



Chapter 3:

E-business infrastructure

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E-Business

Learning outcomes

- ◆ Outline the hardware and software technologies used to build an e-business infrastructure within an organization and with its partners
- ◆ Outline the hardware and software requirements necessary to enable employee access to the Internet and hosting of e-commerce services.

Google Glass: Augment My Reality

- ◆ Have you used any augmented reality applications? If so, has it been useful; if not, is it a service that seems interesting? Why or why not?
- ◆ Are there any privacy issues raised by augmented reality applications?
- ◆ What are the potential benefits of augmented reality applications? Are there any disadvantages?
- ◆ What revenue models could work for providers of augmented services?

The Apple Watch: Bringing the Internet of Things to your Wrist

- ◆ Apple watch introduced in 2015
- ◆ Wearable computing field with potential applications in healthcare, fitness, the military, gaming and so on.
- ◆ Over 100 million wearable computing devices were shipped by 2016.
- ◆ The global market for these products is expected to grow to over \$170 billion by 2021.
- ◆ One Goal: act as a filter to much of the information overload of a smartphone, only notifying users when critical information requires attention

The Internet: Technology Background

◆ Internet

- Interconnected network of thousands of networks and millions of computers
- Links businesses, educational institutions, government agencies, and individuals

◆ World Wide Web (Web)

- One of the Internet's most popular services
- Provides access to billions, possibly trillions, of Web pages

The Internet: Key Technology Concepts

◆ Internet defined as network that:

- Uses IP addressing
- Supports TCP/IP
- Provides services to users, in manner similar to telephone system

◆ Three important concepts:

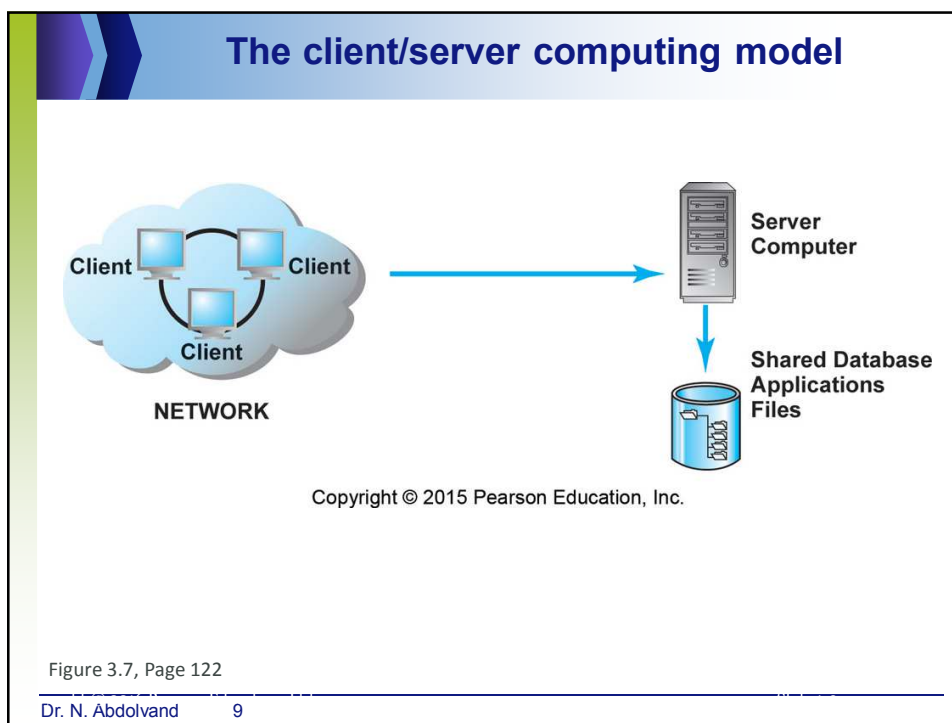
- Packet switching
- TCP/IP communications protocol
- Client/server computing

Domain Names, DNS, and URLs

- ◆ Domain name
 - IP address expressed in natural language
- ◆ Domain name system (DNS)
 - Allows numeric IP addresses to be expressed in natural language
- ◆ Uniform resource locator (URL)
 - Address used by Web browser to identify location of content on the Web
 - For example: http://www.azimuth-interactive.com/flash_test

Client/Server Computing

- ◆ Powerful personal computers (clients) connected in network with one or more servers
- ◆ Servers perform common functions for the clients
 - Storing files
 - Software applications
 - Access to printers, and so on



The New Client: The Mobile Platform

- ◆ Primary Internet access is now through:
 - Tablets
 - Supplementing PCs for mobile situations
 - About 155 million people in US, use tablet computers to access the internet.
 - Smartphones
 - Disruptive technology:
 - Shift in processors, operating systems
 - In 2016, over 210 million Americans use mobile phones to access the internet.

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Cloud Computing

- ◆ Firms and individuals obtain computing power and software over Internet
- ◆ Public, private, and hybrid clouds
- ◆ Radically reduces costs of:
 - Building and operating Web sites
 - Infrastructure, IT support
 - Hardware, software
- ◆ Risks: Organizations become dependent on outside providers

The cloud computing model

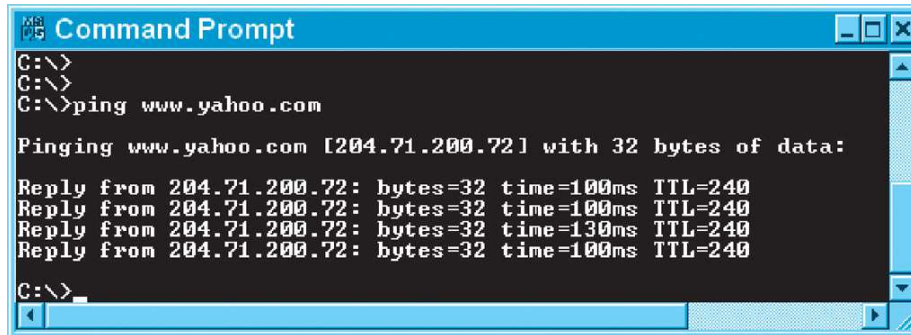


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Three basic types of services

- ◆ Infrastructure as a service (IaaS)
 - Customers use processing, storage, networking, and other computing resources from third-party providers called (CSPs)
- ◆ Software as a service (SaaS)
 - Customers use software hosted by the vendor on the vendor's cloud infrastructure and delivered as a service over a network (e.g. google apps)
- ◆ Platform as a service (PaaS)
 - Customers use infrastructure and programming tools supported by the CSP to develop their own applications.
 - E.g. IBM offers Bluemix for software development and testing on its cloud infrastructure.

The result of a Ping



```

Command Prompt
C:\>
C:\>
C:\>ping www.yahoo.com

Pinging www.yahoo.com [204.71.200.72] with 32 bytes of data:

Reply from 204.71.200.72: bytes=32 time=100ms TTL=240
Reply from 204.71.200.72: bytes=32 time=100ms TTL=240
Reply from 204.71.200.72: bytes=32 time=130ms TTL=240
Reply from 204.71.200.72: bytes=32 time=100ms TTL=240

C:\>
  
```

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The Internet Today

- ◆ Internet growth has boomed without disruption because of:
 - Client/server computing model
 - Hourglass, layered architecture
 - Network Technology Substrate
 - Transport Services and Representation Standards
 - Middleware Services
 - Applications

Who Governs the Internet?

- ◆ Organizations that influence the Internet and monitor its operations include:
 - Internet Corporation for Assigned Names and Numbers (ICANN)
 - Internet Assigned Numbers Authority (IANA)
 - Internet Engineering Task Force (IETF)
 - Internet Research Task Force (IRTF)
 - Internet Engineering Steering Group (IESG)
 - Internet Architecture Board (IAB)
 - Internet Society (ISOC)
 - Internet Governance Forum (IGF)
 - World Wide Web Consortium (W3C)
 - Internet Network Operators Groups (NOGs)

Limitations of the Current Internet

- ◆ Bandwidth limitations
 - Slow peak-hour service
- ◆ Quality of service limitations
 - Latency
- ◆ Network architecture limitations
 - Identical requests are processed individually
- ◆ Wired Internet
 - Copper and expensive fiber-optic cables

The Internet2 Project

- ◆ Consortium of 450+ institutions collaborating to facilitate revolutionary Internet technologies
- ◆ Primary goals:
 - Create leading-edge very-high speed network for national research community
 - Enable revolutionary Internet applications
 - Distributed and collaborative computing environments for sciences, health, arts, and humanities initiatives

The Future Internet

- ◆ Latency solutions
 - diffserv (differentiated quality of service)
- ◆ Guaranteed service levels and lower error rates
 - Ability to purchase the right to move data through network at guaranteed speed in return for higher fee
- ◆ Declining costs
- ◆ The Internet of Things (IoT)
 - Objects connected via sensors/RFID to the Internet
 - “Smart things”
 - Interoperability, standards, and privacy concerns

Hypertext

- ◆ Text formatted with embedded links
 - Links connect documents to one another, and to other objects such as sound, video, or animation files
- ◆ Uses Hypertext Transfer Protocol (HTTP) and URLs to locate resources on the Web
 - Example URL: <http://megacorp.com/content/features/082602.html>

Markup Languages

- ◆ Hypertext Markup Language (HTML)
 - Fixed set of pre-defined markup “tags” used to format text
 - Controls look and feel of Web pages
 - HTML5 the newest version
- ◆ eXtensible Markup Language (XML)
 - Designed to describe data and information
 - Tags used are defined by user

XML example

```

Product>
<Action Value5”Delete”/>
<ProductID>118003-008</ProductID>
</Product>
<Product Type5”Good” SchemaCategoryRef5”C43171801”>
<ProductID>140141-002</ProductID>
<UOM><UOMCoded>EA</UOMCoded></UOM>
<Manufacturer>Compaq</Manufacturer>
<LeadTime>2</LeadTime>
<CountryOfOrigin>
<Country><CountryCoded>US</CountryCoded></Country>
</CountryOfOrigin>

```

Web Servers and Web Clients

- ◆ Web server software
 - Enables a computer to deliver Web pages to clients on a network that request this service by sending an HTTP request
 - Apache, Microsoft IIS
 - Basic capabilities: Security services, FTP, search engine, data capture
- ◆ Web server
 - May refer to either Web server software or physical server
 - Specialized servers: Database servers, ad servers, and so on
- ◆ Web client
 - Any computing device attached to the Internet that is capable of making HTTP requests and displaying HTML pages

Web Servers and Web Clients

- ◆ Database server
 - server designed to access specific information within a database
- ◆ ad server
 - server designed to deliver targeted banner ads
- ◆ Mail server
 - server that provides e-mail messages
- ◆ video server
 - server that serves video clips

Web Browsers

- ◆ Primary purpose to display Web pages
- ◆ Internet Explorer—30% of market
- ◆ Google's Chrome—52%
 - Open source
- ◆ Mozilla Firefox—8%
 - Open source
- ◆ Apple's Safari—4.5 %

The Internet and Web: Features

- ◆ Features on which the foundations of e-commerce are built:
 - E-mail
 - Instant messaging
 - Search engines
 - Online forums
 - Streaming media
 - Cookies

E-mail

- ◆ Most used application of the Internet
- ◆ Uses series of protocols for transferring messages with text and attachments from one Internet user to another
- ◆ Instant Messaging
- ◆ Displays words typed on a computer almost instantly, and recipients can respond immediately in the same way
 - Advanced IM systems include voice/video chat

Search Engines

- ◆ Identify Web pages that match queries based on one or more techniques
 - Keyword indexes, page ranking
- ◆ Also serve as:
 - Shopping tools
 - Advertising vehicles (search engine marketing)
 - Tool within e-commerce sites
- ◆ Outside of e-mail, most commonly used Internet activity
- ◆ Top three search engines:
 - Google: 64%
 - Microsoft Bing: 22%
 - Yahoo: 12%

Online Forums

- ◆ Enable Internet users to communicate with one another, although not in real time
- ◆ Members visit online forum to check for new posts
 - Streaming Media
- ◆ Enables music, video, and other large files to be sent to users in chunks so that the file can play uninterrupted
- ◆ Allows users to begin playing media files before file is fully downloaded

Cookies

- ◆ Small text files deposited by Web site on user's computer to store information about user, accessed when user next visits Web site
- ◆ Can help personalize Web site experience
- ◆ Can pose privacy threat

Web 2.0 Features and Services

- ◆ Online Social Networks
 - Services that support communication among networks of friends, peers
- ◆ Blogs
 - Personal Web page of chronological entries
- ◆ Wikis
 - Web application that allows a user to easily add and edit content on a web page
- ◆ Virtual Reality (VR)
 - Involves fully immersing users within a virtual world, typically through the use of a head-mounted display (HMD) connected to headphones and other devices.
- ◆ Augmented Reality (AR)
 - Involves overlaying virtual objects over the real world, via smartphones, tablets or HMDs

Web 2.0 Features and Services

- ◆ Really Simple Syndication (RSS)
 - Program that allows users to have digital content automatically sent to their computers over the Internet

Web 2.0 Features and Services

- ◆ Podcasting
 - Audio presentation stored as an audio file and available for download from Web
- ◆ Wikis
 - Allows user to easily add and edit content on Web page
- ◆ Music and video services
 - Online video viewing
 - Digital video on demand

Web 2.0 Features and Services

- ◆ Internet telephony (VoIP)
 - Voice over Internet Protocol (VoIP) uses Internet to transmit voice communication
- ◆ Video conferencing, video chatting, and telepresence
- ◆ Online software and Web services
 - Web apps, widgets, and gadgets

Intelligent Personal Assistants

- ◆ Software that interacts with the user through voice commands
- ◆ Features
 - Natural language; conversational interface
 - Situational awareness
 - Interpret voice commands to interact with various Web services
- ◆ Examples: Siri, Google Now

Mobile Apps

- ◆ Use of mobile apps has exploded
 - Downloaded app over \$10 billion in 2016
- ◆ Increased use/purchasing from tablets
- ◆ Platforms
 - iPhone/iPad (iOS), Android, Blackberry
- ◆ App marketplaces
 - Google Play, Apple's App Store, RIM's App World, Windows Phone Marketplace

