A Remote Test Platform for Mobile Application

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***Abstract*—In this paper, a system is proposed to provide a remote test platform for mobile application. The launch of devices and up gradation of the operating system, sustaining and enhancing mobile applications have become time-consuming and expensive for enterprises. It is difficult to estimate a mobile application to work as expected on so many mobile phones in the market. Due to the limited budget, most of the development teams may not have enough testing phones. But under market pressure, the applications have to be launched on time. To overcome this, a unique cloud-based remote testing platform introduced to facilitate testing on any mobile application on multiple platforms and devices. This project provides platform for mobile 0S including IOS, Windows Phone and Android. This platform helps clients streamline their testing processes, reduce capital expenditure and ensure compatibility with various device types and platforms. The operation process contains automated test scripts that will be executed on different mobile phones to improve testing efficiency. By using this proposed system, we can provide a remote test platform which reduces the cost of buying many mobile phones and improve mobile application testing efficiency, quality and reliability.**

***Keywords*—A remote test platform, mobile application, remote testing, cloud testing.**

I. INTRODUCTION

There are approximately seven billion mobile subscriptions worldwide, as estimated by the International Telecommunication Union, investing in and developing mobile applications has become essential for organizations [2]. The adoption of the mobile application is increasing at an enormous rate due to their advanced functionality and features. However, it is challenging for these organizations to manage and maintain an inventory of devices required for testing these mobile applications [1].

To address this problem, this project offers a cloud-based remote testing platform for testing mobile applications across various physical device types, platforms (iOS, Android, and Windows Phone). In this project, clients can enjoy the flexibility of remotely connecting to this platform anytime. It also allows configuring and controlling devices remotely to test scenarios that may require hard keys, soft keys or screen interaction on the device.

The platform can be used to run both manual and automated test scenarios. There are many features that are provided by this proposed system, like mirroring android devices, monitoring CPU, checking memory logs, device control, app control etc. It is intuitive, easy to use and can help clients reduce capital expenditure.

II. LITERATURE SURVEY

This chapter includes the study and research of the document related to the project. Theoretical base is needed to implement the project in a successful way reaching all objectives. This literature is taken from related articles, journals, newspapers, internet and books.

It is a great revolution in the global world that remote testing of the application on a variety of devices (i.e. Smartphone) with different platforms is possible. There are many cloud testing services which provide software testing [5] [6] and mobile applications. Most of these services provide remote access to smartphones in order to accomplish their testing (Keynote Device Anywhere, 2013) [7] [8]. But the quality of testing fails like the remote app does not work on some machines. Among them, we provide optimum features for remote test platform for mobile application.

Interest in critical mobile applications that require high-level reliability and stability is growing rapidly. Smartphones are used for many purposes, but few applications require high security, stability and need prompt reply like online banking (State Bank of India), notifications on hurricanes [3], voice detection, monitoring cardiac patients and traffic monitoring. To ensure the mobile applications' reliability and security, sufficient testing is required on a variety of phones as well as on different platforms [4].
Adequately testing on all these platforms is too expensive for small resource-constrained mobile development companies. The idea is to create a unique cloud-based remote testing platform to facilitate mobile application to test on multiple platforms and devices. The proposed framework is based on a system that connects operational

computers, mobile devices, and databases with applications. This framework is presented as a combination of hardware (smartphones) and software (applications) that allows for different testing methods. For example, it is possible to test a new smartphone for its compatibility with mobile applications and also to test a new application on different smartphones.

III. HARDWARE IMPLEMENTATION

This chapter provides a brief explanation of system architecture, working procedure and various hardware components used in the project.

A. System Architecture

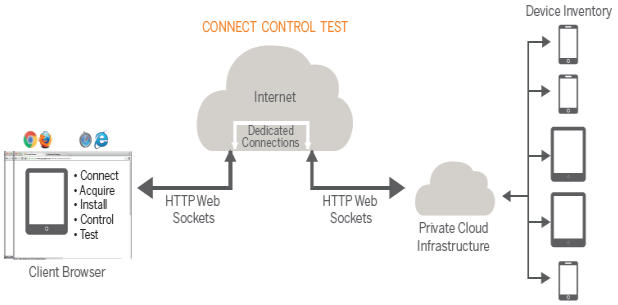

Figure 1 Block Diagram

This proposed system provides cloud server, governor node server, main node server, a PC on the client side and a device inventory.

On the client side, this system provides flexibility for the client to access the device from any location. No need to procure device hardware or maintain inventory. We can install the application and test on various devices remotely. On the server side, it provides high-end severer, huge inventory of devices, dedicated connection with high speed and private cloud infrastructure with redundant backup power supply. The Private cloud infrastructure used for security and data encapsulation, so that devices using the application are not corrupted.

B. Device inventory

The platform has vast device inventory that is updated as and when new devices are introduced to the market. Both android device inventory and iOS device inventory are maintained. These smartphones are connected to the server via USB cables. Android phones with version 4.3 or above are supported. iOS device inventory includes iPhones, iPads, etc… This proposed system provides centralized device inventory database.

C. Main Node Server

Main node Server is primary application server which is connected to Database server. The system maintains a backup server for redundancy. It requires a PC with configuration as following:

1. OS: Windows 7
2. RAM: 4 GB minimum
3. Memory: 30 GB minimum
4. Processor: i5 or above

D. Governor Node Server

Governor Node is close to device inventory, as the devices are directly connected to the server. These devices are connected to the server via SB cable using ADB framework. It requires a PC with the following configuration:

1. OS: Windows 7
2. RAM: 8GB minimum
3. Memory: 30GB minimum
4. Processor: i5 or above

E. Topology

The system topology includes all the network setup from remote client location to the device inventory.

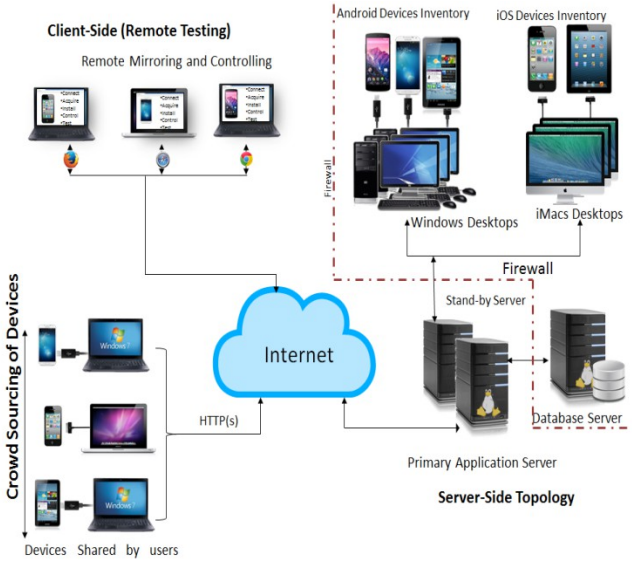

Figure 2 Network Topology

Remote mirroring and controlling of the real devices is done on the client side. Crowd sourcing of devices is additional feature provided by the proposed system. A device inventory is maintained with Governor Node connected directly via USB cables. In the above figure a primary application server is maintained, which is connected to internet. A database server is connected to the primary server. Stand-by server is provided for redundancy. This primary server is connected to real devices via Governor Node. Governor Node requires high configuration systems to process the data and forward to main node.

F. Crowd Sourcing of devices

Crowd sourcing of devices is the additional feature of the proposed system. In this scenario Clients have the flexibility to connect their own devices to the network (on client side), so as to test application on it. This feature makes the user to have two kinds of facilities. First instance device selection. Next step is to test the performance of brand new device (product yet to release in market) on various applications. This feature extends the device inventory on client location.

G. Working Procedure

System implementation includes all the devices used in the project, combining and establishing communication between them. Initially, launch the remote test platform portal from PC then sign-up as the user. Later sign-in with username and password. A screen appears with Dashboard mentioned with "select a device".

Search the device by typing the device name at the top left of the screen and select the device. After selection of the device, a pop-up window appears. Select the group name and allocation time. Once the device is allocated, you can see two options "release "and "stop". "Release button" will help you to release the device in between. "Stop button" will stop your allocation time and will allow other users to use the device.

There are various android device controls of the phone visible on the screen like volume, zoom, lock, reboot, menu, etc... Complete phone mirroring is done. You can avail full device features like call, SMS, video etc... Performance overview of the app installed on your device can be checked by clicking on the monitor option. Performance overview includes logs, CPU, and memory utilization. This system provides two kinds of testing. Automation testing uses scripts and manual testing is done by the user. After you complete an "Automated" test, you can replay, view, download your test results in the same way you do for the manual test.

System generated logs/graphs are compared with the expected outputs given by users, using Galen layout comparison test. After that application developer will analyze the reports and release the application in the market.

IV. FIRMWARE IMPLEMENTATION

Firmware implementation deals with developing, debugging and configuring of source code. To control the operation of hardware, software implementation is required. There are many software tools used in this project. They are:

1. MySQL
2. JDK
3. Android SDK
4. Wildfly
5. Node.js
6. .Net Framework

MySQL is used for installing database on Main Node server with version 5.6. JDK is used for configuring Java. Android SDK is used for android device support in remote test platform like ADB tool. Wildfly is used for setting-up Main Node and Governor Node Server. Node.js and .Net Framework is used for automation setup & Database.

V. RESULTS

The implementation of "Remote test platform for mobile application" is done successfully. A cloud-based remote testing platform is introduced to facilitate testing any mobile application on multiple platforms and devices remotely. The setup was successfully done and the Software tools like MySQL, JDK, Android SDK and .Net Framework were used in the project. The Server nodes were maintained with continuous power supply and backup nodes. The remote access of the real devices from client side is shown in the figure 3. System generated logs/graphs are compared with the expected outputs given by users, using Galen layout comparison test.

Figure 3 Remote monitoring and controlling of devices on browser

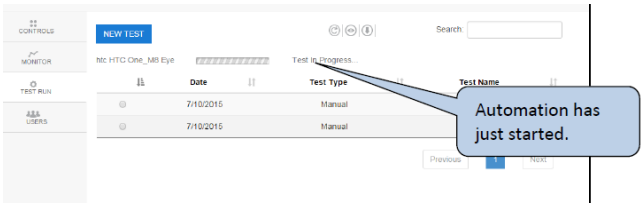

Figure 4. Test run appliation on the real devices

Figure5. CPU utilization by application

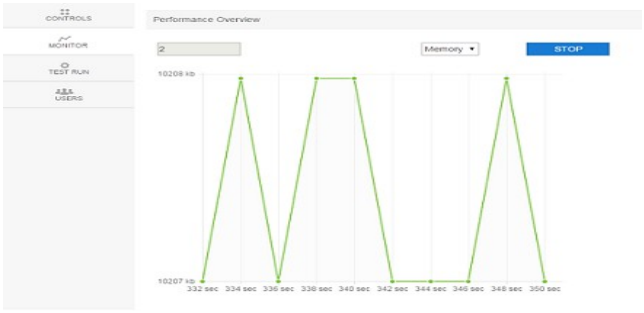

Figure6. Memory utilization of application

VI. CONCLUSION AND FUTURE SCOPE

A. *Conclusion.*

The remote test platform for mobile application on various real devices has been successfully tested and implemented. The proposed system gains many advantages over traditional systems of remote testing. This system provides an inventory of devices required for testing the mobile applications. The platform supports testing of applications across iOS, Android, and Windows Phone OS. This also supports tests related to the audio application. It provides low cost, low latency, high availability of servers, dedicated devices, good reliability and the perfect choice for the application developers to test their product.

B. *Future Scope*

The Remote testing platform for mobile application can be made more reliable by increasing the level of security at the dedicated servers and improve the testing of applications by adding additional features.

C. *Advantages.*

The advantages are:

1. Reduced capital expenditure for application development companies.
2. High availability of server 24/7.
3. Helps the application developers to launch the product faster in the market.
4. Low latency.
5. Dedicated connection near servers.
6. Dedicated device inventory.

D. *Applications.*

This project has a wide range of applications. Among them few are:

1. This project is a boon for application development companies. As it reduces the burden of cost, time and manpower.
2. This idea helps the mobile manufacturers to test the performance of new product before releasing. As the device is tested with various applications. Helps to increase the quality, stability and reliability of the product.

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