Unique Challenges in Mobile Applications testing - Testing Strategy.

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Abstract: The tremendous growth of mobile devices and various mobile operating systems has increased the demand for organizations to develop mobile applications. The development and delivery of mobile applications must be quicker to competitive market with innovative solutions. To test such applications and ascertain the complex functionality is tested on all mobile platforms the need for resources for computing should be identified. Diversity in platforms and OS presents unique challenges that require unique testing approaches and practices to be followed in any organizations. Hence the challenges and current solutions in mobile testing should be identified and analyzed with the available options from the various service providers. The requirements, challenges and options available for Mobile applications testing should be analyzed to meet the quicker development, continuous integrated and tested piece of code available in the market for end user in competitive world.

Keywords: Testing approaches, Unique testing, Mobile applications, Mobile testing, Challenges.

INTRODUCTION

In today's competitive world, Organizations of small, medium and large sizes and various categories and sectors are interested to migrate their business to Mobile world. They are interested to provide their customers with easy to use mobile applications of all sizes to be made available for all ages with the intention to increase their business by serving the daily needs from individual need to organization need. Hence Mobile devices are gaining momentum.

Mobile applications offer great advantages apart from basic need of making phone calls.

1) Games for all ages.
2) Booking a cab and tracking your vehicle
3) Preparation for students' examinations
4) Order medicines and get it delivered online
5) Sales manager tracking their sales and product available in store by working remotely
6) Manufacturer getting orders online.

Mobile devices of all categories from multiple companies are available in market—smart phones, PDAs, cell phones and specialized devices to track logistics that is GPS enabled and special scanning devices.

With multiple options of mobile devices and support for various Operating Systems with various screen resolutions and features provided, there is a demand for

Information Technology to build, integrate, test, deploy it to clients quickly which increases the risk of quality and performance factors.

TYPES OF MOBILE BUSINESS APPLICATIONS
Mobile business applications can be classified as:
Standalone applications: After the software is installed in the device, they do not need any interference with server and can be operated standalone. And as and when needed, it can be synchronized with server in case of application dealing with business. Some applications like games can be played standalones.
Enterprise applications: These applications are mostly used in transactions that interacts with the servers that of cooperate computing environment. such applications interface with external systems through Wireless Application Protocol (WAP), secured protocols (Https) or unsecured Protocol (HTTP).
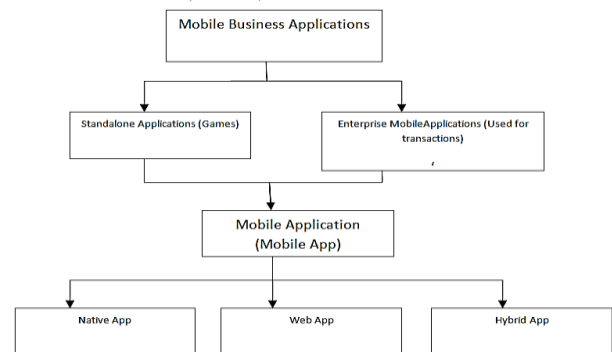
TYPES OF MOBILE APPLICATIONS

Mobile apps are small, self-explained programs used to improvecurrent functionality, always in a simple, improved and end user-friendly way. Today's smart phone comes with powerful web browsers where anything can be done on in a phone's browser like a computer or a laptop. apps mostlyrefer to programs that run on Smart phones or Tablet Computers. In today's world, hundreds of apps of various categories are being develop and delivered in app store or play store There is thousands of apps available under different categories. Nowadays there are apps for everything. Like checking up the weather report, breaking news, playing games, ordering food, chatting with friends,booking Bus tickets, ordering medicines, fixing doctor's appointments. Most applications work as stand alone, and some tools use other tools to provide the report. For example, a sales person plans his trips for site visit for a day and records all the orders that he has collected for the day through the app from mobile devices while offline, and then communicating to Backend serverfrom the phone and the allowing his supervisor to have the final report by connecting through internet. Some apps can be used to control digital recorders through GPS through satellite systems without the need of Internet. Apps that are used to control devices at home sitting from office location.

What is Mobile App?

Mobile apps are isolated piece of code that can function independently. each app provides limited and isolated functionality such as game, calculator, calendars, video players etc. Mobile App due to its feature of small, independent functional unit with limited resource capacity, it has the limitations in its functionality when compared to desktop application.

There are different types of Apps:
- Web App
- Native App
- Hybrid App

Native App

Native App is specifically designed on a platform or device with its own limitations. Native Apps are the software or feature provided by the platform, such mobile apps will have good performance and can be reliable. Native app will mostly access phone's camera, contacts, alarms, music players etc. this type of app easy to develop but expensive as it is more relevant to that particular operating system, and companies to directly use the versions. Most video games are native mobile apps. such features would be regularly being updated and maintained by the OS providers.

Native App is a program that runs on a one type of devices of a respective Operating system like Android, iOS, windows, Symbian, webOSetc, which has a "smart" operating system which supports standalone software and can connect the internet via WAP protocol. Usually people download native mobile apps from app stores such as the apple app store or the Android play store. If user wants to make a particular app experience available to other OS users, that piece of code has to be developed separately and maintained. That gets complicated and expensive. Companies that are looking to promote themselves to the Smartphone market have other options beyond native mobile apps:

- Hybrid App: This type of application has cross-platform compatibility but can still access a phone's hardware. It is developed using platforms such as Sencha, PhoneGap and Mosync.
- Dedicated Web App: A website that is maintained to function on a dedicated mobile device. Such apps would only work on a specific platform will not be supported on others.
- Generic Mobile App: AnApp that would work across all Mobile phones of various platforms.

Web App

Web App stored on a remote server needs internet connectivity to be delivered through a browser. Web apps are rendered fromwebsites that when executed in browsers. In contrast, a mobile web app is software that providesend to end navigation across application to perform a complete task. Suchapplication can be executed through mobile web browser. Such applications are dependant programs whichis not stored in internal mobile device. With latest technologies used to develop app, It has been difficult to differentiate between mobile App and Web App. Mobile web browsers are fully and partially available by the OS providers.

Hybrid App

Hybrid Apps can be run as native apps which uses the device's browser engine. Hybrid, isabstract from multiple sources. A hybrid app shares the technology to implement both mobile and Web. It is the combination of web technology and native components.

Most of the companies develop Hybrid application which allows cross-platform development to reduce the development costs which allows people to code across multiple platforms.

Mobile Platforms
A mobile application platform provides tools and middleware for developing, integrating, testing, deploying and maintenance of software on mobile devices. Mobile application testing is the process by which applications are tested in various mobile devices on various platforms. These applications are either pre-installed on phones during manufacture, or installed from app storesor other software providers. In order to make this application reach the customers, supporting platforms should be analyzed and selected.

The popular mobile application platforms available in present market are
- Android
- iOS
- Windows 10 Mobile

Cross –Platform Mobile Applications
Creating a mobile application is important for every business. However, getting a mobile application that is suitable for every platform is an important ingredient for success. Cross platform apps are developed and services provided for customers.
Cross-Platform Mobile Application Development is also known as Multi-Platform. It which will support majorOS providers

Benefits of Cross-Platform Mobile Application Development:
- Code Re-usability and service availability
- Availability of Plug-ins and faster to market
- Easy to develop and simple to Use
- Cost effective quick ROI
- Quick Solution
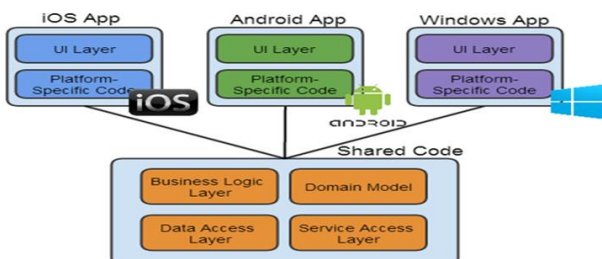
Importance of Mobile Application Testing
Mobile Application testing is like any other application testing. Not only the functional requirements of app are tested, also hardware compatibility of the mobile under test should be tested such as internal processors, internal hardware, screen sizes, resolution, space or memory, camera, radio, Bluetooth, WIFI etc.

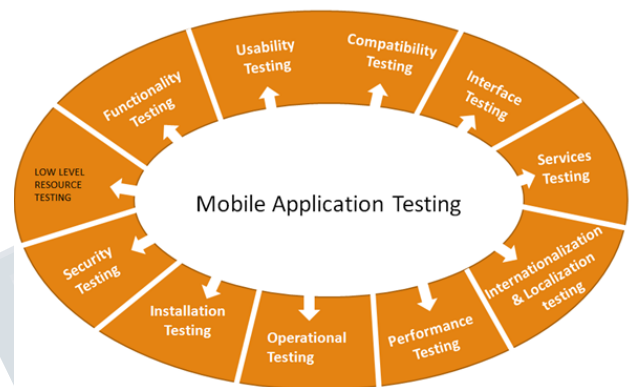### Types of Mobile Application testing

Fig 2.1(a)Parameters of Mobile Application Testing

The critical factors that determine the success of a mobile testing program are:
- Use of test automation
- Use of emulators and actual devices
- Testing for mobile environment and application complexity

Fig 2.1(c)

Unique Challenges in Mobile Application Testing:
Testing applications on mobile devices is more challenging than testing web apps on a challenge due to
- Different range of mobile devices
- Wide varieties of mobile devices
- Different mobile operating systems

➢ Different versions of operation systems
➢ Different mobile network operators
➢ Frequent updates

Critical Challenges to be considered during Mobile Application Testing

Mobile business applications can be classified into standalone applications and enterprise applications. Standalone applications reside in the device and do not interface with external systems. Conversely, enterprise applications are built to perform resource-intensive transactions that are typical of corporate computing environments. Enterprise applications also interface with external systems through Wireless Application Protocol (WAP) or Hyper Text Transfer Protocol (HTTP).

The unique challenges in testing mobile applications arise from the diversity of the device environment, hardware and networking considerations, and Rapid Application Development (RAD) methodologies. These challenges are outlined below:

Diversity of the Device Environment

The realm of mobile computing is composed of various types of mobile devices and underlying software (hundreds of device types, more than 40 mobile browsers). Some of the unique challenges involved in mobile testing because of this condition are:
Rendering of images and positioning of elements on the screen may be unsuitable in some devices due to the difference in display sizes across mobile devices and models. Exhaustive testing of user interfaces is necessary to ensure compatibility of the application.

Rapid Application Development (RAD) Methodologies

To deliver the benefits of faster time to market, RAD environments are used for mobile application development. Since the time taken for development is reduced by the introduction of RAD tools, builds will be available for testing much earlier. Therefore, a RAD methodology imposes an indirect pressure on testing teams to reduce the testing cycle time without compromising quality and coverage.

Hardware Configuration & Network related Challenges

The mobile environment offers lesser memory and processing power for computing when compared with the traditional PC environment. the drawbacks of diverse hardware configurations and the network landscape of mobile devices are:

➢ Limitations in processing speed and memory size
➢ Communication protocols (WAP, Http)
➢ Network latency.
➢ Gateways as data optimizers

Mobile Application Testing Strategy

1) Selection of the devices – devices should be selected as per the market demand.
2) Emulators – to be used during developmentand testing
3) Physical devices: to test the actual app as an end user, and to do real time scenario testing like field testing.
4) Cloud based testing: Hardware is provided by third party, and devices are available in virtual environment,
5) Automation vs. Manual testing: it is always recommended to go for manual testing when the code is under development and features and functionalities are not stable. And automated testing on stable code and during iterative testing to get more ROI.
6) Validate the application on different networks andbandwidth.

The critical factors that determine the success of a mobile testing program are:
➢ Use of test automation
➢ Use of emulators and actual devices
➢ Testing for mobile environment
➢ Application complexity

NON- FUNCTIONAL REQUIREMENT for Testing a Mobile App

In addition to functionality based test cases, Mobile application testing requires special test cases which should cover following scenarios.
➢ Battery consumption
➢ Response time
➢ Mass Data requirements
➢ Memory requirement
➢ Long period test
➢ Load test
➢ Stress test

CONCLUSION

Mobile Application testing is very complicated and critical part of any Mobile Application Development. In this case, Testing team should have complete thorough knowledge of Application testing and QA Methodologies, Good understanding of various types of mobile apps and one should have good knowledge in multiple areas of

testing like mobile environment, hardware, network, compatibility, technology, usability, field level user experience. The testers are also ensuring the 100 % test coverage, and testers can able to test the application under test on different simulators or Emulators.

The knowledge and the study of unique challenges of mobile application testing will help the testing team to get enough knowledge to test Mobile applications without any problem.

REFERENCES:

1)Challenges in Mobile App Testing [Online]. Available: http://www.kualitatem.com/challenges-in-mobile-app-testing/

2)Verma P., "Mobile Application Testing: Challenges and Approaches", IBM the Mobile Frontier, March 2012

3)Dak R., Challenges in Testing Mobile Applications [Online]. Available: http:// rumadak. wordpress.com/2013/06/10/challenges-in-testing-mobile-applications/

4)Mobile complete: http:// www. device anywhere. com/

5)Testing Strategies and Tactics for Mobile Applications [Online]. Available: http: //www. keynote. com/ mobile-app- testing.html

6)Mobile Applications and Testing: https:// experitest. com/blog/seetestautomation/streamline-cicdmethodology-blog/