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Chapter 1

Introduction to developing applications for mobile devices

Objectives

- Describe the differences between application development for a desktop environment versus a mobile device environment based on physical device characteristics
- Describe the differences between application development for a desktop environment versus a mobile device environment based on user needs

This chapter outlines some of the differences between desktops and mobile devices, as well as the needs and expectations of mobile device users. Use this information to design mobile applications that are relevant, timely, and easy to use.

From instant messaging to weather updates, from real-time stock quotes to GPS tracking, there is a large variety of applications that bring information, services, and features literally to the fingertips of mobile device users. To be effective, your mobile device application must give users what they want when they want it. Good application design begins with an understanding of the capabilities of the device and the nature of mobile device usage.
Physical differences between mobile devices and desktops

Although they can perform some of the same tasks, mobile devices serve a completely different function than desktops. Desktops are fast, excellent at multitasking, capable of storing huge amounts of data, and can perform innumerable complex calculations. For large tasks that require a lot of complex, time-consuming effort, use a desktop. Mobile devices, on the other hand, can go anywhere, are extremely versatile, and their simplified design lets users access what they want with minimal input. Mobile devices provide mobile access to an ever-changing variety of information and features.

Mobility

The most basic difference between mobile devices and desktops is that mobile devices are *mobile* and desktops are not. Mobile devices provide continuous access that lets users get the information and features they want, whenever they want them. This means users are not tied to their desks, and they can get information as soon as it is available, regardless of their location. Because they are mobile, they can run applications based on GPS or other location information, bringing the most relevant information to users. For example, a mobile device application can detect the user’s location and request weather or traffic updates specific to that area.

Data storage

With the use of hard disks, thumb drives, and other storage media, desktops can store huge quantities of data and application files. Mobile devices have a much smaller storage capacity, so they cannot store large applications or large amounts of data. If your mobile device application is very large or requires access to a large data store, consider hosting the application instead of distributing it to individual mobile devices.

Memory

Mobile devices have a much lower memory capacity than desktops. Design your mobile applications carefully with memory in mind. If there are insufficient memory resources for your application, users can experience outright failure or very slow performance as the mobile device tries to accommodate the low memory condition. You must also be mindful that the reduced memory capacity means the system is less tolerant of memory leaks in your application.
Energy use and availability

Desktops plug into regular electrical outlets so, barring temporary interruptions in electrical service, they never run out of power. Desktops can therefore run continuously and power availability is not a barrier to long-running applications or processes. For example, a desktop can run a system backup or antivirus scan for hours in the background without having to stop partway through due to a lack of power.

Mobile devices, on the other hand, use batteries, so the available power is limited. A mobile device cannot run a processor- or display-intensive application or operation that takes hours to complete without first running out of power. Because battery power is such an important commodity for the mobile device, you must ensure your application does not use more power than necessary. Users will simply avoid using applications that use too much power.

Screen size

A mobile device screen is physically much smaller than a desktop monitor, and in terms of number of characters and items on the screen, can only display a fraction of what a desktop monitor can. You must consider this reduced screen size when developing mobile device applications; your application will be much more effective and easier to use if users do not have to scroll around too much to see all the available items and information. The reduced screen size also means fine-detailed videos, photos, and graphics may not appear as clearly as they do on a desktop monitor.

Input methods

Mobile devices have very small keyboards that are not suitable for traditional touch-typing, even on devices that feature the standard QWERTY layout. Many users prefer to use the menus and trackball instead of the keys. When designing your mobile device application, avoid tasks that rely heavily on use of the keys. For example, a game that measures or rewards typing speed is not suitable for a mobile device. Design your application to minimize use of the keys for navigation, and consider using an auto-complete feature that “guesses” and fills in words based on the letters the user has already entered.

Number of screens

Desktops are capable of displaying multiple applications concurrently, while mobile devices are limited to displaying a single application screen at a time, and this can be an important fact to consider when designing a mobile device application. For example, if your application sends alerts or updates to the device, design it in a way that alerts but does not interrupt the user. Instead of taking over the device
screen with the update, design the application to inform the user that an update is available by buzzing or leaving an icon in the banner.

**Note:**
Some mobile devices, such as the BlackBerry® Pearl™ 8220, can display a second, smaller screen for notifications.

**Transfer rates**

The traditional wireless connections that many mobile devices use have much slower transfer (upload and download) rates than wire connections. Wireless connections are also less reliable than wire connections and can result in longer and more frequent outages. Avoid creating applications with tasks that are dependent on immediate or long, uninterrupted data transfer. Tasks that require large data transfers can take some time on a mobile device, thereby using up valuable battery power.
1. Which statement is true of mobile devices?
   A. They typically have faster processors than desktops.
   B. They typically have less memory than desktops.
   C. They have access to fewer Internet locations than desktops.
   D. They typically have better screen resolution than desktop monitors.

2. In which of the following areas do mobile devices have an advantage over desktops? Choose all that apply.
   A. Storage capacity
   B. Download speeds
   C. Mobility
   D. Power availability

3. Which of the following statements is true?
   A. Mobile devices can make use of location-based data.
   B. Because they have a slower transfer rate than desktops, mobile devices are not suitable for sending or retrieving GPS data.
   C. Because they have more memory than mobile devices, desktops can move more easily from one location to another location.

4. Which of the following statements is true?
   A. The small keyboard on a mobile device means that users cannot perform traditional touch typing.
   B. The small keyboard on a mobile device means that users cannot type contractions (such as “can’t” or shouldn’t”).
   C. The small keyboard on a mobile device means that users must type abbreviated forms of most words.
D. The small keyboard on a mobile device means that not all of the letters of the alphabet are represented.

5. Which of the following statements is true?

A. Mobile devices do not support scrolling in order to view off-screen items.

B. Mobile device screens can show only a fraction of the number of items on the screen that a desktop monitor can.

C. Mobile device screens show graphics more clearly than desktop monitors, but show video less clearly than desktop monitors.

D. Mobile device screens show better resolution and finer detail than desktop monitors.
Answers

1. B

2. C

3. A

4. A

5. B
Chapter 1

Understanding mobile device users

People use mobile devices differently than they use desktops. In general, mobile device users want immediate, short chunks of relevant information. Contrast this with desktops, which allow users to carry out long-term, large, complex tasks. For example, if users wanted to develop a spreadsheet for an office pool that tracks sports teams, players, points, and scores, as well as members of the pool and their current standings, they would use a desktop. If they wanted to receive instant updates of game scores, no matter where they were, they would need to use a mobile device.

When designing an application, consider the needs and expectations of the user. Factors include speed of task completion or information retrieval, relevance of information and application options, and ease of use. These items are all related to each other. For example, the more relevant the menu selections are to the current task, the easier the application is to use, and the faster users can accomplish their goals.

Speed

Many users use mobile devices as work and personal assistants, calling up critical information as it is needed, then putting the device away until the next task. Much of this information is time-sensitive, so users want to receive it right away. For example, a user may want to look up a friend’s contact information or check the local traffic conditions to find the quickest route to a destination. If the application takes a long time to load or if the information is delayed, it can frustrate the user or be irrelevant by the time the user sees it. Users expect responsiveness and efficiency from their mobile devices. It is a good idea to follow a 60-second rule: your mobile application should provide relevant information in 60 seconds or less to the end user.

Relevance

Most mobile device tasks are focused on a single objective. For example, a user requesting hourly stock quote updates is likely to want the current value of a small group of stocks, and is less likely to want a large spreadsheet detailing the five-day performance of the 100 most popular stocks every hour. When you design a mobile application, present only the options and information that are relevant to the user’s current task, or incorporate ways that let the user define which information or options are most relevant. Look for ways to streamline data presentation so that users can quickly retrieve the information they require. For example, if you are creating a stock quote update application, display the most recent information for the requested stocks, accompanied by links to older data for those stocks or current data for other stocks.

Ease of use

An application that is difficult or cumbersome to use frustrates users and prevents quick access to required features and information. Simplify access to the most commonly used features: do not make
users carry out four steps when one step will do. When designing a mobile device application, you must also consider the user's familiarity and previous experience with mobile device applications. For example, if every mobile device application uses the Escape key to return to the previous screen, and your application uses the Escape key to send email messages, users will have a difficult time navigating through the application. This can lead to delays, mistakes, and frustration, all of which are contrary to what mobile device users expect. When designing your application, build on existing application functionality to promote a level of comfort and familiarity for users.
1. Which of the following statements is true?
   A. Mobile device users tend to run and view several applications at once.
   B. Mobile device users typically want as much information as possible in response to their requests.
   C. Mobile device users tend to want immediate retrieval of time-sensitive information.

2. Which of the following statements is true when developing a mobile device application?
   A. You should build on the functionality of existing applications to promote familiarity and ease of use.
   B. You should create a unique schema for key and menu use so that you do not infringe on the copyrights of existing applications.
   C. You must designate the Escape key for returning to the previous screen.
   D. You must follow the keyboard and menu use specified by the MDA-42 specification.

3. Which of the following statements is true?
   A. When developing mobile device applications, you should follow a 60-second rule, meaning it should take the user no more than 60 seconds to navigate to the desired feature in your application.
   B. When developing mobile device applications, you should follow the 62\textsuperscript{nd} rule, which states that the application must provide information that is at least 98.2\% accurate.
   C. When developing mobile device applications, you should follow a 60-second rule, meaning the application should only display as much text as the user can read in 60 seconds or less.
   D. When developing mobile device applications, you should follow a 60-second rule, meaning the application should provide relevant information in 60 seconds or less to the end user.
Introduction to developing applications for mobile devices

Answers

1. C

2. A

3. D
Mobile devices are different from desktops in many ways, including physical characteristics and capabilities. Understanding these differences allows you to design mobile device applications that are suitable for the device and take advantage of its unique features.

The greatest difference between mobile devices and desktops is mobility. Users can take mobile devices anywhere, accessing the information and features they need at all times. In general, however, mobile devices have less computing power than desktops. They have less storage capacity and less memory than desktops, so they are not as suitable for running large, complex applications as desktops are. Mobile devices use battery power, so design your applications to perform tasks quickly with a minimum of power usage. Additionally, mobile devices have reduced screens and smaller keyboards than desktops; a good mobile device application makes efficient use of the screen and minimizes user input through the keyboard. Finally, because mobile devices use wireless access, their transfer rates are much slower than those of cabled devices, such as desktops. When designing a mobile device application, avoid including tasks that require users to upload or download large amounts of data.

When designing a mobile device application, you must also consider the needs and expectations of the users. Mobile device users expect speed, relevance, and ease of use with their mobile devices, and your application must meet those needs. Your application must execute tasks quickly, provide relevant information to the user in a way that is easy to see, and should follow existing conventions for menu and key usage.
1. Which of the following characteristics of a mobile device might cause a streaming video to appear choppy?
   - A. Reduced screen size
   - B. Slower transfer rates
   - C. Reduced keyboard size
   - D. User's unfamiliarity with the menu functions

2. Which of the following is best suited for use on a mobile device?
   - A. Running a full-featured word processor application
   - B. Hosting a streaming video site
   - C. Running a map application that provides directions based on current GPS coordinates
   - D. Running a development environment

3. If most mobile device applications use the Escape key to delete items:
   - A. You must use that functionality too, because the Escape key is the only button on a mobile device that can execute a delete command.
   - B. You should implement the same functionality, because the Escape key is larger and therefore easier to press on a mobile device than the Delete key.
   - C. You should implement the same functionality, because you can lessen the learning curve for your application by building on already-established conventions.

4. Read the following description of a mobile device application. Does this application meet the needs and expectations of mobile device users? Give three factors that support your answer.

   Description: An application provides sports score updates every minute, every hour, or whenever they change (for example, whenever a point is scored during a game). After launching the application, users specify how often they will receive updates by selecting Tools > Updates > Generate Updates > Configuration > Set Time. When it is time to display an update, the application pauses currently running applications and uses the full screen to show the update informa-
This information is displayed until the user clicks Close. All unviewed updates are stored locally and are displayed in chronological order the next time the user turns on the mobile device.

5. Describe how speed, relevance, and ease of use are related in terms of mobile device use.

6. Complete the following table of differences between mobile devices and desktops. The first item has been completed for you as an example.

<table>
<thead>
<tr>
<th>characteristic</th>
<th>desktop</th>
<th>mobile device</th>
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</thead>
<tbody>
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<td>memory</td>
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<td>less</td>
</tr>
<tr>
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<td></td>
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<tr>
<td>keyboard</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7. Read the following description of a mobile device application, then answer the questions.

Description: An application provides local maps based on the user’s current location. To start the application, the user clicks the map icon in the banner. By rolling the trackball up, the user can zoom in on the map to locate a specific address. If the user selects a specific location on the map, either by clicking it or typing the street address, the application provides real-time audio commands to direct the user based on the user’s GPS location (for example, “Turn left at the next intersection” and “Go straight through the intersection. Your destination is the second building on the left”). The user can then exit the application by pressing the Escape key.

Does this application support the user’s expectation of ease of use? Describe two features of the example application that support your answer.

Does this application support the user’s expectation of relevance? Name two features of the example application that support your answer.

Select three of the physical characteristics of mobile devices discussed in this chapter, and explain how the example application does or does not make good use of those characteristics.