Kristianstad University

# Android Mobile Operating System
# DT271A: Operating Systems
# 2018

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# 1 Introduction

## 1.1 Introduction

Different definition is given to Operating System. But the most simplified and widely acceptable defines Operating System as a software that control running of program be it in a computer system, mobile phone or digital camera. So many operating systems are in use today but the most common are; Android OS, Microsoft windows, Apple macOS, Apple iOS, Chrome OS, Blackberry OS, UNIX, Linux OS, etc.

Android Operating System, is a mobile operating system designed by Google based on a modified Linux and other open source software. It uses processes and thread management models to run it application, services and other element in the system. Android OS is designed primarily for 'Smartphones' and 'Tablets'.

The aim of this report is to analyse Android Operating System and briefly discuss how thread and processes function on it with her advancement through technology revolution. Using a range of different published journals, articles and internet site as a research tool for the topic.

Today, we are witnessing various ideas of development and fast growing mobile phone technology dependent world. Android Mobiles is one major force driving this reform on a day-to-day from one version to improve and creating new version. Since the emergence and invention of Android OS, the global mobile village as never remain the same. The progress record in this field are exciting and with new significant benefits such as improve security, enhancing businesses performance, and social media and communication efficiency.


Figure 1. Android Logo design.

## 1.2 History of Android Mobile OS

The history of Android Mobile Operating System is just a decade that it made it ways into global market trend for customers to buy. Android Operating System became known in about 10 years ago and today, if not most popular amongst its competitors like Symbian, Palm OS, Web OS, BlackBerry and Window Phones. A foremost contender of Android Mobil OS in this series is Apple iOS which of course is another favourite and most commonly use gadget in the world. Until 2008, the company Android Inc.,[ founded in Palo Alto, California, in October 2003 by Andy Rubin, Rich Miner, Nick Sears, and Chris White ] was bought by Google in 2005 which eventually gave birth to Android Mobile Operating System that was launched to the market in September 2008. Between then and now, has different versions of the Android launched started from Android 1.0 with current version Android 9.0.

The early intention of Android Inc., was to develop an Operating System for a digital camera in order to advance it usage but due to low market projection for future prospect the company then decided to throw it challenge into mobile phone industry with Android mobile operating system that would rival the already existing brand such Symbian and Microsoft Window Mobile. Rubin described the Android project as "tremendous potential in developing smarter mobile devices that are more aware of its owner's location and preferences".

The now-familiar logo for Android OS, which look like a combination of a robot and a green bug, was created by Irina Blok an employee of Google. A designed image for Android is shown above in figure 1.

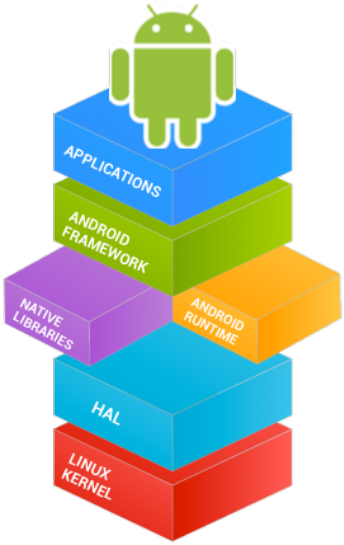


Figure 2. Stack of Android Open Source Project.

# 2 Structure

Android Operating System consist of different software Component which are arrange in a stack manner. The Components are listed but not in structural order: Android Framework, Application program, Linux Kernel, Application Run time, and Libraries.

A diagram illustration of Android architecture is shown below in figure 3.

## 2.1 Android Framework

Every Android application directly interact with Application Framework. Basic functions of Android are managed by this framework such as Resources management, voice call management etc. Android Framework is the second top most layer.

## 2.2 Application Run time

One most important part of Android is Dalvik Virtual Machine (DVM). This quite similar with Java Virtual Machine but it is basically designed and optimized for Android. DVM implementation is efficiently and effectively as possible on mobile devices that are equipped with a slow CPU, limited memory Resources and limited battery capacity. The Application Run time layer is placed in second bottom from the Linux Kernel.

## 2.3 Application

In this layer is where all application installed is situated. It is the top most layer and all the native application of Android such as camera, Google map, browser, sms, contacts etc, are located here. Other applications created by third party users or developers are also placed in the application layer.

## 2.4 Linux Kernel

This layer is the bottom layer in Android OS architecture.  As mentioned in the introduction page, Android is built on Linux 2.6 Kernel while among it functionality is that it provides memory management, process management and device management. Arrays of device drivers also provides by Linux Kernel that makes the interfacing with other peripheral devices easier.

## 2.5 Libraries

On top of Linux Kernel is the libraries layer. This contains all the libraries needed by the operating system for proper functioning. The libraries is a Java libraries which is designed specifically for Android Operating System.

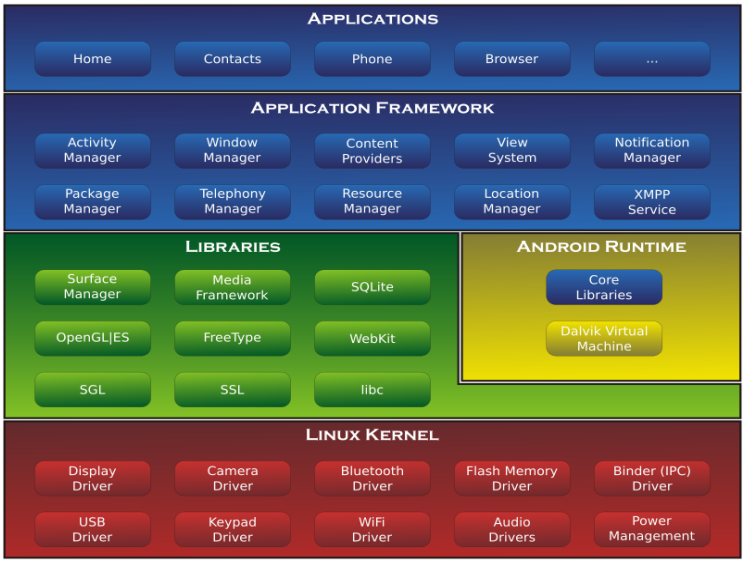


Figure 3. Android architecture diagram.

# 3 Process and thread

## 3.1 Processes

Program execution on Android OS is a bit different when its compared with other operating system in this category. On Android, processes or applications running in the foreground are prioritized while other applications run freely in the background. This is considered to be more efficient and flexible than in the iOS. Process on Android is of different states between most important and least important based on the user interaction. This states can be classified into 5 different stages.

### *3.1.1 Foreground Process*

On Android mobile for example, the currently use application is considered to be the foreground process while other process that is connected and interacting with this application at the same time is as well regarded to be a foreground process.

#### 3.1.2 Visible Process

A visible process is the process affecting what is running on the screen. This process is not the foreground process but it can be seen simultaneously when a program is executing.

#### 3.1.3 Service Process

When a process is executing and are not connected with any visible process but it is working in the background that process is handled by a service process. An example is playing a music on a mobile phone at the background while operating the same mobile phone for some other function at the same time.

#### 3.1.4 Background Process

This processes are for example applications kept in the memory which can be switched to at any given time to resume for quick running. It is most time a pause program which are not visible neither are they using CPU time nor are they using memory resources.

#### 3.1.5 Empty Process

This process has no application data any more but it may remain as catches which can help re-launch of the program faster again. However, one of the key advantage of Android is that the system automatically may kill a least use process [such as empty process, background process, service process] if it need more resources and memory. Is why the OS does not need a task killer.

## 3.2 Thread

Thread defines a process running, and as a component of process, it can be a single thread and a process could also have a multiple thread running at the same time sharing some resources. Thread as a small pieces of code is independently managed or executed by operating system. In Android, there is a Main thread also known as UI thread that run in parallel with other thread in the background.

#### 3.2.1 Main Thread

When a program or an application is launched on Android it creates the first thread of execution known as Main thread. This thread is responsible for handling UI events such as Draw, Listen and dispatching events to the appropriate user interface widgets as well as communicating with components from Android UI toolkit.

#### 3.2.2 Worker Thread

Worker or background thread is created within an application to run long running tasks.

# 4 Method

This report is a research base analyses. Using internet search for most of the information highlighted. The studies were mostly paraphrased and expressed with own understanding and personal use of language.

# 5 Results / Conclusion

This report has emphasis on the importance and usefulness of Digitalization. For instance, it has given rise to a 'network society' and and the impact on our lives is expected to improve positively. The accumulative effect of computer technology has turn to quantative speed and qualitative cross over. This report has equally identified some of the challenges with lot of pressure and risk attributed to the concept of Digitalization. Such challenge is what some scholars has termed a disruptive change in a value chain.

Table 2 above shows how digitization reshaping our countries, companies and citizens. (Source: BCG analysis).

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(4) Android architecture diagram By Smieh - Anatomy Physiology of an Android, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=20067152

(5) Stack of Android Open Source Project By 20px|link=User:Wikideas1|Wikideas1 Wikideas1 (talk) (Uploads) - [1], CC BY 2.5, https://commons.wikimedia.org/w/index.php?curid=55251310

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Digitalization is driving towards an unimaginable future. Automobile digitalization is a concept the world is about to catch on with. A situation where car mobility is computerized with no drivers. In recent year, the unveiling mission of robot industrialization revolution is also setting the environment to a new task and the need for a smart and proficiency society.

most of the computing machine are referred to as mechanical machine. For another period of 20 years (between 1930 – 1950) some scientist invented the electronic computer industry. At this time the computers can only store data in the memory and not the program but instead programmed externally using connected wires and switches.

John von Neumann's computer ideas to have computer memory been able to store program came into limelight in 1950. This von Neumann model was adopted and since then it has been the model follow in computer industry till date.

Subsequently, after 1950, computer system had gone through several generations known as computer generation. We have had from first generation where it was only used by the professionals and computer specialists. It uses vacuum tubes as electronic switches and very expensive. Second generation computer were made to use transistor instead of vacuum tubes. This is when two high-level languages: FORTRAN and COBOL were invented. The third generation computers experienced a new dimension into computer system. The software industry came into existence. Minicomputers were produced and integrated circuit was invented. Computers became less cost, and it reduced in size.

In 1985, after the fourth generation of microcomputers and the first desktop calculator Altair 8800 then the fifth generation was given birth to as an open-ended generation. Computer gadget in form of laptop, palmtop and secondary storage media such as CD-ROM, DVD were all made available in the market.

The now-familiar logo for the Android OS, which looks like a combination of a robot and a green bug, was created by Irina Blok while she was employed by Google.

## 3.3 Future work

It is known fact that computer system and digitalization innovation has successful expanded the scope of job across all works of life and it continue to create new jobs. However, some few thorny questions begging for answers while Digitalization continuing to affect the human imagination and expectation concerning job creation. This was summarily put together in an article. Henning [2] expressly stated the questions as, "How quickly will new jobs be created? In what quantity and quality will they be created? And where will they be created? And what does this mean for social mobility?" The danger and risk is that the fear of unknown is already grasp the mind-set of so many. Even with the persistence agitation and the rise in robots project as a substitute to man power is constituting a fall in labour work force.

## OPERATING SYSTEM: WINDOW OS AND MacOS

### INTRODUCTION

### 1.1 Introduction

Operating System often abbreviated as (OS) had long gone attracted so many different definition and interpretation, but one thing commonly and widely accepted is that OS is the software that control the computer hardware as well as other software installed or that are being used together with the computer hardware. Some example of OS available today are Window OS, MacOS, Chrome OS, Linus, Unix. It is worthy to mention that not only in computer system such Desktop and Laptop did OS operates but also among other day-to-day gadget that use OS are Mobile phones, Smartphone, Tablets, Smart watch etc.

This report is aimed at dwelling solemnly on both Window OS and MacOS by briefly discussed about them and compare her feature on computer system. The two Operating System is considered as two major leading OS in the field of computer development and operation.

### 1.2 History

The birth of Window OS is dated back in the year 1980's by Microsoft Corporation. The Microsoft first operating system which was named MS-DOS designed for IBM computers, was developed in 1981 before the invention and introduction of Microsoft Window versions that started in 1985. Today Microsoft has presently her 10th version in the market. On the hand, MacOS was introduced in 1984 one year before Microsoft Window by Apple Inc. It developed to be used and run on Macintosh, a family of personal computers designed and managed by Apple Inc. Same as Microsft, Apple is also running on her 10th version (currently in the market is the macOS 10.14 Mojave).


Figure 1. History of Window logo


Figure 2. History of MacOS logo

## STRUCTURE

### 2.1 Functionality

In terms of how both MacOS and Window OS operate it isn safe to say that both are of 2 different computer system. MacOS is know to be running on Unix based operation system while Window OS operates on different operating system that a designed by Microsoft herself such as Window XP, Window Vista and Window 7. Security issues in terms of viruses problem is one great achievement by Apple Inc with her built-in security system which help in preventing viruses attacked from internet. Unlike in computer with Window OS, the users is responsible for installing an anti-virus software so as to prevent such attacked. Window OS has a larger number of users when compare with MacOS and this can be ascribe to purposes and efficiencies with regard to what users are interested on. For example Window OS are more appreciated with Office use while MacOS with the good graphical user interface are very suitable for graphics and multimedia uses.

### 2.2 Features

Interesting to know is that both MacOS and Window OS share some similarly components, whish implies that they both can achieve equal solution for same task but perhaps with slightly different or not. To mention but few some of the similar components or features are:

User-Interface – In MacOS structure is layer called Aqua. This is used as a tool for visual feature with extensive colours and texture. And in Window OS, there is Windows shell that serve as graphical icon and visual indicator.

Application system – In Window OS the application and Utilities consist of various components such camera, contact, calculator, character Map calendar etc. And MacOS application layer consist of Carbon, Classic Cocoa and Java known as application development environment with different functionalities.

Core – Darwin core in MacOS is a version of Unix that is responsible for memory usage and transfer of data in and out of central processing unit (CPU). Window OS uses Kernel32.dil to manage its memory usage, I/O interaction as well process operations.

## METHOD

Internet search was the major source of information for this report. A little comparison with running of certain program on different computer that has MacOS and Window OS operating system respectively was also verified to ascertain some of the information gathered. In addition important to mention is that the language use are paraphrased to better explain what was learned.

# CONCLUSION / RESULT

## 4.1 Result

This report has emphasis on the importance and usefulness of both Window OS and MacOS and equally compare some of their perceive advantage and benefits over one another. For instance, it has given rise to a 'competitive society' and and the impact on our computer usage has improved positively and significantly.

## 4.2 Future work

It is known fact that in the field of computer system and its OS innovation is successfully expanding the scope of job across all works of life and continuing to create new user friendly features. However, some few thorny questions begging for answers while OS continuing to affect the human imagination and expectation concerning document security and files safety. This was summarily put together in an article. Henning [2] expressly stated the questions as, "How quickly will new jobs be created? In what quantity and quality will they be created? And where will they be created? And what does this mean for social mobility?" The danger and risk is that the fear of unknown is already grasp the mind-set of so many. Even with the persistence agitation and the rise in robots project as a substitute to man power is constituting a fall in labour work force.

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