7

THINGS YOU SHOULD KNOW ABOUT...
ANDROID

Scenario

A senior in microbiology, Fiona has added a guided studies practicum to her schedule this semester. She's excited to work with Dr. Joren on a project that analyzes the genomes of performing artists, but she wonders how she will juggle her coursework, her lab duties, and the blog posts required for the practicum. Her study partner, Drake, has an iPhone, which he plans to use in the practicum. Fiona's cellular carrier doesn't support the iPhone, however, so she chooses an Android phone that she hopes will meet her needs. Drake tells her that Evernote is a useful app for text and audio notes, and Fiona downloads the Android version.

The first day, as Dr. Joren explains to the students what they will be doing, Fiona types a few hasty observations. When Dr. Joren recommends an upcoming webinar, she connects to Google Calendar and enters a link to the site of the upcoming broadcast. Later that day, as she and Drake begin their joint work in the lab, she switches to voice input for her field notes so she can capture these notes while her hands remain free to execute the steps of her work or snap a photo. At the end of the session, she and Drake can share notes using the Notebook feature in Evernote. Fiona also purchases an Android-based tablet computer, which she can use on the bus to edit text, audio notes, and photos. By the time she gets home, her blog entry for Tuesday is done.

While Fiona is reading a genetics article on the tablet during breakfast one morning, a notice from Google Calendar pops up alerting her to the webinar recommended by Dr. Joren. She switches to Ustream and watches the live feed in which Dr. Marin describes work he is currently doing in Switzerland. She picks up her phone and texts Drake, who is watching on his iPad. She and Drake chat during the webinar and agree that Dr. Marin's work has particular relevance to their efforts in analyzing genetic markers relating to the ability to dance. She e-mails Dr. Marin with a summary of how his work applies to theirs. She asks for a 20-minute video-chat interview on the topic. He agrees, they talk, and Fiona sends the raw footage to Drake and to her laptop. On her laptop, she edits, trims, and posts the resulting five-minute video as her week's blog entry.

1 What is it?

Android is a Linux-based, open-source operating system designed for use on cell phones, e-readers, tablet PCs, and other mobile devices. For users of smart phones, Android provides easy access to social networking sites like Facebook, Twitter, and YouTube and smooth integration with Google products like Gmail, Google Maps, and Google Calendar. While it is owned by Google, it should not be confused with Google's Chrome OS, a web-resident, thin-client operating system designed primarily for netbooks and tablets rather than for mobile devices. Android has been adopted by a number of manufacturers, including Motorola, Samsung, HTC, and Sony Ericsson. The expanding assortment of applications available on this platform suggests that Android-based phones will continue to be strong competitors in the smart-phone market.

2 How does it work?

As a mobile platform, Android has grown in popularity among hardware manufacturers and the general public alike in recent years. Its open market model allows registered software developers to create applications for Android mobile devices in Java and list them in Android Market without undergoing review and waiting for approval. Users can download from a growing store of smart-phone applications at Google Market, many of which connect with existing Google services. They can also download compatible Android apps from other locations. Flexible and adaptable, Android's facility in supporting screen-based interfaces has also made it the OS of choice for many industrial and consumer electronics, including navigation devices, set-top boxes, kiosks, self-checkout stands, medical equipment, netbooks, tablets, and e-readers.

3 Who's doing it?

Computer science departments at numerous colleges and universities are embracing development for the Android platform. A grant from Qualcomm and Vodafone this year, for example, funded a student contest for the best learning-focused application built on the Android platform at the University of Illinois at Urbana-Champaign. Engineering doctoral students from the University of Washington work at Google's Seattle offices to refine the Open Data Kit that they created. This free data-collection platform, built on Android, is designed for use with mobile devices in the developing world, where data collection equipment is in short supply and is often too costly for practical use. In Europe, a student team at the University of Applied Sciences, Northwest Switzerland, wrote a technical report called "Using Android in Industrial Automation," which details the custom hardware front end the students built for Android and explains its use in mobile technology.

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4 Why is it significant?

As a free mobile OS, Android has been selected by many hardware manufacturers to run on a wide range of devices, including cell phones, tablets, e-readers, netbooks, and others. Android-based phones are available from all major cellular providers in the U.S. market, meaning that most students can select a phone running Android from the vendor their friends or families already use. Consequently, Android may bring smart phone and tablet functionality to a much wider cross-section of students and faculty members. Like the iPhone, an Android device may offer intriguing possibilities with regard to context awareness. Android phones can be set up to recognize when the phone operator is in a car, causing the device to respond by reading text messages aloud and accepting only voice input. Or cell phones could silence automatically during class time if users' calendars include class schedules. Such location-awareness could see use in campus-based learning activities like augmented reality games or could remind a student in the library pursuing an English assignment that a previously requested physics text is now available for checkout.

5 What are the downsides?

Platform fragmentation is an issue for Android OS devices. Vendors do not have uniform policies with respect to OS upgrades and version control, so new application releases may not work reliably across all Android devices. Further, while the number of applications available for Android is growing, it continues to trail the number available from the iTunes store. Fewer applications could mean less flexibility for students who wish to utilize Android devices in their schoolwork. For developers, the variety of device types and form factors that use Android make development more expensive; they must adapt their applications to a variety of screen sizes and manufacturer specifications, test the results on each appropriate device, and ensure compatibility and functionality across the board. As a result, users may find an application does not function exactly the same way on all Android phones and may present different variations when compared to its iOS equivalent, something that could complicate the efforts of faculty members and students working on learning activities in a mixed iPhone/Android environment. Finally, Android applications may pose some privacy or security concerns because, unlike Apple, Google does not oversee or approve third-party Android apps before they go to market. For example, in a joint study by Duke University, Penn State University, and Intel, researchers studied a random selection of free Android applications and found that half of them sent private information including GPS coordinates and phone numbers to remote servers without seeking permission or notifying users.

6 Where is it going?

The Android OS may accelerate the diffusion of smart phones by providing a free operating system that can draw from more than 100,000 applications, including those that support teaching and learning. Access to the Android software development kit (SDK) suggests that the number of applications will continue to swell as professional developers provide new offerings. In addition, the App Inventor, which provides a web-based visual development environment for those new to this kind of programming, is meant to entice students and developers from outside the computer science department to write their own applications and thereby ensure a growing base of apps going forward. If App Inventor proves easy enough for non-developers to use, faculty members and students alike may build custom Android applications for research projects, learning challenges, and classroom use. This could engage student interest in the work they do and also in the tools they use, thereby transforming them from consumers of existing applications to creators of apps designed to meet their needs.

7 What are the implications for teaching and learning?

The popularity of smart phones among consumers means developers must assess the spectrum of operating systems upon which these devices run and determine where their efforts will be best spent. Android and iOS, being the two biggest players in this market, will continue to offer their users similar functionality, making it increasingly practical for the faculty to design mobile-based teaching and learning activities. Android, by increasing the user base, might hasten the integration of mobile technology into the learning experience and give students and faculty new ways to interact with content. Many of the tools that support mobile learning are often better suited to communication and data-gathering than to creative efforts like writing a paper, putting together a video retrospective, building a series of charts and graphs, or making a class presentation. Like Apple's iOS products, Android can integrate with devices including laptops, netbooks, and tablets, though in the case of Android, the list of connectable devices is longer. This interconnectivity provides an easy way for students to move data from their smart phones to locations where it can be shared with others and used in the construction of individual and group projects.