CPET 581 E-Commerce & Business Technologies

Design and Build
E-Commerce Web Sites, Mobile Sites, and Apps

Lecture Note 2 of 2

References:
*Chapter 4. Building an E-Commerce Presence: Web Sites, Mobile Sites, and Apps, text book: *e-Commerce: Business*, **Technology, and Society, 8th edition, 2012, by K. C. Laudon and C. G. Traver, publisher Pearson Education Inc.,**

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Topics

- Building an E-Commerce Presence: A Systematic Approach
- Software for E-Commerce Sites
  - Client-side Programming
  - Server-side Programming
- Choosing the Hardware
- Other E-Commerce Site Tools
- Developing a Mobile Web Site and Building Mobile Apps

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TABLE 4.1 SYSTEM ANALYSIS: BUSINESS OBJECTIVES, SYSTEM FUNCTIONALITY, AND INFORMATION REQUIREMENTS FOR A TYPICAL E-COMMERCE SITE

| 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	Shopping cart/payment system	Secure credit card clearing; multiple payment 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

Logical Design for A Simple Web Site
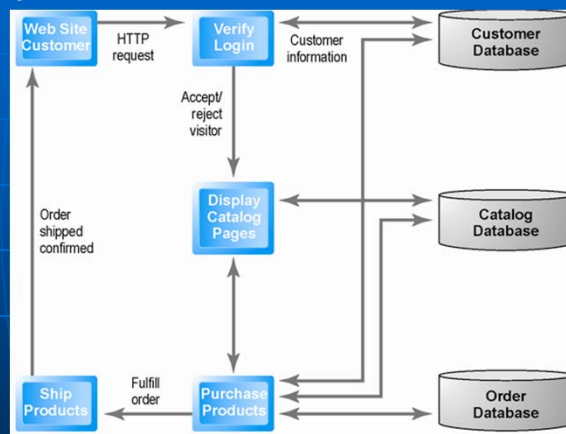
- Figure 4-3

(a) Simple Data Flow Diagram

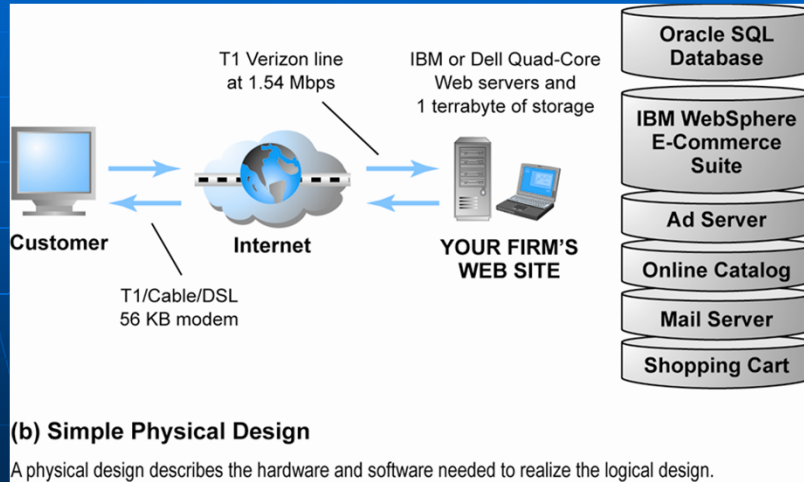This data flow diagram describes the flow of information requests and responses for a sample Web site

Physical Design for a Simple Web Site

- Figure 4-3

(b) Simple Physical Design

A physical design describes the hardware and software needed to realize the logical design.

FIGURE 4.4   CHOICES IN BUILDING AND HOSTING
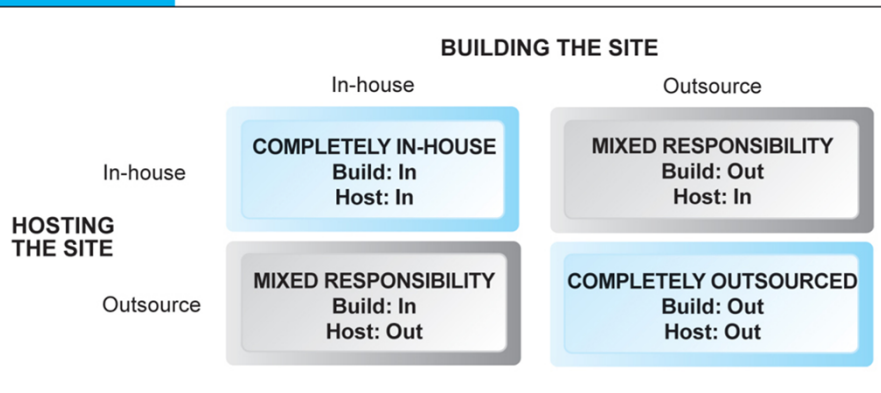
Testing, Implementation and Maintenance

- Testing
  - Unit testing
  - System testing
  - Acceptance testing
- Implementation and maintenance:
  - Maintenance is ongoing
  - Maintenance costs: Similar to development costs
  - Benchmarking

FIGURE 4.5   **THE SPECTRUM OF TOOLS FOR BUILDING YOUR OWN E-COMMERCE SITE**
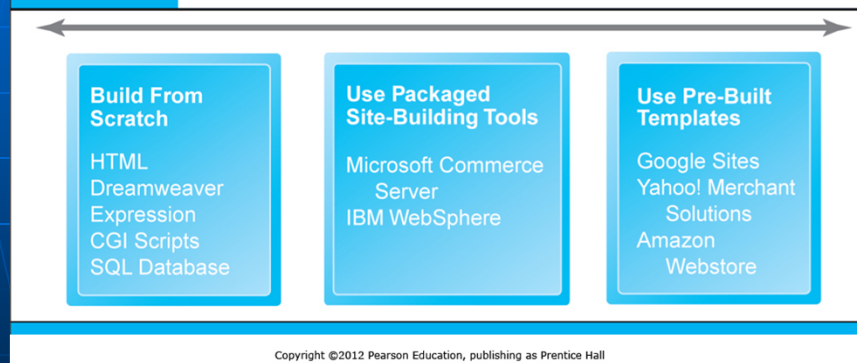
Build From Scratch

HTML
Dreamweaver
Expression
CGI Scripts
SQL Database

Use Packaged Site-Building Tools

Microsoft Commerce Server
IBM WebSphere

Use Pre-Built Templates

Google Sites
Yahoo! Merchant Solutions
Amazon Webstore

Two-Tier E-Commerce Architectures

User requests for pages → **Web Server** → **Dynamic Content Database**

(a) Two-tier Architecture

In a two-tier architecture, a Web server responds to requests for Web pages and a database server provides backend data storage.

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Multi-Tier E-Commerce Architecture

Web Server Layer

Incoming Internet requests T1 Line 1.544 Mbps

Web Servers

Middle-tier Layer

E-commerce Servers
Application Servers
Database Servers
Ad Servers
Mail Servers

Backend Layer

Corporate applications
Finance
Production MRP
Enterprise systems
HR systems

(b) Multi-tier Architecture

In a 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.

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TABLE 4.3	BASIC FUNCTIONALITY PROVIDED BY WEB SERVERS
FUNCTIONALITY	**DESCRIPTION**
Processing of HTTP requests	Receive and respond to client requests for HTML pages
Security services (Secure Sockets Layer)	Verify username and password; process certificates and private/public key information required for credit card processing and other secure information
File Transfer Protocol	Permits transfer of very large files from server to server
Search engine	Indexing of site content; keyword search capability
Data capture	Log file of all visits, time, duration, and referral source
E-mail	Ability to send, receive, and store e-mail messages
Site management tools	Calculate and display key site statistics, such as unique visitors, page requests, and origin of requests; check links on pages

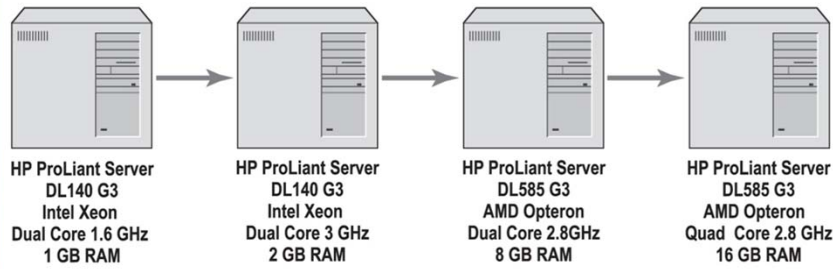| TABLE 4.4	APPLICATION SERVERS AND THEIR FUNCTION
APPLICATION SERVER	**FUNCTIONALITY**
Catalog display	Provides a database for product descriptions and prices
Transaction processing (shopping cart)	Accepts orders and clears payments
List server	Creates and serves mailing lists and manages e-mail marketing campaigns
Proxy server	Monitors and controls access to main Web server; implements firewall protection
Mail server	Manages Internet e-mail
Audio/video server	Stores and delivers streaming media content
Chat server	Creates an environment for online real-time text and audio interactions with customers
News server	Provides connectivity and displays Internet news feeds
Fax server	Provides fax reception and sending using a Web server
Groupware server	Creates workgroup environments for online collaboration
Database server	Stores customer, product, and price information
Ad server	Maintains Web-enabled database of advertising banners that permits customized and personalized display of advertisements based on consumer behavior and characteristics
Auction server	Provides a transaction environment for conducting online auctions
B2B server	Implements buy, sell, and link marketplaces for commercial transactions

TABLE 4.7	FACTORS IN RIGHT-SIZING AN E-COMMERCE PLATFORM				
SITE TYPE	PUBLISH/ SUBSCRIBE	SHOPPING	CUSTOMER SELF-SERVICE	TRADING	WEB SERVICES/B2B
Examples	WSJ.com	Amazon	Travelocity	E*Trade	Ariba e-procurement exchanges
Content	Dynamic Multiple authors High volume Not user-specific	Catalog Dynamic items User profiles with data mining	Data in legacy applications Multiple data sources	Time sensitive High volatility Multiple suppliers and consumers Complex transactions	Data in legacy applications Multiple data sources Complex transactions
Security	Low	Privacy Non-repudiation Integrity Authentication Regulations	Privacy Non-repudiation Integrity Authentication Regulations	Privacy Non-repudiation Integrity Authentication Regulations	Privacy Non-repudiation Integrity Authentication Regulations
Percent secure pages	Low	Medium	Medium	High	Medium
Cross session information	No	High	High	High	High
Searches	Dynamic Low volume	Dynamic High volume	Non-dynamic Low volume	Non-dynamic Low volume	Non-dynamic Moderate volume
Unique items (SKUs)	High	Medium to high	Medium	High	Medium to high
Transaction volume	Moderate	Moderate to high	Moderate	High to extremely high	Moderate
Legacy integration complexity	Low	Medium	High	High	High
Page views (hits)	High to very high	Moderate to high	Moderate to low	Moderate to high	Moderate

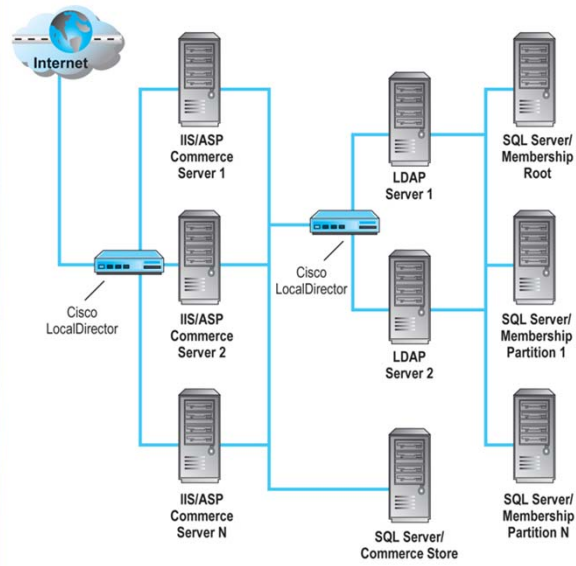| TABLE 4.8	VERTICAL AND HORIZONTAL SCALING TECHNIQUES
TECHNIQUE	APPLICATION
Use a faster computer	Deploy edge servers, presentation servers, data servers, etc.
Create a cluster of computers	Use computers in parallel to balance loads.
Use appliance servers	Use special-purpose computers optimized for their task.
Segment workload	Segment incoming work to specialized computers.
Batch requests	Combine related requests for data into groups, process as group.
Manage connections	Reduce connections between processes and computers to a minimum.
Aggregate user data	Aggregate user data from legacy applications in single data pools.
Cache	Store frequently used data in cache rather than on the disk.

FIGURE 4.13   VERTICALLY SCALING A SYSTEM

HP ProLiant Server
DL140 G3
Intel Xeon
Dual Core 1.6 GHz
1 GB RAM

HP ProLiant Server
DL140 G3
Intel Xeon
Dual Core 3 GHz
2 GB RAM

HP ProLiant Server
DL585 G3
AMD Opteron
Dual Core 2.8GHz
8 GB RAM

HP ProLiant Server
DL585 G3
AMD Opteron
Quad Core 2.8 GHz
16 GB RAM

FIGURE 4.14   HORIZONTALLY SCALING A SYSTEM

Internet

IIS/ASP Commerce Server 1

IIS/ASP Commerce Server 2

IIS/ASP Commerce Server N

Cisco LocalDirector

LDAP Server 1

LDAP Server 2

SQL Server/ Commerce Store

Cisco LocalDirector

SQL Server/ Membership Root

SQL Server/ Membership Partition 1

SQL Server/ Membership Partition N

TABLE 4.9	IMPROVING THE PROCESSING ARCHITECTURE OF YOUR SITE	
ARCHITECTURE IMPROVEMENT	**DESCRIPTION**	
Separate static content from dynamic content	Use specialized servers for each type of workload.	
Cache static content	Increase RAM to the gigabyte range and store static content in RAM.	
Cache database lookup tables	Use cache tables used to look up database records.	
Consolidate business logic on dedicated servers	Put shopping cart, credit card processing, and other CPU-intensive activity on dedicated servers.	
Optimize ASP code	Examine your code to ensure it is operating efficiently.	
Optimize the database schema	Examine your database search times and take steps to reduce access times.	

TABLE 4.10	E-COMMERCE WEB SITE FEATURES THAT ANNOY CUSTOMERS	
Requiring user to view ad or Flash introduction before going to Web site content	Inability to use browser's Back button
Pop-up and pop-under ads and windows	No contact information available (Web form only)
Links that don't work	Unnecessary splash/flash screens, animation, etc.
Confusing navigation; no search function	Music or other audio that plays automatically
Requirement to register and log in before viewing content or ordering	Text not easily legible due to size, color, format
Slow loading pages	Typographical errors
Content that is out of date	

TABLE 4.11	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	

Developing a Mobile Web Presence

- Three types of mobile e-commerce software
  - Mobile Web site
  - Mobile Web app
  - Native app
- Planning and building mobile presence
  - As with regular Web site, use systems analysis/design to identify unique and specific business objectives

Planning and Building a Mobile Web Presence

TABLE 4.13	UNIQUE FEATURES THAT MUST BE TAKEN INTO ACCOUNT WHEN DESIGNING A MOBILE WEB PRESENCE
FEATURE	IMPLICATIONS FOR MOBILE PLATFORM
Hardware	Mobile hardware is smaller, and there are more resource constraints in data storage and processing power.
Connectivity	The mobile platform is constrained by slower connection speeds than desktop Web sites.
Displays	Mobile displays are much smaller and require simplification. Some screens are not good in sunlight.
Interface	Touch-screen technology introduces new interaction routines different from the traditional mouse and keyboard. The mobile platform is not a good data entry tool but can be a good navigational tool.

Developing a Mobile Web Presence

- Design considerations
  - Platform constraints: Smartphone/tablet
- Performance and cost
  - Mobile Web site:
    - Least expensive
  - Mobile app:
    - Can utilize browser API
  - Native app:
    - Most expensive; requires more programming

Designing for Accessibility in a Web 2.0 and Mobile World

- Why might some merchants be reluctant to make their Web sites accessible to disabled Americans?

- How can Web sites be made more accessible?

- Should all Web sites be required by law to provide "equivalent alternatives" for visual and sound content?

- What additional accessibility problems do mobile devices pose?

Summary