Chapter 4
Building an E-commerce Web Site

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Learning Objectives

- Explain the process that should be followed in building an e-commerce web site
- Describe the major issues surrounding the decision to outsource site development and/or hosting
- Identify and understand the major considerations involved in choosing web server and e-commerce merchant server software

Learning Objectives

- Understand the issues involved in choosing the most appropriate hardware for an e-commerce site
- Identify additional tools that can improve web site performance

Building an E-commerce Web Site: A Systematic Approach

- Planning: the systems development life cycle
- Systems analysis: identify business objectives, system functionality, and information requirements
- System design: hardware and software platforms
- Building the system: in-house vs. Outsourcing
- Testing the system
- Implementation and maintenance

Pieces of the Site-building Puzzle

Page 180, figure 4.1
Planning: the Systems Development Life Cycle

- A methodology for understanding the business objectives of any system and designing an appropriate solution
  - Systems analysis
  - Systems design
  - Building the system
  - Testing
  - Implementation

Systems Analysis: Identify Business Objectives, System Functionality, and Information Requirements

- Business objectives
  - A list of capabilities you want your site to have
- System functionalities
  - A list of types of information systems capabilities you will need to achieve your business objectives
- Information requirements
  - The information elements that the system must produce in order to achieve the business objectives

System Design: Hardware and Software Platforms

- System design specification
  - Description of the main components in a system and their relationship to one another
- Logical design
  - Describes the flow of information at your e-commerce site
    - The processing functions that must be performed
    - The databases that will be used
    - The security and emergency backup procedures that will be instituted
    - The controls that will be used in the system
- Physical design
  - Translates the logical design into physical components

Systems Analysis: Business Objectives, System Functionality, and Information Requirements

A Logical and Physical Design for a Simple Web Site

This data flow diagram describes the flow of information requests and responses for a simple Web site.
Choice in Building and Hosting

You have a number of alternatives when building and hosting an e-commerce site.

Building the System: In-house Vs. Outsourcing

- Outsourcing
  - Hiring an outside vendor to provide the services you cannot perform with in-house personnel
- Co-location
  - When a firm purchases or leases web server (and has total control over its operation) but locates the server in a vendor’s physical facility
  - The vendor maintains the facility, communications lines, and the machinery

The Spectrum of Tools for Building Your Own E-commerce Site

Costs of Customizing E-commerce Packages

Key Players: Hosting/co-location Service

Testing the System

- Unit testing
  - Involves testing the site’s program modules one at a time
- System testing
  - Involves testing the site as a whole, in a way the typical user will in using the site
- Acceptance testing
  - Verifies that the business objectives of the system as originally conceived are in fact working
Implementation and Maintenance

- **Benchmarking**
  - A process in which the site is compared with those of competitors in terms of response speed, quality of layout, and design
- **Maintenance is on-going**
  - 20% devoted to debugging code and responding to emergency situations
  - 20% concerned with changing reports, data files, and links to backend databases
  - 60% devoted to general administration and making changes and enhancements to the system

Choosing Server Software

- **System architecture**
  - Refers to the arrangement of software, machinery, and tasks in an information system needed to achieve a specific functionality
- **Two-tier architecture**
  - A web server responds to requests for web pages and a database server provides backend data storage
- **Multi-tier architecture**
  - A web server is linked to a middle-tier layer that typically includes a series of application servers that perform specific tasks, as well as to a backend layer of existing corporate systems

Two-tier and Multi-tier E-commerce Architectures

Choosing Server Software

- Site management tools
  - Verify that links on pages are still valid and also identify orphan files
- Dynamic page generation tools
  - The contents of a web page are stored as objects in a database, rather than being hard-coded in HTML

Web Server Software

Key Players in Web Server Software

Basic Functionality Provided by Web Servers

<table>
<thead>
<tr>
<th>FUNCTIONALITY</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processing of HTTP requests</td>
<td>Receive and respond to client requests for HTML pages.</td>
</tr>
<tr>
<td>Security services (secure sockets layer)</td>
<td>Verify username and password, process certificates and phishing key information required for credit card processing and other secure information.</td>
</tr>
<tr>
<td>File transfer protocol</td>
<td>Transfers files and very large files from server to server.</td>
</tr>
<tr>
<td>Search engine</td>
<td>Indexing of site content, keyword search capability.</td>
</tr>
<tr>
<td>Data capture</td>
<td>Log file of all visitors, times, locations, and referrals.</td>
</tr>
<tr>
<td>E-mail</td>
<td>Ability to send, receive, and store e-mail messages.</td>
</tr>
<tr>
<td>Site management tools</td>
<td>Calculates and displays key site statistics, such as unique visitors, page requests, and single or overall referrals.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Apache</th>
<th>HTTP 62%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Netscape Enterprise</td>
<td>6%</td>
</tr>
<tr>
<td>MS</td>
<td>21%</td>
</tr>
<tr>
<td>Other</td>
<td>8%</td>
</tr>
<tr>
<td>Zero</td>
<td>3%</td>
</tr>
</tbody>
</table>
Web Application Servers

- Software programs that provide the specific business functionality required of a web site
- Include:
  - Catalog display
  - Transaction processing
  - Audio/video server
  - Auction server
  - B2B server

Application Servers and Their Function

<table>
<thead>
<tr>
<th>Application Server</th>
<th>Functionality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catalog display</td>
<td>Provides a database for product descriptions and pricing.</td>
</tr>
<tr>
<td>Transaction server</td>
<td>Enables online credit card transactions.</td>
</tr>
<tr>
<td>Audio server</td>
<td>Supports audio streaming.</td>
</tr>
<tr>
<td>Auction server</td>
<td>Manages auction processes for online sales.</td>
</tr>
</tbody>
</table>

E-commerce Merchant Server Software Functionality

- Software that provides the basic functionality need for online sales, including:
  - An online catalog that lists products available on a web site
  - Order taking via an online shopping cart that allows shoppers to set aside desired purchases in preparation for checkout, review what they have selected, edit their selections as necessary, and actually make the purchase by clicking a button
  - Online credit card processing verifies the shopper’s credit card and then processes the debit to the card

Merchant Server Software Packages (E-commerce Suites)

- Offers an integrated environment that provides most or all of the functionality and capabilities needed to develop a sophisticated, customer-centric site.
- Key factors to consider:
  - Functionality
  - Support for different business models
  - Business process modeling tools
  - Visual site management tools and reporting
  - Performance and scalability
  - Connectivity to existing business systems
  - Compliance to standards
  - Global and multicultural capability
  - Local sales tax and shipping rules

Widely Used Midrange and High-end E-commerce Suites

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>APPROXIMATE PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microsoft Commerce Server 2000</td>
<td>$8,500 per processor</td>
</tr>
<tr>
<td>IBM Websphere Commerce Suite</td>
<td>$5,000 single workstation for Start edition; $45,000 for Professional edition (per processor)</td>
</tr>
<tr>
<td>InterWorld Commerce Exchange</td>
<td>$65,000</td>
</tr>
<tr>
<td>Open Market Transit</td>
<td>$125,000</td>
</tr>
<tr>
<td>InterShip Infinity Suite</td>
<td>$125,000-$250,000</td>
</tr>
<tr>
<td>Microsoft One-to-One Enterprise</td>
<td>$250,000-$500,000</td>
</tr>
<tr>
<td>Blue Martini Customer Interaction System</td>
<td>$1,000,000+</td>
</tr>
</tbody>
</table>

Choosing the Hardware for an E-commerce Site

- Hardware platform
  - Refers to all the underlying computing equipment that the system uses to achieve e-commerce functionality
- Stateless
  - Refers to the fact that the server does not have to maintain an ongoing dedicated interaction with the client
- I/O intensive
  - Requires input/output operations rather than heavy-duty processing power
- CPU intensive
  - Operations that require a great deal of processing power
Degradation in Performance As Number of Users Increase

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Capacity of Static Page Web Servers

Page 204, figure 4.9

Visitor Profile at Typical E-commerce Sites

Page 205, table 4.7

The Impact of Dynamic Page Content on Web Servers

Page 206, figure 4.10

The Relationship of Bandwidth to Hits

Page 207, figure 4.11

Right-sizing Your Hardware Platform: The Supply Side

- Scalability
  - Refers to the ability of a site to increase in size as demand warrants
  - Scale hardware vertically
  - Scale hardware horizontally
  - Improve processing architecture of the site
Tools for Interactivity and Active Content

- **Common gateway interface**
  - A set of standards for communication between a browser and a program running on a server that allows for interaction between the user and the server
  - Active server pages
  - A proprietary software development tool that enables programmers using Microsoft’s IIS package to build dynamic pages

**Tools for Interactivity and Active Content**

- **Java**
  - A programming language that allows programmers to create interactivity and active content on the client machine thereby saving considerable load on the server
  - Java server pages (JSP)
  - A web page coding standard that allows developers to dynamically generate web pages in response to user requests
  - Javascript
  - A programming language invented by Netscape that is used to control the objects on an HTML page and handle interactions with a browser
Tools for Interactivity and Active Content

- **Active X**
  - A programming language created by Microsoft to compete with Java
- **Vbscript**
  - A programming language invented by Microsoft to compete with JavaScript
- **Coldfusion**
  - An integrated server-side environment for developing interactive web applications

Personalization Tools

- **Personalization**
  - The ability to treat customers based on their personal qualities and prior history with your site
- **Customization**
  - The ability to change the product to better fit the needs of the customer

The Information Policy Set

- **Privacy policy**
  - A set of public statements declaring how you treat your customers and how you treat their personal information that you gather on the site
- **Accessibility rules**
  - A set of design objectives that ensure disabled users can effectively access your site
- **Financial reporting policies**
  - Statement declaring how you will account for revenues and costs at your site