Management Information System

St. Clements University
MBA Program
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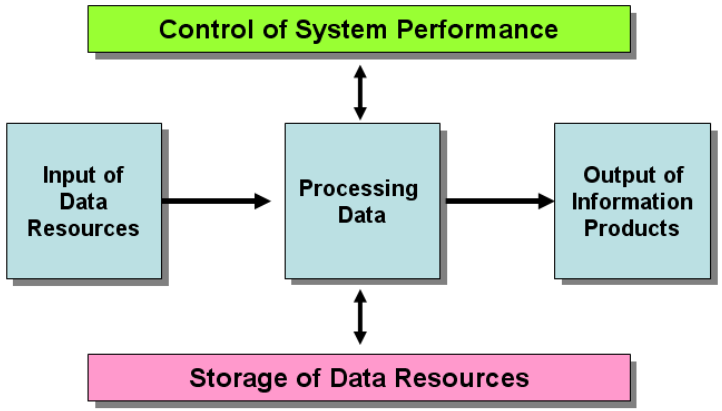
Table of Contents

1. The role of information systems

What Is an Information System ?

- An information system is a mechanism that helps people collect, store, organize, and use information. This is the primary use for computers.
- An information system can be manual, like a card catalog or an address book.
- Computerized information systems can range from a simple database of names to a sophisticated ERP system.

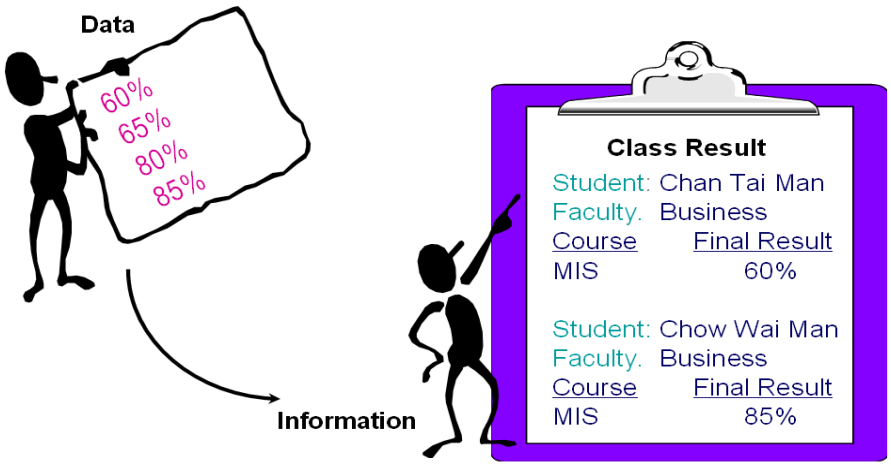
Computer-based Information Systems Model



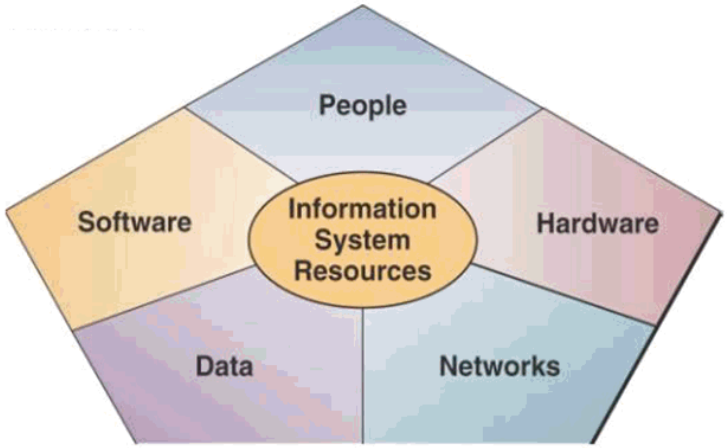
Data and Information - 1

- An IS is a set of interrelated components that collect (or retrieve), process, store, and distribute information to support decision making and control in an organization.
- What is the difference between ***information*** and ***data***?
  - **Data:** Streams of raw facts representing events such as business transactions.
  - **Information:** Clusters of data that are meaningful and useful to human beings in the processes such as making decisions.

Data and Information - 2



Components of Information Systems



The Challenges of Information Systems: Key Management issues - 1

Positive Impacts of Information Systems

- Faster calculations and paperwork
- Analysis of customer purchase patterns and preferences
- More efficient business services
- Instant global distribution of information

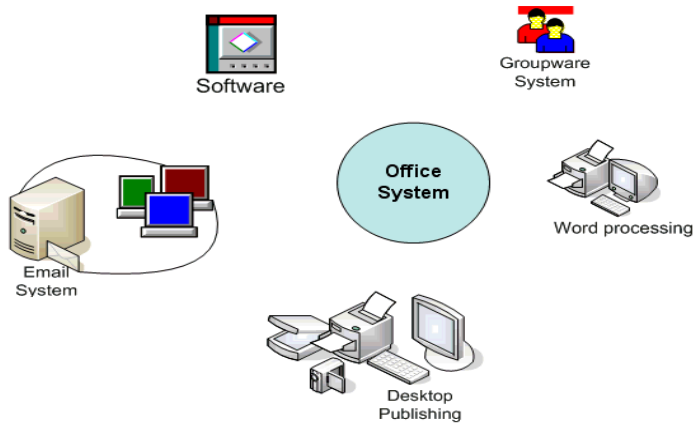
The Challenges of Information Systems: Key Management issues - 2

Negative Impacts of Information Systems

- Automation leading to job elimination
- Privacy concerns
- System outages and shutdowns
- Health problems, repetitive stress injury
- Illegal distribution of intellectual property

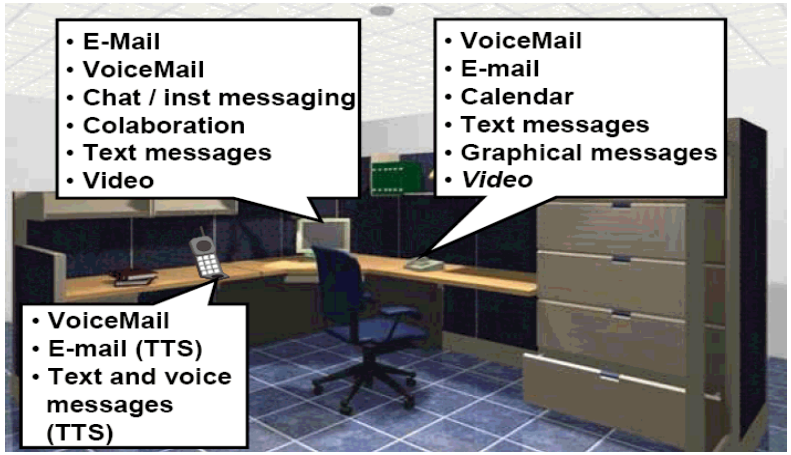
2. Hardware and Software in the Enterprise

Common Compartments in an Office System



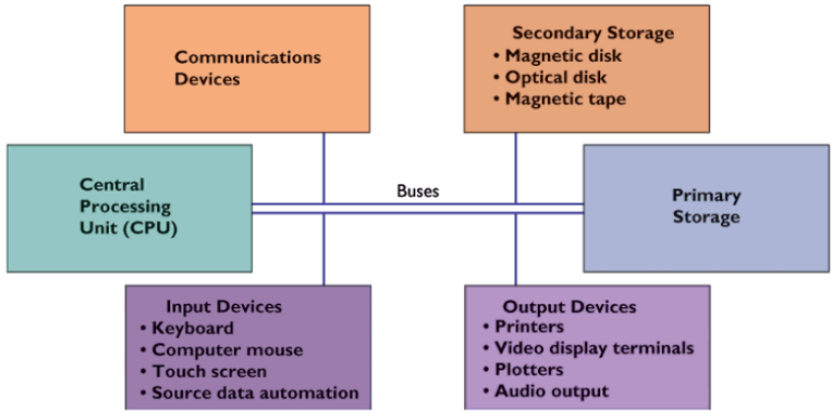
Example of today's work environment

- Three communication devices: PC, desk phone, mobile



Computer Hardware and Information Technology Infrastructure - 1

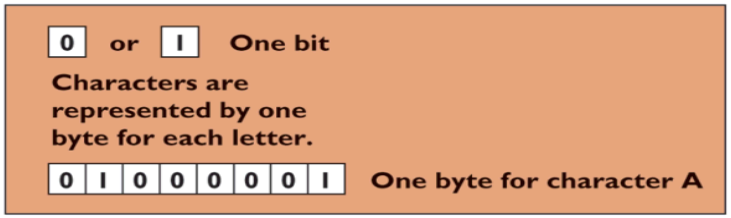
- Hardware components of a computer system



Computer Hardware and Information Technology Infrastructure - 2

The Computer System

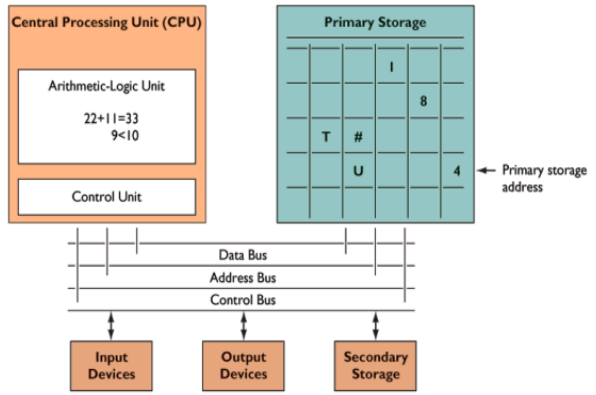
- **Bit**
  - Binary digit
  - Represents 0 or 1
- **Byte**
  - String of eight bits
  - Stores one number, symbol, character, part of picture



Computer Hardware and Information Technology Infrastructure - 3

The Computer System

- **The Central Processing Unit (CPU)**
  - Controls other parts of computer
- **Arithmetic-logic unit**
  - Performs principle logical/mathematical operations
- **Control unit**
  - Coordinates other parts, such as reading a stored program



Computer Hardware and Information Technology Infrastructure - 4

The Computer System

- **Primary Storage**
  - Located near CPU
  - Stores all or part of active software program
  - Stores data the program is using
  - Composed of semi-conductors
  - RAM (random access memory): Used for short-term, temporary storage
  - ROM (read-only memory): Semiconductor memory chips with program instructions

Computer Hardware and Information Technology Infrastructure - 5

The Computer System

- **Secondary Storage Technology**
  - Used for relatively long-term storage of data outside CPU
  - Magnetic disk: floppies, hard disks, RAID
  - Flash memory (USB Drive)
  - Optical disk: CD-ROM, CD-RW, DVD
  - Magnetic tape
  - Storage networking: direct-attached storage; network-attached storage; storage area networks

Computer Hardware and Information Technology Infrastructure - 6

Hierarchy of Memory Capacity

- Kilobyte (KB): approximately one thousand bytes.
- Megabyte (MB): approximately one million bytes (1,048,576 bytes, or 1,024 x 1,024).
- Gigabyte (GB): actually 1,073,741,824 bytes (1,024 x 1,024 x 1,024 bytes).
- Terabyte: One trillion bytes, 10^{12} bytes.
- Petabyte: Approximately 10^{15} bytes.
- Exabyte: Approximately 10^{18} bytes.

Computer Hardware and Information Technology Infrastructure - 7

A storage area network (SAN)

Computer Hardware and Information Technology Infrastructure - 8

The Computer System

- **Input Devices**
  - Keyboard and mouse
  - Touch screen
  - Optical character recognition
  - Magnetic ink character recognition (MICR)

⑆⑈1234567890⑆⑈ ⑈1234567890⑈ ⑇⑈1234567890⑈⑇ ⑈⑈1234567890⑈⑈

  - Pen-based input
  - Digital scanner
  - Audio input
  - Radio-frequency identification (RFID)

Computer Hardware and Information Technology Infrastructure - 9

The Computer System

- **Output Devices**
  - Cathode-ray tube (CRT)
  - LCD Panel
  - Printers
  - Audio output

Classifying Computers

- **Mainframe:** Largest computer, largest multi-user systems, handles massive amounts of data; used for large business, scientific, military applications.

- **Workstation:** More powerful desktop computer used for computation-intense tasks. A midrange systems multi-user system.
- **Personal computer**: Portable or desktop microcomputer. A single user system.

Types of Software

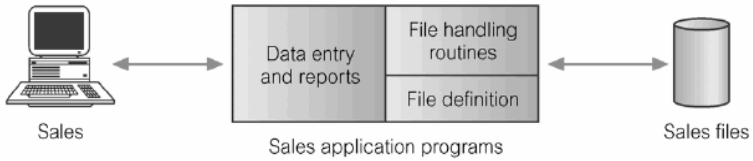
- **Software program:** A series of statements or instructions to the computer
- Two major types of software:
  - **System software**
    - Generalized programs that manage the computer's resources
    - For example, the Windows family of Operating Systems
  - **Application software**
    - Programs written for or by users to perform a specific task.
    - For example, Word,Excel, Powerpoint

3. Database Management Systems

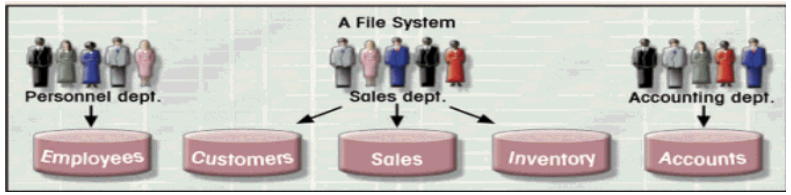
File Systems - 1

Traditional file environment:

- Each application program defines and manages its own data.



- Each program defines and manages its own data.



File Systems - 2

Limitations of File-based Approach:

1. Separation and isolation of data

- Each program maintains its own set of data.
- Users of one program may be unaware of potentially useful data held by other programs.

2. Duplication of data

- Same data is held by different programs.
- Wasted space and potentially different values and/or different formats for the same item.

File Systems - 3

3. **Data dependence**

- File structure is defined in the program code.

4. **Incompatible file formats**

- Programs are written in different languages, and so cannot easily access each others files.

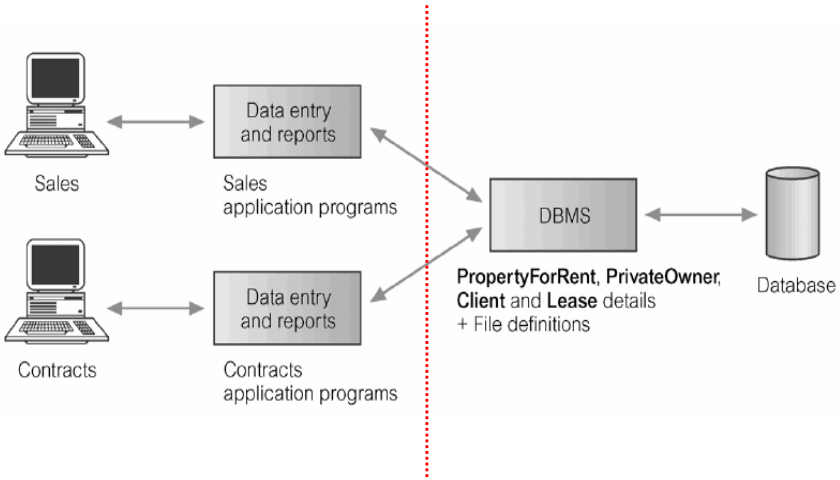
5. **Fixed Queries/Proliferation of application programs**

- Programs are written to satisfy particular functions.
- Any new requirement needs a new program.

The Database Approach to Data Management - 1

- **Shared collection** of logically related data (and a description of this data), designed to meet the information needs of an organization.
- System catalog (metadata) provides **description of data** to enable program–data independence.
- Logically related data comprises entities, attributes, and relationships of an organization's information.

The Database Approach to Data Management - 2



DBMS Approach

Database Management System (DBMS)

- A software system that enables users to define, create, and maintain the database and which provides controlled access to this database.

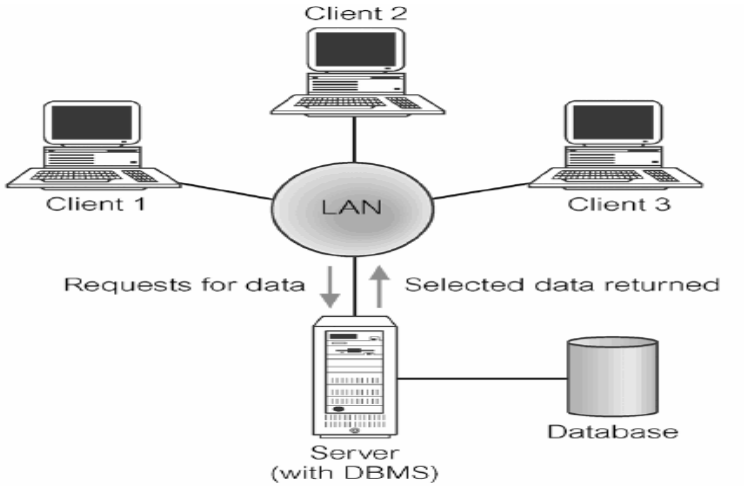
DBMS Components

1. **Data definition language**: Formal language for specifying the structure of database
2. **Data manipulation language**: For extracting data from database, e.g. SQL.

How a DBMS Solves Problems of a Traditional File Environment

- Reduces data redundancy
- Eliminates data inconsistency
- Uncouples programs from data
- Increases access and availability of data
- Allows central management of data, data use, and security

Database Client-server Architecture



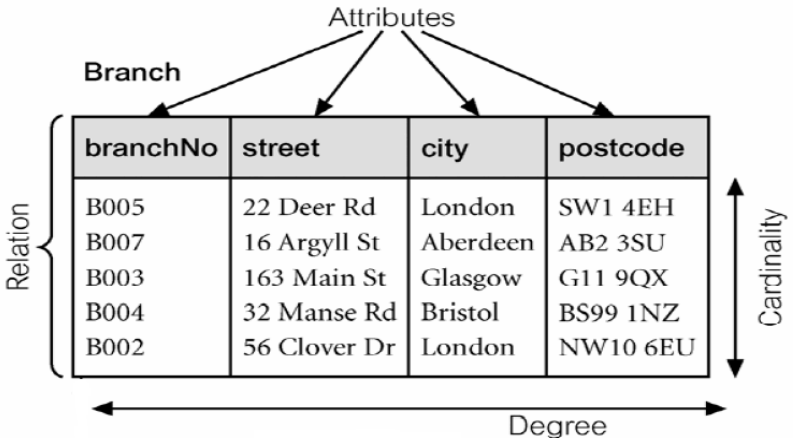
Disadvantages of DBMS

- Complexity
- Size
- Cost of DBMS
- Additional hardware costs
- Cost of conversion
- Performance
- Higher impact of a failure

Relational DBMS - 1

- A **relation** is a table with columns and rows.
  - **Attribute** is a named column of a relation.
  - **Domain** is the set of allowable values for one or more attributes.
  - **Tuple** is a row of a relation.
  - **Degree** is the number of attributes in a relation.
  - **Cardinality** is the number of tuples in a relation.
- Relational Database is a collection of normalized relations with distinct relation names.

Relational DBMS - 2



- Relates data across tables based on **common data element.**

Relational DBMS - 3

Table (Relation)

Columns (Attributes, Fields)

ORDER

Order_ Number	Order_ Date	Delivery_ Date	Part_ Number	Part_ Quantity
1634	02/02/04	02/22/04	152	2
1635	02/12/04	02/28/04	137	3
1636	02/13/04	03/01/04	145	1

PART

Part_ Number	Part_ Description	Unit_ Price	Supplier_ Number
137	Door latch	22.50	4058
145	Door handle	26.25	2038
150	Door seal	6.00	4058
152	Compressor	70.00	1125

SUPPLIER

Supplier_ Number	Supplier_ Name	Supplier_Address
4058	CBM Inc.	44 Winslow, Gary, IN 44950
2038	Ace Inc.	Rte. 101, Essex, NJ 07763
1125	Bryant Corp.	51 Elm, Rochester, NY 11349

Relational DBMS - 4

Alternative terminology for relational model terms

Formal terms	Alternative 1	Alternative 2
Relation	Table	File
Tuple	Row	Record
Attribute	Column	Field

Relational DBMS - 5

Basic Operations in a Relational Database:

- **Select:** Creates subset of rows that meet specific criteria

Original table

P_CODE	P_DESCRIPT	PRICE
123456	Flashlight	5.26
123457	Lamp	25.15
123458	Box Fan	10.99
213345	9v battery	1.92
254467	100W bulb	1.47
311452	Powerdrill	34.99

SELECT ALL will yield

New table or list

P_CODE	P_DESCRIPT	PRICE
123456	Flashlight	5.26
123457	Lamp	25.15
123458	Box Fan	10.99
213345	9v battery	1.92
254467	100W bulb	1.47
311452	Powerdrill	34.99

SELECT only PRICE less than 2.00 will yield

P_CODE	P_DESCRIPT	PRICE
213345	9v battery	1.92
254467	100W bulb	1.47

SELECT only P_CODE=311452 will yield

P_CODE	P_DESCRIPT	PRICE
311452	Powerdrill	34.99

Relational DBMS - 6

- **Project:** Yields all values for selected attributes – vertical subset of a table.

Original table

P_CODE	P_DESCRIPT	PRICE
123456	Flashlight	5.26
123457	Lamp	25.15
123458	Box Fan	10.99
213345	9v battery	1.92
254467	100W bulb	1.47
311452	Powerdrill	34.99

PROJECT PRICE yields

New table or list

PRICE
5.26
25.15
10.99
1.92
1.47
34.99

PROJECT P_DESCRIPT and PRICE yields

P_DESCRIPT	PRICE
Flashlight	5.26
Lamp	25.15
Box Fan	10.99
9v battery	1.92
100W bulb	1.47
Powerdrill	34.99

PROJECT P_CODE and PRICE yields

P_CODE	PRICE
123456	5.26
123457	25.15
123458	10.99
213345	1.92
254467	1.47
311452	34.99

Relational DBMS - 7

- **Join:** Enables users to create a new table containing only relevant information from **more than one table**.

Table name: CUSTOMER

CUS_CODE	CUS_LNAME	CUS_ZIP	AGENT_CODE
1132445	Walker	32145	231
1217782	Adares	32145	125
1312243	Rakowski	34129	167
1321242	Rodriguez	37134	125
1542311	Smithson	37134	421
1657399	Vanloo	32145	231

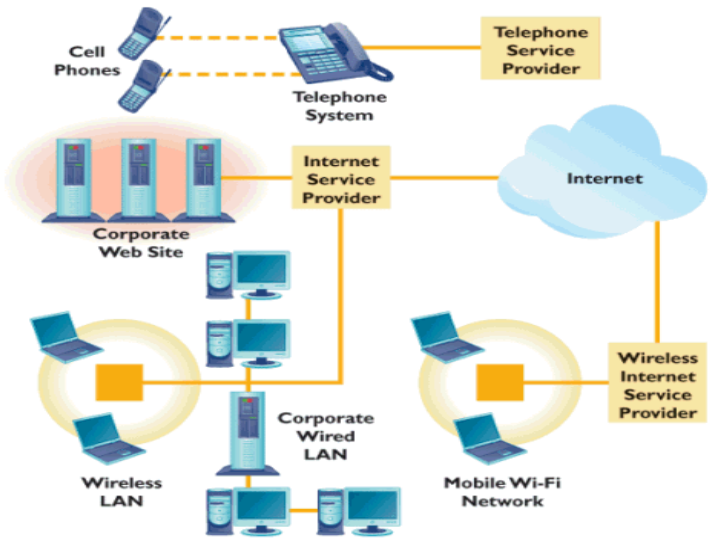
Table name: AGENT

AGENT_CODE	AGENT_PHONE
125	6152439887
167	6153426778
231	6152431124
333	9041234445

CUS_CODE	CUS_LNAME	CUS_ZIP	AGENT_CODE	AGENT_PHONE
1217782	Adares	32145	125	6152439887
1321242	Rodriguez	37134	125	6152439887
1312243	Rakowski	34129	167	6153426778
1132445	Walker	32145	231	6152431124
1657399	Vanloo	32145	231	6152431124

4. Business Telecommunications System

Corporate Telecommunications System

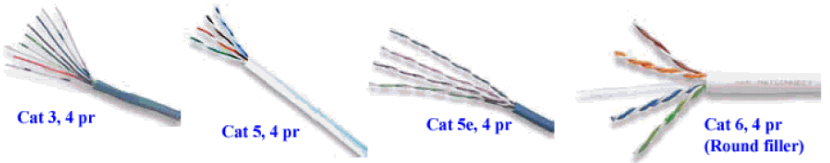


Features of Contemporary Telecommunications Systems – 1

Transmission Media - 1

Twisted wire

- Copper wire twisted in pairs
- Older analog transmission medium
- Can be used for digital signals
- Modems used for translating analog to digital

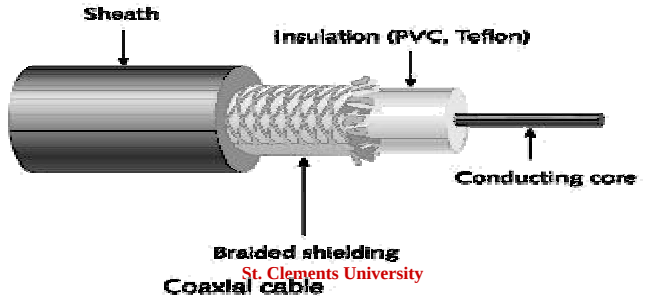


Features of Contemporary Telecommunications Systems – 2

Transmission Media - 2

Coaxial cable:

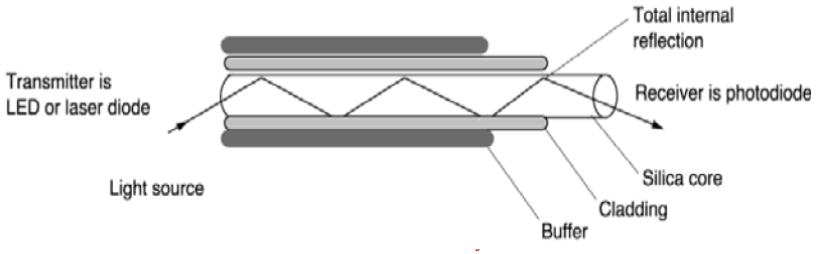
- Insulated copper wire
- Faster, more interference-free than twisted pair
- Difficult to install



Features of Contemporary Telecommunications Systems – 3

Transmission Media – 3

- **Fiber optics**
  - Transmission of data as light pulses through optical fiber
  - First converting electronic binary signals to light, and then convert the light signals back to electronic signals at the receiving end.
  - Faster, lighter, more durable



Features of Contemporary Telecommunications Systems – 4

Transmission Media – 4

- Fiber-optic technology has revolutionized telecommunications due to the very high speed of data transmission it can support.
- 0.1kg of optical fiber carries the same information as 30,000kg of copper cable
- At 2.5 Gbps, it is
  - equivalent to more than 3 hrs of TV per second
  - 24,000 simultaneous phone calls

Features of Contemporary Telecommunications Systems – 5

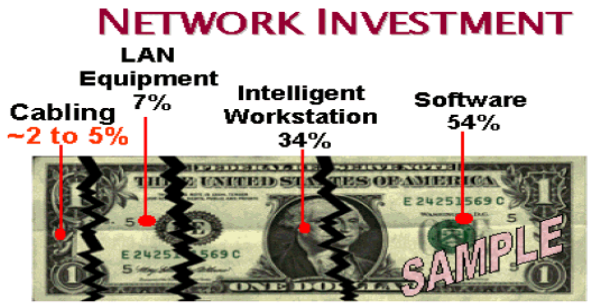
Transmission Media - 5

CABLING LIFE CYCLE

Features of Contemporary Telecommunications Systems – 6

Transmission Media – 6

- Although cabling represents only 2 to 5% of the total network investment, the cabling systems will outlive most network components.



Features of Contemporary Telecommunications Systems – 7

Transmission Media – 7

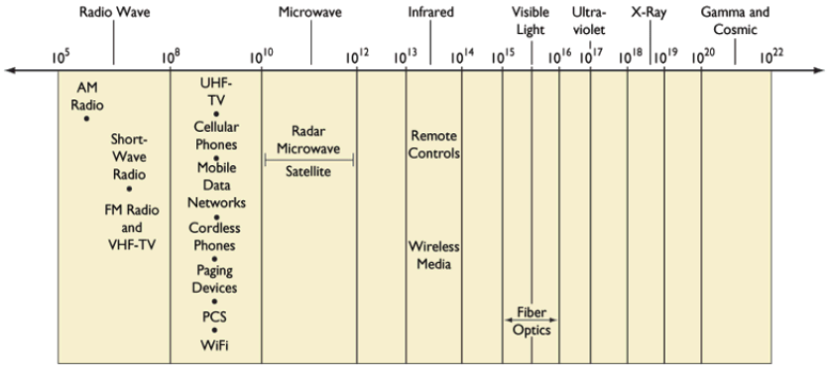
Wireless Transmission

- Use electromagnetic spectrum
- Microwave and infrared use high-frequency radio signals
- Paging systems, cellular telephones, PDAs, mobile data networks
- Wireless communication requires compatible standards
- Security/privacy issues

Features of Contemporary Telecommunications Systems – 8

Transmission Media – 8

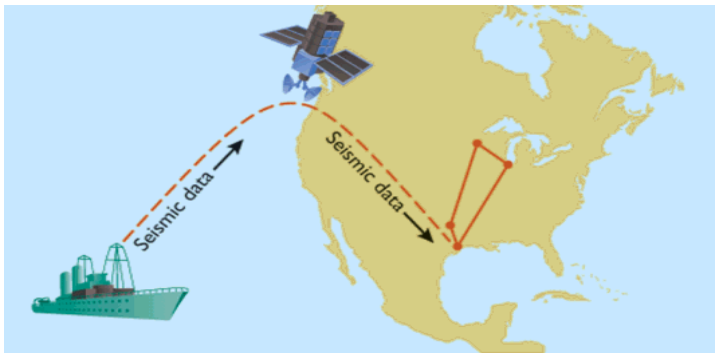
Frequency ranges for communication media and devices



Features of Contemporary Telecommunications Systems – 9

Transmission Media – 9

- **Satellite transmission system**



Features of Contemporary Telecommunications Systems – 10

Transmission Media – 10

- **Transmission Speed Comparison**

Twisted wire	Up to 1G+ Mbps
Microwave	Up to 200+ Mbps
Satellite	Up to 200+ Mbps
Coaxial cable	Up to 200 Mbps
Fiber-optic cable	Up to 6+ Tbps

5. Communications Networks

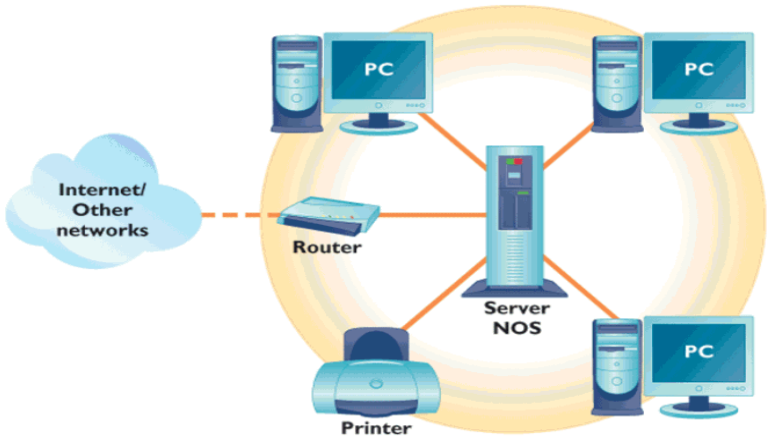
Communications Networks - 1

Local Area Networks (LAN) - 1

- A LAN is a data communication system allowing a number of independent devices to communicate directly with each other,
  - within a moderately sized geographic area,
  - and over a physical communications channel of moderate data rates.
- To implement a LAN, we need to use cabling or wireless technology to link up computers and networking devices, and the required software such as a Network Operating System (NOS).

Communications Networks - 2

Local Area Networks (LAN) - 2



Communications Networks - 3

Local Area Networks (LAN) – 3

- In a client/server arrangement, network services are located on a dedicated computer called a server. The server responds to the requests of clients for, print, application and other services.

Merits:

- The network is scalable.
- Enhanced security, ease of access, and control.

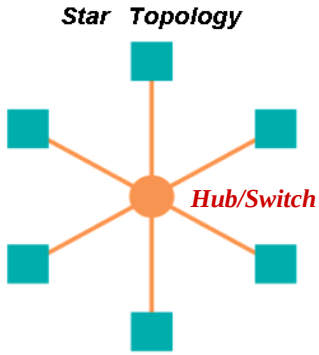
Demerits:

- Introduce a single point of failure in the network.
- More expensive, require specialized hardware and software.
- Require a trained, expert staff member to administer and maintain.

Communications Networks - 4

Local Area Networks (LAN) – 4

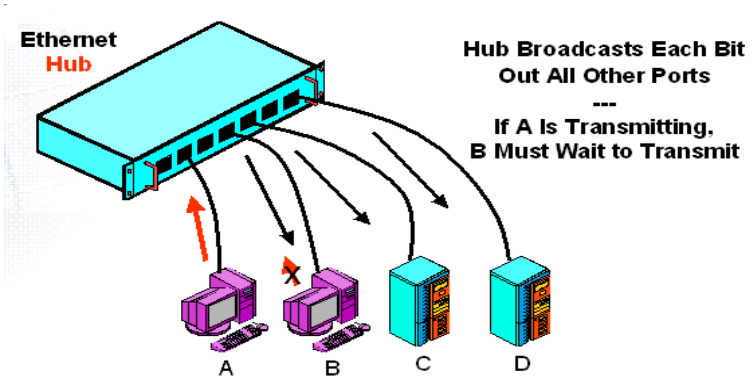
- Ethernet is by far the most common
- Star topology using Ethernet **hubs** and/or **switches**
- Use UTP cabling
- Relatively cheap, easy to install and manage
- Ethernet standards make use of latest developments in network technology



Communications Networks - 5

Local Area Networks (LAN) – 5

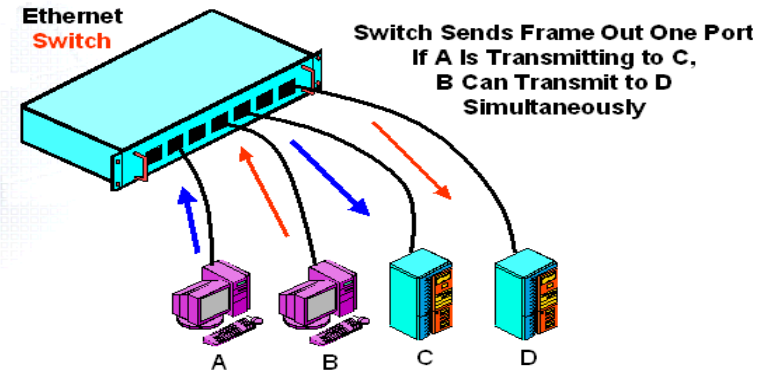
Hub Versus Switch Operation



Communications Networks - 6

Local Area Networks (LAN) – 6

Hub Versus Switch Operation



Communications Networks - 7

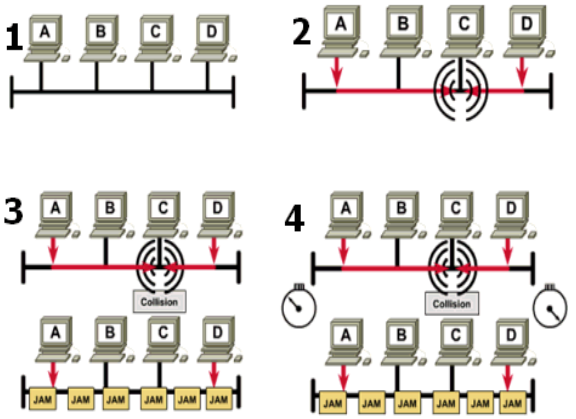
Local Area Networks (LAN) – 7

Hub Versus Switch Operation

- **Hubs Need Media Access Control**
  - This limits when a station may transmit
  - Ethernet hubs use CSMA/CD
- **Carrier Sense Multiple Access (CSMA)**
  - Only transmit if no other station is transmitting
  - Otherwise, wait
- **Collision Detection (CD)**
  - If two NICs transmit at the same time, this is a collision
  - Both will stop, wait a random amount of time, and then go back to CSMA to send again

Communications Networks - 8

Local Area Networks (LAN) – 8



CSMA/CD

1. Listen then transmit
2. Collision occurs
3. Broadcast jam signal
4. Devices back off appropriate amount of time, goes back to listen then transmit and then retransmit

Communications Networks - 9

Local Area Networks (LAN) – 9

UTP dominates the Ethernet access line market

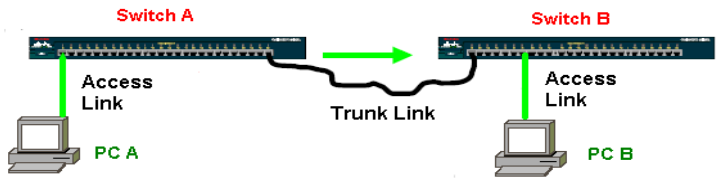
Physical Layer Standard	Speed	Maximum Run Length	Medium Required
10BASE-T	10 Mbps	100 meters	4-pair Category 3 or higher
100BASE-TX	100 Mbps	100 meters	4-pair Category 5 or higher
1000BASE-T (Gigabit Ethernet)	1,000 Mbps	100 meters	4-pair Category 5 or higher

Physical Layer Standard	Speed	Maximum Run Length	Medium 850 nm light (inexpensive) Multimode fiber	
1000BASE-SX	1 Gbps	220 m	62.5 microns	160 MHz-km

Communications Networks - 10

Local Area Networks (LAN) – 10

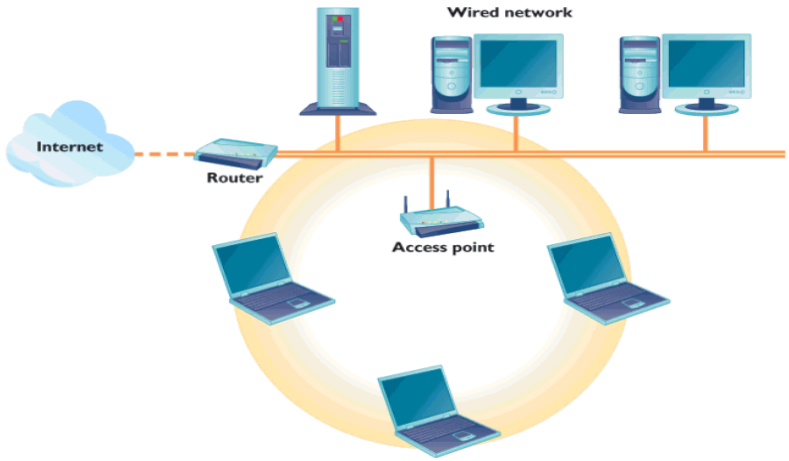
- **Access links** to client stations today are dominated by 100BASE-TX
  - But 1000BASE-T usage is growing
- **Trunk links** today are dominated by 1000BASE-SX
  - Sufficient for most LAN trunk line distances and speeds
  - Short trunk links, however, use UTP
  - Longer and faster trunk links use other fiber standards



Communications Networks - 11

Local Area Networks (LAN) – 11

An 802.11 Wireless LAN



Communications Networks - 12

Local Area Networks (LAN) – 12

Wireless LAN Benefits

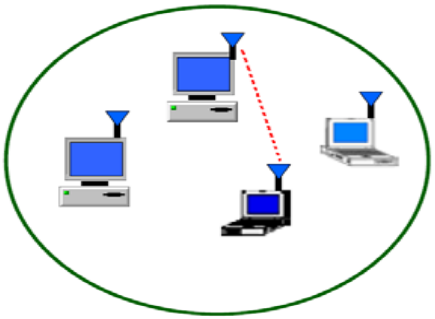
- **Removes wiring challenges**
  - Limited connections to users
  - Perfect for facilities where cost of wiring is prohibitive or impossible
- **Able to redeploy with minimal expense**
  - Low Installation Cost
  - Fast installation, Less Influence
  - Connect permanent or temporary campus buildings quickly and easily
- **Large coverage, High Performance**

Communications Networks - 13

Local Area Networks (LAN) – 13

Wireless LAN

- **Ad-hoc mode**: Peer-to-peer mode; wireless devices communicate with each other directly.
- It involves at least 2 stations
- No backbone infrastructure
- Suitable for small area

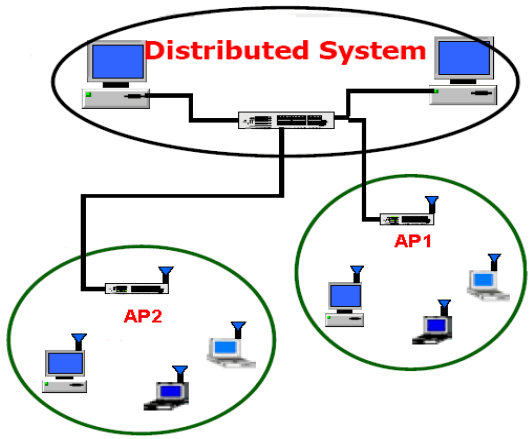


Communications Networks - 14

Local Area Networks (LAN) – 14

Wireless LAN

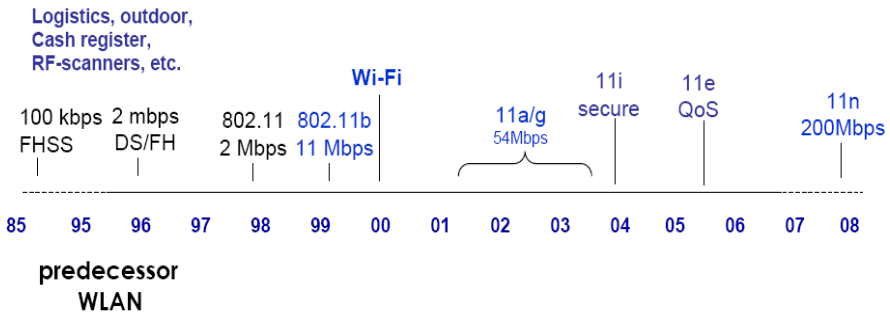
- **Infrastructure mode:**
- Wireless devices communicate with wired LAN via ***access points*** (APs).



Communications Networks - 15

Local Area Networks (LAN) – 15

- **WLAN-standards**



Communications Networks - 16

Local Area Networks (LAN) – 16

- **Wireless LAN Standard**

Standard	802.11b	802.11a	802.11g
Frequency Band	2.4 GHz	5 GHz	2.4GHz
Data rate	11 Mbps	54 Mbps	54 Mbps

- **Hot spot:** Geographic location in which an access point provides public Wi-Fi network service.
  - Eg. Free PCCW Wi-Fi service in the HK International Airport

Communications Networks - 17

Local Area Networks (LAN) – 17

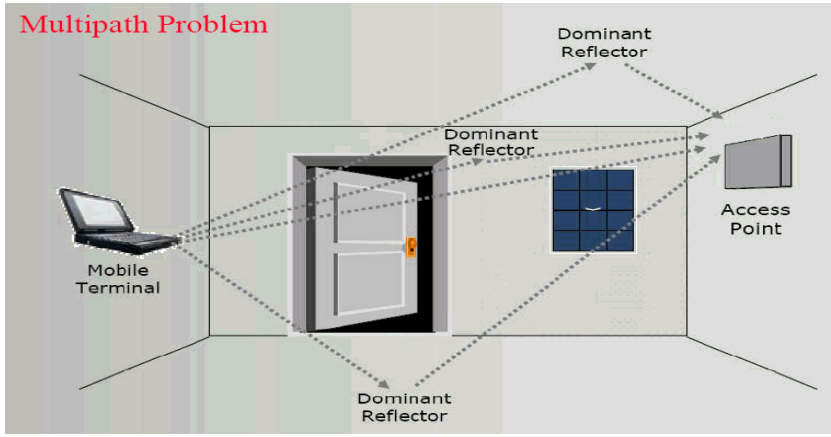
What is 802.11n?

- New IEEE Standard under development
- Uses MIMO radio technology as a basis
- End result will be more “wire-like” performance
- Anywhere from 100Mbps to 600Mbps depending on implementation
- First standard to support both 2.4 GHz and 5 GHz

Communications Networks - 18

Local Area Networks (LAN) – 18

Multi Path Reflections

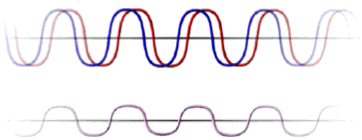


Communications Networks - 19

Local Area Networks (LAN) – 19

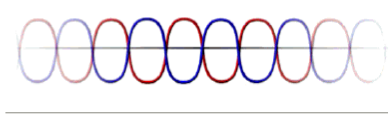
Multi Path Reflections

Original signal + reflections arrive at the receiver and are "added", resulting in a distorted reconstructed signal



Null Waves : Original signal and reflected signals are 180 degrees out of phase, cancelling each other out.

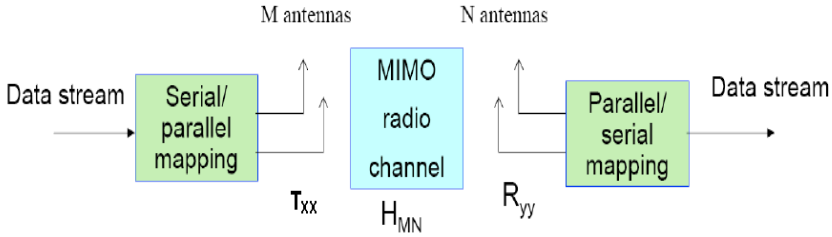
Causing drop outs.



Communications Networks - 20

Local Area Networks (LAN) – 20

- MIMO (Multiple Input / Multiple Output)
- Sending signals on multiple Tx antennas
- Receiving signals on multiple Rx antennas



Communications Networks - 21

Local Area Networks (LAN) – 21

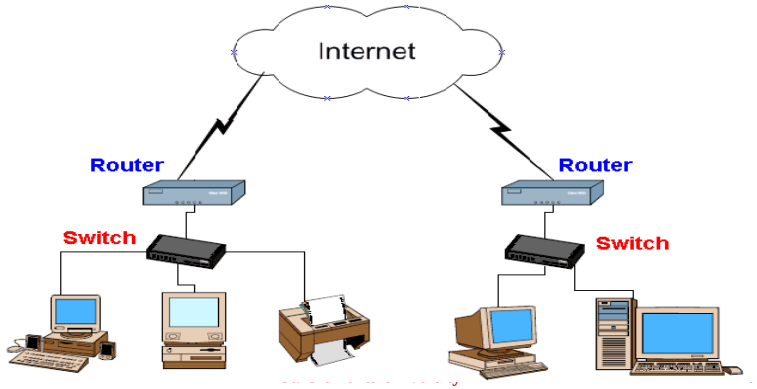
Bluetooth

- Standard for wireless personal area networks that can transmit up to 722 Kbps within 10-meter area
- It is a wireless LAN technology designed to connect devices of different functions such as telephones, notebooks, computers (desktop and laptop), cameras, printers and so on.
- A Bluetooth LAN is an ad-hoc network.
- The Bluetooth technology is the implementation of a a protocol defined by the **IEEE 802.15** standard.
  - The standard defines a wireless personal-area network (PAN) operable in an area the size of a room or a hall.

Communications Networks - 22

Local Area Networks (LAN) – 22

- **Routers** provides access to company networks on other sites, and to the Internet.



Communications Networks - 23

Wide Area Networks - 1

- A WAN is a single networks that connect different sites
- WANs and the Telephone
  - WAN technology usually uses the Public Switched Telephone Network transport system for transmission
  - Adds data switching and management
- WAN Purposes
  - Internet access
  - Link sites within the same corporation
  - Provide remote access to individuals who are off site

Communications Networks - 24

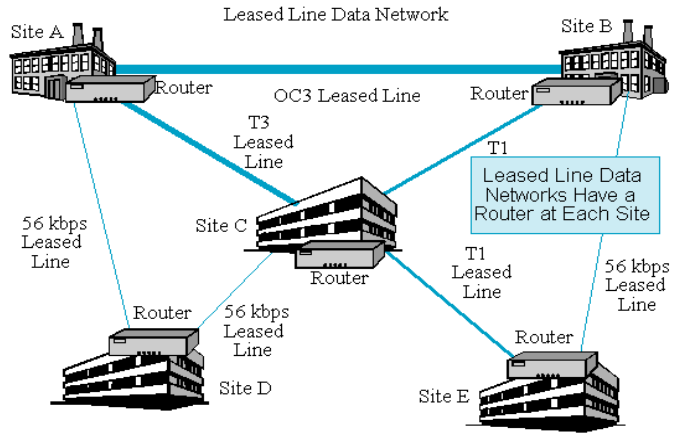
Wide Area Networks – 2

- WANs are characterized by **high cost** and **low speeds**.
- High cost per bit transmitted compared to LANs.
- Consequently, lower speeds (most commonly 128 kbps to a few megabits per second)
- This speed usually is aggregate throughput shared by many users
- Much slower than LAN speeds (100 Mbps to 1 Gbps to the desktop)

Communications Networks - 25

Wide Area Networks – 3

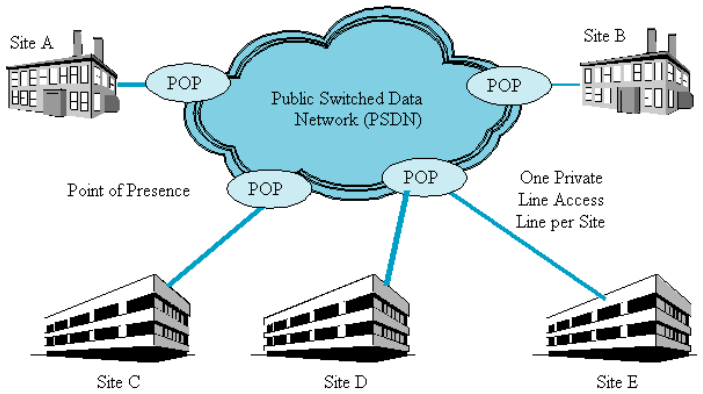
Leased Line Data Networks



Communications Networks - 26

Wide Area Networks – 4

WAN using Public Switched Data Networks



Communications Networks - 27

Source: HKBN

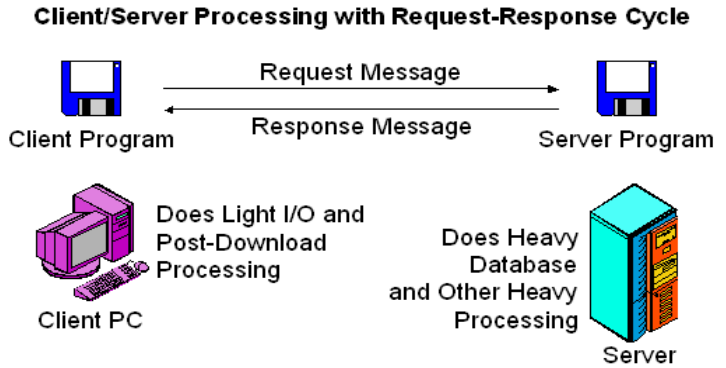
Communications Networks - 28

Source: HKBN

6. Networked Applications

Application Architectures - 1

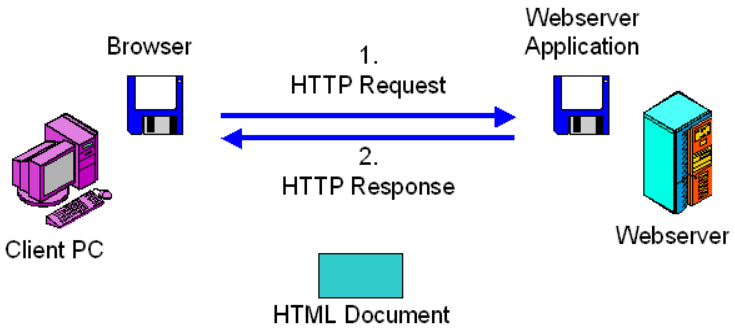
Client/Server Computing



Highly scalable: Use larger server as number of clients increases

Application Architectures - 2

Web Page Browsing



Web Search Engines

- Web pages that conduct searches of the Web to find words or expressions you enter.

E-Mail - 1

What is E-Mail?

- E-mail (electronic mail) is the exchange of computer-stored messages by telecommunication.

Mail Server

- A hardware and software system that determines from the recipient's address one of several routes on which to send the message.

Mail Client Software or E-Mail Program

- A software that requests mail delivery from the mail server to your PC.

Email Address

- An address that uniquely identifies an individual or organization that is connected to the Internet.
- **mis.st.clements@gmail.com**

E-Mail - 2

Protocols that make email works

- **SMTP (Simple Mail Transfer Protocol)**
  - It decides which paths an e-mail message takes on the Internet.
- **POP (Post Office Protocol)**
  - It handles incoming messages.
- **IMAP (Internet Message Access Protocol)**
  - A protocol for retrieving mail messages from a server.
- **MIME (Multipurpose Internet Mail Extensions)**
  - A protocol that specifies how to encode non-text data, such as graphics and sound, so it can travel over the Internet.

E-Mail - 3

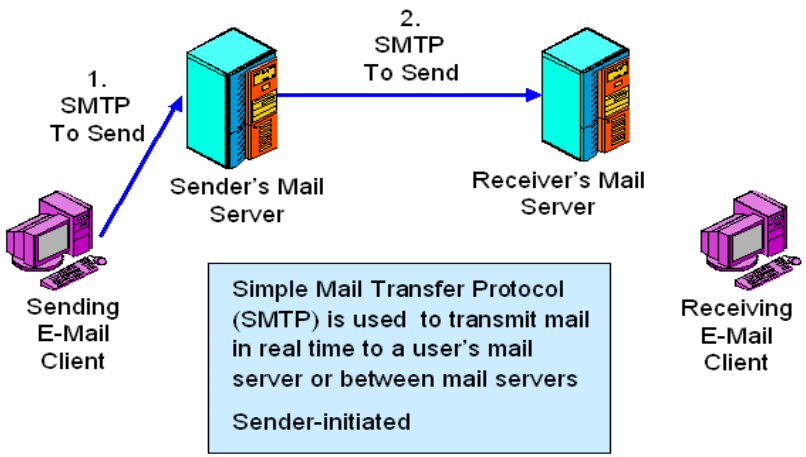
Importance of E-Mail

- Universal service on the Internet
- Attachments make e-mail a general file delivery mechanism!

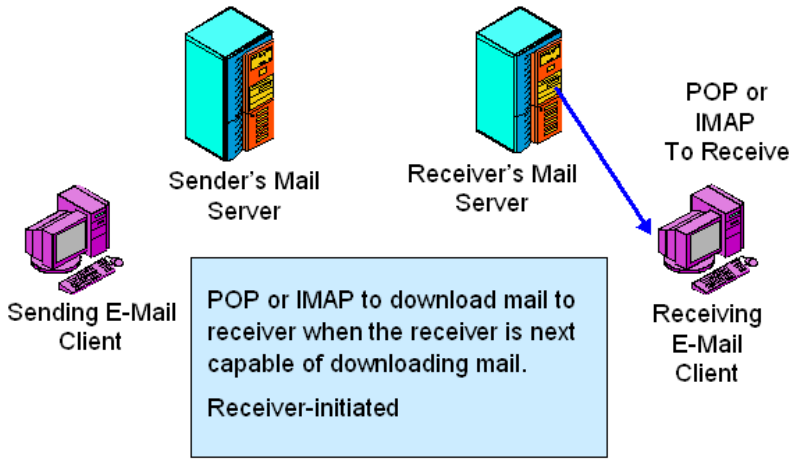
Mail Standards

- Message body standards
- Receiver must understand sender's message
  - RFC 822 and RFC 2822 for all-text bodies
  - HTML bodies with fancy text and graphics
  - UNICODE for non-English language characters

E-Mail - 4



E-Mail - 5



E-Mail – 6

The "evils" come with email:

- Messages with inappropriate content.
  - Racial or sexual harassment
  - Threats
- Spam, adware, spyware, and other abuses.
- Viruses, Worms, and Trojan Horses are often delivered by e-mail attachments!

E-Mail - 7

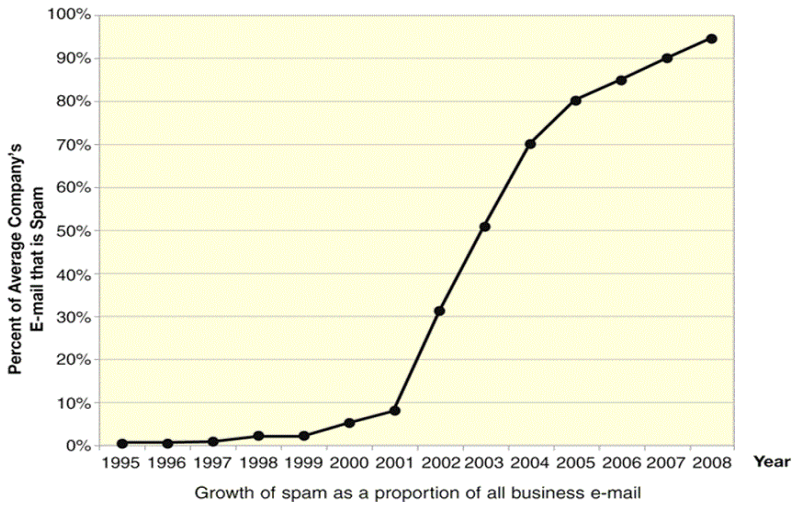
Viruses, Worms, and Trojan Horses

- Use of antivirus software is a must.
- Where to Do Scanning?
  - On client PCs
    - But users often turn off their software,
    - Fail to download virus definitions regularly
    - Or let their contracts lapse
  - On the corporate mail server or application firewall
    - Users cannot turn off

E-Mail - 8

- **Spam** are unsolicited commercial e-mail
- Why they are harmful?
  - Time consumed by users deleting them
  - Bandwidth and storage consumed
  - Legitimate messages lost because overlooked
- Separating SPAM from legitimate e-mail is difficult
  - Many spam messages get through to users
  - Some legitimate messages are deleted
  - Some firms merely mark messages as probable spam

E-Mail - 9 Growth of SPAM in business email



E-Mail - 10

- Magnitude of spam problem
  - 24-hour period in 2008
  - 220 billion spam e-mail messages sent
- Researchers believe:
  - More than 98 percent of all e-mail messages will be spam before effective technical solutions implemented
  - Spam leveling off (approaching 100 percent)
  - Absolute spam e-mail numbers could continue to grow rapidly

E-Mail - 11

- Antispam efforts
  - Limit spam annoyance and cost
  - E-mail server computer software
    - Server-level filtering: mail server computers
    - Limit amount of spam getting through to employees
  - Individual users
    - Client-level filtering: individual users' computers
    - Install client-based spam-filtering programs, set filters
- Some solutions require:
  - Passing of new laws
  - Technical changes in Internet mail-handling systems

E-Mail - 12

Individual user antispam tactics

- Focus
  - Limit spammer's access to (use of) e-mail address
- Use complex e-mail address
  - Reduce the likelihood that a spammer can automatically generate e-mail addresses
  - xq7iy23@mycompany
- Control e-mail address exposure
  - Discussion boards, chat rooms, other online sources
- Use multiple e-mail addresses
  - Switch to another if spammers uses one

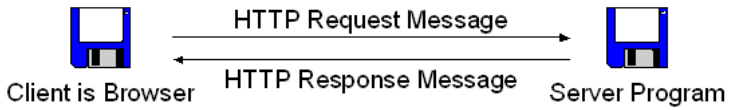
E-Mail - 13

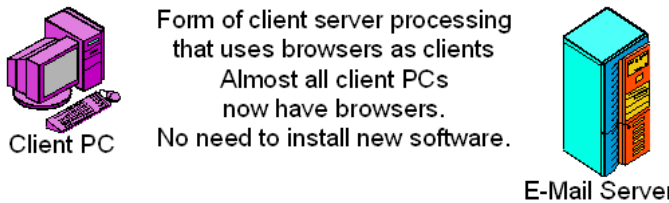
Web-Based E-Mail Services - 1

- Many Internet Web sites provide free e-mail addresses and accounts for **registered users**.
- They may be used with any Web browser.
- Examples: Gmail, Yahoo! Mail, Hotmail etc.

E-Mail - 14

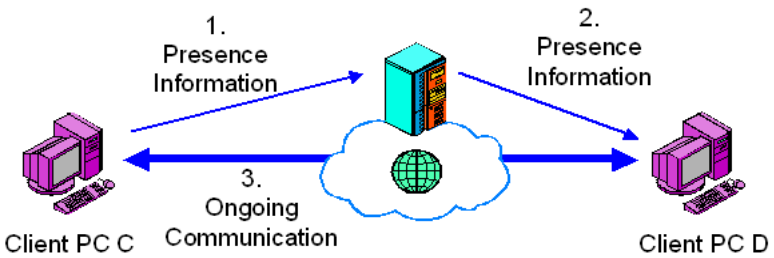
Web-Based E-Mail Services - 2





Instant Messaging Servers - 1

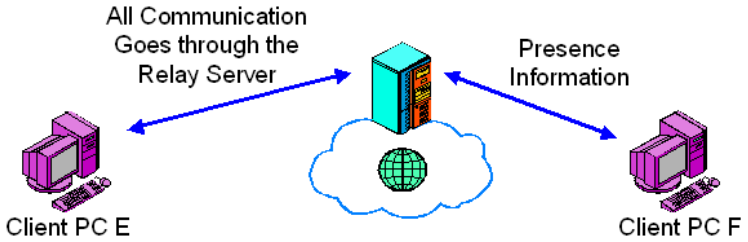
Use of a Presence Server



Clients register with presence servers.
Presence servers notify other clients as appropriate.
Clients use this information to communicate directly.

Instant Messaging Servers - 2

Use of a Relay Server



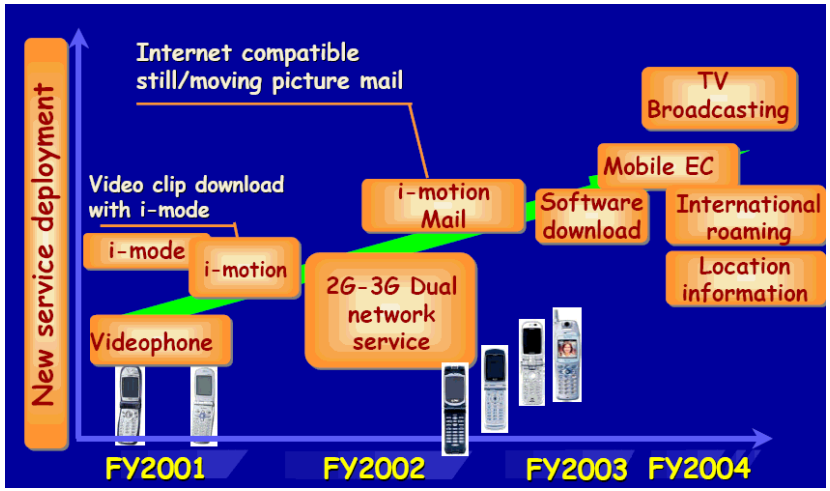
Relay servers route all IM messages.
This permits security filtering and other services.
It limits privacy because the relay server sees everything.

8. Contemporary Mobile Services

Generations of Mobile Networks

- 1G: basic mobile telephony
- 2G: mobile telephony for mass users
  - regional roaming
- 2.5G: mobile internet services
- 3G:
  - global roaming
  - enhanced mobile Internet services

3G Services – To explore the non-voice Applications



HSDPA

- High-Speed Downlink Packet Access (HSDPA) is a 3G mobile telephony communications protocol.
- It support services requiring instantaneous high data rates in the downlink, e.g. Internet browsing, video on demand, office application.
- Peak data rates 3-4 times higher than current 3G.
- Current HSDPA deployments support down-link speeds of 1.8, 3.6, 7.2 and 14.4 Mbit/s.
- New terminals are required to take advantage of HSDPA.

SmarTone-Vodafone

Public Wi-Fi Service

- 每日港幣 18 元使用費，即可全日無限量使用 HSDPA、3G 本地資料傳輸。

PCCW NEXTGEN HSPA+ 21Mbps - 1

- Rolled out in 09 Q2.

PCCW NEXTGEN HSPA+ 21Mbps - 2

- The Evolved High Speed Packet Access，HSPA+ will increase the download speed of mobile handset from 7.2 Mbps to 21 Mbps.
- 目前，市場上流動通訊業者一般沿用的基幹線路網絡是傳統的 E1 歐洲制式，每條陸上線路的傳輸速度只稍微高於 2Mbps。
- 然而，電訊盈科的全光纖基幹線路爲客戶提供數據高速公路」，助他們享用超越 1000Mbps 的超高速上網服務。

8. Information Systems Types

Types of Information Systems

- Office Automation Systems
- Transaction Processing Systems
- Management Information Systems
- Decision Support Systems
- Expert Systems

Office Automation Systems

- Office automation systems are used to automate routine office tasks, such as the creation of documents, billing, and others.
- Office automation systems can be built from off-the-shelf applications – standard productivity software that most users are familiar with.
- In some office systems, commercial software may be customized to perform specific tasks, but this is not always necessary.

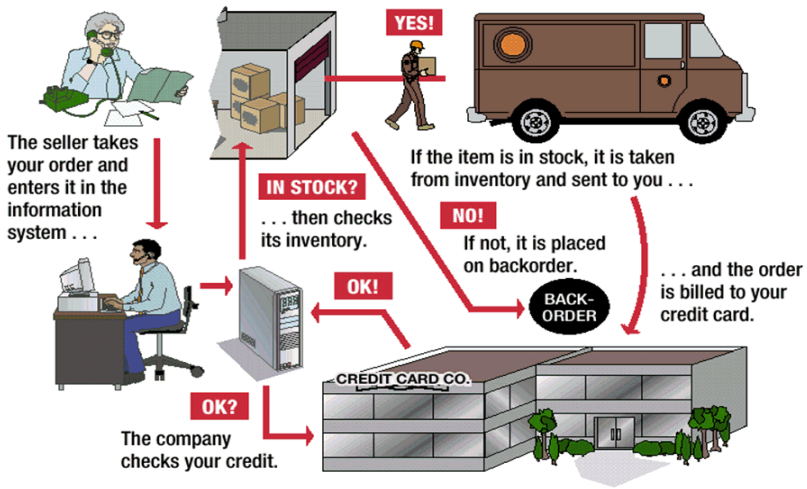
Example: Convenient Store

- Convenience store chain needs accurate stock count
  - Overstocking expensive
  - Understocking results in customer dissatisfaction
  - Manual counts used data collection sheets
  - Expensive, labor intensive
- Solution based on handheld computer
  - Counts entered relayed immediately to headquarters
  - Bar code scanner employed to shorten process, minimize errors
  - Allows for real time product totals
  - Dramatic reduction in labor involved
  - Lower inventory levels and quicker response time

Transaction Processing Systems - 1

- A transaction processing system is used to handle the processing and tracking of transactions.
  - A transaction is an event that can occur as a series of steps, such as taking and fulfilling an order from a customer.
- A Transaction Processing System (TPS) monitors, collects, stores and processes data generated from all business transactions.
  - **Source data automation** is the process of automating the TPS data entry as much as possible because of the large volume involved.

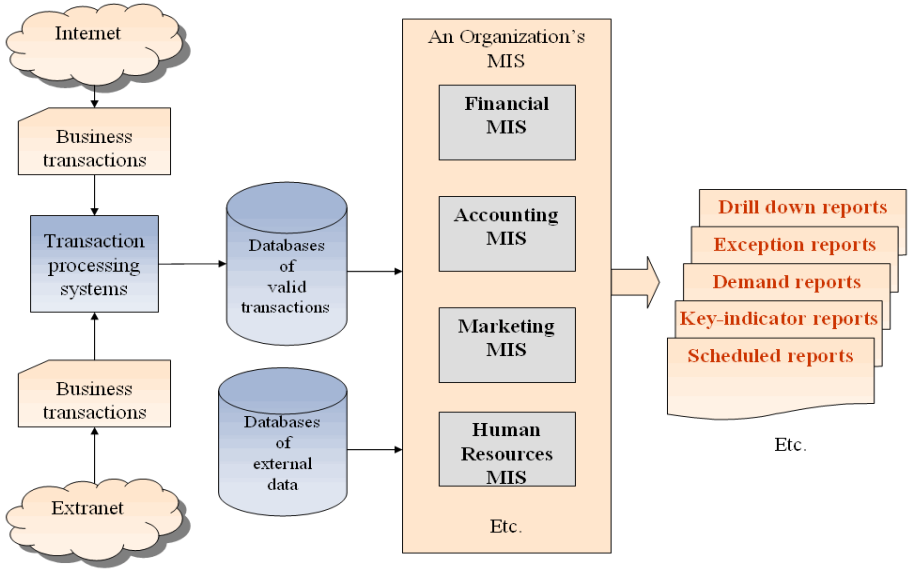
Transaction Processing Systems - 2



Management information system (MIS) - 1

- Also called “information reporting systems”
- Original type of management support system
- Produce information products that support many of the day-to-day decision-making needs of the organization.
- Provide information to (middle level) managers in the functional areas to support planning, organizing, and controlling operations.
- Output, or reports, are usually generated through accumulation of transaction processing data.

Management information system (MIS) - 2



Management information system (MIS) - 3

Outputs of an MIS

Scheduled reports

- Produced periodically, or on a schedule (daily, weekly, monthly)

Key-indicator report

- Summarizes the previous day’s critical activities
- Typically available at the beginning of each day

Demand report

- Gives certain information at a manager’s request

Exception report

- Automatically produced when a situation is unusual or requires management action

Drill Down Reports

- Provide detailed data about a situation. To move from summary data to lower and lower levels of detail.

Information Systems for Specific Functional Areas

- Information Systems that are designed to support a functional area by increasing its internal effectiveness and efficiency in the following areas:
  - accounting, finance, marketing, operations, and human resources management functional areas.

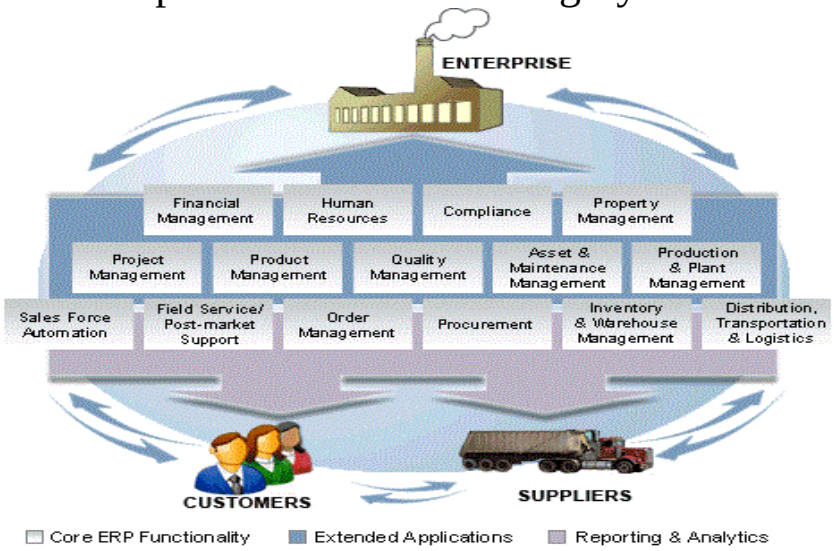
Enterprise Resource Planning Systems - 1

- The term ERP originally referred to how a large organization planned to use organizational wide resources.
- ERP is a way to integrate the data and processes of an organization into one single system.
- ERP's major objective is to tightly integrate the functional areas of the organization and to enable seamless information flows across the functional areas.

Enterprise Resource Planning Systems - 2

- **Data sharing**
  - One data model
  - No data replication
  - Automatic synchronization
  - All applications/modules share same data, with same data model
- **Modularity**
  - Independent modules

Enterprise Resource Planning Systems - 3



Enterprise Resource Planning Systems - 4

- Why ERP?
- A need to replace outdated business applications
  - common processes and procedures
  - common shared data
  - common reporting
- A need to consolidate IT platforms
  - replacement of legacy systems
  - reduced IT operating costs

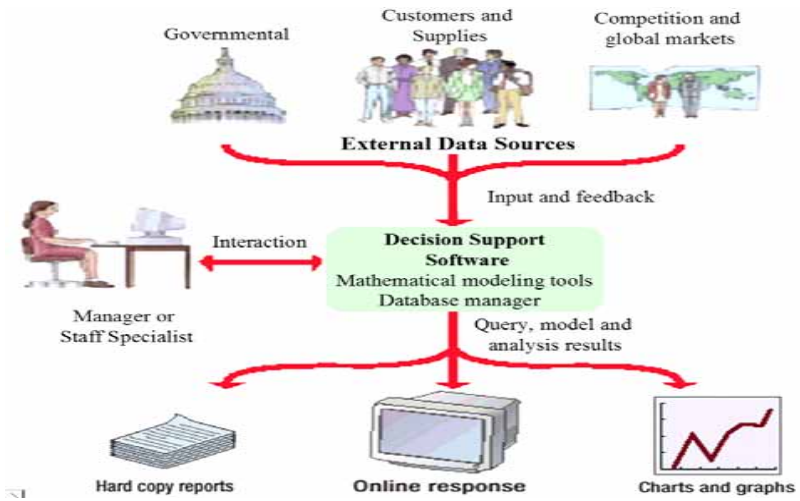
Decision Support Systems (DSS) - 1

- A decision support system **collects various types of business data**, and is used to generate special reports that help managers make decisions.
- A decision support system may use data from a company's transaction processing system and from external sources, such as stock market reports, information about competitors, and so on.
- These systems provide highly tailored, structured reports that can be used for very specific business situations.

Decision Support Systems (DSS) - 2

- Some Sophisticate Functions of DDS
- **What-If Analysis**
  - An end user makes changes to variables, or relationships among variables, and observes the resulting change in the value of other variables.
- **Sensitivity Analysis**
  - A special type of what-if analysis in which the value of only one variable is changed repeatedly, and the resulting changes on other variables are observed.
- **Goal-seeking analysis**
  - Attempts to find the value of the inputs necessary to achieve a desired level of output.

Decision Support Systems (DSS) - 3



Expert systems - 1

- An expert system is a specialized information system that performs tasks normally done by people, such as making decisions.
- Can ***support*** decision makers or completely ***replace*** them.
  - Expert systems are used to approve bank loans, make large-scale purchasing decisions, and assist with medical diagnoses.
- Expert systems rely on huge, detailed databases (**knowledge bases**). Special software, called an **inference engine**, analyzes data to answer questions or make choices.

Expert systems - 2

- The transfer of expertise from an expert to a computer and then to a user involves four activities:
  - **Knowledge acquisition**: Knowledge is from experts or from documented sources.
  - **Knowledge representation**: Acquired knowledge is organized as rules or frames (objective-oriented) and stored electronically in a knowledge base.

Expert systems - 3

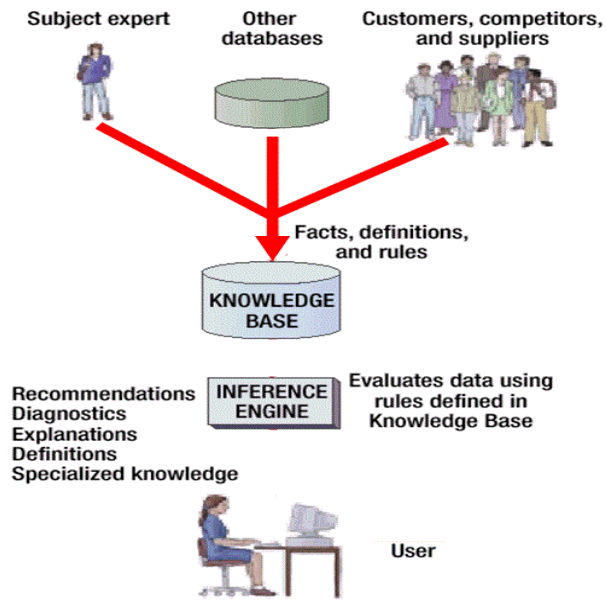
- **Knowledge inferencing**: Given the necessary expertise stored in the knowledge base, the computer is programmed so that it can make inferences. The reasoning function is performed in a component called the ***inference engine***, which is the brain of ES.
- **Knowledge transfer**: The inferenced expertise is transferred to the user in the form of a recommendation.

Expert systems - 4

The Components of Expert Systems

- **Knowledge base** contains knowledge necessary for understanding, formulating and solving problems.
- **Inference engine** is a computer program that provides a methodology for reasoning and formulating conclusions.
- **User interface** enables users to communicate with the computer
- **Blackboard** is an area of working memory set aside for the description of a current problem.
- **Explanation subsystem** explains its recommendations.

Expert systems - 5



Expert systems - 6

- Rule: Example

關係
If the 'fuel tank' is empty
Then the car is dead

建議
If the season is autumn
and the sky is cloudy
and the forecast is drizzle
Then the advice is 'take an umbrella'

策略
If the car is dead
Then the action is 'check the fuel tank'
If the 'fuel tank' is full
Then the action is 'check the battery'

指示
If the car is dead
and the 'fuel tank' is empty
Then the action is 'refuel the car'

啓發式
If the spill is liquid
and the 'spill pH' < 6
and the 'spill smell' is vinegar
Then the 'spill material' is 'acetic acid'

Why Managers Need IT Support - 1

- A key to good decision making is to explore and compare many relevant alternatives. The more alternatives that exist, the more computer-assisted search and comparison are needed.
- Typically, decisions must be made under time pressure. Frequently it is not possible to manually process the needed information fast enough to be effective.

Why Managers Need IT Support - 2

- It is usually necessary to conduct a sophisticated analysis in order to make a good decision. Such analysis requires the use of modeling.
- Decision makers can be in different locations and so is the information. Bringing them all together quickly and inexpensively may be a difficult task.

9. Management of MIS

Role of the IS Department

- The Information Systems (IS) department is responsible for designing, building, and managing an organization's information systems.
- In years past, the IS department served only the informational needs of managers. Today, the IS team supports all workers in a business, and supports the business' mission, as well.
- An IS department's tasks include designing, planning, installing, and maintaining systems; generating reports; and cost control.

MIS Management - 1

Managing Hardware and Software

- **Capacity planning**: Process of predicting when a computer hardware system becomes saturated
- **Scalability:** Ability of a computer, product, or system to expand to serve a larger number of users without breaking down

MIS Management - 2

- Total Cost of Ownership (TCO) of Technology Assets
  - Includes both direct and indirect costs
  - Hardware and software acquisitions account for only 20% of TCO
  - TCO for a PC may run to three times original purchase price
  - Be aware of hidden costs!

END