

1.5 Timetable allocation (per week)



HNDIT1042 Information Management and Information Systems

- Lectures : 3 hours
- Tutorials /practicals : 2 hours
- Student activities : 8 hours
- Notional hours :13 hours

Assignment plan

On-line quizzes 20%

Group Assignment 20%

Final Examination (03 hour paper) 60%

Total 100%

Course Aims

- To develop an awareness of the nature and use of information and information systems in an organizational context

Learning Outcomes (LO)

- After successful completion of this course the student should be able to:
- LO1: Explain systems and management concepts and their relevance for information systems
- LO2: Understand the importance and the need for professionalism in managing computer-based systems
- LO3: Explain the strategic use of information technology and the effect of advances in telecommunications and other equipment
- LO4: Discuss the need for special types of MIS and describe their components
- LO5: Describe the issues of planning the development of computer-based applications
- LO6: Understand the need for control and maintenance of information systems
- LO7: Understand the importance of managing remote and network services
- LO8: Examine the operational issues concerned with the management of information system

Learning Activities

Session	Lesson topic	Tutorials/Practical
Week 01	introduction to Information systems	Define data, Information, System, Information systems. Qualities of information Classifications of information



WEEK1

INTRODUCTION TO INFORMATION SYSTEMS

Data

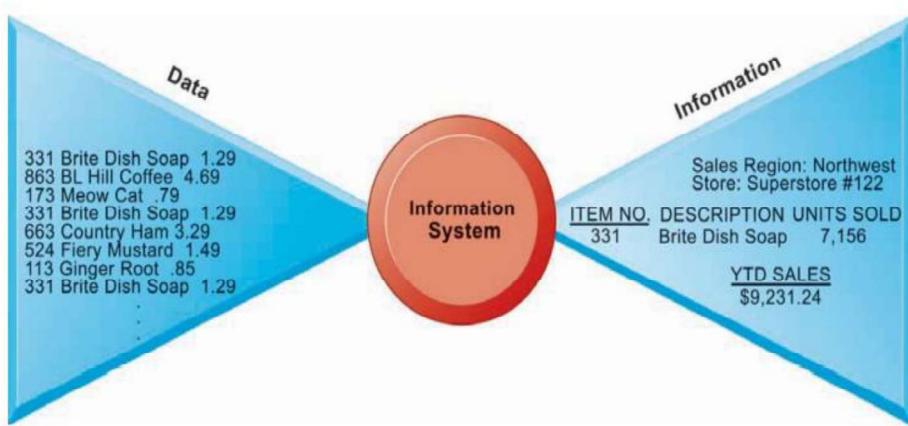
- streams of raw facts representing events occurring in organizations or the physical environment before they have been organized and arranged into a form that people can understand and use.

Information

information we mean data that have been shaped into a form that is meaningful and useful to human beings.



FIGURE 1.3 DATA AND INFORMATION



Raw data from a supermarket checkout counter can be processed and organized to produce meaningful information, such as the total unit sales of dish detergent or the total sales revenue from dish detergent for a specific store or sales territory.



What is a system?

- A system is a **collection of elements or components that are organized for a common purpose**.



solar system



Nervous system

WHAT IS AN INFORMATION SYSTEM?

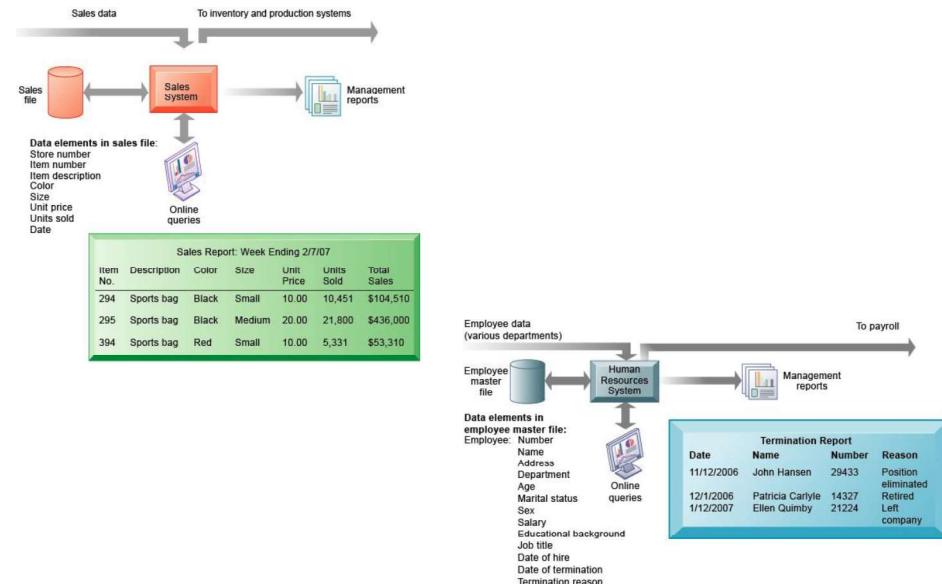
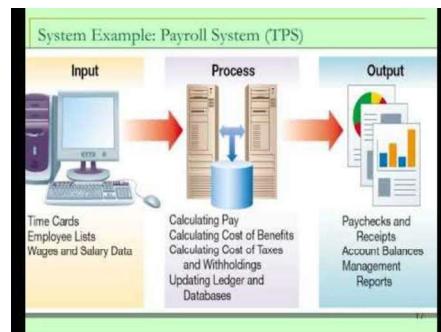
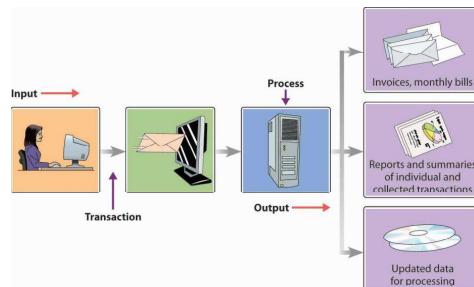
- An information system is a set of interrelated components that collect (or retrieve), process, store, and distribute information to support decision making and control in an organization.

Additional outcome:

- Managers and workers analyze problems, visualize complex subjects.
- Create new products.



Different types of information systems

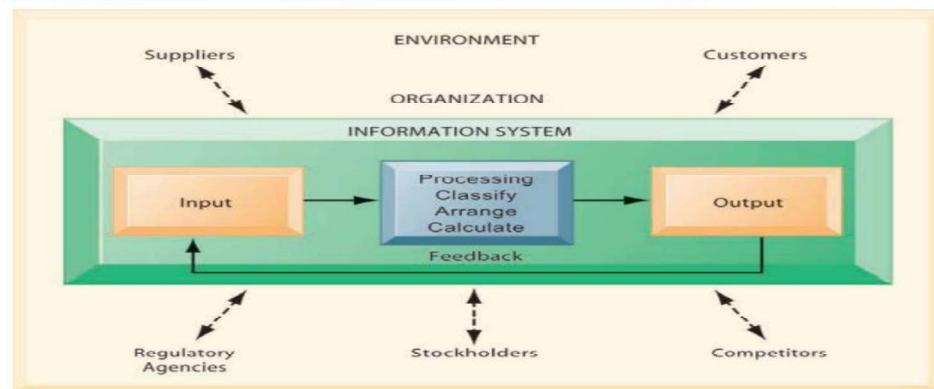


Functions of an Information System

- **Input** captures or collects raw data from within the organization or from its external environment.
- **Processing** converts this raw input into a meaningful form.
- **Output** transfers the processed information to the people who will use it or to the activities for which it will be used.
- **Feedback**, which is output that is returned to appropriate members of the organization to help them evaluate or correct the input stage.

Functions of an Information System

FIGURE 1.4 FUNCTIONS OF AN INFORMATION SYSTEM



An information system contains information about an organization and its surrounding environment. Three basic activities—input, processing, and output—produce the information organizations need. Feedback is output returned to appropriate people or activities in the organization to evaluate and refine the input. Environmental actors, such as customers, suppliers, competitors, stockholders, and regulatory agencies, interact with the organization and its information systems.

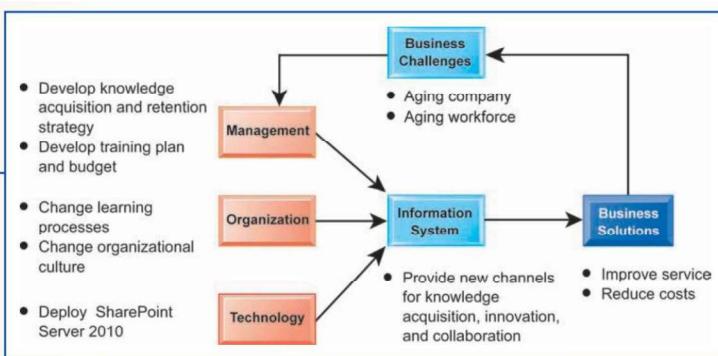
Computer Based Information Systems (CBIS)

- It is a data processing system into a high-quality information and can be used as tools that support decision-making, coordination and control as well as visualization and analysis.

Computer-based information systems

- Computer-based information systems** use computer technology to process raw data into meaningful information.
- There is a sharp distinction between a computer and a computer program on the one hand, and an information system on the other.
- Electronic computers and related software programs** are the technical foundation, the tools and materials, of modern information systems. Computers provide the equipment for storing and processing information.
- Computer programs, or software**, are sets of operating instructions that direct and control computer processing.

aging



ACTIVITY 1

DIMENSIONS OF INFORMATION SYSTEMS



- Using information systems effectively requires an understanding of the **organization, management, and information technology** shaping the systems.
- An information system creates value for the firm as an organizational and management solution to challenges posed by the environment.

what Information systems will be able to do?

- Increasing market share
- becoming the high-quality or low-cost production.
- developing new products
- increasing employee productivity

1. Organizational dimension of information system

Organization

- An organized group of people who have a common goal and work together.
- The key elements of an organization are its **people, structure, business processes, politics, and culture.**



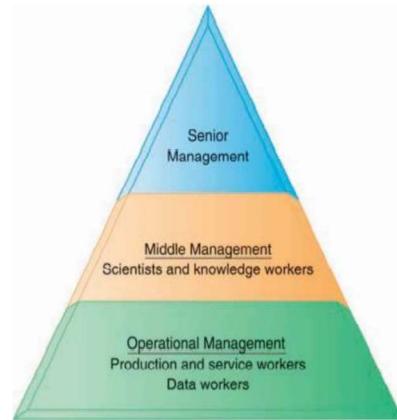
Organizational peoples

- Senior management
- Middle management
- Operational management
- Knowledge workers
- Data workers
- Production or service workers



Organizational structure

- Organizations have a structure that is composed of different levels and specialties.
- Their structures reveal a clear-cut division of labor. Authority and responsibility in a business firm are organized as a **hierarchy**, or a pyramid structure.
- The upper levels of the hierarchy consist of managerial, professional, and technical employees, whereas the lower levels consist of operational personnel



Organizational business process

- Business Process is a set of tasks that directly or indirectly help your business provide the products/services to the customer.
- organizations' business processes include formal rules that have been developed over a long time for accomplishing tasks. rules guide employees in a variety of procedures.

example of Business Process

Marketing agency processes can be a bit tricky as there is more qualitative output to be delivered. Here are the steps of an ad creation process:

Industry: Marketing
Company type: Ad agency
Process: Ad creation



1. Understanding client requirements
2. Brainstorming idea for the ad
3. Preparing a campaign
4. Pitching the idea to the client
5. Getting the approval
6. Making necessary changes
7. Providing the deliverables



Organizational politics and culture

- Parts of an organization's culture can always be found embedded in its information systems
- Culture can be defined as **the consistent organizational behaviors of employees and leaders** (norms).
- Organizational culture facilitates the achievement of an organization's strategic objectives.
- Organizational culture often mirrors the organization's core values and directly reflects the organization's leadership.
- Organizational politics is referred to the self-interest and agenda of an individual in an organization without any concern about its impact on the objective of the company to achieve its goals.

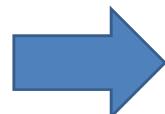
Management dimension of Information System

- Information technology can play a powerful role in helping managers to
 - Design and deliver new products and services
 - Redirecting and redesigning their organizations.
 - Make decisions
 - Formulate action plans to solve organizational problems.
- Managers set the organizational strategy for responding to those challenges.



3. Technology dimension of Information Technology

- Computer hardware** is the physical equipment used for input, processing, and output activities in an information system.
- Computer software** consists of the detailed, preprogrammed instructions that control and coordinate the computer hardware components in an information system.
- Data management technology** consists of the software governing the organization of data on physical storage media.
- Networking and telecommunications technology**, consisting of both physical devices and software, links the various pieces of hardware and transfers data from one physical location to another.



ACTIVITY 2

Information quality Dimensions

- High-quality decisions require high-quality information.



QUALITY DIMENSION	DESCRIPTION
Accuracy	Do the data represent reality?
Integrity	Are the structure of data and relationships among the entities and attributes consistent?
Consistency	Are data elements consistently defined?
Completeness	Are all the necessary data present?
Validity	Do data values fall within defined ranges?
Timeliness	Are data available when needed?
Accessibility	Are the data accessible, comprehensible, and usable?

Categories of information

- There are three main categories of business information. These are related to the purpose for which the information is utilized.
-



Types of Information that are required at Different Levels of Management

- **STRATEGIC INFORMATION**:- This relates long-term planning policies and is therefore of most interest to top management.
- **TACTICAL INFORMATION**:- This is of use in short-term planning, i.e. months rather than year, and is of more interest at departmental level
- **OPERATIONAL INFORMATION**:- This applies to the short-term, perhaps hourly, running of a department.

Questions

- Distinguish between data and information ?
- How are information systems transforming business, and why are they essential for running and managing a business today?
- What is an information system? How does it work? What are its management, organization, and technology components?

How are information systems transforming business, and why are they essential for running and managing a business today?

- Information systems are a foundation for conducting business today. In many industries, survival and the ability to achieve strategic business goals are difficult without extensive use of information technology.
- Businesses today use information systems to achieve six major objectives: **operational excellence; new products, services, and business models; customer/supplier intimacy; improved decision making; competitive advantage; and day-to-day survival**

What is an information system? How does it work?

- an information system collects, stores, and disseminates information from an organization's environment and internal operations to support organizational functions and decision making, communication, coordination, control, analysis, and visualization.
- Information systems transform raw data into useful information through three basic activities: input, processing, and output.

What are its management, organization, and technology components?

- The management dimension of information systems involves issues such as leadership, strategy, and management behavior.
- The technology dimension consists of computer hardware, software, data management technology, and networking/telecommunications technology (including the Internet).
- The organization dimension of information systems involves issues such as the organization's hierarchy, functional specialties, business processes, culture, and political interest groups



HNDIT1042 Information Management and Information Systems

Week2

Organizations and Management hierarchy Type of information (Strategic, Tactical, Operational)

WEEK 2

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Learning Objectives

- Define and describe business processes and their relationship to information systems.
- Evaluate the role played by systems serving the various levels of management in a business and their relationship to each other.
- Describe the information systems supporting the major business functions
- Explain how enterprise applications improve organizational performance.

what Information systems will be able to do?

- Increasing market share
- becoming the high-quality or low-cost producer.
- developing new products
- increasing employee productivity

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Business processes

- Business processes are the collection of activities required to produce a product or service.
- Every business can be seen as a collection of business processes.
- Many business processes are tied to a specific functional area.
- For example
 - the sales and marketing function is responsible for identifying customers,
 - the human resources function is responsible for hiring employees.

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Business Processes and Information Systems

- Examples of functional business processes

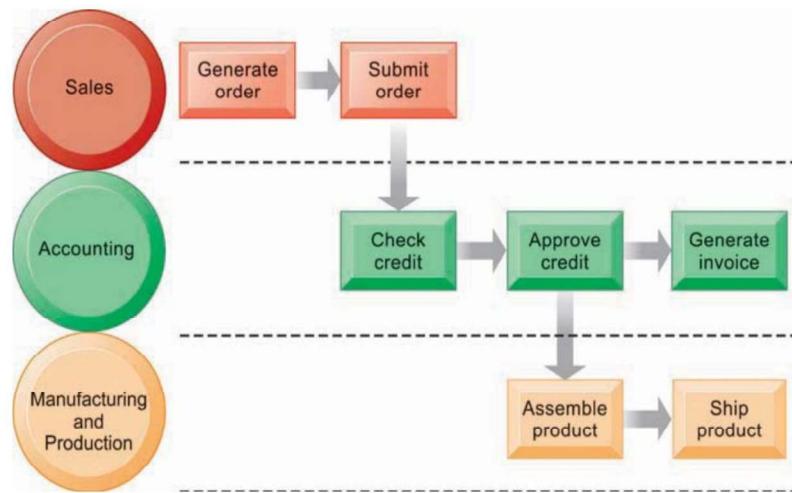
FUNCTIONAL AREA	BUSINESS PROCESS
Manufacturing and production	Assembling the product Checking for quality Producing bills of materials
Sales and marketing	Identifying customers Making customers aware of the product Selling the product
Finance and accounting	Paying creditors Creating financial statements Managing cash accounts
Human resources	Hiring employees Evaluating employees' job performance Enrolling employees in benefits plans

simple business process of fulfilling a customer order

- the sales department receives a sales order.
- The order passes first to accounting to ensure the customer can pay for the order either by a credit verification or request for immediate payment prior to shipping.
- Once the customer credit is established, the production department pulls the product from inventory or produces the product.
- Then the product is shipped.
- A bill or invoice is generated by the accounting department, and a notice is sent to the customer indicating that the product has shipped.
- The sales department is notified of the shipment and prepares to support the customer by answering calls or fulfilling warranty claims

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FIGURE 2.1 THE ORDER FULFILLMENT PROCESS

Fulfilling a customer order involves a complex set of steps that requires the close coordination of the sales, accounting, and manufacturing functions.

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How do information systems improve business processes?

- Information systems automate many steps in business processes that were formerly performed manually
 - such as checking a client's credit,
 - generating an invoice and shipping order

Types of Information Systems

Three main categories of information systems serve different organizational levels:

- Operational-level systems: support operational managers, keeping track of the elementary activities and transactions
- Management-level systems: serve the monitoring, controlling, decision-making, and administrative activities
- Strategic-level systems: help senior management tackle and address strategic issues

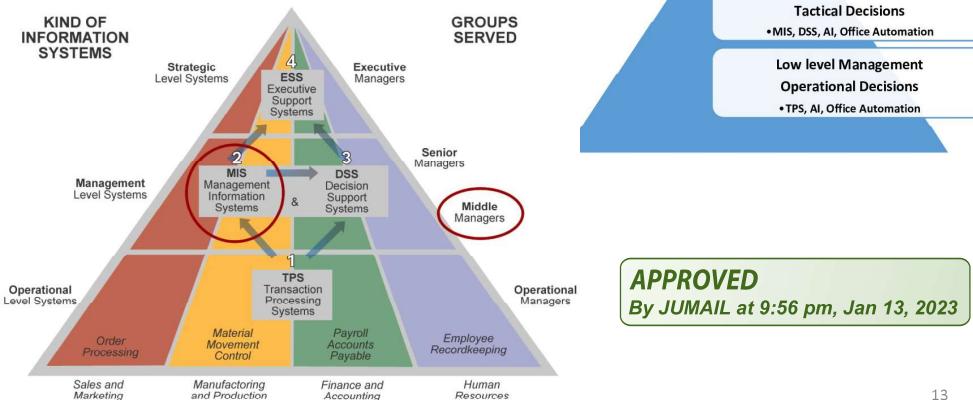
TYPES OF INFORMATION SYSTEMS

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SYSTEMS FOR DIFFERENT MANAGEMENT GROUPS

The four major types of information systems



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Transaction Processing Systems

- keep track of the elementary activities and transactions of the organization.
 - sales, receipts, cash deposits, payroll, credit decisions, and the flow of materials in a factory.
- Performs and records the daily routine transactions necessary to conduct business
 - sales order entry, hotel reservations, payroll, employee record keeping, and shipping.
- Answer routine questions and to track the flow of transactions through the organization.
 - Eg: How many parts are in inventory? What happened to Mr. Smith's payment? To answer these kinds of questions

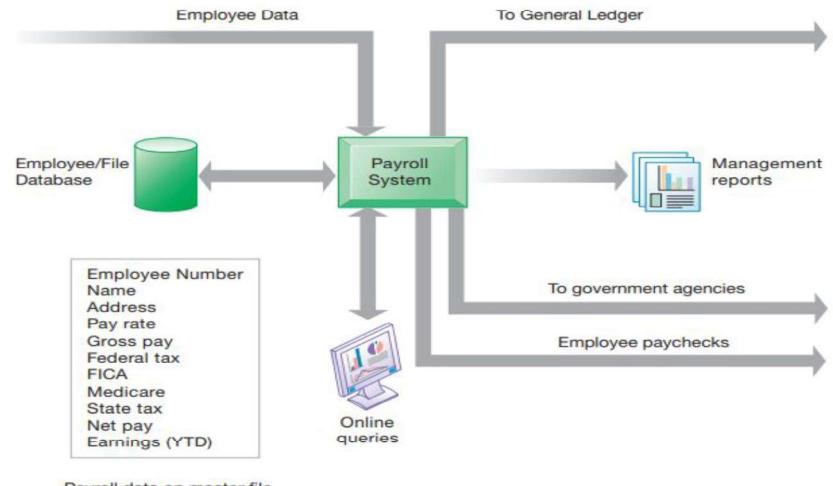
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payroll system

- A payroll system keeps track of money paid to employees. An employee time sheet with the employee's name, social security number, and number of hours worked per week represents a single transaction for this system. Once this transaction is input into the system, it updates the system's master file that permanently maintains employee information for the organization. The data in the system are combined in different ways to create reports of interest to management and government agencies and to send paychecks to employees.

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FIGURE 2.2 A PAYROLL TPS



A TPS for payroll processing captures employee payment transaction data (such as a time card). System outputs include online and hard-copy reports for management and employee paychecks.

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Types of Information Systems

Business intelligence

- Data and software tools for organizing and analyzing data

Used to help managers and users make informed decisions

- Business intelligence systems
 - Management information systems
 - Decision support systems
 - Executive support systems

SYSTEMS FOR BUSINESS INTELLIGENCE FOR MIDDLE MANAGEMENT

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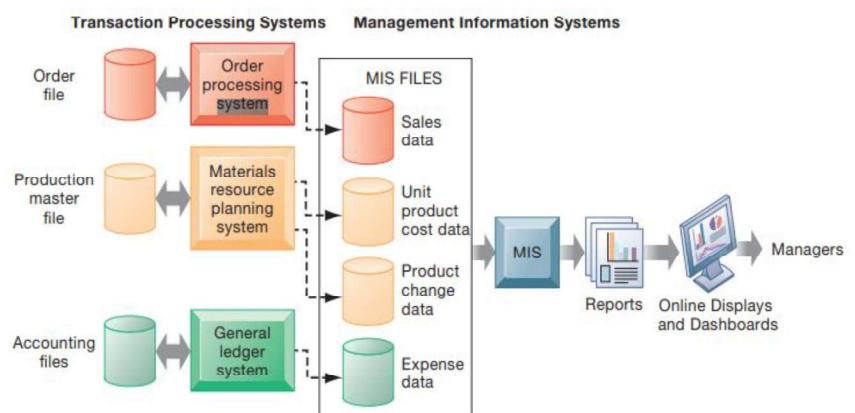
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management information systems (MIS)

- Summarize and report on the company's basic operations using data supplied by transaction processing systems.
- serving middle management.
- Provide middle managers with reports on the organization's current performance.
- Inflexible
- Have little analytical capability.
- Use simple routines, such as summaries and comparisons.

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FIGURE 2.3 HOW MANAGEMENT INFORMATION SYSTEMS OBTAIN THEIR DATA FROM THE ORGANIZATION'S TPS



In the system illustrated by this diagram, three TPS supply summarized transaction data to the MIS reporting system at the end of the time period. Managers gain access to the organizational data through the MIS, which provides them with the appropriate reports.

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Sample report

Consolidated Consumer Products Corporation Sales by Product and Sales Region: 2011

PRODUCT CODE	PRODUCT DESCRIPTION	SALES REGION	ACTUAL SALES	PLANNED	ACTUAL versus PLANNED
4469	Carpet Cleaner	Northeast	4,066,700	4,800,000	0.85
		South	3,778,112	3,750,000	1.01
		Midwest	4,867,001	4,600,000	1.06
		West	4,003,440	4,400,000	0.91
TOTAL			16,715,253	17,550,000	0.95
5674	Room Freshener	Northeast	3,676,700	3,900,000	0.94
		South	5,608,112	4,700,000	1.19
		Midwest	4,711,001	4,200,000	1.12
		West	4,563,440	4,900,000	0.93
TOTAL			18,559,253	17,700,000	1.05

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Decision Support System

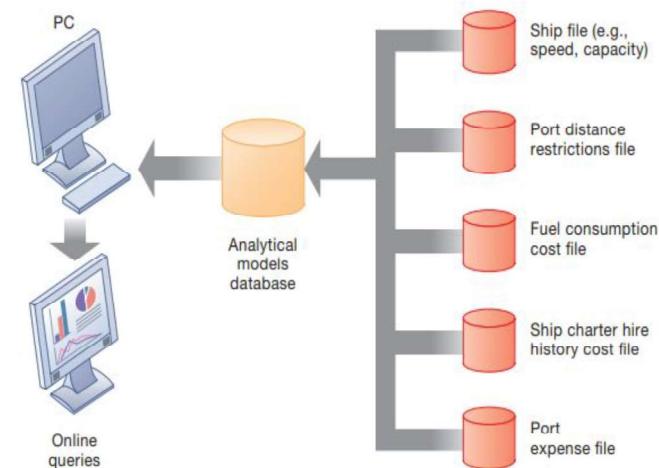
- DSS use internal information from TPS and MIS.
- Serve middle management
- Support non-routine decision making
 - Example: What is the impact on production schedule if December sales doubled?

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DSS for Voyage-estimating system

- The voyage-estimating system of a large global shipping company that transports bulk cargoes of coal, oil, ores, and finished products. The firm owns some vessels, charters others, and bids for shipping contracts in the open market to carry general cargo. A voyage estimating system calculates financial and technical voyage details. Financial calculations include ship/time costs (fuel, labor, capital), freight rates for various types of cargo, and port expenses. Technical details include a myriad of factors, such as ship cargo capacity, speed, port distances, fuel and water consumption, and loading patterns (location of cargo for different ports). The system can answer questions such as the following: Given a customer delivery schedule and an offered freight rate, which vessel should be assigned at what rate to maximize profits? What is the optimal speed at which a particular vessel can optimize its profit and still meet its delivery schedule? What is the optimal loading pattern for a ship bound for the U.S. West Coast from Malaysia? Figure 2.5 illustrates the DSS built for this company.

FIGURE 2.5 VOYAGE-ESTIMATING DECISION-SUPPORT SYSTEM



This DSS operates on a powerful PC. It is used daily by managers who must develop bids on shipping contracts.

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Executive support systems (ESS)

- Support senior management.
- Address non-routine decisions requiring judgment, evaluation, and insight because there is no agreed-on procedure for arriving at a solution.
- Present graphs and data from many sources through an interface.
- Incorporate data about external events (such as new tax laws or competitors,) as well as summarized information from internal MIS and DSS.
- They filter, compress, and track critical data, displaying the data of greatest importance to senior managers.
- Systems include business intelligence analytics for analyzing trends, forecasting, and “drilling down” to data at greater levels of detail.

ESS example

- the CEO of Leiner Health Products, the largest manufacturer of private-label vitamins and supplements in the United States, has an ESS that provides on his desktop a minute-to-minute view of the firm's financial performance as measured by working capital, accounts receivable, accounts payable, cash flow, and inventory. The information is presented in the form of a digital dashboard, which displays on a single screen graphs and charts of key performance indicators for managing a company. Digital dashboards are becoming an increasingly popular tool for management decision makers.

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HNDIT1042 Information Management and Information Systems

Week3

Organizations and Management hierarchy Type of information (Strategic, Tactical, Operational)-Continue.....

WEEK 3

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Enterprise Application

- Because of the organizational growth and acquisition of smaller firms system become collection of systems. Implement enterprise application to getting them as a single system.

ENTERPRISE APPLICATIONS

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Advantages

- Businesses become more flexible and productive by coordinating their business processes more closely and integrating groups of processes.
- Efficient management of resources and customer service.

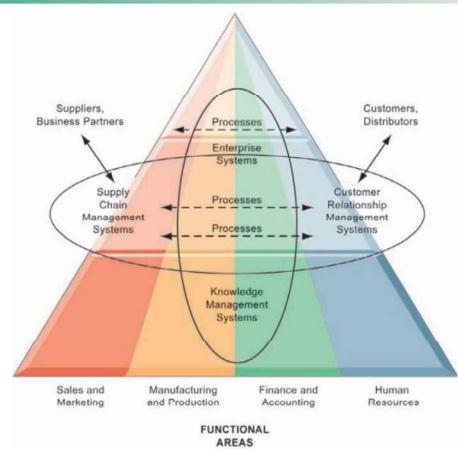
Four major enterprise applications

1. Enterprise systems
2. Supply chain management systems
3. Customer relationship management systems
4. Knowledge management systems.

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FIGURE 2.6 ENTERPRISE APPLICATION ARCHITECTURE



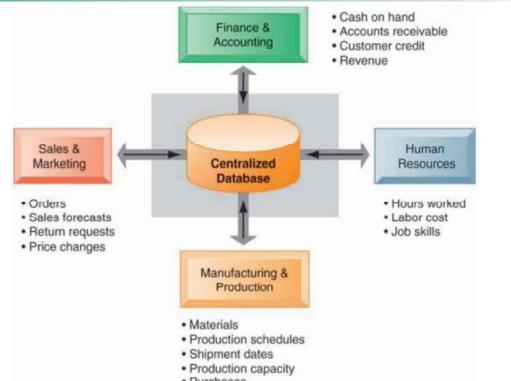
1. Enterprise Systems

- enterprise systems, also known as enterprise resource planning (ERP) systems, to integrate business processes in manufacturing and production, finance and accounting, sales and marketing, and human resources into a single software system.
- Information that was previously fragmented in many different systems is stored in a single comprehensive data repository where it can be used by many different parts of the business

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FIGURE 9.1 HOW ENTERPRISE SYSTEMS WORK



Enterprise systems feature a set of integrated software modules and a central database that enables data to be shared by many different business processes and functional areas throughout the enterprise.

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Example for ERP

- when a customer places an order, the order data flow automatically to other parts of the company that are affected by them.
- The order transaction triggers the **warehouse** to pick the ordered products and schedule shipment.
- The warehouse informs the **factory** to replenish whatever has been depleted.
- The **accounting department** is notified to send the customer an invoice.
- Customer service representatives** track the progress of the order through every step to inform customers about the status of their orders.
- Managers are able to use firmwide information to make more precise and timely decisions about daily operations and longer-term planning.

2. Supply chain management systems

- Help manage relationships with their suppliers.
- These systems help suppliers, purchasing firms, distributors, and logistics companies share information about orders, production, inventory levels, and delivery of products and services
- The ultimate objective is to get the right amount of their products from their source to their point of consumption in the least amount of time and at the lowest cost.

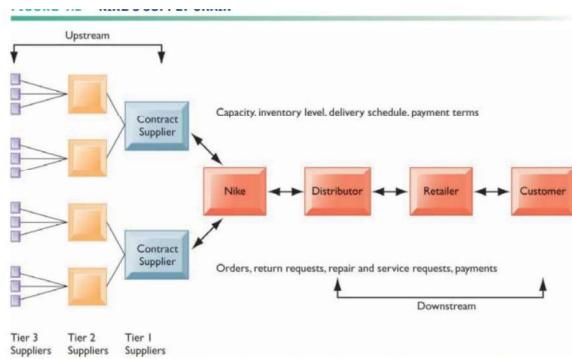
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Eg: the supply chain for Nike sneakers

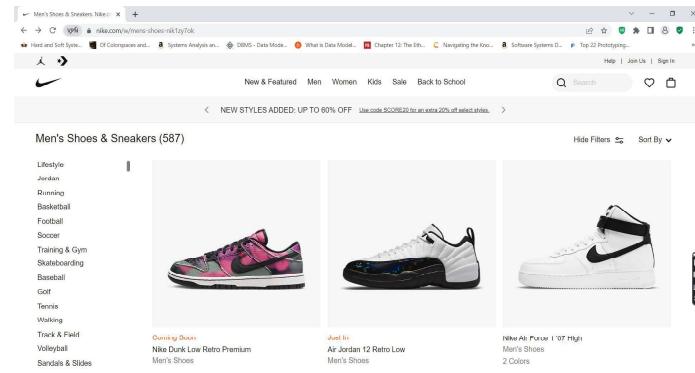
- Nike designs, markets, and sells sneakers, socks, athletic clothing, and accessories throughout the world.
- Its primary suppliers are contract manufacturers with factories in China, Thailand, Indonesia, Brazil, and other countries.
- These companies fashion Nike's finished products.
- Nike's contract suppliers do not manufacture sneakers from scratch. They obtain components for the sneakers—the laces, eyelets, uppers, and soles—from other suppliers and then assemble them into finished sneakers.
- These suppliers in turn have their own suppliers. For example, the suppliers of soles have suppliers for synthetic rubber, suppliers for chemicals used to melt the rubber for molding, and suppliers for the molds into which to pour the rubber.
- Suppliers of laces have suppliers for their thread, for dyes, and for the plastic lace tips.

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- Chart illustration of Nike's supply chain for sneakers; it shows the flow of information and materials among suppliers, Nike, Nike's distributors, retailers, and customers. Nike's contract manufacturers are



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Advantages

- Increase firm profitability by lowering the costs of moving and making products.
- Enabling managers to make better decisions about how to organize and schedule sourcing, production, and distribution.

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3. Customer relationship management systems

- (CRM) systems to help manage their relationships with their customers.
- CRM systems provide information to coordinate all of the business processes that deal with customers in sales, marketing, and service to optimize revenue, customer satisfaction, and customer retention.

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Advantages

- This information helps firms identify, attract, and retain the most profitable customers;
- provide better service to existing customers;
- increase sales.

CRM..

- CRM capture and integrate customer data from all over the organization, consolidate the data, analyze the data, and then distribute the results to various systems and **customer touch points** across the enterprise.

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Touch point

- A touch point (also known as a contact point) is a method of interaction with the customer.

Eg: telephone, e-mail, customer service desk, conventional mail, Facebook, Twitter, Web site, wireless device, or retail store.

FIGURE 9.6 CUSTOMER RELATIONSHIP MANAGEMENT (CRM)



CRM systems examine customers from a multifaceted perspective. These systems use a set of integrated applications to address all aspects of the customer relationship, including customer service, sales, and marketing.

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Good CRM systems provide data and analytical tools for answering questions such as these:

- What is the value of a particular customer to the firm over his or her lifetime?
- Who are our most loyal customers?
- It can cost six times more to sell to a new customer than to an existing customer.
- Who are our most profitable customers?
- What do these profitable customers want to buy?

4. Knowledge Management Systems

- Have better knowledge about how to create, produce, and deliver products and services.
- This firm knowledge is unique, difficult to imitate, and can be leveraged into long-term strategic benefits.
- Knowledge management systems (KMS) enable organizations to better manage processes for capturing and applying knowledge and expertise.
- These systems collect all relevant knowledge and experience in the firm, and make it available wherever and whenever it is needed to improve business processes and management decisions.

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1. enterprise-wide knowledge management systems

- Three major types of knowledge management systems:
 1. enterprise-wide knowledge management systems
 2. knowledge work systems
 3. intelligent techniques

- General-purpose firmwide efforts to collect, store, distribute, and apply digital content and knowledge.
- These systems include capabilities for searching for information, storing both structured and unstructured data, and locating employee expertise within the firm.
- supporting technologies are:
 - portal
 - search engines
 - collaboration and social business tools
 - learning management systems.

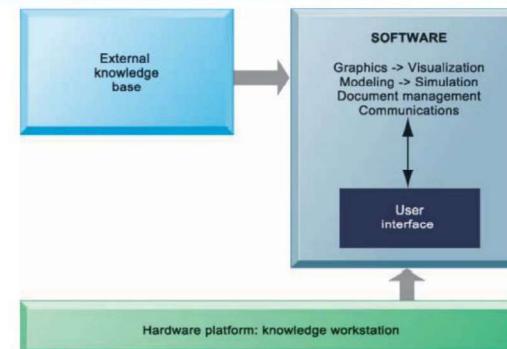
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2. Knowledge work systems (KWS)

- Specialized systems built for engineers, scientists, and other knowledge workers charged with discovering and creating new knowledge for a company

FIGURE 11.4 REQUIREMENTS OF KNOWLEDGE WORK SYSTEMS



Knowledge work systems require strong links to external knowledge bases in addition to specialized hardware and software.

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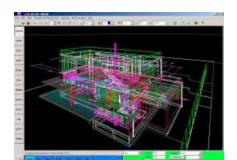
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EXAMPLES OF KNOWLEDGE WORK SYSTEMS

- CAD systems
- virtual reality systems for simulation and modeling
- financial workstations.

CAD

- Computer-aided design (CAD) automates the creation and revision of designs, using computers and sophisticated graphics software.



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virtual reality systems for simulation and modeling

- Virtual reality systems have visualization, rendering, and simulation capabilities that go far beyond those of conventional CAD systems.



example

- Ford Motor Company has been using virtual reality to help design its vehicles.
- In one example of Ford's Immersive Virtual Environment, a designer was presented with a car seat, steering wheel, and blank dashboard.
- Wearing virtual reality glasses and gloves with sensors, the designer was able to "sit" in the seat surrounded by the vehicle's 3-D design to experience how a proposed interior would look and feel. The designer would be able to identify blind spots or see if knobs were in an awkward place.
- Ford's designers could also use this technology to see the impact of a design on manufacturing.

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Augmented reality

- It is a related technology for enhanced visualization.
- AR provides a live direct or indirect view of a physical real-world environment whose elements are augmented by virtual computer-generated imagery.
- The user is grounded in the real physical world, and the virtual images are merged with the user's view to create the augmented display.



Virtual Reality Modeling Language (VRML).

- VRML is a set of specifications for interactive, 3-D modeling on the World Wide Web that can organize multiple media types, including animation, images, and audio to put users in a simulated real-world environment.
- VRML is platform independent, operates over a desktop computer, and requires no special bandwidth.



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example



- What Is the Difference Between AR and VR?

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financial workstations

- The financial industry is using specialized investment workstations such as Bloomberg Terminals to leverage the knowledge and time of its brokers, traders, and portfolio managers.



The **Bloomberg Terminal** is a computer software system provided by the **financial data vendor Bloomberg L.P.** that enables professionals in the financial service sector and other industries to access Bloomberg Professional Services through which users can monitor and analyze real-time financial **market data** and place trades on the **electronic trading platform**.

35

36

3. intelligent techniques

- Artificial intelligence and database technology provide a number of intelligent techniques that organizations can use to capture individual and collective knowledge and to extend their knowledge base.
 - Expert systems, case-based reasoning,
 - fuzzy logic are used for capturing tacit knowledge.
 - Neural networks and data mining are used for knowledge discovery.

37

38



END

39

Strategic Business Objectives of Information System



HNDIT1042 Information Management and Information Systems

- Increasing market share
- becoming the high-quality or low-cost producer
- developing new products
- Increasing employee productivity

1

2

Six strategic business objectives:

- operational excellence;
- new products, services, and business models;
- customer and supplier intimacy;
- improved decision making;
- competitive advantage;
- survival.

1. operational excellence

- Businesses continuously seek to improve the efficiency of their operations in order to achieve higher profitability.
- **Information systems and technologies support to**
 - managers for achieving higher levels of efficiency and productivity in business operations
 - changes in business practices and management behavior.

3

4

example



- Walmart, the largest retailer on earth, exemplifies the power of information systems coupled with state of the art business practices and supportive management to achieve world-class operational efficiency.
- In fiscal year 2016, Walmart achieved \$499 billion in sales—nearly one-tenth of retail sales in the United States—in large part because of its Retail Link system, which digitally links its suppliers to every one of Walmart's stores.
- As soon as a customer purchases an item, the supplier monitoring the item knows to ship a replacement to the shelf. Walmart is the most efficient retail store in the industry, achieving sales of more than \$600 per square foot, compared with its closest competitor, Target, at \$425 a square foot and other large general merchandise retail firms producing less than \$200 a square foot.

5

2. new products, services, and business models

- Information systems and technologies are a major enabling tool for firms to create new products and services as well as entirely new business models.
- A business model describes how a company produces, delivers, and sells a product or service to create wealth.

6

example

- Today's music industry is vastly different from the industry a decade ago. Apple Inc. transformed an old business model of music distribution based on vinyl records, tapes, and CDs into an online, legal distribution model based on its own iPod technology platform.
- Apple has prospered from a continuing stream of innovations, including the iTunes music service, the iPad, and the iPhone.

7

3. Customer and Supplier Intimacy

- When a business really knows its customers and serves them well, the customers generally respond by returning and purchasing more.
- This raises revenues and profits.
- Business engages its suppliers, the better the suppliers can provide vital inputs. This lowers costs.

8

example

- The Mandarin Oriental hotel group which operates hotels in Asia, Europe, and the Americas, exemplifies the use of information systems and technologies to achieve customer intimacy.
- These hotels use computers to keep track of guests' preferences.
- When a customer arrives at one of these hotels, the system automatically changes the room conditions, such as dimming the lights, setting the room temperature, or selecting appropriate music, based on the customer's digital profile.
- The hotels also analyze their customer data to identify their best customers and to develop individualized marketing campaigns based on customers' preferences.



9

example2

- Large national retailers in Europe, the U.S., and Asia exemplify the use of information systems to enable supplier and customer intimacy.
- Every time a dress shirt is bought at a store the record of the sale appears immediately on computers of suppliers like TAL Apparel Ltd. in Hong Kong, a contract manufacturer that produces one in eight dress shirts sold in the United States and Europe.
- TAL runs the numbers through a computer model it developed and then decides how many replacement shirts to make and in what styles, colors, and sizes.
- TAL then sends the shirts directly to retail stores, completely bypassing retailers' warehouses (European Commission, 2014).

10

4. Improved Decision Making

- Many business managers operate in an information fog bank, never really having the right information at the right time to make an informed decision.
- Instead, managers rely on forecasts, best guesses, and luck.
- In the past decade, information systems and technologies have made it possible for managers to use real-time data from the marketplace when making decisions.

END



Information System Strategies

Information System Strategies for Dealing with Competitive Forces

- There are four generic strategies, each of which often is enabled by using information technology and systems:
 1. low-cost leadership
 2. product differentiation
 3. focus on market niche
 4. strengthening customer and supplier intimacy.

1

2

1. low-cost leadership



- Supermarkets and large retail stores such as Walmart use sales data captured at the checkout counter to determine which items have sold and need to be reordered. Walmart's continuous replenishment system transmits orders to restock directly to its suppliers.
- The system enables Walmart to keep costs low while fine-tuning its merchandise to meet customer demands.

low-cost leadership

- Use information systems to achieve the lowest operational costs and the lowest prices.
-

3

4

- How can you establish a competitive advantage in costs?
 - High asset utilization
 - Low direct & indirect operating costs
 - Value chain control

activity

- Go through this web site and identify **the best real-world Cost Leadership examples** to help us understand the concept.
 - <https://mktoolboxsuite.com/cost-leadership-examples/>

5

6

2. Product differentiation

- Use information systems to enable new products and services or greatly change the customer convenience in using your existing products and services.
 - Eg: Google continuously introduces new and unique search services on its website, such as Google Maps.

activity

- Visit this site and identify how to make differentiation in each and every industry
 - <https://mktoolboxsuite.com/differentiation-strategy-examples/>

7

8

3. Niche market

- A niche market is the subset of the market on which a specific product is focused.
- The market niche defines the product features aimed at satisfying
 - Price (luxury, moderate, discount)
 - Demographics (gender, age, income level, education level)
 - Level of quality (premium, handmade, economical)
 - Psychographics (values, interests, attitudes)
 - Geographics (residents of a certain country, city, or even neighborhood)
- It is also a small market segment

9

Focus on Market Niche

- Use IS to enable a specific market focus and serve this narrow target market better than competitors.

10

niche markets and product idea

- Conscious consumers
 - consumers were willing to change their shopping habits to reduce environmental impact.
- The rise of the conscious consumer has paved the way for vegan, eco-friendly, and cruelty-free variations of conventional products.

11

Bee's Wrap

- to replace plastic wrap with options made from beeswax. This natural alternative to food storage is not only environmentally friendly but also more cost effective for consumers because it's reusable.
-



Focus on Market Niche ..

- Information systems support this strategy by producing and analyzing data for finely tuned sales and marketing techniques.
- Information systems enable companies to analyze
 - customer buying patterns
 - Tastes
 - preferences closely

13

Focus on Market Niche ..

- efficiently pitch advertising and marketing campaigns to smaller and smaller target markets.
- The data come from a range of sources
 - credit card transactions,
 - demographic data
 - purchase data from checkout counter scanners at supermarkets and retail stores
 - data collected when people access and interact with web sites.
- Sophisticated software tools find patterns in these large pools of data and infer rules from them to guide decision making.
- Analysis of such data drives one-to-one marketing that creates personal messages based on individualized preferences.

14

A screenshot of an online shopping website. At the top, there's a navigation bar with various links. Below it, a search bar and a shopping cart icon are visible. A prominent orange circle highlights a 'Be Friends' button on a social media-style overlay. The main content area shows product categories like Air Pumps & Accessories, Shrink Wrap, Groceries, etc., with small thumbnail images. At the bottom, there's a 'Just For You' section with recommended items.

A screenshot of an eBay listing for a 'Samsung Galaxy S10 White Sprint ATT T-Mobile Verizon Factory Unlocked - OPEN BOX'. The listing includes a large image of the phone, seller information (bobat wireless), and purchase details. An orange circle highlights the 'Add to Watchlist' button in the right sidebar.

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4. Strengthen Customer and Supplier Intimacy

- A business can also use information systems to apply the strategy of strengthening customer and supplier intimacy.
- This strategy creates strong linkage between the company and their suppliers and/or customers.
- It also increases loyalty to a business and creates stronger relationships.
- Customers and suppliers will feel more valued by the company as well.

example



TOYOTA

- Toyota, along with other automobile companies, allows their suppliers access to production schedules.
- This makes it easier for suppliers to know when to ship parts and supplies without having to communicate back and forth about fulfilling orders.
- This strategy makes the production process run smoother and faster because the supplier can produce the goods they need and ship them to Toyota just in time for their production of the vehicles.

Amazon employs the customer intimacy strategy

- Amazon tracks their account users preferences and recommends certain products that customer may like based on their recent searches and purchases.
- Amazon also recommends products based on if another customer bought the same or a similar product to the user and what the other customer purchased with it.



TABLE 3.4 FOUR BASIC COMPETITIVE STRATEGIES

STRATEGY	DESCRIPTION	EXAMPLE
Low-cost leadership	Use information systems to produce products and services at a lower price than competitors while enhancing quality and level of service	Walmart
Product differentiation	Use information systems to differentiate products, and enable new services and products	Uber, Nike, Apple
Focus on market niche	Use information systems to enable a focused strategy on a single market niche; specialize	Hilton Hotels, Harrah's
Customer and supplier intimacy	Use information systems to develop strong ties and loyalty with customers and suppliers	Toyota Corporation, Amazon



What is Strategic Planning Process

- the method used by organizations to develop plans to achieve overall, long-term goals.
- it helps you create a roadmap for which strategic goals you should make an effort to achieve, and which initiatives are less useful to the business.
- Helping you understand your internal and external strategy.

21

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The process of strategic planning is the steps you take as an organization to determine:

- Your organization's management (Vision)
- What and for whom are you going to do (Mission)
- How to measure and guide your strategy towards where you want to be (Objectives)

23

Why?

- To get your team on the same page and align with the vision, mission, and goals of your organization;
- It is maximizing your organization's resources to avoid wasting time and money on unimportant projects or activities;
- To understand the trends and scenarios in the industry that might affect your organization in the coming years;
- To Develop an action schedule for keeping you and your staff on track and to be responsible for the outcomes

24

5 steps

- Step 1: Clarify Your Strategic Position

- Considering both internal and external sources, get the right stakeholders involved right from the start.
- Identify main competitive issues by talking to the company's managers, collecting input from clients, and gathering business and consumer data to get a better view of the market and customer role.

25



26

2. Prioritize Your Objectives

- After the current market position has been established, objectives that will help meet expectations. Specific objectives will be in accordance with the mission and direction of the organization

27

Step 3: Formulate A Strategy

- This phase involves identifying the strategies required to accomplish the goals and mapping out a schedule and effective communication of responsibilities.

28

Step 4: Implement and Manage The Strategy

- Effective implementation of the strategy is key to the growth of the business enterprise. This phase is the action stage for the strategic management process. In case the cumulative strategy does not work with the existing operations of the business, a new structure and strategy should be installed at the beginning of this phase.

29

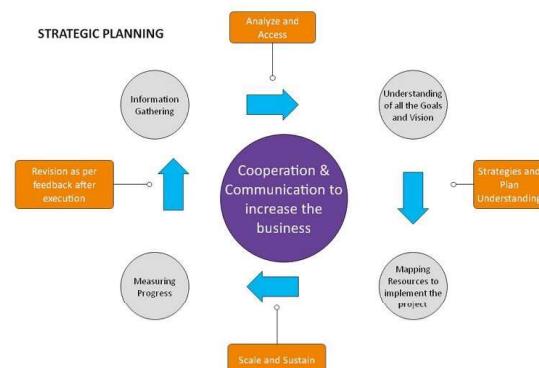
Step 5: Monitor and Evaluate Strategy

- The strategic plans and priorities will be checked and revised once a year to incorporate with new business adjustments, and ensure targets are based on the organization's constantly-changing environment.
- Strategy assessment and control actions include performance measurements, consistent review of internal and external issues and, where necessary, corrective actions. Any successful strategic evaluation starts with the definition of the parameters to be measured.

30

Examples of Strategic Planning Process

- This strategic planning diagram shows the procedure from understanding the goals and missions to analyze the strategic plan.



31

TABLE 3.5 IMPACT OF THE INTERNET ON COMPETITIVE FORCES AND INDUSTRY STRUCTURE

COMPETITIVE FORCE	IMPACT OF THE INTERNET
Substitute products or services	Enables new substitutes to emerge with new approaches to meeting needs and performing functions
Customers' bargaining power	Availability of global price and product information shifts bargaining power to customers
Suppliers' bargaining power	Procurement over the Internet tends to raise bargaining power over suppliers; suppliers can also benefit from reduced barriers to entry and from the elimination of distributors and other intermediaries standing between them and their users
Threat of new entrants	Internet reduces barriers to entry, such as the need for a sales force, access to channels, and physical assets; it provides a technology for driving business processes that makes other things easier to do
Positioning and rivalry among existing competitors	Widens the geographic market, increasing the number of competitors and reducing differences among competitors; makes it more difficult to sustain operational advantages; puts pressure to compete on price

32

END

An effective information system



Database and Information Management

- An effective information system provides users with accurate, timely, and relevant information.
- **Accurate** information is free of errors.
- Information is **timely** when it is available to decision makers when it is needed.
- Information is **relevant** when it is useful and appropriate for the types of work and decisions that require it.

1

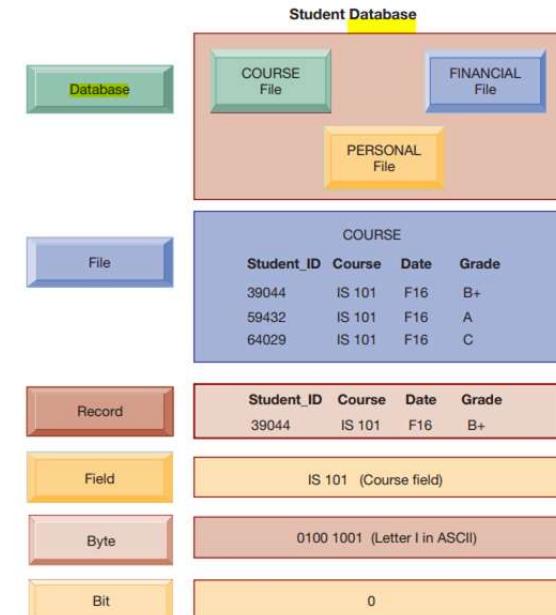
2

File Organization

- A **bit** represents the smallest unit of data a computer can handle.
- A group of bits, called a **byte**, represents a single character, which can be a letter, a number, or another symbol.
- A grouping of characters into a word, a group of words, or a complete number (such as a person's name or age) is called a **field**.
- A group of related fields comprises a **record**;
- a group of records of the same type is called a **file** .
- A group of related files makes up a **database**.

3

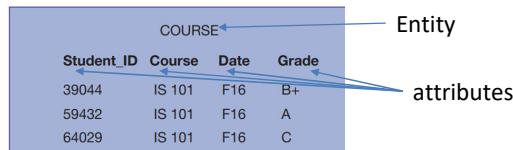
FIGURE 6.1 THE DATA HIERARCHY



4

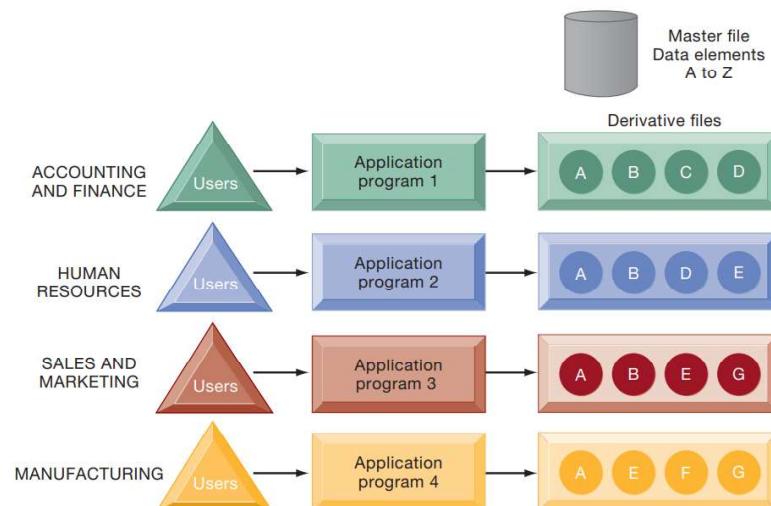
Database Concepts

- An **entity** is a person, place, thing, or event on which we store and maintain information.
- Each characteristic or quality describing a particular entity is called an **attribute**.



5

FIGURE 6.2 TRADITIONAL FILE PROCESSING



The use of a traditional approach to file processing encourages each functional area in a corporation

6

Problems with the Traditional File

1. data redundancy and inconsistency
2. program-data dependence
3. inflexibility
4. poor data security
5. an inability to share data among applications.

1. Data Redundancy and Inconsistency Data

- Data redundancy presence of duplicate data in multiple data files so that the same data are stored in more than one place or location.
- Data redundancy wastes storage resources and also leads to data inconsistency, where the same attribute may have different values.

7

8

example

Emp_code	Emp_name	Emp_experience	Dept_id	Dep_manager
emp001	K.Saman	2	Dep22	Ranil
emp002	R.Sunil	5	Dep18	Sunil
emp003	N. Shafeen	3	Dep17	Anil
emp004	P.Kumara	1	Dep_22	Ranil
emp005	R.Perera	4	Dep18	Sunil
emp006	S.Gamage	2	Dep19	Malki

same data are stored in more than one place or location

same attribute may have different values

Inventory

Item_ID	Item	Stock
39044	IS101	Extra Large
59435	IS102	Small

FactoryStock

ItemID	Name	Size
39044	Shirt	XL
59435	Short	S

the sales, inventory, and manufacturing systems of a clothing retailer might use different codes to represent clothing size. One system might represent clothing size as “extra large,” whereas another might use the code “XL” for the same purpose.

10

2. Program-Data Dependence

- Program-data dependence refers to the coupling of data stored in files and the specific programs required to update and maintain those files such that changes in programs require changes to the data.

3. Lack of Flexibility

- A traditional file system can deliver routine scheduled reports after extensive programming efforts, but it cannot deliver ad hoc reports or respond to unanticipated information requirements in a timely fashion.

4. Poor Security

- Because there is little control or management of data, access to and dissemination of information may be out of control.
- Management may have no way of knowing who is accessing or even making changes to the organization's data.

13

5. Lack of Data Sharing and Availability

- Because pieces of information in different files and different parts of the organization cannot be related to one another, it is virtually impossible for information to be shared or accessed in a timely manner.
- Information cannot flow freely across different functional areas or different parts of the organization.

14

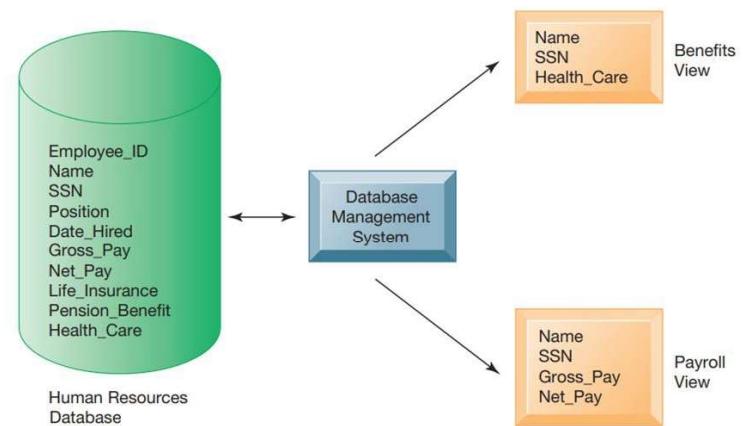


A database management system (DBMS)

- A database management system (DBMS) is a software designed to define, manipulate, retrieve and manage data in a centralized database
 - The DBMS acts as an interface between application programs and the physical data files.
 - When the application program calls for a data item, such as gross pay, the DBMS finds this item in the database and presents it to the application program.

15

FIGURE 6.3 HUMAN RESOURCES DATABASE WITH MULTIPLE VIEWS



A single human resources database provides many different views of data, depending on the information requirements of the user. Illustrated here are two possible views, one of interest to a benefits specialist and one of interest to a member of the company's payroll department.

16

How a DBMS Solves the Problems of the Traditional File Environment

- A DBMS reduces data redundancy and inconsistency by minimizing isolated files in which the same data are repeated.
- Even if the organization maintains some redundant data, using a DBMS eliminates data inconsistency because the DBMS can help the organization ensure that every occurrence of redundant data has the same values.

17

Employee dept

example

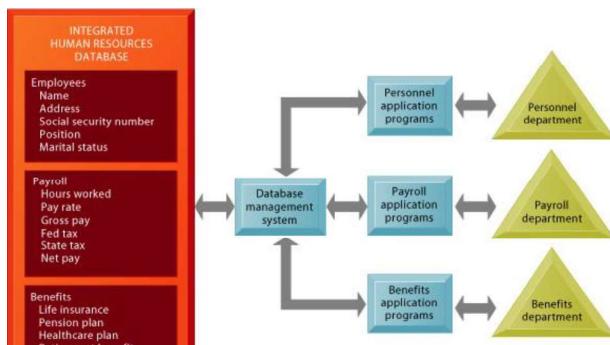
Employee	Emp_code	Emp_name	Emp_experience	Dept_id	Dep_manager
	emp001	K.Saman	2	Dep22	Ranil
	emp002	R.Sunil	5	Dep18	Sunil
	emp003	N. Shafeen	3	Dep17	Anil
	emp004	P.Kumara	1	Dep_22	Ranil
	emp005	R.Perera	4	Dep18	Sunil
	emp006	S.Gamage	2	Dep19	Malki

Employee	Emp_code	Emp_name	Emp_experience	Department	Dept_id	Dep_manager
	emp001	K.Saman	2		Dep22	Ranil
	emp002	R.Sunil	5	Math's	Dep18	Sunil
	emp003	N. Shafeen	3	Science	Dep17	Anil
	emp004	P.Kumara	1	Economy	Dep19	Malki
	emp005	R.Perera	4			
	emp006	S.Gamage	2			

18

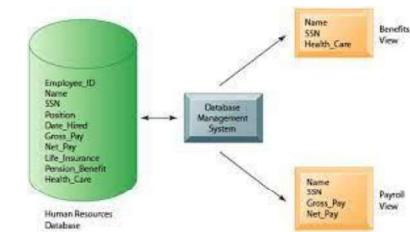
- The DBMS uncouples programs and data, enabling data to stand on their own.

Access and availability of information will be increased and program development and maintenance costs reduced because users and programmers can perform ad hoc queries of the database for many simple applications without having to write complicated programs.



19

- The DBMS enables the organization to centrally manage data, their use, and security.
- Data sharing throughout the organization is easier because the data are presented to users as being in a single location rather than fragmented in many different systems and files.



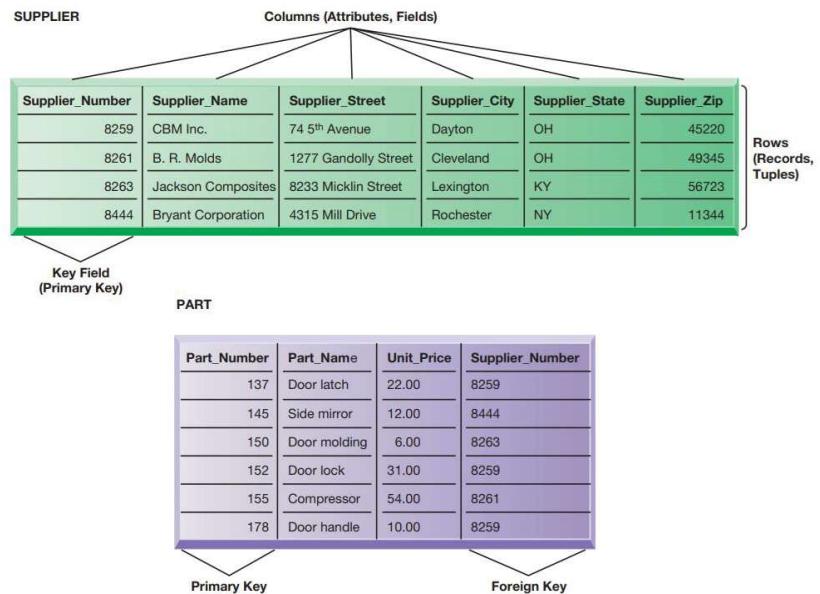
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Relational DBMS

- Relational databases represent data as two-dimensional tables (called relations).
- Tables may be referred to as files.
- Each table contains data on an entity and its attributes.
- Eg:
 - Microsoft Access- for desktop
 - DB2, Oracle Database, and Microsoft SQL Server are relational DBMS for large mainframes and midrange computers.
 - MySQL is a popular open source DBMS.

21

FIGURE 6.4 RELATIONAL DATABASE TABLES



The diagram illustrates two relational database tables: SUPPLIER and PART.

SUPPLIER Table:

Supplier_Number	Supplier_Name	Supplier_Street	Supplier_City	Supplier_State	Supplier_Zip
8259	CBM Inc.	74 5th Avenue	Dayton	OH	45220
8261	B. R. Molds	1277 Gandolly Street	Cleveland	OH	49345
8263	Jackson Composites	8233 Micklin Street	Lexington	KY	56723
8444	Bryant Corporation	4315 Mill Drive	Rochester	NY	11344

Annotations for SUPPLIER: "Key Field (Primary Key)" points to the first column (Supplier_Number). "Columns (Attributes, Fields)" points to the six columns. "Rows (Records, Tuples)" points to the four rows.

PART Table:

Part_Number	Part_Name	Unit_Price	Supplier_Number
137	Door latch	22.00	8259
145	Side mirror	12.00	8444
150	Door molding	6.00	8263
152	Door lock	31.00	8259
155	Compressor	54.00	8261
178	Door handle	10.00	8259

Annotations for PART: "Primary Key" points to the first column (Part_Number). "Foreign Key" points to the fourth column (Supplier_Number).

22

- SUPPLIER**(supplier_number, supplier_name, supplier_street, supplier_city, state, ZIP_code)
- Each table consists of a grid of columns and rows of data.
 - Each individual element of data for each entity is stored as a separate field, and each field represents an **attribute** for that entity.

23

Related terms to Relational database

Tuples

- The actual information about a single supplier that resides in a table is called a row.
- Rows are commonly referred to as records, or in very technical terms, as **tuples**.

key field

- The field for Supplier_Number in the SUPPLIER table uniquely identifies each record so that the record can be retrieved, updated, or sorted. It is called a **key field**.

Primary key

- Each table in a relational database has one field that is designated as its primary key. This key field is the unique identifier for all the information in any row of the table and this **primary key** cannot be duplicated.

foreign key

- An attribute in a relation of a database that serves as the primary key of another relation in the same database

24

Capabilities of Database Management Systems

Domain

- **Domain** refers to all the values which a data element may contain.

- A DBMS includes capabilities and tools for organizing, managing, and accessing the data in the database.
- The most important are its **data definition language**, **data dictionary**, and **data manipulation language**.

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data definition capability

- DBMS have a data definition capability to specify the structure of the content of the database.
- It would be used to create database tables and to define the characteristics of the fields in each table.
- This information about the database would be documented in a data dictionary.
- A **data dictionary** is an automated or manual file that stores definitions of data elements and their characteristics

Sample data dictionary report

- The sample data dictionary report for a human resources database provides helpful information, such as the size of the data element, which programs and reports use it, and which group in the organization is the owner responsible for maintaining it. The report also shows some of the other names that the organization uses for this piece of data.

```

NAME: AMT-PAY-BASE
FOCUS NAME: BASEPAY
PC NAME: SALARY

DESCRIPTION: EMPLOYEE'S ANNUAL SALARY

SIZE: 9 BYTES
TYPE: N (NUMERIC)
DATE CHANGED: 01/01/04
OWNERSHIP: COMPENSATION
UPDATE SECURITY: SITE PERSONNEL
ACCESS SECURITY: MANAGER, COMPENSATION PLANNING AND RESEARCH
MANAGER, JOB EVALUATION SYSTEMS
MANAGER, HUMAN RESOURCES PLANNING
MANAGER, SITE EQUAL OPPORTUNITY AFFAIRS
MANAGER, SITE BENEFITS
MANAGER, CLAIMS PAYING SYSTEMS
MANAGER, QUALIFIED PLANS
MANAGER, SITE EMPLOYMENT/EEO
BUSINESS FUNCTIONS USED BY: COMPENSATION
HR PLANNING
EMPLOYMENT
INSURANCE
PENSION
401K

PROGRAMS USING: PI01000
PI02000
PI03000
PI04000
PI05000

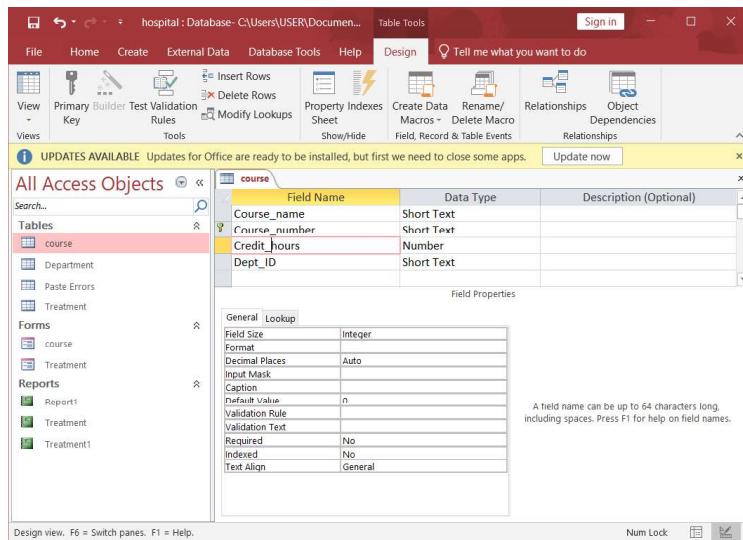
REPORTS USING: REPORT 124 (SALARY INCREASE TRACKING REPORT)
REPORT 448 (GROUP INSURANCE AUDIT REPORT)
REPORT 452 (SALARY REVIEW LISTING)
PENSION REFERENCE LISTING

```

27

28

ACCESS DATA DICTIONARY FEATURES



The screenshot shows the Microsoft Access application interface. The title bar indicates it's a hospital database. The ribbon is set to 'Table Tools Design'. On the left, the 'Tables' pane shows a table named 'course' selected. The main area displays the 'course' table structure with three fields: 'Course_name' (Short Text), 'Course_number' (Short Text), and 'Credit_hours' (Number). Below the table, the 'Field Properties' dialog is open for the 'Credit_hours' field, showing its properties like 'Format' (Integer) and 'Decimal Places' (Auto). A note at the bottom says: 'A field name can be up to 64 characters long, including spaces. Press F1 for help on field names.'

29

Data Manipulation

- DBMS includes tools for accessing and manipulating information in databases.
- Most DBMS have a specialized language called a **data manipulation language** that is used to add, change, delete, and retrieve the data in the database.
- The most prominent data manipulation language today is **Structured Query Language**, or SQL.

30

PRACTICAL WITH ACCESS

Normalization

- Normalization is the process of organizing data in a database.
- This includes creating tables and establishing relationships between those tables according to rules designed both to protect the data and to make the database more flexible by eliminating redundancy and inconsistent dependency.

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- The conceptual database design describes how the data elements in the database are to be grouped.
- The design process identifies relationships among data elements and the most efficient way of grouping data elements together to meet business information requirements.
- Groups of data are organized, refined, and streamlined until an overall logical view of the relationships among all the data in the database emerges.
- To use a relational database model effectively, complex groupings of data must be streamlined to minimize redundant data elements and difficult many-to-many relationships.
- The process of creating small, stable, yet flexible and adaptive data structures from complex groups of data is called normalization .

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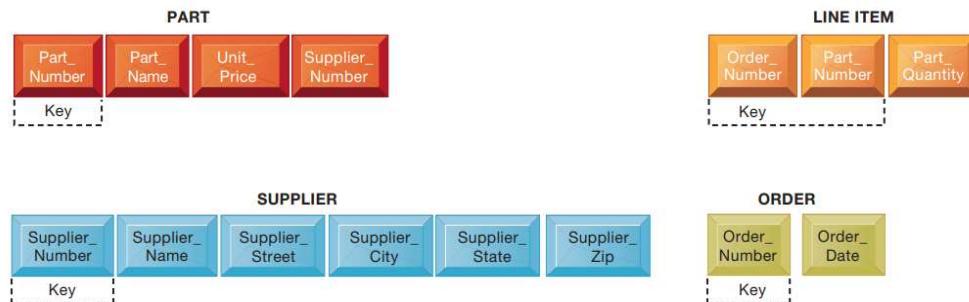
34

FIGURE 6.9 AN UNNORMALIZED RELATION FOR ORDER



An unnormalized relation contains repeating groups. For example, there can be many parts and suppliers for each order. There is only a one-to-one correspondence between Order_Number and Order_Date.

FIGURE 6.10 NORMALIZED TABLES CREATED FROM ORDER



After normalization, the original relation ORDER has been broken down into four smaller relations. The relation ORDER is left with only two attributes, and the relation LINE_ITEM has a combined, or concatenated, key consisting of Order_Number and Part_Number.

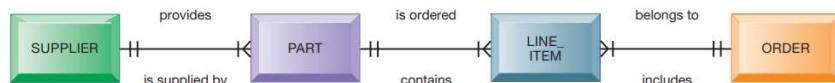
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36

Entity relationship Diagram

- This diagram illustrates the relationship between the entities SUPPLIER, PART, LINE_ITEM, and ORDER.
- The boxes represent entities.
- The lines connecting the boxes represent relationships.
- A line connecting two entities that ends in two short marks designates a one-to-one relationship.
- A line connecting two entities that ends with a crow's foot topped by a short mark indicates a one-to-many relationship.

FIGURE 6.11 AN ENTITY-RELATIONSHIP DIAGRAM



This diagram shows the relationships between the entities SUPPLIER, PART, LINE_ITEM, and ORDER that might be used to model the database in Figure 6.10.

- one ORDER can contain many LINE_ITEMS

- If the business doesn't get its **data model right**, the system won't be able to serve the business well.
- The **company's systems** will not be as effective as they could be because they'll have to work with data that may be inaccurate, incomplete, or difficult to retrieve.

example

- Famous Footwear, a shoe store chain with more than 800 locations in 49 states, could not achieve its goal of having “the right style of shoe in the right store for sale at the right price” because its database was not properly designed for rapidly adjusting store inventory.
- The company had an Oracle relational database running on a midrange computer, but the database was designed primarily for producing standard reports for management rather than for reacting to marketplace changes.
- Management could not obtain precise data on specific items in inventory in each of its stores.
- The company had to work around this problem by building a new database where the sales and inventory data could be better organized for analysis and inventory management.



Database and Information Management

part2

Non-relational cloud databases

- **Non-relational cloud databases** store and manage unstructured data, such as email and mobile message text, documents, surveys, rich media files, and sensor data.
- They don't follow a clearly-defined schema like relational databases and allow you to save and organize information regardless of its format.

1

2

Non-relational database management systems

- Use a more flexible data model
- Designed for managing large data sets across many distributed machines and for easily scaling up or down.
- Useful for accelerating simple queries against large volumes of structured and unstructured data, including web, social media etc.

Need of non-relational database

- Cloud computing
- unprecedented data volumes
- massive workloads for web services
- Need to store new types of data require database

3

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Cloud database

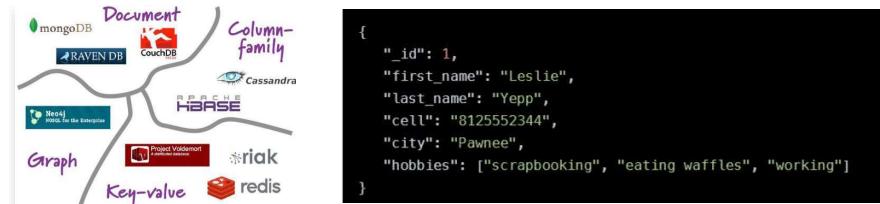
- A cloud database is a database built to run in a public or hybrid cloud environment to help organize, store, and manage data within an organization. Cloud databases can be offered as a managed database-as-a-service (DBaaS)

5

NoSQL databases are non-tabular databases and store data differently than relational tables. NoSQL databases come in a variety of types based on their data model.

- Oracle NoSQL database
- MongoDB, Redis, Cassandra, Hbase, and Cloud Bigtable
- Amazon's SimpleDB

Data set using MongoDB



6

News article

MariaDB Launches New Database-as-a-Service, Partners with Google Cloud

By John K. Waters ■ April 2, 2020

MariaDB has launched a new database-as-a-service (DBaaS) this week called SkySQL, which it's billing as the first to provide a "MariaDB in the cloud" experience.

The company behind the popular open source relational database management system (DBMS) also announced a technical partnership with Google Cloud to make SkySQL available on the Google Cloud Platform (GCP).



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AWS Database Services - Free Cloud Database Solutions

Build, Deploy and Manage Relational & NonRelational **Databases** in the Secure **Amazon Cloud**. Sign Up For AWS & Get 20 GB of Free General **Database** Storage for 12 Months...

RDS

Set Up, Operate and Scale Relational Databases in the Cloud.

Redshift

Fast, Scalable Data Warehouse with Simple and Cost-Effective Analysis.

DynamoDB

Fast and Flexible NoSQL Database for Low Latency Data at Any Scale.

Database Migration

Migrate Databases to AWS Quickly and Securely with Minimal Downtime.

Amazon Cloud Databases

- Amazon and other cloud computing vendors provide relational database services as well.
- Amazon Relational Database Service (Amazon RDS) offers MySQL, SQL Server, Oracle Database, PostgreSQL, MariaDB, or Amazon Aurora DB (compatible with MySQL) as database engines.
- Pricing is based on usage.
- Oracle has its own Database Cloud Services using its relational Oracle Database
- Microsoft Windows SQL Azure Database is a cloud-based relational database service based on Microsoft's SQL Server DBMS.

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Advantages of Cloud Database

- Special appeal for web-focused start-ups or small to medium-sized businesses seeking database capabilities at a lower price than in-house database products.

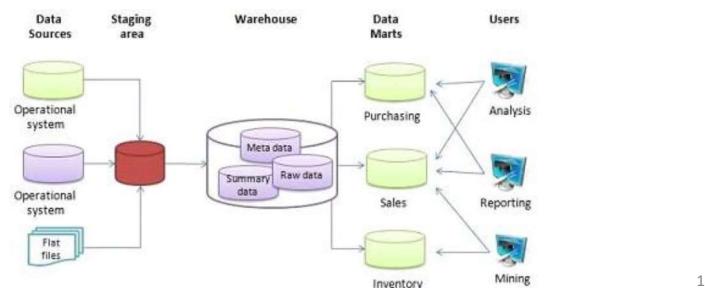
What are the principal tools and technologies for accessing information from databases to improve business performance and decision making?

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12

Data Warehouses

- A data warehouse is a database that stores current and historical data of potential interest to decision makers throughout the company.



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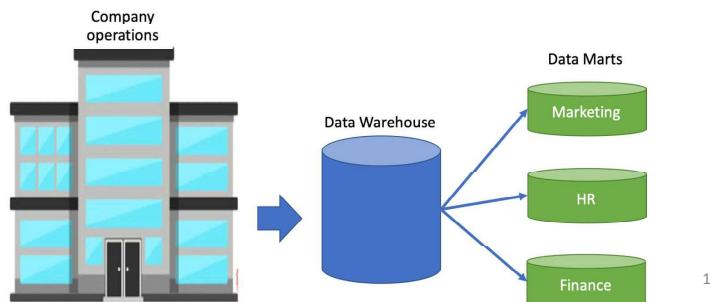
Data warehouse..

- The data warehouse makes the data available for anyone to access as needed, but the data cannot be altered.
- A data warehouse system also provides a range of ad hoc and standardized query tools, analytical tools, and graphical reporting facilities.

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Data Marts

- A data mart is a subset of a data warehouse in which a summarized or highly focused portion of the organization's data is placed in a separate database for a specific population of users.



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Hadoop

- Hadoop is an open source software framework managed by the Apache Software Foundation that enables distributed parallel processing of huge amounts of data across inexpensive computers.



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Hadoop...

- For handling unstructured and semi-structured data in vast quantities, as well as structured data, organizations are using Hadoop.
- It **breaks** a big data problem down into sub-problems, **distributes** them among up to thousands of inexpensive computer processing nodes, and then **combines the result** into a smaller data set that is easier to analyze.
- Hadoop can process large quantities of any kind of data(Facebook and Twitter feeds, complex data such as web server log files, and unstructured audio and video data)
- Companies use Hadoop for analyzing very large volumes of data as well as for a staging before they are loaded into a data warehouse.
- Yahoo uses Hadoop to track users' behavior so it can modify its home page to fit their interests

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In-Memory Computing

- Facilitating big data analysis is to use in-memory computing ,which relies primarily on a computer's main memory (RAM) for data storage.
- Users access data stored in system primary memory,.
- Dramatically shortening query response times.
- In-memory processing makes it possible for very large sets of data, amounting to the size of a data mart or small data warehouse, to reside entirely in memory.

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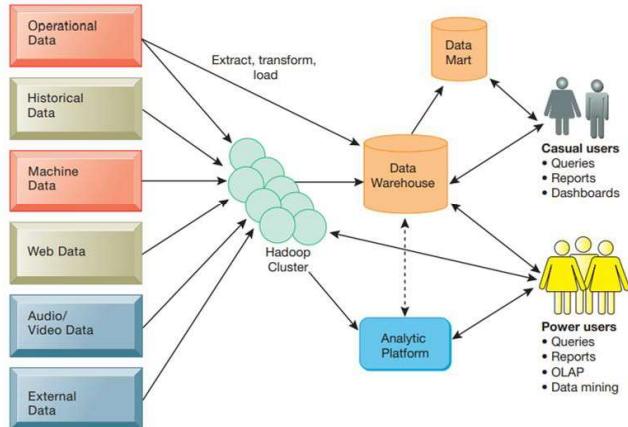
Analytic Platforms

- Analytic platforms such as IBM PureData System for Analytics, feature preconfigured hardware-software systems that are specifically designed for query processing and analytics.
 - For example, IBM PureData System for Analytics features tightly integrated database, server, and storage components that handle complex analytic queries 10 to 100 times faster than traditional systems.
- Analytic platforms include in-memory systems and NoSQL non-relational database management systems.
- Analytic platforms are now available as cloud services.

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Analytical Tools: Relationships, Patterns, Trends

FIGURE 6.12 CONTEMPORARY BUSINESS INTELLIGENCE INFRASTRUCTURE



A contemporary business intelligence infrastructure features capabilities and tools to manage and analyze large quantities and different types of data from multiple sources. Easy-to-use query and reporting tools for casual business users and more sophisticated analytical toolsets for power users are included.

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22



Online Analytical Processing (OLAP)

- Suppose your company sells four different products—nuts, bolts, washers, and screws—in the East, West, and Central regions.
- If you wanted to ask a fairly straightforward question, such as how many washers sold during the past quarter, you could easily find the answer by querying your sales database.
- But what if you wanted to know how many washers sold in each of your sales regions and compare actual results with projected sales? To obtain the answer, you would need online analytical processing (OLAP).
- OLAP supports multidimensional data analysis**, enabling users to view the same data in different ways using multiple dimensions.
- OLAP enables users to obtain online answers to ad hoc questions.**

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Data mining

- Data Mining** is a process of finding potentially useful patterns from huge data sets.
- The patterns and rules are used to guide **decision making and forecast** the effect of those decisions.

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The types of information obtainable from data mining

- associations
- sequences
- classifications
- Clusters
- forecasts.

1. Associations

Associations are occurrences linked to a single event.

Eg: A study of supermarket purchasing patterns might reveal that,

- when corn chips are purchased, a cola drink is purchased 65 % of the time, but when there is a promotion, cola is purchased 85% of the time.
- This information helps managers make better decisions because they have learned the profitability of a promotion.

2. sequences

- In sequences events are linked over time.
 - If a house is purchased, a new refrigerator will be purchased within two weeks 65% of the time, and an oven will be bought within one month of the home purchase 45 % of the time.

Classification

- **Classification** recognizes patterns that describe the group to which an item belongs by examining existing items that have been classified and by supposing a set of rules.
 - For example, businesses such as credit card or telephone companies worry about the loss of steady customers.
 - Classification helps discover the characteristics of customers who are likely to leave
 - can provide a model to help managers predict who those customers are so that the managers can devise special campaigns to retain such customers.



Clustering

- **Clustering** works in a manner similar to classification when no groups have yet been defined.
- A data mining tool can discover different groupings within data,
 - Eg: finding affinity groups for bank cards or partitioning a database into groups of customers based on demographics and types of personal investments.

END



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objectives

- Describe the issues of planning the development of computer-based applications
- Understand the need for control and maintenance of information systems

How does building new systems produce organizational change?

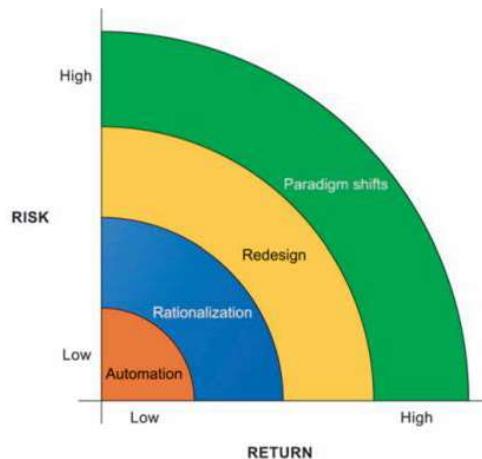
- Building a new information system is one kind of planned organizational change.
- The introduction of a new information system involves much more than new hardware and software. It also includes changes in jobs, skills, management, and organization.
- When we design a new information system, we are redesigning the organization.

Systems Development and Organizational Change

- Information technology can promote various degrees of organizational change, ranging from incremental to far-reaching
 - (1) automation
 - (2) rationalization
 - (3) business process redesign
 - (4) paradigm shifts

Automation

FIGURE 13.1 ORGANIZATIONAL CHANGE CARRIES RISKS AND REWARDS



- The most common form of IT-enabled organizational change is automation .
- Information technology involved assisting employees with performing their tasks more efficiently and effectively.
- Eg: Calculating paychecks and payroll registers

Rationalization

- A deeper form of organizational change one that follows quickly from early automation—is rationalization of procedures.
- Rationalization of procedures is the streamlining of standard operating procedures.
 - For example, Angostura's new mobile order system is effective not only because it uses computer technology but also because the company simplified its business processes for this function. Fewer manual steps are required.

business process redesign

- A more powerful type of organizational change is business process redesign, in which business processes are analyzed, simplified, and redesigned.
- Business process redesign reorganizes workflows, combining steps to cut waste and eliminate repetitive, paper-intensive tasks.

Example for redesign

- Ford Motor Company's invoice less processing, which reduced head count in Ford's North American Accounts Payable organization of 500 people by 75%.
- Accounts payable clerks used to spend most of their time resolving discrepancies between purchase orders, receiving documents, and invoices.
- Ford redesigned its accounts payable process so that the purchasing department enters a purchase order into an online database that can be checked by the receiving department when the ordered items arrive.
- If the received goods match the purchase order, the system automatically generates a check for accounts payable to send to the vendor. There is no need for vendors to send invoices.

Paradigm shift

- Rationalizing procedures and redesigning business processes are limited to specific parts of a business.
- More radical form of business change is called a paradigm shift.
- A paradigm shift involves rethinking the nature of the business and the nature of the organization

Systems development

- Systems development is a structured kind of problem solved with distinct activities.
- These activities consist of *systems analysis*, *systems design*, *programming*, *testing*, *conversion*, and *production and maintenance*.

WHAT ARE THE CORE ACTIVITIES IN THE SYSTEMS DEVELOPMENT PROCESS?

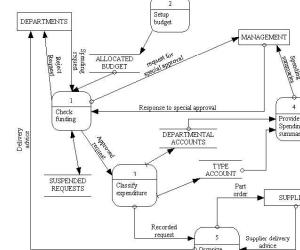
Requirement Identification and system analysis

- Systems analysis is the analysis of a problem that a firm tries to solve with an information system. It consists of
 - defining the problem
 - identifying its causes
 - specifying the solution
 - identifying the information requirements
- The systems analyst then details the problems of existing systems. By
 - examining documents
 - work papers
 - procedures
 - observing system operations
 - interviewing key users of the systems
- **the solution requires building a new information system or improving an existing one.**
- The systems analysis also includes a feasibility study to determine whether that solution is feasible, or achievable, from a financial, technical, and organizational standpoint.
- The feasibility study determines whether the proposed system is expected to be a good investment.

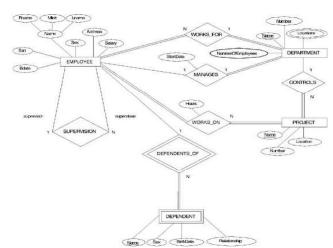
System design

- Systems design shows how the system will fulfill system objective.
- The design of an information system is the overall plan or model for that system.
- Each design represents a unique blend of technical and organizational components

• Data flow diagram



• ER diagram



coding

- During the coding(Programming) stage, system specifications that were prepared during the design stage are translated into software program code.
- Many organizations no longer do their own programming for new systems. Instead, they **purchase the software that meets the requirements** for a new system from external sources such as
 - software packages from a commercial software vendor
 - software services from a software service provider
 - outsourcing firms that develop custom application software for their clients.

Testing

- Thorough testing must be conducted to establish whether the system produces the right results.
- Testing an information system can be broken down into three types of activities:
 - unit testing
 - system testing
 - acceptance testing.

- **Unit testing** , or program testing, consists of testing each program separately in the system.
- **System testing** tests the functioning of the information system as a whole.
- **Acceptance testing** provides the final certification that the system is ready to be used in a production setting.

Conversion

- Conversion is the process of changing from the old system to the new system.
- Four main conversion strategies are
 - the parallel strategy
 - the direct cutover strategy
 - the pilot study strategy
 - the phased approach strategy.

Production and Maintenance

- After the new system is installed and conversion is complete, the system is said to be in production.
- During this stage, the system will be reviewed by both users and technical specialists to determine how well it has met its original objectives and to decide whether any revisions or modifications are in order.

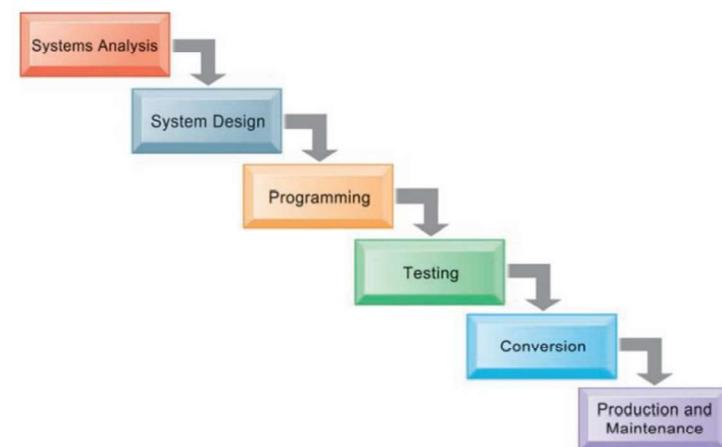
What are alternative methods for building information systems?

- The traditional systems life cycle
- Prototyping
- application software packages
- end-user development
- outsourcing.

The traditional systems life cycle

- The systems life cycle is still used for building large complex systems that require a formal requirements analysis predefined specifications, and tight controls over the system-building process.
- It can be costly, time-consuming, and inflexible.

FIGURE 13.9 THE TRADITIONAL SYSTEMS DEVELOPMENT LIFE CYCLE

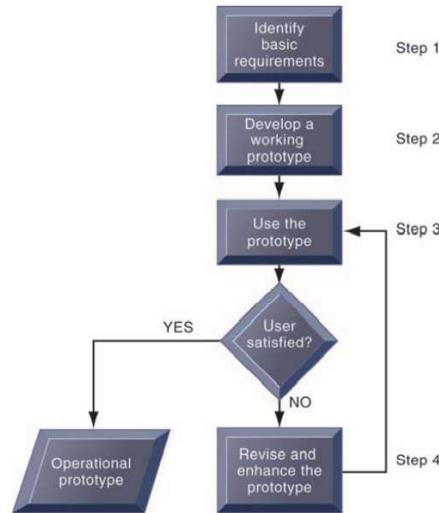


The systems development life cycle partitions systems development into formal stages, with each stage requiring completion before the next stage can begin.

FIGURE 13.10 THE PROTOTYPING PROCESS

Prototyping

- The prototype is a working version of an information system or part of the system, but it is meant to be only a preliminary model.
- Once operational, the prototype will be further refined until it conforms exactly to users' requirements.
- Once the design has been finalized, the prototype can be converted to a polished production system.



The process of developing a prototype can be broken down into four steps. Because a prototype can be developed quickly and inexpensively, systems builders can go through several iterations, repeating steps 3 and 4, to refine and enhance the prototype before arriving at the final operational one.

End-user development

- Prototyping is most useful when there is some uncertainty about requirements or design solutions and often used for designing an information system.
- End-user development allows end users, with little or no formal assistance from technical specialists, to create simple information systems, reducing the time and steps required to produce a finished application.
- Using user-friendly query languages and reporting, website development, graphics, and PC software tools, end users can access data, create reports, and develop simple applications on their own with little or no help from professional systems analysts or programmers.



Application Software Packages and Cloud Software Services and outsourcing

- If a commercial software package or cloud software service can fulfill most of an organization's requirements, the company does not have to write its own software .

- The company can save time and money by using the prewritten, predesigned, pretested software programs from the software vendor.
- Package and SaaS vendors supply much of the ongoing maintenance and support for the system.



outsourcing

- A company could hire an external vendor to design and create the software for its system, but that company would operate the system on its own computers.
- The outsourcing vendor might be domestic or in another country.

What are new approaches for system building in the digital firm era?

- Rapid Application Development (RAD)
- Agile Development

Rapid application development (RAD)

- The term rapid application development (RAD) is used to describe this process of creating workable systems in a very short period of time with some flexibility to adapt as a project evolves.
- RAD also involves close teamwork among end users and information systems
- Simple systems often can be assembled from prebuilt components

Joint application design (JAD)

- It is used to accelerate the generation of information requirements and to develop the initial systems design.
- JAD brings end users and information systems specialists together in an interactive session to discuss the system's design.
- Properly prepared and facilitated, JAD sessions can significantly speed up the design phase and involve users at an intense level.

Agile development

- Focuses on rapid delivery of working software by breaking a large project into a series of small subprojects that are completed in short periods of time using iteration and continuous feedback.
- Each mini-project is worked on by a team as if it were a complete project.
- Improvement or addition of new functionality takes place within the next iteration as developers clarify requirements.
- This helps to minimize the overall risk and allows the project to adapt to changes more quickly.
- Agile methods emphasize face-to-face communication over written documents, encouraging people to collaborate and make decisions quickly and effectively.



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transforming business?

- There are three interrelated changes in the technology area:
 - (1) the emerging mobile digital platform
 - (2) the growing business use of "big data,"
 - (3) the growth in "cloud computing,"

INFORMATION SYSTEMS IN GLOBAL BUSINESS TODAY

How are information systems

devices.

- Managers are increasingly using these devices to coordinate work, communicate with employees, and provide information for decision making.
- emerging mobile platform greatly enhances the accuracy, speed, and richness of decision making

The emerging mobile digital platform

- More and more business computing is moving from PCs and desktop machines to these mobile

New in mobile platform

- The small, lightweight netbooks optimized for wireless communication and Internet access.

- tablet computers such as the iPad, and digital e-book readers such as Amazon's Kindle with some web access capabilities.
- Smartphones and tablet computers are increasingly used for business computing as well as for consumer applications.
- Wearable computing devices are a recent addition to the mobile digital platform. These include smartwatches, smart glasses, smart ID badges, and activity trackers.



Examples of wearable computer

- Smart Watch
- Head-Mounted Displays (HMDs)
- Smart Clothing



Wearable devices in business

1. allow field workers remote access to inspections information;

- Smart Jewelry e.g. smart ring
- Google Glass
- Apple Glass
- Microsoft HoloLens
- Bar Code Reader
- Eye Trackers
- Face Detection
- Detecting Six Sense Gestures
- Measuring of body temperature



Wearable devices in business

1. Businesses can use smart wearables to connect technicians to vital information about the equipment they are servicing;



Wearable devices in business

1. track employees in challenging

environments:
they can make sure a firefighter is healthy enough to enter a burning building.



- Both time shifting and space shifting are the norm.
 - Time shifting refers to business being conducted continuously 24/7 rather than in narrow “work day” time bands of 9 a.m. to 5 p.m.
 - Space shifting means that work takes place in a global workshop, as well as within national boundaries.

Opportunities

laptops [against malware, theft, accidental loss, unauthorized access, and hacking attempts.](#)

Securing Mobile Platforms

- Devices need to be secured like desktops and
 - To control [updates to applications;](#)
 - lock down or erase lost or stolen devices so they can't be compromised.

Securing Mobile Platforms ..

- Companies should make sure that their [corporate security policy](#) includes mobile devices.
- They will need [mobile device management tools](#) to authorize all devices in use;
- to [maintain accurate inventory records](#) on all mobile devices, users, and applications;

Securing Mobile Platforms ..

- Firms should [develop guidelines](#) stipulating approved mobile platforms and software applications as well as the required [software and procedures for remote access of corporate systems.](#)
- All mobile device users should be required to use

the password feature found in every smartphone. •
Mobile security products are available from
Kaspersky, Symantec, Trend Micro, and McAfee.

(2) the growing business use of "big data"

- **Big Data** is a collection of data that is huge in volume, yet growing exponentially with time. It is a data with so large size and complexity that none of traditional data management tools can store it or process it efficiently.
- Big data is also a data but with huge size.

• **Social Media** The statistic shows that **500+terabytes** of new data get ingested into the databases of social media site **Facebook**, every day. This data is mainly generated in terms of photo and video uploads, message exchanges, putting comments etc.

What is an Example of Big Data?

- The **New York Stock Exchange** is an example of Big Data that generates about **one terabyte** of new trade data per day.



- A single **Jet engine** can generate **10+terabytes** of data in **30 minutes** of flight time. With many thousand flights per day, generation of data reaches up to many **Petabytes**.



- Early identification of risk to the product/services, if any
- Better operational efficiency

Advantages Of Big Data Processing

- Businesses can utilize outside intelligence while taking decisions

Access to social data from search engines and sites like facebook, twitter are enabling organizations to fine tune their business strategies.

- Improved customer service

Traditional customer feedback systems are getting replaced by new systems designed with Big Data technologies. In these new systems, Big Data and natural language processing technologies are being used to read and evaluate consumer responses.

(3) the growth in “cloud computing,”

- Cloud computing refers to a model of computing that provides access to a shared pool of computing resources (computers, storage, applications, and services) over the network, often the Internet.

Advantages

- Cost

Cloud computing eliminates the capital expense of buying hardware and software and setting up and running on-site datacenters—the racks of servers, the round-the-clock electricity for power and cooling, and the IT experts for managing the infrastructure. It adds up fast.

- Speed

- Most cloud computing services are provided self service and on demand, so even vast amounts of computing resources can be provisioned in minutes, typically with just a few mouse clicks, giving businesses a lot of flexibility and taking the pressure off capacity planning.

- **Global scale**

- The benefits of cloud computing services include the ability to scale elastically. In cloud speak, that means delivering the right amount of IT resources—for example, more or less computing power, storage, bandwidth—right when they’re needed, and from the right geographic location.

- **Productivity**

- On-site datacenters typically require a lot of “racking and stacking”—hardware setup, software patching, and other time-consuming IT management chores. Cloud computing removes the need for many of these tasks, so IT teams can spend time on achieving more important business goals.

- **Performance**

- The biggest cloud computing services run on a worldwide network of secure datacenters, which are regularly upgraded to the latest generation of fast and efficient computing hardware. This offers several benefits over a single corporate datacenter, including reduced network latency for applications and greater economies of scale.

- **Reliability**

- Cloud computing makes data backup, disaster recovery, and business continuity easier and less expensive because data can be mirrored at multiple redundant sites on the cloud provider’s network.

- **Security**

- Many cloud providers offer a broad set of policies, technologies, and controls that strengthen your security posture overall, helping protect your data, apps, and infrastructure from potential threats.

- **Infrastructure as a service (IaaS) •**

The most basic category of cloud computing services. With IaaS, you rent IT infrastructure—servers and virtual machines (VMs), storage, networks, operating systems—from a cloud provider on a pay-as-you-go basis.

Types of cloud services: IaaS, PaaS, serverless, and SaaS

- Platform as a service refers to cloud computing services that supply an on-demand environment for developing, testing, delivering, and managing software applications. PaaS is designed to make it easier for developers to quickly create web or mobile apps, without worrying about setting up or managing the underlying infrastructure of servers, storage, network, and databases needed for development.

- **Platform as a service (PaaS)**

- **Serverless computing**

- Overlapping with PaaS, serverless computing focuses on building app functionality without spending time continually managing the servers and infrastructure required to do so. The cloud provider handles the setup, capacity planning, and server management for you. Serverless architectures are highly scalable and event-driven, only using resources when a specific function or trigger occurs.

Types of cloud services..

Different types of cloud computing deployment models are:

- **Software as a service (SaaS)**

- Software as a service is a method for delivering software applications over the Internet, on demand and typically on a subscription basis. With SaaS, cloud providers host and manage the software application and underlying infrastructure, and handle any maintenance, like software upgrades and security patching. Users connect to the application over the Internet, usually with a web browser on their phone, tablet, or PC.

- Public cloud
- Private cloud
- Hybrid cloud
- Community cloud
- Multi-cloud

<https://www.geeksforgeeks.org/cloud-deployment-models/>

END