BUILDING AN E-COMMERCE SYSTEM

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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

IMPORTANT CONSTITUENTS FOR SITE-BUILDING

- Main areas where one needs to make decisions in building a site include:
  - Human resources and organizational capabilities—creating a team that has the skill set to build and manage a successful site
  - Hardware
  - Software
  - Telecommunications
  - Site design

FACTORS BEFORE PLANNING E-COMMERCE – VISIONING PROCESS

Go-to-Market Process

280Group
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IMAGINING THE E-COMM. PRESENCE

- What's the idea? – Visioning process
- Where's the money – Business & Revenue Model
- Who & where is the target audience?
- Characterize the Market
- Source & type of Content? - Static or dynamic
- SWOT Analysis
- E-commerce Presence Map
- E-Commerce Presence Timeline
- Cost of E-commerce presence

4 TYPES OF E-COMM. PRESENCE & RELATED PLATFORMS & ACTIVITIES

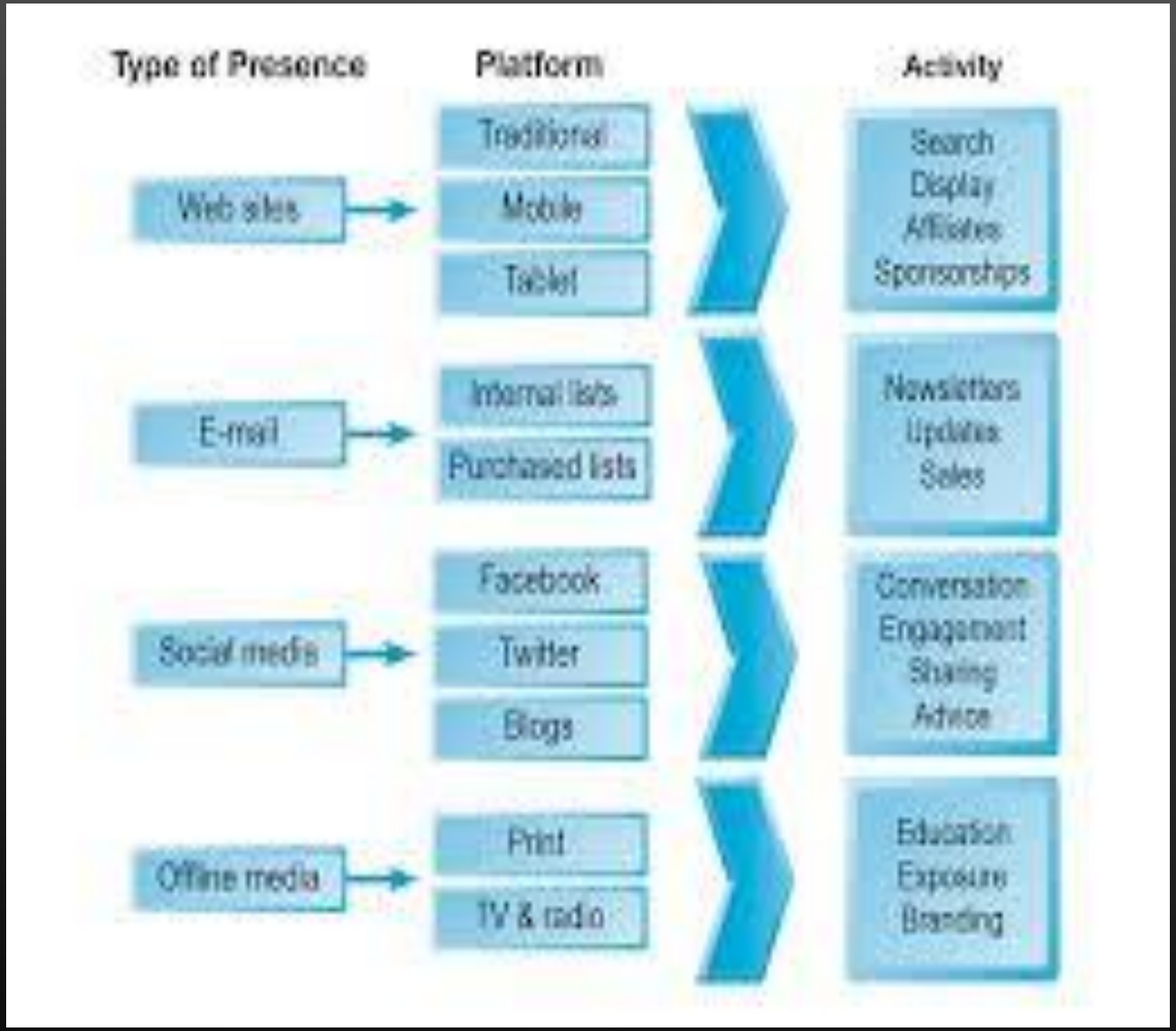


TABLE 3.1 E-COMMERCE PRESENCE TIMELINE

PHASE	ACTIVITY	MILESTONE
Phase 1: Planning	Envision e-commerce presence; determine personnel	Mission statement
Phase 2: Website development	Acquire content; develop a site design; arrange for hosting the site	Website plan
Phase 3: Web implementation	Develop keywords and metatags; focus on search engine optimization; identify potential sponsors	A functional website
Phase 4: Social media plan	Identify appropriate social platforms and content for your products and services	A social media plan
Phase 5: Social media implementation	Develop Facebook, Twitter, and Pinterest presence	Functioning social media presence
Phase 6: Mobile plan	Develop a mobile plan; consider options for porting your website to smartphones	A mobile media plan

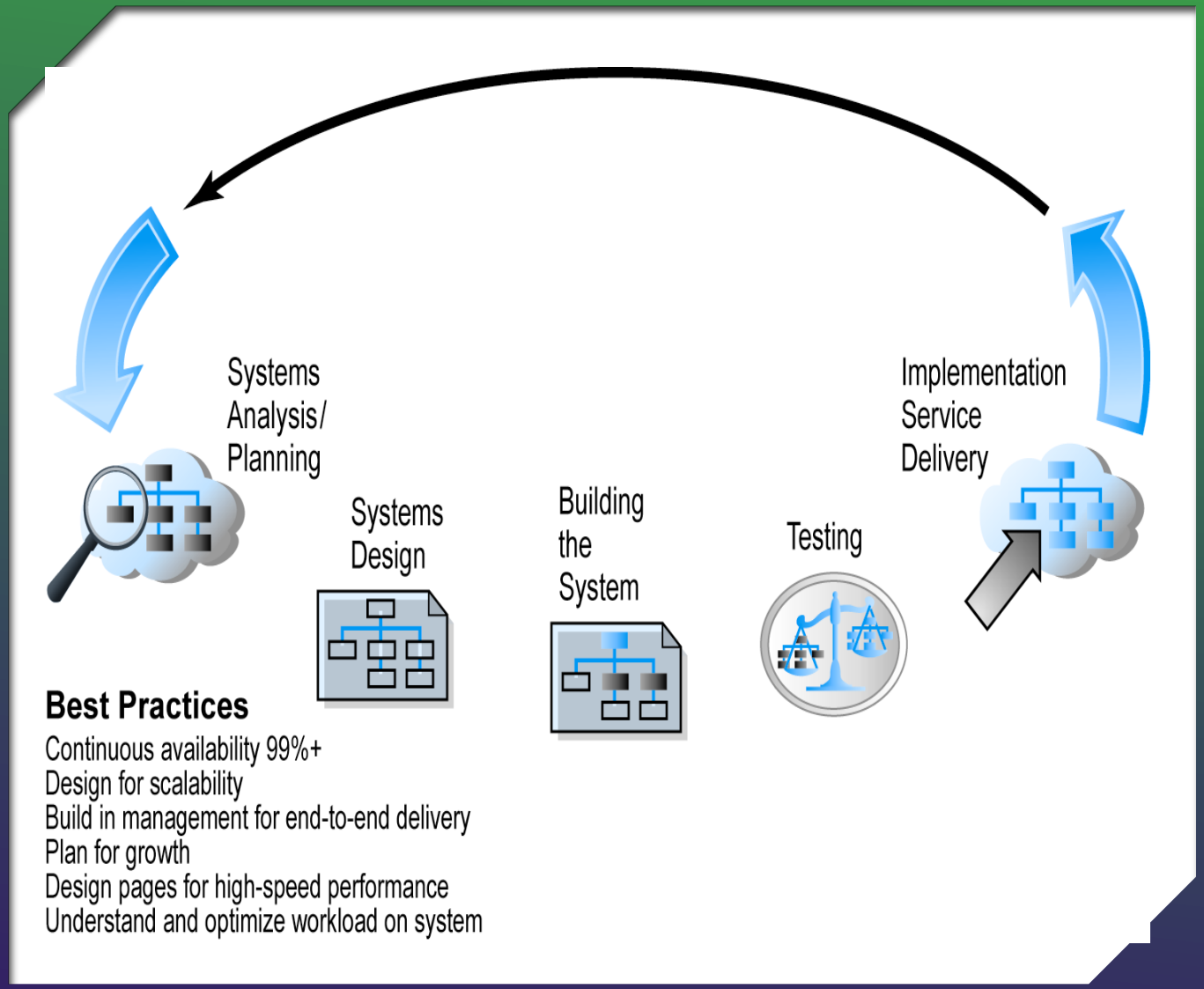
THE SYSTEMS DEVELOPMENT LIFE CYCLE (SDLC)

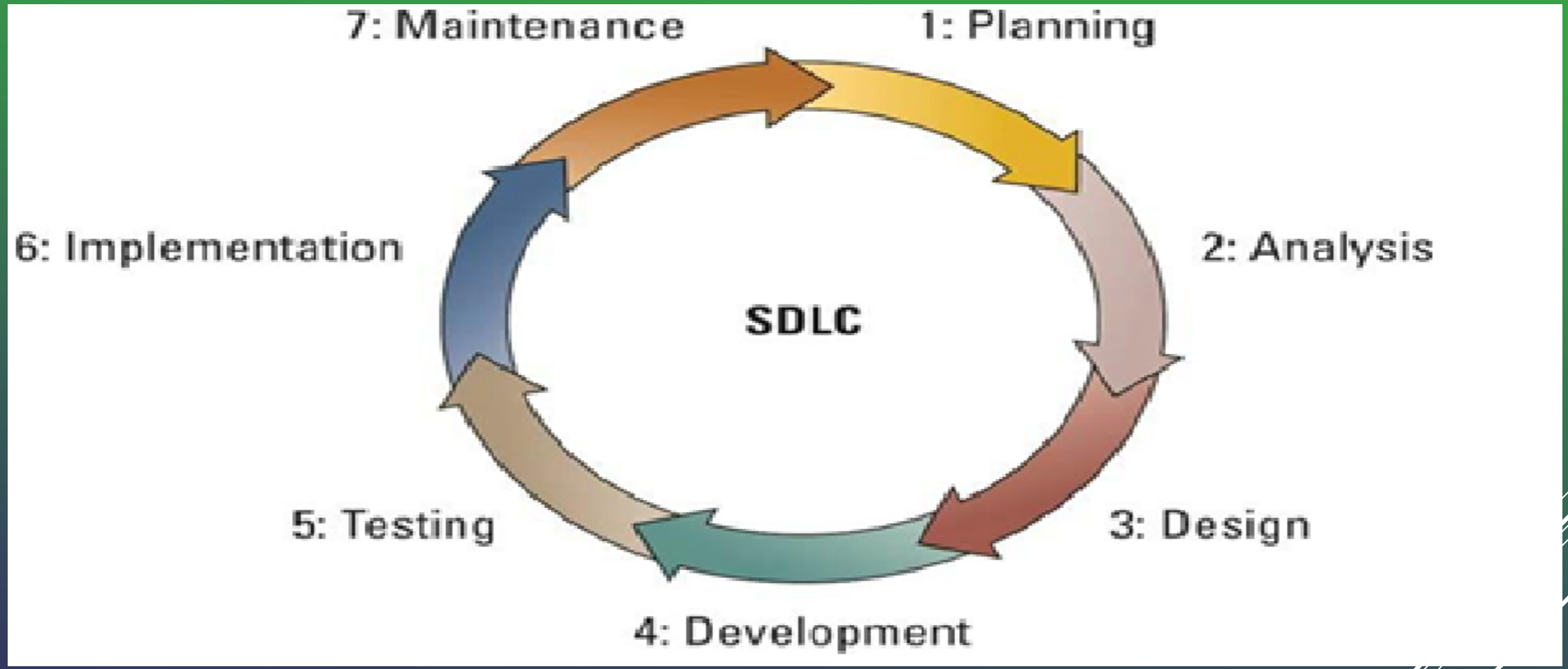
- SDLC is considered to be the foundation for all software development methodologies, with various activities associated with each level.
- Activities such as budgets, requirements gathering, and documentation writing, are included in the cycle, as well as the more technical elements.
- SDLC usually begins with determining customer business needs, which is followed by later phases.
- The cycle ends when all requirements have been fulfilled.

THE SYSTEMS DEVELOPMENT LIFE CYCLE

- Systems Development Life Cycle (SDLC): Methodology for understanding the business objectives of a system and designing an appropriate solution
- Five major steps in the SDLC:
  - Systems analysis/planning
  - Systems design
  - Building the system
  - Testing
  - Implementation

WEB SITE SYSTEMS DEVELOPMENT LIFE CYCLE





HTTPS://WWW.INNOVATIVEARCHITECTS.COM/KNOWLEDGECENTER/BASIC-IT-SYSTEMS/SYSTEM-DEVELOPMENT-LIFE-CYCLE.ASPX

SYSTEM ANALYSIS/PLANNING: IDENTIFYING BUSINESS OBJECTIVES, SYSTEM FUNCTIONALITY, AND INFORMATION REQUIREMENTS

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

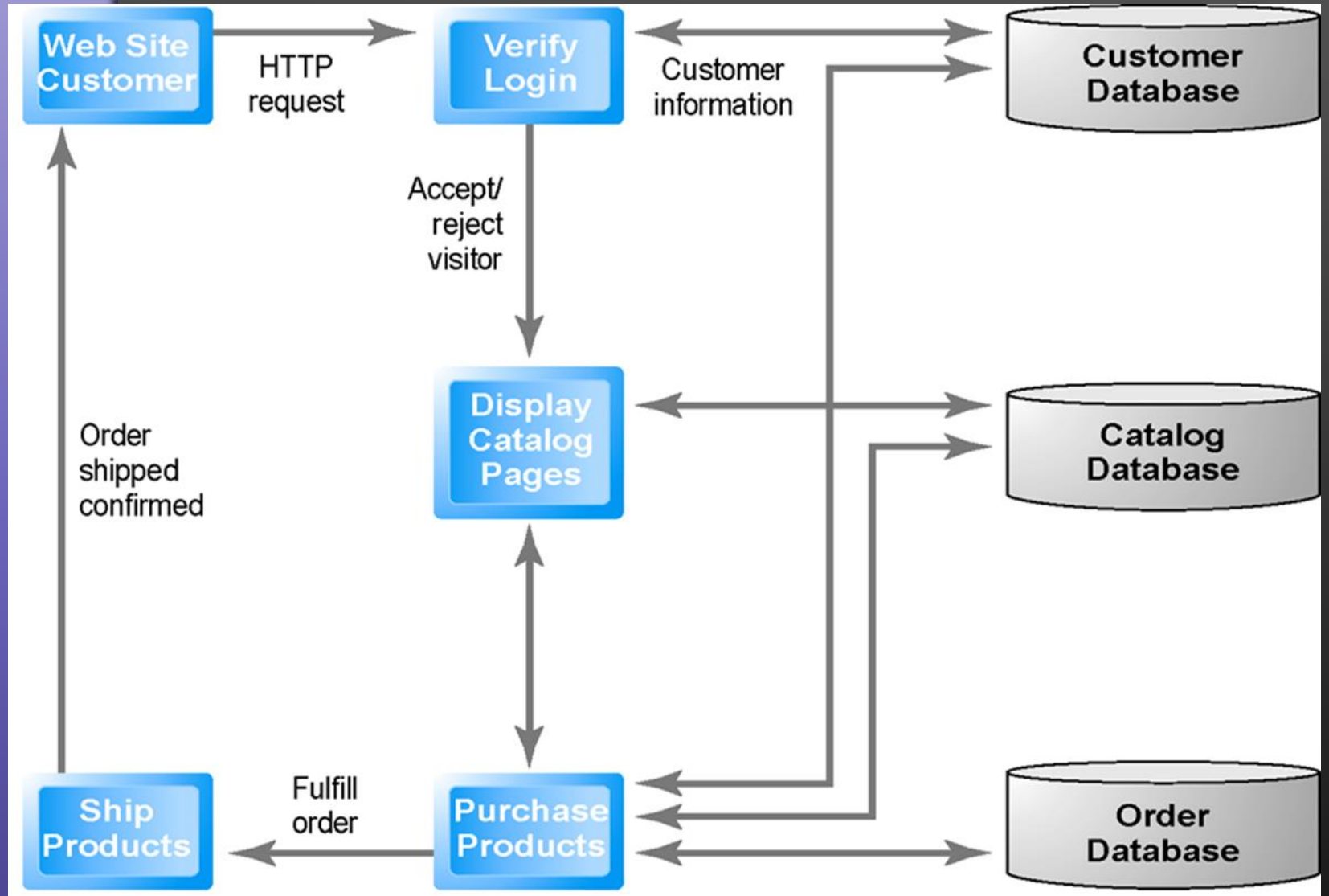
TABLE 4.1 SYSTEM ANALYSIS: BUSINESS OBJECTIVES, SYSTEM FUNCTIONALITY, AND INFORMATION REQUIREMENTS FOR A TYPICAL E-COMMERCE SITE

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 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

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

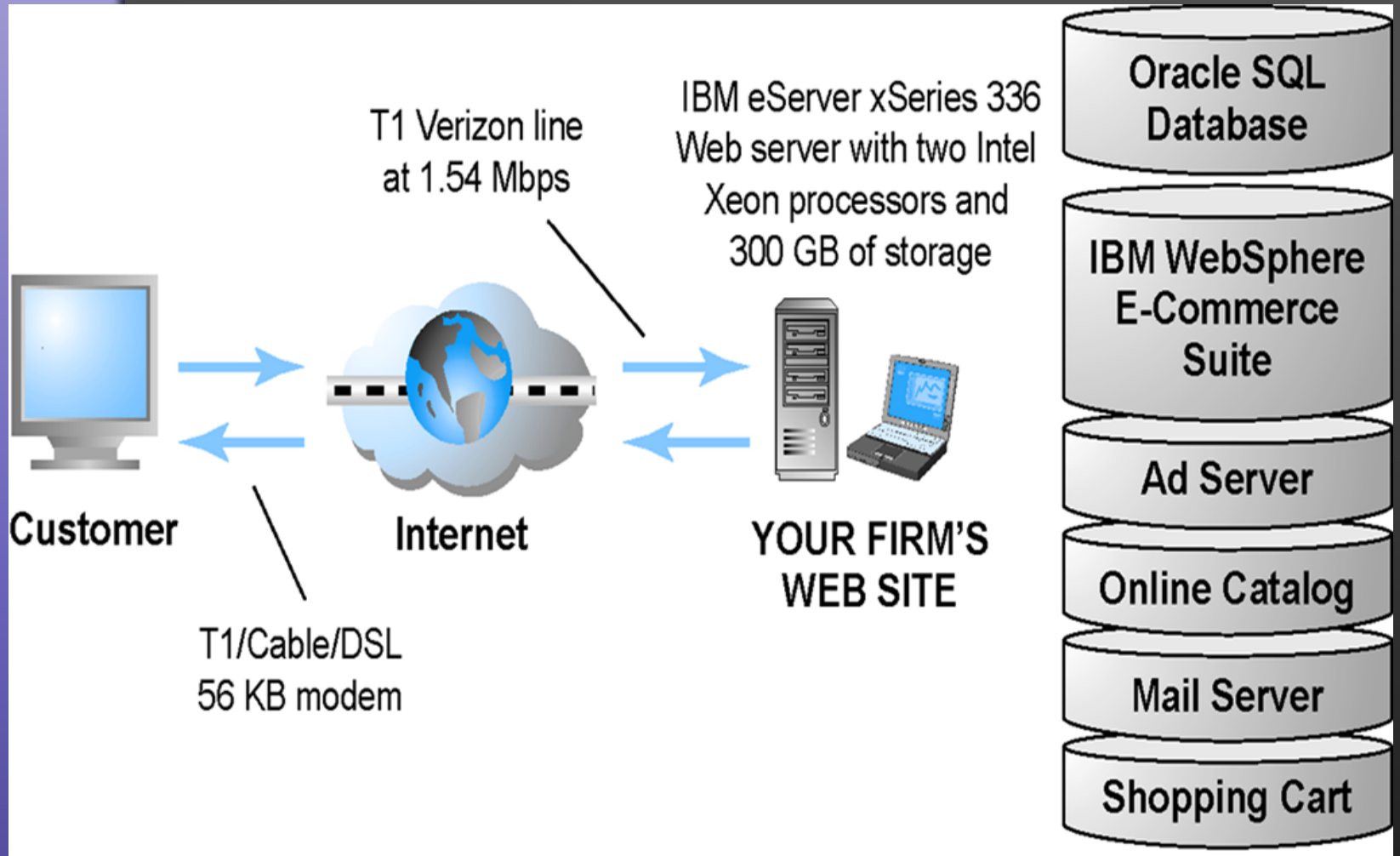
A LOGICAL DESIGN FOR A SIMPLE WEB SITE



(a) Simple Data Flow Diagram

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

A PHYSICAL DESIGN FOR A SIMPLE WEB SITE



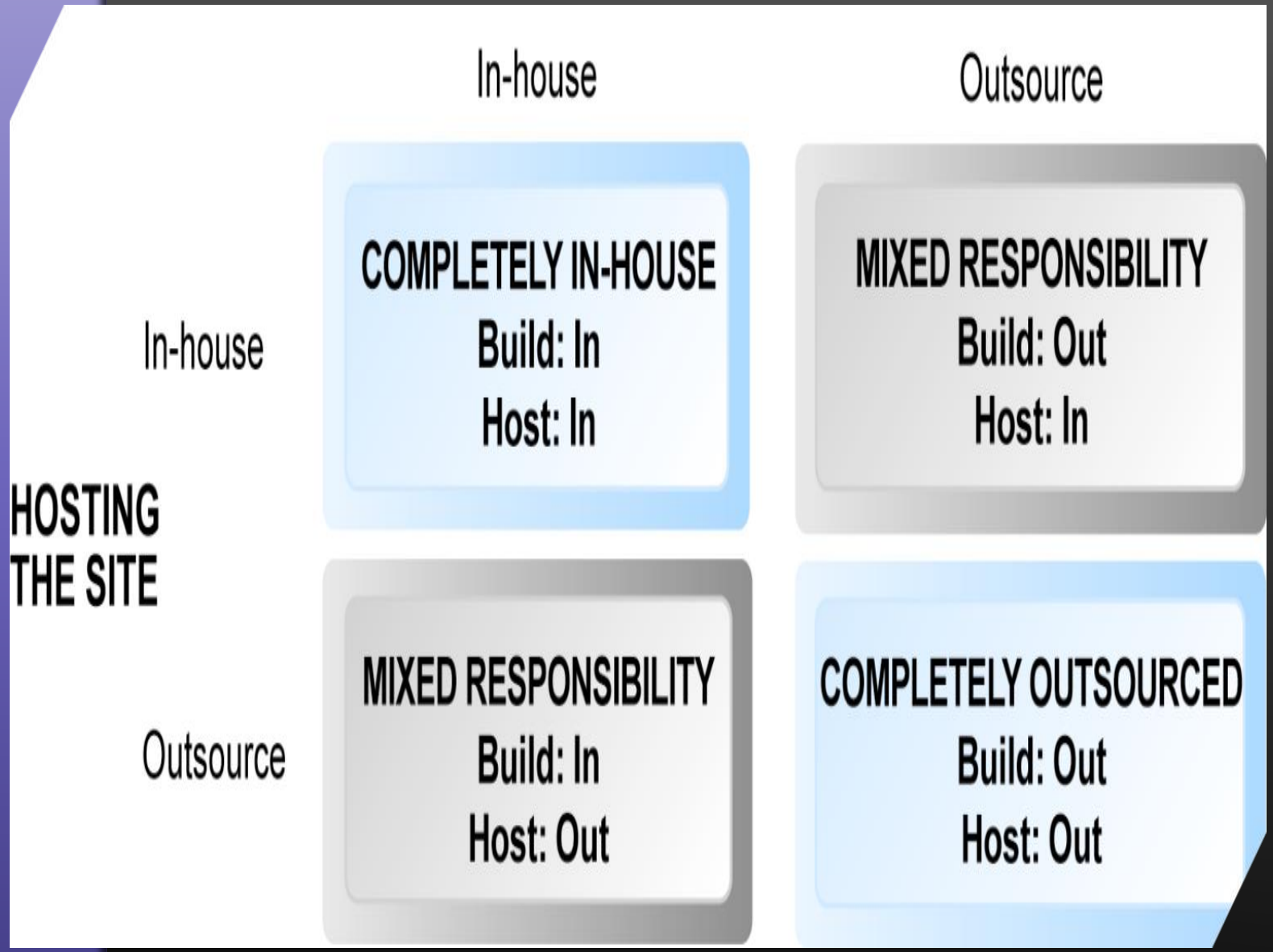
(b) Simple Physical Design

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

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

CHOICES IN BUILDING AND HOSTING



TESTING, IMPLEMENTATION, AND MAINTENANCE

- Testing: Includes unit testing, system testing, and acceptance testing
- Implementation and maintenance:
  - Maintenance is ongoing
  - Benchmarking: process by which site is compared to those of competitors in terms of response speed, quality of layout, and design

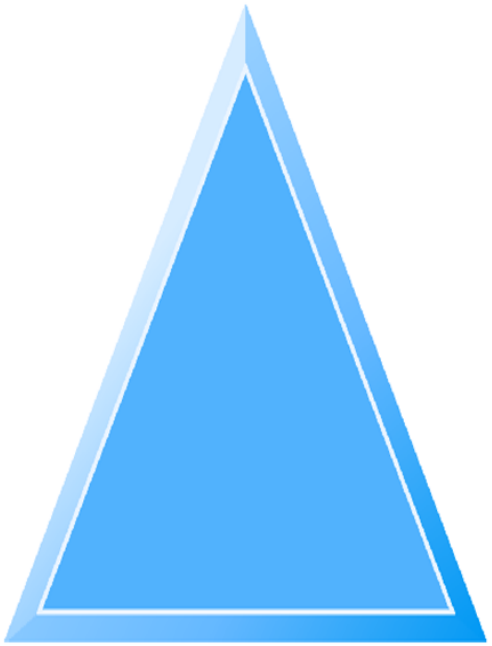
DISADVANTAGES OF SDLC

- It does not work so well where there are levels of uncertainty or unnecessary overheads.
- It directs the development efforts with an emphasis on planning, but the system does not encourage creative input or innovation throughout the lifecycle.

FACTORS IN WEB SITE OPTIMIZATION

Page Delivery

Content delivery networks
Edge caching
Bandwidth



Page Generation

Server response time
Device-based accelerators
Efficient resource allocation
Resource utilization thresholds
Monitoring site performance

Page Content

Optimize HTML
Optimize images
Site architecture
Efficient page style

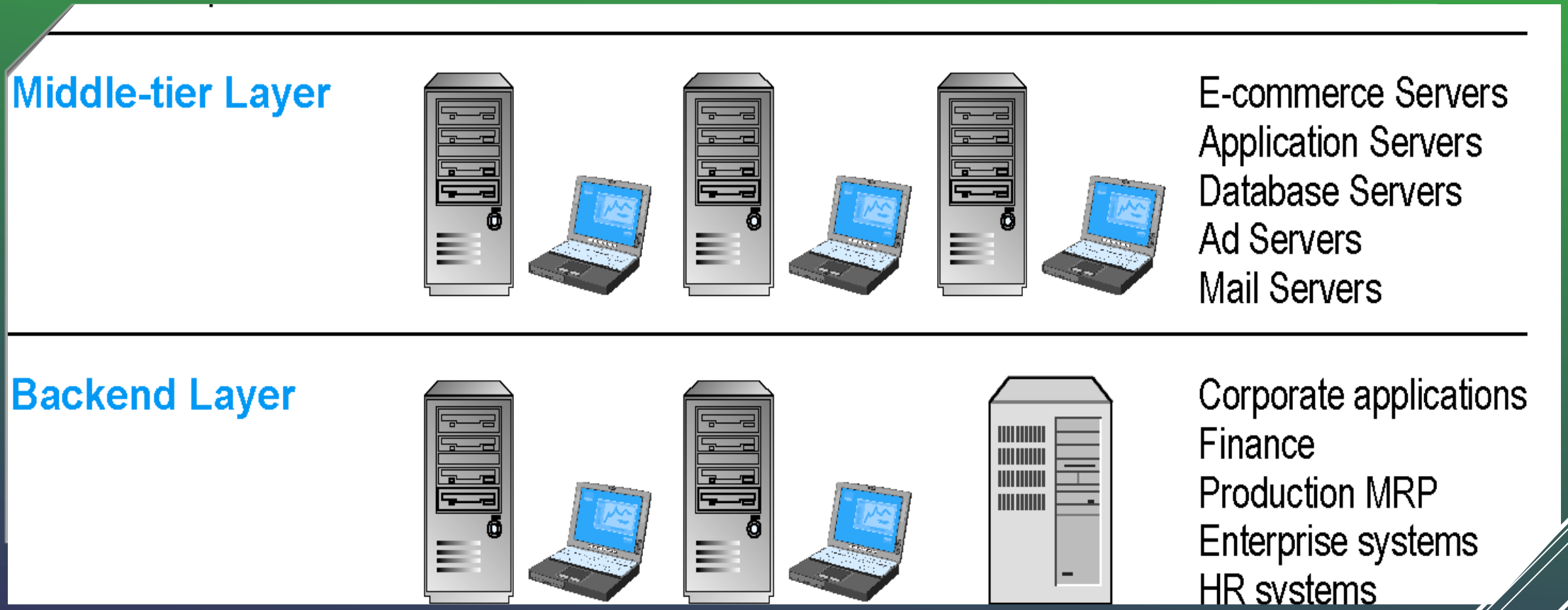
SIMPLE VERSUS MULTI-TIERED WEB SITE ARCHITECTURE

- System architecture: refers to the arrangement of software, machinery, and tasks in an information system needed to achieve a specific functionality
  - Two-tier architecture
  - Multi-tier architecture

TWO-TIER E-COMMERCE ARCHITECTURE

(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.



MULTI-TIER E-COMMERCE ARCHITECTURE

- All e-commerce sites require basic Web server software to answer HTTP requests from customers
- Web servers use HTTP to allow access to the Internet. They search through and use HTML files that are sent to web browsers and translated so the user can understand them.
- It is also capable of accessing and storing other types of files, but they are often attached in some way to the HTML files it has, such as having images that are placed upon the HTML.
- Web servers are primarily used to store, process and deliver the pages of a website to users. In layman's terms, this means that web servers are what make websites appear when you type in a URL.

WEB SERVER

BASIC FUNCTIONALITY PROVIDED BY WEB SERVERS

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

SITE MANAGEMENT TOOLS

- All Web servers contain basic site management tools that verify that links on pages are still valid and also identify orphan files
- Additional site management software and services can also be purchased from providers.

- https://www.webtrends.com/

DYNAMIC PAGE GENERATION TOOLS

- Dynamic page generation: contents of Web page stored as objects in database rather than being hard-coded in HTML; are fetched when needed from database
- Tools include CGI (Common Gateway Interface), ASP (Active Server Pages), JSP (Java Server Pages)
- Lowers menu costs, permits easy online market segmentation, enables cost-free price discrimination

- Web application servers: Provide specific business functionality required of a Web site
  - Example of middleware software
  - Number of different types available, providing a variety of functionality

APPLICATION SERVERS

APPLICATION SERVERS AND THEIR FUNCTIONS

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

https://www.tutorialspoint.com/web_developers_guide/web_server_types.htm

- Provides the basic functionality needed for online sales: Online catalog, shopping cart, credit card processing
- Merchant server software packages: Offer integrated environment
- E-commerce merchant services
  - Example: Yahoo's Small Business Merchant Solutions, Freemerchant
- Open source Web building tools:
  - Example: Apache Web server; ZenCart; Echo Internet Gateway; MySQL; PHP, PERL, Javascript; Google Analytics
- https://www.cio.com/article/2395122/e-commerce/5-best-ecommerce-software-platforms-for-small-business.html

E-COMMERCE MERCHANT SERVER SOFTWARE

EXERCISE : BUSINESS CASE FOR CHOOSING E-COMMERCE

- https://www.businessnewsdaily.com/7706-choosing-ecommerce-software.html

- Hardware platform: Underlying computing equipment that system uses to achieve e-commerce functionality
- Objective to have enough platform capacity to meet peak demand but not so much that you are wasting money
- Important to understand the different factors that affect speed, capacity, and scalability of a site

CHOOSING THE HARDWARE FOR AN E-COMMERCE SITE

- Demand that customers put on site the most important factor affecting the speed of site
- Factors involved in demand include:
  - Number of simultaneous users in peak periods
  - Nature of customer requests (user profile)
  - Type of content (dynamic versus static Web pages)
  - Required security
  - Number of items in inventory
  - Number of page requests
  - Speed of legacy applications

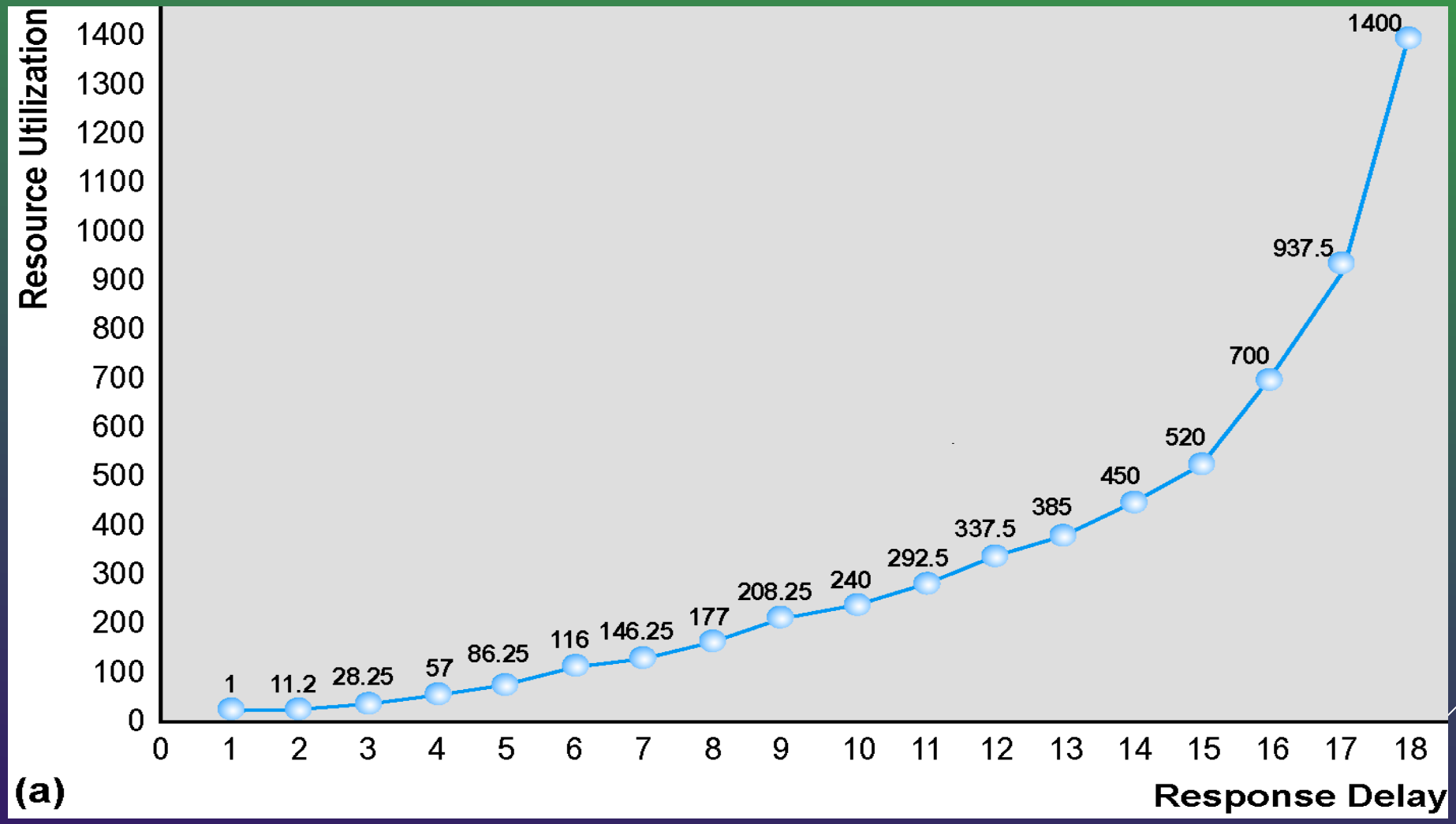
RIGHT-SIZING YOUR HARDWARE PLATFORM: THE DEMAND SIDE

FACTORS IN RIGHT-SIZING AN E-COMMERCE PLATFORM

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

DEGRADATION IN PERFORMANCE AS NUMBER OF USERS INCREASES



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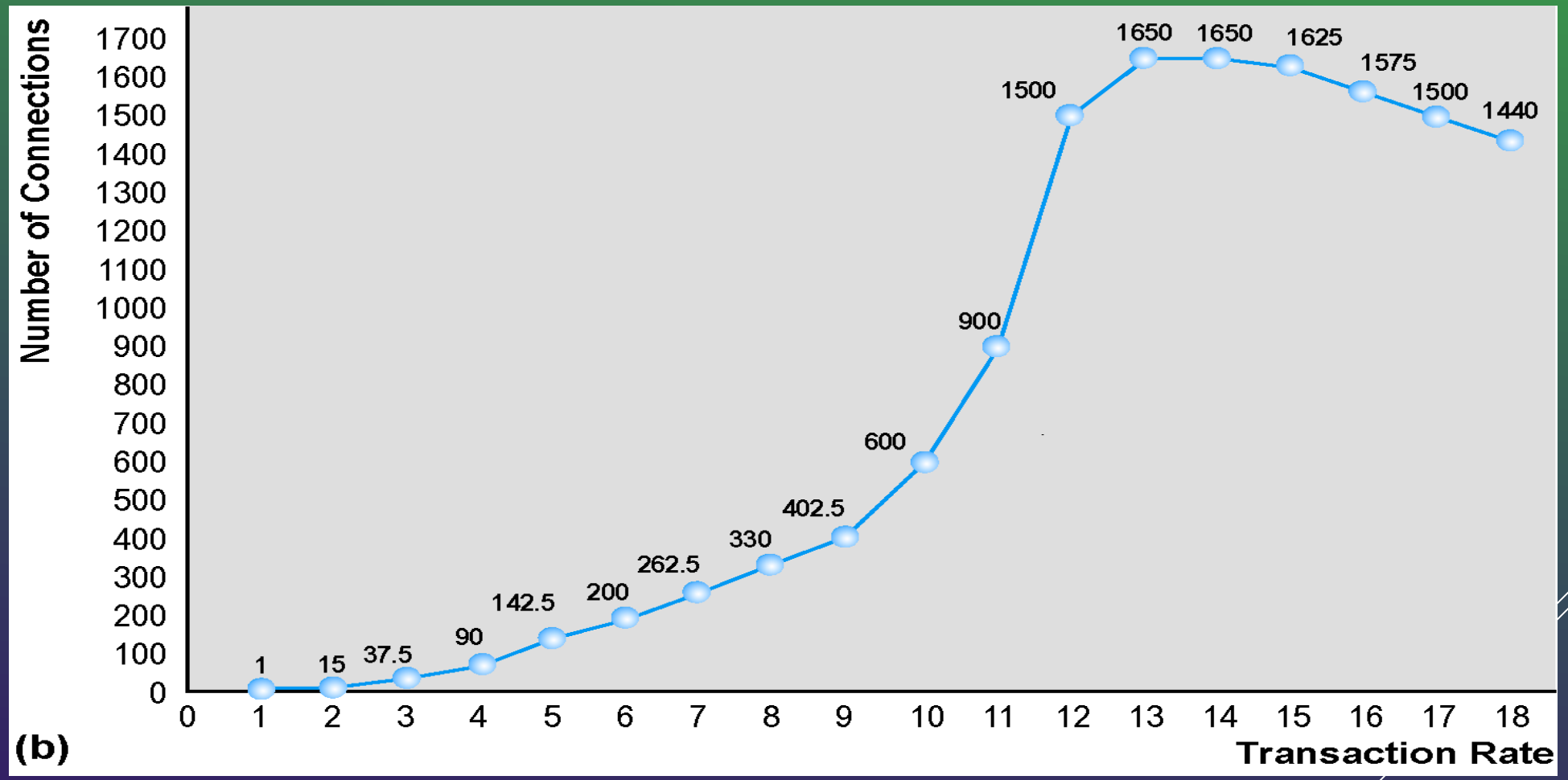


RIGHT-SIZING YOUR HARDWARE PLATFORM: THE SUPPLY SIDE

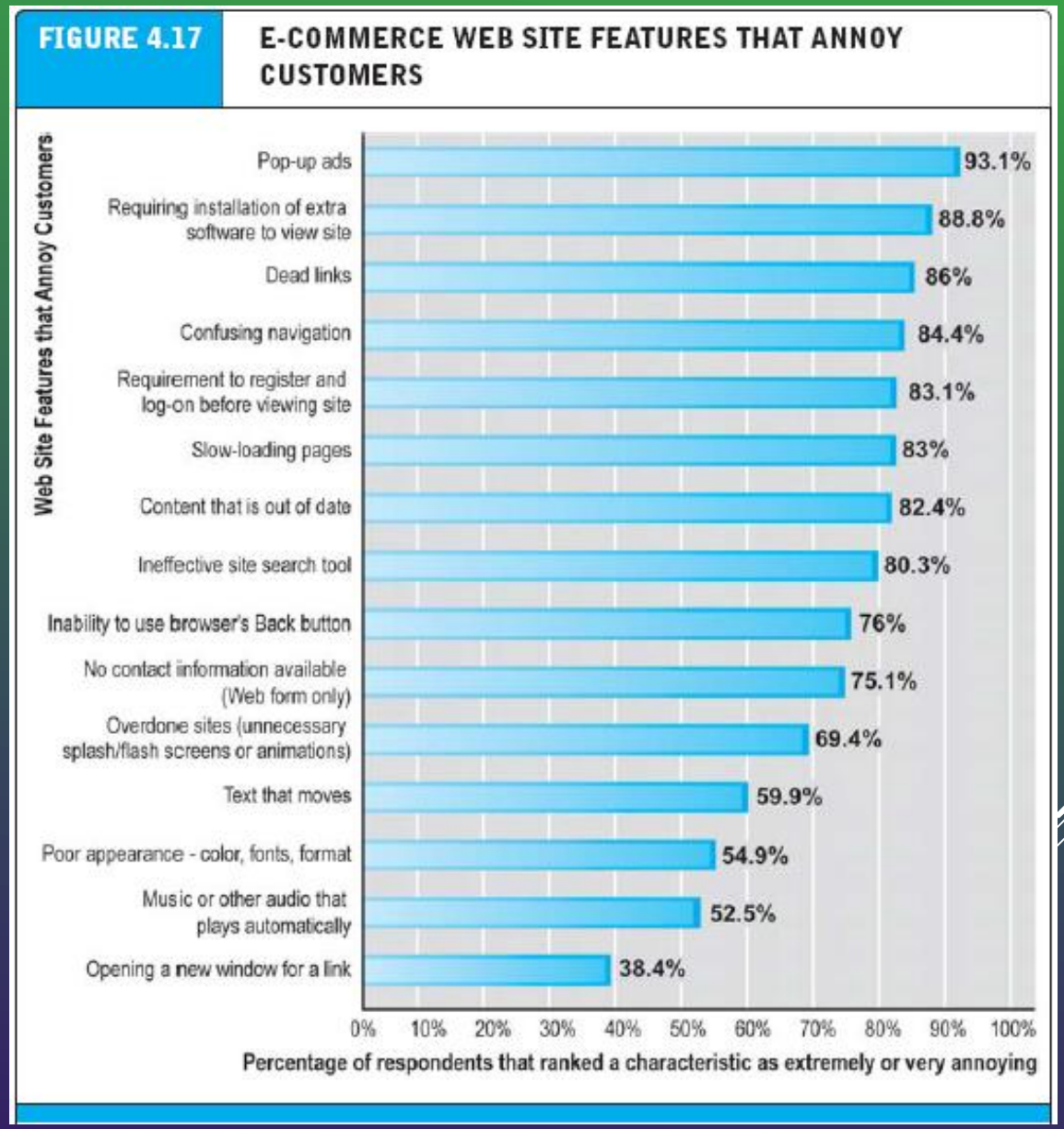
- Scalability: Ability of site to increase in size as demand warrants
- Ways to scale hardware:
  - Vertically: increase processing power of individual components
  - Horizontally: employ multiple computers to share workload
  - Improve processing architecture

VERTICAL AND HORIZONTAL SCALING TECHNIQUES

TABLE 4.8 VERTICAL AND HORIZONTAL SCALING TECHNIQUES

TECHNIQUE	APPLICATION
Use a faster computer	Applies to edge servers, presentation servers, data servers, etc.
Create a cluster of computers	Use computers in parallel to balance loads
Use appliance servers	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 a 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

E-COMMERCE WEB SITE FEATURES THAT ANNOY CUSTOMERS



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

THE EIGHT MOST IMPORTANT FACTORS IN SUCCESSFUL E-COMMERCE SITE DESIGN

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

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

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