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Common Platform for Mobile Application

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Abstract – At present scenario the market is flooded with many Smart phones compatibility issues intended with Operating System, so the applications are not made in a manner to suite large mass. Till now the applications made were targeted to a particular Operating System only which restricted there usability. With the limitations of above in mind there is a need of a common platform for all the OS, so that an application can be developed in such a way that all the OS supports it. This paper presents the design and implementation of the Home automation system on two of the Operating System and creation of a unique XML document that can be placed over the server which can be adapted by any other mobile device without any platform issues. We have taken Home Automation system as our application, in which all the household devices such as Bulb, Fan, and AC etc. all are controlled by a smartphone which is connected to a server containing the XML file via an internet connection. Every change made by the user on the smartphone affects the data in the XML file of server, which thus helps in continuous updating of data and all other users get an updated status in their respective OS.

Keywords – Home Automation; Operating System; XML.

1. Introduction

The explosive growth in cellular mobile communication in the recent decade is changing the way people live and work. Mobile handsets today are essentially handheld computers with integrated communication capabilities. The handsets allow users to download and run applications. This opens the door for introducing a vast variety of functionalities to the mobile phone and making the mobile a real intelligent device. But even after immense work on mobile platform the compatibility factor is always a constraint. The constraint is the Operating System of the mobile device. This makes the application to be used in a particular operating system. It also refers to the version of an operating system. The main objective of this paper is to showcase a protocol which will be acting as a common platform between different mobile OS and running the same application efficiently without operating system platform limitations [19].

2. The APP (Application)

When we talk of an APP (Application) in a Smartphone it creates a hype in the mind of developers as well as the users as it gives the highest opportunity to both of them to get proper feedback and review as it is monitored properly by the respective APP markets. So when we talk about an APP for this unique idea it should be such that many users are simultaneously using an application and are continuously changing its content. So keeping the above thing in mind we are implementing this on the Home automation system. Home automation allows the controlling and monitoring of various home appliances by a single system and brings greater convenience, better

security, as well as higher energy-efficiency to home users. The home appliances are controlled by the home server, which operates according to the user commands received from the mobile phone via the internet as a communication medium. A key to the home automation system is the capability for remote operation.

3. Previous Systems

Considerable efforts have been put into the development of remote control systems for home automation. Earlier systems are mainly based on the use of telephone line, such as a phone-based system for home automation using a hardware-based remote Controller [1][2], and a personal computer [3]. The Above systems make use of the telephone as the remote control input device and have no any friendly user interface. With the proliferation of Internet, various Internet-based remote control architectures for home automation have been proposed [4]-[8]. These systems rely on the Internet as the medium for communication and generally feature friendly graphical user interfaces. The Internet-based approach requires a home server running on an Internet-connected personal computer all the time.

3. Present Systems

The present system for this application has been through WAP (Wireless Application Protocol) in some countries and the latest in this field was in 2011 by Arabic company e-home automation [15] where they provided the feature of home automation through iphone but again if we see there is a restriction of buying a high end Smartphone for this application

In our proposed system the home server is built upon a separate Server, which will have the repository of the

XML files intended to the operating system and the version being used. It also takes into the account the different screen size and resolution functionalities allowing a user to control and monitor any variables related to the home by using any smart phone.

4.1 Basic Methodology

To understand the basic methodology it is important to understand where this common protocol can be placed in order to achieve this universality of this application.

For this we have taken the help of the Mobile Strategy pyramid [14] which discloses following information about mobile device functionality. This pyramid is a graphic representation of how the complex world of mobile interacts together and where the various types of products and services can be placed in importance relative to other options.
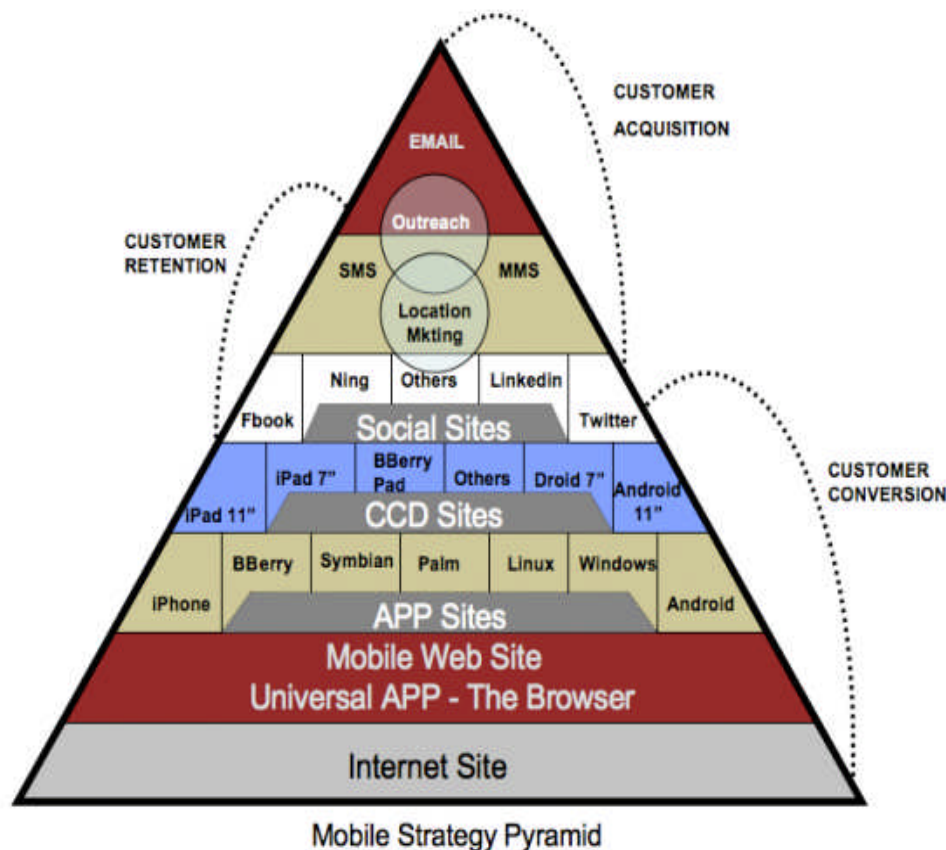

Fig1. Mobile Strategy Pyramid

If we observe the Browser brick from the above pyramid it is clear that we can target all the OS simultaneously because this is the platform which is before all the OS and after the Internet medium. The pyramid above gives us a clear picture about where our APP should be placed in order to achieve cross platform issue and also to generate 10 times faster revenue by targeting multiple Os and multiple versions of the OS.

4.2 Basic Architecture

This methodology is achieved through application of the following principles:

- The application functionality is delivered to the mobile device through an internet protocol thus enabling all web-enabled smartphones to universally access the application.

- Applications are hosted on server hence all processing for the mobile device is performed on the back-end server.
- The client intended application provides maximum level of functionality and computing power. The mobile client application works in tandem with the interface bringing mobile-relevant functionality to the user.
- The Application is developed on Java and XML. Therefore, it is platform independent and capable of running on any platform. The core power of this whole paper is XML it is the crux of our project as XML is the transporting medium of data among the different OS.

We have currently implemented this in different versions of Android Operating system and Blackberry OS. With two different Operating Systems using the same application functionality it will update the server with the latest status of the application.

Fig2. Basic architecture of overall system

4.3 Why XML

- Storage and transportation of data.
- Common for all platforms.
- Extensibility.
- Enables cross platform integration and interoperability.

5. System Tech-Specs

5.1. Smartphones

The mobile phone (Smartphone) is the interface between the user and the home automation system. It has two tasks:

1. Providing a user-friendly interface for the user to input control commands and view system's feedback.
2. Sending user commands to and receiving system's feedback from the home server.

An Android and Blackberry based Smartphone with enabled internet is chosen in our design due to the portability of Java and the fast increasing popularity of android and Blackberry enabled mobiles. Another Operating system with which we are working is iOS, the most advanced operating system designed by Apple Inc. The use of Blackberry makes work simple as the base is Java for developing purpose, so the logic will remain same. The portability of Java ensures that applications developed in Java language are portable across different mobiles from different manufacturers.

Since Android has a rich library of application program interfaces (API) providing functions such as graphical user interface, sending and receiving SMS messages, and communicating via GPRS, etc., Android applications for mobile phones can be easily developed by using Android development tools commonly known as

ADT. In addition, phone manufactures provide their respective handset emulators for developers to test their applications on before testing on real phones.

The major reason behind choosing Android and Blackberry as the preferred are due to the market share they have achieved. The activity classification feature and synchronizing features make them outstanding in the field of smartphones.

5.2 Virtual Scenario

The working of the home automation using UMAD is as follows:

- A house will be fully home automated on a press of a button like locking doors, ON/OFF Tube lights and Bulbs, Fans, TV, AC etc.
- The house members residing in this house may have different smartphones of different companies (Here we are referring to different platforms).
- Our application can be installed on every smart phone device through different mobile manufacturers online markets once deployed otherwise directly by transferring .apk file for Android and .jad file for Blackberry.
- These phones have to connect to the server for the first time to give the details of all the attributes of the particular smart phone device relating to the screen size and resolution to fit the application GUI perfectly.
- After verification application is downloaded on the Smartphone with the latest updates available.
- Now the house members can start using this application through which they can toggle the functions of all the home automation and can also get the latest update of the house where they can track the activities of other members.
- Every change made is written back on the server so that the server gets updated instantly and this will

also give the latest status to all the house members (Clients) simultaneously.

- The client application present on the mobile will only have code to download and parse xml file on to Sdcard, and will return back the unique identification number of the components (Button, Image List, Checkbox etc.) to the server.
- The server will read the unique id and accordingly will make the changes in the server xml as all functionality is provided on the server side.

- This feature will revolutionize the home automation industry as all functionality will be implemented on the server and the changes made will affect the xml file on server.
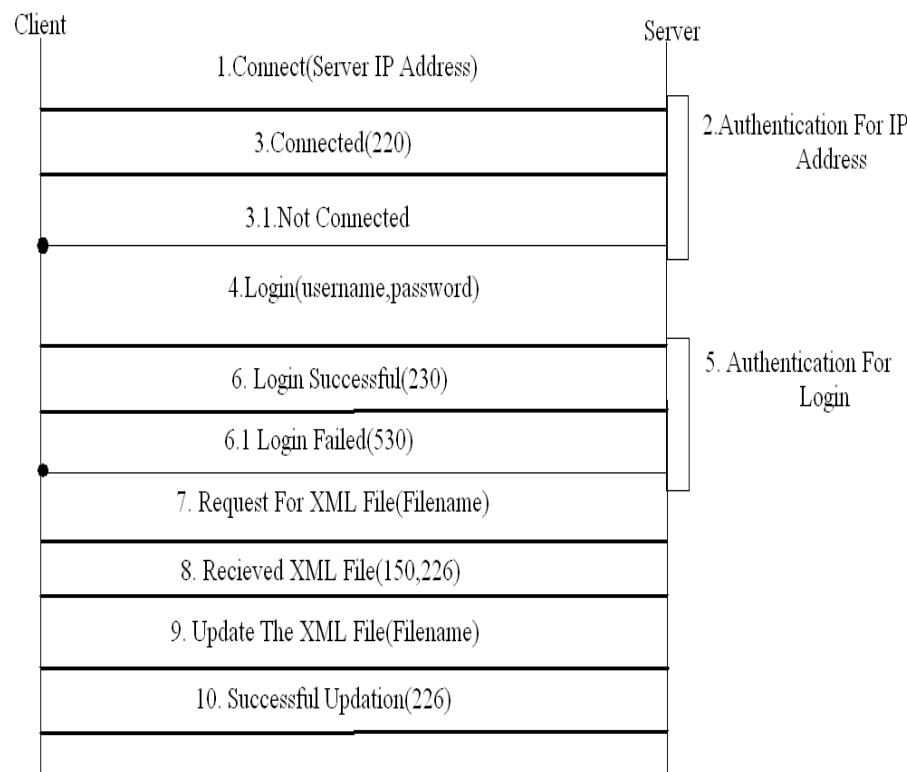
6. The Protocol Documentation

Fig3. Protocol implementation

The protocol designed above describes the overall working of the whole platform between client and server. The clients here are the multiple users having different OS and the server contains a resource of XML files.

According to the above communication diagram there is a client and a server and all the actions and reactions i.e. the request is recorded and shown in a sequenced manner.

According to the above diagram the client gets connected to the server using the host address and the server authenticates the user. The user is given extra feature of security by providing username and password. This again is checked by the server and a proper security is maintained. Now after successful connection establishments the user can request for the latest XML file i.e. the main XML file which will be the updated one. The server will provide the required XML file and the respective client will download it. After getting the latest file the client may apply certain changes in the XML and it will send the updates to the server and all the changes are updated again in the main server and all the upcoming clients will download this XML file only.

Another breakthrough to this protocol will be the notification to the clients when a certain part of the application is changed or when the client intends to add certain appliances to the old system it can be easily updated using this versioning system.

7. Hardware Interface

As for Home Automation application the hardware requirement is basically a Smartphone with a server placed at a backend. A hardware which will communicate with the home appliances will be placed inside the house which will listen to the instructions from Smartphone and accordingly will take necessary action. This hardware is nothing but the Hardware Modulator, which will have the function of reading the server commands and connecting to the hardware devices in response of which the devices will do the appropriate function.

For e.g.: If user switch On the bulb then he will click the required button on the Smartphone and that will give a message to the Server which will command the Hardware Modulator to switch on the bulb. Our

main focus is on the software part and which will provide the interfaces to execute these functions. The Hardware Modulator which is already present in the market will be just an extension as a connecting device.

When it comes to hardware PRO -100 from Zigbee is the most efficient as it provides all the hardware interfaces to the software through its protocols.

8. Advantages

- Cross-platform mobile frameworks being open source has support from a large community of developers.
- Increases sales/profits.
- Augments the brand like never before.
- Users can have access the apps from various places instead of one.
- Once written, used everywhere coding of app – saves lot of development time.
- Distribute same app to a huge user base.
- Achieve more diversity on different app development platforms.
- Get option of integrating native features of smartphones/mobiles.

- User can now buy app once and use it on any mobile or web platform that supports it.

9. Screenshots

Here are some of the screen shots that explain the working of the overall system. These screenshots have been attempted in two OS i.e. one on Android and the other on Blackberry.

Fig 4 is the starting page of the application where the User/Client gets connected to the Server using a host Address i.e. the IP Address which will be provided to the users through e-mail notification. This IP address will Authenticate the user for further access. The Fig 5 comes with an extra feature of authenticating the appropriate user. The username and password can be created by a specific user to provide more security to the overall application.

Fig 6 and Fig 7 gives the dynamic GUI of the application. The list generated is nothing but a XML parsed file which is common for all the OS. The list entails the details about the respective rooms and then the respective appliances of the rooms.
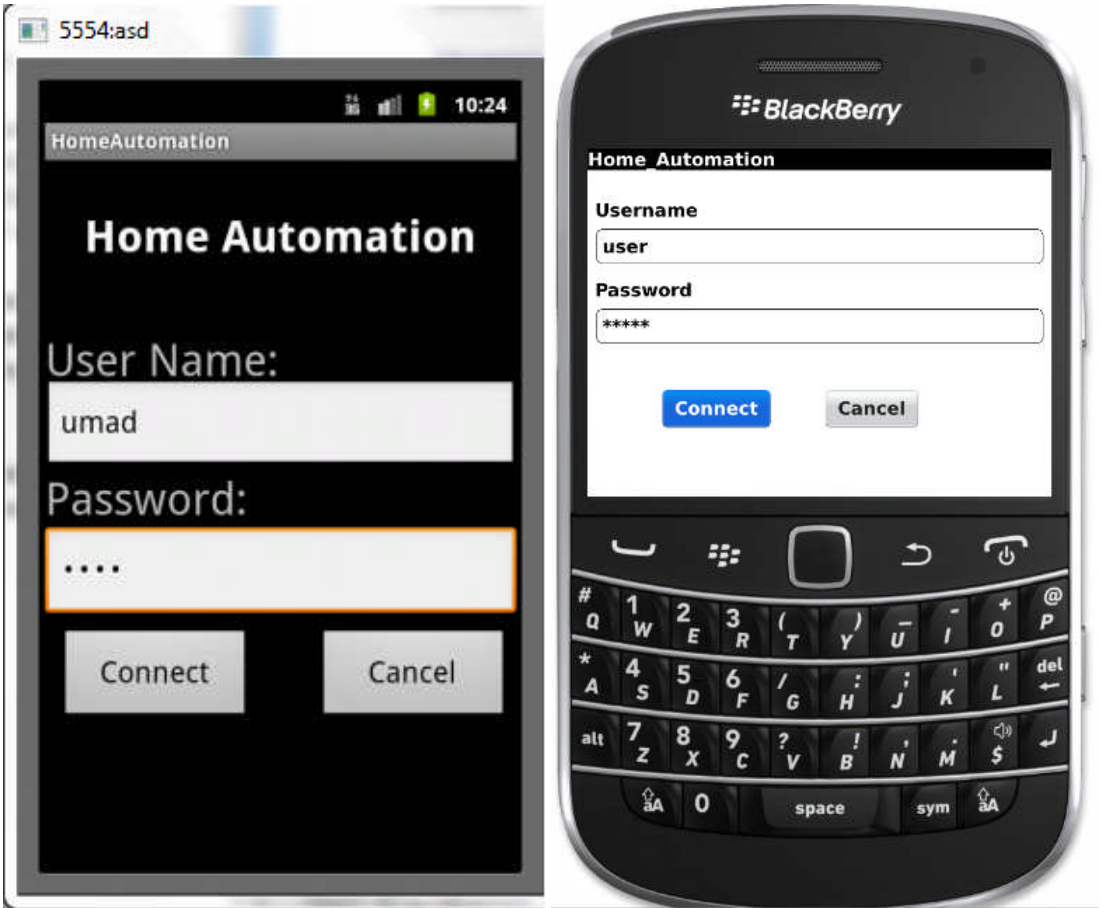

Fig4. Provide Host IP address

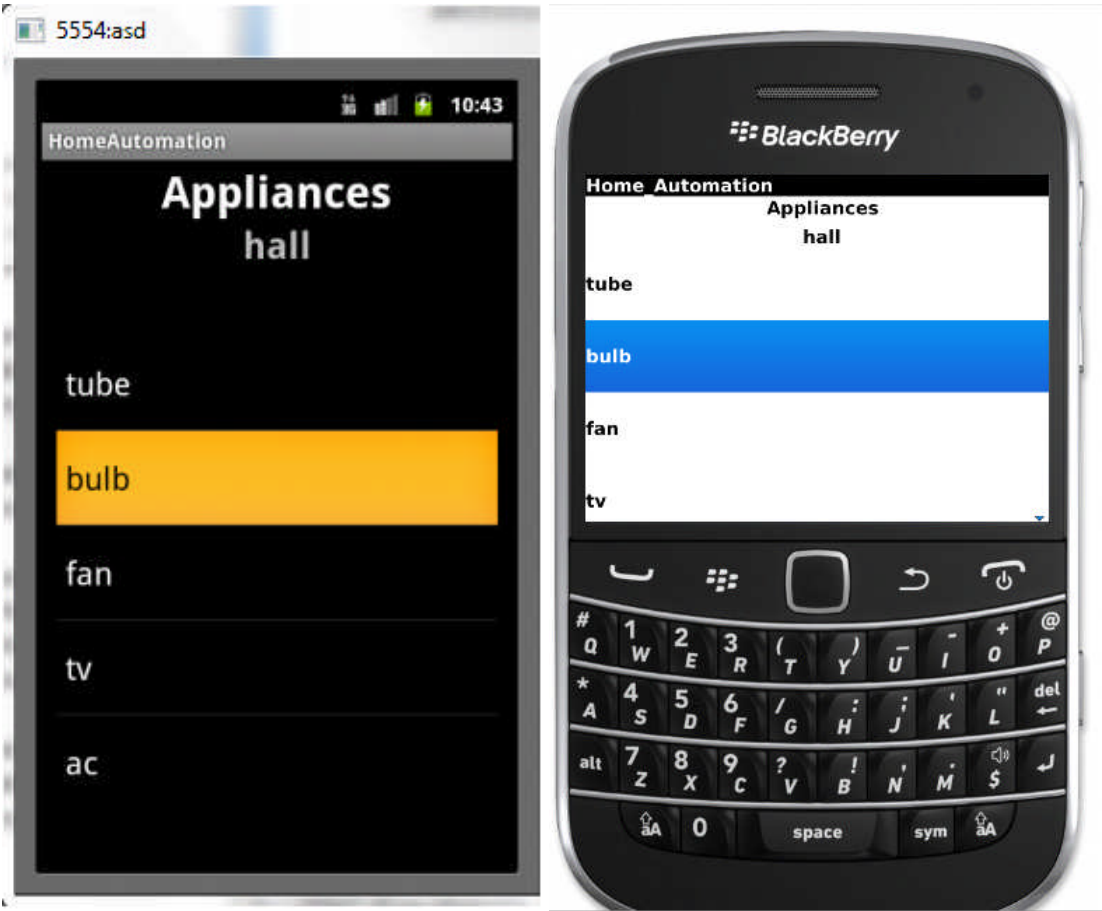Fig5. Login Page

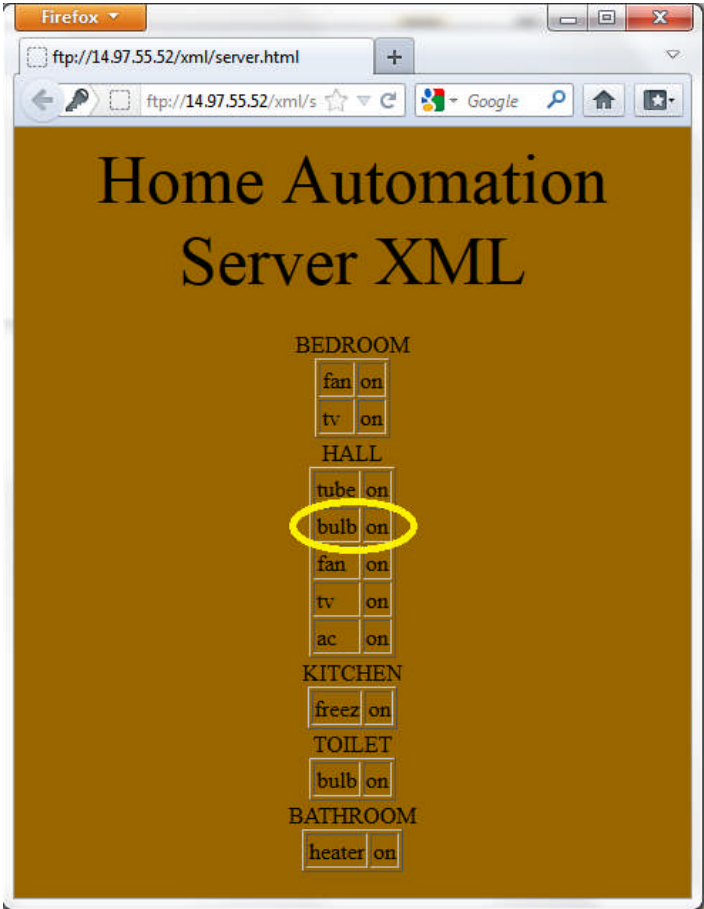Fig6. XML parsed and dynamic GUI

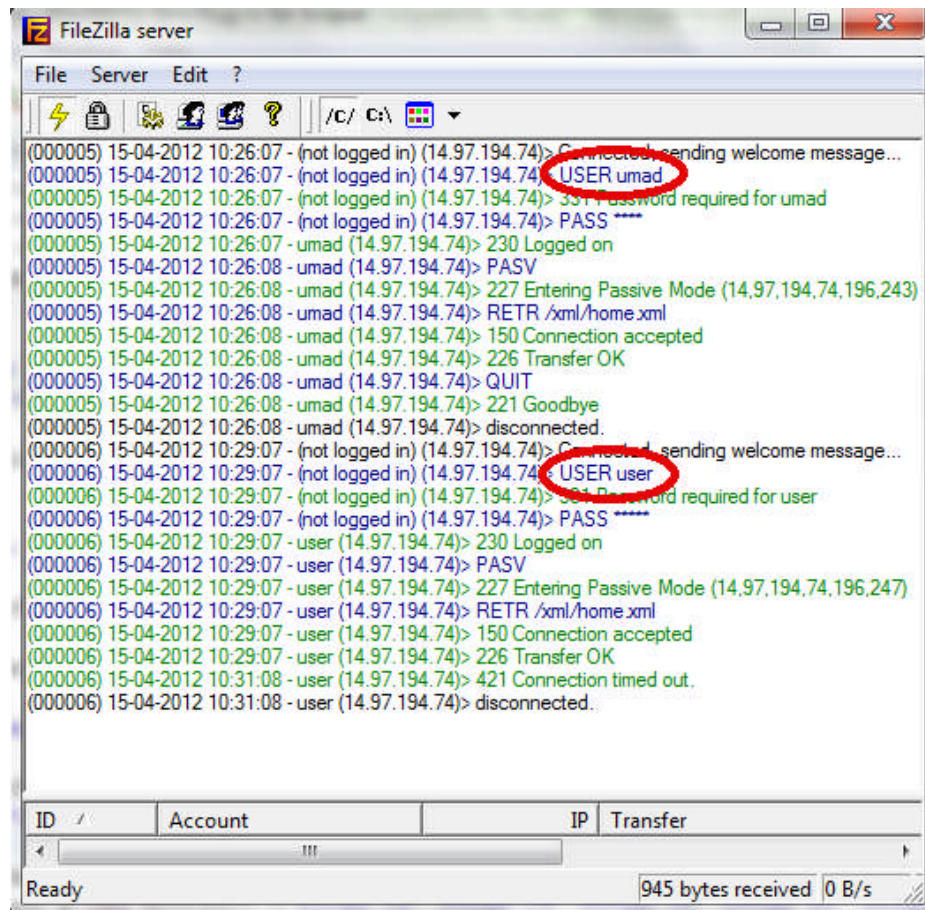Fig7. XML parsed and dynamic GUI

Fig8. Server XML page

Fig9. Filezilla Server showing two different user login for downloading XML files from the server.

Fig10. Toggle button status is read from XML and a GUI is created.

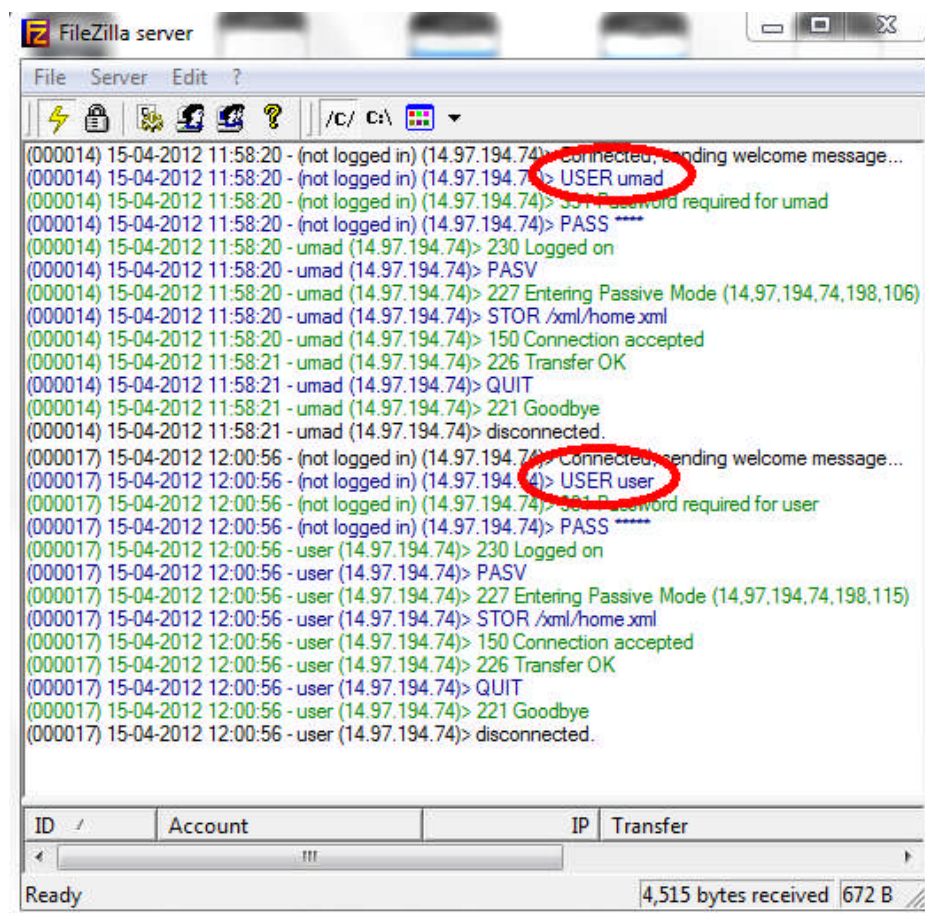Fig11. Status changed by clicking the button and it is updated on server.

Fig12. Filezilla Server showing two different user login for updating XML files on the server.
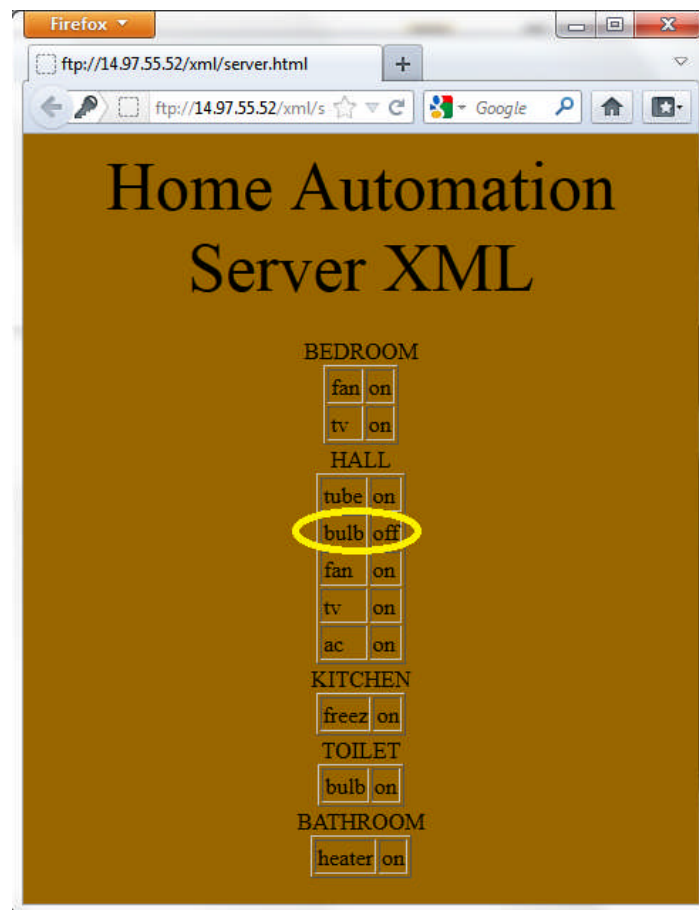
Fig13. Server XML is updated

In Fig 8 the server contains a user interface for having a check of all the updated XML files in the repository.

Fig 9 describes the user activity which is monitored through Filezilla which comes along with Xampp. The following figure shows clearly the activity of two users namely 'user' and 'umad' one an Android client and the other Blackberry client. Both the users access the application by downloading the XML file and update the changes in the file and this is reflected in the Filezilla. With this we also extend our feature of creating logs of different user activities.

Fig 10 and Fig 11 shows the proper view of dynamic updation. As we see in the Fig 8 the updated status of the appliance bulb is ON. So the user in the Fig 10 gets the result in the GUI format as shown, now the both the users try to OFF the appliance and the XML file takes the updated result to the server and the updates are committed based on the last activity of the user.

In the Fig 12 we see the Filezilla where we can see the updation of the XML file. Again we can observe the two users activity from different OS performing the same function.

Fig 13 shows us clearly how the bulb appliance has been updated in the server.

The above describes our working model of the same application on two different OS platform. If this particular is achieved that makes sure that this can be implemented in all the OS available on earth making the functionality of an app universal.

10. Future Work

- The work on Android and Blackberry is done and it is also feasible on iOS. The XML will remain the same in the entire context. If this particular is possible on two platforms it opens the market to all as all the OS, as the crux is the transport of dynamism provided by the XML files. This makes it all platform compatible in a very near future.
- As the application we are developing is wholly internet based the server functionality can be put in cloud which makes sense as it gives faster access and saves the cost of maintaining the servers also. So Cloud Computing can be used for cost effectiveness and maintenance benefits.
- 3G and 4G network will improve server response time.
- Smartphone's with higher processor speed and RAM will speed up the overall process.

11. Conclusion

The design and implementation of a novel mobile-based home automation system without Operating System Constraint is presented. The design consists of a mobile phone with Android and Blackberry applications, a cellular modem, and a microcontroller (basically the Hardware). The home appliances are controlled by the microcontroller, which operates according to the user commands received from the mobile phone via the modem. Such a design transforms a mobile phone into a

portable remote controller for home automation. It is noted that the proposed system is not restricted to home automation, it can be applied directly to remote control of many industrial devices.

12. Acknowledgement

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