c h a p t e r

9

THE INTERNET & THE NEW INFORMATION TECHNOLOGY INFRASTRUCTURE
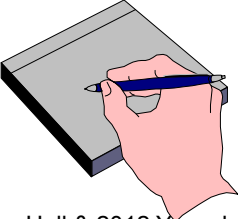
9.1

LEARNING OBJECTIVES

- **Describe features of infrastructure & connectivity standards**
- **Describe Internet & its capabilities**
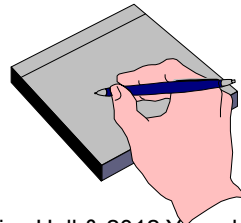- **Evaluate internet benefits**

>>

9.2

LEARNING OBJECTIVES

- **Describe technologies for supporting electronic commerce**
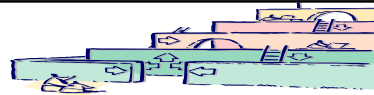- **Analyze problems of new information technology (IT) infrastructure**

*

MANAGEMENT CHALLENGES

- **NEW INFORMATION TECHNOLOGY INFRASTRUCTURE**
- **THE INTERNET**
- **THE WORLD WIDE WEB**
- **SUPPORT TECHNOLOGIES FOR ELECTRONIC COMMERCE & ELECTRONIC BUSINESS**
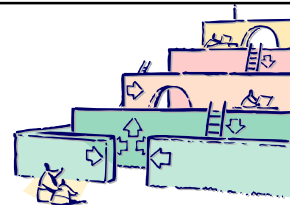- **MANAGEMENT ISSUES & DECISIONS**

**

MANAGEMENT CHALLENGES

- **BROADER PERSPECTIVE OF INFRASTUCTURE DEVELOPMENT**
- **SELECTING TECHNOLOGIES FOR *IT* INFRASTUCTURE (CONNECTIVITY)**

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9.5

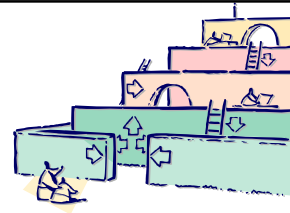# THE NEW INFORMATION TECHNOLOGY (IT) INFRASTRUCTURE 1/2

- **LINKS: Workstations, network computers, local area networks (LANs), server computers**
- **Information flows freely throughout organization**
- **MAY BE LINKED: Kiosks, point-of-sales (POS) terminals, information appliances, Internet**

>>

9.6

THE NEW INFORMATION TECHNOLOGY (IT) INFRASTRUCTURE 2/2

- **ENTERPRISE NETWORKING:** Hardware, software, networks, data resources. Creates companywide network to speed processes, lower costs
- **INTERNETWORKING: Linking of separate networks in an outside of organization ➔**

*

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INTERNETWORKING

**LINK NETWORKS
EACH RETAINS IDENTITY
INTO INTERCONNECTED NETWORK**

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NETWORK C

NETWORK A

NETWORK B
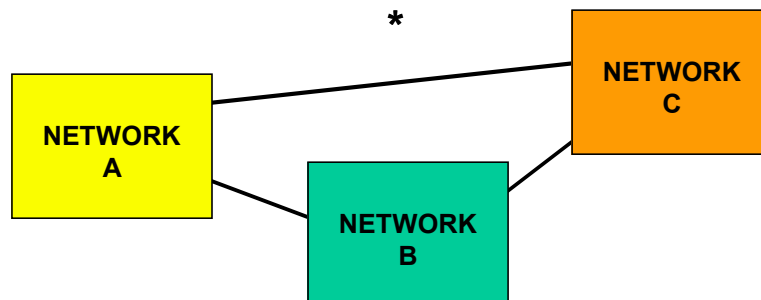
9.8

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CONNECTIVITY

Measure of ability of computing devices to pass & share information without human intervention

OPEN SYSTEMS: Software able to function on different computer platforms. Nonproprietary operating systems, applications, protocols

*

9.9

TRANSMISSION CONTROL PROTOCOL / INTERNET PROTOCOL (TCP / IP)

REFERENCE MODEL DEVELOPED BY DEPARTMENT OF DEFENSE IN 1972

1. **APPLICATION: Provides screen presentations**
2. **TRANSMISSION CONTROL PROTOCOL (TCP): Breaks data into datagrams**
3. **INTERNET PROTOCOL (IP): Breaks, sends datagrams as smaller IP packets; can repeat transmission to increase reliability**

\>\>

9.10

TRANSMISSION CONTROL PROTOCOL / INTERNET PROTOCOL (TCP / IP)

4. NETWORK INTERFACE: Handles addressing and interface between computer & network

5. PHYSICAL NET: Defines electrical transmission characteristics for sending signal along networks to destination

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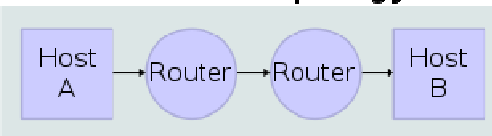
9.11

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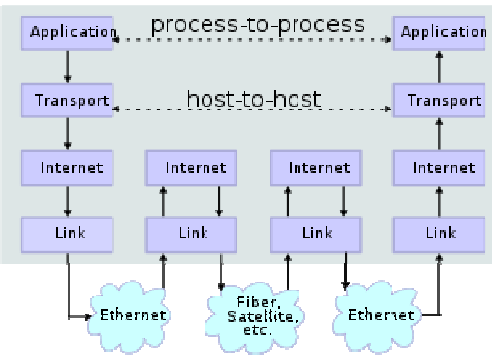
TCP/IP model

- Created in the 1970s by DARPA
- General design guidelines and implementations of specific networking protocols to enable computers to communicate over a network.
- Provides end-to-end connectivity specifying how data should be formatted, addressed, transmitted, routed and received at the destination.

Network Topology

Host A → Router → Router → Host B

Data Flow

Application	process-to-process	Application
Transport	host-to-host	Transport
Internet	Internet	Internet	Internet
Link	Link	Link	Link

Ethernet — Fiber, Satellite, etc. — Ethernet

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OPEN SYSTEM INTERCONNECT (OSI)

- **International reference model**
- **Linking different types of computers & networks**

*

OSI Model			
	Data unit	Layer	Function
Host layers	Data	7. Application	Network process to application
		6. Presentation	Data representation,encryption and decryption
		5. Session	Interhost communication
	Segments	4. Transport	End-to-end connections and reliability,Flow control
Media layers	Packet	3. Network	Path determination and logical addressing
	Frame	2. Data Link	Physical addressing
	Bit	1. Physical	Media, signal and binary transmission

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INTERNET

- **Began as government connection of universities**
- **International Inter-Connected Network of Networks**
- **Internet service provider (ISP): organization connected to internet backbone, leases temporary connections to subscribers**
- **No one owns it, no formal organization**
- **But many regulating bodies.**

9.14   *

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Dynamic web pages

- **Client-side**
  - **Runs on client-side (browser)**
  - **Examples: java applets, javascript, Macromedia/Adobe Flash, Air**
- **Server-side**
  - **Common Gateway Interface (CGI)**
  - **Servlets (Java)**
  - **PHP**
  - **ASP**
  - **JSP**

9.15

Inter-Process Communications

- **Distributed Systems**
  - **Examples of IDE's**
  - **Web-based systems**
- **Models:**
  - **Peer-to-Peer (P2P) eMule, Torrent, Modern IM**

  - **Client/Server Model**
    - **Centralized service(s)**

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9.16

8
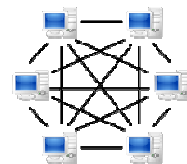
CLIENT/SERVER ON THE INTERNET

- **Internet is a distributed system**
- **CLIENT: Runs Web browser, other software, connects to server**
- **SERVER: Has Web server, data transferred through a common language (HTTP), other services include Simple Mail Transfer Protocol (SMTP), Domain Name Serving (DNS), File Transfer Protocol (FTP), Firewall (filters data to & from Internet-filter traffic), Network News Transfer Protocol (NNTP)**
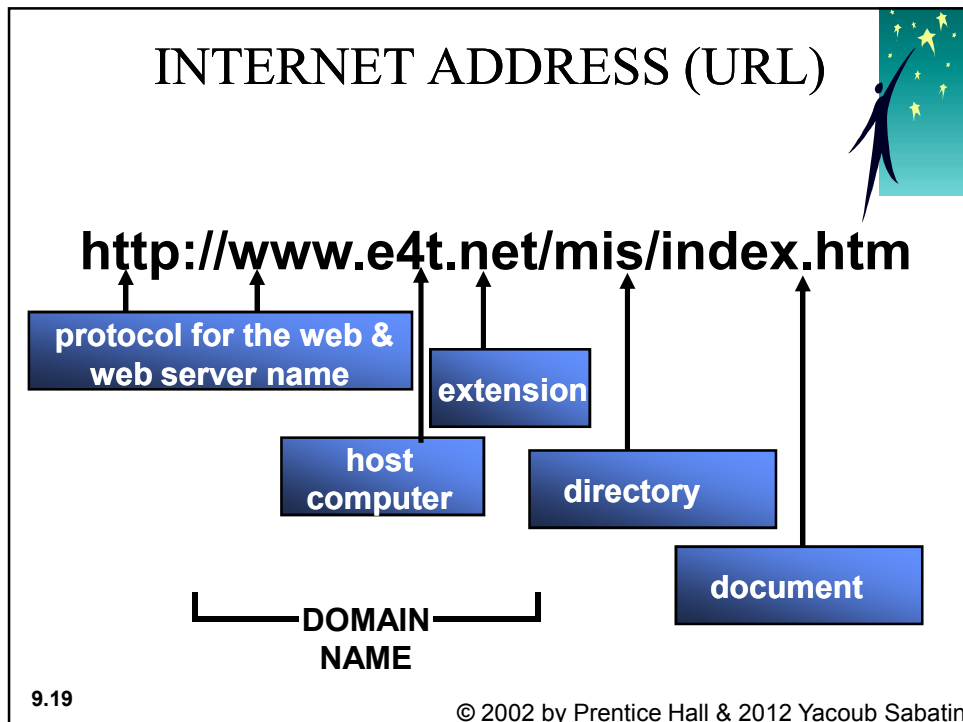
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9.17

INTERNET TERMS

- **WEB SERVER: HW & SW**
- **BROWSER**
- **DOMAIN: a network belongs to entity**
- **CLOUD: The rest of the Internet**
- **HOME PAGE: WWW screen display welcomes user to organization's page**
- **WEBMASTER: Person in charge of Web site**
- **UNIFORM RESOURCE LOCATOR (URL): Address of specific Internet resource, now referred to by URI**

9.18
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INTERNET ADDRESS (URL)

http://www.e4t.net/mis/index.htm

protocol for the web & web server name

extension

host computer

directory

document

DOMAIN NAME

9.19

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EXAMPLES OF INTERNET CLIENT PLATFORMS 1/3

- **NetTops, NetBooks, and Tablets are the popular examples nowadays**
- **PC: General purpose, performs many tasks, may be unreliable, complex**
- **SMART PHONE: Handheld, has small screen, keyboard, e-mail, browsing, voice**

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10

EXAMPLES OF INTERNET CLIENT PLATFORMS 2/3

- **PERSONAL DIGITAL ASSISTANT (PDA): Handheld personal digital assistant**
- **GAME MACHINE/GAME CONSOL: Modem, keyboard, Web access**
- **E-MAIL MACHINE: Tablet, keyboard, text e-mail, requires e-mail service**

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EXAMPLES OF INTERNET CLIENT PLATFORMS 3/3

- **SET TOP BOX: Provides Web surfing, e-mail, uses television set, wireless keyboard**
- **NET PC: Minimal local storage & processing, uses software, services delivered by Internet (Google CR-48 and likes)**
- **PAGER: Handheld, provides limited e-mail, browsing**

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MAJOR INTERNET SERVICES

- **WORLD WIDE WEB: Text, audio, graphics, video**
- **E-MAIL: Person-to-person messaging; document sharing**
- **FTP: Transfer files from computer to computer**
- **TELNET: Log on one computer, work on another**
- **LISTSERVs: e-mail list servers for discussion groups (maintains email lists, outstaged by simpler scripts and social apps)**
- **CHATTING: Interactive conversations**
- **GOPHERS: Use menus to locate text material (outstaged by HTML and hypermedia)**
- **USERNET NEWSGROUPS: Electronic bulletin boards for discussion groups**
- **Many services converged now into WWW**

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9.23

INTERNET TERMS

- **HYPERTEXT TRANSPORT PROTOCOL (http): Communications standard used to transfer Web pages**
- **HYPERTEXT MARKUP LANGUAGE (HTML): Popular programming language for creating Web sites/pages**
- **XML:**
  - **As a lang**
  - **Content vs representation**
  - **RSS and alikes**
  - **Data about data**
  - **Machine is Us**

9.24   *****

SEARCHING THE WEB FOR INFORMATION

- **SEARCH ENGINE: Tool for locating specific sites or information on WWW**
- **PORTAL: Point of entry to WWW**
- **"PUSH" TECHNOLOGY: Server streams relevant content to browser/client**
- **RSS is a "pull" technology, but this is done automatically without user action.**
- **MULTICASTING: Sending data to select group**

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NEXT GENERATION INTERNET

- **BROADBAND: Fiber optics and related technology will provide much higher delivery speed (target: 10 to 100 million bits per second to the desktop)**
- **INTERNET2:**
  - **New protocols, higher transmission speed, interconnected *gigapops* (regional high-speed points-of-presence), connected to high-performance Backbone Network infrastructure. Will differentiate priorities of messages, provide video portals for lifelike video**

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NEXT GENERATION INTERNET

- **INTERNET2 PROJECT:**
  - **Advanced networking consortium led by the research and education community.**
  - **Led by members from research, academia, industry and government.**
  - **Meets the high-performance demands of research and education environment.**
  - **Internet2 Network is a next-generation Internet Protocol and optical network.**
  - **Dynamic circuit network.**
  - **Allows user-based allocation of high-capacity data circuits over the fiber-optic network.**

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9.27

THE WIRELESS WEB

- **Mobile commerce (m-commerce)**
- **Access to web on the go: anywhere, any time, many functions**
- **Context-aware computing.**
  - **Information-based services**
  - **Transaction-based services**
  - **Personalized services**
- **3G:**
  - **Unlike 2G and 2.5G**
  - **Allows simultaneous use of speech and data services**
  - **Higher data rates up to 14.0 Mbit/s on the downlink and 5.8 Mbit/s on the uplink.**
- **4G networks:**
  - **Future**
  - **Target peak data rates of up to 100 Mbit/s for high mobility**
  - **Target up to 1 Gbit/s for low mobility**
 - **LTE/WiMax**

9.28

INTRANET
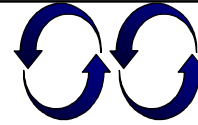
- **INTERNAL (Private) NETWORK**
- **Uses Internet Protocol Technologies**
- **Focal Point of Internal Communication and Collaboration.**
- **WWW Technology**
- **FIREWALL: Security System To Prevent Invasion of Private Networks (Filtering Traffic)**
- **Overcomes Computer Platform Differences (Easier Integration of Legacy Systems)**
- **Often Installed on Existing Network Infrastructure**

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9.29

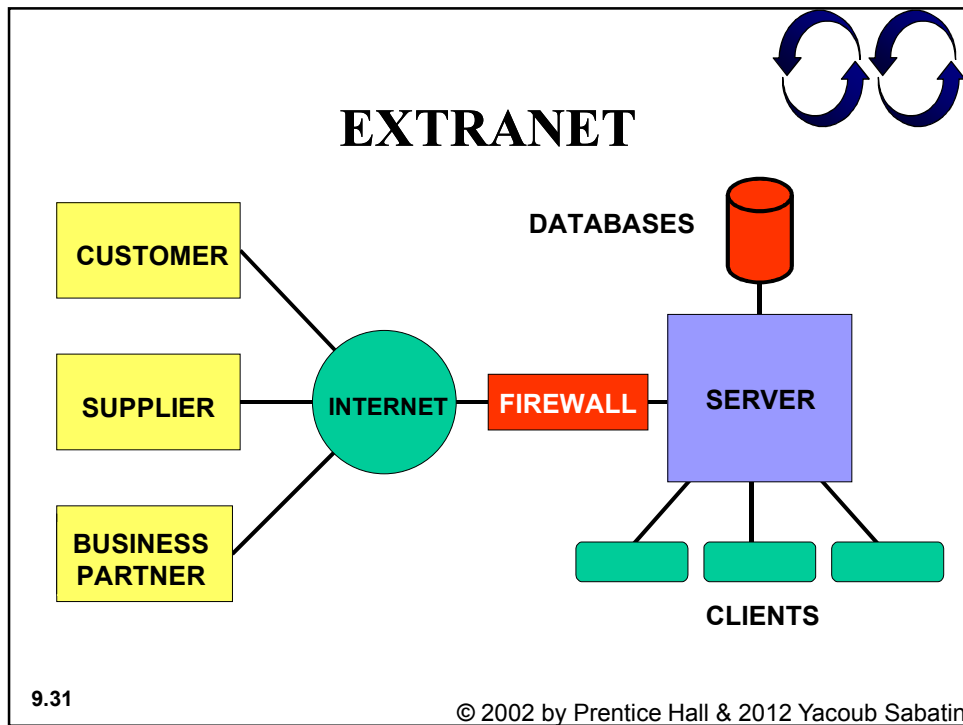© 2002 by Prentice Hall & 2012 Yacoub Sabatin
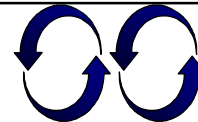
EXTRANET

- **Private network**
- **Uses Internet protocols & connectivity.**
- **Intranet extended to users outside the company**
- **ALLOWS SELECT USERS OUTSIDE ORGANIZATION TO USE ITS INTRANET:**
  - **CUSTOMERS**
  - **BUSINESS PARTNERS**
  - **VENDORS**
- **Allow for an extended Enterprise and business-to-business (B2B) Transactions.**

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EXTRANET

CUSTOMER

SUPPLIER

BUSINESS PARTNER

INTERNET

FIREWALL

DATABASES

SERVER

CLIENTS

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INTERNET BENEFITS

- **GLOBAL CONNECTIVITY**
- **REDUCED COMMUNICATIONS COST**
- **LOWER TRANSACTION COSTS**
- **REDUCED AGENCY COSTS**
- **INTERACTIVITY, FLEXIBILITY, CUSTOMIZATION**
- **ACCELERATED KNOWLEDGE**

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E-COMMERCE SERVER SOFTWARE

- **SET UP ELECTRONIC STOREFRONT**
- **DESIGN ELECTRONIC SHOPPING CART**
- **MAKE SHIPPING ARRANGEMENTS**
- **LINK TO ELECTRONIC PAYMENT**
- **DISPLAY PRODUCT AVAILABILITY & TRACK SHIPMENTS**
- **CONNECT TO BACK-OFFICE SYSTEMS**
- **REPORT TRANSACTION**

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CUSTOMER TRACKING TOOLS

- **COLLECT & STORE DATA ON BEHAVIOR**
- **ANALYZE DATA**
- **IDENTIFY TRENDS**
- **CLICKSTREAM TRACKING: Collects detailed customer data, stores in log**
- **COLLABORATIVE FILTERING: Combines data on similar customers, predicts future behavior**
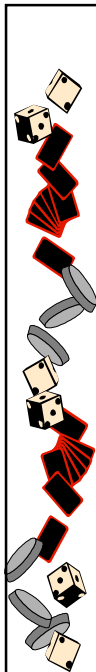
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ADDITIONAL TOOLS

- **WEB CONTENT MANAGEMENT: Assists Webmaster oversee large sites, CMS's**
- **WEB SITE PERFORMANCE MONITORING: Detects, analyzes, helps correct problems**
- **WEB HOSTING SERVICE: Maintains large Web server for subscribers**

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9.35

POTENTIAL PROBLEMS WITH *IT* INFRASTRUCTURE

- **CONNECTIVITY & APPLICATIONS INTEGRATION**
- **LOSS OF MANAGEMENT CONTROL**
- **ORGANIZATIONAL CHANGE**
- **HIDDEN COSTS**
- **NETWORK RELIABILITY, SECURITY, BANDWIDTH**

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9.36