

E-commerce
business, technology, society.
Fourth Edition

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Chapter 4

Building an E-commerce Web Site

Right-Sizing a Web Site Class Discussion

- What are the factors you should take into account when sizing a Web site's infrastructure?
- Why is peak usage an important factor to consider?
- What did eBay discover from its use of OPERA?
- How can operators of smaller sites deal with the right-sizing issue?

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Building an E-commerce Site: A Systematic Approach

- Two most important management challenges in building a successful e-commerce site are:
 - Developing a clear understanding of business objectives
 - Knowing how to choose the right technology to achieve those objectives

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Systems Analysis: Business Objectives, System Functionality, and Information Requirements for a Typical E-commerce Site

Table 4.1, Page 202

BUSINESS OBJECTIVE	SYSTEM FUNCTIONALITY	INFORMATION REQUIREMENTS
Display goods	Digital catalog	Dynamic text and graphics catalog
Provide product information (content)	Product database	Product description, stocking numbers, inventory levels
Personalize/customize product	Customer on-site tracking	Site log for every customer visit; data mining capability to identify common customer paths and appropriate responses
Execute a transaction payment	Shopping cart/payment system	Secure credit card clearing; multiple options
Accumulate customer information	Customer database	Name, address, phone, and e-mail for all customers; online customer registration
Provide after-sale customer support	Sales database	Customer ID, product, date, payment, shipment date
Coordinate marketing/advertising	Ad server; e-mail server; e-mail campaign manager; ad banner manager	Site behavior log of prospects and customers linked to e-mail and banner ad campaigns
Understand marketing effectiveness	Site tracking and reporting system	Number of unique visitors, pages visited, products purchased, identified by marketing campaign
Provide production and supplier links	Inventory management system	Product and inventory levels, supplier ID and contact, order quantity, data by product

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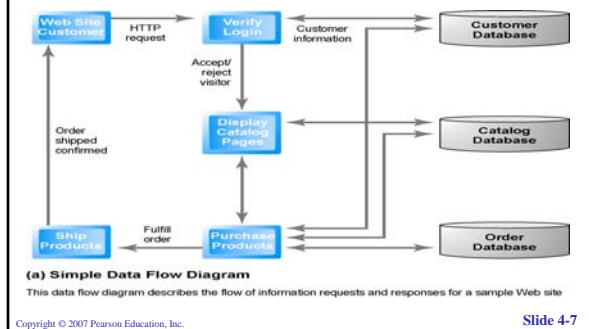
Systems Design: Hardware and Software Platforms

- System design specification: Description of the main components of a system and their relationship to one another
- System design can be broken down into two parts:
 - Logical design
 - Physical design

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A Logical Design for a Simple Web Site

Figure 4.3 (a), Page 204



Building the System: In-House versus Outsourcing

- Outsourcing: hire outside vendor to provide services involved in building site
- Build own vs. outsourcing:
 - Build your own requires team with diverse skill set; choice of software tools; both risks and possible benefits
- Host own vs. outsourcing
 - Hosting: Hosting company responsible for ensuring site is accessible 24/7, for monthly fee
 - Co-location: Firm purchases or leases Web server (with control over its operation), but server is located at vendor's facility

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Web Site Design: Basic Business Considerations

- To achieve basic business functionality of a Web site, need to be aware of design guidelines and software tools that can build active content and functionality
- Poorly designed Web sites drive customers away

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E-commerce Web Site Features that Annoy Customers

FIGURE 4.17 E-COMMERCE WEB SITE FEATURES THAT ANNOY CUSTOMERS

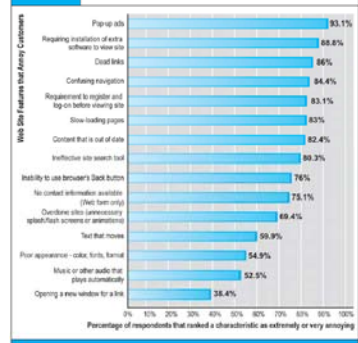


Figure 4.17, Page 233

SOURCE: Based on data from Hostway Corporation's survey, Consumers' Pet Peeves about Commercial Web Sites, Hostway Corporation, 2007.

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The Eight Most Important Factors in Successful E-commerce Site Design

Table 4.10, Page 234

TABLE 4.10 THE EIGHT MOST IMPORTANT FACTORS IN SUCCESSFUL E-COMMERCE SITE DESIGN	
FACTOR	DESCRIPTION
Functionality	Pages that work, load quickly, and point the customer toward your product offerings
Informational	Links that customers can easily find to discover more about you and your products
Ease of use	Simple fool-proof navigation
Redundant navigation	Alternative navigation to the same content
Ease of purchase	One or two clicks to purchase
Multi-browser functionality	Site works with the most popular browsers
Simple graphics	Avoids distracting, obnoxious graphics and sounds that the user cannot control
Legible text	Avoids backgrounds that distort text or make it illegible

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Tools for Interactivity and Active Content

- Widgets: Small pre-built chunk of code that executes automatically in a HTML Web page
- Mashups: Pull functionality/data from one program and include it in another
- CGI (Common Gateway Interface): Standards for communication between browser and program running on a server that allows for interaction between the user and the server
- ASP (Active Server Pages): Used to build dynamic pages with Microsoft's IIS
- Java: Used to create interactivity and active content on client computer

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Personalization Tools

- Personalization: Ability to treat people based on their personal qualities and prior history with your site
- Customization: Ability to change the product to better fit the needs of the customer
- Cookies the primary method for achieving personalization and customization

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The Information Policy Set

- Privacy policy: Set of public statements declaring how site will treat customers' personal information that is gathered by site
- Accessibility rules: Set of design objectives that ensure disabled users can affectively access site

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Chapter 5

Online Security and Payment Systems

The E-commerce Security Environment: The Scope of the Problem

- Overall size of cybercrime unclear; amount of losses significant but stable; individuals face new risks of fraud that may involve substantial uninsured losses
 - Symantec: Cybercrime on the rise from 2006
 - IC3: Processed 200,000+ Internet crime complaints
 - 2007 CSI survey: 46% detected security breach; 91% suffered financial loss as a result
 - Underground economy marketplace that offers sales of stolen information growing

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Customer and Merchant Perspectives on the Different Dimensions of E-commerce Security

Table 5.1, Page 264

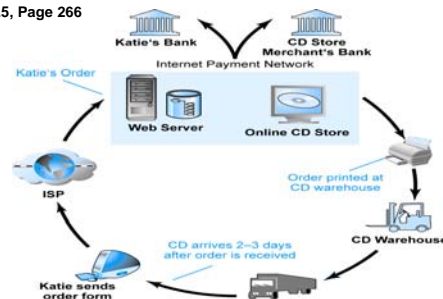
TABLE 5.2 CUSTOMER AND MERCHANT PERSPECTIVES ON THE DIFFERENT DIMENSIONS OF E-COMMERCE SECURITY		
DIMENSIONS	CUSTOMER'S PERSPECTIVE	MERCHANT'S PERSPECTIVE
Integrity	Has information I transmit or receive been altered?	Has data on the site been altered without authorization? Is data being received from customers valid?
Nonrepudiation	Can a party to an action with me later deny taking the action?	Can a customer deny ordering products?
Authenticity	Who am I dealing with? How can I be assured that the person or entity is who they claim to be?	What is the real identity of the customer?
Confidentiality	Can someone other than the intended recipient read my messages?	Are messages or confidential data accessible to anyone other than those authorized to view them?
Privacy	Can I control the use of information about myself transmitted to an e-commerce merchant?	What use, if any, can be made of personal data collected as part of an e-commerce transaction? Is the personal information of customers being used in an unauthorized manner?
Availability	Can I get access to the site?	Is the site operational?

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A Typical E-commerce Transaction

Figure 5.5, Page 266



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Vulnerable Points in an E-commerce Environment

Figure 5.6, Page 267



SOURCE: Boncella, 2000.

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Most Common Security Threats in the E-commerce Environment

- Malicious code (viruses, worms, Trojans)
- Unwanted programs (spyware, browser parasites)
- Phishing/identity theft
- Hacking and cybervandalism
- Credit card fraud/theft
- Spoofing (pharming)/spam (junk) Web sites
- DoS and dDoS attacks
- Sniffing
- Insider attacks
- Poorly designed server and client software

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Malicious Code

- **Viruses:** Have ability to replicate and spread to other files; most also deliver a “payload” of some sort (destructive or benign); include macro viruses, file-infecting viruses, and script viruses
- **Worms:** Designed to spread from computer to computer
- **Trojan horse:** Appears to be benign, but then does something other than expected
- **Bots:** Can be covertly installed on computer; responds to external commands sent by the attacker

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Unwanted Programs

- Installed without the user’s informed consent
 - **Browser parasites:** Can monitor and change settings of a user’s browser
 - **Adware:** Calls for unwanted pop-up ads
 - **Spyware:** Can be used to obtain information, such as a user’s keystrokes, e-mail, IMs, etc.

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Phishing and Identity Theft

- Any deceptive, online attempt by a third party to obtain confidential information for financial gain
 - Most popular type: e-mail scam letter
 - One of fastest growing forms of e-commerce crime

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Hacking and Cybervandalism

- **Hacker:** Individual who intends to gain unauthorized access to computer systems
- **Cracker:** Hacker with criminal intent (two terms often used interchangeably)
- **Cybervandalism:** Intentionally disrupting, defacing or destroying a Web site
- Types of hackers include:
 - White hats
 - Black hats
 - Grey hats

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Credit Card Fraud

- Fear that credit card information will be stolen deters online purchases
- Hackers target credit card files and other customer information files on merchant servers; use stolen data to establish credit under false identity
- One solution: New identity verification mechanisms

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Spoofing (Pharming) and Spam (Junk) Web Sites

- Spoofing (Pharming)
 - Misrepresenting oneself by using fake e-mail addresses or masquerading as someone else
 - Threatens integrity of site; authenticity
- Spam (Junk) Web sites
 - Use domain names similar to legitimate one, redirect traffic to spammer-redirect domains

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DoS and DDoS Attacks

- Denial of service (DoS) attack
 - Hackers flood Web site with useless traffic to inundate and overwhelm network
- Distributed denial of service (DDoS) attack
 - Hackers use numerous computers to attack target network from numerous launch points

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Other Security Threats

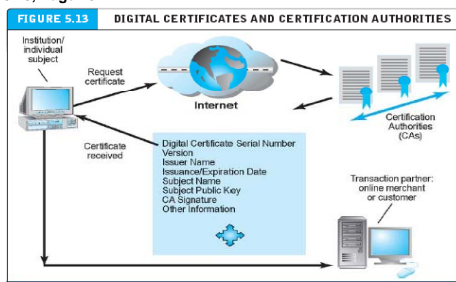
- Sniffing: Type of eavesdropping program that monitors information traveling over a network; enables hackers to steal proprietary information from anywhere on a network
- Insider jobs: Single largest financial threat
- Poorly designed server and client software: Increase in complexity of software programs has contributed to increase in vulnerabilities that hackers can exploit

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Digital Certificates and Certification Authorities

Figure 5.13, Page 287



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Securing Channels of Communication

- Secure Sockets Layer (SSL): Most common form of securing channels of communication; used to establish a secure negotiated session (client-server session in which URL of requested document, along with contents, is encrypted)
- S-HTTP: Alternative method; provides a secure message-oriented communications protocol designed for use in conjunction with HTTP
- Virtual Private Networks (VPNs): Allow remote users to securely access internal networks via the Internet, using Point-to-Point Tunneling Protocol (PPTP)

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Types of Payment Systems

- Cash
- Checking Transfer
- Credit Card
- Stored Value
- Accumulating Balance

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Cash

- Legal tender
- Most common form of payment in terms of number of transactions
- Instantly convertible into other forms of value without intermediation
- Portable, requires no authentication
- “Free” (no transaction fee), anonymous, low cognitive demands
- Limitations: easily stolen, limited to smaller transaction, does not provide any float

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Checking Transfer

- Funds transferred directly via signed draft/check from a consumer's checking account to merchant/ other individual
- Most common form of payment in terms of amount spent
- Can be used for small and large transactions
- Some float
- Not anonymous, requires third-party intervention (banks)
- Introduces security risks for merchants (forgeries, stopped payments), so authentication typically required

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Credit Card

- Represents account that extends credit to consumers; allows consumers to make payments to multiple vendors at one time
- Credit card associations: Nonprofit associations (Visa, MasterCard) that set standards for issuing banks
- Issuing banks: Issue cards and process transactions
- Processing centers (clearinghouses): Handle verification of accounts and balances

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Stored Value

- Accounts created by depositing funds into an account and from which funds are paid out or withdrawn as needed
 - Examples: Debit cards, gift certificates, prepaid cards, smart cards
 - Peer-to-peer payment systems such as PayPal a variation

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Accumulating Balance

- Accounts that accumulate expenditures and to which consumers make period payments
 - Examples: Utility, phone, American Express accounts

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Dimensions of Payment Systems

Table 5.6, Page 305

TABLE 5.6 DIMENSIONS OF PAYMENT SYSTEMS					
DIMENSION	CASH	PERSONAL CHECK	CREDIT CARD	STORED VALUE (DEBIT CARD)	ACCUMULATING BALANCE
Instantly convertible without intermediation	yes	no	no	no	no
Low transaction cost for small transactions	yes	no	no	no	yes
Low transaction cost for large transactions	no	yes	yes	yes	yes
Low fixed costs for merchant	yes	yes	no	no	no
Reliable (able to be repudiated)	no	yes	yes	no (usually)	yes
Financial risk for consumer	yes	no	up to \$50	limited	no
Financial risk for merchant	no	yes	yes	no	yes
Anonymous for consumer	yes	no	no	no	no
Anonymous for merchant	yes	no	no	no	no
Immediately responsible	yes	no	no	no	no
Security against unauthorized use	no	some	some	some	some
Tamper-resistant	yes	no	yes	yes	yes
Requires authentication	no	yes	yes	yes	yes
Special hardware required	no	no	yes—by merchant	yes—by merchant	yes—by merchant
Buyer keeps float	no	yes	yes	no	yes
Account required	no	yes	yes	yes	yes
Has immediate monetary value	yes	no	no	yes	no

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E-commerce Payment Systems

- Credit cards are dominant form of online payment, accounting for around 70% of online payments in 2007
- Other e-commerce payment systems:
 - Digital cash
 - Online stored value systems
 - Digital accumulating balance payment systems
 - Digital credit accounts
 - Digital checking

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Online Stored Value Systems

- Permit consumers to make instant, online payments to merchants and other individuals based on value stored in an online account
- Rely on value stored in a consumer's bank, checking, or credit card account
- PayPal most successful system
- Smart cards another example
 - Contact and contactless
 - Mondex, Octopus

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Wireless Payment Systems

- Use of mobile handsets as payment devices well-established in Europe, Japan, South Korea
- Not very well established yet in U.S, but with growth in Wi-Fi and 3G cellular phone systems, this is beginning to change

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Electronic Billing Presentment and Payment (EBPP)

- Online payment systems for monthly bills
- EBPP expected to grow rapidly, to an estimated 40% of all households by 2007
- Main business models in EBPP market include:
 - Biller-direct
 - Consolidator
- Above are supported by EBPP infrastructure providers

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