Firefox OS

Aishwarya Mohan
Dept. Of computer science
Carmel College, mala

Shilha Wilson
Dept. Of computer science
Carmel College, mala

***Abstract* --The Firefox operating system which is also known by its project name; Boot to Gecko (B2G) is mainly an operating system for Smartphone and tablet computers and in future it is also used on smart TVs. Firefox OS is new to market so, not so many smartphone or tablet computers are running on this OS, but in future dozens of smart phones and tablets release on this OS. It is an open source mobile operating system that uses modified version of the Linux kernel. It is developed by Mozilla, which is non-profit organization. Mozilla is best known for the Firefox web browser. Firefox OS provide complete community-based alternative system for smartphones, using open standards and approaches such as HTML5 applications, JavaScript, a robust privilege model, open web APIs to communicate directly with phone hardware and application marketplace.**

I. INRODUCTION

Firefox OS is a operating system and software platform for smartphones developed by Mozilla corporation. It is based on Linux kernel. Firefox OS is open source software stack for smartphones or mobile devices. This OS is little dissimilar from android/iOS. It actually bridges the gap between feature phones and smartphones which runs on android/iOS. Like android/iOS, Firefox OS doesn't have the concept of native applications. All the applications on this OS are web based. These applications are created by HTML5, so this web based applications almost take no time to download. As almost all the applications are web based on this OS so it can run smooth if the ram is low.

On July 25, 2011, Dr. Andreas Gal, the director of research and development of Mozilla announced boot to gecko "B2G" project. This Project aims to build a complete standalone OS for the open web.

In July, 2012, the project boot to gecko was renamed by Firefox Operating System. The first generation smartphone which has pre-installed Firefox OS was Alcatel One Touch Fire.

II. WHAT IS FIREFOX OS?

Firefox OS as a mobile operating system built on open web standards. That means it works a lot like a browser or a website. The same code behind those is behind Firefox's mobile OS. It's also open source, meaning anyone with the knowledge to do so may help contribute to the code to make it better and build application for it.

The concept is similar to Chrome OS for computers. The difference is that Firefox is made for smartphones, which are more likely to have near-constant connectivity just like Chrome OS, Firefox OS apps are web-based and made with HTML5 and other web coding. Mozilla says this will make it easier for developers to create apps because they won't need to learn new code or deal with major compatibility issues. In the end, that means more apps for consumers and fewer problems with them.

A. Architecture Of Firefox Os

Now let's have a look into the architecture of the Firefox OS. The Firefox OS architecture is an integrated technology stack which provides a rich smart phone experience using open standards and web technologies. It is mainly consist of four major software layers

i. Gonk
ii. Genko
iii. XUL runner
iv. Gaia

i. GONK

Gonk is the software in the middle which consist of Linux kernel and other software libraries. It also consists of user space hardware abstraction layer (HAL). Gonk is mainly a simple Linux distribution that includes mechanisms of Android and is stretched by Mozilla to assimilate with all layers in the Firefox OS architecture. Gonk implies a fusion of open source software and hardware and OEM dependent components. Gonk also take cares of B2G processes, like starts, manages, and shuts down processes of Gonk.

- Linux Kernel

Uses libraries from Android (GPS, camera, etc.) and other open source projects (Linux, libusb, bluez, and so on).

- Radio Interface Layer(RIL)

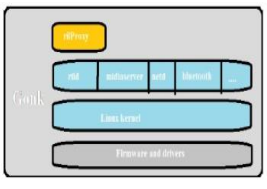

Figure 1: Gonk

Interacts with the modem hardware (telephony) in the phone. It is consisting of two components:
rild: rild daemon talks to the modem firmware
rilProxy: It proxies messages between rild and processes of B2G

- *Mediaserver process*

Controls audio and video playback. Gecko communicates with the media server through an Android RPC mechanism.

- *Netdprocess*

network deamon that interacts directly with network interfaces (Wi-Fi) in the hardware.

- *Bluetooth*

Bluetooth and other service level daemons providing access to hardware capabilities.

ii. GENKO

It is the web browser engine of Firefox OS. It is used in various applications developed by Mozilla Corp. It is aimed to support open Internet standards, and is used by different applications to display web pages. In some cases, an application's user interface itself uses Gecko . It offers a rich programming API that makes it appropriate for a wide variety of roles in Internet enabled applications, such as web browsers, etc. Some of the standards Gecko supports are as following:

- CSS Level 2.1
- DOM Level 1 and 2
- HTML4 (partial support for HTML5)
- JavaScript 1.8.5
- MathML
- RDF
- XForms (via an official extension)
- XHTML 1.0
- XML 1.0
- XSLT and Xpath

iii. XUL RUNNER

XULRunner is a runtime engine for XUL. It works as a runtime system for everything written in XUL, specifically any Firefox add-ons. It substituted the
Gecko Runtime Environment. It stores a wide range of configuration data like bookmarks, cookies, etc. In internally managed SQLite databases. It also offer add-onto manage SQLite databases.

iv. GAIA

Gaia is nothing but user interface application of Firefox OS. When Firefox OS starts up, everything appears on the screen is drawn by Gaia, including the lock screen, home screen, and other applications. Gaia only interface to the underlying operating system and hardware is through standard Web APIs, which are applied by Gecko. Gaia is written totally in HTML, CSS, and JavaScript. Third party apps can be installed alongside Gaia.

B. *Five Unique Features Of Firefox Os*

Firefox OS is the new buzzword in the mobile industry with two smartphones, Alcatel OneTouch Fire and ZTE Open, already released in Europe and more recently in Latin America. It has caught the combined attention of both smartphone enthusiasts and free-software advocates by introducing novel concepts to the existing mobile ecosystem.

Launched by Mozilla foundation as the world's first "open Web Devices", Firefox OS based smartphones aim to provide feature phone users with an affordable yet powerful option for their first smartphone.So what are these unique features of Firefox OS all smartphone users, developers and notably OEMs simply must know?All three layers of Firefox OS are completely open source.

Gaia, the user interface is writtenentirely in HTML5standard along with JS and CSS. Geckois an open-source runtime engine which implementsthe open Web APIsfrom Gaia.Gonk, the lowest layer is made up of a simplifiedLinux kerneland the HAL with open source libraries. In essence, there areno proprietary componentsin the entire architecture which is in contrast to all the current mobile platforms.Firefox OS has an open development community.

There isno SDK(Software Development Kit) to download and install. Instead, all the OS developmental branches are maintained asGitHub projects and are open to public. This means that users and developers can continuously track and contribute to the development and be part of the process at all stages."Web is the platform"is the central theme of Firefox OS.

Everything on the smartphone from the usual applications like calls, messaging, camera to the special applications like social apps, maps, web browsers is aweb site written using HTML5. This is made possible by using open Web APIs whichcan accessthe device hardwarebased on the access permissions. Therefore, potentially allweb developers can write applicationsfor Firefox OSwithout learning platform specific APIs or languages.Firefox OS can be upgraded in parts.

The platform architecture is designed to ensure that frequently changing features are kept in theGecko layerwhich canbeupdated independently. Usually lower layers affect the functionality of the system and need longer integration and testing cycles compared to higher layers. Thus OEMs can push upgrades faster and reduce OSfragmentationin new and old devices.Dynamic app search and single use applications

Firefox OS does not differentiate between mobile websites or Firefox OS apps. When user searches for a keyword, they are given arelevant combination of apps and region specifiCmobile website which can in turn have embedded Web apps.In a truly unique concept, the user can furtherrun the applicationdirectlyfrom the webpage and only download if needed for future use.For example, searching for an album can get results to buy the song, see concert tickets and listen to the song instantly.

Effectively for the developers, all theirmobile optimized popularwebsites can be convertedInto Firefox apps which can run on any platform or OS with just a compatible internet browser. The OEMs can alsopromote region specific appsand customize the experience for the end user.

The underlying theme of all these new features

of Firefox is to bring the power of the World Wide Web to the mobile platform byenhancing the power of HTML5 technologies.Withmore than 20 industry partnersand more smart devices including tablets and smart watches on the way, Firefox certainly has the potential to "stimulate an inspiring new wave of innovation for the Web" as predicted by Jay Sullivan, CEO of Mozilla Foundation.

Wein Sasken have been closely following the developmentof Firefox OS and have already ported it onto existing smartphones and Reference HW. Our long experience in providing integrated solutions in all mobile platforms from bring-up to launch and beyond makes it easy for us tobuild, integrate and deliver new products quickly and efficiently.

C. Applications

In Firefox OS applications can be classified into four groups listed below.

i. Platform applications
ii. Communication applications
iii. productivity applications
iv. Media applications

i. Platform applications

It includes the System app, Browser apps,window management functionality and settings

- System app

It is the 1st web app loaded by Gecko during the Firefox OS bootup procedure. It switches several tasks that are required usually for the running of the system.

- Browser

It provides browser like functionality where it is required containing page navigation, search and bookmarks.

- Window Management

It contains app life cycle and interface, notifications, animations, etc. It is controlled by a specific part of the System app.

- Settings

It allows users to configure device settings. It responds to incoming activities, which allows other apps to jump inside the Settings app to handle the configuration as necessary.

ii. Communication applications

It Contains the Dialler, Contact, SMS apps and FTU apps.

iii. Productivity Application

It includes Email, Calendar, and Clock apps.

- Calendar

It is the built-in calendar app in Firefox OS.

- Clock

It is default Clock app in Firefox OS. It includes alarm, timer and stopwatch functionality.

- Email

In this e-mail app we can configure our email account.

iv. Media Application

It contains some media related functions such as forward lock DRM and wallpapers & some apps like Camera, Gallery, Music, and Video player.

- Gallery

It is an exhibition room of images and videos in the phone.

- Video

Video is a simple video player app that will play videos present on your device's storage media.

- Camera

Camera allows users to capture and manage videos and photos from the device camera. It has some extra features alongside capturing images.

III. WHAT IS ANDROID?

Android is the name of the mobile operating system made by American company; Google. It most commonly comes installed on a variety of smartphones and tablets from a host of manufacturers offering users access to Google's own services like Search, YouTube, Maps, Gmail and more.

This means you can easily look for information on the web, watch videos, search for directions and write emails on your phone, just as you would on your computer, but there's more to Android than these simple examples.

A. What Can An Android Phone Do?

Figure 2: Android

Android phones are highly customisable and as such can be altered to suit your tastes and needs with wallpapers, themes and launchers which completely change the look of your device's interface. You can download applications to do all sorts of things like check your Facebook and Twitter feeds, manage your bank account, order pizza and play games. You can plan events on from your phone's calendar and see them on your computer or browse websites on your desktop and pick them up on your phone.

Another neat feature of Android is that it automatically backs up your contacts for you. When you set up an Android phone you'll need to create a Google Account or sign in with an existing one. Every time you save a number to the address book of your Android phone it will be synced to your Google Account.

The benefit of this is that if you lose your phone all of your numbers will be saved. The next time you get an Android phone (or and iPhone or Windows Phone if you prefer) and sign in with your Google Account, all of your contacts and friend's numbers will be displayed in your new phone's address book immediately, no need to transfer or back them up anywhere else.

Syncing is a way for your phone to keep all your information; websites, contacts, calendar entries and apps up-to-date. This can happen over your phone's mobile data or WiFi connection, seamlessly, in the background.

B. Features & Specifications Of Android Os

Androidis a powerful Operating System supporting a large number of applications in Smart Phones. These applications make

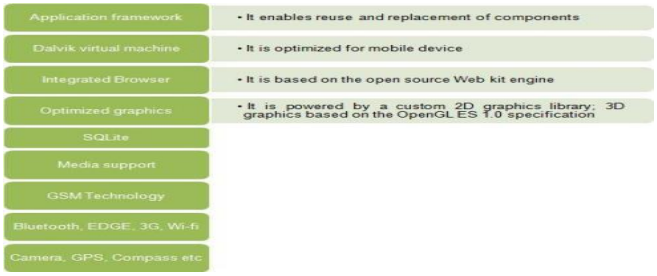

Figure 3:Specifications of Android

life more comfortable and advanced for the users. Hardware that support Android are mainly based on ARM architecture platform. Some of the current features and specifications of android are:

Android comes with an Android market which is an online software store. It was developed by Google. It allows Android users to select, and download applications developed by third party developers and use them. There are around 2.0 lack+ games, application and widgets available on the market for users.

Android applications are written in java programming language. Android is available as open source for developers to develop applications wich can be further used for selling in android market. There are around 200000 applications developed for android with over 3 billion downloads. Android relies on Linux version 2.6 for core system services such as security, memory management, process management, network stack, and driver model. For software development, Android provides Android SDK (Software development kit). Read more about open source software.

C. Applications

These are the basics of Android applications:

• Android applications are composed of one or more application components (activities, services, content providers, and broadcast receivers)

• Each component performs a different role in the overall application behaviour, and each one can be activated individually (even by other applications)

• The manifest file must declare all components in the application and should also declare all application requirements, such as the minimum version of Android required and any hardware configurations required

• Non-code application resources (images, strings, layout files, etc.) should include alternatives for different device configurations (such as different strings for different languages)

Google, for software development and application development, had launched two competitions ADC1 and ADC2 for the most innovative applications for Android. It offered prizes of USD 10 million combined in ADC1 and 2. ADC1 was launched in January 2008 and ADC 2 was launched in May 2009. These competitions helped Google a lot in making Android better, more user friendly, advanced and interactive.

D. What Happened To Android And Ios?

You may be wondering why a new mobile OS? Isn't Android and iOS enough to meet our needs? The reality is there's always room for improvement and innovation even in saturated markets like mobile operating system. There are many problems that are needed to be fixed in both operating systems. Following are few of the problems:

- Both Android and iOS are resource hungry. To have best experience with them, you need high end phone.
- High end phones are not affordable by everyone. So you can say they are designed for rich people.

  Resource hungry also means consuming more battery. They don't have good battery life.

- Your phone is not upgradable to every new release of Android or iOS. Just because with every new release, you need a higher specs device to run it smoothly. So after few releases you are out of scene!
- Left behind on older versions means you can't run new version of apps because they require you to upgrade to particular version of the OS.
- You are forced to download apps only from their marketplaces. Only Apple and Google are making money from this. What about network operators? What if someone like us want to build their own marketplace?

IV. PROBLEMS THAT FIREFOX OS SOLVES?

Because of this architectural design, Firefox OS consume very less resources. Consuming less resources means many things.It can run smoothly on low-end devices.

- Of course low and mid range phones are less expensive than the high-end phones. So you can say Firefox OS hardware will be much cheaper than Android and iOS. Everyone can afford it easily.
- Firefox OS devices will have much longer battery life because of less resource consumption.

Few other problems that Firefox OS solves.

- Your phone never gets obsolete because web is the native platform. New version of apps will run easily even on your older hardware
- You are not forced to download apps from Mozilla's market place. You can add any web app on the internet as native app if the developer has added a small manifest file in the root dir of that app. You can even create your own market place.
- Imagine a word in your mind and try searching it in App Discovery interface of Firefox OS, it will give you high quality chosen apps from all over the internet. This truly unlocks the power of web on mobile.

V. CONCLUSION

Firefox OS is an open platform turning the Web into a platform and ending the era of proprietary platforms. The reason for the success will be mainly the cheap pricing that Firefox OS is already bringing to the mobile web market. However, predictions in this dynamicmarket are not very reliable, so let us see how the market evolves.

REFERENCES

[1] http://en.wikipedia.org/wiki/Firefox_OS
[2] https://developer.mozilla.org
[3] http://en.wikipedia.org/wiki/Gecko_(software)
[4] http://en.wikipedia.org/wiki/XULRunner
[5] http://techblogon.com/mozilla
[6] http://www.digit.in/mobile