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RESEARCH ARTICLE

Android Application Development & Its Security

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Abstract— In this paper we will look at the Android platform and Android based mobile application development & its security. Further we will look to explore an Android application available in google play store My Notepad. This application is used to save notes by using easy direct manipulation. It is featured with functions as Voice Navigation and Voice Based Searching, it requires internet connection to utilize these key features as well. We then present an outline on further research and development of the application.

Keywords— Android, Voice, Development, Security

I. INTRODUCTION

Android is a mobile operating system (OS) based on the Linux kernel [1] and currently developed by Google. With a user interface based on direct manipulation, Android is designed primarily for touchscreen mobile devices such as smartphones and tablet computers. Android's source code is released by Google under open source licenses, although most Android devices ultimately ship with a combination of open source and proprietary software, including proprietary software developed and licensed by Google. Android is popular with technology companies which require a ready-made, low-cost and customizable operating system for high-tech devices. Android's open nature has encouraged a large community of developers and enthusiasts to use the open-source code as a foundation for community-driven projects, which add new features for advanced users or bring Android to devices which were officially released running other operating systems.

A. ARCHITECTURE

1) LINUX KERNEL

At the bottom of the layers is Linux - Linux 2.6 [2-3] with approximately 115 patches. This provides basic system functionality like process management, memory management, device management like camera, keypad, display etc. Also, the kernel handles all the things that Linux is really good at such as networking and a vast array of device drivers, which take the pain out of interfacing to peripheral hardware.

2) *LIBRARIES*

On top of Linux kernel there is a set of libraries including open-source Web browser engine WebKit, well known library libc, SQLite database which is a useful repository for storage and sharing of application data, libraries to play and record audio and video, SSL[4] libraries responsible for Internet security etc.

3) *ANDROID RUNTIME*

Android Runtime [5] is the third section of the architecture and available on the second layer from the bottom. This section provides a key component called Dalvik [6] Virtual Machine which is a kind of Java Virtual Machine specially designed and optimized for Android. The Android runtime also provides a set of core libraries which enable Android application developers to write Android applications using standard Java programming language.

4) *APPLICATION FRAMEWORK*

The Application Framework [7] layer provides many higher-level services to applications in the form of Java classes. Application developers are allowed to make use of these services in their applications.

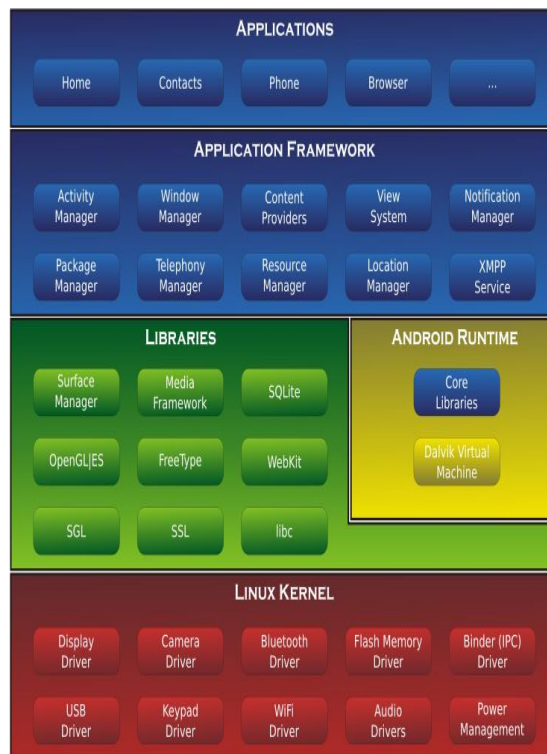


Fig 1 Android System Architecture

B. SECURITY AND PRIVACY

Android applications run in a sandbox [8], an isolated area of the system that does not have access to the rest of the system's resources, unless access permissions are explicitly granted by the user when the application is installed. Before installing an application, Play Store displays all required permissions: a game may need to enable vibration or save data to an SD card, for example, but should not need to read SMS messages or access the phonebook. After reviewing these permissions, the user can choose to accept or refuse them, installing the application only if they accept.

II. ANDROID APPLICATION DEVELOPMENT

Android software development [9] is the process by which new applications are created for the Android operating system. Applications are usually developed in Java programming language using the Android Software Development Kit (SDK), but other development environments are also available.

A. ANDROID SDK

The Android software development kit (SDK) includes a comprehensive set of development tools. These include a debugger, libraries, a handset emulator based on QEMU, documentation, sample code, and tutorials. Currently supported development platforms include computers running Linux (any modern desktop Linux distribution), Mac OS X 10.5.8 or later, and Windows XP or later. Also, Android software can be developed on Android itself by using specialized Android applications. Android applications are packaged in .apk format and stored under /data/app folder on the Android OS (the folder is accessible only to the root user for security reasons). APK package contains .dex files (compiled byte code files called Dalvik executables), resource files, etc.

B. ANDROID DEBUG BRIDGE

The Android Debug Bridge (ADB) [10] is a toolkit included in the Android SDK package. It consists of both client and server-side programs that communicate with one another. The ADB is typically accessed through the command-line interface, although numerous graphical user interfaces exist to control ADB. The format for issuing commands through the ADB is typically:

```
adb [-d|-e|-s <serialNumber>] <command>
```

III. PROBLEM IDENTIFICATION OF ANDROID APPLICATION – MY NOTEPAD

The methodology used to develop the application My Notepad [11] is RAD i.e. Rapid Application Development [12]. Here all the modules are time boxed and individually developed. This Android application focuses on Voice Based Searching and Navigation with basic operations included as well. The few highlighted problems occurred while developing the same are illustrated below:

A. VOICE NAVIGATION

While implementing voice navigation in the application, the system often use to form multiple words when the user speaks. It forms an array of similar words while guessing the word told by the user. In this phase of development we have seen that most of the times the first word in the array of similar words is likely to be perfect. So while implementing we took the first word as the correct one and process accordingly.

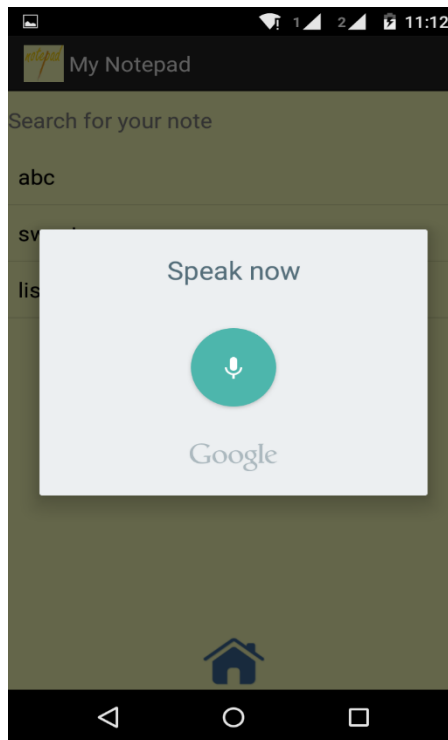


Fig 2 Voice Navigation in application

B. VOICE SEARCHING

Voice searching is a feature which asks the user for the keyword which user wants to search. By replying the same it uses voice based text conversion and the converted text is searched. While searching this, we have searched the title as well as the body of note. This gives us the full detail where the word is likely available in the application's note

IV. GROWTH AND FEATURES – MY NOTEPAD

An Android based application My Notepad is developed using Java. It is notepad which saves your data. Whenever you save the data in My Notepad the application will generate a text file in your sd card on My Notepad folder with the title of the note as file name. You can save your data secretly by securing it with Password. The data secured with password is not shown in the default folder, it will be hidden. You can change themes according to your choice. You can share the data to any of the social networking sites using this application.

A. FEATURES

1) BASIC OPERATIONS

Creating, Deleting, Viewing, Sorting, etc. of notes in the application. These are basic operations performed in the notepad.

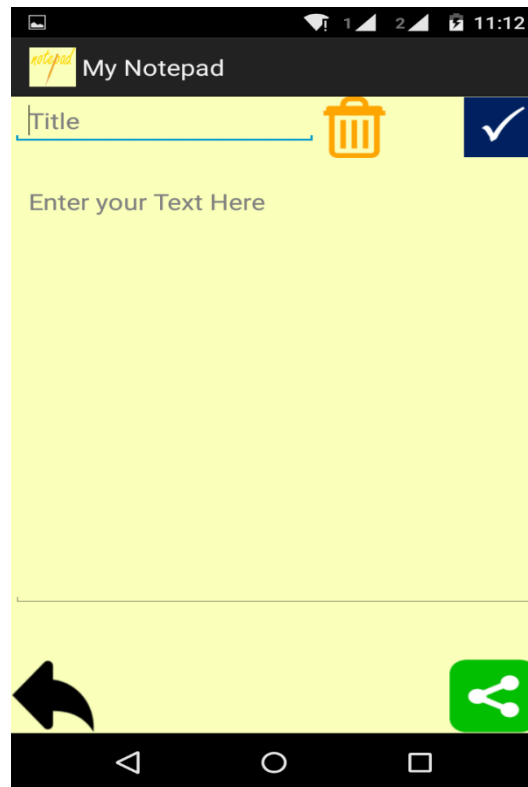


Fig 3 Application My Notepad basic features

2) *SECURING*

Securing you data with a password (Archiving the notes in a password protected environment). The data can be secured with a password.

3) *VOICE NAVIGATION*

Voice Navigation (Switching to different activities by Voice). This feature transfers the control from one activity to other

4) *VOICE SEARCHING*

Voice based searching (Searching of contents in the note by either voice or manual operation). By speaking keywords to search by pressing the voice button will search for the keyword throughout.

5) *OTHERS*

Deleting backups on sd card and changing themes. This will delete the backup on sd card and will change themes in background.

V. CONCLUSION

The android application provides a full overview how to save the data in the application, along with other operations as such sorting, searching, changing themes, etc. The UI of the application is made attractive to provide the user a good soothing experience. Widgets and other features as such voice navigation and searching for the user is available. Further development of the same is acceptable. The above paper can be used as a reference for the same.

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Android incorporates industry-leading security features and works with developers and device implementers to keep the Android platform and ecosystem safe. A robust security model is essential to enable a vigorous ecosystem of applications and devices built on and around the Android platform and supported by cloud services. As a result, through its entire development lifecycle, Android has been subject to a rigorous security program. Android is designed to be open. Android applications use advanced hardware and software, as well as local and served data, exposed through the platform to bring in