

# Implementing HP University Website on Android Platform

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## ABSTRACT

With increasing dominance of Android Operating System in the field of Mobile Computing Devices, it became the necessity of hour to develop an Android Application having all the required information related to university. Considering all the problems faced by the students while using the website, it led us in exploring various possibilities to provide a better way for accessing all the university related information. The Android operating system provided a convenient and user friendly platform which was very helpful in solving the problems we recognized. In the development process we researched additional possibilities which included the real time navigation to university, a students focused platform for all kinds of updates, contact directories, gazetted holiday calendar. As a result of research we were able to develop an android application consisting of all features of university website and much more.

## Keywords

Android Operating System, Himachal Pradesh University, Mobile Computing.

## 1. INTRODUCTION

Android operating system includes Linux kernel at its core and it is used for touch screen mobile devices such as smart phones and tablets.

The GUI (Graphical User Interface) of Android operating system is based on the concept of direct manipulation on the devices which includes real world actions such as swiping, tapping, scrolling on the device

Android has many features for users such as they can customize their home screens with shortcuts of applications, widgets of application with live updates such as emails and weather information, directly to the home screen. Another feature is that applications can send notifications to the user about information, such as new emails and text messages.

Android was first developed by Android Inc. whose founder member were Andy Rubin, Rich Miner, Nick Sears and Chris White, later Google acquired it along with its founders on August 17, 2005.

First idea behind the development of Android operating system was to develop an operating system for digital cameras. Android was first launched in 2007 and in the same year Open Handset Alliance – a group of technology companies (hardware, software and telecommunication)

focussed to improve open standards for mobile devices was also established[1].

Android is used by various technology companies which require a ready-made, affordable and customizable operating system for mobile devices. With the development of technologies the area of android operating system is also increasing from mobile devices to digital cameras, televisions, gaming consoles, etc.more.

## 2. ANDROID ARCHITECTURE

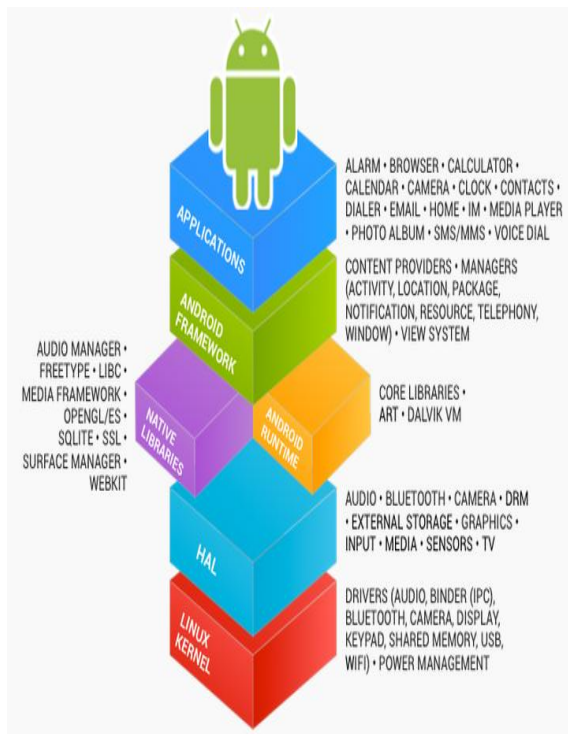
Android Kernel is based on the one of the Long Term Support (LTS) version of Linux Kernel. After April 2014, Android operating system mainly use versions 3.4 or 3.10 of the Linux LTS kernel [2][3]. The kernel version used depends upon the actual Android device and its architecture or hardware platform [4][5][6] Android used various kernel versions since the version 2.6.25 that was used in one the first versions of the Android i.e Android 1.0.[7]

The Linux kernel used for Android have many changes implemented by Google. These changes were implemented outside the typical Linux kernel development cycle, such as the architectural changes for small devices and inclusion of components like Binder, ashmem, pmem, logger, wakelocks and efficient memory management keeping in mind the small memory available for disposal in mobile devices .[8]

Some features that Google added back to the Linux kernel, specifically a power management feature called "wakelocks", Wakelocks was rejected by some mainline kernel developers because they felt that Google did not show any interest to maintain its own code.[9][10][11]

Google said in April 2010 that they would hire two employees to work for the Linux kernel community [12] but Greg Kroah-Hartman, who was the Linux kernel maintainer for the stable branch, in December 2010 said that he was concerned that Google was no longer trying to get their code improvements included in mainstream Linux kernel.

Android owned by Google is based on Linux kernel [13] [14] as said earlier and Android developers are able to access all the components of application framework used by core applications when creating an application and thus making it easier to develop the applications which runs on the platform. Figure below shows the basic diagram of android architecture.



**Fig 2.1 android architecture stack** <sup>[15]</sup>

The Android OS is considered as software stack of different layers and each layer is independent layer which includes group of several program components. Some developers are present who use the Android Open Source Project (AOSP) and therefore there are various modified and tweaked versions of the operating system such as cyanogen mod which is completely based on Android Open Source Project (AOSP).

There are APIs, libraries, middleware and APIs, and application software on the top of Linux kernel. An application framework which have java-compatible libraries is used to run application software. But upgrading of the Android's Linux kernel is done independent of other Android's source code base.

Till version 5.0 of Android operating system, it uses Dalvik as a process virtual machine with the trace-based just-in-time (JIT) compilation to run Dalvik or the "dex-code" (i.e. Dalvik Executable), which is generally translated from the Java bytecode. Following the trace-based JIT principle, along with interpreting the majority of application code, it performs the compilation and execution of some frequently executed code segments ("traces") every time an application is launched on the Android device.

Android's standard C library called Bionic, was developed by Google mainly for Android, and is a derivation of the BSD's standard C library code. Bionic it was designed with

various major features specific to the Linux kernel. Smaller runtime footprint is one of the main benefits of using Bionic instead of the GNU C Library (glibc) or uClibc. Bionic also boasts of optimization for low-frequency CPUs. Bionic is licensed under the terms and conditions of the BSD license, hence Google finds it more suitable for Android's overall licensing model <sup>[16]</sup>.

### 3. PROBLEM DEFINITION

As there were problems which were faced by students while accessing the Himachal Pradesh University official website on the mobile devices. Following are the problems in detail:

1. Compatible issues: The official website was not compatible with the smaller devices as a result it makes it difficult to open the website on the mobile devices and also Mobile View was not available.
2. Another problem includes non-availability of information at one location. Also multiple links are available for single information.
3. Information related to navigation, contacts of Himachal Pradesh University staff and helpline numbers are not available on the website which may be required during emergency or for other purposes.
4. Himachal Pradesh University have two websites and also results are declared on both websites which confuse student about from where to fetch information about results, notifications etc.

### 4. DESIGN

The android application design includes four activities in all, which constitutes the whole application. The activities are switched by using Intents as done in traditional android applications. The data used by the app is either stored in the application itself or is fetched from the internet.

The "contacts", "holidays", "about hpu" uses the stored data within the application in form of the hypertext markup language pages while "notifications", "results", "hpu live" fetches the data from the internet and the navigation to the hpu uses the underlying navigation apps installed on your android device.

Most of the items in the menu section is designed to create an intent to open the activity which contains the web View, which then loads the required data. The contacts or telephone numbers when clicked invokes the telephony manager and copies the contact on your dialing screen. No services has been created which runs in the background and consume the memory even while app is not being used.

The data flow diagram plays an important role in the design face as it helps in understanding the flow of information and also acts as important tool while managing the flow of information between various activities taking place in the android application.

### 5. IMPLEMENTING

Our The next task was to implement all our research work to develop an effective and efficient system. It started with planning of whole process. Discussions regarding the necessary equipment, software and then working out the whole system. This is considered to be the most important stage while developing a new system as this will decide how the final application will turn out to be. The implementation included two main tasks.

1. GUI Implementation.

This part includes creating an easy yet effective user interface so that the application can be reached and used by a wider audience. It starts with creating an Activity, a screen that acts as a base for all the other components that can reside on it. Each activity is given a window in which developers can draw a user interface. Then comes the fragments which represent the behavior of a portion of user interface in an Activity.

Combining both of the above components we were able to develop display screens for various functionality and features for the HP University Android Application

## 2. Coding(Implementing Functionality)

The coding part comprises of giving work to these activity and layouts. We link a java file with each xml file which decides the functionality of that activity. Our application consists of just 4 activities which hold all the features of the application and making it highly efficient.

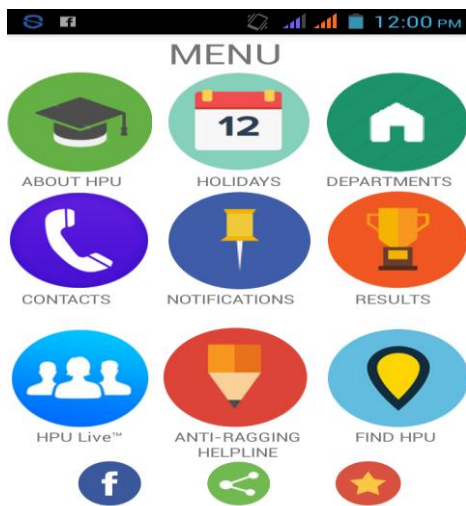


Fig 4.1 Application GUI

## 6. STATISTICS

The first version of the application was launched in October 2015 . Since then the application has seen massive growth and has been downloaded over 700 times till now. The version 1.2 was released on March 17, 2017. The following graph reflects all the downloads from the Google play store for the months of March, April and May (till 4th may) of 2016. It can be seen in the graph that in the last three months there is almost 300% rise in the total downloads



Fig 5.1 Graph showing the three months download data.

The average ratings for the application is 4.6 out 5 on the Google play platform and was reviewed by more than 37 people. Most of the reviews out of total reviews are positive.

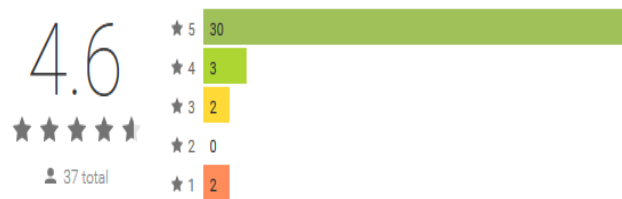


Fig 5.2 Ratings of the Application on the google play platform

Further if we look on the devices on which the app is installed the market is dominated by Android 4.4 but Android lollipop and Marshmallow are soon going to overtake the market share of the kitkat devices , hence the further development and improvement of the application should be targeted on the marshmallow and lollipop platforms.

TOTAL INSTALLS BY USER ON MAY 3, 2016

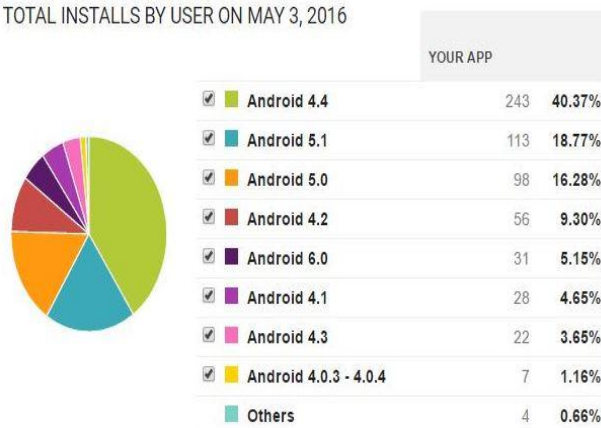


Fig 5.2 Downloads on various android version

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