Management Information Systems

2nd & 3rd Module

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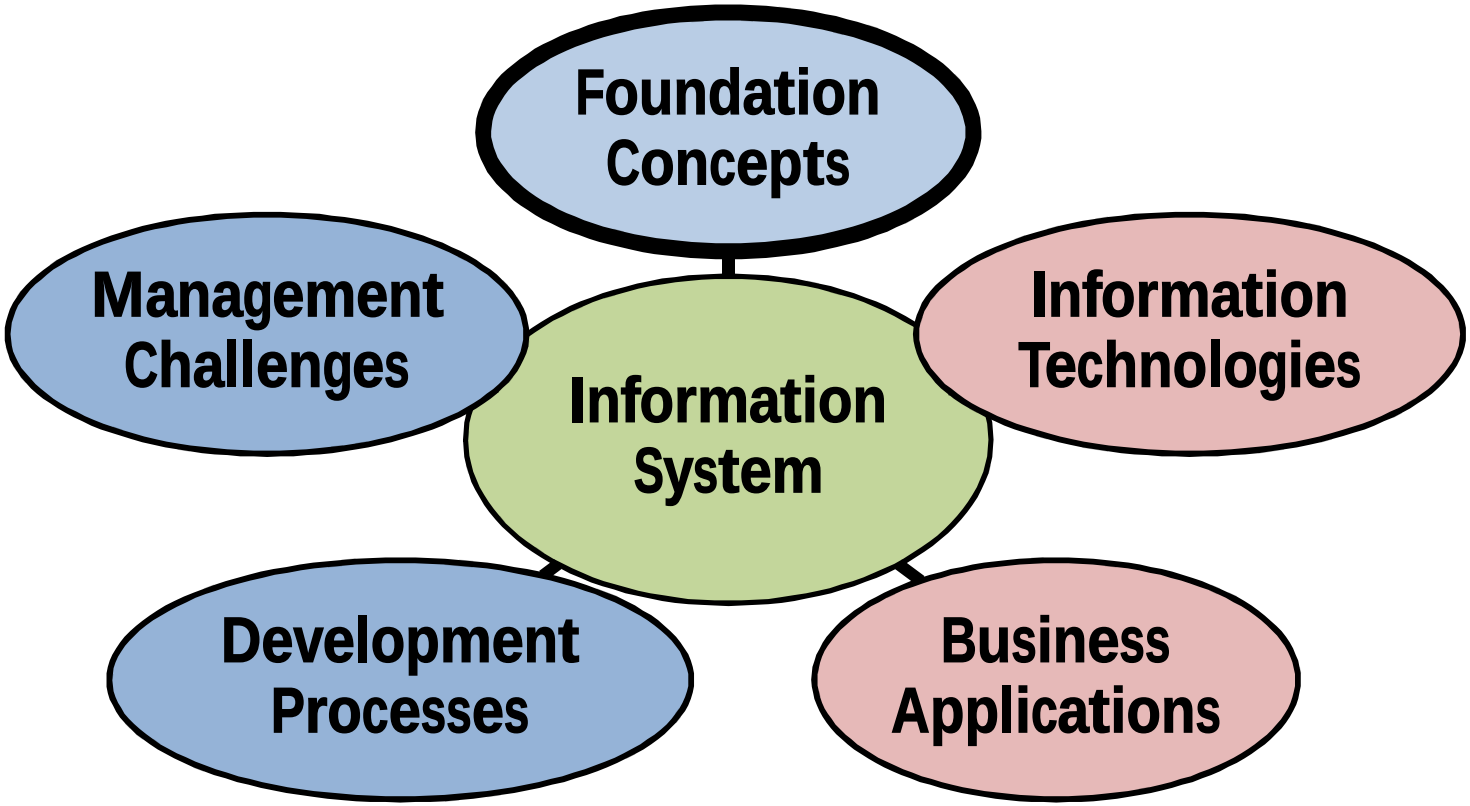
IS Knowledge Framework for Business Professionals



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Information Technology

- A term that encompasses all forms of technology used to create, store, exchange and utilize information in its various forms including business data, conversations, still images, motion pictures and multimedia presentations

- IT deals with the use of electronic computers and computer software to convert, store, protect, process, transmit, and securely retrieve information

Generation of Computers

First Generation - 1940-1956: Vacuum Tubes

- The first computers used vacuum tubes for circuitry and magnetic drums for memory, and were often enormous, taking up entire rooms.
- Very expensive , using a great deal of electricity, generated a lot of heat,
- Relied on machine language,
- Input based on punched cards and paper tape, and output was displayed on printouts.
- The UNIVAC and ENIAC (U.S. Census Bureau in 1951)

- **Second Generation - 1956-1963: Transistors**

- Transistors (1947)
- Relied on punched cards for input and printouts for output
- Symbolic, or assembly, languages, which allowed programmers to specify instructions in words
- Early versions of COBOL and FORTRAN.
- Stored their instructions in their memory, which moved from a magnetic drum to magnetic core technology.
- The first computers of this generation were developed for the atomic energy industry.

- **Third Generation - 1964-1971: Integrated Circuits**

- Integrated circuit (silicon chips, called semiconductors,) which drastically increased the speed and efficiency of computers.
- Keyboards and monitors and interfaced with an operating system,
- Computers for the first time became accessible to a mass audience because they were smaller and cheaper than their predecessors.

- **Fourth Generation - 1971-Present: Microprocessors**
- The microprocessor brought the fourth generation thousands of integrated circuits n of computers, as were built onto a single silicon chip.
- The Intel 4004 chip, developed in 1971, located all the components of the computer - from the central processing unit and memory to input/output controls - on a single chip.
- Fourth generation computers also saw the development of GUIs, the mouse

- **Fifth Generation - Present and Beyond: Artificial Intelligence**
- Based on artificial intelligence
- Some applications, such as voice recognition
- The use of parallel processing and superconductors is helping to make artificial intelligence a reality
- The goal of fifth-generation computing is to develop devices that respond to natural language input and are capable of learning and self-organization

Microcomputer

- A **microcomputer** is a computer with a microprocessor as its central processing unit
- Occupy physically small amounts of space when compared to mainframe and minicomputers
- Many microcomputers (when equipped with a keyboard and screen for input and output) are also personal computers (in the generic sense)

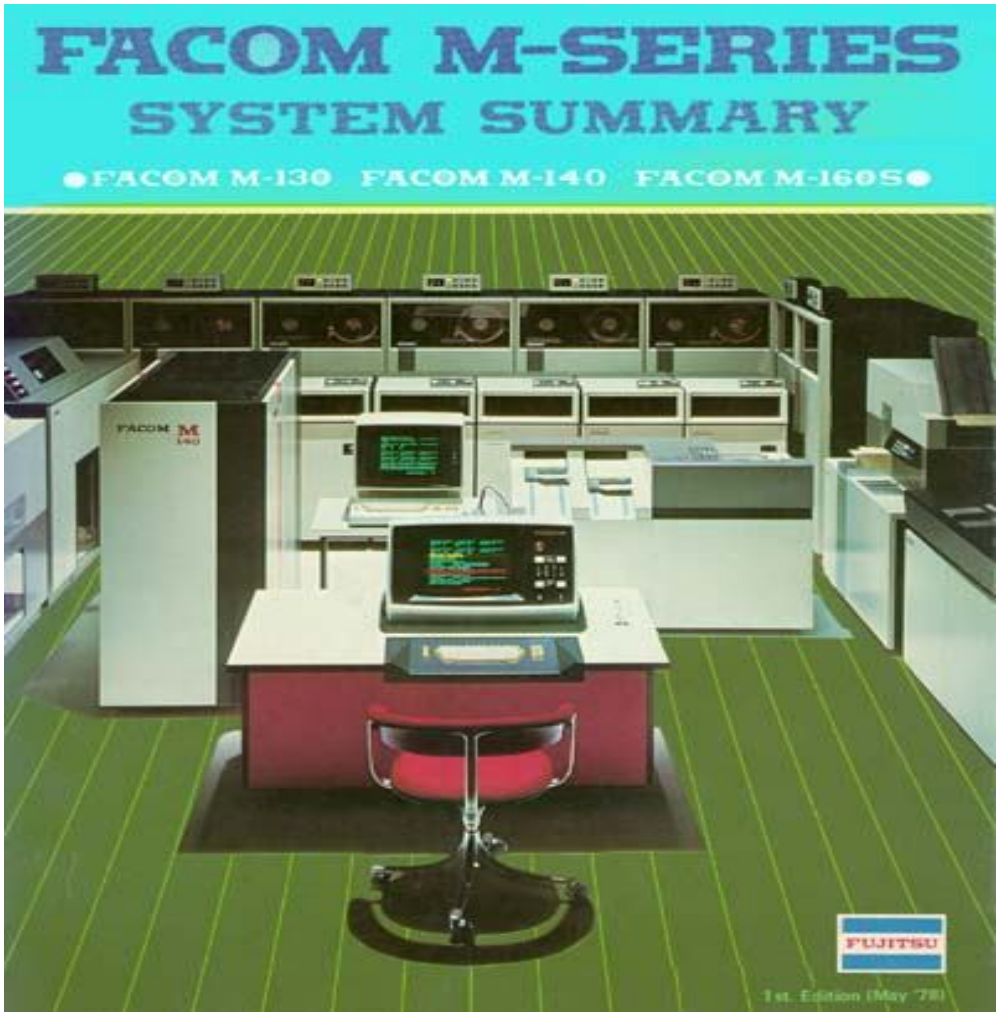
Midrange computers

- A class of computer systems which fall in between mainframe computers and microcomputers
- Emerged in the 1960s
- Digital Equipment Corporation (PDP line), Data General, Hewlett-Packard (HP3000 line), IBM (System/3 and successors), and Sun Microsystems (SPARC Enterprise).
- IBM (System/3, System/34, System/32, System/36, System/38, and *AS/400*, which was recently rebranded to System)

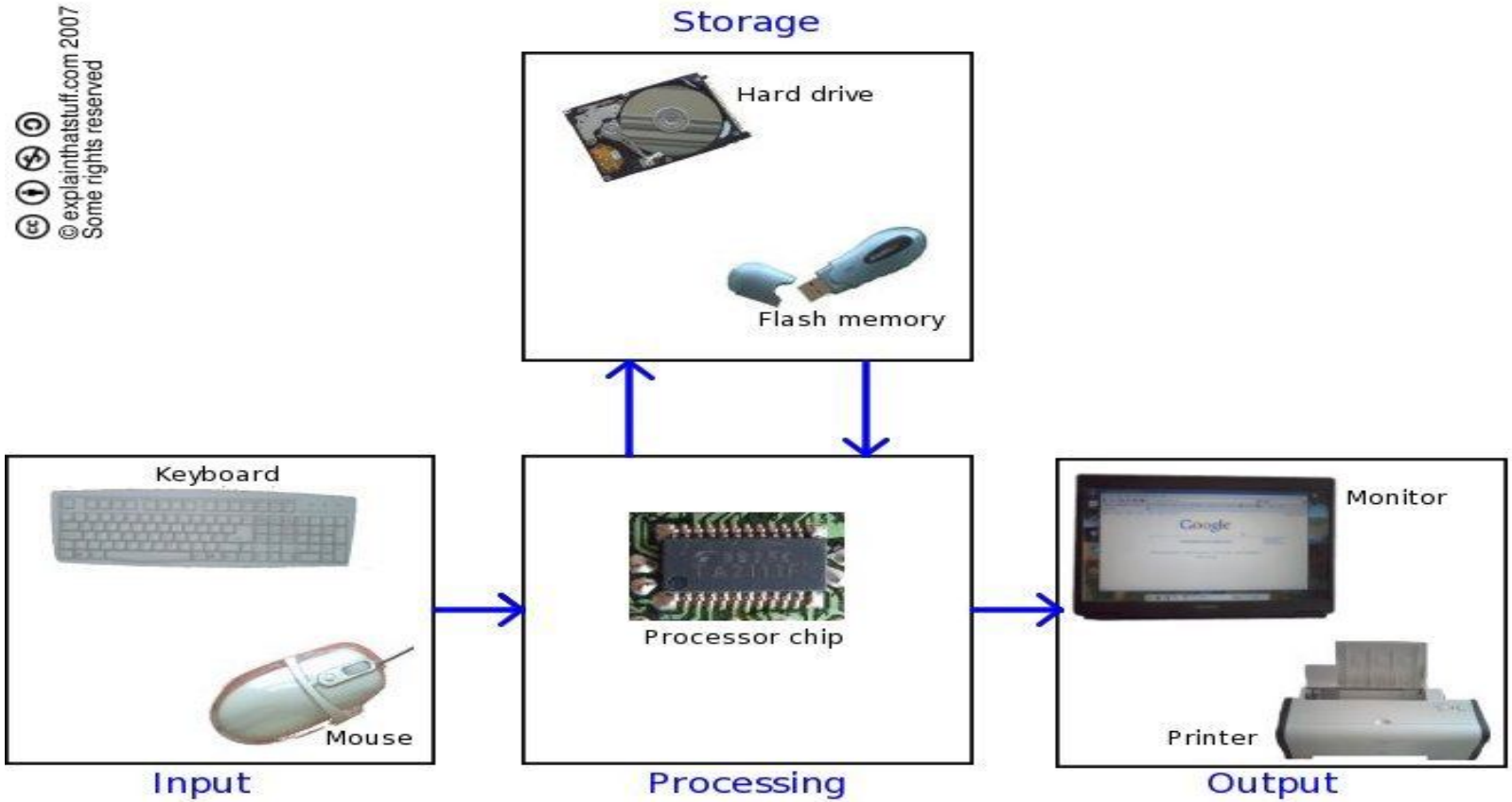
Mainframes

- Used mainly by large organizations for critical applications, typically bulk data processing such as census, industry and consumer statistics, ERP, and financial transaction processing
- High-end commercial machines from less powerful units
- Large systems, the UNIVAC 1100/2200 series systems, and the pre-System/360 IBM 700/7000 series

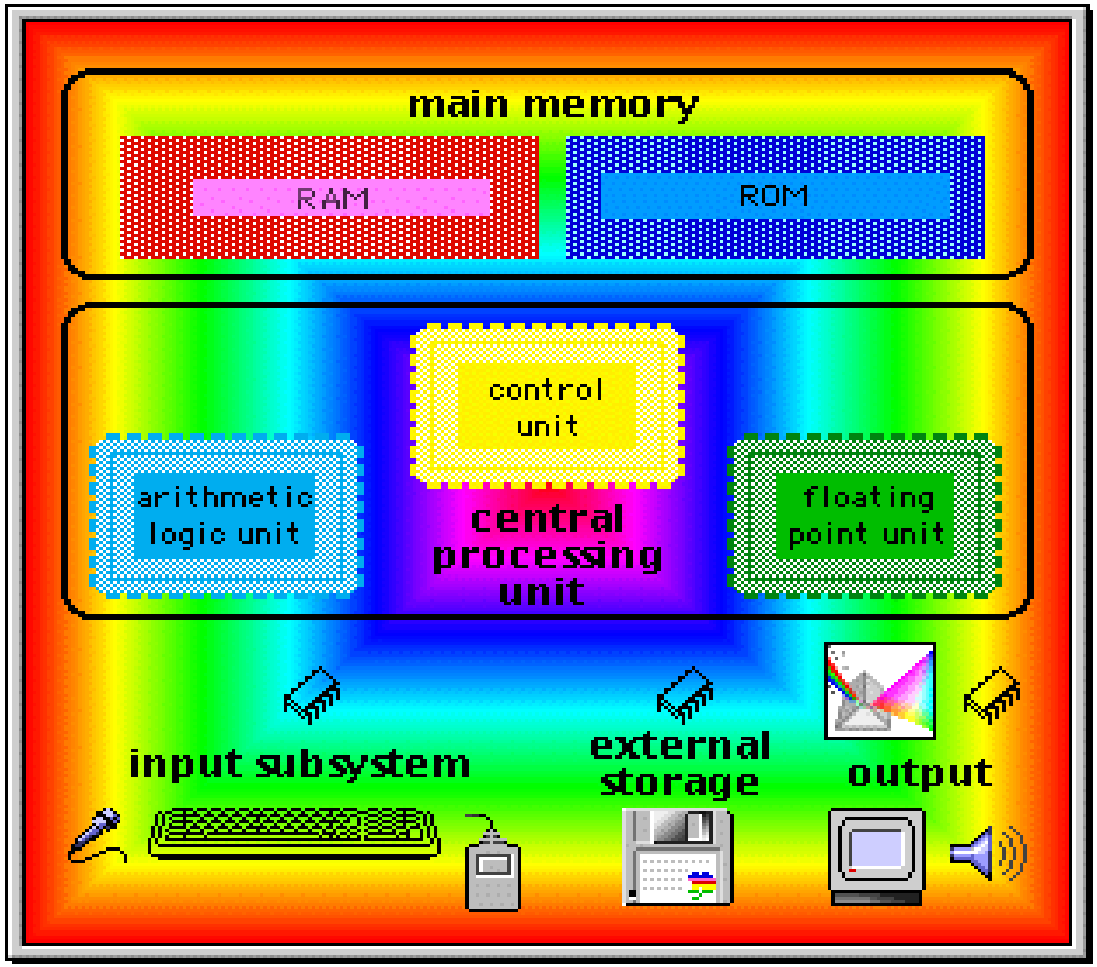
Mainframe


FACOM M-SERIES
SYSTEM SUMMARY
●FACOM M-130 FACOM M-140 FACOM M-160S●
FUJITSU

Computer System



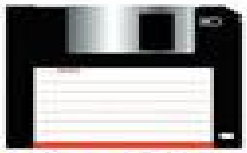
Computer System



Input Devices

Output Devices

Flash



Floppy Disk

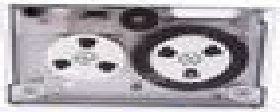
Zip Disk

CD + RW

CD + R

DVD + RW

DVD + R



Storage Tape

Smart Media

Removable Hard – Drive

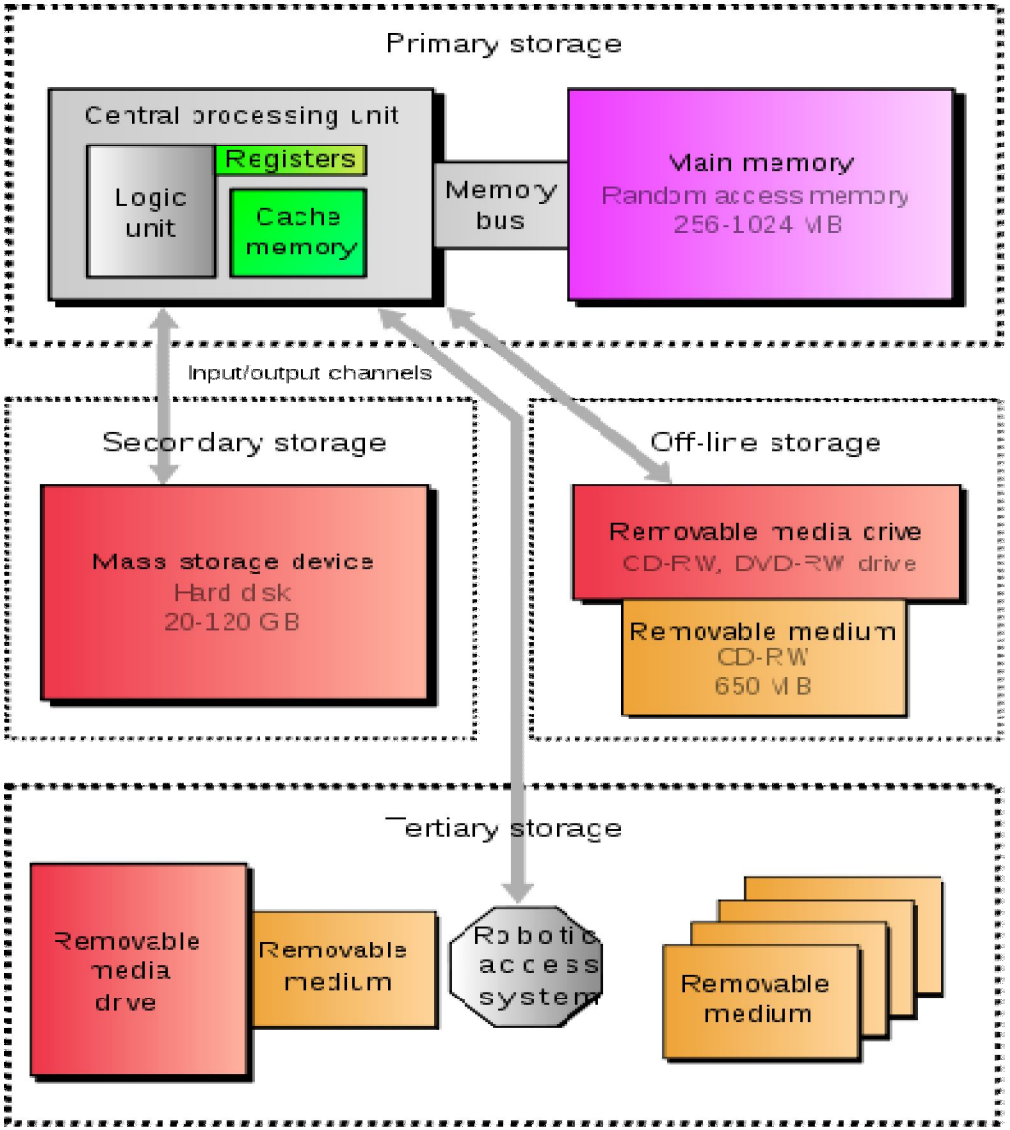
Micro Drive

Memory Stick

Smart Cards

Online Storage Site

PC Card



Computer data storage

- Computer data storage, often called storage or memory, refers to computer components, devices, and recording media that retain digital data used for computing for some interval of time.
- For information retention.
- Semiconductor storage known as random access memory (RAM) and sometimes other forms of fast but temporary storage.
- Storage - optical discs, forms of magnetic storage like hard disks
- Memory and storage were respectively called *primary storage* and *secondary storage*

Computer Software

Software

Computer Software

- Sets of instructions or data that tell a computer what to do
- A set of programs and procedures that are intended to perform some tasks on a computer system
- A set of such instructions for accomplishing a particular task is referred to as a program

Types of Computer Software

- Application software which perform productive tasks for users
- System software which interface with hardware to provide the necessary services for application software
- Firmware which is software programmed resident to electrically programmable memory devices on board mainboards or other types of integrated hardware carriers

Application Software

- Office Suits (MS-Office)
- Web Browsers
- E-Mail
- Word Processing
- Publishing software (Adobe PageMaker)
- Spreadsheets
- Database Managers
- Presentation Graphics (PowerPoint)
- Personal Information Manager (Personal Digital Assistant)
- Groupware (Collaboration software – Microsoft exchange)

System Software

- Operating system
- Network Management Programs
- Application servers
- System Utilities
  - Virus scanners, compression

Operating System

- System software
- It is responsible for the management and coordination of activities and the sharing of the limited resources of the computer
- The operating system acts as a host for applications that are run on the machine

OS Functions

- User Interface
- Resource Management
- File Management
- Task management (Multitasking)

OS

- Windows
- Unix
- Linux
- Mac OS X

Programming Languages

- **1GL** or first-generation language was (and still is) *machine language* or the level of instructions and data that the processor is actually given to work on (which in conventional computers is a string of 0s and 1s)

- **2GL** or second-generation language is assembler (sometimes called "assembly") language

- **3GL** or third-generation language is a "high-level" programming language, such as PL/I, C, or Java.
- compiler converts the statements of a specific high-level programming language into

- **4GL** or fourth-generation language is designed to be closer to natural language than a 3GL language. Languages for accessing databases are often described as 4GL

- **5GL** or fifth-generation language is programming that uses a visual or graphical development interface to create source language
- Microsoft, Borland, IBM, and other companies make 5GL
- Visual programming allows you to easily envision object-oriented programming class hierarchies and drag icons to assemble program components

Web-Languages

- HTML, an initialism of HyperText Markup Language, is the predominant markup language for Web pages

- The Extensible Markup Language (XML) is a general-purpose specification for creating custom markup languages

Web-Services

- A standardized way of integrating Web-based applications using the XML over an Internet protocol backbone
- XML is used to tag the data, SOAP is used to transfer the data, WSDL is used for describing the services available and UDDI is used for listing what services are available
- Web services allow organizations to communicate data without intimate knowledge of each other's IT systems behind the firewall

Language Translators

Translate Instructions of Programming Languages into Machine Language

- Assembler
  - translates assembly language
- Compiler
  - Translates HLL, complete machine code
- Interpreter
  - Translates Instruction by instruction

Data Resource Management

Data

- Data are virtual resources, that needs to be managed

Data Concepts

- Character
  - Single Alphabet, numeric, or symbol
- Field
  - Attribute of an entity
- Record
  - Set of related fields
- File
  - Set of related records
- Database
  - Set of related data files

Types of Database

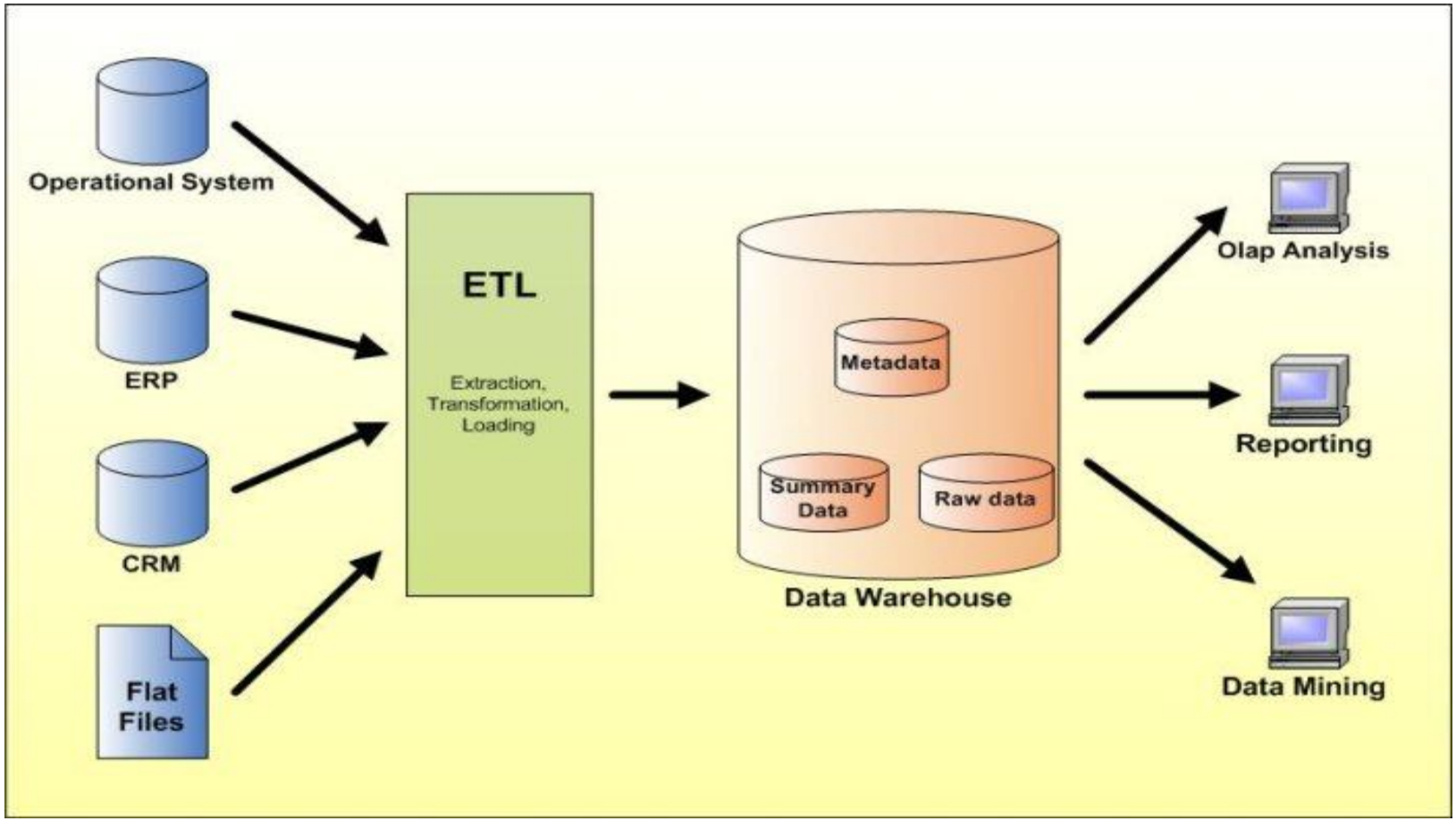
- Operational database
  - Store detailed data needed to support business activities
- Distributed database
  - Distributed copies or parts at network or web
- Hypermedia Database
  - Store hyperlinked pages of multimedia (text, graphic, images, video)

Data warehouse / Data mining

- Data warehouse is a repository of an organization's electronically stored data
- Data warehouses are designed to facilitate reporting and analysis

- Data mining is the process of sorting through large amounts of data and picking out relevant information

Data Warehouses and Data Mining



Traditional File System

- Data recorded manually
- Information is generated by processing of data manually
- There are many difficulties in manual based information

Traditional File System Problems

- Data Redundancy
- Lack of data integration
- Data dependence (depends upon programs to access, format)
- Inconsistent

DBMS

- A database management system (DBMS) is computer software that is used to create, manage, delete databases

Benefits of DBMS

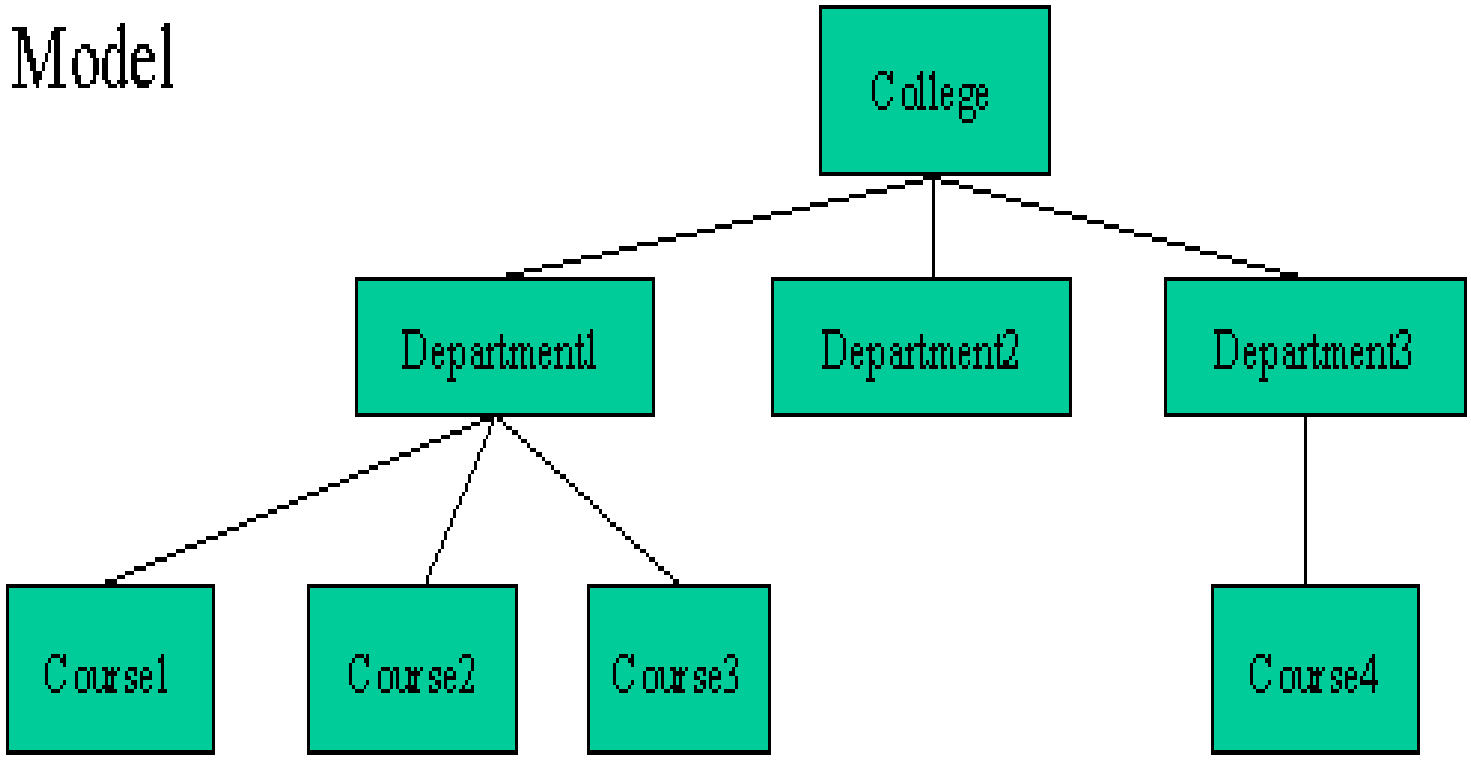
- Database interrogation
  - Retrieval of data using query
- Database maintenance
  - Update and correct data
- Application development
  - Database development

Database Structures

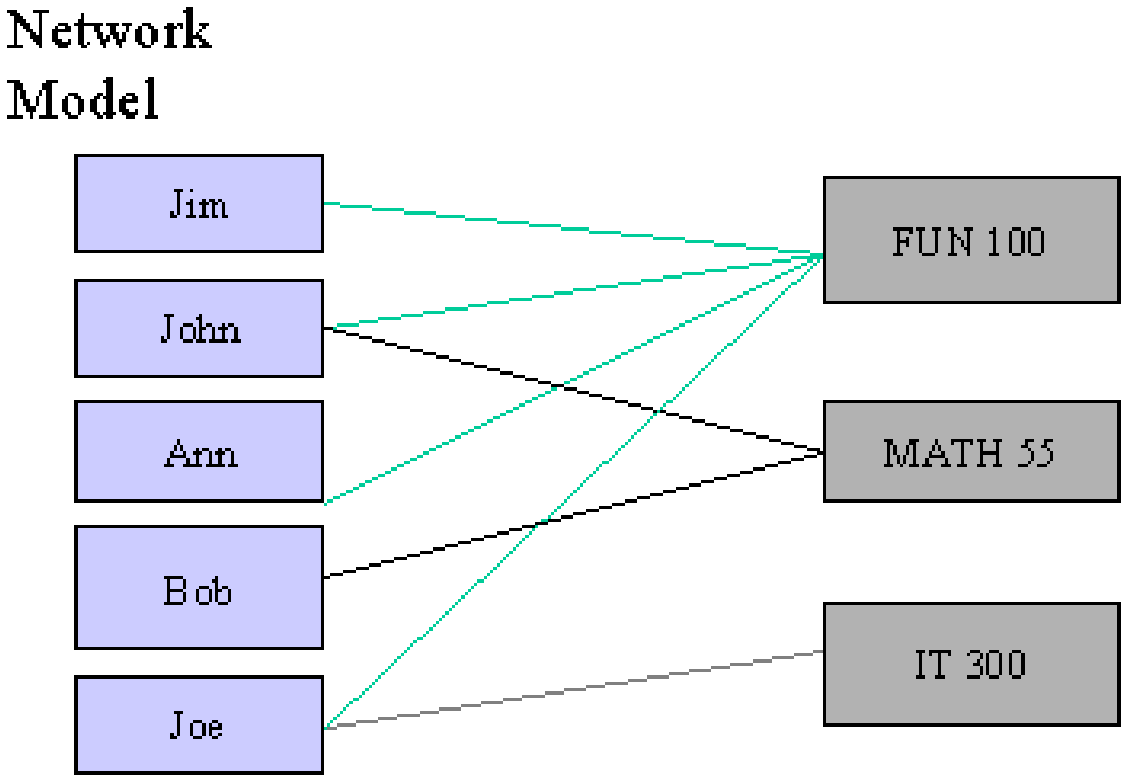
- Hierarchical Structure
- Network Structure
- Relational Structure
- Multidimensional Structure
- Object Oriented Structure

Hierarchical Structure

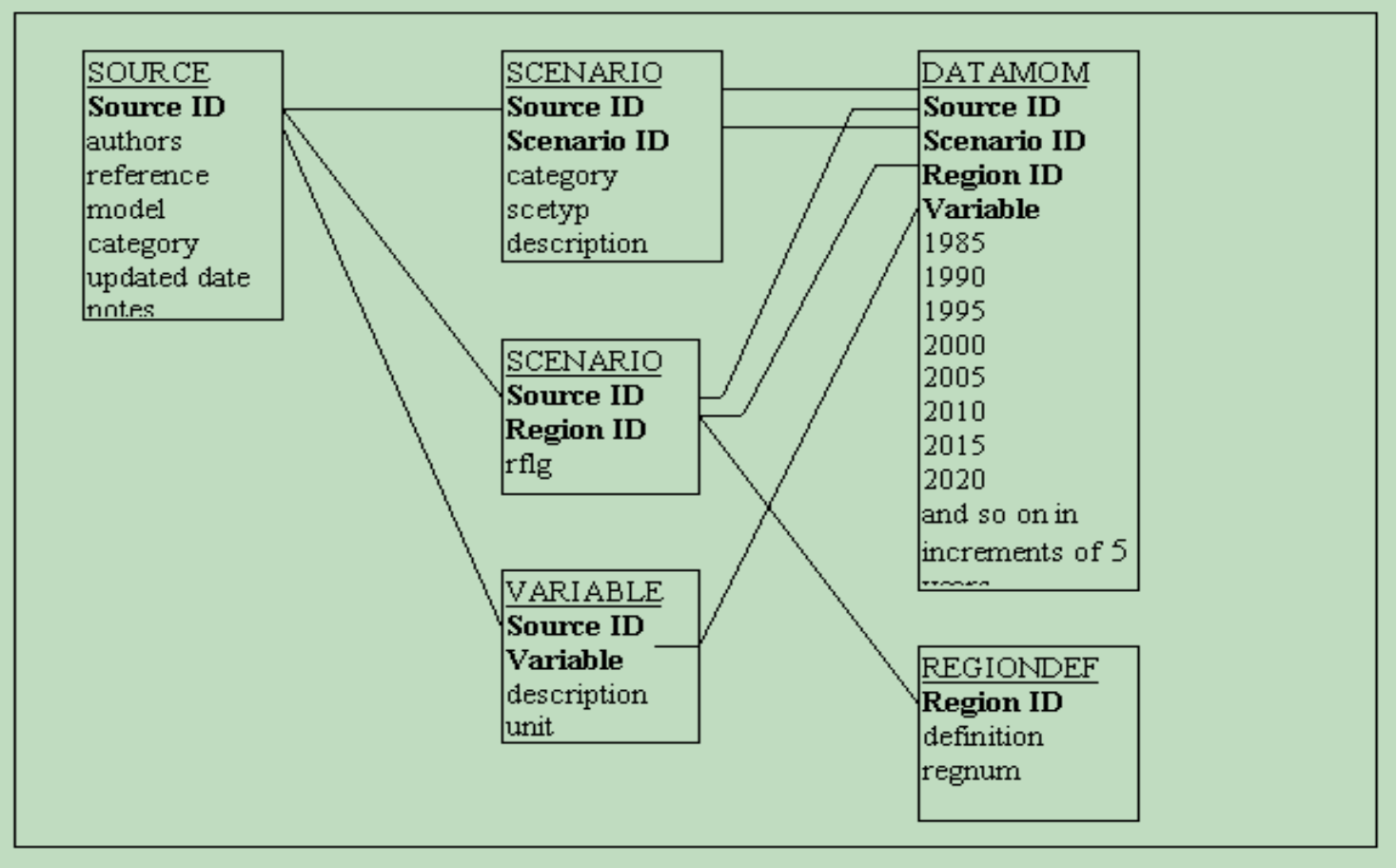
Tree
Model



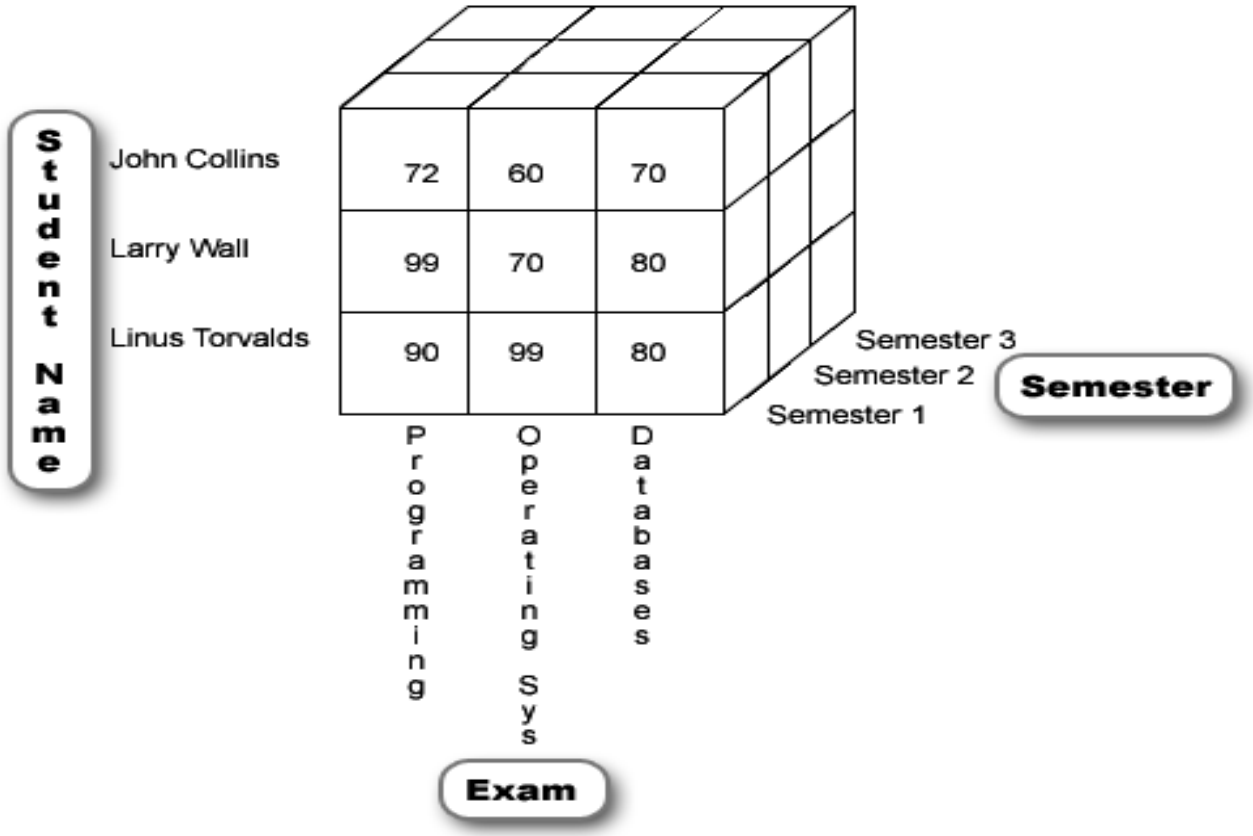
Network Structure



Relational Structure

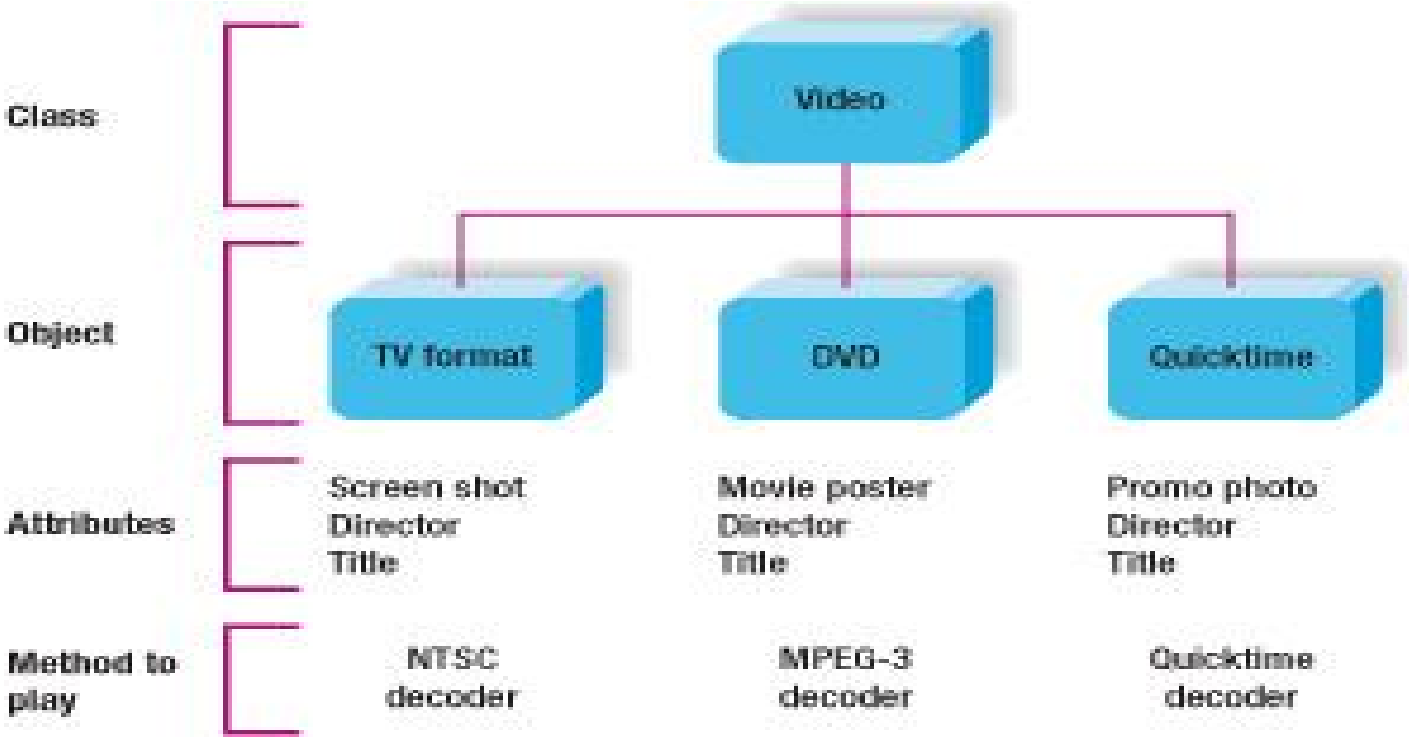


Multidimensional Structure

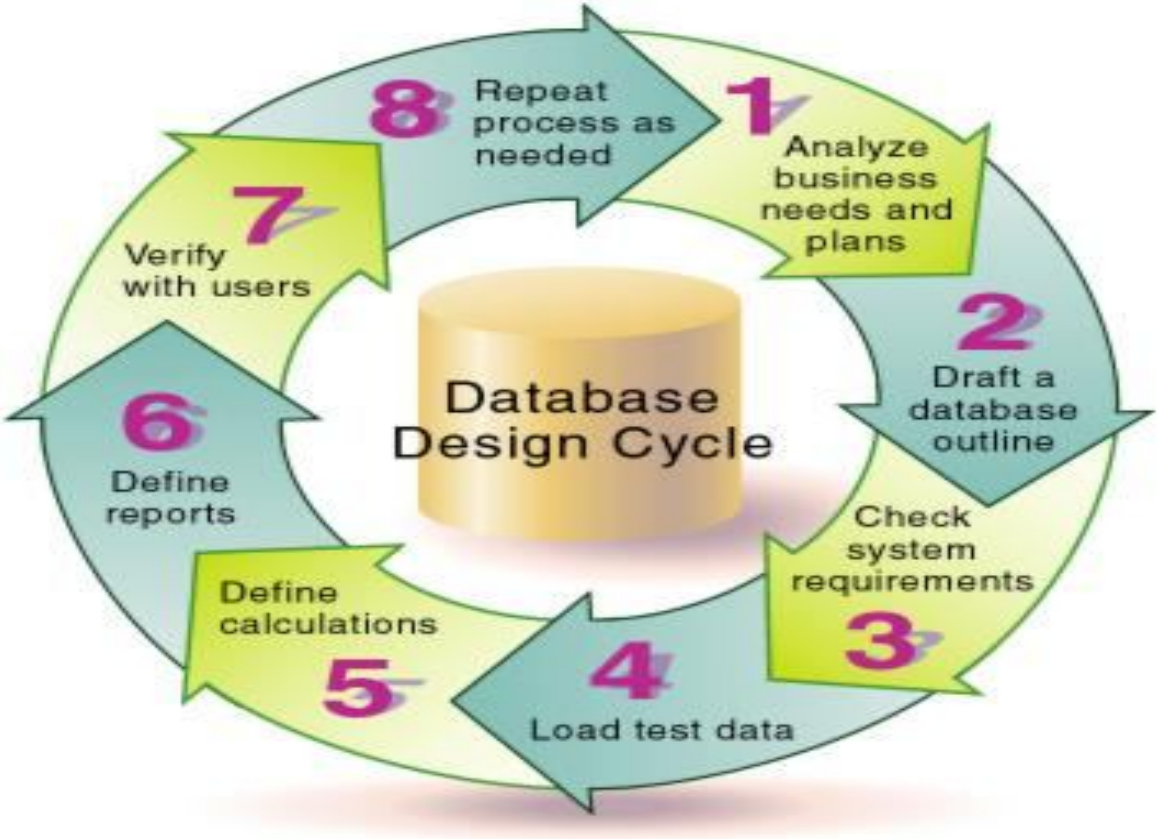


Object Oriented Structure

- An object has structure or state (variables) and methods (behavior/operations)



Database Design Cycle



Telecommunication and Networks

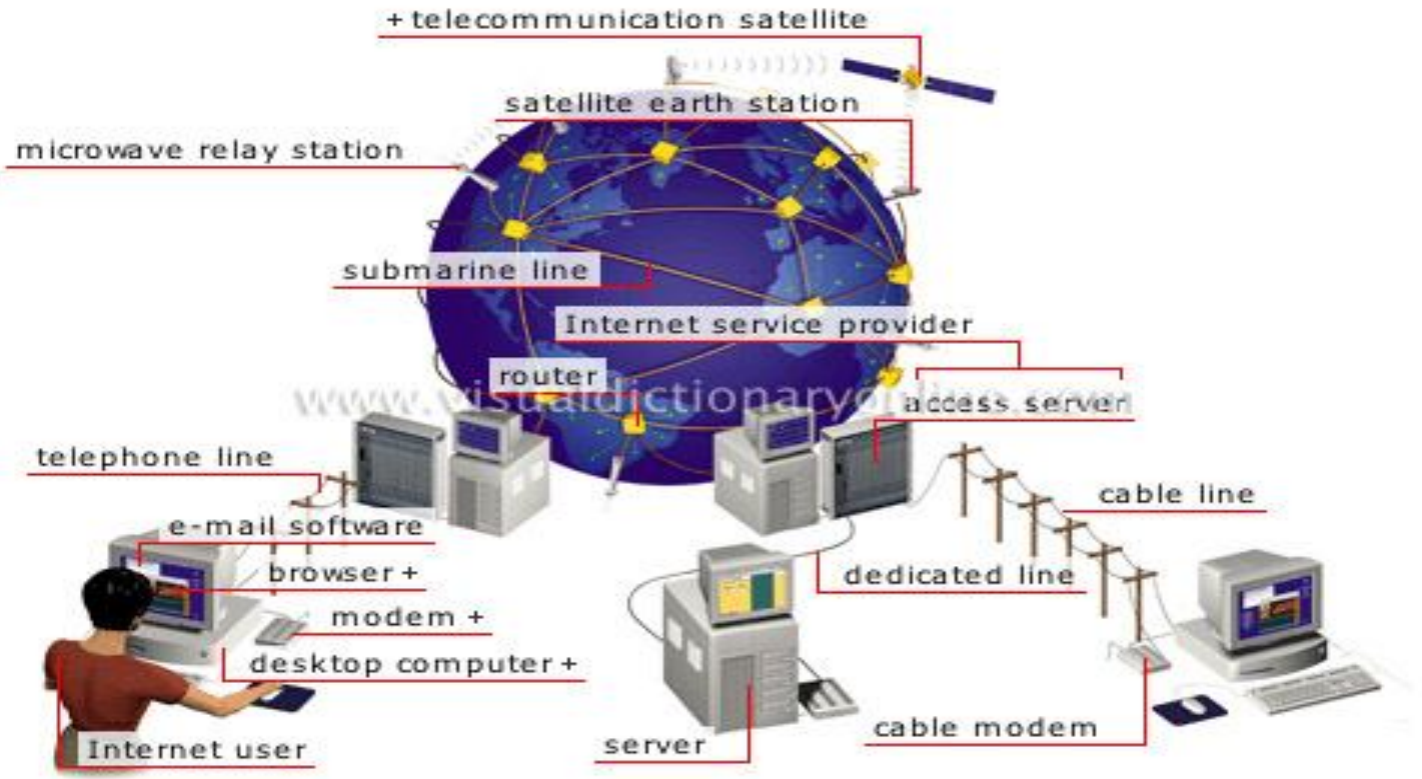
Networked Enterprise

- Business have become networked enterprise
- Internet etc. are networking business process and employees together
- Connecting them to customer, supplier etc.

Trends in Business Telecommunication

- Industry Trend
  - Towards more competitive vendors, alliances
- Technology Trend
  - Towards extensive use of technology
- Application Trend
  - Towards use of internet to support e-commerce

Internet



Business Value of internet

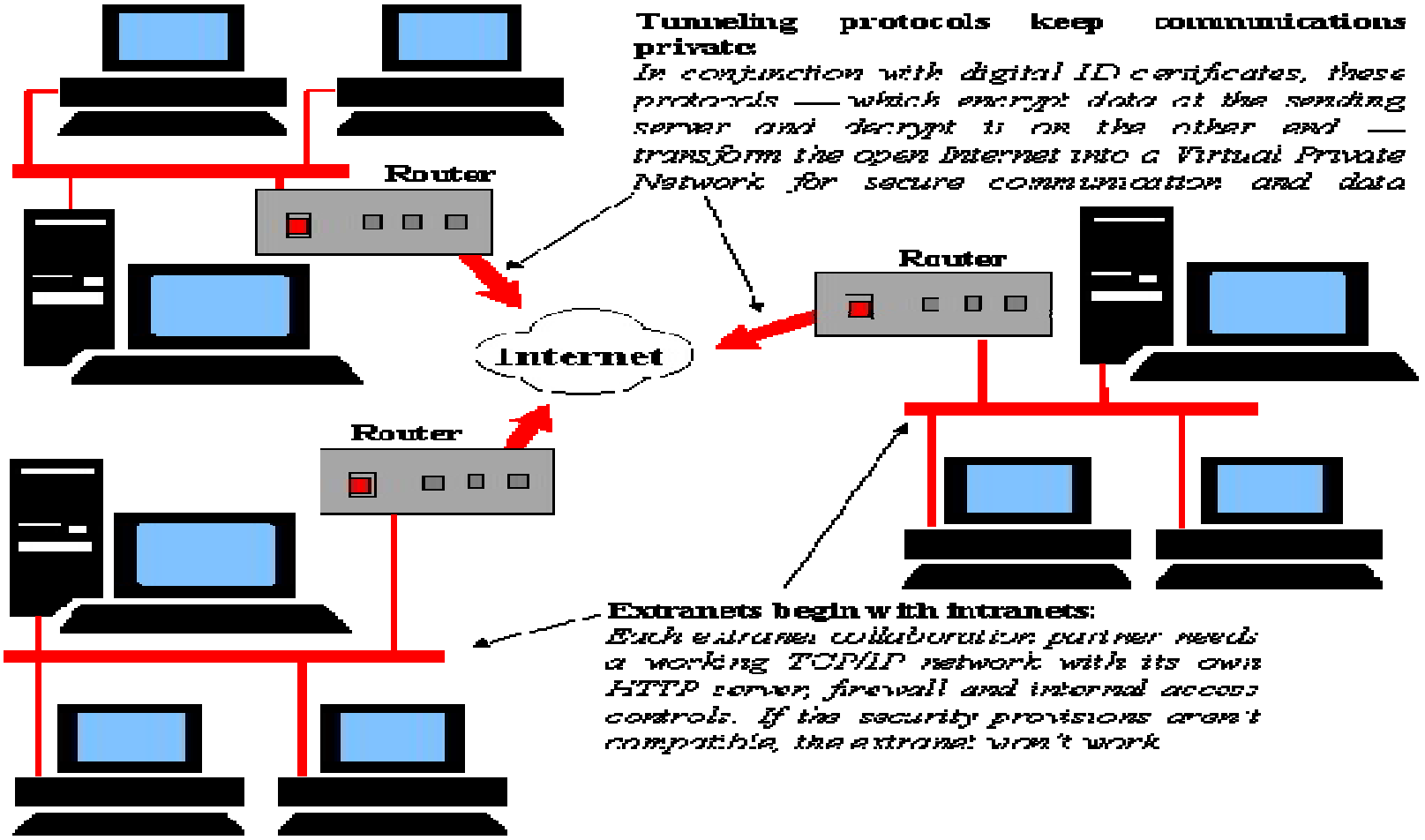
- Generate new revenue from online sales
- Reduce transaction cost through online sales
- Attract new customers Via Web Marketing
- Increase loyalty of customers by improving services through Web
- Develop new web-based markets

Intranet

Business Value of Intranet

- Communication and Collaboration
- Web-publishing
  - sharing documents
- Business operations and management
  - View and use of corporate data

Extranet



Tunneling protocols keep communications private:
In conjunction with digital ID certificates, these protocols — which encrypt data at the sending server and decrypt it on the other end — transform the open Internet into a Virtual Private Network for secure communication and data

Extranets begin with intranets:
Each extranet collaboration partner needs a working TCP/IP network with its own HTTP server, firewall and internal access controls. If the security provisions aren't compatible, the extranet won't work

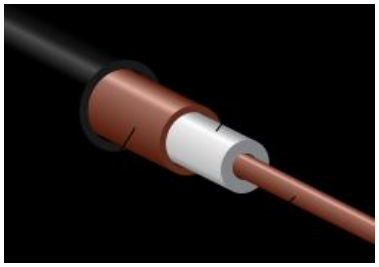
Network Alternatives

- Networks (LAN, WAN, MAN, Internet, intranet etc.)
- Media (Twisted pair, coaxial cable etc.)
- Processors (Modems, switches et.)
- Software (Network operating system)
- Channels (analog, digital, circuit, messaging, packets etc.)
- Topologies (Bus, ring, star, TCP/IP etc.)

Telecommunication Media

- Physical media for Telecommunication
  - Twisted pair

  - Coaxial cable

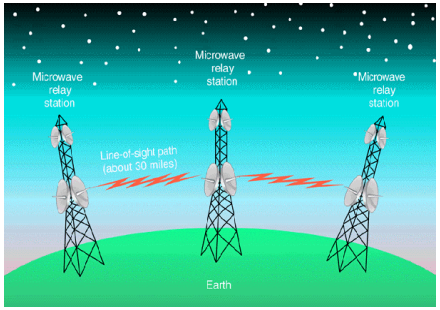


  - Optical fiber

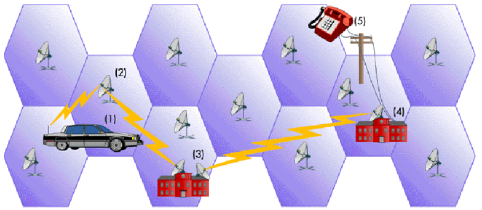
Telecommunication Media

- Telecommunication through Free Space
  - Communications satellite

  - Microwave



  - Cellular transmission



Enterprise Business System

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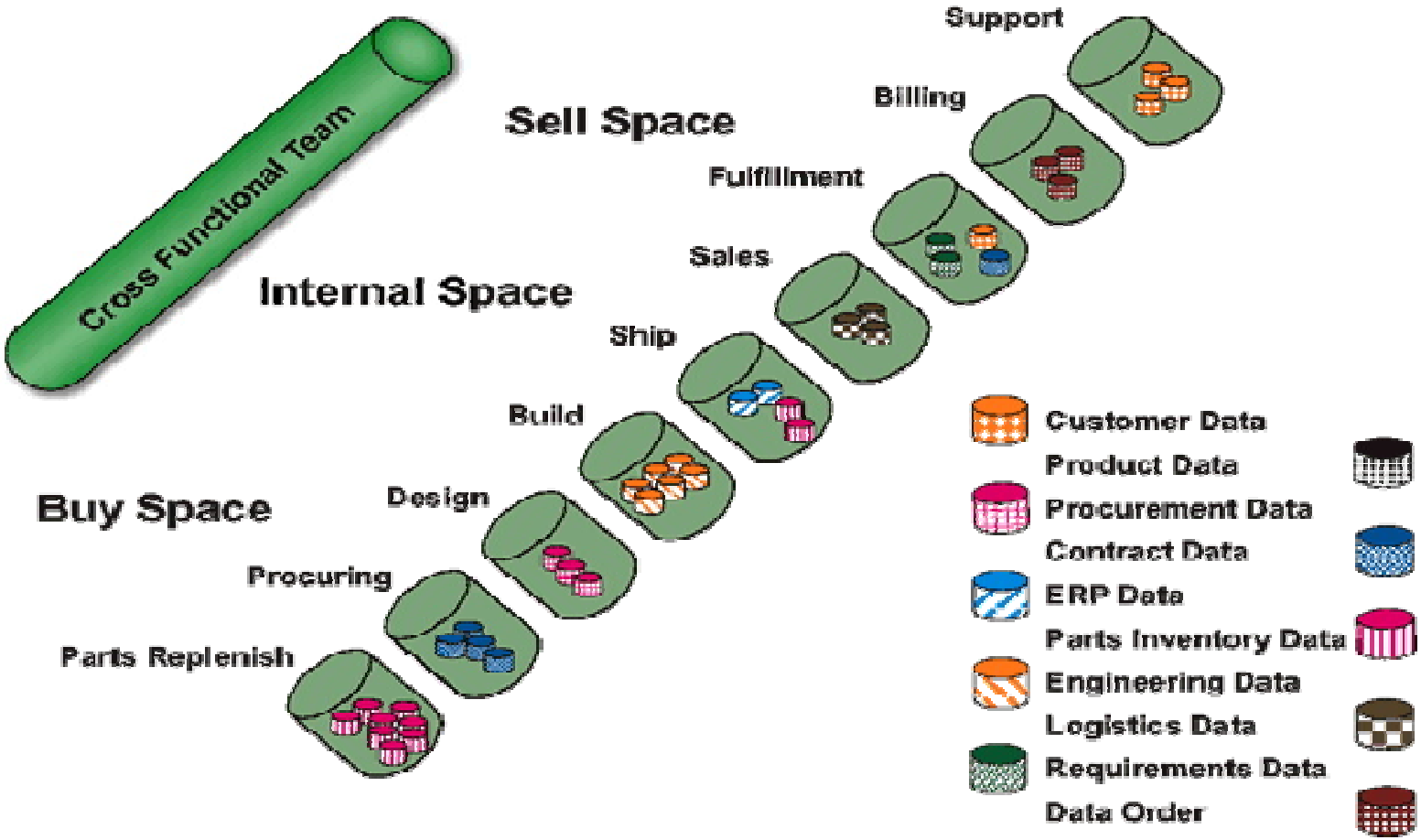
Cross-Functional Enterprise



Enterprise Application

- Transaction Processing system
  - Cross-functional Information systems that process data resulting from the occurrence of business transaction

- Online Transaction Processing System

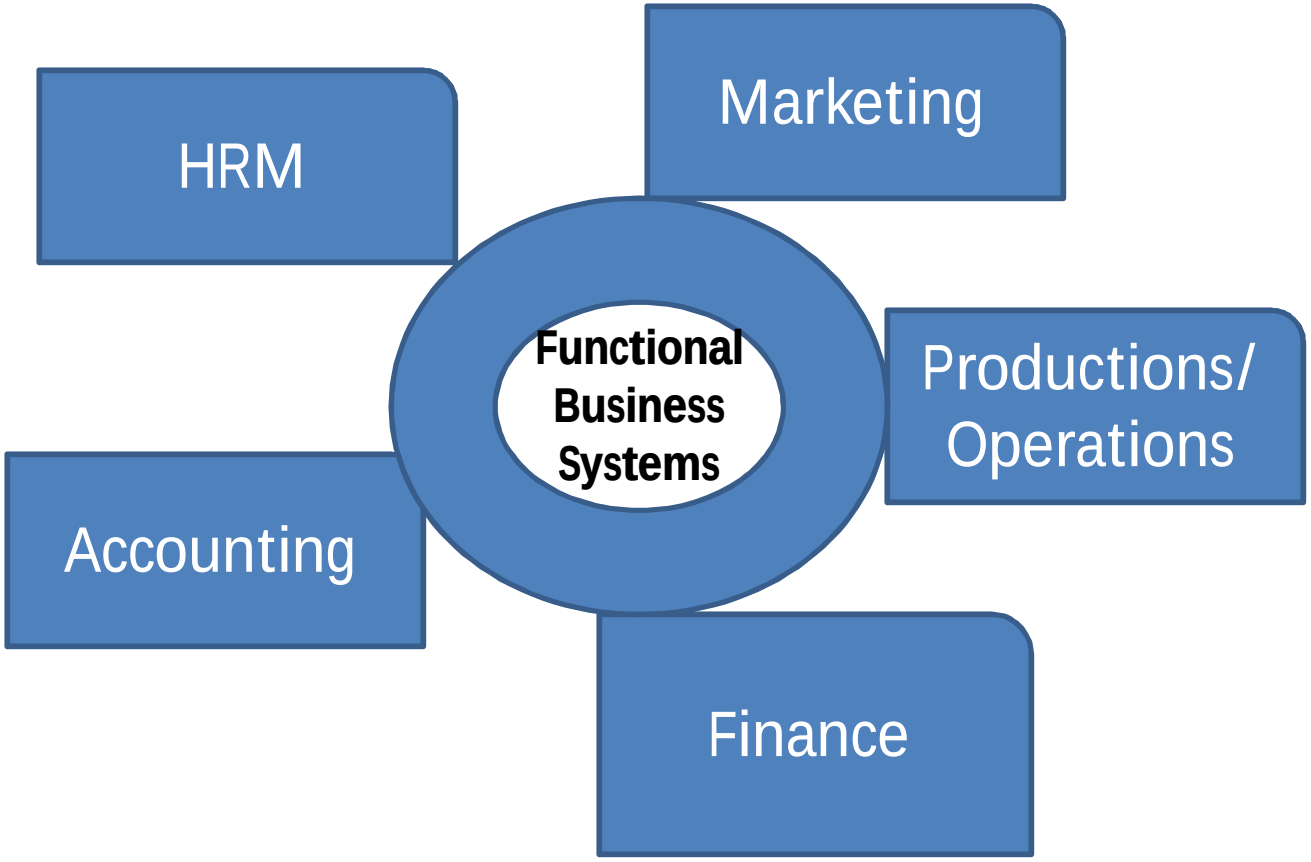
Transaction Processing Cycle

- Data Entry
- Transaction Processing (batch processing or online processing)
- Database Maintenance
- Document and Report generation
- Inquiry processing

Enterprise Collaboration System

- Electronic Communication Tools
  - Email, voice mail, Fax
- Electronic Conferencing Tool
  - Data conferencing, chat systems
- Collaborative Work Management Tools
  - Calendaring and scheduling, workflow systems

Functional Business Systems



Enterprise Business Systems

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Customer Relationship Management

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Customer Relationship Management

- A cross functional e-business application that integrates many customer serving processes in sales, direct marketing, account and order management and customer service and support
- CRM system include a family of software modules that provides the tools that enable a business and its employee to provide fast, convenient, dependable and consistent service to its customers

CRM from the Information Technology Perspective

- From the technology perspective, companies often buy into software that will help to achieve their business goals
- For many, CRM is far more than a new software package, the renaming of traditional customer services, or an IT-based customer management system to support sales people

CRM from the Customer Life Cycle (CLC) Perspective

- CLC focuses upon the creation of and delivery of lifetime value to the customer
- Looks at the products or services that customers need throughout their lives

CRM from the Business Strategy Perspective

Enterprise Resource Planning (ERP)

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Enterprise Resource Planning

- ERP is a way to integrate the data and processes of an organization into one single system

- ERP originally referred to how a large organization planned to use organizational wide resources

- In order for a software system to be considered ERP, it must provide an organization with functionality for two or more systems

- ERP packages exist that only cover two functions for an organization (QuickBooks: Payroll & Accounting), most ERP systems cover several functions

The Ideal ERP System

These software modules for ERP can include:

- **Manufacturing**
  - Engineering, capacity, workflow management, quality control, bills of material, manufacturing process, etc.
- **Financials**
  - Accounts payable, accounts receivable, fixed assets, general ledger and cash management, etc.
- **Human Resources**
  - Benefits, training, payroll, time and attendance, etc

The Ideal ERP System

- **Supply Chain Management**
  - Inventory, supply chain planning, supplier scheduling, claim processing, order entry, purchasing, etc.
- **Projects**
  - Costing, billing, activity management, time and expense, etc.
- **Customer Relationship Management**
  - sales and marketing, service, commissions, customer contact, calls center support, etc.
- **Data Warehouse**
  - Usually this is a module that can be accessed by an organizations customers, suppliers and employees

Advantages of ERP Systems

- A totally integrated system
- The ability to streamline different processes and workflows
- The ability to easily share data across various departments in an organization
- Improved efficiency and productivity levels
- Better tracking and forecasting
- Improved customer service

Disadvantages of ERP Systems

- Customization in many situations is limited
- The need to reengineer business processes
- ERP systems can be cost prohibitive to install and run
- ERP's may be too rigid for specific organizations that are either new or want to move in a new direction in the near future

Supply Chain Management

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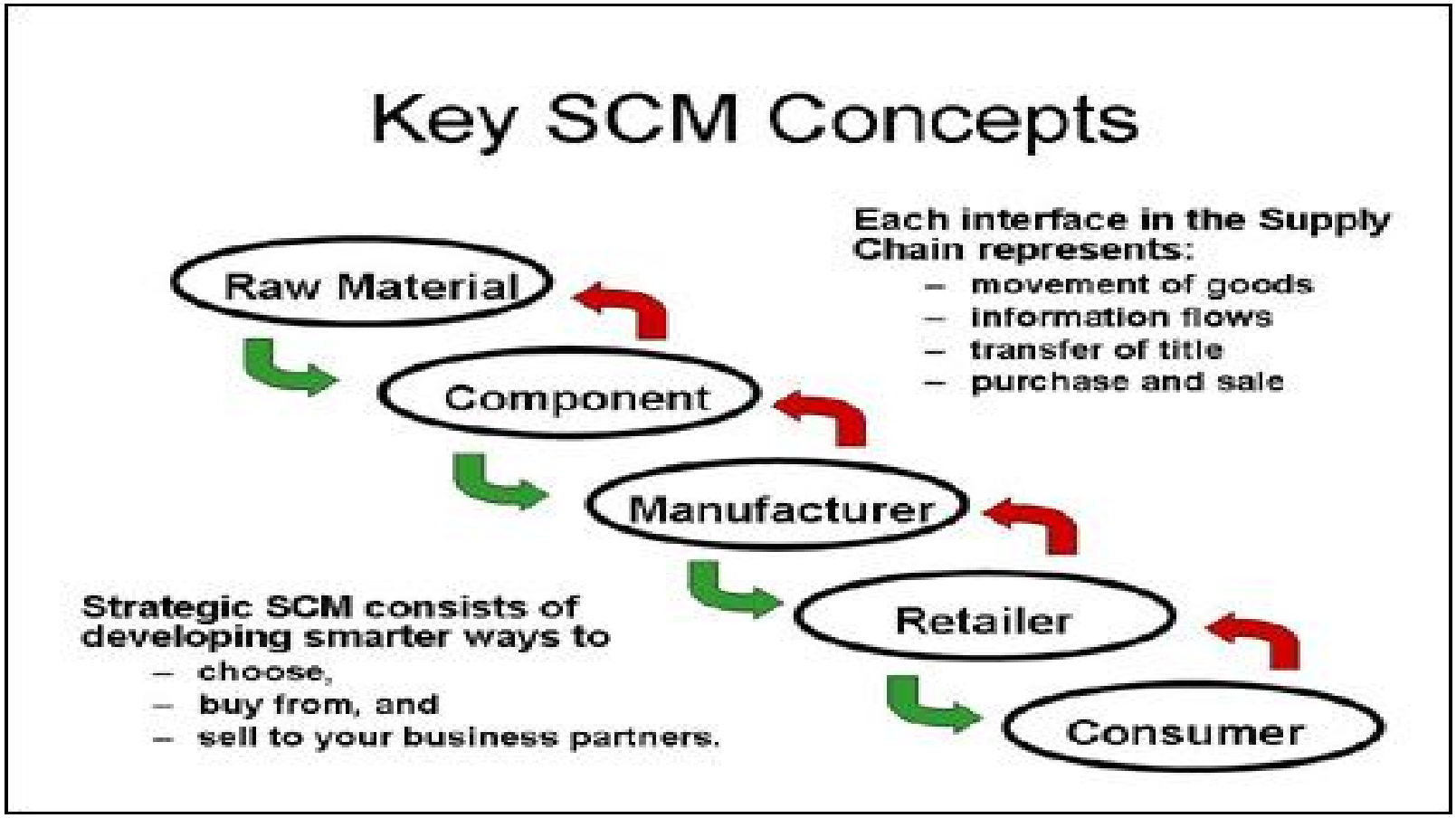
Supply Chain Management

- Supply chain management (SCM) is the management of a network of interconnected businesses involved in the ultimate provision of product and service packages required by end customers (Harland, 1996)
- Supply Chain Management spans all movement and storage of raw materials, work-in-process inventory, and finished goods from point-of-origin to point-of-consumption (supply chain)

Supply Chain Management



E-Commerce

e-commerce

- Buying and selling of products or services over electronic systems such as the Internet and other computer networks
- A large percentage of electronic commerce is conducted entirely electronically for virtual items
- Online retailers are sometimes known as e-tailers and online retail is sometimes known as e-tail

Market segments

Electronic commerce operates in all four of the major market segments:

- business-to-business
- business to consumer
- consumer to consumer
- consumer to business

Business applications

- e-mails and Messaging
- Documents, spreadsheets, database
- Accounting and finance systems
- Orders and shipment information
- Enterprise and client information reporting
- Domestic and international payment systems
- On-line Shopping
- Messaging
- Conferencing
- Online Banking

Benefits of the Internet for Electronic Commerce

- Ease of access and global reach
- Low-cost advertising medium
- Low barriers to entry

E-commerce problems

- Failure to understand the customer, why they buy, and how they buy
- Failure to consider the competitive situation
- Inability to predict environmental reaction
- Over-estimation of resource competence

Decision Support System

Decision Support System

- Decision support systems constitute a class of computer-based information systems including knowledge-based systems that support decision-making activities

Information that DSS application gather

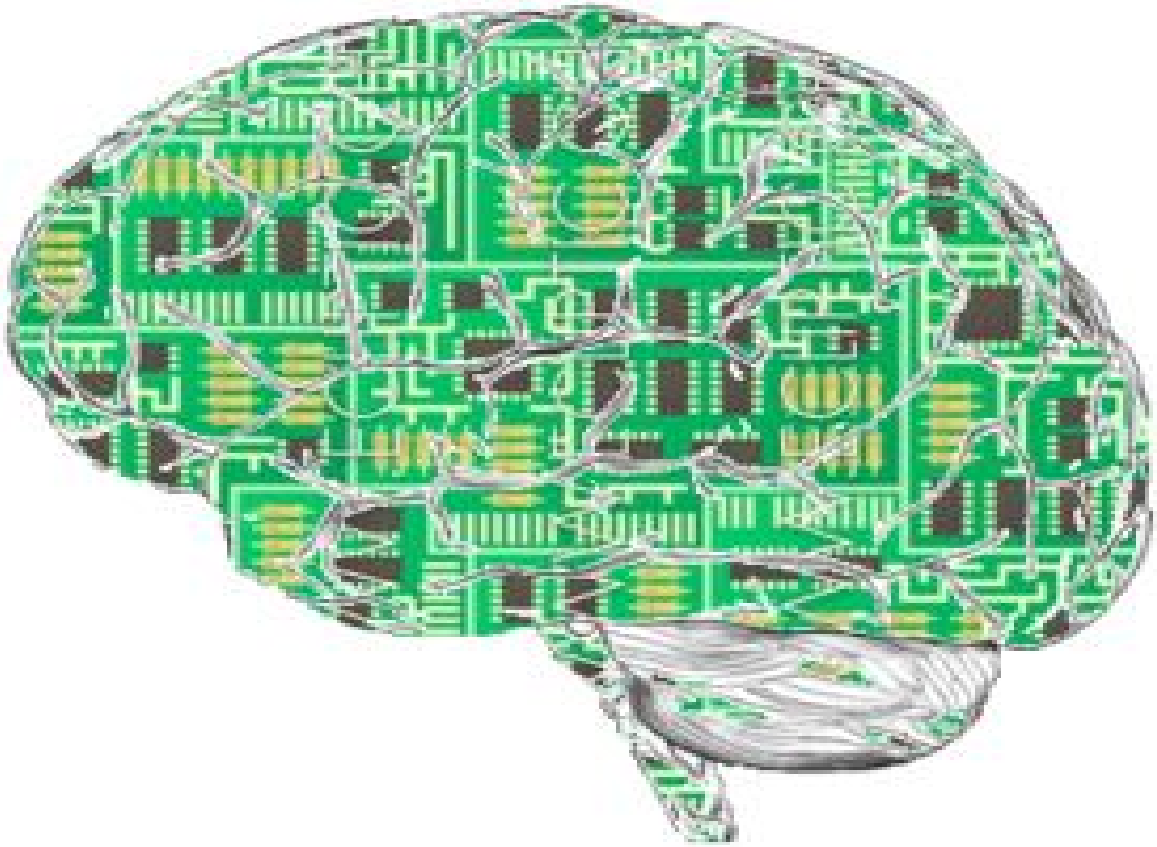
Typical information that a decision support application might gather and present would be:

- an inventory of all of current information assets (including legacy and relational data sources, cubes, data warehouses, and data marts)
- comparative sales figures between one week and the next
- projected revenue figures based on new product sales assumptions
- the consequences of different decision alternatives, given past experience

Benefits of DSS

- Improves personal efficiency
- Expedites problem solving
- Facilitates interpersonal communication
- Promotes learning or training
- Increases organizational control
- Generates new evidence in support of a decision
- Creates a competitive advantage over competition
- Encourages exploration and discovery on the part of the decision maker
- Reveals new approaches to thinking about the problem

Artificial Intelligence



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Artificial Intelligence

- AI is the science and engineering of making intelligent machines, especially intelligent computer programs

- It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable

Applications of AI

- Robotics
- Game
- Speech recognition
- Understanding natural language
- Expert systems

Expert System

- An expert system is software that attempts to reproduce the performance of one or more human experts, most commonly in a specific problem domain,

- A traditional application and/or subfield of artificial intelligence