Chapter 8
Quality Attributes for Mobile Applications

João M. Fernandes
Universidade do Minho, Portugal

André L. Ferreira
Universidade do Minho, Portugal

ABSTRACT

A mobile application is a type of software application developed to run on a mobile device. The chapter discusses the main characteristics of mobile devices, since they have a great impact on mobile applications. It also presents the classification of mobile applications according to two main types: native and web-based applications. Finally, this chapter identifies the most relevant types of quality attributes for mobile applications. It shows that the relevant quality attributes for mobile applications are usually framed in the Usability, Performance, and Maintainability and Support categories.

INTRODUCTION

A mobile application (or just mobile app) is a type of software application developed to run on a mobile device. Mobile applications are a recent type of software application that emerged due to the appearance of many handheld devices, like smartphones, which are considered to be the personal computer of the future (Duffy, 2012), or tablet computers. Mobile devices are expected to be easily carried, held, and used in the hands; hence, mobile devices are characterized by being relatively small devices when compared to desktop computers. For this reason, mobile devices are naturally restricted in several dimensions that strongly affect the operating characteristics of an application that executes on this type of devices. In many cases, the challenges for the software or systems engineer when developing a mobile application are similar to the ones to develop other types of embedded applications (Wasserman, 2010). Common issues include integration with hardware, security, performance, reliability, and storage limitations.

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BACKGROUND

Until recently, mobile devices were characterized for having small display sizes, low processing power, poor connectivity, and limited interaction methods. The range of mobile applications available for these devices was relatively small. Mobile devices have evolved considerably in recent years as result of improvements in mobile technology, mobile networking and mobile computing. Examples are increased processing power of mobile devices, novel forms of user interaction, for example the introduction of the touch feature to operate mobile devices, and new protocols of connectivity. These improvements in the hardware motivated the increase in the range and availability of mobile applications.

Mobile applications are software systems that have specific characteristics when compared with normal desktop applications. Mobile applications differ from desktop applications by having to deal with limitations on specific hardware resources, like display size, processing power and memory to name a few. Probably the most significant difference is that mobile applications run on mobile devices with energy consumption limitations. Increase battery lifetime is a significant concern for both mobile applications developers and hardware manufacturers, namely in what concerns multimedia applications running on mobile devices.

Mobile applications can now take advantage of new hardware capabilities, meaning that they can provide a wider set of functions or use, which inevitably results in more complex software solutions. Development of mobile applications is now closer than before to the development of desktop applications in terms of complexity (examples are *Android OS*, *Apple iOS* and *Windows Phone* mobile operating systems); however the hardware is still a relevant differentiator. These differences motivate the need to understand clearly how the hardware constraints impact the software design decisions. For that purpose, one must understand which quality attributes are more relevant for mobile applications, providing an inevitable link to constraints imposed by the hardware itself. Understanding the possible impact of the hardware of mobile devices in software design decision motivates the discussion of this chapter.

MOBILE DEVICES CHARACTERISTICS

Mobile devices have a set of characteristics that have a great impact on how mobile applications are designed or created (Juárez-Ramírez et al., 2012). These characteristics establish the constraints that influence most technical and non-technical decisions on software applications development for mobile devices. A list of these characteristics is presented in this section.

Small Display Size: Mobile devices have relatively small displays when compared to desktop computers or laptops. Small mobile devices, in particular small smartphones, have display sizes of 4 to 4.5 inches but these can go down to 2.45 inches. Typical smartphones have display sizes between 4.5 to 6 inches and tablets range from 5 up to 13 inches. Mobile applications must be designed to successfully provide the desired functionality in a limited screen size. These conditions contrast greatly with normal applications that are designed to use larger screens. Small screen sizes pose great constraints to usability of mobile apps.

Small Memory Size: Normally, mobile devices have less memory available than desktop computers. Mobile devices, as any computing device, have both ROM (Read-Only Memory) and RAM (Random-Access Memory). ROM, which technically is EEPROM, i.e., Electrically-Erasable Programmable ROM, and so is both readable and writeable by the end user, does not require power to maintain its (non-volatile)