

Scalable Pattern Architecture for Mobile Portal

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Abstract

Web portal services have been adopted by large number of sectors (including education sector) in carrying out their daily transactions. However, as a result of inadequate web portal infrastructures to cater for the large number of population using this web portal, the need for mobile portal cannot be completely abandoned. Since a large number of every population (including students of higher institutions of learning) has a mobile phone with portal capabilities, this technology (mobile portal) is therefore a panacea to solving web portal problems. Today a large number of the students access the web portal using their mobile phones. However, because the portal was not built mainly for mobile phones, viewing and carrying out the complete services of the portal is a serious challenge to mobile phone users mainly in the aspect of data and forms transparency and integrity. Hence the need for building and using mobile portal cannot be under estimated. Mobile computing has improved the way of carrying out business transactions. It has simplified the task of many organizations in reaching their customers easily. It is a safe technology that can be deployed and use anywhere and at anytime. It is a technology that can be referred to as portable technology. However, many people refused to adopt this technology because of a big question about its scalability. Hence this paper has designed, demonstrates and presents scalable pattern architecture for building mobile portal using higher institution services as a reference point. The pattern architecture presented will help to achieve scalability of mobile portal when fully implemented, thereby solving the problem faced by many developers in engineering mobile portals.

Keywords: Mobile Portal; Scalability; Pattern Architecture; Web Portal Services.

1. Introduction

A web portal is a large search engine site through which any person can access a wide range of services. It provides a wide range of varieties of services to its users. In [1], a web portal is a large search engine site that has branched off to offer a wide variety of services. When a web portal is solely designed to provide educational services to both services and users, it is called a college portal.

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A college portal provides services like student online applications, student registration, courses registration, and clearance form, academic performance records etc. Using college portals in processing academic data is easy and efficient than the manual method of doing this task. The manual method is tedious, time consuming and prone to error in data processing. This makes many colleges to adopt a web portal in processing student's information. The advantages of a college portal have made many higher institutions in Nigeria to employ this platform in student data management. With this in place in many institutions today, students can perform their registration using laptop and computers with internet enabled at any location that must not necessarily be the school's location when compared to the manual system that must be done at a particular location, at a time scheduled by the authorities. It is true that college portal has adequate advantages that make it more viable to use when compared to manual method of performing their task. However, many problems are still militating against the use of this technology (web portal) in managing student information, mainly in a developing country like Nigeria. Some of these problems are inefficiency of internet facilities in developing countries like Nigeria, insecurity of student's information and the cloud of students' experience by most ICT centers during student's registration can always result to theft and damage of properties. Hence, the need to employ mobile devices (phones) in managing student information cannot be underestimated. This kind of technology will redirect the system from web portal for higher institution to mobile portal or mobile computing system for colleges.

Mobile computing system is the use of mobile devices like phones with internet enabled in performing transactions with ease. It is a kind of computing system that uses only mobile capabilities in performing online transactions. Reference [2] stated that mobile computing involves using wireless devices to perform transactions. It allows many organizations to perform their operations and carry out their day-to-day services through the use of mobile devices. According to [3], mobile computing is a technology that involves the use of wireless devices to perform transactions. It was shown by them how mobile computing system can boost the businesses where it is been applied. Mobile computing has improved the way of carrying out business transactions. It has simplified the task of many organizations in reaching their customers. It is a safe technology that can be deployed and use anywhere and at anytime. They are technology that can be referred to as portable technology. They can secure web system and can be customized only by the owner or user of a particular mobile. Mobile computing do not need detail training before users can get use to it, since many users today has mobile phones. Consequently, there is need for mobile portals in Nigeria Tertiary Institutions since it has more advantages than its web counterpart. Similarly, mobile devices like mobile phones are increasingly common among our youth in tertiary institutions and as such provide new possibilities and opportunities for educational societies [4]. The work of [5] and [6] showed the beauty of applying mobile computing system into educational communities. Till today, there is no Nigeria tertiary institution that has completely deployed a mobile computing portal for managing students' data. Meanwhile, many of these institutions portals can be accessed by some internet enabled phones but most aspects of the forms are not always visible, since they were designed for computers like laptop but not mobile phones and students find it difficult to access some vital services of these system. Perhaps, the reason behind this is how to achieve efficient and scalable mobile application. Meanwhile, software scalability is of general importance to software development community. Reference [7] pointed out that the poor scalability of web services if not properly addressed, may not only pose a serious threat to its survivability but may also lead the Information Technology (IT) community into shambles. They further show while scalability and software

performance measurement is highly important before the deployment of such software. Hence, the need to deploying mobile portals in tertiary institutions cannot be overemphasized. On this note, it is important to provide an architecture that is suitable for developing scalable mobile portals mainly in university communities. Consequently, this paper has presented scalable pattern architecture for developing and deploying a mobile portal that is suitable in developing such for tertiary institutions.

2. Related Work

A portal can be described as websites with many pages that are organized by tabs or some other navigation, each page contains a nesting of sub-pages, or one or more portals individual windows that display data from static HTML content to a complex web services [8]. They went ahead to outline the characteristics, advantages and disadvantages of portals. Developing a portal to manage student data and priority enable environment for processing student's data is referred to as student portal. It is a personalized student-centric view of a college web services and resources [9]. They enable students to access direct educational resources. Using mobile devices to processing student data is has series of advantages when compared to the normal web portal. These devices are gaining more popularity in developing nations. They are providing necessary capabilities to users to retrieving and manipulating information anywhere, anytime. Reference [10] stated that, by 2001, there were more people using mobile phones than personal computers around the world. Mobile technologies are further enabling organization and communicate more effectively with methods such as wireless technologies [11]. Reference [12] stated that mobile portal will handle the permission element by giving users right to define the type of communication information and payment features for any mobile business. In the work of [3], the challenges and problems of mobile computing were highlighted. They however stated that it is still efficient and better to use than the web portal in this information age. Meanwhile, many banks have deployed mobile applications for their operations and the success recorded is highly encouraging to deploying this kind of system in the education sectors. According to [13], mobile banking applications provide instant information that is useful to banks' customers anywhere, anytime. Reference [14] developed a WAP based bug tracking application. The application is a bug report system accessible from mobile phones or devices. The success of mobile computing in these few aforementioned area shows that educational sectors can enjoy such technology. Reference [15] developed a model of the multimedia kernel for distant education. It is an organogram representing an m-learning suitable in educational sectors. Reference [16] developed a mobile portal to monitor the weight of a diabetic patient in a remote area in United States. Reference [17] discussed the importance of learning context with a particular focus upon educational application of mobile technologies. Reference [18] developed a WAP application for airline reservation. The application enabled users to access flight information and make reservations of a particular airline using their mobile phones. Reference [19] developed a mobile monitoring system using mobile computing to boost crude oil production in Nigeria.

The software was hosted on the mobile phone platform and could access database of oil well from remote location anywhere, anytime. Reference [20] developed a mobile commerce site that can be used by pharmaceutical stores. The software permits a number of after sales services such as prescription of drugs to buyers, allow customer to ask questions on prescribed drugs.

3. Methodology

The design science approach was used to carry out the research in this paper. The approach was defined in the work of [21] as a good approach that provides a method for conducting research and provides a model for the research output. Hence, this research was carried out using this approach. Using the design science approach, the steps enumerated below were followed

- Identification and definition of the Problem: This is the process of establishing the problem to be solved, which is for this case, developing architecture that can achieve scalability for mobile application when implemented.
- Possible Solution: This is the identification of the possible solutions to the identified problem. This is by using pattern architecture.
- Model Design: This is developing the solution to the problem in form of a model.
- Demonstration: Demonstrating how efficient will the model solve the problem
- Evaluation: Observing how good the model supports the solution to the problem

3.1. Proposed Architectural Pattern

The proposed architectural pattern for the mobile portal development is based on three key components of pattern development in engineering a software; Model, View and Controller. The architecture is presented in Figure 1.

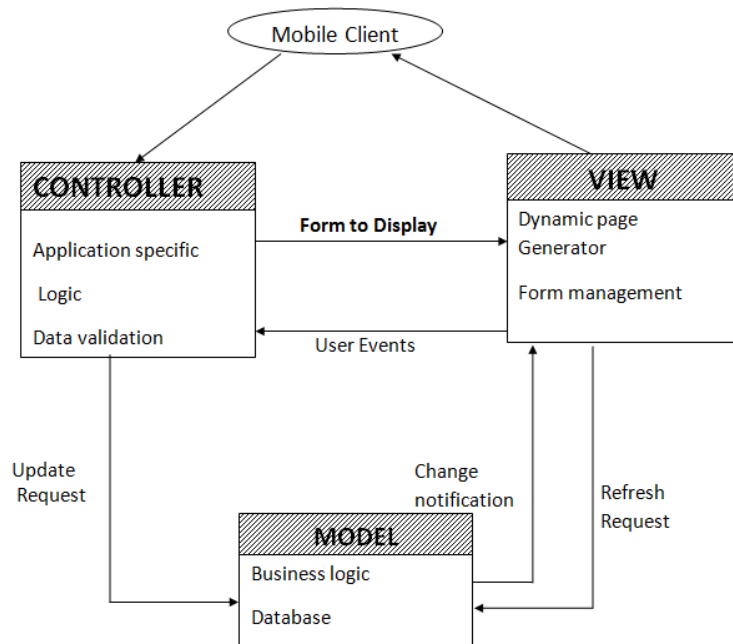


Figure 1: Pattern Architecture

4. Discussions

Model View Controller or MVC as it is popularly called, is a software design pattern for developing applications. A Model View Controller pattern is made up of the following three parts:

5. Model

The model is responsible for managing the data of the application. It responds to the request from the view and it also responds to instructions from the controller to update itself. It is the lowest level of the pattern which is responsible for maintaining data. The model defines what data the mobile application should contain. If the state of this data changes, the model will notify the view (so the display can change as needed) and sometimes the controller (if different logic is needed to control the updated view). This is effectively use for handling data and the business logic of the mobile application. In the mobile portal the model would specify what data the courses items should contain — course, course unit, etc and what courses items are already present.

6. View

This module is responsible for displaying all or a portion of the data to the user. It means presentation of data in a particular format, triggered by a controller's decision to present the data. The view defines how the application data should be displayed. In the mobile portal, the view would define how the courses for registration by the students and the results are presented to the student, and receive the data to display from the model. It is use for effective handling of the mobile application graphical user interfaces and presentations.

7. Controller

This contains the software code that controls the interactions between the Model and View. The controller is responsible for responding to the user's input and perform interactions on the data model objects. The controller receives the input, it validates the input and then performs the business operation that modifies the state of the data model. The controller contains logic that updates the model and view in response to input from the users of the mobile application. For example, the mobile portal will have input forms and buttons that allow user to add or delete items. These actions require the model to be updated, so the input is sent to the controller, which then manipulates the model as appropriate, which then sends updated data to the view. The user might however also want to just update the view to display the data in a different format, e.g., change the courses order to alphabetical order, or lowest to highest unit of courses. In this case the controller could handle this directly without needing to update the model.

Separating a mobile application into these three distinct components is a good idea for a number of reasons, including:

- *Improved scalability:* This is the ability for an application to grow. For example, if the mobile application begins experiencing performance issues because database access is slow, you can upgrade the hardware running the database without other components being affected

- *Ease of maintenance*: Since the components have a low dependency on each other, making changes to one (to fix bugs or change functionality) does not affect another component. All the components are loosely coupled.
- *Reusability*: This pattern enable model to be reused by multiple views
- The Model-View-Controller pattern highly supports the separation of concerns. This advantage not only increases the testability of the code but it also makes it easier to extend, allowing a fairly easy implementation of new features.
- The Model classes don't have any reference to Android classes and are therefore straightforward to unit test. The Controller doesn't extend or implement any Android classes and should have a reference to an interface class of the View. In this way, unit testing of the Controller is also possible.
- If the Views respect the single responsibility principle then their role is just to update the Controller for every user event and just display data from the Model, without implementing any business logic. In this case, unit interface tests should be enough to cover the functionalities of the View.

8. Recommendations

The deployment of mobile portal will help to address the challenges faced while using web portal services. This paper recommends the use of this technology (mobile portal) in education sector. If any mobile portal must survive in achieving scalability, the parttern architecture provided in this paper should be adopted by software engineers. The full adoption of the architecture will simplify the task of mobile portal development.

9. Conclusion

The high demanding rate of mobile portal for many aspects of the economy and education inclusive is as a result of the problem associated with the web portal in delivering its services. Currently, many higher institutions of learning are managing their student's data using this platform (web platform). The architecture of the web is such that it is not effectively feasible for mobile phones capabilities. The need for mobile portal in managing student data is on the increase on daily basis, since the higher institutions of learning are managing large volume of student's data. Hence, there is need to have a better architecture in implementing this kind of portal. This paper has therefore provided a technical architecture that will enable developers in archiving scalable mobile portal for academic activities. Basically, the architecture provided is based on MVC pattern for easy development, management and maintenance of the mobile portal. This will help to achieve a scalable mobile portal. Pattern for developing system is a technical aspect of the system that is to be developed. If attention is not given to pattern in development, scalability will be difficult.

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