GLOBAL EDITION

E-commerce 2023–2024

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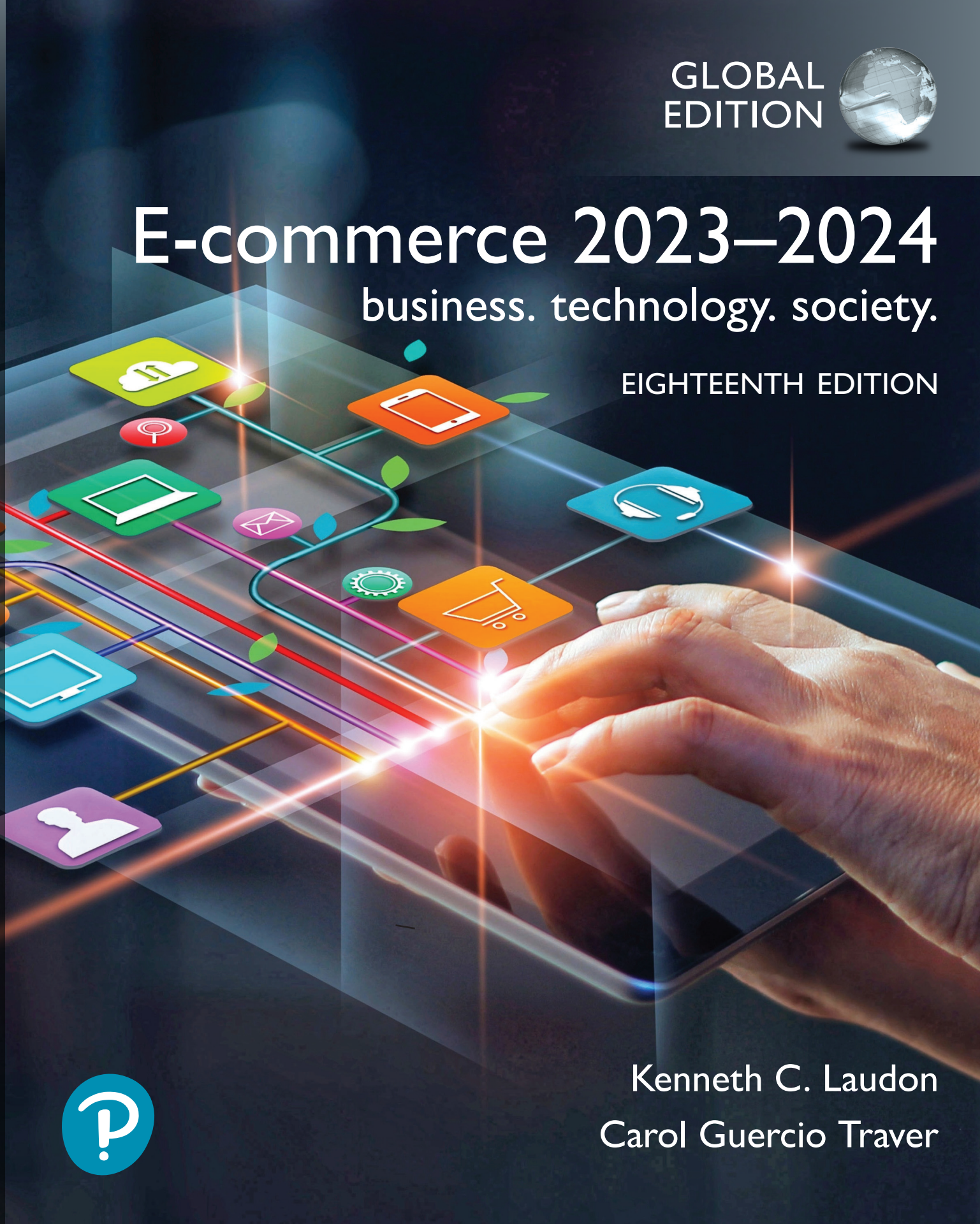
EIGHTEENTH EDITION



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Chapter-Opening Cases, Insight Cases, and Case Studies

environment for server-side applications (including mobile). Node.js is one of the most popular server-side developer frameworks, used by companies such as PayPal, Walmart, and LinkedIn, resulting in JavaScript remaining a vital language not just for web development but also for platform as a service (PaaS) applications.

There are also a number of other tools based on JavaScript that help automate the process of creating web applications. React and Vue are open-source JavaScript libraries for building user interfaces. AngularJS (sometimes also referred to as Angular.js) is another popular tool. AngularJS is a JavaScript-based open-source front end web application framework that extends the functionality of HTML. D3.js (short for Data Driven Documents) is a JavaScript library for visualizing data with HTML, SVG, and CSS. jQuery is a cross-platform JavaScript library designed to simplify the client-side scripting of HTML. Ajax (asynchronous JavaScript and XML) uses a variety of different tools, including JavaScript, to allow web pages to be updated asynchronously (i.e., updating only parts of the page rather than having to reload the entire page to change just part of the content). TypeScript is an open-source programming language developed and maintained by Microsoft that is designed for the development of large applications. It is included in Microsoft's Visual Studio software development package. Typescript is a superset of JavaScript, building on JavaScript but with extra development tools. Existing JavaScript programs are also valid TypeScript programs. TypeScript can be used to develop both client-side and server-side JavaScript applications. The use of TypeScript has soared over the past several years (Krill, 2022).

Active Server Pages (ASP) and ASP.NET

Active Server Pages (ASP)
a proprietary software development tool that enables programmers using Microsoft's IIS to build dynamic pages

ASP.NET
the successor to ASP

Active Server Pages (ASP) was invented by Microsoft in late 1996 and grew rapidly to become the major technique for server-side web programming in the Windows environment. ASP enables developers to easily create and open records from a database and execute programs within an HTML page as well as handle all the various forms of interactivity found on e-commerce sites. ASP permits an interaction to take place between the browser and the server. However, ASP programs are restricted to use on Windows servers running Microsoft's IIS web server software. **ASP.NET**, first released in January 2002 and part of Microsoft's .NET framework, is the successor to ASP. The current version of ASP.NET features a modern, cross-platform web framework for cloud and regular application servers.

ColdFusion

ColdFusion
an integrated server-side environment for developing interactive web applications

ColdFusion is an integrated server-side environment for developing interactive web and mobile applications. Originally developed by Macromedia and now offered by Adobe, ColdFusion combines an intuitive, tag-based scripting language and a tag-based server scripting language (CFML) that lowers the cost of creating interactive features. ColdFusion offers a powerful set of visual design, programming, debugging, and deployment tools, including the ability to create mobile apps, robust security features, and support for interoperability. The most recent version, Adobe ColdFusion 2021/2020, offers a new administrative user interface, improved object-oriented programming support, express and modular installation features, and enhanced cloud and security tools (Atteo, 2022).

PHP, Ruby on Rails (RoR), and Django

PHP is an open-source, general-purpose scripting language that is most frequently used in server-side web applications to generate dynamic web page content, although it can also be used for client-side graphical user interface applications. PHP is also a part of many web application development frameworks, such as CakePHP, CodeIgniter, and others, and is also part of the LAMP (Linux, Apache, MySQL, PHP) open-source web development model for building dynamic websites and web applications (Perl and Python are sometimes substituted for PHP in some LAMP projects). According to W3Techs, PHP is, by far and away, the most commonly used server-side scripting language (used by more than 75% of the websites whose server-side programming language it was able to identify), with ASP.NET a distant second, used by around 8%; followed by Ruby on Rails at 6%; Java, with only about 4%; Scala (a general-purpose programming language that has the capability to interoperate with Java and JavaScript) at around 2.5%; JavaScript at about 2%; and Python at a little more than 1%. ColdFusion and Perl were both used by fewer than 1% (W3techs.com, 2022). Hackers often try to exploit PHP code and use it for a variety of attacks, such as SQL injection, code injection, and phishing attacks.

PHP
an open-source, general-purpose scripting language

Ruby on Rails (Ruby, RoR, or Rails) is an open-source web application framework based on the Ruby programming language. RoR is based on a philosophy known as convention over configuration, or coding by convention (CoC), which means that the framework provides a structured layout that minimizes the number of decisions that the programmer needs to make, thereby simplifying and speeding development. JavaScript and Ajax are highly integrated into RoR, which makes it easy to handle Ajax requests for page updates. Ruby was very popular in the early 2000s, but in the last several years, it has fallen out of favor somewhat. Some well-known websites based on RoR include Shopify, Groupon, Etsy, Kickstarter, Hulu, and Airbnb (Rejman, 2022).

Ruby on Rails (Ruby, RoR, or Rails)
an open-source web application framework based on the Ruby programming language

Django is also an open-source web application framework. It is based on the Python programming language. Django is optimized for the creation of complex, database-driven websites. It allows for fast development, focuses on automating as much as possible, emphasizes the reusability of various components, and follows the DRY (Don't Repeat Yourself) programming principle. Some well-known websites based on Django include Instagram, Spotify, Pinterest, Dropbox, NASA, and Quora (Citrusbug.com, 2021).

Django
an open-source web application framework based on the Python programming language

Other Design Elements

One easy way to pump up the energy on your website is to include some appropriate widgets (sometimes called gadgets, plug-ins, or snippets). **Widgets** are small chunks of code that execute automatically in your HTML web page. They are prebuilt, and many are free. Social networks and blogs use widgets to present users with content drawn from around the Web (news headlines from specific news sources, announcements, press releases, and other routine content), calendars, clocks, weather, games, and other functionality. You can copy the code to an HTML web page. You can find widgets at Apple's Dashboard Widgets, Wolfram|Alpha Widgets, and SIMILE Widgets. There are also widgets for specific platforms such as WordPress, Amazon, and Pinterest.

widget
a small, prebuilt chunk of code that executes automatically in your HTML web page; capable of performing a wide variety of tasks

Mashups are a little more complicated and involve pulling functionality and data from one program and including it in another. The most common mashup involves using Google Maps data and software and combining it with other data. For instance, if

you have a local real estate website, you can download Google Maps and satellite image applications to your site so that visitors can get a sense of the neighborhood. There are thousands of Google Map mashups, from maps of political protests to maps of the Fortune 500 companies, all with associated news stories and other content. Other mashups involve sports, shopping, and news.

PERSONALIZATION/CUSTOMIZATION TOOLS

You will definitely want to know how to treat each customer on an individual basis and emulate a traditional, face-to-face marketplace. *Personalization* (the ability to treat people based on their personal qualities and prior history with your site) and *customization* (the ability to change the product to better fit the needs of the customer) are two key elements of e-commerce that potentially can make it nearly as powerful as a traditional marketplace and perhaps even more powerful than shopping at an anonymous suburban shopping mall. Speaking directly to the customer on a one-to-one basis, and even adjusting the product to the customer, is quite difficult in the usual type of mass marketing, one-size-fits-all commercial transactions that characterize much of contemporary commerce.

Website personalization involves altering a website based on who is viewing it, by serving dynamic content, messages, and offers tailored to the individual. E-commerce customization focuses on generating personalized product recommendations, including both similar and complementary items.

There are a number of methods for achieving personalization and customization. One basic method involves the placement of cookie files on the user's client computer. A cookie is a small text file placed on the user's client computer that can contain any kind of information about the customer, such as customer ID, campaign ID, or prior purchases at the site. When the user returns to the site, or indeed goes further into the site, the customer's prior history can be accessed from a database. Information gathered on prior visits can then be used to personalize the visit and customize the product. We discuss the use of cookies and other behavioral tracking tools further in Chapter 6.

There are also a number of other, more sophisticated tools available that offer intelligent customer segmentation, personalization, and individualized product recommendations. Examples include Kibo Montetate and Barilliance. Most e-commerce suites, such as Salesforce Commerce Cloud, include similar functionality. At the other end of the spectrum, Google Optimize is a free tool that can customize a website based on visitor location, browser device, and digital behavior.

privacy policy
a set of public statements declaring to your customers how you treat their personal information that you gather on the site

accessibility rules
a set of design objectives ensuring that users with disabilities can effectively access your site

THE INFORMATION POLICY SET

When developing an e-commerce site, you will also need to focus on the set of information policies that will govern the site. You will need to develop a **privacy policy**—a set of public statements declaring to your customers how you treat their personal information that you gather on the site. You also will need to establish **accessibility rules**—a set of design objectives ensuring that users with disabilities can effectively access your site. There are more than 650 million people worldwide who have a disability, many of whom may require special help in order to be able to access computers or mobile devices (see *Insight on Society: Designing for Accessibility*). E-commerce information policies are described in greater depth in Chapter 8.

INSIGHT ON SOCIETY

DESIGNING FOR ACCESSIBILITY

About 10% of the population worldwide has a disability that affects their ability to use the Internet. There are approximately 360 million people worldwide with hearing loss and 285 million with significant vision loss. Although these and other disabilities, such as motor and mobility impairments, can be addressed with intelligent software and hardware design, oftentimes, they are not. As a result, the Internet and mobile devices can be unfriendly places for many people with disabilities.

How can designers build in accessibility? One tool is screen-reader software. The screen-reader software is looking for ASCII text, which it can convert to speech or Braille. Examples of such software include Freedom Scientific's Job Access with Speech (JAWS) and VoiceOver, a free, built-in screen reader available on all Apple computers running Mac OS X Tiger or later.

There are also several simple strategies web designers can use to improve accessibility. Embedding text descriptions behind images allows screen readers to announce those descriptions. Allowing users to set the color and font schemes also can make a difference for the visually impaired. Adding screen magnification tools and sound labels where hyperlinks appear are two additional ways to increase accessibility. For those who are hearing impaired, access to close-captioned video with subtitles can also be helpful. These are examples of "equivalent alternatives" that disability advocates suggest should be required for both visual and auditory content to ensure that individuals with disabilities have equal access to information that appears onscreen.

The Web Content Accessibility Guidelines (WCAG) issued by the World Wide Web Consortium (W3C) provide organizations with strategies in web design for accommodating people with many different kinds of disabilities. The most current version of WCAG is WCAG 2.1, but W3C is now working on WCAG 3.0. The new version of WCAG is more extensive than the previous version and aims to accommodate more disabilities, cover a wider array of technologies, and be easier to update. For example, WCAG 3.0 will pay more attention to the needs of people with varying levels of impairment. It will be applicable to a variety of new technologies, such as wearable devices, voice assistants, Internet of Things technologies, augmented reality, virtual reality, and the metaverse. Although the final version is not expected to be published before 2023, companies can begin to prepare for it based on the draft version currently available.

Ensuring accessibility of mobile devices has its own set of issues, in many instances even more challenging than those associated with the Web. The small size of the device, screen, and keypad presents its own problems. Third-party applications, such as text-to-speech/screen readers and screen magnifiers, are now becoming available, but much work still needs to be done. For instance, many mobile devices come equipped with voice control capabilities and audio alerts, which could be helpful to those with vision or motor difficulties, but in most cases, these are still limited to simple tasks and do not provide access to the full functionality of the device. In addition, the deaf community cannot rely on audio content or alerts, so developers need to provide text or other alternatives for auditory information. Those with impaired motor functionality also face great challenges

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in dealing with input to mobile devices. To deal with these challenges, WCAG 2.1 provides a number of additional guidelines for mobile accessibility.

Web accessibility is also a matter of government policy. Article 9 of the United Nations' Convention on the Rights of Persons with Disabilities requires that appropriate measures must be taken to ensure access to information and communications technologies for persons with disabilities on an equal basis with others as a matter of basic human rights. As of January 2023, 185 out of the 193 United Nations member countries have ratified the Convention. In 2020, the EU's Web Accessibility Directive, which applies to government agencies and their vendors, and which uses WCAG 2.1 as its framework, took effect, and going forward from that time, all new and existing public websites must conform to its requirements.

The European Accessibility Act (EAA), first proposed by the European Commission in 2015, is another significant step forward in accessibility. In 2019, the EAA was approved and began a three-year transition period during which nation-states must enact specific versions of the Act into their national laws, followed by another three-year period in which its provisions must be fully implemented, by 2025. The EAA sets accessibility requirements for certain products and services, including computers and operating systems, banking services, smartphones, digital television services, transportation services, e-books, and e-commerce. The requirements set forth what features must be accessible, such as a user interface, but do not mandate specific technical solutions.

Various countries have also implemented accessibility legislation. In many cases, standards apply only to government agency websites and not private websites. For example, French law requires all French public websites to comply with its standard, RGAA 3, which is based on WCAG 2. In Germany, all government websites must comply with BITV 2 (also based on WCAG 2). One exception is Australia, which requires non-government as well as government websites to comply with WCAG 2. In the UK, service providers must make reasonable adjustments to ensure that their websites are accessible to all users. In determining what is reasonable, the Statutory Code of Practice indicates that factors to be taken into account include the service provider's financial and other resources, the amount of resources already spent on making adjustments, and the extent of any disruption that it would cause the service provider. Large companies will clearly have a more difficult time justifying any failure to make their websites accessible. In the United States, several statutes impose various obligations with respect to accessibility.

Still, there's a long way to go. According to WebAIM's 2023 report on the accessibility of the home pages of the top 1 million websites, more than 96% had WCAG 2.0 failures. At the same time, the need for website and mobile app accessibility has been emphasized by the Covid-19 pandemic. As the pandemic surged, governments around the world required people to remain at home, limiting their ability to interact with society other than through online methods. In such a world, it is even more critical that websites and apps be accessible to all, including those who have a disability.

SOURCES: "Web Content Accessibility Guidelines (WCAG) 2.1: W3C Recommendation 05 June 2018," W3.org, accessed April 1, 2023; "The WebAIM Million," Webaim.org, February 15, 2023; "The European Accessibility Act: Everything You Need to Know," by Ran Ronen, Forbes.com, May 11, 2022; "The Future of Web Accessibility: WCAG 3.0," by Ran Ronen, Forbes.com, March 11, 2022; "Key EU Web Accessibility Directive Deadline Passes," Boia.org, October 2, 2020; "European Accessibility Act: Final Steps on the European Level—First Steps on the National Level," by David Hay, Eud.eu, March 13, 2019; "Government Accessibility Standards and WCAG 2," by Mark Rogers, Powermapper.com, November 28, 2017; "Commission Proposes to Make Products and Services More Accessible," European Commission, December 2, 2015; "Tough New EU Public Sector Web Accessibility Rules Take Shape," by Dan Jellinek, UKAuthority.com, March 4, 2014.

4.6 DEVELOPING A MOBILE WEBSITE AND BUILDING MOBILE APPLICATIONS

Today, building a website is just one part of developing an e-commerce presence. Given that more than 90% of all Internet users access the Web at least part of the time from mobile devices, businesses today need to develop mobile websites and mobile web apps, native apps, or hybrid apps in order to interact with customers, suppliers, and employees. Deciding which of these extended web presence tools to use is a first step.

There are different kinds of m-commerce platform offerings to consider, each with unique advantages and costs. A **mobile website** is a version of a regular website that is scaled down in content and navigation so that users can find what they want and move quickly to a decision or purchase. You can see the difference between a regular website and a mobile site by visiting the Amazon website from your desktop computer and then from a smartphone or tablet computer. Amazon's mobile site is a cleaner, more interactive site suitable for finger navigation and efficient consumer decision making. Like traditional websites, mobile websites run on a firm's servers and are built using standard web tools such as server-side HTML, Linux, PHP, and SQL. Like all websites, the user must be connected to the Web, and performance will depend on bandwidth. Generally, mobile websites operate more slowly than traditional websites viewed on a desktop computer connected to a broadband office network. Most large firms today have mobile websites.

mobile website
a version of a regular desktop website that is scaled down in content and navigation

A **native app** is an application designed specifically to operate using a mobile device's hardware and operating system. These stand-alone programs can connect to the Internet to download and upload data and can operate on this data even when not connected to the Internet. You can download a book to an app reader, disconnect from the Internet, and read your book. Because the various types of smartphones have different hardware and operating systems, apps are not "one size fits all" and therefore need to be developed for different mobile platforms. An Apple app that runs on an iPhone cannot operate on Android phones. As you learned in Chapter 3, native apps are built using different programming languages depending on the device for which they are intended, which is then compiled into binary code, and which executes extremely quickly on mobile devices. For this reason, native apps are ideal for games, complex interactions, on-the-fly calculations, graphic manipulations, and rich media advertising.

native app
an application designed specifically to operate using a mobile device's hardware and operating system

A **mobile web app** is an application built to run on the mobile web browser built into a smartphone or tablet computer. In the case of Apple, the native browser is Safari. Generally, a mobile web app is built to mimic the qualities of a native app using HTML5, CSS, and JavaScript. Mobile web apps are specifically designed for the mobile platform in terms of screen size, finger navigation, and graphical simplicity. Mobile web apps can support complex interactions used in games and rich media; can perform real-time, on-the-fly calculations; and can be geo-sensitive using the smartphone's built-in global positioning system (GPS) function. Mobile web apps typically operate more quickly than mobile websites but not as quickly as native apps.

mobile web app
an application built to run on the mobile web browser built into a smartphone or tablet computer

Increasingly, developers are combining elements of native apps and mobile web apps into hybrid apps. A **hybrid app** has many of the features of both a native app and a mobile web app. Like a native app, it runs inside a native container on the mobile device

hybrid app
an app that has many of the features of both a native app and a mobile web app