your taste. Listen on Android, iOS, and the web Subscription-only features: New. The family plan, where up to six family members can enjoy Google Play Music for one low price. On-demand access to over 35 million songs. YouTube Red membership (see www.youtube.com/red for details). Download music to your device and listen when you're not connected. Ad-free, uninterrupted listeningLearn where Google Play Music is available at

**https://support. google.com/googleplay/? p=availabilityLearn more about Google Play Music at https://play. google.com/music.**

https://download.cnet.com/Google-Play-Music/3000-2141\_4-75449409.html

**Google Play Movies & TV**

Google Play makes finding and watching movies & TV shows easier than ever.  
  
Buy or rent the newest movies and shows before they hit DVD or streaming. You can also search for titles to see which streaming apps offer them.  
Anything you buy or rent on Google Play can be downloaded to watch when you’re not connected. Watch instantly on your Android phone or tablet, or on your TV using Chrome cast.

* **WATCH ACROSS YOUR STREAMING APPS**  
  New! See if a streaming service offers your favorite show or movie. Just search for it and check to see if other streaming options are available.
* **NEW WAYS TO DISCOVER SHOWS & MOVIES**  
  Find new shows and movies to watch in just a few taps - from family movies to award-winning crime shows  
  Give a thumbs up or down to get better recommendations for what to watch next
* **SEE THE NEWEST RELEASES HERE FIRST**  
  Buy or rent the newest movies and shows before they hit DVD or streaming apps  
  Add shows and movies to your watch list to view them later

https://play.google.com/store/apps/details?id=com.google.android.videos&hl=en

**Topic C – Programming Tools & Environment**

## **1. Android Studio**

As the official integrated development environment for all Android applications, [Android Studio](https://developer.android.com/studio/index.html) always seems to top the list of preferred tools for developers.

Google created Android Studio back in 2013. It replaced – or should we say it eclipsed? – Eclipse Android Development Tools (ADT) as the primary IDE for native Android app development.

Android Studio provides code editing, debugging, and testing tools all within an easy-to-use drag-and-drop interface. It is free to download and is supported not only by Google, but also by a large and actively engaged community of Android developers.

## **2. ADB (Android Debug Bridge)**

Android Studio includes the [Android Debug Bridge](https://developer.android.com/studio/command-line/adb.html), which is a command-line tool or “bridge” of communication between Android devices and other computers that can be used during development and the overall debugging and QA process.

By connecting an Android device to the development PC and entering a series of terminal commands, a developer is able to make modifications as needed to both devices.

https://www.altexsoft.com/blog/engineering/top-20-tools-for-android-development/

**Topic D – System Tools**

**System Tools - Remote desktop manager, Admin tools**

System Tools is a free remote desktop management app that includes six simple tools that every IT admin needs. As an IT admin, you have a lot of desktop management activities to handle, and although you'd like to, you can't always resolve every issue instantly. This is where System Tools comes in handy, helping IT admins like yourself manage computers even while they're away from their desks.   
**Getting started with System Tools:**  
Download and install the app.  
Sync your Active Directory details.   
Under the list of computers in each domain/workgroup, select the computers that you'd like to manage.   
**Key features:**  
Pull up information about managed computers like system name, date, serial number, username, manufacturer, operating system, RAM, model, and more, from your mobile device.  
Manage software in your network with in-depth details like software name, version, manufacturer, and installation date. You can also uninstall software remotely.  
See which tasks are running on any given computer in your network and stop tasks instantly.   
Remotely wake any system on the network using your mobile device.  
Remotely shutdown, restart, standby, and hibernate your computers.  
Effectively manage all windows services in your remote machines.    
**Use cases:   
This free admin tool can help you:**  
Identify prohibited software in your network and uninstall it instantly.  
Detect and end remote tasks that reduce system efficiency.  
Shutdown and restart remote computers when there is a demand.  
Terminate windows service and tasks in remote machines instantly.  
**What's unique?**  
With System Tools, you don't have to manually configure any setup on remote computers. Once you've selected computers under a domain/workgroup, System Tools automatically pushes a small package to that selected remote computer within the next two seconds. And there you go, that computer is officially under your control, no matter where you are. This app makes remote desktop management look easy.

https://play.google.com/store/apps/details?id=com.manageengine.systemtools&hl=en

**Topic E – Software Security & Updates**

**Security Updates and Resources**

The Android security team is responsible for managing security vulnerabilities discovered in the Android platform and many of the core Android apps bundled with Android devices.

The Android security team finds security vulnerabilities through internal research and also responds to bugs reported by third parties. Sources of external bugs include issues reported through the [Android Security Issue template](https://g.co/AndroidSecurityReport), published and pre-published academic research, upstream open source project maintainers, notifications from our device manufacturer partners, and publicly disclosed issues posted on blogs or social media.

**Reporting security issues**

Any developer, Android user, or security researcher can notify the Android security team of potential security issues through the [security vulnerability reporting form](https://g.co/AndroidSecurityReport).Bugs marked as security issues are not externally visible, but they may eventually be made visible after the issue is evaluated or resolved. If you plan to submit a patch or Compatibility Test Suite (CTS) test to resolve a security issue, please attach it to the bug report and wait for a response before uploading the code to AOSP.

https://source.android.com/security/overview/updates-resources.html

**Topic F – File System & User Accounts**

**File System**

Provides an interface to a file system and is the factory for objects to access files and other objects in the file system.The default file system, obtained by invoking the [FileSystems.getDefault](https://developer.android.com/reference/java/nio/file/FileSystems.html#getDefault()) method, provides access to the file system that is accessible to the Java virtual machine. The [FileSystems](https://developer.android.com/reference/java/nio/file/FileSystems.html) class defines methods to create file systems that provide access to other types of (custom) file systems.

A file system is the factory for several types of objects:

* The [getPath](https://developer.android.com/reference/java/nio/file/FileSystem.html#getPath(java.lang.String,%20java.lang.String...)) method converts a system dependent *path string*, returning a [Path](https://developer.android.com/reference/java/nio/file/Path.html) object that may be used to locate and access a file.
* The [getPathMatcher](https://developer.android.com/reference/java/nio/file/FileSystem.html#getPathMatcher(java.lang.String)) method is used to create a [PathMatcher](https://developer.android.com/reference/java/nio/file/PathMatcher.html) that performs match operations on paths.
* The [getFileStores](https://developer.android.com/reference/java/nio/file/FileSystem.html#getFileStores()) method returns an iterator over the underlying [file-stores](https://developer.android.com/reference/java/nio/file/FileStore.html).
* The [getUserPrincipalLookupService](https://developer.android.com/reference/java/nio/file/FileSystem.html" \l "getUserPrincipalLookupService()) method returns the [UserPrincipalLookupService](https://developer.android.com/reference/java/nio/file/attribute/UserPrincipalLookupService.html) to lookup users or groups by name.
* The [newWatchService](https://developer.android.com/reference/java/nio/file/FileSystem.html" \l "newWatchService()) method creates a [WatchService](https://developer.android.com/reference/java/nio/file/WatchService.html) that may be used to watch objects for changes and events.

File systems vary greatly. In some cases the file system is a single hierarchy of files with one top-level root directory. In other cases it may have several distinct file hierarchies, each with its own top-level root directory. The [getRootDirectories](https://developer.android.com/reference/java/nio/file/FileSystem.html" \l "getRootDirectories()) method may be used to iterate over the root directories in the file system. A file system is typically composed of one or more underlying [file-stores](https://developer.android.com/reference/java/nio/file/FileStore.html) that provide the storage for the files. Theses file stores can also vary in the features they support, and the file attributes or *meta-data* that they associate with files.A file system is open upon creation and can be closed by invoking its [close](https://developer.android.com/reference/java/nio/file/FileSystem.html#close()) method. Once closed, any further attempt to access objects in the file system cause [ClosedFileSystemException](https://developer.android.com/reference/java/nio/file/ClosedFileSystemException.html) to be thrown. File systems created by the default [provider](https://developer.android.com/reference/java/nio/file/spi/FileSystemProvider.html) cannot be closed.A FileSystem can provide read-only or read-write access to the file system. Whether or not a file system provides read-only access is established when the FileSystem is created and can be tested by invoking its [isReadOnly](https://developer.android.com/reference/java/nio/file/FileSystem.html" \l "isReadOnly()) method. Attempts to write to file stores by means of an object associated with a read-only file system throws [ReadOnlyFileSystemException](https://developer.android.com/reference/java/nio/file/ReadOnlyFileSystemException.html).File systems are safe for use by multiple concurrent threads. The [close](https://developer.android.com/reference/java/nio/file/FileSystem.html#close()) method may be invoked at any time to close a file system but whether a file system is *asynchronously closeable* is provider specific and therefore unspecified. In other words, if a thread is accessing an object in a file system, and another thread invokes the close method then it may require to block until the first operation is complete. Closing a file system causes all open channels, watch services, and other [closeable](https://developer.android.com/reference/java/io/Closeable.html) objects associated with the file system to be closed.

<https://developer.android.com/reference/java/nio/file/FileSystem>

**User types**

Android device administration uses the following user types.

* *Primary*. First user added to a device. The primary user cannot be removed except by factory reset and is always running even when other users are in the foreground. This user also has special privileges and settings only it can set.
* *Secondary*. Any user added to the device other than the primary user. Secondary users can be removed (either by themselves or by the primary user) and cannot impact other users on a device. These users can run in the background and continue to have network connectivity.
* *Guest*. Temporary secondary user. Guest users have an explicit option to quick delete the guest user when its usefulness is over. There can be only one guest user at a time.

**Managing multiple users**

Management of users and profiles (with the exception of restricted profiles) is performed by applications that programmatically invoke API in the DevicePolicyManager class to restrict use.Schools and enterprises may employ users and profiles to manage the lifetime and scope of apps and data on devices, using the types outlined above in conjunction with the [UserManager API](http://developer.android.com/reference/android/os/UserManager.html) to build unique solutions tailored to their use cases.

https://source.android.com/devices/tech/admin/multi-user

**Topic G – Special Features of your OS**

**Alternate Keyboards**

Android supports multiple keyboards and makes them easy to install; the SwiftKey, Skype, and 8pen apps all offer ways to quickly change up your keyboard style. Other mobile operating systems either don’t permit extra keyboards at all, or the process to install and use them are tedious and time-consuming.

**Wireless App Downloads**

Accessing app stores on any mobile device can be frustrating, but iOS makes it a little more difficult—download an app on your computer, and it won’t sync to your mobile device until you plug in and access iTunes. Using the Android Market or third-party options like AppBrain, meanwhile, let you download apps on your PC and then automatically sync them your Droid, no plugging required.

<https://www.gazelle.com/thehorn/2014/02/10/the-android-operating-system-10-unique-features/>

**Topic H – Limitations of your OS**

**Quality and Defects of Apps in Play Store: -**The quality of the available apps on the Play Store is much worse compared to those on Android App Store. It is only because Android’s policy field allows publishing any resolution. There are also many apps on the Play Store that are not reconcilable with different levels or ranges of Android phones. There are several other apps on the Play Store that are free for download, with brimful of advertisements and marketing materials that tend make the user experience obtrusive and jarring.

**Device Issues: Storage Limit; Drains Battery; Overheating: -**Storage limit is one of the main issues, as majority of the android devices have minimal internal storage capacity. Thus downloading large files, games, videos, storing apps become an issue. Surely you can transfer big files to SD card but some games or apps don’t allow transferring on SD card or sometimes malfunctioning occurs while operating from memory card. You need to root your device for that. Other limitation is since Android has many ongoing processes running in the background the high usage of RAM get stressed resulting in the poor Battery performance. With Android phones excess heating is a common issue, particularly when playing games with heavy graphics or when one is drowned in extreme multitasking.

**System Drawbacks & Unlimited Applications:** - Android is known as the “world of applications’’, which consequently means you need to have uninterrupted internet service that’s likely not possible for all the users. Though data connection isn’t any big issues anymore, yet you require a good supply of Internet for the apps to function efficiently. Android platform is open for all, thus the availability of its source code is open to everyone, which invites the attention of hackers and their ill deeds. Eventually this infects the apps before even they get launched publically. Most of the apps in the Play Store are stuffed with malware. Android users can’t directly control the device for any issue as it doesn’t give it users’ access to Administrators rights.

https://www.quora.com/What-are-the-top-3-limitations-of-of-Android-app-development

**Step 2 – Organized Research**

Organize your rough research information to provide more stricture and meaning.

* Re-read your rough research to identify (highlight) important sub-topics and facts
* Rearrange (cut–and-paste) your rough research so that related sub topics and facts are next to each other.
* Your finished organization should look like the template provided below.
* Upload your rough research notes to your repository when you are done.

Suggested organization template:

* **Topic A – Productivity & Application Software**

**Sub-Topic 1: Evernote**

* Fact 1: Price: Free to download/ $7.99-$14.99 per month
* Fact 2:
* Evernote features audio, text, picture, and all types of notes. It is an also has excellent organization features, cross-device syncing, collaboration features, and more. There isn't a lot wrong with it. You do pay for all of those features.

https://www.androidauthority.com/best-productivity-apps-for-android-217650/

**Sub-Topic 2: Google Drive**

* Price: Free
* The Google Drive is a productivity apps. Google Drive, is a type of storage app to support all types of files, like Google Keep, Docs, Sheets, and Slides. These let you take notes and do work. This app covers any need like file sharing, file storage, office apps, note taking apps, and even photo storage.

https://www.androidauthority.com/best-productivity-apps-for-android-217650/

* **Topic B – Entertainment & Media Software**
* **Sub-Topic 1: Google Play Music for Android**
* Google Play Music provides free, radio for what you’re listening to. It will instantly list the radio stations based on songs, artists, or albums, or browse by genre, mood, activity, and more.
* https://download.cnet.com/Google-Play-Music/3000-2141\_4-75449409.html
* **Sub-Topic 2:** Google Play Movies & TV
* Google Play is where you can watch movies & TV shows easier than ever. You can buy or rent the newest movies and shows before they hit DVD or streaming. Anything you buy or rent on Google Play can be downloaded to watch when you’re not connected.
* <https://play.google.com/store/apps/details?id=com.google.android.videos&hl=en>

**Topic C – Programming Tools & Environment**

**Sub-Topic 1: Android Studio**

* Fact 1: Price: Free / Plus $25 registration fee.
* Fact 2:

The official development environment for all Android applications. Google created Android Studio back in 2013. Android Studio provides code editing, debugging, and testing tools all within an easy-to-use drag-and-drop interface.

<https://www.altexsoft.com/blog/engineering/top-20-tools-for-android-development/>

**Sub-Topic 2: ADB (Android Debug Bridge)**

* Fact 1: Price: Free
* Fact 2:

"Android Studio also includes the Android Debug Bridge, which is a command-line tool of communication between Android devices and computers that can be used during development and the overall debugging and, by connecting an Android device to the PC, a developer is able to make modifications as needed to both devices."

<https://www.altexsoft.com/blog/engineering/top-20-tools-for-android-development/>

**Topic D – System Tools**

**Sub-Topic 1: System Tools - Remote desktop manager, Admin tools**

* Fact 1: Price: Free
* Fact 2:

System Tools is a free remote desktop management app that includes six simple tools. System Tools comes in handy, helping yourself manage computers even while they're away from their desks.  
**Use cases:**This free admin tool can help you: Identify prohibited software in your network and uninstall it instantly.

" "Detect and end remote tasks that reduce system efficiency."

"Shutdown and restart remote computers when there is a demand."

"Terminate windows service and tasks in remote machines instantly."

https://play.google.com/store/apps/details?id=com.manageengine.systemtools&hl=en

**Topic E – Software Security & Updates**

**Sub-Topic 1: Security Updates and Resources**

* Fact 1: Price: Free
* Fact 2:

The Android security team is responsible for managing security vulnerabilities discovered in the Android platform and many of the core Android apps bundled with Android devices.

The Android security team finds security vulnerabilities through internal research and also responds to bugs reported by third parties.

**Topic E – Software Security & Updates**

**Sub-Topic 2: Reporting security issues**

* Fact 1: Price: Free
* Fact 2:

Any developer, Android user, or security researcher can be notified by the Android security team of potential security issues through the form. Bugs marked as security issues are not externally visible, but they may eventually be made visible after the issue is resolved.

https://source.android.com/security/overview/updates-resources.html

**Topic F – File System & User Accounts**

**Sub-Topic 1: File System**

* Fact 1: Price: Free
* Fact 2:

It Provides an interface to a file system and is the factory for objects to access files and other objects in the file system. The File System defines methods to create file systems that provide access to types of file systems.

<https://developer.android.com/reference/java/nio/file/FileSystem>

**Topic F – File System & User Accounts**

**Sub-Topic 2: User types and Managing multiple users**

* Fact 1: Price: Free
* Fact 2: Android device administration uses the following user types.
* ***“Primary*. First user added to a device. The primary user cannot be removed except by factory reset and is always running even when other users are in the foreground. This user also has special privileges and settings only it can set.”**
* ***“Secondary*. Any user added to the device other than the primary user. Secondary users can be removed (either by themselves or by the primary user) and cannot impact other users on a device. These users can run in the background and continue to have network connectivity.”**
* ***“Guest*. Temporary secondary user. Guest users have an explicit option to quick delete the guest user when its usefulness is over. There can be only one guest user at a time.”**

<https://source.android.com/devices/tech/admin/multi-user>

**Topic G – Special Features of your OS**

**Sub-Topic 1: Alternate Keyboards**

* Fact 1: Price: Free
* Fact 2:

Android allows multiple keyboards and makes it easy to install, like the SwiftKey, Skype, and 8pen apps all offer ways to quickly change up your keyboard style. Other mobile operating systems sometimes don’t allow extra keyboards at all.

**Topic G – Special Features of your OS**

**Sub-Topic 2: Wireless App Downloads**

* Fact 1: Price: Free
* Fact 2:

Using the Android Market , it lets you download apps on your PC and then automatically sync them your Droid, no plugging required.

<https://www.gazelle.com/thehorn/2014/02/10/the-android-operating-system-10-unique-features/>

**Topic H – Limitations of your OS**

**Device Issues: Storage Limit; Drains Battery; Overheating:**

Storage limit is one of the main issues, as majority of the android devices have minimal internal storage capacity. Downloading large files, games, videos, storing apps become an issue. Sometimes you can transfer big files to SD card but some games or apps don’t allow transferring on SD card. Other limitation is since Android has many system/apps in use in the background the high usage of the RAM get stressed out which leads to poor Battery performance. With Android phones over heating is a common issue, particularly when playing games with heavy graphics or when a person is multitasking.

https://www.quora.com/What-are-the-top-3-limitations-of-of-Android-app-development

**Step 3 – Concept Map**

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

Use the PowerPoint template provided as a starting point.

You can use PowerPoint or another concept mapping tool of your choice.

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

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

Share your finished concept map with Mr. Nestor at p0079141@pdsb.net

The concept map template can be downloaded from the “Topic A” folder on the class GitHub repository

