Applying Google Cloud Messanging Technology in Conveying Information for UniKL BMI Communication Technology section

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Abstract: In universities, the old school way to display messages regarding exam dates, special events and class cancellations are on noticeboards. But sticking up and removing the various notices every day is cumbersome. Do the students read the notices? How about torn notices? Is the posted notice authentic? There are so many issues regarding the relevancy of using noticeboards in order to convey message. Thus, the usage of push notification service can overcome these problems. With the advent of mobile and pervasive computing era, smartphones became important. Everybody owns it. In conjunction with the statement, a study that uses push notification service is developed. The service will be tested to UniKL-BMI's Communication Technology Section staff and students. Messages will be sent by administrator to students through Google Cloud Messaging services. By having such system, information can easily be broadcasted and student will never miss any information send to them.

Keywords: Google Cloud Messanging, push notification

1.0 INTRODUCTION

The purpose of this study to develop an application for Communication Technology Section UniKL BMI. Majority of the students of UniKL BMI use their smartphone for daily use. Therefore, this application can be easily installed into their smartphone. Basically this study focus more on software, but also involve hardware devices. The software part is uses Google Cloud Messaging (GCM) using based on Android software which is Basic4Android Software (B4A), Java and Android Software Development Kit (SDK).

GCM for Android is a service that allows us to send data from our server to the users' Android-powered device. It allows 3rd-party application servers to send messages to their Android applications[1]. Therefore lecturers can easily communicate and connected to students. On the other hand student can also easily promote activities using this application. Additionally, the student also will easily get info from Communication Technology Section using this application. By using the push style notification technique with cloud, the server can keep track of the user's mobile which means that if

the mobile device is on or off at that particular moment it would not be an issue. Every time it connects with the Internet the user can get update or notification

A new form of cloud-based push-styled mobile application that exploits today's push notification services as a means of command dissemination[1]. The aim of this study is to take advantages of the fast growing popularity of Android devices by developing an Android application that would retrieve and display and event or memo on Android devices, thus enabling students get up to date information anywhere they are once have the application installed on their Android device. The users will always be updated about the circular or events. After this, students will be more alert when Communication Technology Section UniKL BMI is organizing any programs, important memo and news.

2.0 MATERIALS AND METHODS

This study is focused on the development of application based on Android software and Android devices.

2.1 SQLite

SQLite is an in-process library that implements a self-contained, serverless, zero-configuration, transactional SQL database engine. The database files are read/written directly to disk with no intermediary server process required. With SQLite, the process that wants to access the database reads and writes directly from the database files on disk[2]. There is no intermediary server process.

2.1.1 Serverless

Most SQL database engines are implemented as a separate server process. Programs that want to access the database communicate with the server using some kind of interprocess communication (typically TCP/IP) to send requests to the server and to receive back results. SQLite does not work this way. With SQLite, the process that wants to access the database reads and writes directly from the database files on disk. There is no intermediary server process.

The main advantage is that there is no separate server process to install, setup, configure, initialize, manage, and troubleshoot. Any program that is able to access the disk is able to use SQLite database.

2.1.2 Zero-configuration

i. SQLite does not need to be "installed" before it is used.
ii. There is no "setup" procedure.
iii. There is no server process that needs to be started, stopped, or configured.
iv. SQLite uses no configuration files.

2.1.3 Transactional

i. SQLite implements serializable transactions that are atomic, consistent, isolated, and durable (ACID).
ii. All changes within a single transaction in SQLite either occur completely or not at all, even if the act of writing the change out to the disk is interrupted by
   a. A program crash,
   b. An operating system crash, or
   c. A power failure.

2.1.4 The needs to use SQLite

a) Embedded applications:
   a. All applications that need portability, that do not require expansion, e.g. single-user local applications, mobile applications or games.

b) Disk access replacement:
   a. In many cases, applications that need to read/write files to disk directly can benefit from switching to SQLite for additional functionality and simplicity that comes from using the *Structured Query Language* (SQL).

c) Testing:
   a. It is an overkill for a large portion of applications to use an additional process for testing the business-logic (i.e. the application's main purpose: functionality).

2.2 Google Cloud Messanging (GCM)

Google Cloud Messaging for Android (GCM) is a service that allows us to send data from our server to the users' Android-powered device[3]. It allows 3rd-party application servers to send messages to their Android applications. This is a key feature as always need the server application to be in direct contact with the mobile application such that can send messages to the mobile application about new versions for instance[3,4]. An Android application on an Android device doesn't need to be running to receive messages.

The system will wake it up the Android application via Intent broadcast when the message arrives. This is achieved if the application is set up with the proper broadcast receiver. The application has full control of how to handle the GCM messages passed to it. For example, the application might post a notification when receiving these messages. It requires devices running Android 2.2 or higher that also have the Google Play Store application installed. It is a completely free service whatever our messaging needs are. Google Cloud Messaging technology is the new version of the C2DM (cloud to device messaging) technology.

2.2.1 The needs to use GCM

i. Client server architecture is the most common architecture
   a. Most application do all the heavy

lifting and processing at the servers and then use the processed data within the applications

ii. Background process polling server for information at regular intervals is a bad design

    a. Battery performance
    b. System resource usage (memory , CPU)
    c. Complicated coding

iii. Application does not need to be running in the background for receiving data messages.
iv. Lower cost and better tracking than SMS
v. Less coding required
    a. Not need to worry about queuing of messages
    b. Differed delivery
vi. Simpler application flow
vii. In a nutshell it makes application design much more simple, improves battery performance and makes better use of system resources
viii. Scalability & extensibility
ix. More computing power

2.2.2 Major component applying GCM

i. Database
ii. GCM servers
iii. Mobile device

2.3 B4J

Based on figure 1 the same B4X language and concepts as its B4A (Android) and B4i (iOS) counterparts, B4J offers an IDE with a full set of features. These include a visual designer, debugger, compiler, hundreds of libraries, and a packager that creates self-contained installers with no dependencies. Another advantage of B4J is that the code developed for the desktop can be easily reused to build similar applications for Android or iOS platforms, and vice versa. Use this particular development platform to create and compile apps that can run on Windows, Mac, Linux and ARM boards (such as Raspberry Pi).
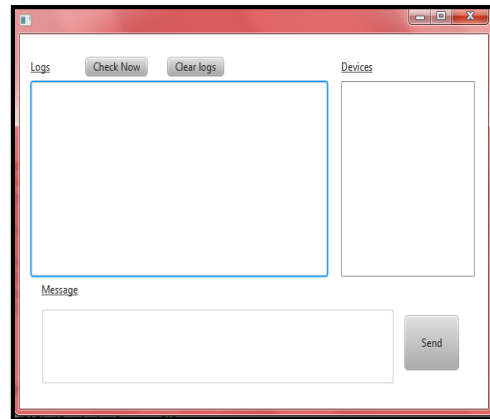

Figure 1: B4J interface for broadcast message

2.4 B4A

Basic4android is one of the fastest growing Android Rapid Application Development (RAD) Tool available in the market today. It is a commercial product inspired by Microsoft Visual Basic 6 and Microsoft Visual Studio.

The programming language that is easy to use especially for those who were Android enthusiasts is the Basic4android. B4A helps to make applications for Android devices, the language itself is a reminiscent of the BASIC programming language.

One of the most important features of the Basic4android is not only the ease of the Basic programming language but the speed of a native Android app because it don't need an interpreter in between Android and the app.

Based on figure 2 the Basic4android users can use the existing libraries created by fellow users to extend its functionality even further. With the popularity of Android, now considered as the most popular mobile operating system, developers will have a bright future when using B4A, especially in the commercial sense for the product that has created can be easily monetized. Basic4android created apps are just as good, and quick as apps hand coded in Java, but with the added benefit of being quick and easy to develop and deploy.
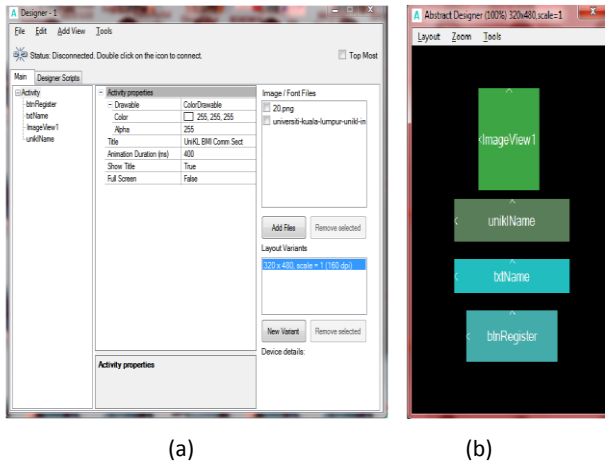
(a)   (b)

Figure 2: (a) Interface using B4A (b) layout design of apps

2.5 Android Smartphone

Smartphone with Android Operating System, at least the lowest Android Operating System (OS) is Android 4.2.2 "Jelly Bean".
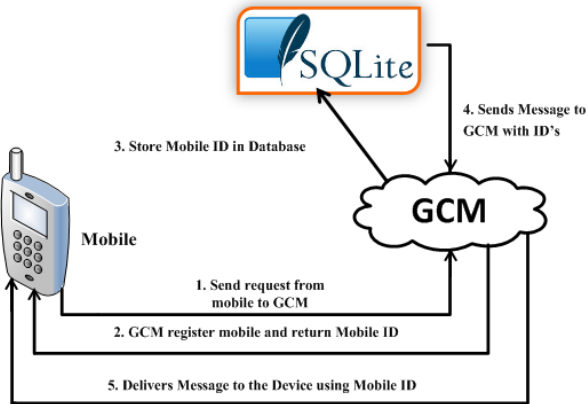
2.6 Process of Study

Figure 3: Study process

Based on Figure 3 is shows the study process:

i.   First android device sends sender id, application id to GCM server for registration.

ii.   Upon successful registration, GCM server issues mobile id to android device.

iii. After receiving mobile id, GCM will send mobile id to server. Server will store mobile id in the database for later usage.

iv.   Server sends a message to GCM server along with mobile id (which is stored earlier at server database).

v.   GCM server will delivers that message to respected mobile device using mobile id.

3.0 RESULT AND ANALYSIS

This part shows the result that obtained in this study.

3.1 Register Google Developer for GCM
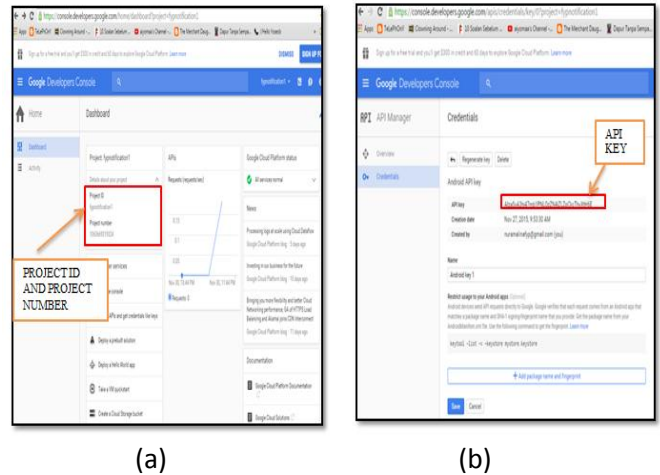

(a)   (b)

Figure 4: (a) product and project number (b) API key

i.   Firstly, sign up a google email account to register as Google Developer

ii.   After login to gmail account, then go **https://console.developers.google.com** to register as developer.

Based on figure 4 after successfully registered, Google will provide user *Project Id*, *Project Number* and *API Key*. Three important information that Google provided for developer is very important to include in programs.
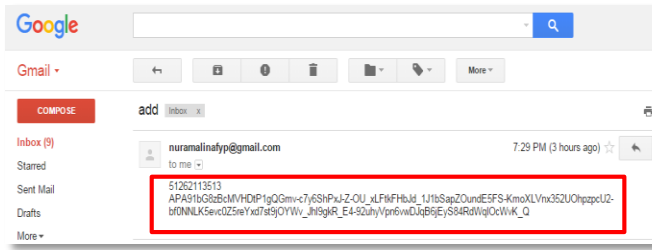
3.2 Mobile ID

Figure 5: Mobile ID

After student register student id on Apps, the GCM will provide different mobile ID for each of student ID that registered. For this example on Figure 5, the student id is 51262113513, and below the student id is the Mobile ID.

3.3 Data is store on SQLite Database
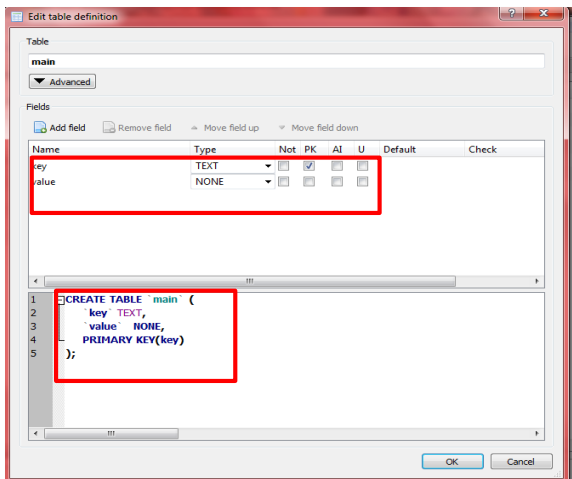

Figure 6: SQLite database name, table name and field

i.   Based on figure 6 database tables provide the most basic level of data structure in a database. Each database can contain multiple tables and each table is designed to hold information of a specific type. Each table in a database is assigned a name that must be unique within that particular database. A table name, once assigned to a table in one database, may only be re-used within the context of a different database.

ii. Each column represents a data field in the corresponding table. For example, the name, address and telephone data fields of a table are all columns. Each column, in turn, is defined to contain a certain datatype which dictates the type of data the column can contain. A column designed to store numbers would, therefore, be defined as a numerical datatype.

iii. Each new record that is saved to a table is stored in a row. Each row, in turn, consists of the columns of data associated with the saved record. Rows are also sometimes referred to as records or entries and these terms can generally be used interchangeably.

iv. iv. In this study, the database name is "store,db", the table "main" name is and field name is "key" and "value".
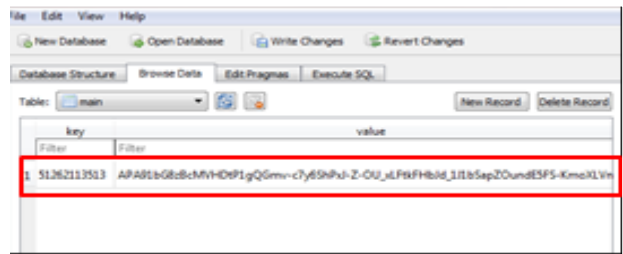

Figure 7: data is store in SQLite database

v.   Based on figure 7, after GCM received the student id and GCM store the data of student id and mobile id on SQLite.

vi. On SQLite, the SQLite database can be organise by checking how many student that have been registered and delete the record that we unwanted.
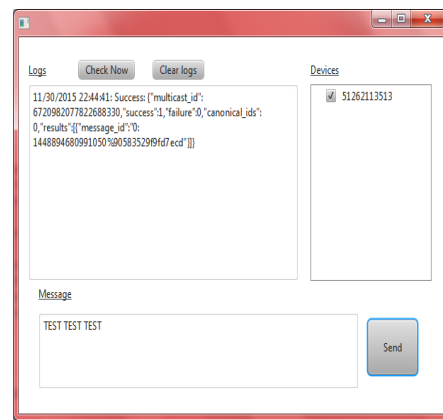
3.4 Broadcast message using B4J

Figure 8: Message is successfully broadcast

i.   Based on figure 8, after data is store on SQLite database, run the program on B4J, it will show message box of broadcast message.

ii. At device section it shows the student id that had been registered.

iii. When click the check now button, it will refresh and it will show whether the new id is registered or not.

iv. On log box, shows the result of message is send successfully or failed.

v. Function of message box is for write messages to be broadcast to the registered students.

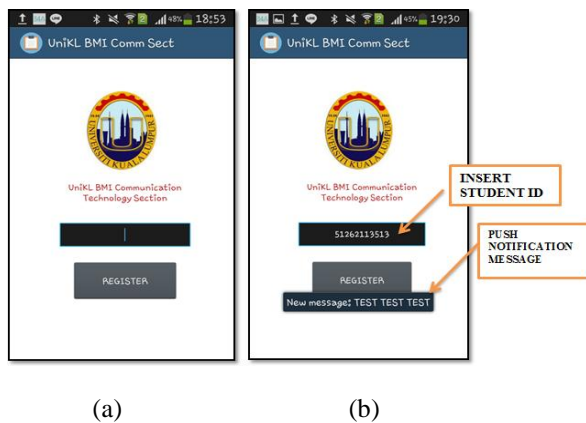## 3.5 Application interface on mobile

(a) (b)

Figure 9: (a) front interface of application (b) insert the student id and the phone receive the push notification message " TEST TEST TEST"

i. Based on figure 9 this is the interface of application for UniKL BMI Communication Technology Section for this semester.
ii. The student must fill in the spaces provided with student id.
iii. After the student id is registered, the students will receive the message being broadcasted by admin.

4.0 CONCLUSION

As a conclusion, a system which applies GCM Technology in Conveying Information to UniKL BMI Communication Technology Section Students has been developed. The push notification application for UniKL BMI Communication Technology Section students will reduce lot of manual work. Using traditional method, sticking various notices day-to-day is a tedious process which requires a user to manage these notices to be displayed. To overcome the limitations of old techniques, the push notification came into existence. GCM has been used to broadcast notices to all the students who are registered with this application. Every student will be aware of all on going events and activities inside the college. This ensures every person are well informed about the college.

Moreover, it will notify every user easily and that too with no time and place restrictions. This application will notify students every event that held by UniKL BMI Communication Section that is controlled by one admin. It gives free service to notify all the students. There will be no cost of sending notification to all. This application also can save smart devices battery in such a way the service that implemented in application is not running all the time. Whenever GCM ping the smart devices, only then it makes a broadcast to phone that initiates the service. Using this way, the device's battery can be efficiently managed. Furthermore, the beauty of this system is combination of 3 elements which are Google Cloud Messaging, Android Apps and Java Apps.

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