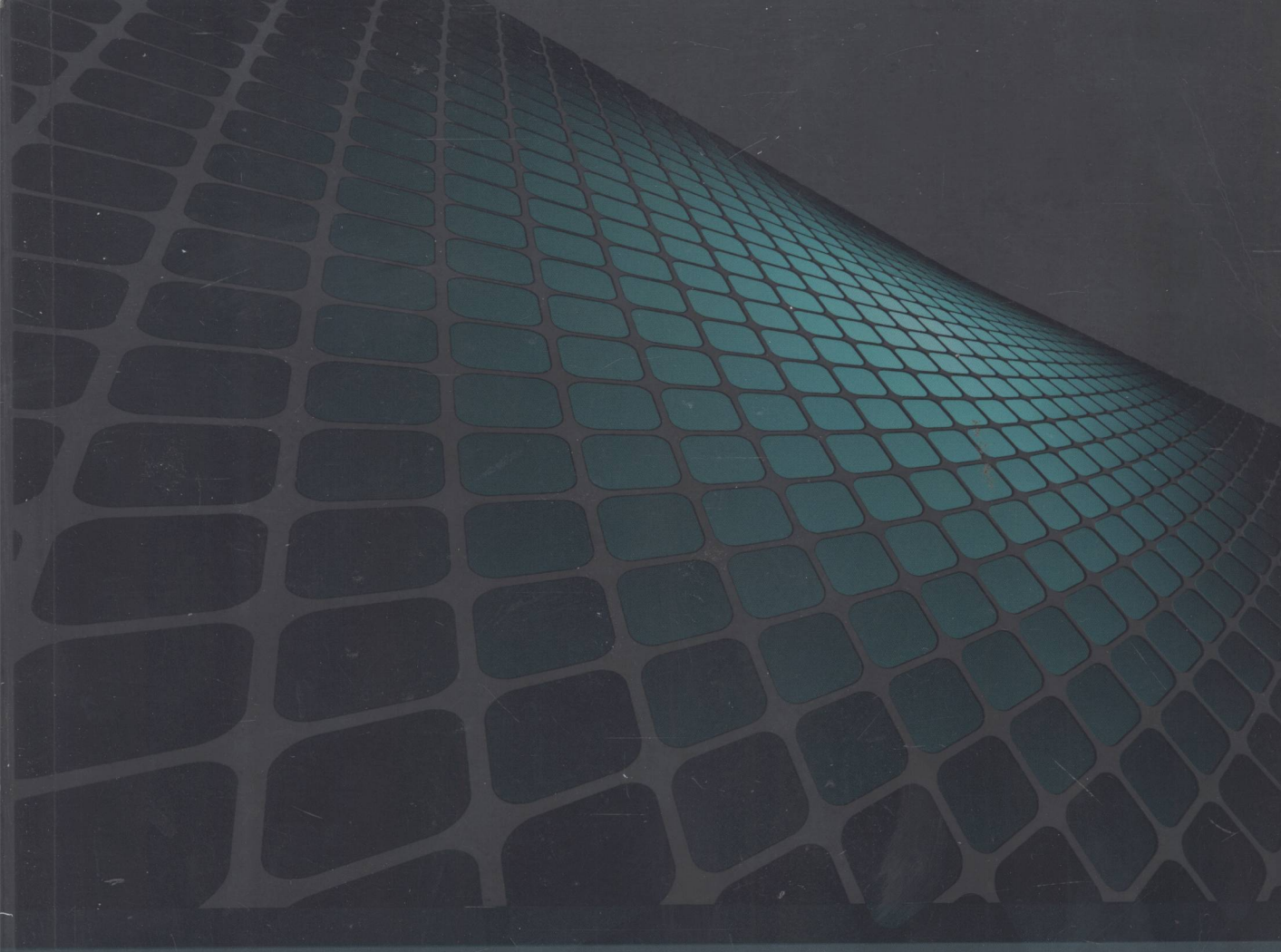

Web Application DESIGN PATTERNS

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Web Application Design Patterns

Pawan Vora

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Praise for *Web Application Design Patterns*

This is the type of book you'll want to read with your entire team and a flip chart because every page will produce a list of actionable changes for the applications you're developing. Pawan Vora has produced an amazing catalogue of the essential patterns for designing today's web-based applications.

— Jared Spool, Founding Principal, User Interface Engineering

A generation has watched the Internet work its way into every part of society as talented designers and developers have explored new user interfaces and as the most robust design patterns have emerged through the refining fire of hundreds of millions of users. Pawan Vora has done a wonderful service in capturing these best practices in *Web Application Design Patterns*. This book will be valuable to people ranging from those putting together their first website to those shaping corporate web experiences, and from practitioners to researchers benchmarking existing patterns as new interface paradigms are created.

— Arnie Lund, User Experience Director, Microsoft

Web Application Design Patterns is a must-read if you are in the business of designing web applications, or you simply want to understand the elements of a well-designed web application. Pawan Vora has condensed best practices, along with research and his solid experience, to create a useful reference about designing web applications. Even if you skim the book and look at the designs, it will spark creative design ideas.

— David Dick, Senior Member of STC, User and UX Special Interest Group

Excellent! A very complete and exhaustive overview of patterns for web applications with many previously undocumented patterns. This book is written in a very accessible way and will tell you (nearly) everything you need to know when designing web applications. A must-have for any designer!

— Martijn van Welie, Pattern Author, Philips Design

Dedication

To my little princess, Sumi

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Pawan Vora

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He has been a user experience professional for more than 14 years and has designed user interfaces for a range of applications for business-to-consumer, business-to-business, consumer-to-consumer, and business-to-employee environments. He has published and conducted a number of tutorials and in-house training workshops on web site design, web application design, and design patterns in the United States and internationally.

Pawan has a Ph.D. and M.S. in industrial engineering from the State University of New York at Buffalo in addition to his bachelor's degrees in production engineering and mechanical engineering from Victoria Jubilee Technical Institute in Mumbai, India.

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CHAPTER 1

Introduction

INTRODUCTION

Increasingly, software applications are built using web technologies and made accessible via web browsers (e.g., Internet Explorer, Firefox, Safari, and Opera). They are commonly referred to as *web applications*, or hosted applications—applications based on a software as a service (SaaS) model[1] or cloud computing.[2] These web applications are different from more traditional web sites in that their emphasis is on allowing users to accomplish tasks such as send email, make travel reservations, find homes, pay bills, transfer money, buy products, send invitations, and so forth (Figures 1.1 through 1.4). Web sites, on the other hand, are content oriented and are designed to facilitate browsing and consumption of rather static information (Figure 1.5).

BENEFITS OF WEB APPLICATIONS

The trend in favor of web applications is understandable in view of the benefits these applications offer, as described in the following sections (Baxley, 2003; Turnbull, 2006).

Ease of access

Typically, the only software users need to access and use web applications is a browser such as Internet Explorer, Firefox, Safari, and Opera. Users do not need to download and install separate software to use different web applications, although there are instances when they have to download helper applications

[1]SaaS is a software application delivery model where a software vendor develops a Web-native software application and hosts and operates it (either independently or through a third party) for use by customers over the Internet. Customers do not pay for owning the software; they subscribe to it and pay a regular subscription fee for using it.

[2]Web applications are considered to be a form of "cloud computing" because applications and files are hosted in the Internet "cloud," which consists of thousands of computers and servers, all linked together and made accessible via the Internet.

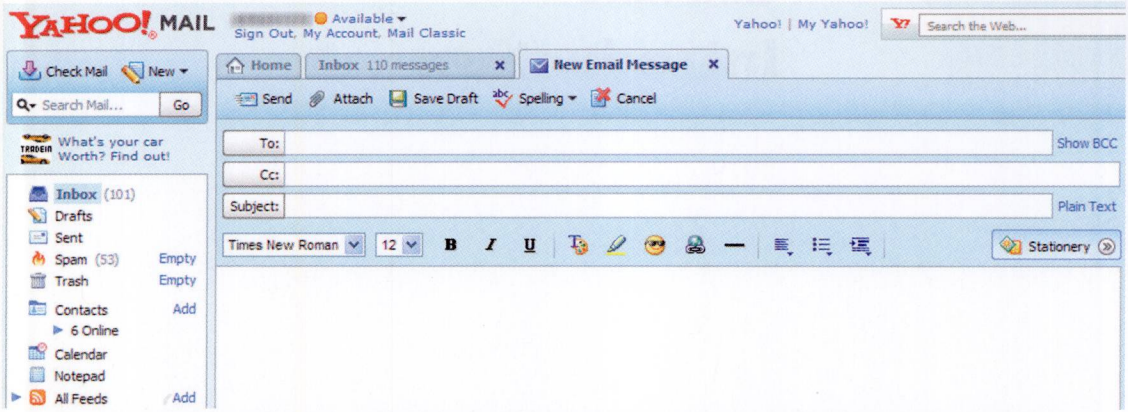

FIGURE 1.1 Users can manage their email via the Web, as in this example from Yahoo! Mail, which is similar to its desktop counterparts such as Microsoft Outlook, Mozilla Thunderbird, and Eudora.

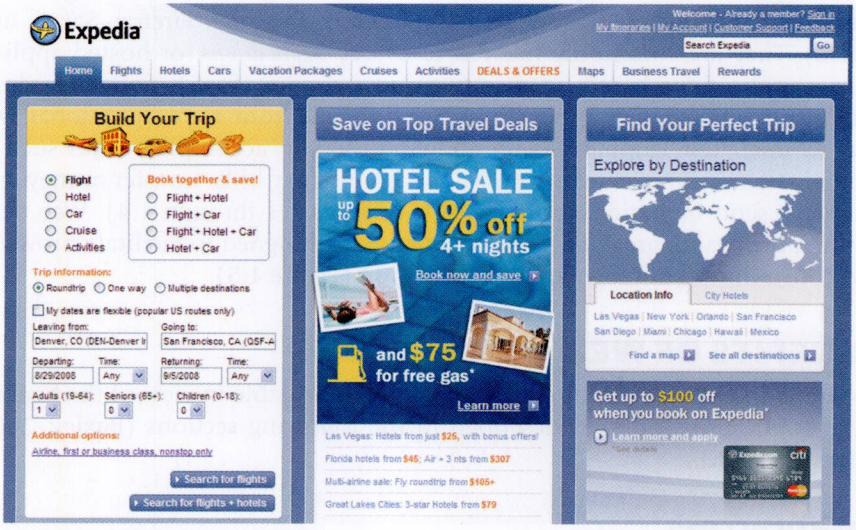

FIGURE 1.2 Users can search for travel options and make reservations using web applications like Expedia.

or plug-in modules, such as Adobe Flash, Java, Microsoft Silverlight, and so forth, to access all or part of a web application.

Moreover, because both the application and information are stored on servers of the application's providers and not on users' computers, users can access web applications from almost anywhere, as long as the computer they use has a web browser and Internet connectivity. This remote data storage also facilitates sharing and collaboration among users; for example, users can share bookmarks with applications such as Delicious (*www.delicious.com*) and Furl

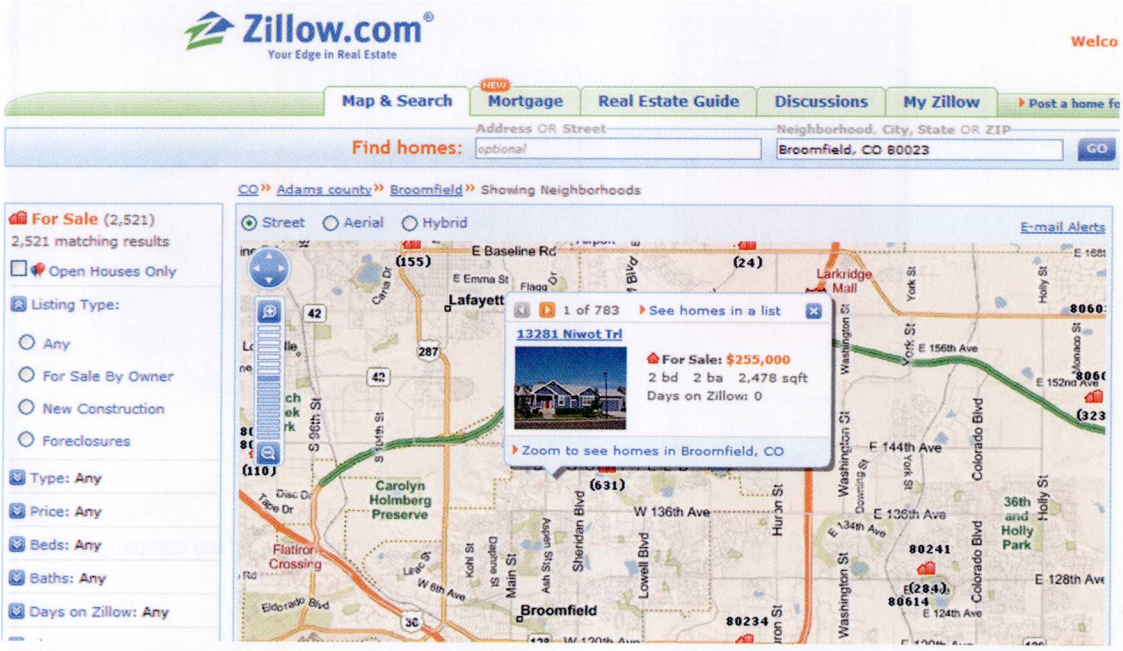

FIGURE 1.3 Users can find homes for sale, assess the value of a home, and see recent sales of homes in a neighborhood on sites such as Zillow.com.

FIGURE 1.4 Users can buy products on sites like Buy.com.

FIGURE 1.5 Ultragrain allows users to access static information about the company and its products on its web site (*www.ultragram.com*).

(*www.furl.net*), and remotely collaborate on the same documents using productivity applications such as Google Docs and Spreadsheets (*docs.google.com*) and Zoho (*www.zoho.com*).

Ease of deployment

Web applications are also popular with businesses and software developers because they can be developed, updated, and maintained remotely without requiring users to install (or reinstall) them. A related advantage of web applications is that they *can* perform as specified regardless of the operating system on users' computers. They can be built once and deployed to almost any user, rather than creating separate versions of applications for Microsoft Windows, Macintosh OS X, GNU/Linux, and other operating systems.

"Trained" user base

The Web's growth and widespread adoption (from 16 million users in December 1995 to almost 1.5 billion users in June 2008, according to Internet World Stats; *www.internetworldstats.com*) has made the Web style of interaction familiar to a large number of users. Most Internet users can now be expected to be familiar with web browser terminology such as home, back, forward, bookmarks, hypertext links, submit buttons, and so forth. With this knowledge, and the fact that using web applications does not require elaborate installations, barriers to their use (or at least to try them out) are much lower. Further, it helps that many popular web applications are now available for free or have a free trial period.

Maturity and reliability of network connectivity and web technologies

An important roadblock for earlier web applications was unreliable network connectivity and significantly inconsistent web standards support—that is, HTML, CSS, and JavaScript—in web browsers. This is no longer the case. Adherence to web standards is improving, and browser inconsistencies that used to cause frustration for web developers are decreasing. In addition, network connectivity and broadband access is becoming more reliable, more ubiquitous, and cheaper to use. According to Website Optimization the use of broadband Internet access grew to 57 percent in US homes in March 2008 and was 90 percent among active Internet users (*www.websiteoptimization.com/bw/0807/*). This stable platform has also spawned the availability of visual development tools and frameworks to facilitate web application development.

CHALLENGES TO DESIGNING INTERFACES FOR WEB APPLICATIONS

Despite these benefits and increasing use, designing interfaces for web applications remains difficult. Challenges in creating usable interactions are mainly related to the underlying "loosely coupled" web architecture, a limited set of interactive controls natively supported in web browsers, and the lack of design guidance as to how user interactions should be implemented.

"Loosely coupled" web architecture

An important challenge faced by web application designers is caused by the "loosely coupled" or "stateless" nature of the Web. The Web's interaction paradigm is very simple: Users request web pages with web browsers, and servers respond by sending the requested pages to the browsers or informing users if there are problems retrieving those pages. However, once a user's request is satisfied by the web server, by sending the web page to the browser, the connection between the web server and the web browser is severed. When a user makes a subsequent request, the connection is established again with the server until the new web page is "reloaded" in the user's browser.

Each page reload, or page refresh, is marked by perceptible delays caused by the need to establish the connection, the server to respond to the request, the network to receive the page, and the browser to reload the page. This creates a jumpy and discontinuous experience for web application users. For example, a user browsing a hierarchical tree structure of items may have to wait after every click to expand, or collapse, a data node for the page to reload and see the expanded, or collapsed, view. Although this problem is addressed to a great extent by the use of scripting technologies such as JavaScript and Rich Internet Applications (see Chapter 8), it's an important user experience issue faced by most web applications.

Limited set of controls, or widgets, to support application design

In the current version of HTML (version 4.01), native support for controls is limited to text boxes, radio buttons, checkboxes, dropdown lists, and command or action buttons. It does not offer support for sophisticated interactions common in desktop applications such as spin controls, calendars, wizards, tabs, toolbars, drag-and-drop, floating palettes, dialog boxes, context-sensitive menus, and so forth, which are available in even basic desktop applications. Although such controls can be developed using JavaScript and Cascading Style Sheets (CSS), a lack of inherent support for them has led to a variety of implementations with inconsistent presentations and interactions.

Inconsistent interaction approaches

Both the underlying technological architecture of the Web and the limited set of controls available make it difficult to create interactions for web applications comparable to desktop applications. Additionally, because most web applications are designed to be browser-agnostic, interactions and appearance cannot be simulated to match all operating systems; for example, tabs in the Macintosh OS X Aqua interface are visually quite different than the tabs in the Windows Vista interface (Figure 1.6).

Although the Web's relatively unrestricted development environment offers considerable creativity and flexibility to designers, the resulting diversity and inconsistency in user interfaces and interaction approaches in web applications is often challenging for users. This is due to the fact that users are faced with a variety of styles of interfaces and interactions, each with its own vocabulary of objects, actions, and visuals mixed together in the same application (see Tidwell, 2006). Figure 1.7 shows an example of changing the tab name in Zoho Notes (a note-taking web application like Microsoft OneNote) and Zoho Sheet (a worksheet web application like Microsoft Excel). To change the tab name in Zoho Notes, users must double-click the tab name and a Rename dialog pops up. In order to change the tab name in Zoho Sheet, users must right-click the

NOTE

The next version of HTML (version 5) will support additional form elements that are currently part of the World Wide Web Consortium's (W3C) Web Forms 2.0 (*www.w3.org/TR/web-forms-2/*). This new version offers additional form controls (e.g., the **<datalist>** element to create combo-boxes and the **<output>** element to show values derived from other form controls) as well as an extension to existing form controls (e.g., **<input type="date" />**, **<input type="email" />**, etc.), which makes web application development a little easier. Opera (version 9 and above) currently supports Web Forms 2.0 enhancements and offers a good platform to develop interactive prototypes.

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