DEVELOPING AN ANDROID BASED LEARNING APPLICATION FOR MOBILE DEVICES

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Abstract—This paper summarizes the development of MLEA, a platform which assists, through Android cell phones and tablets, the mobility of users of learning virtual environments. MLEA is an application that implements computational techniques such as web services, design patterns, ontologies, and mobile computational techniques in order to allow the communication between mobile devices and the content management system – Moodle. It’s based on a service oriented, client server architecture that combines the REST protocol and JSON format for data interchange. The client will be provided with features for alerts, file downloads, chats and forums, grade books, quizzes, and lectures.

I. INTRODUCTION

As more and more smart phone and tablet users are increasing, which leads the man to connect Internet through hand-held devices. Today smart mobile devices are changing our way of work, study and daily act. Both the e-learning or mobile learning allude to the use of mobile devices and applications supporting the their use in educational environment. It facilitates student to access educational resources without need to be physically present at the working environment. It involves the integration of various technologies, on the one hand protocols which are associated with distance education.

The project has the objective of providing students and teachers the benefits of mobile learning, whose modular construction based on Service Oriented Architecture (SOA), which integrates learning environment Moodle smartphone and cell type tablets with Android operating system. The project develops all infrastructures on both the server and the application client that will be used by students. MLEA emphasis training of those who cannot attend regular to-face classroom courses. As it is a free application for Android device users, given to date there is no custom tool mobile fully functional, allowing access to a Moodle transparently and efficiently. With the current alternatives for mobile devices, users can access the server, but ago formats (size and shape of the screen) which are not adapted to the type of device, which is why, in some cases, the experience can be unsettling. An important aspect to note is that the architecture developed will make possible in the future to develop client applications for various mobile operating systems, such as iPhone, windows etc. drawing much of the infrastructure constructed and thus can be reached more users.

Mobile Learning Engine (MLE) Moodle is a free, which was initially developed to run on devices under Java 2 Platform, Micro Edition (J2ME), however, there is an Android version 1.0, which does not work on current phones. The user can also access the platform from the mobile phone, you can use your own phone to access a formatted version MLEMoodle. For this application to work properly, the user must configure the Moodle server. MoodleTouch (mTouch) has been developed for the system iPhone OS (iOS), but the development team is working on an alternate version of Android. The interface application is well developed and is very intuitive. All resources and activities are formatted for display in a mobile device. This application does not require any configuration Moodle server to work, so it is compatible with version 2.0 of Moodle. Meanwhile, it is not a free application. MLEA is a free solution for users with cell phones and Smartphone type tablet with Android operating system.

Our application will include SOA. SOA is oriented architecture services that promotes environment for the rapid development of complex processes. As we have seen, there is much work in this field. But many of proposals are in advance stage. Furthermore, none of these projects notification includes alert activity, which is an important contribution of our proposal.

Architecture Model

Figure No. 1 shows the architecture of MLEA

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The client side represents the application developed for mobile devices Android operating system, while the server side infrastructure is performing the integration with the Moodle environment. Figure No.1 MLEA Architecture On the server side, a set of web services acts as communication interface between clients and the server, resulting customer will get requested application. Through web services, customers have access to key resources Moodle, as a forum, assessment, messages, chat, file downloads, alerts, course rating and announcements among others. Upon receiving an application, a web service accesses the database for Moodle retrieve and or manipulate the information necessary to the application respond appropriately. On the client side, the implementation is based on the pattern Android development: for each application screen, there Java class responsible for controlling the actions of that screen. Thus, for each functionality provided (by forum example, assessment, messages, chat ...) there is a set of screens and, therefore, a set of Java classes, represented in the architecture using packet

Finally, database performs the query in database Moodle, desired course, and returns the information doing the reverse route to reach the MainActivity that show the courses for the user to select the course desired.

3.2 Client
The client side, i.e. the Android application uses the Facade pattern project for communication between screens and the class responsible for invoking web services. As mentioned above, each screen in the application Android has an associated class. MLEA class acts on the application as a front for communication between Connection Manager classes and controllers. When a class controller performs some application, MLEA class performs adjustments to the ConnectionManager which understand the request. For example, if required as ConnectionManager parameter the user logged in, the class uses the class MLEA Shared Info to retrieve information from the database cell. The same occurs the request. Figure No.3 illustrates the use of the facade, which is used for all requirements developed. The figure shows created modules (eg, Course, Forum, Chat) are MLEA class customer, which defines an interface between the Connection Manager class and Shared Info, isolating them from the rest of application.

3.3 Server
The server side uses two design patterns to meet the customer requests. First, the web services uses DAO design pattern (Data Access Object), for access and manipulate the information in the database Moodle. This pattern project provides an abstraction layer separating the application persistence mechanism, providing the flexibility to change the location where they are stored data, without the need to alter the logic programming. Thus it is possible to use different bases data having the information stored in databases local and / or remote files even use (no practice recommended). For each type of data that will be used, there is a DAO interface indicating the operations that can be performed with this type. The model layer of the application has the following types of data, each with a specific DAO interface: login, forum, assessment, messages, chat, file downloads, location, alerts, announcements, grades, course choice, survey, advertisement, evaluates forum, statistics and display users online forum. To increase the flexibility of the application, no DAO classes are instantiated by the web services directly, rather than this is used to construct a factory classes of DAO. This practice corresponds to project usage pattern Factothry Method, which ensures that any application to use the DAO appropriate to the chosen configuration. the following figure presents the use of design patterns, wherein the set web services
database used to instantiate the interfaces, which are used to access and manipulate Information in the database Moodle.

II. IMPLEMENTATION WEBSERVICES

For each application functionality, there is a class responsible for providing the entire web services for the specific requirement. Figure

These web services were developed using the protocol REST (Representational State Transfer) Web services, because Android does not have native support for other protocol. Thus, the development was easier with the use of libraries in Android for the invocation of the services. Besides HTTP, REST protocol standard used by for communication, we used JSON (JavaScript Object Notation) to define the format of the data, be a lightweight format for sharing computer data, it resulting in advantages in processing applications mobile. Figure No. 5, are classes implemented, with their web services. For example, the Forum Resource class, contains 4 web services: the first one is list is the getForumDiscussions, this service receives as parameter identifiers forum, user and course returning all threads that make up a specific forum.

Newer versions, however, we identified that the amount of services available from Moodle is very little and the same, only a small portion would be usable for project purposes. Given this situation, we chose develop all services necessary for the web application operation.

Table No.1 shows the services provided by Moodle Currently, highlighting those which were used for the application development. The web services were developed presented in Figure No.5, wherein each method is a web service. As can be seen in the Table, the services provided by Moodle not sufficient to meet the MLEA needs, for this reason, all web services used were implemented by way MLEA Moodle independent; were also implemented the Moodle few exploitable services. 4.1 Code of web services Considering the large number of web services implemented, and the fact that everyone has enough code structure similar (were implemented using the same patterns design), below is the code for a web service, which is responsible for retrieving the list of all courses involving a specific user university, although this depends on the physical location of the stakeholders. The conclusion of studies has allowed new Professional inroads into new and better marketplaces work nationally and internationally. It also permitted that graduates access to specialized studies complement their training. Since the launch of MLEA, will be received first benefits of the project in the various scenarios and headquarters of the Technological University of Panama, who participated in development. The participation of all stakeholders, also allow us to identify situations and cases to guide towards continuous improvement and adaptation of the application. An important aspect to note is that the architecture developed makes possible that in the future, they can develop client applications for various mobile operating systems, such as iPhone, drawing much of the infrastructure constructed and thus can be reached more users.

CONCLUSION

The Virtual University Program, is contributing to that, every day, more people are able to access higher level training and can complete their education.

REFERENCES
