

## 1.6 Tour of the Book

In this section, we include walkthroughs of each chapter outlining the material covered. There will be terms in these sections that are unfamiliar to you. They will be defined in the chapters of the book. Every chapter ends with an Internet and World Wide Web Resources section that provides a listing of Web sites you should visit to enhance your knowledge of various wireless Internet and m-business topics. You may also want to visit [www.deitel.com](http://www.deitel.com) and [www.prenhall.com/deitel](http://www.prenhall.com/deitel) to keep informed of the latest information, book errata and additional teaching and learning resources.

### *Chapter 1—Introduction and Tour of the Book*

In this chapter, we introduced the wireless Internet and m-business and the profound implications they are having on the business world and our personal lives. We overviewed many of the technologies, protocols and programming languages discussed in the text. Brief introductions to the Internet and the World Wide Web, e-business and e-commerce were also presented. We also introduced many of the new and exciting applications that are emerging in the wireless industry.

### *Chapter 2—m-Business*

In this chapter, we begin to explore the emerging world of the wireless Internet and *m-business*. We consider how wireless applications increase productivity and reduce errors. For example, wireless devices can allow a doctor to review the patient's medical history and allergies at the time of prescription and transmit prescriptions from a patient's bedside to the pharmacy, reducing errors due to illegible handwriting. We also explore how individuals can access the Internet through wireless devices to check stocks, send e-mail, make retail purchases, monitor airline schedules and conduct many other daily transactions. We examine how m-business differs from e-business and how to accommodate these differences when building a Web site targeting a mobile audience. The chapter exercises direct students to the Web to investigate existing applications and challenge students to create new and exciting applications of their own.

### *Chapter 3—Location-Based Services and Location-Identification Technologies*

Chapter 3 examines location-based services and location-identification technologies—including Time Difference of Arrival (TDOA), Global Positioning System (GPS) and Enhanced Observed Time Difference (E-OTD)—which can determine a user's location within just a few meters. Location-based services are among the most beneficial features of wireless technology. They provide both convenience and peace of mind. For example, the ability to determine a user's position enables advertisers to send a promotion for the coffee flavor of the day as a coffee connoisseur passes a coffee shop, or it can help individuals find their way to the nearest police station, gas station or hospital. The E911 Act—the government mandate that requires all cell phones to host location-identification technologies—is also discussed. This mandate enables emergency rescue services to locate accident victims with a high degree of accuracy.

### *Chapter 4—e-Marketing and m-Marketing*

Competition is intense in the e-business, e-commerce, m-business and *m-commerce* worlds, and having solid e-marketing and *m-marketing* strategies can give a company an

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advantage. Wireless devices, the Internet and the World Wide Web provide marketers with new tools for marketing campaigns. In this chapter, we discuss the importance of tailoring a marketing strategy to include the online and wireless channels. We explore how the Internet and wireless devices can be included in the various components of a marketing campaign, including branding, marketing research, advertising, promotions, public relations and customer service. The development of the wireless Internet has greatly enhanced the ability of organizations to target consumers and deliver timely, relevant content. We also examine how location-based services and wireless technologies can deliver promotions, coupons, advertisements and customer service more effectively. The challenges of electronic and wireless marketing are also addressed, including the lack of wireless marketing standards, consumer and carrier acceptance and personalization versus privacy issues.

### ***Chapter 5—e-Payments and m-Payments***

The ability to complete monetary transactions securely using wireless devices is crucial to the future of m-commerce. M-wallets allow users to store payment information, such as billing and shipping addresses and credit-card numbers on a secure server. In this chapter, we review electronic payment technologies and discuss the future of monetary transactions via wireless devices. We learn about interoperability problems due to the variety of devices from which wireless payments can be made. Financial institutions and wireless companies have formed organizations to produce transaction models that solve interoperability issues. This chapter explores these m-payment models. Challenges facing the acceptance of wireless payment options are also discussed. We examine the companies that are developing wireless payment technologies, and describe the products, software and services offered. Payment options highlighted in this chapter include m-wallets, wireless micropayments, electronic bill presentment and payment, and digital cash. We also review the technologies enabling m-payments such as Bluetooth wireless technology, point-of-sale, bar coding and others.

### ***Chapter 6—Security***

To have a successful online or mobile business, it is essential to protect consumer information and ensure secure transactions. This requires authentication of the parties involved, verification of the information's integrity, privacy of the information and proof that the information was sent and properly received. This chapter examines security systems and technologies used to meet these requirements, including cryptography, digital signatures, steganography and the cutting-edge technology of biometrics. We also analyze the strengths and weaknesses of today's security standards, such as the Wireless Transport Layer Security (WTLS) protocol, smart cards and Virtual Private Networks. Viruses and denial-of-service attacks are discussed along with current solutions and prevention techniques. Security breaches and network attacks cause immense damage and loss of productivity and credibility to the affected individuals or organizations, making it essential for e-businesses and m-businesses to protect their customers and for customers to protect their own interests.

### ***Chapter 7—Legal and Social Issues; Web Accessibility***

In this chapter, we explore the effects of the Internet, the World Wide Web and wireless communication on us as individuals and as a society. Communication via wireless devices can improve our business operations, and our personal lives. We explore peer-to-peer communication enhanced by the ability to locate people geographically. Services such as Amer-

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ica Online's AIM (AOL Instant Messenger) are reviewed. Safety issues and health concerns associated with wireless communications, including a discussion of driving while using a mobile device and radiation emissions are reviewed. We explore how wireless communication and location-identification technologies can enhance the lives of people with disabilities. A discussion of various laws and mandates that require e-businesses and Web-site owners to meet the needs of these individuals is also included. We investigate privacy issues, such as using wireless location-based technologies to target and track people, and explore the ways in which constant availability will affect our daily activities. Defamation, copyright infringement, sexually explicit speech and cybercrime are also discussed.

***Chapter 8—International Wireless Communications***

The wireless Internet and mobile communications are exploding worldwide. This chapter examines the cultural and technological reasons why numerous countries lead the United States in wireless communications. International regulation and licensing of wireless communications and their effects on the development of global m-business are examined. We review a variety of wireless applications, including wireless Internet access, wireless Internet content portals, Short Messaging Service (SMS), stock trading and grocery ordering. This chapter examines the cell-phone markets in regions including Asia, Europe, North and South America and Africa. We explore how to create a global m-business; globalization issues, such as the different cultural perspectives on location tracking, personalization and privacy are also discussed.

***Chapter 9—Wireless Communications Technologies: Part 1***

Although in its early stages, wireless communications technologies are developing rapidly. New products and protocols are being created, while new challenges continue to surface. In this chapter, we examine the hardware, including PDAs, cell phones and hybrid devices, used to conduct wireless transactions. Wireless carriers, such as Verizon, Nextel, AT&T and Sprint are also discussed. We consider the short-messaging service (SMS), one of the most popular wireless applications. We explore SMS applications, as well as a variety of other services, including voice capabilities, e-mail and wireless Internet access. Wireless networks, such as Wireless Local Area Networks (WLANs), Wireless Wide Area Networks (WWANs) and Wireless Personal Area Networks (WPANs) are discussed. Standards for wireless communication networks including 802.11a, 802.11b, 802.11e, 802.11g and HiperLAN/2 and other developments in wireless networks, are presented. Finally, wireless communication technologies, such as infrared, laser communication and satellite transmission are introduced.

***Chapter 10—Wireless Communications Technologies: Part 2***

In this chapter, we discuss the various wireless communications standards employed in the U.S. and around the world, including 2.5G and third generation (3G) technologies. We introduce Advanced Mobile Phone Service (AMPS), Global System for Mobile Communication (GSM), Code Division Multiple Access (CDMA), Time Division Multiple Access (TDMA), Wideband Code Division Multiple Access (W-CDMA) and CDMA2000. We also consider key programming technologies associated with wireless communications such as Wireless Application Protocol (WAP—we explore WML and WMLScript), Java 2 Micro Edition (J2ME—we include an appendix introducing Java programming), Compact HyperText Markup Language (cHTML), eXtensible Markup Language (XML) and eXten-

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sible Hypertext Markup Language (XHTML and XHTML Basic). Proprietary platforms, such as Qualcomm's Binary Run-Time for Wireless (BREW) are also discussed. BREW is covered in more detail in Chapter 29, BREW.

### ***Chapter 11—Palm™ and Palm OS®***

In this chapter, we focus on the Palm™ handheld and other devices running the Palm® operating system. We introduce various devices, their capabilities and their features. We explore wireless Internet access, how to choose a wireless Internet access service and how to enable your wireless PDA. Chapter 11 also provides in-depth explorations of wireless Palm™ applications, such as databases, travel reservations, games, business resources and many others. We examine Palm®'s operating system and how it controls PDAs. We discuss memory, processors, security issues and data input sources. We explain how the system runs applications, and we list tools and resources available to developers for creating applications for Palm OS®. We also present a long list of wireless application resources.

### ***Chapter 12—Microsoft® Windows CE, Pocket PC and Stinger***

In this chapter, we focus on Pocket PC devices. This includes those manufactured by Compaq, Casio and Hewlett-Packard. We discuss the history and development of Microsoft's mobile operating systems, including Stinger—Microsoft's scaled-down version of Windows CE built for smart phones. We discuss the features of Pocket PC devices that run on the Windows CE operating system. We explore wireless Internet access, how to choose a wireless Internet access program and how to set up your wireless devices. We examine various aspects of Windows CE, including memory, embedded systems, processors, security and running applications. We discuss specific applications and software types as well as development tools available to enhance Pocket PC capabilities. We also compare Pocket PCs and Windows CE to Palm OS®-based devices and desktop computers. Finally, we look to the future of the Pocket PCs within the mobile devices market.

### ***Chapter 13—Introduction to Wireless Markup Language (WML): Part 1***

In this chapter, we begin to explore WML—the Wireless Markup Language. WML is a markup language for describing the elements of a WAP application, so a wireless browser, such as Openwave's Mobile Browser, can render (i.e., display) that page. We introduce the basics of creating WAP applications in WML using our LIVE-CODE™ approach. Every concept is presented in the context of a complete, working WML document followed by the screen output produced when the WML document containing the program is rendered by a wireless browser. We write several WAP applications. The next chapter introduces more sophisticated WML techniques, such as tables, which are useful for presenting and manipulating information from databases. We introduce basic WML tags and attributes. As the book proceeds, you will be able to create increasingly appealing and powerful WAP applications. Some key topics covered in this chapter include: incorporating text and images in a WML document, linking to other WML documents, incorporating special characters (such as ampersands) into WML documents and separating parts of WML documents with horizontal lines (called horizontal rules).

### ***Chapter 14—Introduction to Wireless Markup Language (WML): Part 2***

In this chapter, we discuss more advanced WML elements and features, and we demonstrate how to present information in tables. We discuss how to collect information from

people browsing a Web site. We explain how to use internal linking to make WAP applications easier to navigate. By the end of this chapter, we will have covered the most commonly used WML tags and features that enable users to create more complex and visually appealing WAP applications.

### ***Chapter 15—WMLScript: Introduction to Scripting***

Chapter 15 presents our first WMLScript programs (called scripts). Scripting helps WAP applications “come alive” by manipulating elements dynamically as the client browses that page. Chapters 15 through 20 present the features of the WMLScript scripting language. WMLScript enables us to present many fundamental computer-science concepts to the same extent as other programming languages (such as C, C++ and Java) but in the context of the wireless Internet. Using our LIVE-CODE™ approach, every concept is presented in the context of a complete, working WMLScript program that is immediately followed by WML document that references it and the screen output. The chapter introduces nonprogrammers to basic programming concepts and constructs. The scripts in this chapter illustrate how to write (output) text to a WAP application for display and how to obtain (input) data from the user. Chapter 15 also provides detailed treatments of decision making and arithmetic operations. After studying this chapter, the student will understand how to write simple, but complete, WMLScript programs.

### ***Chapter 16—WMLScript: Functions***

Chapter 16 takes a look inside WMLScript's executable units called functions. We discuss predefined WMLScript functions and programmer-defined functions. The techniques presented in Chapter 16 are essential to the production of properly structured programs. Unlike HTML and JavaScript, WMLScript cannot be embedded in a WML deck. WMLScript is contained in its own document consisting of one or more functions. WMLScript functions are executed as a result of a function call in the WML deck. We introduce events and event-handling elements required for programming graphical user interfaces (GUIs) in WML forms. Events are notifications of state changes such as button clicks. WMLScript allows programmers to respond to various events by coding functions called event handlers. This begins our discussions of event-driven programming—the user drives the program by interacting with GUI components and the scripts respond to the events by performing appropriate tasks (event handling). The event-driven programming techniques introduced here are used in scripts throughout the book.

### ***Chapter 17—WMLScript: Control Structures I***

Chapter 17 focuses on the program-development process. The chapter discusses how to take a problem statement (i.e., a requirements document) and develop a working WMLScript program, including performing intermediate steps in a program development tool called pseudocode. The chapter introduces some simple control structures used for decision making (**if** and **if/else**) and repetition (**while**). We examine counter-controlled repetition and sentinel-controlled repetition, and we introduce WMLScript's increment, decrement and assignment operators. The chapter uses simple flowcharts to illustrate the flow of control through each type of control structure. This chapter helps the student develop good programming habits in preparation for dealing with the more substantial wireless programming tasks in the remainder of the text.

**Chapter 18—WMLScript: Control Structures 2**

Chapter 18 discusses much of the material WMLScript has in common with the C programming language, especially the sequence, selection and repetition control structures. Here we introduce an additional control structure for repetition (**for**). This chapter also introduces several operators that allow programmers to define complex conditions in their decision-making and repetition structures. The chapter uses flowcharts to show the flow of control through each of the control structures and concludes with a summary that enumerates each of the control structures. The techniques discussed in Chapters 17 and 18 constitute a large part of what traditionally has been taught in universities under the topic of structured programming.

**Chapter 19—WMLScript: Objects**

This chapter begins our discussion of object-based programming with WMLScript's built-in objects. The chapter discusses terminology and overviews the WMLScript **Float**, **Language**, **URL** and **WMLBrowser** object's methods.

**Chapter 20—WMLScript: Strings and Characters**

In this chapter, we introduce WMLScript's **String** object. The **String** object facilitates the processing of words, sentences, characters and groups of characters. The **String** object performs string manipulation functions such as searching and extraction. In this chapter, we provide several examples of WMLScript's string-processing capabilities with the **String** object.

**Chapter 21—Web Clipping**

Chapter 21 introduces Web-clipping technology for Palm™ handhelds. The chapter focuses on designing Web-clipping applications. It contains directions for downloading the Palm™ OS emulator and the Web Clipping Application Builder, which are software packages needed to test and run Web-clipping applications. This chapter explores the main goal of Web-clipping application design—overcoming the handheld's slow transfer time by storing files in Web-clipping applications. The chapter also discusses how to store and access files within Web-clipping applications for faster transfer speeds as well as using hyperlinks, graphics, tables and colors.

**Chapter 22—i-mode**

i-mode has taken Japan by storm and is leading the way to 3G technology for wireless devices. This chapter discusses the history of Japan's telecommunications system and how the market for i-mode developed. We explore i-mode technology and the devices with which it is used. The standards behind i-mode, such as CDMA, PCP-D and W-CDMA, are introduced. We also include a programming introduction to Compact HyperText Markup Language (cHTML), which is used to create i-mode applications. We examine the potential for i-mode and its provider, NTT DoCoMo, in Japanese and international markets. We discuss the future of i-mode technology, 3G technology, and what impact 3G will have on the global wireless communications market.

**Chapter 23—Bluetooth™ Wireless Technology**

This chapter explores Bluetooth wireless technology. Conceived by Ericsson in 1994, Bluetooth wireless technology provides short-range, low-power communications between

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devices with embedded Bluetooth modules. More than 2200 companies have joined the Bluetooth Special Interest Group (SIG) since 1998. We chronicle the history of Bluetooth wireless technology and the growth of the SIG. The technology will encourage cross-platform capabilities and be used with not only cell phones, PDAs and laptop computers, but also cars, locks and even refrigerators. We explore how Bluetooth wireless technology can be used to link numerous devices, and the benefits of interoperability among these devices. We also examine the profiles that guide Bluetooth application development and security issues. Bluetooth programming is introduced via a chat application. As of this writing, Bluetooth technology is early in its development cycle. It is most well formed in the “lower layers” of its protocols. It is not well developed at what is often call the “application layer”—the “target” for which most Deitel LIVE-CODE™ examples are written. So for this first edition of *Wireless Internet and Mobile Business How to Program* we have included a brief introduction to Bluetooth programming featuring code snippets rather than our traditional complete working LIVE-CODE™ examples. We expect to include LIVE-CODE™ examples in the second edition of this book and in our upcoming *Bluetooth Wireless Technology How to Program* book.

### **Chapter 24 and 25—XHTML Basic 1 & 2**

In these chapters, we provide an introduction to XHTML (eXtensible HyperText Markup Language) Basic. XHTML Basic is a scaled-down version of XHTML for Web clients like mobile phones, PDAs and pagers. When it is released, WAP 2.0 will include XHTML Basic. The XHTML Basic that will be supported by WAP devices will also support WML extensions that will add the functionality of WML to the functionality provided by XHTML Basic itself. The chapters discuss common XHTML Basic elements, headers, linking to other Web sites, using images, special characters, unordered and ordered lists, simple and complex forms and basic tables.

### **Chapter 26—Active Server Pages (ASP) and VBScript**

In this chapter we discuss Microsoft’s Active Server Pages (ASP), the first of the two key server-side technologies the book presents. Active Server Pages can be programmed in a variety of scripting languages—the most popular being Microsoft’s VBScript. We discuss VBScript, its use and its syntax. The case study in this chapter is an e-Learning program that addresses the needs of a programmer who develops wireless applications for several different clients, both wireline and wireless. The case study teaches a user what each Deitel tip icon illustrates as seen throughout the programming chapters in the book. We use a Microsoft Access database to store each tip’s information and use ASP to program the business logic—the so-called “middle tier.” The ASP on the server is programmed to “pipe out” content to three different clients—XHTML for a Web browser, WML and WMLScript for a WAP device and cHTML for an i-mode device. This is done by marking up the tip information using XML. This XML is then transformed to client-specific markup using XSL transformations.

### **Chapter 27—Server-Side Java Programming and Java 2 Micro Edition (J2ME), MIDP and MIDlets**

This chapter introduces Java wireless technologies by providing a Java implementation of the ASP case study that we presented in the last chapter. We begin our discussion by introducing Java 2 Micro Edition (J2ME), a Java platform popular for building mobile device

applications. We explain both the Connected Limited Device Configuration (CLDC) and the Mobile Information Device Profile (MIDP), that collectively provide an API (application programming interface) allowing programmers to design J2ME software. We focus exclusively on MIDP devices such as cell phones. To show how a J2ME client—called a MIDlet—operates with a server, we re-implement the ASP case study of the last chapter. This case study uses Java servlets—applications that extend server functionality—instead of ASP. The servlets use JDBC—an API that provides for database manipulation. The servlets store this information as an XML document, apply an XSL transformation to the document, then send the resulting content to multiple clients. These clients include Windows Internet Explorer (XHTML), i-mode devices (cHTML), WAP devices (WML) and J2ME clients (MIDlets).

#### ***Chapter 28—Microsoft .NET Mobile Framework***

The Microsoft .NET Mobile Framework is one of the newest technologies in the wireless world. Readers having a base knowledge of C++ and ASP .NET can use this chapter to create Web Forms, which can be converted automatically to WML and WAP. The student will also learn about Web Controls, or objects that can be added to a Web page. We discuss how to use this new technology to create wireless Web content, and how to make the information render differently depending on the device accessing the page.

#### ***Chapter 29—BREW (Binary Run-Time Environment for Wireless)***

Because of the lack of standardization in cell-phone hardware, developing an application for all cell phones on the market is a daunting task. BREW (Binary Run-Time Environment for Wireless) is a technology developed by Qualcomm to overcome this obstacle. If an application is developed for BREW, it will work on any BREW-enabled cell phone. The chapter outlines the features of BREW, gives an overview of the Brew SDK (software developers kit) and its environment and introduces how to program BREW applications. The BREW applications are written in the C++ programming language. [This chapter assumes a knowledge of C++.]

#### ***Chapter 30—Multimedia: Audio, Video and Speech Recognition***

This chapter discusses wireless multimedia technologies. A decade ago, the typical desktop computer's power—although considered substantial at the time—was inadequate for integrating high-quality audio and video into applications. Today's machines offer stunning multimedia capabilities via CD-ROMs and streaming audio and video over the Web. Even PDAs, Pocket PCs and cell phones have multimedia capabilities. Most wireless devices have audio and some even have video. Wireless multimedia is not without limitations. Wireless device performance and Internet bandwidths lag significantly behind those of desktop computers. However, an interesting rule of thumb in the computing industry is to plan for the impossible because the impossible has repeatedly become reality.

#### ***Chapter 31—Macromedia® Flash™***

Macromedia Flash is a cutting-edge multimedia application used to create interactive content for wireless devices and the World Wide Web. Until recently, only desktop computers could view Flash multimedia content, however the recent release of the Flash 4 Player for Pocket PC has given Pocket PCs much of the same Flash capabilities. This chapter teaches how to use Flash to create wireless applications for Pocket PCs. Creating Flash content for

wireless devices presents several challenges, even to the experienced Flash developer. Traditionally Flash has been used to add interactivity, sound, animation and video to Web sites. Wireless devices, however, cannot support the same level of interactivity due to lack of memory and lower processor speeds. This chapter teaches the fundamentals of Macromedia Flash while focusing on the portability, file size and usability issues specific to wireless development.

#### ***Appendix A—Introduction to Java Programming***

This Appendix introduces some of the key concepts in the Java language such as data types, control structures, user interfaces, event handling, multithreading, database access using Java Database Connectivity (JDBC) and servlets. The material in this appendix is necessary for understanding the case study that we present in Chapter 27.

#### ***Appendix B—Career Opportunities***

The Internet presents valuable resources and services for job seekers and employers. Automatic search features allow employees to scan the Web for open positions. Employers also can find job candidates using the Internet. This greatly reduces the amount of time spent preparing and reviewing resumes, as well as travel expenses for distance recruiting and interviewing. In this chapter, we explore career services on the Web from the perspectives of job seekers and employers. We introduce comprehensive job sites, industry-specific sites (including site geared specifically for Java and wireless programmers) and contracting opportunities, as well as additional resources and career services designed to meet the needs of a variety of individuals.

#### ***Appendix E—ASCII Character Set***

This appendix contains a table of the 128 alphanumeric symbols and their ASCII (American Standard Code for Information Exchange) numbers.

#### ***Appendix D—Special Characters and the Web***

A table shows many commonly used special characters, called the character entity references by the World Wide Web Consortium (W3C).

#### ***Appendix E—Unicode<sup>®</sup>***

This appendix overviews the Unicode Standard. As computer systems evolved worldwide, computer vendors developed numeric representations of character sets and special symbols for the local languages spoken in different countries. In some cases, different representations were developed for the same languages. Such disparate character sets made communication between computer systems difficult. XML and XML-derived languages, such as WML, support the Unicode Standard, which defines a single character set with unique numeric values for characters and special symbols for most of the world's languages. This appendix discusses the Unicode Standard, overviews the Unicode Consortium Web site and shows a WML example that displays "Welcome to Unicode!" in many languages.

#### ***Appendix F—Number Systems***

This appendix explains the binary, octal, decimal and hexadecimal number systems. It shows how to convert numbers between these bases and perform mathematical operations in each base. Readers of this book will be particularly interested in the hexadecimal number system.

**Appendix G—Colors and the Web**

An explanation of how to create colors using either color names or hexadecimal RGB values is provided, along with the table that matches colors to values.

**Appendix H—Extensible Markup Language (XML)**

Throughout the book, we have been emphasizing WML. This language derives from SGML (Standardized General Markup Language), which became an industry standard in 1986. SGML is employed in publishing applications worldwide, but it has not been incorporated into mainstream computing and information technology curricula. Its sheer size and complexity limit its use beyond heavy-duty, industrial-strength applications. The Extensible Markup Language (XML) is an effort to make SGML-like technology available to a much broader community. XML, a condensed subset of SGML, contains additional features for usability. XML differs in concept from WML. WML is a markup language, and XML is a language for *creating* markup languages. XML enables document authors to create their own markup for virtually any type of information. As a result, document authors use this extensibility to create entirely new markup languages to describe specific types of data, including mathematical formulas, chemical molecular structures, music and recipes. Markup languages created with XML include WML (Wireless Markup Language, Chapters 13 and 14), XHTML (Extensible HyperText Markup Language, for Web content), XHTML Basic (Chapters 24 and 25), MathML (for mathematics), VoiceXML™ (for speech), SMIL™ (the Synchronized Multimedia Integration Language, for multimedia presentations), CML (Chemical Markup Language, for chemistry) and XBRL (Extensible Business Reporting Language, for financial data exchange). XML is a technology created by the World Wide Web Consortium for describing data in a portable format. XML is one of most important technologies in industry today and is being integrated into almost every field. Every-day, companies and individuals are finding new and exciting uses for XML. In this appendix, we present examples that illustrate the basics of marking up data using XML. We demonstrate several XML-derived markup languages, such as MathML, CML, *XML Schema* (for checking an XML document's grammar), *XSLT (Extensible Stylesheet Language Transformations)*, for transforming an XML document's data into an XHTML document) and Microsoft's *BizTalk™* (for marking up business transactions). The reader interested in a deeper treatment of XML may want to consider our book, *XML How to Program*.