MOBILE APP TESTING –
Manual Testing

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Document History

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Contents

Mobile application testing

Mobile application testing is the process through which applications are tested for required quality, functionality, compatibility, usability, performance and other characteristics.

It includes a broad range of application testing and evaluation techniques that encompasses both standard software testing and mobile-platform-specific testing procedures.

Mobile application testing is typically performed by mobile application developers after a mobile application is developed or before it is released to consumers. Typically, the key objectives of mobile application testing are:

- Hardware compatibility and functionality - The mobile application's response to a mobile device's physical input and interaction with components. This includes touch screen, keyboard, display, sensors, network and more
- OS compatibility - Evaluates and ensures that the application is completely compatible with different OS platforms.
- Source code evaluation - Identifies and resolves any code errors and bugs within the application.
- Usability and Functionality - The application is easy to use and provides all desired functionalities.

Importance of Mobile App Testing:

- Majority of problems that an app faces, could be addressed through a successful mobile app testing.
- This also increases the go-to-market time and ensures success of the app.
- This saves the app reputation on the market and makes it possible to succeed and reach the business goal.

Mobile applications are classified into 3 types:-

- **Native apps** are created for one specific platform or operating system.
- **Web apps** are responsive versions of websites that can work on any mobile device or OS because they're delivered using a mobile browser.
- **Hybrid apps** are combinations of both native and web apps, but wrapped within a native app, giving it the ability to have its own icon or be downloaded from an app store.

Mobile Web App:

Web applications can be accessed using a browser on the mobile device or server-side apps to access websites on mobile using different browsers like chrome, Firefox by connecting to a mobile network or wireless network like WIFI.

Benefits of Mobile Web:

- Easy access.
- Easy Development
- Easy update
- No installation required.

Drawbacks of Mobile Web:

- No offline capabilities support.
- Limited functionality in the comparison with Hybrid and Native Apps. (no access to the file system and local resources).
- Problems with redistribution: Google Play and App Store don't support redistribution of the Mobile Web Apps.

Native App:

Native mobile apps are designed to be "native" to one platform, whether it's Apple iOS, Google's Android, or Windows Phone. The native platform can be advantageous because it tends to optimize the user experience. Because it was developed specifically for the platform, it can operate more quickly and intuitively.

Benefits of Native App:

- Native app works offline.
- It can use all features of its device.
- Advanced user experience.
- Push notifications can be used for user's alert.
- Redistribution is easy, as it is found in app store.

Drawbacks of Native App:

- Native Apps creation is expensive in comparison to the Mobile Web apps.
- It requires high costs for the maintenance.

Hybrid App:

These apps can be installed on devices just like native apps, but they run through web browsers. All hybrid apps are developed through the HTML5 programming language. Though hybrid apps are not as fast or reliable as native apps, they have a greater capacity for streamlining the development process. Because you don't have to build and maintain apps for separate platforms, your business can save on time and resources. It's ideal for apps that primarily deliver content.

Benefits of Hybrid App:

- Developing a Hybrid App is cheaper than developing a Native App. It can be built for cross-platforms, i.e., reduced cost for App development.
- Maintenance is simple, as there are not many versions to be maintained.
- It can take advantage of a few features available in the device.
- It can be found in the App Store, which makes the distribution easy.
- It has a browser embedded within the app only.

Drawbacks of Hybrid App:

- Graphics are less accustomed with the operating system as compared to Native Apps.
- Hybrid Apps are slower than Native Apps.

Mobile Application Testing Types:

- Functional Testing
- Compatibility Testing
- Usability Testing
- Interrupt Testing
- Installation Testing
- Globalization Testing
- Localization Testing
- Performance Testing
- Memory Leakage Testing
- Power Consumption Testing
- Security Testing
- Recovery Testing
- OS Version Testing
- Certification Testing

Functional Testing:

Functional testing performs on the functional behavior of the application to ensure that the application is working as per the requirements.

Compatibility Testing:

Compatibility Testing is done on different mobile devices, different screen sizes, and different versions of the Operating system according to the requirement.

Usability Testing:

Usability testing is used to test the mobile applications in terms of usability, flexibility, and user-friendliness.

Interrupt Testing:

It is the evaluation of the application behavior during various types of interruptions.
The anticipated behavior of an application should be to come out clean of the interruption and resume the task.

Installation Testing:

Installation testing is performed to check the application is installed correctly on mobile device and it is working as expected after installation.

Globalization Testing:

This testing is performed to ensure the software application can run in any cultural or local environment. It ensures that the application can be used all over the world and accepts all the language texts.
Localization Testing:

- Localization testing is a software testing technique in which the behavior of a software is tested for a specific region, locale or culture.
- It is a process of testing a globalized application whose UI, default language, currency, date, time format, and documentation are designed as per the targeted country or region.
- It is the process of customizing the software as per the targeted language and country.
- The major area affected by localization testing includes **content and UI.**

Performance Testing:

Performance testing is done on the application after changing the connection from 2G, 3G to WiFi. We will test the performance of the application by sharing the documents, battery consumption, etc.

Memory Leakage Testing:

- A memory leak is a type of resource leak that occurs when a computer program incorrectly manages memory allocations in a way that memory which is no longer needed is not released. A memory leak may also happen when an object is stored in memory but cannot be accessed by the running code.
- Mobile devices have very limited memory as compared to other computers, and mobile operating systems have a default behavior to terminate applications that are using excessive memory and causing a poor user experience.
- Memory testing is exceptionally important for mobile applications to ensure that each application maintains optimized memory usage throughout the user journey. It is recommended that we conduct memory testing on the actual target device.

Power Consumption Testing:

Power consumption refers to the electrical energy per unit time, supplied to operate something. Ex: Mobile, There are several types of batteries used in different mobile devices (cadmium/ lithium/ Nickel).
 While we focus on power consumption testing, we are required to measure the state of the battery at   each activity level. It will give us a better understanding of power consumption by an individual application.

Security Testing:

- This sensitive information can easily be targeted by malicious attackers.
- Security testing checks for vulnerabilities involving hacking, access control and authentication, data security, session management and other security standards.
- It uncovers vulnerabilities of the system and determines that the data and resources of the system are protected from possible intruders.
- It ensures that the software system and application are free from any threats or risks that can cause a loss

Recovery Testing:

- Recovery testing is performed in order to determine how quickly the application can recover after it has gone through crash, hardware failures, network failures or any unexpected behavior.
- Recovery Testing is to determine whether software operations can be continued after disaster or integrity loss.
- **Recovery testing** is the forced failure of the software in a variety of ways to verify that **recovery** is properly performed.

OS Version Testing:

- First, we should think about why it's necessary to test your app on different operating systems and versions. The most obvious reason that comes to mind is that your users have different <u>OS versions</u> installed on their phones.
- Mobile applications can also have functions that are only supported specific OS version.
- we need to remember that newer versions of OS aren't installed on older devices. At some point, mobile devices are no longer supported – but your customers still have them in their pockets – OS Version testing is must.
- To handle this in your tests, verify your App tests in every latest OS version.

Certification Testing:

To get a certificate of compliance, each mobile device needs to be tested against the guidelines set by different mobile platforms.
Certification testing is the check before a mobile device goes to the market.

Heart Rate Monitoring System:

REQUIREMENTS:

Requirement ID	Requirement Description
HRM_SRS_1	Play Store shall have HRM App to install.
HRM_SRS_2	HRM App shall install properly and App name shall be display as "HeartRate Monitor"
HRM_SRS_3	App shall work in while online and offline mode.
HRM_SRS_4	HRM shall be display Instructions screen after launching the app for first time.
HRM_SRS_5	Camera access popup shall be display after instructions screen.
HRM_SRS_6	HRM shall allow the user to Measure BPM
HRM_SRS_7	Menu screen shall be display with below options: • MEASURE • STATISTICS • HISTORY • CALM • SETTINGS • HELP • FEEDBACK • REMOVE ADS
HRM_SRS_8	If user taps on STATISTICSoption from More menu, STATISTICS screen shall be display with options: All LABELS Day Week Month All LABELS shall display at Left side. Day, Week and Month options shall be display Right side.
HRM_SRS_9	HRM asks user every time to "Tap here to Start" to check BPM
HRM_SRS_10	HRM shall be display popup to save data with: • Title with: Heart Rate • Measured Heart Rate with BPM as unit. • "LABEL" Text field • "IGNORE" button • "SAVE" button
HRM_SRS_11	If user taps on HISTORY option from More menu then HISTORY screen shall display with list of previously measured Heart Rate values

HRM_SRS_12	User shall be able to update and delete the record from HISTORY
HRM_SRS_13	HRM shall be display Warning screen only once.
HRM_SRS_14	HRM shall be display detailed instructions in HELP screen.
HRM_SRS_15	If user taps on SETTINGS option from More menu, SETTINGS screen shall be display with list of options: Basic Information: DOB and Weight Flash: Use Flash checkbox – Default enabled Sensitivity: Low and High checkbox – Default High Heart Waves: Save checkbox – Default enabled. Measurement Time (Sec): Default 15 Seconds Sound: Beep with Pulse checkbox – Default disabled Google Fit: Send Heart Rates to Google Fit checkbox – Default disabled. Share/Export History option.
HRM_SRS_16	HRM shall allow the user to share/export the measured heart rate History.

SCENARIO IDENTIFICATION:

S. No	Requirement	Scenario Description	Test Protocol Name
1	Req 1: Play Store shall have HRM App details.	Verify App details in: Play Store search screen when user searched	Heart Rate Monitor _Test Protocol
2	Req 2: App shall install properly	Verify availability of Install option. Verify waiting period once install option is selected. Verify availability of open and uninstall option after complete installation.	Heart Rate Monitor _Test Protocol
3	Req 3: App shall work in while online and offline mode.	Verify working of app: When internet is available. When internet is not available.	Heart Rate Monitor _Test Protocol
4	Req 4: HRM shall be display Instruction's screen after launching the app for first time.	Verify the display of instructions: During the first-time launch. During the second launch.	Heart Rate Monitor _Test Protocol
5	Req 5: Camera access popup shall be displayed after instructions screen.	Verify the popup of camera access request after the display of instruction screen. Verify the availability of "ok" option. Verify the popup of access request with allow and deny option available.	Heart Rate Monitor _Test Protocol

		Verify the camera works when user allows access Verify the error message pop up when user declines the access.	
6	Req 6: HRM shall allow the user to Measure BPM	Verify the provision of user access to measure BPM. Verify the display "tap here to start" message. Verify the app measures the BPM when finger is placed on the camera. Verify the app does not measure the BPM when finger is placed on the camera	Heart Rate Monitor _Test Protocol
7	Req 7: Menu screen shall be displayed	Verify the display of menu with the following options when user selects the menu option: • MEASURE • STATISTICS • HISTORY • CALM • SETTINGS • HELP • FEEDBACK • REMOVE ADS	Heart Rate Monitor _Test Protocol
8	Req 8: STATISTICS screen shall be displayed when taps on "STATS"	Verify the display of statistics with the following options when user selects the "Stats" option: • All LABELS • Week • Month Verify the display of "All labels" on left hand side of screen Verify the display of "Week" and "Month" on the right-hand side of the screen. Verify the display of bar graph of previous and present-day measurements of BPM with date and range Verify the display of "AVG", "MIN' and "MAX" of the measurements.	Heart Rate Monitor _Test Protocol
9	Req 9: HRM shall ask the user to "Tap here to Start" to check BPM every time	Verify the display "tap here to start" message.	Heart Rate Monitor _Test Protocol

		Verify the flashlight is turned 'On' when the user taps on "tap here to start". Verify the app measures the BPM when finger is placed on the camera	
10	Req 10: HRM shall be display popup to save data.	HRM shall be display popup to save data with: • Measured Heart Rate with BPM as unit. • "LABEL" Text field • "IGNORE" button • "SAVE" button Verify user can give a label to the measured data in the "label" field.	Heart Rate Monitor _Test Protocol
11	Req 11: HISTORY screen shall be displayed when taps on the option	Verify user can tap on HISTORY option from menu. Verify the display of all the previous measurements with BPM as unit on the left-hand side on screen. Verify the display of label name, date and time on the right-hand side of screen. Verify the display of "ALL LABELS" on the top left-hand side of the screen. Verify the selection of label by the user.	Heart Rate Monitor _Test Protocol
12	Req 12: User shall be able to update and delete the record from HISTORY	Verify the user can select one data by tapping on reading. Verify user can give or edit a label to the measured data in the "label" field. Verify the display of "delete", "cancel" and "Update" option on the screen. Verify the display of updated data when the user taps on update. Verify the deletion of data when user taps on delete. Verify no change in data when user taps on cancel.	Heart Rate Monitor _Test Protocol
13	Req 13: HRM shall display Warning screen only once.	Verify the display of warning screen when the app is used for the first time.	Heart Rate Monitor _Test Protocol

14	Req 14: HRM shall display detailed instructions in HELP screen.	Verify the display of HELP screen with FAQs and warning screen when user taps on "Help". Verify the provision to scroll through the screen.	Heart Rate Monitor _Test Protocol
15	Req 15: HRM shall display Setting screen.	Verify the display of "SETTINGS" screen when user taps on SETTINGS option from More menu, with list of options: • Basic Information: DOB and Weight • Flash: Use Flash checkbox – Default enabled • Sensitivity: Low and High checkbox – Default High • Heart Waves: Save checkbox – Default enabled • Measurement Time (Sec): Default 15 Seconds • Sound: Beep with Pulse checkbox – Default disabled • Google Fit: Send Heart Rates to Google Fit (checkbox – Default disabled) • Share/Export History option. Verify the user can fill the basic information. Verify the user can check the checkboxes.	Heart Rate Monitor _Test Protocol
16	Req 16: HRM shall allow the user to share/export the measured heart rate History.	Verify user can tap on the SHARE/ EXPORT HISTORY option. Verify the display of "saving data" options when user taps on Share/Export history. Verify the sharing/exporting of history in CSV format when the user taps on the options displayed under "saving data".	Heart Rate Monitor _Test Protocol

TEST CASES:

Pre-Requisites:

Make sure internet is available.

Make sure that "HEART RATE MONITOR" application is available on Play Store.

STEP #	Action Description	Acceptance Criteria	Actual Result	Conclusion
1	Open play store application. Enter "Heart Rate Monitor" in the search field.	Details of "heart rate monitor" app is displayed among the listed apps.	Details of "heart rate monitor" app displayed among the listed apps.	✓ **Passed** o Failed
2	Verify the details of app	Details of "heart rate monitor" is displayed with: • App icon • App name" Heart Rate Monitor" • Ratings • Category of app • Number of downloads • Size of app.	Details of "heart rate monitor" displayed.	✓ **Passed** o Failed
3	Tap on the "Heart Rate Monitor" app	"Heart Rate Monitor" Screen is displayed with → Install button	Heart Rate Monitor" Screen displayed along with Install button.	✓ **Passed** o Failed
4	Tap on install button.	• Installation process begins. • Cancel button is displayed. • "Uninstall" and "open" buttons displayed after complete installation.	App was installed. "Uninstall" and "open" buttons were displayed after complete installation.	✓ **Passed** o Failed
5	Tap on "open" button.	The app is launched.	The app was launched successfully	✓ **Passed** o Failed
6	Launch the app from Play Store or from the Apps screen for the first time	The instructions for user are displayed with → "Ok" option	The instructions for user displayed along with "Ok" option	✓ **Passed** o Failed

7	Exit from the app and Launch the app again.	The instructions for user are not displayed.	The instructions was not displayed after the first launch/use.	✓ **Passed** ○ Failed
8	Launch the app and tap "OK" on the instruction screen	Pop up for camera access is displayed with → "Ok" option	Pop up for camera access is displayed along with "Ok" option	✓ **Passed** ○ Failed
9	Tap "ok" on the camera access pop up	Pop up prompting the user to grant Permission for camera access is displayed with → Deny option → Allow option	Pop up for camera access displayed.	✓ **Passed** ○ Failed
10	Tap "deny" option on camera access popup	Pop up for camera access is displayed with → "Ok" option	Pop up prompting the user to permit camera access is displayed again along with "Ok" option	✓ **Passed** ○ Failed
11	Tap "allow" option on camera access popup	"tap here to start" is displayed on screen.	Screen displays "tap here to start"	✓ **Passed** ○ Failed
12	Tap on "tap here to start" and place a finger on camera	The app starts measuring the heartbeat rate and displays the reading in both numeric and graphical from.	The app starts measuring the heartbeat rate of the user in both numeric and graphical from.	✓ **Passed** ○ Failed
13	Tap on "tap here to start" and finger is not placed on camera	Turns on the flashlight and waits for the user for further action	The app turns on the flashlight and waits for user.	✓ **Passed** ○ Failed
14	Tap on the menu icon.	The menu with following options is displayed: • MEASURE • STATS • HISTORY • CALM • SETTINGS • HELP • FEEDBACK • REMOVE ADS	The menu with said options displayed on left hand side of screen.	✓ **Passed** ○ Failed
15	Tap on "Stats"	Statistics with the following options when user selects the "Stats" option:	STATS screen displayed with "all labels", "week" and "month"	✓ **Passed** ○ Failed

		→ All LABELS on left hand side of screen → WEEK and MONTH right hand side of screen → "AVG", "MIN' and "MAX" of the measurements displayed below the bar graph.			
16	App measures the BPM.	App measures the BPM and a popup to save data is displayed with measure bpm and the following options: → "LABEL" Text field → "IGNORE" button → "SAVE" button	The measured BPM displayed on the pop-up prompting to label and save or ignore the data.	✓ **Passed** ○ Failed	

Review Process

Test Case name	Step No.	Reviewer		Author Comments	Comments
		Comments	**Severity**		
Heart Rate Monitor_Test Protocol	4	More clarity on steps, use bullet points.	Minor	Fixed	-
Heart Rate Monitor_Test Protocol	10	Expected output is not clear	Critical	Fixed	-
Heart Rate Monitor_Test Protocol	12	Output needs more description	Major	Fixed.	-
Heart Rate Monitor_Test Protocol	16	Test description not apt.	Major	Fixed	-

Common Mistakes for Mobile App Testing:

- Testing without knowing the purpose
- Testing everything, without priorities
- Web Testing vs Mobile testing
- Only focusing on the UI
- Not testing in different platform devices and OS versions.
- Network testing problems are not checked
- Performance issues are not addressed
- Syncing data test is not done

Challenges in Mobile Application Testing:

- Different Platforms
- Different Screen Sizes
- Different OS versions
- Different network connection types
- Frequent updates.
- Power consumption and battery life