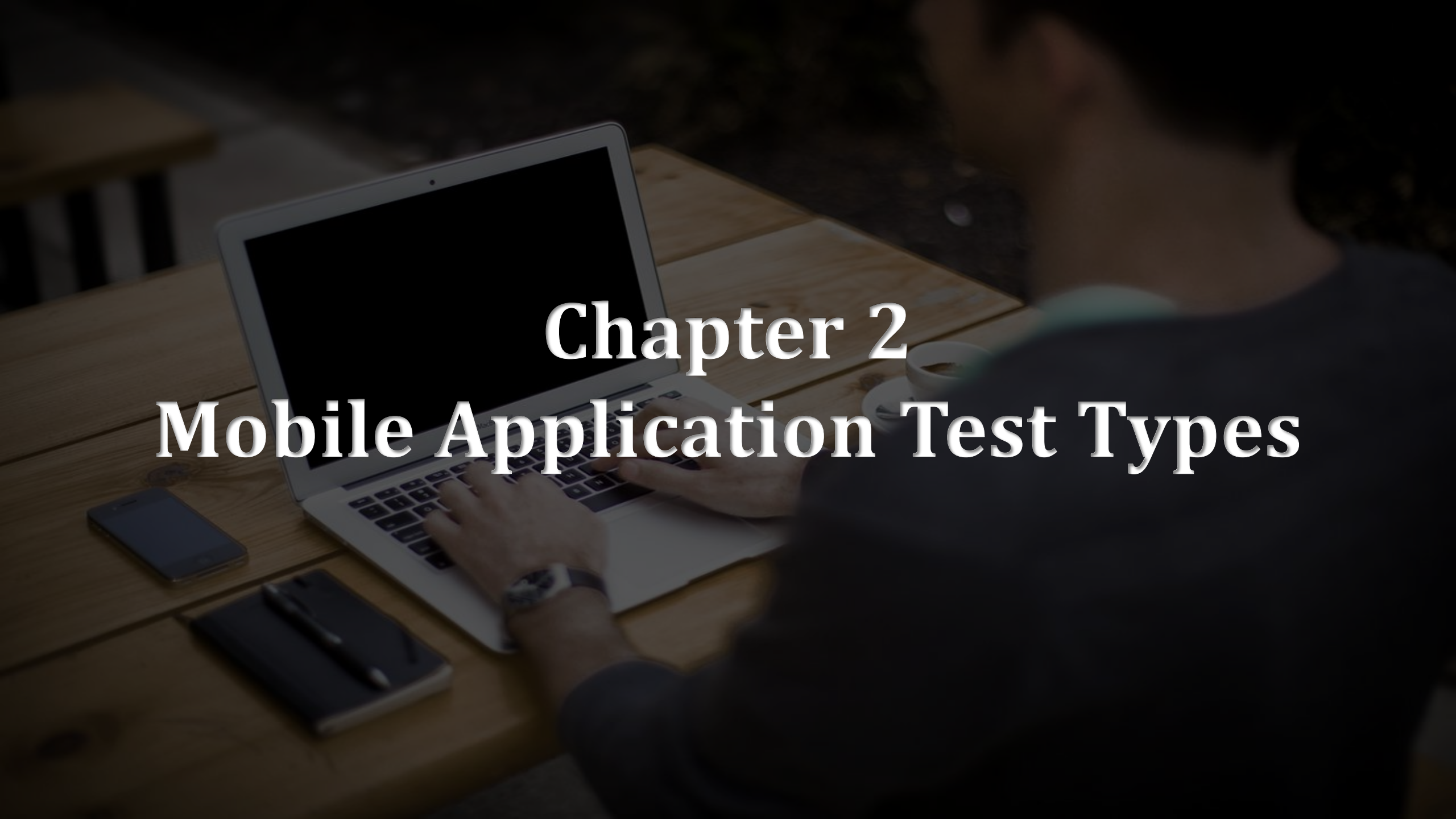

Chapter 2
Mobile Application Test Types

Testing for Compatibility with Device Hardware

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Testing for Device Features

- **Market data is used to select a device portfolio most appropriate for the target market**
- **The device portfolio selection is a compromise between market coverage, cost and risk**

Testing for Device Features

- Applications can be installed on different types of devices with the following features:
  - Different methods for switching off
  - Different ways to navigate
  - Use of hard and soft keyboards
  - Various hardware features such as:
    - Radio
    - USB
    - Bluetooth
    - Cameras
    - Speakers
    - Microphones
    - Headphone access

Testing for Device Features

- **It is not enough to test if the application works correctly with the expected features. In addition, it is required to test the app if a certain feature is absent.**

- **An app that supports the usage of front and rear camera should not crash if it is installed and executed on a device having multiple cameras, only one camera or not camera at all.**

Testing for Different Displays

- **Screen size:** the physical size of the area where pictures and videos are displayed. The size of a screen is usually described by the length of its diagonal, which is the distance between opposite corners, usually in inches.

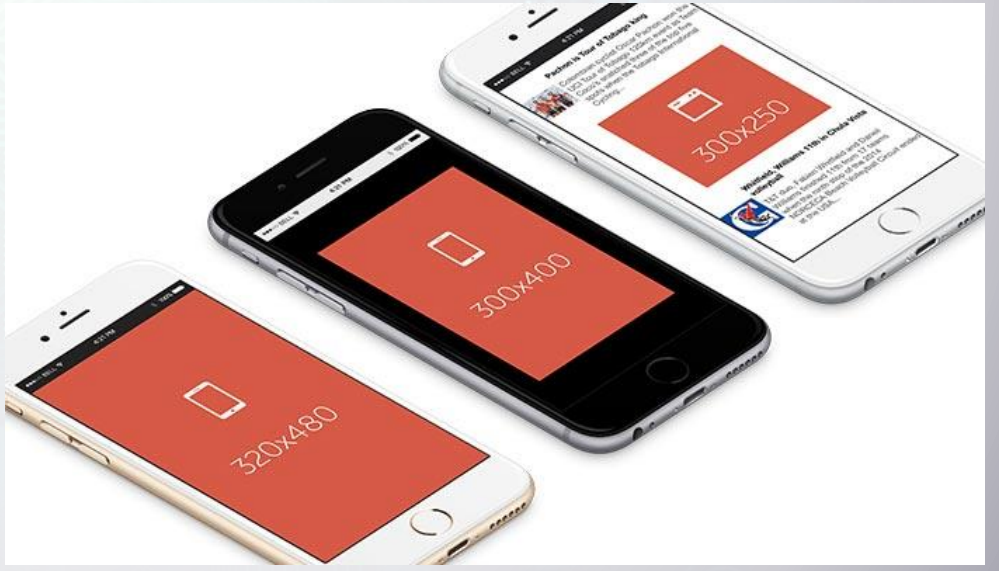
- **Viewport size:** The viewport is a website's visible area on the screen of the user. This dimension varies with each device, so the viewport will be smaller on a tablet than a computer screen, and smaller again on a mobile phone.

- **Aspect ratio:** the proportional relationship between the height and width of a rectangle

- **Resolution:** The number of horizontal and vertical pixels on a display screen (dpi or ppi)

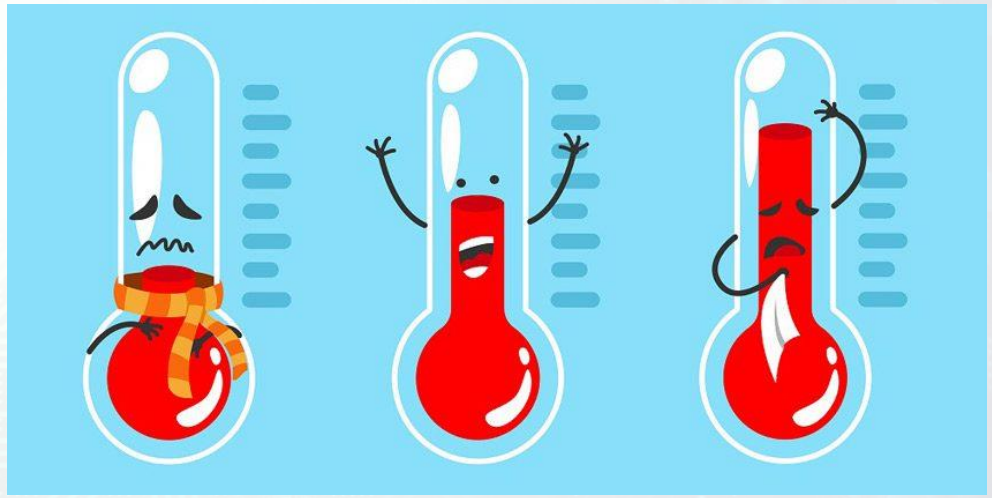
Testing for Different Displays

- **Testing for different displays needs to be check the following:**
  - **The app scales all UI elements according to current screen density and size**
  - **User interface elements do not overlap**
  - **Usability or touch issues do not occur**
  - **There is no problematic shrinkage of images because of high dpi/ppi**



Testing for Device Temperature

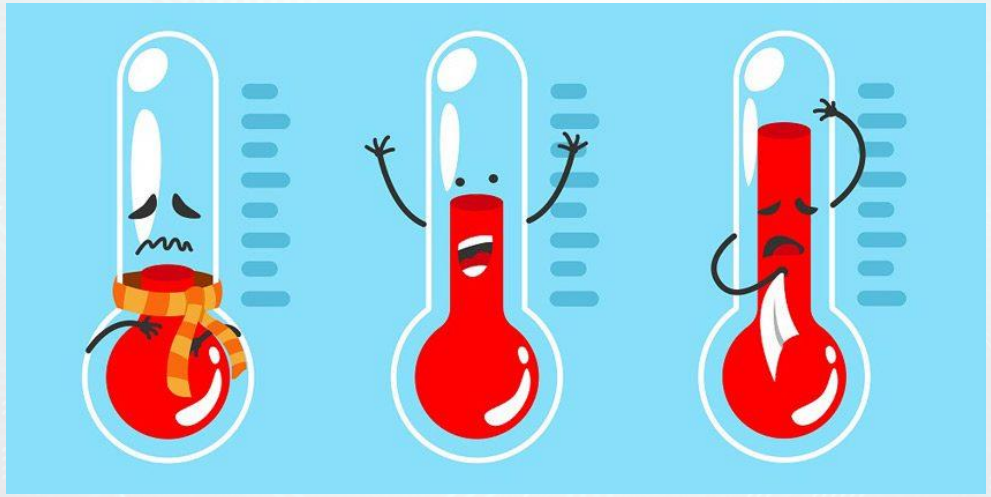
- **Unlike desktop computers, mobile devices react differently to increases in device temperature.**



- **Reasons of overheating:**
  - **Battery charging**
  - **Intense workload**
  - **Apps running in the background**
  - **Continuous usage of cellular data, Wi-Fi or GPS**

Testing for Device Temperature

- **Overheating makes the device attempts to reduce heating and conserver battery levels. This may include a drop in the CPU frequency, the freeing up of memory, and the turning off parts of the system.**



- **Tests must be designed to consume a lot of energy which leads to the generation of heat over a long uninterrupted period of time.**

Testing for Device Input Sensors

- **The app works as intended for each of the sensors available (circular motion-back and forth motion-walking)**
- **Features that react to external lighting react correctly under various lighting conditions**
- **Sound inputs and outputs respond correctly with soft and hard volume buttons**
- **Location position is accurate (switch GPS on and off- Different GPS signal quality)**

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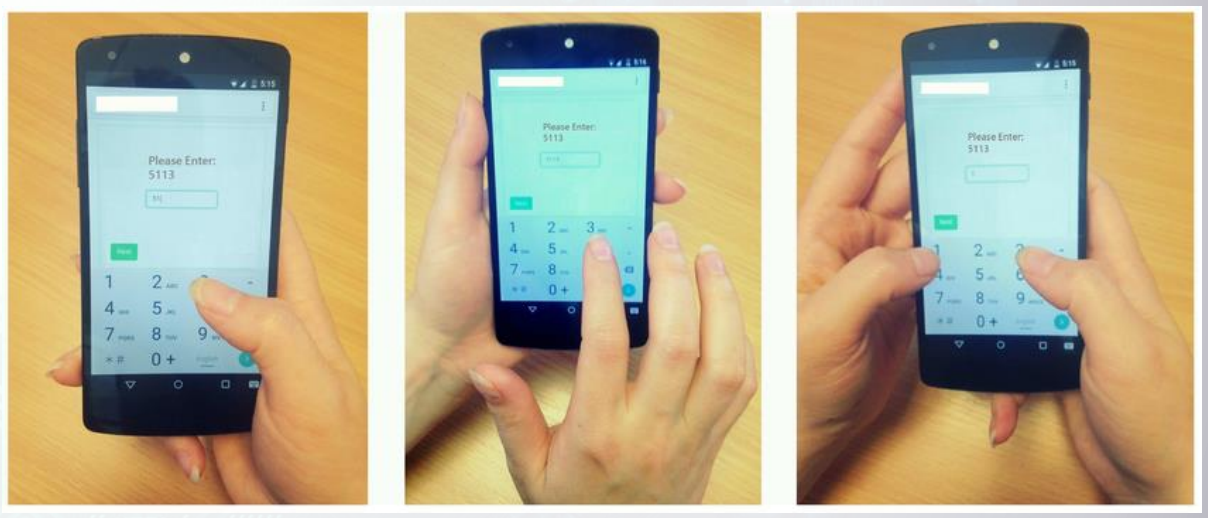
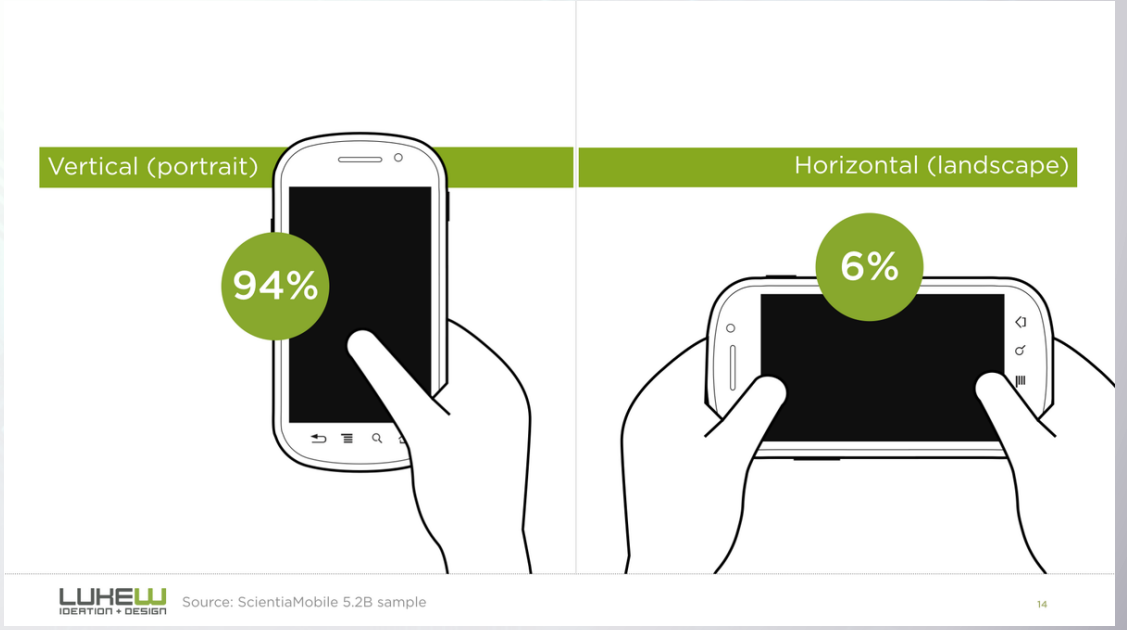
Testing Various Input Methods

- Interaction with soft keyboards
- Placing fingers on the touch screen (press/touch, double touch, multi-touch, swipe, tap, double tap, drag, and pinch open/close)
- Cameras can capture images and videos, scan barcodes, QR codes and documents, and measure distances
- The appropriate camera is turned on by default



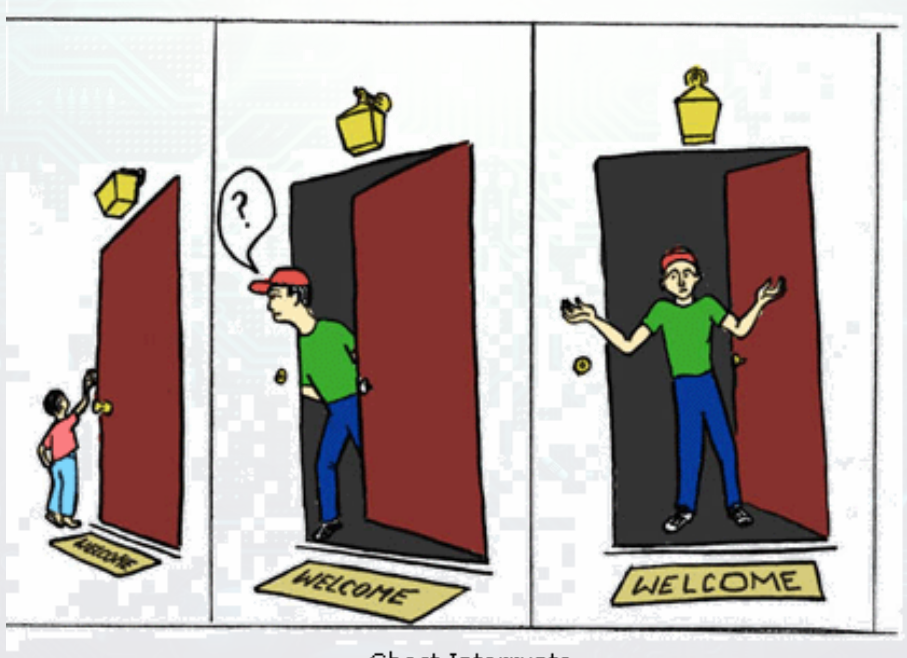
Testing for Screen Orientation Change

- Tests after a change of screen orientation check the following:
  - Correct usability and functionality
  - The app maintains its state
  - Input data fields retain already captured data
  - Output data fields display the same data
- Switch the orientation more that one time



Testing for Typical Interrupts

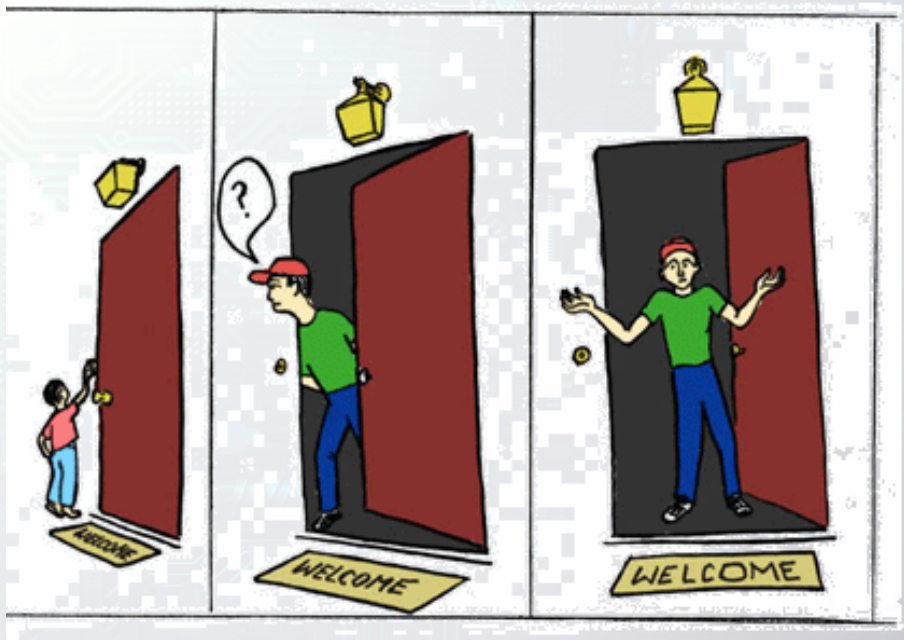
- **Device Interrupts:**
  - **Voice call, messages, charger switched on, low memory and other notifications**
- **User Interrupts:**
  - **App switching-Setting the device into standby**



Ghost Interrupts

Testing for Typical Interrupts

- You should test the following:
  - The app handles all of the interrupts correctly
  - The app continuous to function correctly regardless of the interrupt happened
  - After returning from “do-not-disturb” mode, many notifications are received at once
  - Answer a phone call while using the app



Ghost Interrupts

Testing for Access permissions for Device Features

- You should test the following:
  - The app is able to work with reduced permissions
  - Permissions are only requested for the resources which are relevant to the app's functionality

- You need to know why the app needs each permission and how functionality should be impacted if the permission is rejected during installation

Testing for Power Consumption and State

- Check the following:
  - Battery power state and drainage-related defects
  - Power consumption while the app is active
  - Power consumption while the app is in the background

- Log analyzers are needed to extract information about battery drain patterns

Testing for App Interactions with Device Software

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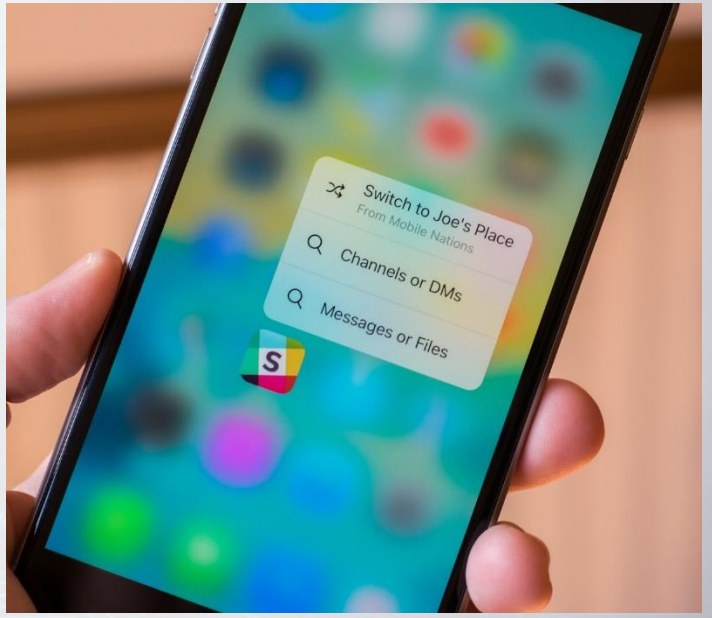
Testing for Notifications

- **The following test conditions must be considered:**
  - **The correct handling of notifications received when the app is in the foreground or background**
  - **If notifications allow direct interaction with the app content, the user interaction must be provided by the app at a later time**
  - **If notifications allow access to the app then the corresponding page of the app must be opened**

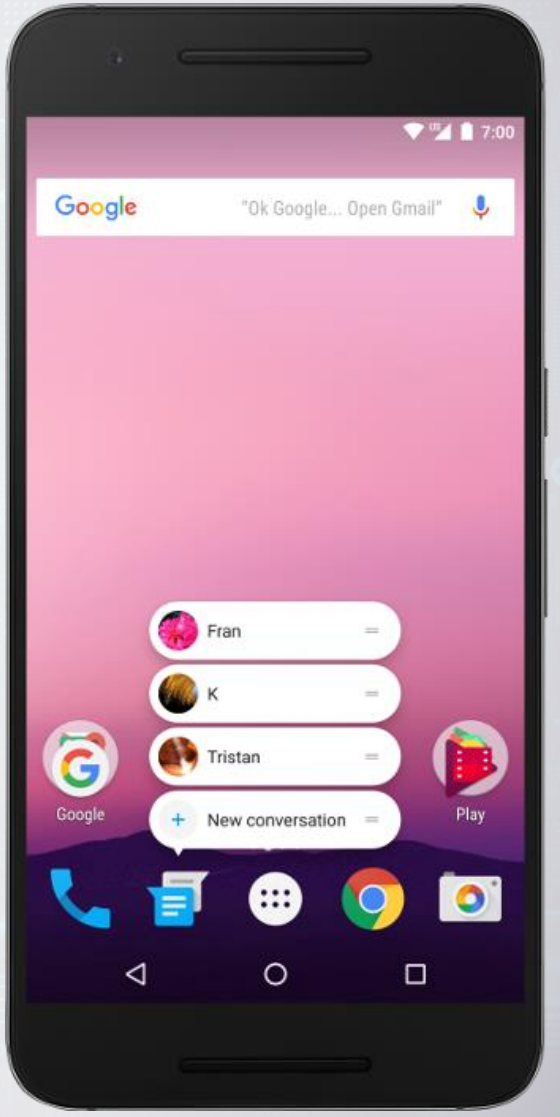
Testing for Quick Access Links

- **Force-touch: a technology developed by Apple Inc. that enables trackpads and touchscreens to distinguish between various levels of force being applied to their surfaces.**
- **3D touch: the name of the same technology on the iPhone models**
- **Haptic touch: it replaces 3D touch in iOS 13 and iPhone 11**
- **App Shortcuts: the same feature for android phones**



Testing for Quick Access Links

- **The following test conditions must be considered:**
  - **The system under test must behave correctly if it is installed on versions of the operating system which either offer or do not offer such features**
  - **The actions performed in quick-access links are reflected correctly in the app when opened**



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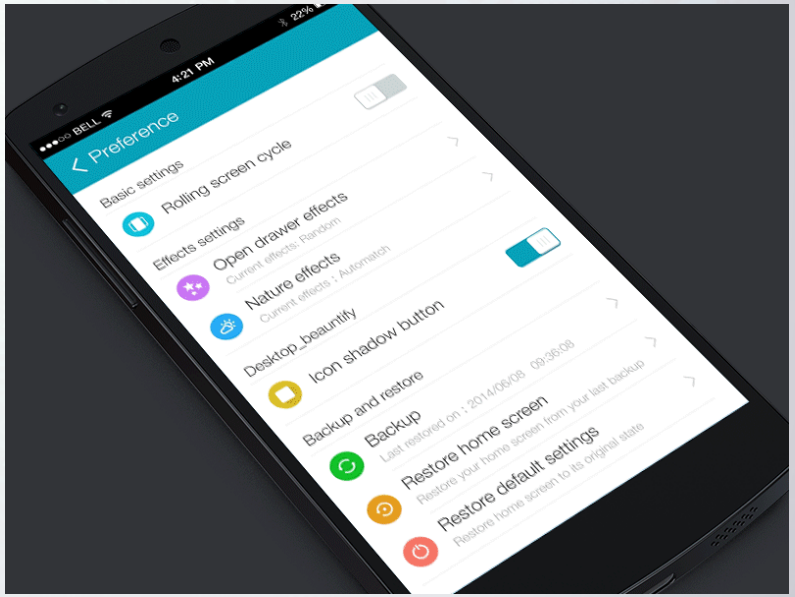
Testing for User Preferences provided by the operating system

- **The following test conditions must be considered:**

  - **User can amend typical preference options such as sound, brightness, network, power save mode, date and time, time zone, languages, access type and notifications.**

  - **The apps adhere to the set preferences by behaving accordingly**



Testing for Different Types of Apps

Native Apps	Hybrid Apps	Web Apps
-Device Compatibility -Utilization of Device Features	-Interaction with native features -Performance Issues due to abstraction layer -Usability (look and feel) compared to native apps	-Cross-browser compatibility -Utilization of OS features -Usability compared to native apps

Testing for Interoperability with multiple platforms and Operating System Versions

- **The following test conditions must be considered:**
  - Cross functionality where multi-platform apps share some code or have been created using cross-platform development frameworks
  - If apps do not share code, then it is like testing two different applications and everything needs to be tested
  - Testing for backward compatibility
  - Testing new or changed features made to platforms (Doze framework/Haptic Touch)

Testing for Interoperability and Co-existence with other Apps on the Device

- **The following test conditions must be considered:**
  - **Data transfer between the system under test and the utilized app is correct**
  - **There is no harm done to any user data stored within a utilized app**
  - **Conflicting behaviors. For example, an app might turn off GPS to save energy, while another app turns on GPS automatically**

Testing for Various Connectivity Methods

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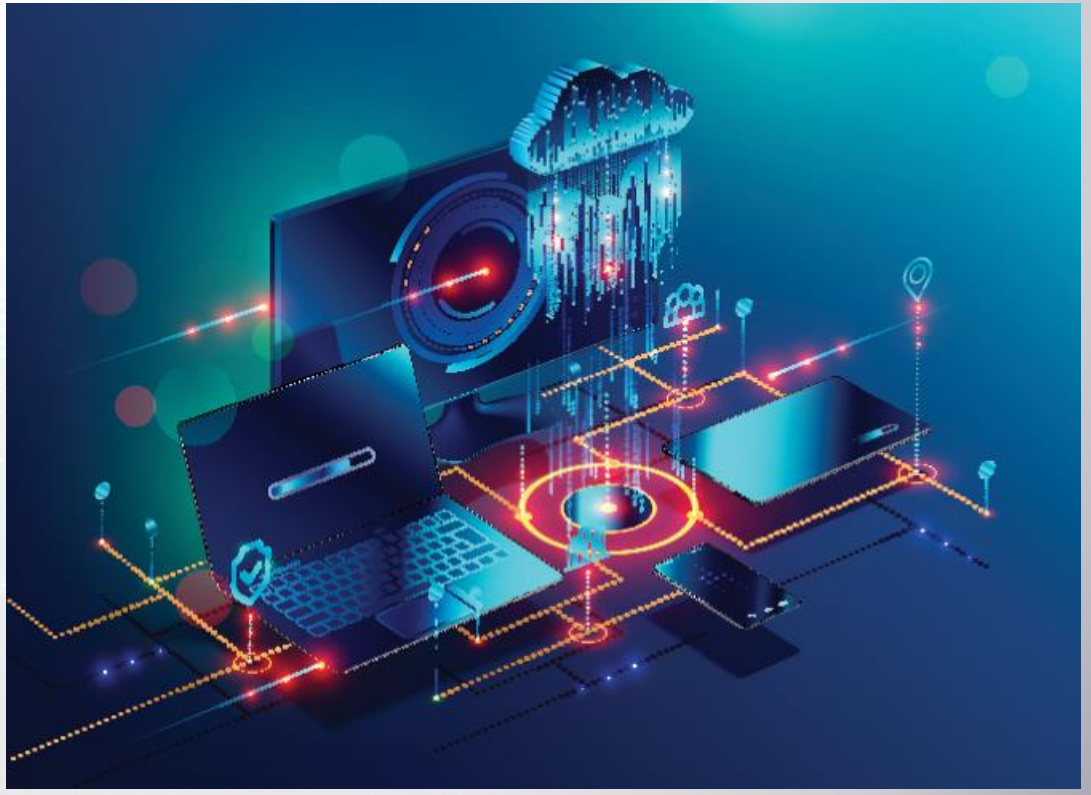
Connectivity Methods

-Mobiles can use different connectivity methods:

-Cellular Networks (2G-3G-4G-5G)
-Wi-Fi
-NFC
-Bluetooth



Connectivity Methods

-The following alternatives should be considered:

-Simulators/Emulators (limited value)
-Setting up your own mobile network (Very costly)
-Field testing (Limited in reproduction of tests)

Connectivity Methods

- **The following test conditions must be considered:**
  - **Correct app functionality with different connectivity modes**
  - **Switching between modes does not cause any unexpected behavior or data loss**
  - **Clear information is given to the user if functionality is restricted due to limited or no network connection. The message should state the limitations and their reasons**