

Survey on Fitness Centres Automation and Development of Mobile Application for Android Platform

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ABSTRACT:

This paper contains the details of research and market survey carried out for the creation of an Android application that automates a fitness centre's entire business process. The various problems faced at different fitness centres are discussed along with relevant proposed resolutions for the same. A comparison of various mobile platforms has been made concluding that android is the most favourable for this application development.

KEYWORDS— Fitness Centre, Business Process Automation, Mobile Application, Android SDK, Cross Platform Tools

I. INTRODUCTION

The fitness industry is a rapidly evolving business today. Being fit itself has unfolded from a luxury to being a basic need. As a result a large number of fitness centres have mushroomed up across cities. Being individual or small-medium functioning, these centres have rareness of a regularized operations model, with remittance being made in instalments, attendance of client being random, with the fitness regimes following a similar modus operandi. As a result the stakeholders of fitness centres the owners/managers and the customers themselves are at a loss, with the owners/managers facing functioning, compliance and turnover issues, while the customers face issues with their fitness quotients.

Therefore Fitko is a cloud based solution for gyms and fitness centres that digitizes and centralizes all the business processes for fitness managers, giving easy and on the fly access to workout schedule and assessments for members.

The rest of this document describes the market survey conducted to infer the necessity of this product.

II. MARKET SURVEY

In this section the paper describes the review of current market that was performed as a first step in this work. Though it could find no application that performs exactly the same functions as this application, none the less a lot was learnt through researches into existing systems as well as a brief outlook on the requirement analysis of the fitness industry.

A. Background

Sugoi Labs is a company that aims at transforming business processes into technology processes over the mobile and web. Fitko is one such product developed by Sugoi Labs which makes life of fitness centre owners and members easier via digitization and on the fly access, bringing various business processes of running a fitness centre on to the mobile and cloud for owners/managers, and helps fitness centre members in managing fitness schedules and evaluating regular fitness assessments, thus allowing a very compact system to interact with the centre and trainers.

This project's ruling aim is to come up with the mobile version of Fitko over the android platform.

B. Existing Systems

A market survey was conducted on the various systems being used by fitness centres. Many centres were visited and it was concluded that there is no existing automated system in India to keep record of the entire

business processes of the fitness centres. Sugoi Labs proposed an idea of a SaaS based solution for the automation of the business process of the fitness centres. Still nothing exists on the mobile platform.

A few surveyed fitness centers are stated below. This helped to not only comprehend the problems requirements involved, but also convinced that this work will have to be implemented from scratch.

Details of centers surveyed:-

Name: Sri Maruthi Core Fitness

Established: 2011

Number of Branches: 2

Average Number of members: 300 (per branch)

Membership charge: Rs 13,000 p.a.

Facilities: General fitness, strength training, free weights, cardio, personal training, aerobics, free trials, physiotherapy

Contact: Arab (manager), 9880394402.

Name: D Sculpt Fitness

Established: 2014

Number of Branches: 1

Average Number of members: Newly opened

Membership charge: Rs 9,999 p.a.

Facilities: Personal training, General fitness, strength training, free weights, cardio, free trials.

Contact: Deepak Gowda, 9916065699

Name: Apple Fitness

Established: 2014

Number of Branches: 1

Average Number of members: Newly opened

Membership charge: Rs 20,000 p.a.

Facilities: General fitness, personal training, strength training, free weights, cardio, aerobics, free trials, steam & shower, cross fit, zumba, functional training zone, power yoga, body pump, body combat.

Contact: Santosh Kumar (manager), 9901625555.

All fitness centres surveyed had variant facilities and business characteristics, but they all had similar problems pertaining to manual conduction of all managerial activities. The following were the several problems faced by all the centres in general:

User management:

- It's difficult to track number of active members in a particular centre.
- It's difficult to track number of new members per week/month.

Attendance: The process of keeping check on absenteeism is tedious.

Payment:

- Tracking of partial payments.
- Renewals of payment accounts.

Card based exercise schedule: Manual maintenance and accessibility to user cards is time-consuming.

Regular assessment of each member.

Trainer management: Allotment of a trainer to each member as well as maintaining the trainer-user ratio accurately.

C. Technology Survey

The team chooses to implement mobile app as opposed to a web application because:

Mobile applications are more cost efficient. Fitness centres will have the additional overhead of computer systems, if web application is needed.

Mobile applications are more accessible to all stakeholders.

The chosen platform to work on is android owing to its generic popularity and simplicity of use. Android is the most widely used mobile operating system now-a-days with more users and more phones worldwide than compared to any other operating system. On little research, a few advantages and disadvantages were inferred as cited below:

Advantages:

- a. Multitasking
- b. Ease of notification
- c. Easy access to thousands of applications via the Google Android App market
- d. Diverse phone options
- e. Can install a modified ROM
- f. Widget
- g. Google maniac

- h. Lower iteration time

Disadvantages:

- a. Continuous internet connection
- b. Advertising
- c. More fragmentation
- d. In-app purchases easier on other platforms such as iOS

As shown above, the advantages clearly outweigh the disadvantages and hence our inclination towards using android

Android Architecture

The android system is a Linux based system which uses software stack architecture design pattern. The Android architecture consists of four layers namely Linux kernel, Libraries and Android runtime, Application framework and Applications.

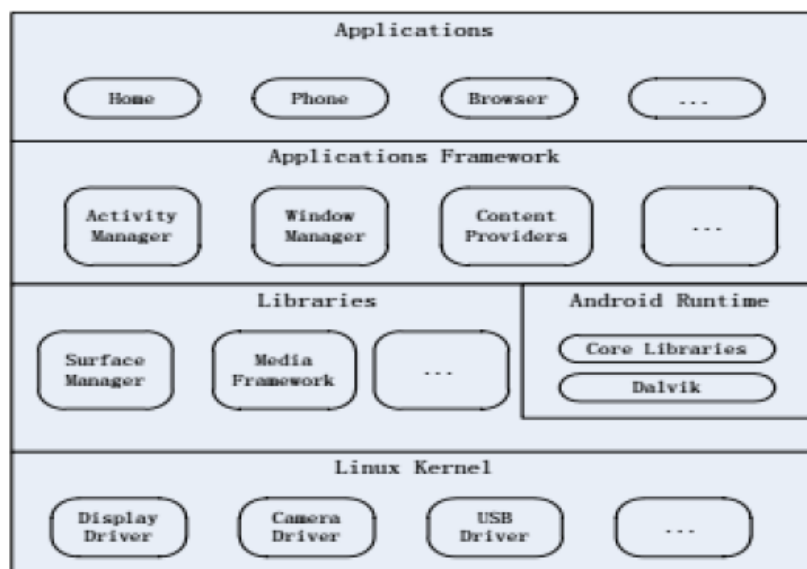


Figure 1. Android Architecture

Applications: The set of core applications that the android app will be shipped with includes client, SMS program, calendars, maps, browsers, contacts and others. These applications are developed using java.

Applications Framework: Android offers developers the ability to build innovative applications by providing an open development platform. Developers can freely take advantage of the device hardware, access location information, run background services, set alarms, add notifications to the status bar, and much more. All the API framework of the core program can be accessed by the developers. This framework specifies the reuse of its component.

Libraries and Android Runtime: The two components in which the library is divided in to are Android libraries and Android Runtime. The Runtime consists of Java core library and Dalvik Virtual Machine. The Library provides Java core library with most functions. Dalvik virtual machine is register virtual machine and makes some specific improvements for mobile device. Android system library is support the application framework; it is also an important link connecting between application framework and Linux

Kernel. This system library is developed in C or C++ language. These libraries can also be utilized by the different components in the Android system. They provide service for the developers through the application framework.

Linux Kernel: The kernel system service provided by Android inner nuclear layer is based on Linux 2.6 kernel; Operations like internal storage, internet protocol, process management, bottom-drive and other core service are all based on Linux kernel. [1]

History of Android and the SDK

Open Handset Alliance which is led by Google created Android. There was mixed feedback on developing applications for the Android platform. The various issues cited include bugs, documentation inadequacy, QA infrastructure, and it was found that there was no public issue-tracking system. Google promulgated an issue tracker on January 18, 2008. Android-targeted applications began to appear the week after the platform was announced. The snake game was the first publicly available application. A SIM-unlocked and hardware-unlocked device that is designed for advanced developers is the Android Dev Phone. Regular consumer devices purchased at retail can be used by developers to test and use their applications; some developers may choose not to use a peddle device, favoring an unsealed or no-contract device.

The Android 0.9 SDK beta was released on August 18, 2008. This release provided an updated and extended API. It also improved development tools and provided an updated design for the home screen. The comprehensive directions for upgrading are available to those already working with an earlier release. The Android 1.0 SDK (Release 1) was released on September 23, 2008. According to the release notes, it included predominately bug fixes, even though some smaller features were added. It also included several API changes from the 0.9 version. Numerous versions have been released since it was developed. [2]-[6]

Review of Android SDK

The Android software development kit (SDK) includes a wide-ranging set of development tools [7], a few of which are namely a debugger, libraries, a handset emulator based on QEMU, various documentation, sample code, and tutorials. It currently supports development platforms including computers running Linux (any modern desktop Linux distribution), Mac OS X 10.5.8 or later, and Windows XP or later. One can also develop Android software on Android itself by using the AIDE - Android IDE - Java, C++ app and the Java editor app. Eclipse is the officially supported integrated development environment (IDE) using the Android Development Tools (ADT) Plugin, though IntelliJ IDEA IDE (all editions) fully supports Android development out of the box[8] . Android development is also supported by Net Beans IDE via a plugin [9]. Furthermore, developers may use any text editor to edit Java and XML files. They can then use command line tools (Java Development Kit and Apache Ant are required) for the creation, building and debugging of Android applications as well as control attached Android devices (e.g., triggering a reboot, installing software package(s) remotely) [10].

Enhancements to Android's SDK go hand in hand with the overall Android platform development. Older versions of the Android platform is also supported by the SDK if at all developers wish to target their applications at familiar older devices. The provided development tools are downloadable components, such that after one has downloaded the latest version and platform, for compatibility testing even the older platforms and tools can also be downloaded.

The Android SDK package also includes a toolkit which is the Android Debug Bridge (ADB). It consists of both client and server-side programs that communicate with one another. The command-line interface [11] accesses the ADB, although numerous graphical user interfaces exist to control ADB.

A diagnostic protocol, called Fastboot, included within the SDK package is used primarily to modify the flash file system via a USB connection from host computer. It is required that the device should be started in a boot loader or Second Program Loader mode in which only the most basic hardware initialization is performed. It accepts a specific set of commands sent to it via USB using a command line, after enabling the protocol on the device.

The NDK is based on command-line tools and requires invoking them manually to build, deploy and debug the apps, unlike Java application development, which is based on an IDE. Integration of the NDK into Eclipse [12] and Visual Studio [13] is allowed by several third party tools.

The Android 3.1 platform (also backported to Android 2.3.4) introduced Android Open Accessory support, which allows external USB hardware (an Android USB accessory) to interact with an Android-powered device in a particular "accessory" mode. When an Android-powered device is in accessory mode, the connected accessory performs as the USB host (powers the bus and enumerates devices) and the Android-powered device acts as the USB device. Android USB accessories are notably designed to attach to Android-powered devices and adhere to a simple protocol (Android accessory protocol) that allows them to detect Android-powered devices that support accessory mode. [14]

Tools Available for Cross Platform Application Development

Cross platform applications means creating single Application or writing single source code and get it executed on different platforms. While development of mobile Application developer checks for technique which will be best to save money, avoid learning new languages and make Application fit for maximum devices. Due to varying device hardware capability and different Software architecture, it,s a challenge to deploy single code base application on Multiple platforms. Cross platform development tools gives a solution. There exists number of tools available for cross platform development.

1. Appcelerator"s Titanium

Appcelerator introduced Titanium in 2008, an open source cross platform app development framework.

Advantages:

- Can be used as standalone software or in integration with tools like PhoneGap.
- Uses Alloy framework where interfaces are designed using XML and CSS.

Disadvantages:

- Additional cost is required for extra analytical capabilities and cloud services.

2. Corona SDK

Corona SDK uses a scripting language called Lua that could integrate spite sheets, and social media into the app.

Advantages:

- It is a faster application developer as opposed to traditional methods.
- Can design cross-browser applications, games and e-books.

Disadvantages:

- Starter is the only free structure offered by Corona, which doesn"t consist of as many features as Pro, which is the paid one.

3. Qt

Qt Creator is an IDE provided by the cross platform development framework Qt.

Advantages:

- It provides services for iOS and Android as well as desktop operating systems.
- Reuse of code is plausible.

Disadvantages:

- Size of app could be too large due to large Qt libraries.

4. Sencha Touch

It is an HTML5 mobile application framework.

Advantages:

- Can be implemented in a hybrid shell or within a browser
- Works on webkit based on browsers in iOS, Android and tablets.

Disadvantages:

- Not designed for desktop internet applications at all.
- Works slower compared to native apps.
- Has trouble in accessing hardware of device.

5.Xamarin

It is designed to be a single code bas accrues different mobile platforms without compromising quality or performance.

Advantages:

- Its eases development by facilitating features from creation to publication that is inclusive of interface, debugging, testing and deployment of project.
- Primarily uses C# and .Net libraries and also allows Visual Studio.

Disadvantages:

- It does not allow the creation of reusable components outside its own environment.
- UI development is not portable between platforms.

6.PhoneGap

Nitobi introduced PhoneGap, an application development framework which allows developer to create applications across multiple platforms. This work was further contributed to the Apache Software Foundation and named as Callback and later changed to Cordova.

Advantages:

- Supports all major platforms as well as APIs
- Based on newest technologies such as HTML5, CSS3 and javascript. Thereby it does not need dense programming language.

Disadvantages:

- To create an app more than once, a fee is required to be paid on a monthly basis.
- Cannot be efficient when working for native apps.
- Does not support all the functionalities.

Advantages of Android Studio

- Gradle Build system deep integration
- ADT Feature parity
- Dual monitor support
- Build Variants - Quickly switch between different product versions.

Disadvantages of Android Studio:

- It's an "early access" right now, so it's buggy.
- It doesn't offer any features currently that IntelliJ's build-in Android support doesn't have.

For this application to be developed the best choice is Android Studio owing to its above cited advantages which are in favour of the application to be developed.

Sr. No.	Tools	Programming Language Used	License	Device capability Support	Integrated Development Environment support and build environment	Cross platform development on
1	Apache Cordova/ PhoneGap	HTML, CSS, JavaScript	Apache 2	Geolocation, Files, Network, Accelerometer, Notifications, Camera, Contacts, Compass, Storage and media	Any SDK can be used just PhoneGap plugins need to be installed.	iPhone, Android, Tizen, Windows Phone, BlackBerry, Symbian, Palm, Bada
2	Sencha Touch	HTML, CSS, JavaScript	GPLv3, Free Commercial License, Paid OEM and Embedded Systems Licenses	-	Sencha Architect 2	iOS (iPhone, iPad, iPod touch), Android, Kindle, BlackBerry, Bada

3	Qt	C++, QML	Free & commercial licenses available	Commercial license, GPL v3 and LGPL v2	-	Qt Creator
4	Xamarin	C#	Open Source license- LGPLv2 license	-	Xamarin Studio or Visual Studio	iOS, Android and Windows
5	Corona SDK	Lua	Free unlimited trial; commercial licenses available for deployment	camera, accelerometer, gps	Xcode	iOS, Android, NOAA Color
6	Titanium Appcelerator	JavaScript, HTML, CSS, AJAX, jQuery	Open Sourced Apache 2.0 licensed, commercial and enterprise licenses available	Vibration, Geolocation & Mapping, Accelerometer, Sound, Photo Gallery, Orientation, Camera, Screenshot, Shake, Record Video Proximity Events, Push Notifications	Titanium Studio based on Eclipse, Titanium SDK	Android, iPhone, BlackBerry, Tizen, mobile web

III. CONCLUSION

The ultimate vision of this application is to be a one stop platform built upon the growing and vital need for fitness, which will enable fitness domain businesses to operate seamlessly and on the other end allow fitness consumers to connect and work out on their fitness levels, with these businesses.

This project strives at maintaining minimal shortcomings by enabling all fundamental features available to all associated clients of the fitness centre, i.e. user, trainer and admin. The project approaches the entire application by designing each module at a time. This application layer then acts as the medium between the user and the database, and on appropriate interaction between all significant models, it enhances the entire process of the fitness centre experience.

Though this application tries to offer all essential facilities required at a fitness centre, it doesn't guarantee the user's efficient use of the product. For instance, alerts sent to the user's phone may be ignored.

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