

Educational Training Information System Based on Two-Tiered Architecture

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Abstract

Today, everyone uses mobile devices. Therefore, mobile applications are more popular than others. For the mobile device, android is one of the top operating systems, being one out of more than billions of devices. This paper is based on two-tiered system. The presentation logic and some application logic are resided at the client. The remaining application logic and the data logic are resided at the server site. The system in this paper is a native Android application that provides the users with the information about Information and Communication Technology (ICT) centers and Foreign Language centers in Pakokku city. At the client site, the user can see the course information, address and phone number of the respective center and can also make registration. At the server site, the admin can update every piece of information for the respective center and can do deleting the respective course.

1. Introduction

Development of mobile phones is fast with in the development of technologies. A mobile phone is easy to use, portable, handles big data, multifunctional and user-friendly. Therefore, many operating systems are being developed for those devices like Android operating systems, iOS (iPhone Operating System) and Window Phone operating systems.

With the development of the operative systems, mobile applications are very useful and mobile application developments are very popular. [15] develops the native Android application which provides the user with information about every college that is affiliated with their respective universities. The application allows the user to register and to login using their registered

credentials. The user can select a university and a college with their affiliation. The application features call, send email, let view the website, receive push notification message and view the location of the college. Admin can update every piece of information provided for users as well as add, update and delete using same application. [16] is the development of Android mobile Application that assists in Tracking vehicle arrival status for Dry Port Service Enterprise in Ethiopia. It also not only develops the android application development but also its design the database and connection of the Back-End.

In the system, an Android application is developed based on two-tiered architecture. The client can send the Hypertext Transfer Protocol (HTTP) requests to retrieve the information of educational training centers in Pakokku city. The server responds the required requests. The primary objective of the system is to provide the information of ICT training and Foreign Language training centers and make registration via mobile phones. The user can see all of the information at one place. In addition, the respective course registration can be made in saving time.

In this paper, section 2 presents the related theory and technology used. Section 3 explains the implementation of the system design. Finally, section 4 wraps the system.

2. Theory and Technology Background

This section explains the system-based theory and applied technology.

The system is the client server architecture. At the client site, which is the user interface, android application is developed by using java and at the

server site, data query from MySQL database is made in PHP page.

2.1. Architectural Elements

To understand the fundamental building blocks of a distributed system, it is necessary to consider four key questions [14]:

- What are the entities that are communicating in the distributed system?
- How do they communicate, or more specifically, what communication paradigm is used?
- What roles and responsibilities do they have?
- What are they mapped on the physical infrastructure?

The entities in this system are processes and they communicate using request reply protocol under remote communication paradigm. As the roles and responsibilities, this system is client server architectural style. At the aspect of physical infrastructure, multiple clients request services from one server. The architectural style of the system is as shown in Figure 1.

2.2. Tier Architecture

In terms of distributed services, tiering is a technique to organize functionality of a given layer and place this functionality into the server [14]. In the two-tier solution, the three aspects mentioned

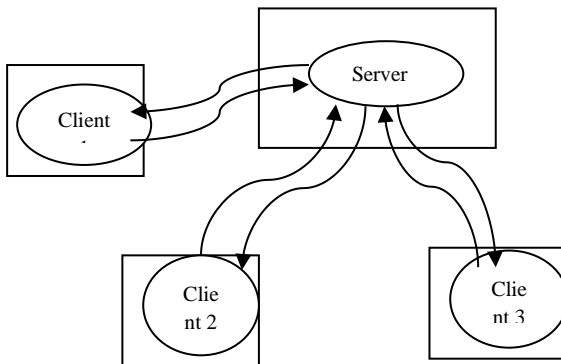


Figure 1 : Architectural Style of the System

above must be partitioned into two processes, the client and the server. This is most commonly done by splitting the application logic, with some residing in the client and the remainder in the server. The advantage of this scheme is low latency in terms of interaction, with only one exchange of messages to invoke an operation. The disadvantage is the splitting of application logic across a process boundary, with the consequent restriction on which parts of the logic can be directly invoked from which other part. In the three-tier solution, there is a one-to-one mapping from logical elements to physical servers and hence, for example, the application logic is held in one place, which in turn can enhance maintainability of the software. Each tier also has a well-defined role; for example, the third tier is simply a database. The first tier can also be a simple user interface allowing intrinsic support for thin clients. The drawbacks are the added complexity of managing three servers and also the added network traffic and latency associated with each operation.

2.3. Android

Android is an open source Linux-based operating system (OS) made for mobile devices (smart phones and tablet computers), developed by Open Handset Alliance led by Google [7]. Android provides various open source libraries, framework, SDKs and also plug-ins and documentation. The Android OS consists of different layers of software divided into five sections that are divided into four main sections. Figure 2 shows the architecture diagram of the Android OS [5].

Android uses Java to build native apps and XML to figure out the user interface. Java utilizes Android SDK libraries to develop an application.

Application Home, Contacts, Phones, Browsers	
Application Framework Managers for Activity, Windows, Package, ...	
Libraries SQLite, OpenGL, SSL, ...	Android Runtime Score Libraries, Dalvik Virtual Machine
Linux Kernel Display driver, Camera driver, Flash memory driver, WIFI driver, Audio driver, ... Android Runtime Score Libraries, Dalvik Virtual Machine	

Figure 2: Architecture Diagram of Android Operating System

2.4. PHP

PHP (HyperText Preprocessor) is an open source scripting language that is used widely, and it is executed on the server [1]. PHP file can contain text, HTML, CSS, JavaScript, and PHP code. Its result is returned to the browser. PHP can generate dynamic page content and can encrypt data. It run on various platforms and is compatible with almost all servers used today (Apache, IIS, ect).

2.5. MySQL

The collection of data or any information organized inside a system is known as a database. Organization of data can be accessed easily, managed properly and can be modified or updated as per the system's or application's needs [11]. The database can be accessed and manipulated using the standard language called SQL (Structured Query Language). The functions of SQL are to execute a query against the database, retrieve data, insert, update and delete records. The query also can create a new database and tables. The permission also can be set in a table. MS Access, SQL Server, and MySQL are types of RDBMS.

MySQL is developed, distributed and supported by Oracle Corporation. It is the relational database that stores data in separate

tables. It is open source, fast, reliable, scalable, and convenience to use [12].

3. Implementation of the System

The system in this paper is divided into two main different parts, the client site which is user's interface where data is visualized or seen and the server site where data is written and is fetched to the client site. The system architecture is shown in Figure 3.

MySQL database is used to store data. The Android project is not able to communicate with MySQL database directly, so PHP scripts are used to communicate, to edit and to execute and interactive interpreters to an Android device.

3.1. Development Setup

During the system development, the following hardware and software set up are configured as follows. Another versions or earlier version may also be possible.

Hardware Setup

- Intel ® core (TM)i7
- A mobile phone with android version minimum 4.4

Software Setup

- JDK 6, Android studio, XAMPP 5.6.3, adv driver

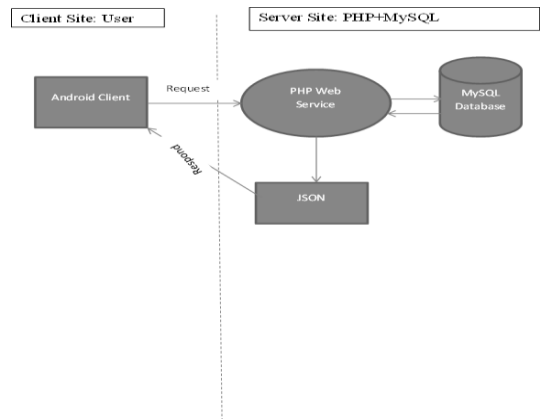


Figure 3: Architecture of the System

3.2. System Design

The system interaction is designed with use case diagram. In this system, there are two roles: user and admin.

3.2.1. User Use Case Diagram

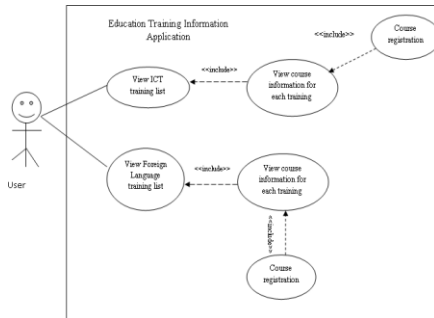


Figure 4: User Use Case Diagram

Firstly, the user can see the training list and then the course information of the respective course can be seen and the registration can be made.

3.2.1. Admin Use Case Diagram

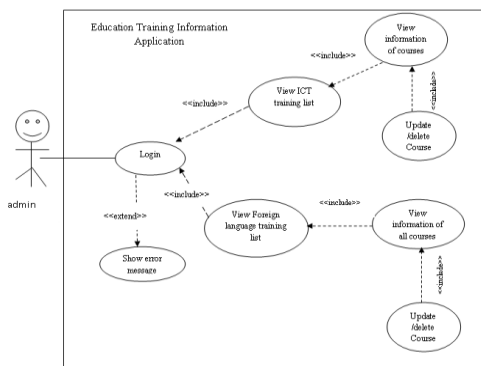


Figure 5: Admin Use Case Diagram

The admin must login to manage the information. After login, the list of ICT training and Foreign Language training centers can be viewed. Then, the list of course information of the respective center can be viewed and edited. The

admin also has the right to delete the course of the respective center.

3.3. GUI Design

This section presents software code implementation with the graphical user interfaces. At the client site (via android), this system has four main screens:

- Home screen
- List of Centers Information (center name, address, phone number) screens
- Course information screens
- Registration screen



Figure 6: Home Screen



Figure 7: List of Centers Information



Figure 8: Course Information Screen



Figure 9: Registration Screen

At the server site, the system has admin login page, list of center name page, course information of the selected center page, update page and a message alert dialog box for any course deletion.

4. Conclusion

The primary goal of this system is to provide the users with the information of the educational training centers in Pakokku city. The functionality of this system is to view the centers information, and to make a registration via android mobile phone. The system can meet these functionalities. The main challenges are the use of JSON and adjusting user interface on mobile device. Current targets are phone calling service, sending email with making registration, and searching function using search tab.

References

- [1] <https://www.w3schools.com>
- [2] <https://www.simplifiedcoding.net>
- [3] <https://www.simplifiedcoding.net/retrieve-data-mysql-database-android>
- [4] <https://www.youtube.com/watch?v=qMJo15o4pKE>
- [5] https://www.techotopia.com/index.php/AnOverview_of_the_Android_Architecture
- [6] <https://androidprogramz.blogspot.com/2012/07/retrieve-database-from-mysql-and.html>
- [7] <https://www.lifewire.com/what-is-google-android-1616887>
- [8] <https://www.androidauthority.com/history-android-os-name-789433/>
- [9] <https://www.json.org/>
- [10] <https://www.codeproject.com/Articles/800703/Connecting-your-Android-app-WAMP-server>
- [11] <http://searchsqlserver.techtarget.com/definition/database>
- [12] <https://www.mongodb.com/compare/mongodb-mysql>
- [13] www.tutorialpoints.com/selected_android_tutorial.pdf
- [14] G. Coluris, J. Dollimore, T. Kindberg, G. Blair, "Distributed Systems: concepts and design", Fifth Edition, ISBN 10: 0-13-214301-1
- [15] Sujana Raj Shretha, "A COLLEGE ANDROID MOBILE APPLICATION", Degree Program in Information Technology, University of Applied Science (Nepal), 2016.
- [16] Zekir Ahmed Awol, "Android Application development for importing Vehicles to Ethiopia Tracking system", project paper for Degree in Business Information Technology, 2016.