

Introduction to IS (IS101)

Lecture 1

Presented By:

Dr. Asmaa Saad

Course Objectives

Information systems are an integral part of all business activities and careers. This course is designed to introduce students to

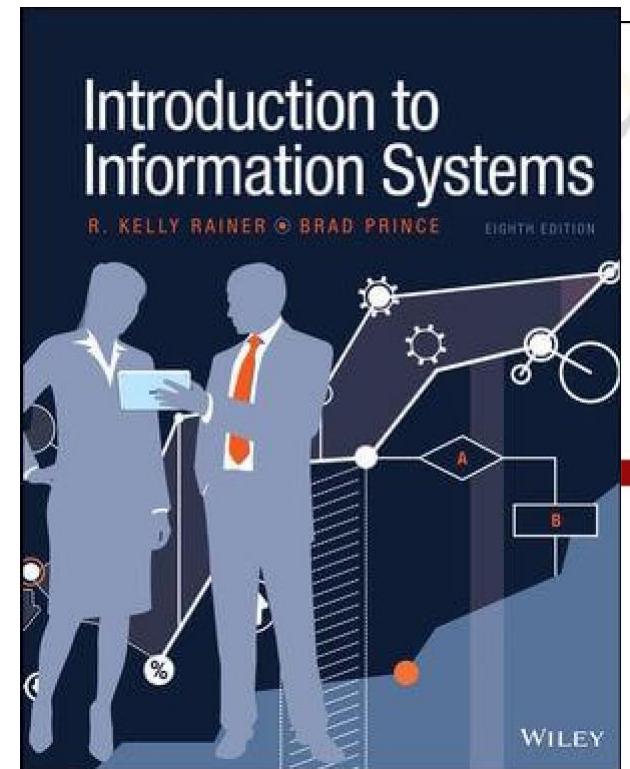
1. Demonstrate how information systems are used throughout organizations.
2. Look at information technologies and the use of information in business.
3. Identify the key components of information systems — *people, software, hardware, data, and communication technologies* — and how these components can be integrated and managed to create competitive advantage.

Course Objectives

4. Through the knowledge of how IS provides a competitive advantage students will gain an understanding of how information is used in organizations and how IT enables improvement in quality and speed.
5. Discuss topics, such as the electronic business, enterprise information systems, business intelligence, information for decision-making, and business information systems development.

Textbook:

R. Kelly Rainer and Brad Prince. (2019) “**Introduction to Information Systems**” 8th Ed., Wiley, ISBN 978-1-119-59463-5



Assessment:

Assessment	weight
Mid term exam	20%
Quizzes	10%
Practical exam	15%
Attendance	5%
Final exam	50%

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Introduction to Information Systems

R. Kelly Rainer Brad Prince

Eighth Edition

Chapter 1

Introduction to Information Systems

Chapter Outline

1. Why Should I Study Information Systems?
2. Overview of Computer-Based Information Systems
3. How Does IT Impact Organizations?
4. Importance of Information Systems to Society

1.1 Why Should I Study Information Systems

- The Informed User—You!
- IT Offers Career Opportunities
- Managing Information Resources

The Informed User – You!

Informed user:

a person who has a knowledge about information systems and information technology.

Why Should I Study Information Systems?

1. You benefit more when you understand what is “behind” IT applications in your organization(see Fig 1.1).
2. You can provide valuable input.
3. You can recommend and help select IT Applications.
4. You will be aware of new technology.
5. You understand how IT improves performance.
6. Understanding IT is very beneficial to entrepreneurs.

Figure 1.1 MIS provides what users see on their computer screens.



iStock.com/Slawomir Fajer

IT Offers Career Opportunities

- IT is vital to modern business providing many creative career opportunities
 - Programmers, business analysts, systems analysts, and designers.
 - Chief Information Officer (CIO) – executive in charge of the IS function.

Top Job Rankings: *U.S. News & World Report* (out of 100)

- #1 Software Developer
- #32 Information Security Analyst
- #42 Information Technology Manager
- #46 Computer Systems Analyst

Top Job Rankings: *Money* (out of 50)

- #2 IT Development Manager
- #8 Mobile Systems Developer
- #21 Software Engineer
- #26 Database Administrator

Top Job Rankings: *Forbes* (out of 20)

- #2 Software Engineer
- #4 IT Manager
- #13 Data Engineer
- #14 Front-end Engineer (User Experience Designer)

Table 1.1
Information Technology Jobs

Position	Job Description
Chief Information Officer	Highest-ranking IS manager; is responsible for all strategic planning in the organization
IS Director	Manages all systems throughout the organization and the day-to-day operations of the entire IS organization
Information Center Manager	Manages IS services such as help desks, hot lines, training, and consulting
Applications Development Manager	Coordinates and manages new systems development projects
Project Manager	Manages a particular new systems development project

Systems Manager	Manages a particular existing system
Operations Manager	Supervises the day-to-day operations of the data and/or computer center
Programming Manager	Coordinates all applications programming efforts
Systems Analyst	Interfaces between users and programmers; determines information requirements and technical specifications for new applications
Business Analyst	Focuses on designing solutions for business problems; interfaces closely with users to demonstrate how IT can be used innovatively
Systems Programmer	Creates the computer code for developing new systems software or maintaining existing systems software

Applications Programmer	Creates the computer code for developing new applications or maintaining existing applications
Emerging Technologies Manager	Forecasts technology trends; evaluates and experiments with new technologies
Network Manager	Coordinates and manages the organization's voice and data networks
Database Administrator	Manages the organization's databases and oversees the use of database-management software
Auditing or Computer Security Manager	Oversees the ethical and legal use of information systems
Webmaster	Manages the organization's World Wide Web site
Web Designer	Creates World Wide Web sites and pages

Managing Information Resources (1 of 2)

- Managing Information Resources is difficult and complex because:
 - IS has an enormous strategic value to organizations.
 - ISs are very expensive to acquire, operate, and maintain.
 - Evolution of the MIS function within the organization. the main function of the MIS department is to use IT to solve end users' business problems.

Managing Information Resources (2 of 2)

- MIS personnel vs. end users
- Changing Role of the IS Department
 - Traditional Function of the MIS Department
 - New (Consultative) Functions of the MIS Department

Traditional Function of the MIS Department

- Managing systems development and systems project management.
- Managing computer operations.
- Staffing, training, and developing IS skills.
- Providing technical services.
- Infrastructure planning, development, and control.

New (Consultative) Functions of the MIS Department (1 of 2)

- Initiating and designing specific strategic IS.
- Incorporating the Internet and e-commerce into the business.
- Managing system integration including Internet, Intranets, and Extranets.
- Educating the non-MIS staff about IT.
- Educating the MIS staff about the business.

New (Consultative) Functions of the MIS Department (2 of 2)

- Partnering with business-unit executives.
- Managing outsourcing.
- Proactively using business and technical knowledge to seed innovative IT ideas.
- Creating business alliances with business partners.

Introduction to IS (IS101)

Lecture 2

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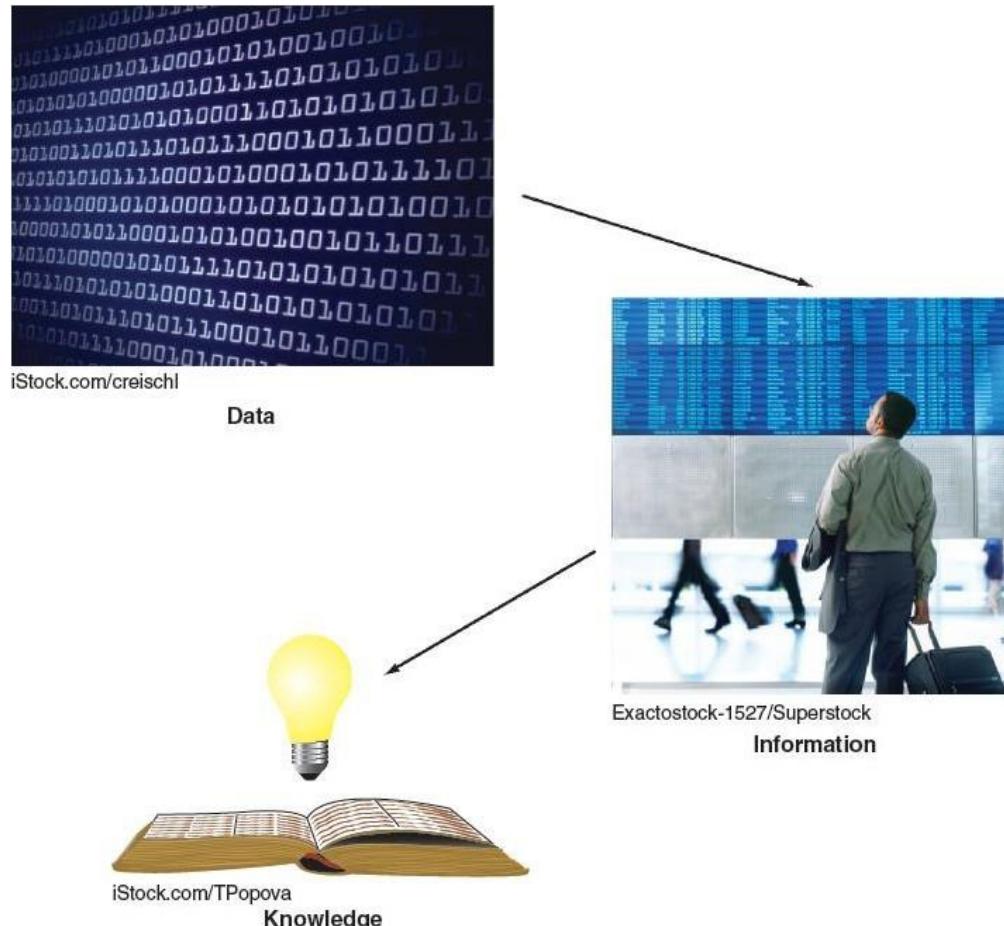
Chapter 1

Introduction to Information Systems

1.2 Overview of Computer-Based Information Systems

- Data, Information, Knowledge
- What is Computer-Based Information System (CBIS)?
- Components of CBIS.
- Major capabilities of CBIS.
- Types of CBIS.

FIGURE 1.2 Data, Information, and Knowledge.



Data, Information, and Knowledge.

- **Data items** refer to an elementary description of things, events, activities, and transactions that are recorded, classified, and stored but are not organized to convey any specific meaning.
- Data items can be numbers, letters, figures, sounds, and images. Examples of data items are collections of numbers (e.g., 3.11, 2.96, 3.95, 1.99, 2.08) and characters (e.g., B, A, C, A, B, D, F, C).

Data, Information, and Knowledge.

- **Information** refers to data that have been organized so that they have meaning and value to the recipient.
- **For example**, a grade point average (GPA) by itself is data, but a student's name with his or her GPA is information.

Data, Information, and Knowledge.

- **Knowledge** consists of data and/or information that have been organized and processed to convey understanding, experience, accumulated learning, and expertise as they apply to a current business problem.
- For example, suppose that a company hiring successful employees. It has found over time that students with GPA over 3.0 have greatest success in its management program.
- Based on this accumulated knowledge, that company decide to interview only those students with GPAs over 3.0.

What is Computer-Based Information Systems?

A computer-based information system (CBIS) is an information system that uses computer technology to perform some or all of its intended tasks.

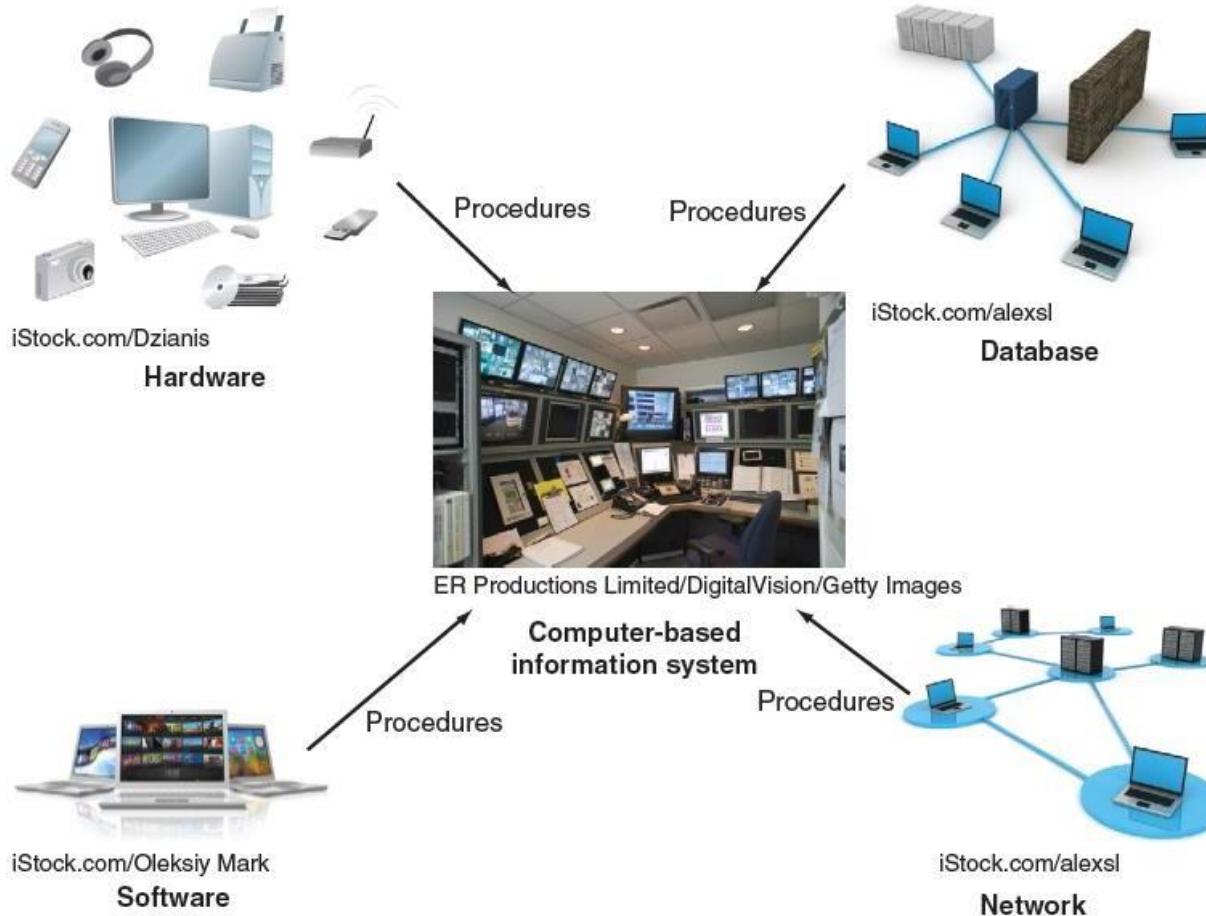
Basic components of computer-based information systems

- Hardware
- Software
- Database
- Network
- Procedures
- People



IT components

FIGURE 1.3 Computer-based information systems



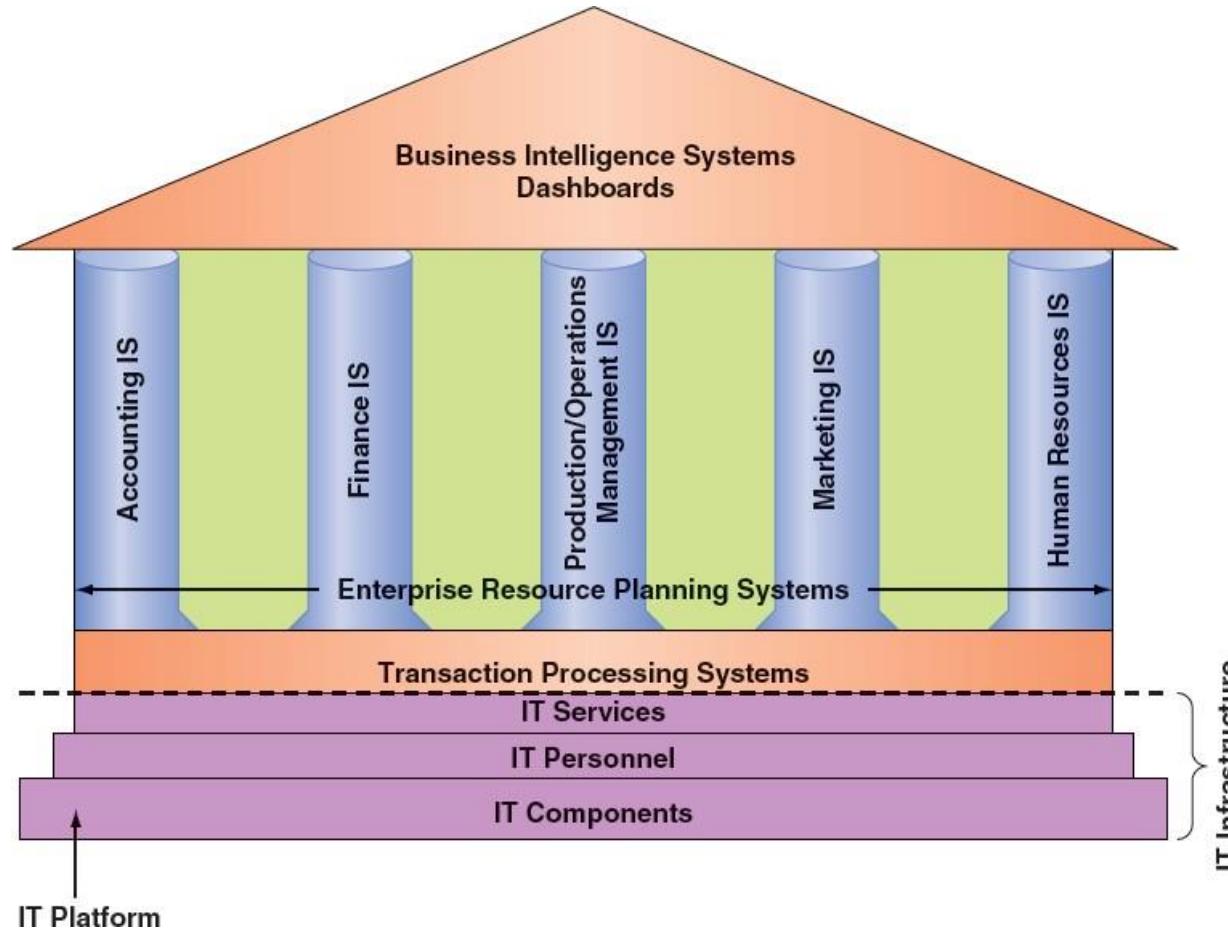
Basic components of computer-based information systems

- **Hardware:** consists of devices such as the processor, monitor, keyboard, and printer.
- **Software:** a program or collection of programs that enable the hardware to process data.
- **Database:** a collection of related files or tables containing data.
- **Network:** a connecting system (wired or wireless) that permits different computers to share resources.

Basic components of computer-based information systems

- **Procedures:** are the instructions for combining the above components to process information and generate the desired output.
- **People:** individuals who use the hardware and software, interface with it, or utilize its output.

FIGURE 1.4 IT inside your organization.



Major Capabilities of Information Systems

- Perform high-speed, high-volume numerical computations.
- Provide fast, accurate communication and collaboration within and among organizations.
- Store huge amounts of information in an easy-to-access, yet small space.
- Allow quick and inexpensive access to vast amounts of information, worldwide.
- Interpret vast amounts of data quickly and efficiently.
- Automate both semiautomatic business processes and manual tasks.

Types of Computer-Based Information Systems

- Breadth of Support of ISs
- Support for Organizational Employees

Breadth of Support of Information Systems (1 of 3)

- Functional Area Information Systems (FAIS)
 - Accounting
 - Finance
 - Production & Operations Management
 - Marketing
 - HR

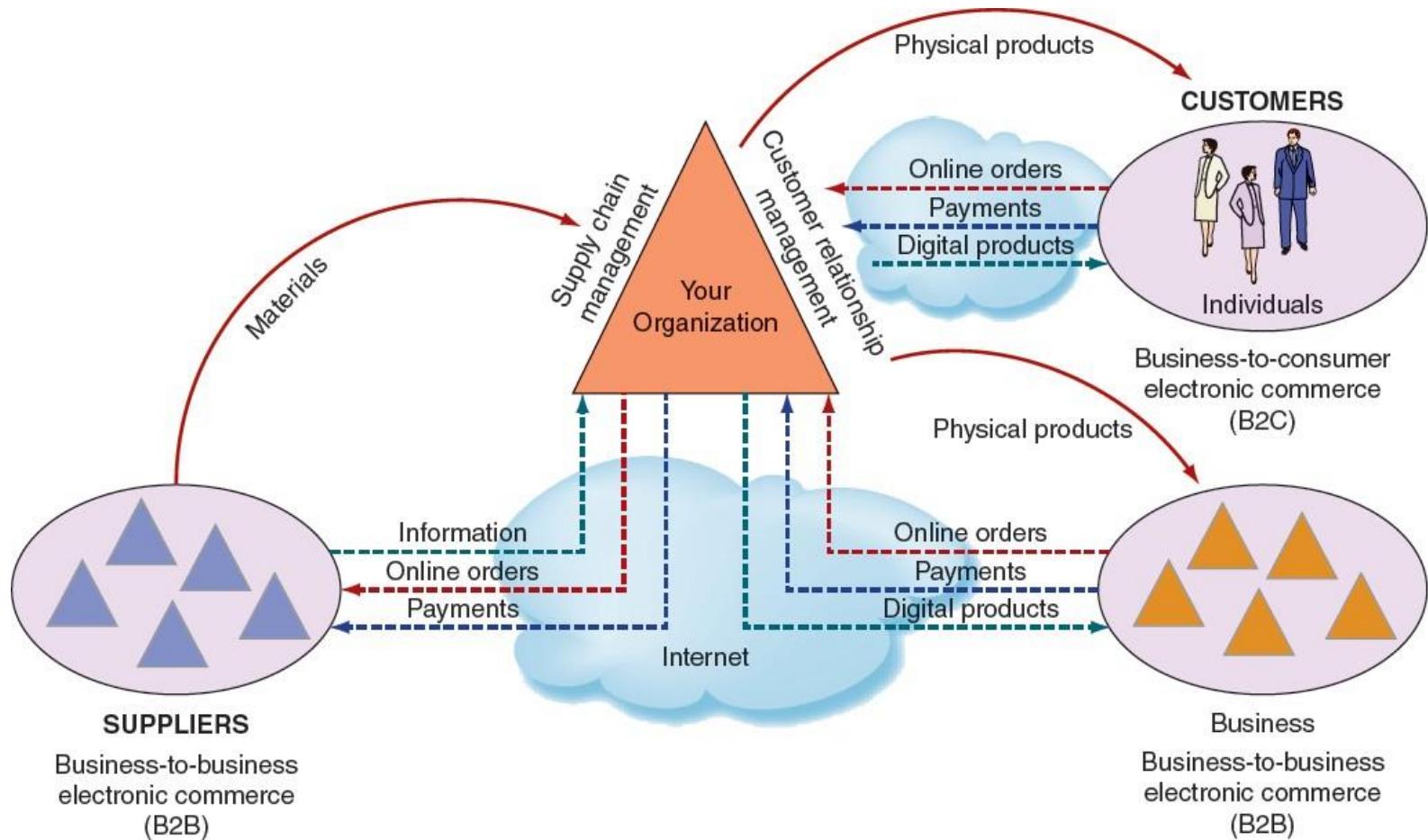
Breadth of Support of Information Systems (2 of 3)

- Two Information Systems support the entire organization:
 - Enterprise Resource Planning (ERP) Systems
 - Provide communication among functional area ISs
 - Transaction Processing Systems (TPS)
 - Support the “real time” monitoring, collection, storage, and processing of data from the organization’s day to day operations

Breadth of Support of Information Systems (3 of 3)

- Interorganizational Information Systems (IOS)
 - Supports many Interorganizational operations
 - Examples of IOS:
 - Supply Chain Management (SCM).
 - Electronic commerce (e-commerce) systems.
 - Human Resource (HR).

FIGURE 1.5 IS that function among multiple organizations



Support for Organizational Employees

- Clerical Workers
- Knowledge Workers
- Functional area information systems
- Business Intelligence (BI)
- Expert Systems (ES)
- Dashboards

FIGURE 1.4 Types of Organizational ISs

Type of System	Function	Example
Transaction processing system	Processes transaction data from terminal	Walmart checkout point-of sale business events
Enterprise resource planning	Integrates all functional areas of the organization.	Oracle, SAP system Microsoft Office
Functional area IS	Supports the activities within specific functional area.	System for processing payroll
Decision support system	Provides access to data and analysis tools.	“What-if” analysis of changes in budget
Expert system	Mimics human expert in a particular area and makes decisions.	Credit card approval analysis
Executive dashboard	Presents structured, summarized information about aspects of business important to executives.	Status of sales by product
Supply chain management system	Manages flows of products, services, and information among organizations.	Walmart Retail Link system connecting suppliers to Walmart
Electronic commerce system	Enables transactions among organizations and between organizations and customers.	www.dell.com

Support for Organizational Employees

- **Clerical Workers:** support managers at all levels of the organization.
- **Lower-level managers:** handle the day-to-day operations of the organization and make routine decisions.
- **Middle managers:** make tactical decisions, which deal with activities such as short-term planning, organizing, and control.

Support for Organizational Employees

- **Knowledge Workers:** professional employees that are experts in a particular subject area (e.g., financial and marketing analysts).
- **Functional area information systems:** summarize data and prepare reports, primarily for middle managers, but sometimes for lower-level managers as well.

Support for Organizational Employees

- **Business Intelligence (BI) systems:** systems that provide computer-based support for complex, nonroutine decisions, primarily for middle managers and knowledge workers.
- **Expert Systems (ES):** systems that attempt to duplicate the work of human experts by applying reasoning capabilities, knowledge, and expertise within a specific domain.
- **Dashboards :** a special form of IS that support all managers of the organization by providing rapid access to timely information and direct access to structured information in the form of reports.

1.3 How Does IT Impact Organizations?

- IT Reduces the Number of Middle Managers
- IT Changes the Manager's Job
- Will IT Eliminate Jobs?
- IT Impacts Employees at Work

IT Reduces the Number of Middle Managers

- IT makes middle managers more productive
- Consequently, IT reduces the number of middle managers required and increase the number of employees who can report to a single manager.

IT Changes the Manager's Job

- Decision making is the most important managerial task
- IT changes the way managers make decisions
 - IT provides near-real-time information
 - Managers have less time to make decisions
 - IT provides tools for analysis to assist in decision making

Will IT Eliminate Jobs?

- The competitive advantage of replacing people with IT & machines is increasing rapidly
- Increasing the use of IT in business also:
 - Creates new job categories
 - Requires more employees with IT knowledge and skills

IT Impacts Employees at Work

- IT Impacts Employees' Health & Safety
 - Job Stress
 - Long-term use of the keyboard & mouse
- IT Provides Opportunities for People with Disabilities
 - Speech-recognition for employees unable to type due to physical impairment
 - Audible screen tips for employees who are visually impaired

FIGURE 1.6 Ergonomic products protect computer users.



Media Bakery



Media Bakery



Media Bakery



Media Bakery

1.4 Importance of Information Systems to Society

- IT Affects Our Quality of Life
- IT Impacts Healthcare

IT Affects Our Quality of Life

- IT has changed the way we work
 - Smartphones provide constant access to text, email, and voice communications
 - The lines between time at work and leisure time at home have become blurred
 - Surveys indicate employees take laptops and smartphones on vacation

IT Impacts Healthcare

- IT used in Healthcare to:
 - Make better/faster diagnoses
 - Streamline the process of researching & developing new drugs
 - To enhance the work of radiologists
 - Allow surgeons to use virtual reality to plan complex surgeries & use robots to remotely perform surgery

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Lecture 3

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Chapter 2

Organizational Strategy, Competitive Advantage, and Information Systems

2.1 Business Processes

- Competitive advantage
- Cross-Functional Processes
- Information Systems and Business Processes

Business Processes

- A **business process** is:
 - an ongoing collection of related activities that create a product or service of value to the organization, its business partners, and/or its customers.
- Comprised of three elements:
 - Inputs (Materials, services, and information).
 - Resources(People and equipment that perform process activities).
 - Outputs(The product or a service created by the process).
- Efficiency vs. Effectiveness.

Business Processes

- Efficiency vs. Effectiveness.

Efficiency focuses on doing things well in the process; for example, progressing from one process activity to another without delay or without wasting money or resources.

Effectiveness focuses on doing the things that matter; that is, creating outputs of value to the process customer—for example, high-quality products.

Table 2.1: Examples of Business Processes (1 of 2)

ACCT Accounting Business Processes	
Managing accounts payable	Managing invoice billings
Managing accounts receivable	Managing petty cash
Reconciling bank accounts	Producing month-end close
Managing cash receipts	Producing virtual close
FIN Finance Business Processes	
Managing account collection	Producing property tax assessments
Managing bank loan applications	Managing stock transactions
Producing business forecasts	Generating financial cash flow reports
Applying customer credit approval and credit terms	
MKT Marketing Business Processes	
Managing post-sale customer follow-up	Handling customer complaints
Collecting sales taxes	Handling returned goods from customers
Applying copyrights and trademarks	Producing sales leads
Using customer satisfaction surveys	Entering sales orders
Managing customer service	Training sales personnel

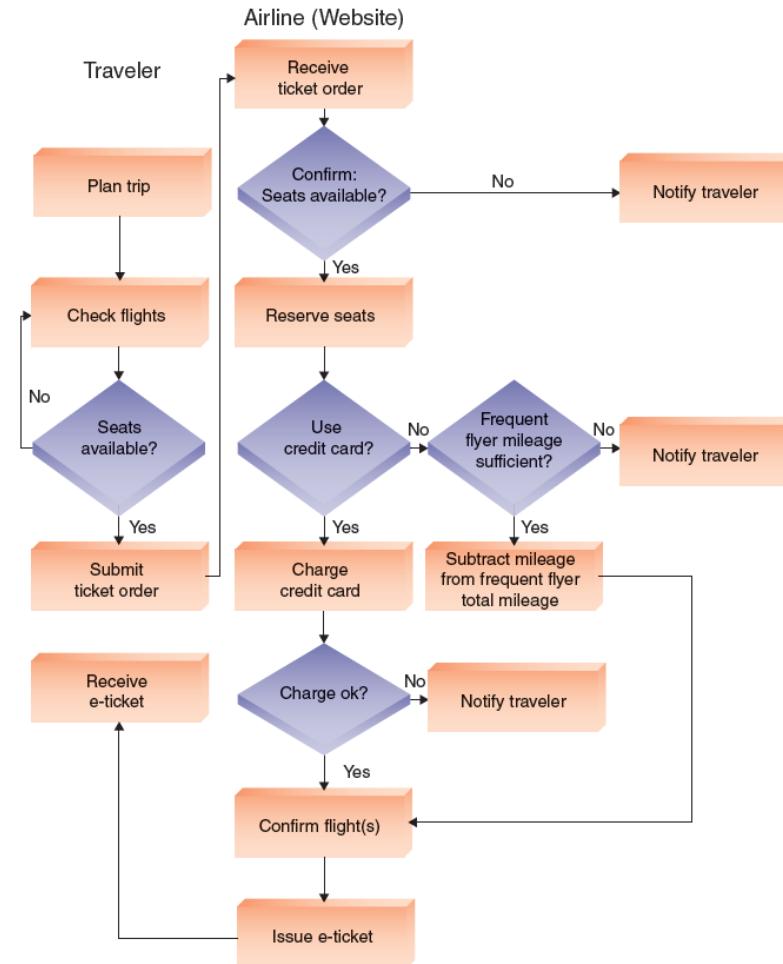
Table 2.1: Examples of Business Processes (2 of 2)

POM Production/Operations Management Business Processes	
Processing bills of materials	Managing quality control for finished goods
Processing manufacturing change orders	Auditing for quality assurance
Managing master parts list and files	Receiving, inspecting, and stocking parts and materials
Managing packing, storage, and distribution	Handling shipping and freight claims
Processing physical inventory	Handling vendor selection, files, and inspections
Managing purchasing	
HRM Human Resources Business Processes	
Applying disability policies	Producing performance appraisals and salary adjustments
Managing employee hiring	Managing resignations and terminations
Handling employee orientation	Applying training and tuition reimbursement
Managing files and records	Managing travel and entertainment
Applying health care benefits	Managing workplace rules and guidelines
Managing pay and payroll	Overseeing workplace safety
MIS Management information Systems Business Processes	
Antivirus control	Applying e-mail policy
Computer security issues incident reporting	Generating Internet use policy
Training computer users	Managing service agreements and emergency services
Computer user and staff training	Applying user workstation standards
Applying disaster recovery procedures	Managing the use of personal software

Cross-Functional Processes

- No single functional area is responsible
- steps executed in a coordinated, collaborative way
- Procurement & Fulfillment Cross-functional processes:
Procurement (warehouse, purchasing, and accounting.)
Fulfillment (sales- warehouse – and accounting)

Figure 2.1 Business process for ordering an e-ticket from an airline website.



Information Systems & Business Processes

- IS's vital role in three areas of business processes
 - Executing the process
 - Capturing and storing process data
 - Monitoring process performance

2.2 Business Process Improvement, Business Process Reengineering, and Business Process Management

- Reengineering
- Improvement
- Management

Measures of Excellence in Executing Business Processes

- Customer Satisfaction
- Cost Reduction
- Cycle and fulfillment time reduction
- Quality
- Differentiation
- Productivity

Measures of Excellence in Executing Business Processes

- Customer Satisfaction: The result of optimizing and aligning business processes to fulfill customers' needs, wants, and desires.
- Cost Reduction: The result of optimizing operations and supplier processes.
- Cycle and fulfillment time reduction: the result of optimizing the manufacturing and logistics processes.

Measures of Excellence in Executing Business Processes

- **Quality:** The result of optimizing the design, development, and production processes.
- **Differentiation:** The result of optimizing the marketing and innovation processes.
- **Productivity:** The result of optimizing each individual's work processes.

Business Process Reengineering (BPR) (1 of 3)

- Michael Hammer & James Champy, 1993, *Reengineering the Corporation*
- **BPR**
 - A redesign of an organization's business processes to increase productivity and profitability
 - Examines business processes with a “clean sheet” approach

Business Process Reengineering (BPR) (2 of 3)

- **BPI**
 - An incremental approach to move an organization toward business process centered operations done by knowledge workers.
 - Focuses on reducing variation in process outputs by identifying the underlying cause of the variation
- Six Sigma is a popular methodology for BPI

Business Process Reengineering (BPR) (3 of 3)

- Five basic phases of successful BPI
 - Define
 - Measure
 - Analyze
 - Improve
 - Control

Business Process Reengineering (BPR)

(3 of 3)

- Five basic phases of successful BPI (**DMAIC**):
 - **Define:** the BPI team documents the existing “as is” process activities, process resources, and process inputs and outputs.
 - **Measure:** the BPI team identifies relevant process metrics and collects data to understand how the metrics evolve over time.
 - **Analyze:** the BPI team examines the “as is” process map and the collected data to identify problems with the process and their root causes.

Business Process Reengineering (BPR) (3 of 3)

- Five basic phases of successful BPI
 - **Improve:** the BPI team identifies possible solutions for addressing the root causes, maps the resulting “to be” process alternatives, and selects and implements the most appropriate solution.
 - **Control:** the BPI team establishes process metrics and monitors the improved process after the solution has been implemented to ensure the process performance remains stable.

BPR versus BPI

BPI

- Low risk / low cost
- Incremental change
- Bottom-up approach
- Takes less time
- Quantifiable results
- All employees trained in BPI

BPR

- High risk / high cost
- Radical redesign
- Top-down approach
- Time consuming
- Impacts can be overwhelming
- High failure rate

Business Process Management (BPM) (1 of 2)

- A management system used to support continuous BPI initiatives for core business processes over time
- Important components of BPM:
 - Process modeling
 - Business Activity Monitoring (BAM)

Business Process Management (BPM) (2 of 2)

- Business Process Management Suite (BPMS)
 - An integrated set of applications used for BPM
- Emerging Trend of Social BPM
 - Technologies enabling employees to collaborate across functions internally and externally using social media tools

Introduction to IS (IS101)

Lecture 4

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Chapter 5

Data and Knowledge Management

Chapter Outline

1. Managing Data
2. The Database Approach
3. Big Data
4. Data Warehouses and Data Marts
5. Knowledge Management
6. Appendix: Fundamentals of Relational Database Operations

5.1 Managing Data

- The Difficulties of Managing Data
- Data Governance

Difficulties in Managing Data

- Data increases exponentially with time
- Multiple sources of data
- New sources of data
- Data rot, or data degradation
- Data security, quality, and integrity
- Government Regulation

Multiple Sources of Data

- Internal Sources
 - Corporate databases, company documents
- Personal Sources
 - Personal thoughts, opinions, experiences
- External Sources
 - Commercial databases, government reports, and corporate Web sites.
 - **Clickstream data:** are those data that visitors and customers produce when they visit a website and click on hyperlinks.

Data Governance

- An approach to manage information across an entire organization.
- **Master Data Management:** a strategy for data governance involving a process that spans all organizational business processes and applications.
- **Master Data:** is a set of core data that span the enterprise information systems.

5.2 The Database Approach

- The Data Hierarchy
- The Relational Database Model

Database Management Systems

A set of programs that provide users with tools to create and manage a database.

Examples:

Oracle – MS SQL Server - MS Access

Database Management Systems

Minimize Three Main Problems

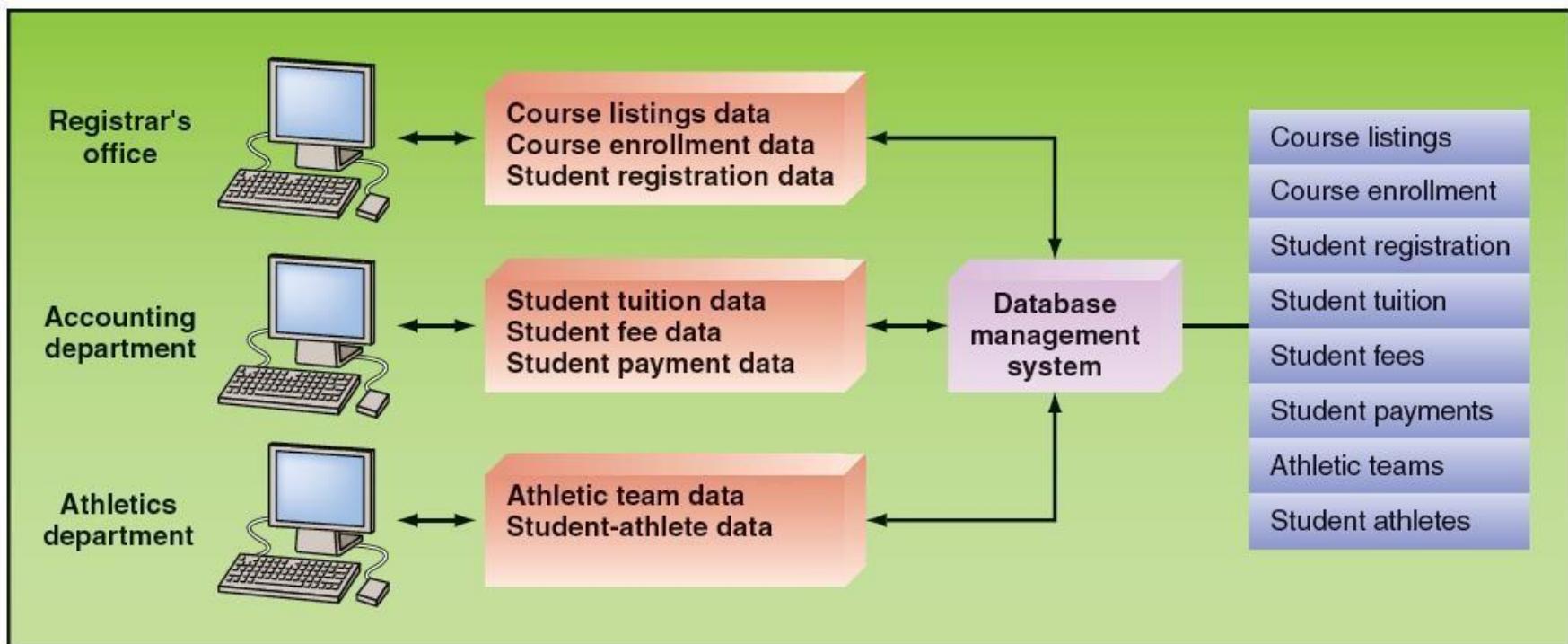
- **Data Redundancy:** The same data are stored in multiple locations.
- **Data Isolation:** Applications cannot access data associated with other applications.
- **Data Inconsistency:** Various copies of the data do not agree.

Database Management Systems

Maximize Three Things

- **Data Security:** Because data are “put in one place” in databases, there is a risk of losing a lot of data at one time. Therefore, databases must have extremely high security measures in place to minimize mistakes and deter attacks.
- **Data Integrity:** Data meet certain constraints; for example, there are no alphabetic characters in a Social Security number field.
- **Data Independence:** Applications and data are independent of one another; that is, applications and data are not linked to each other, so all applications are able to access the same data.

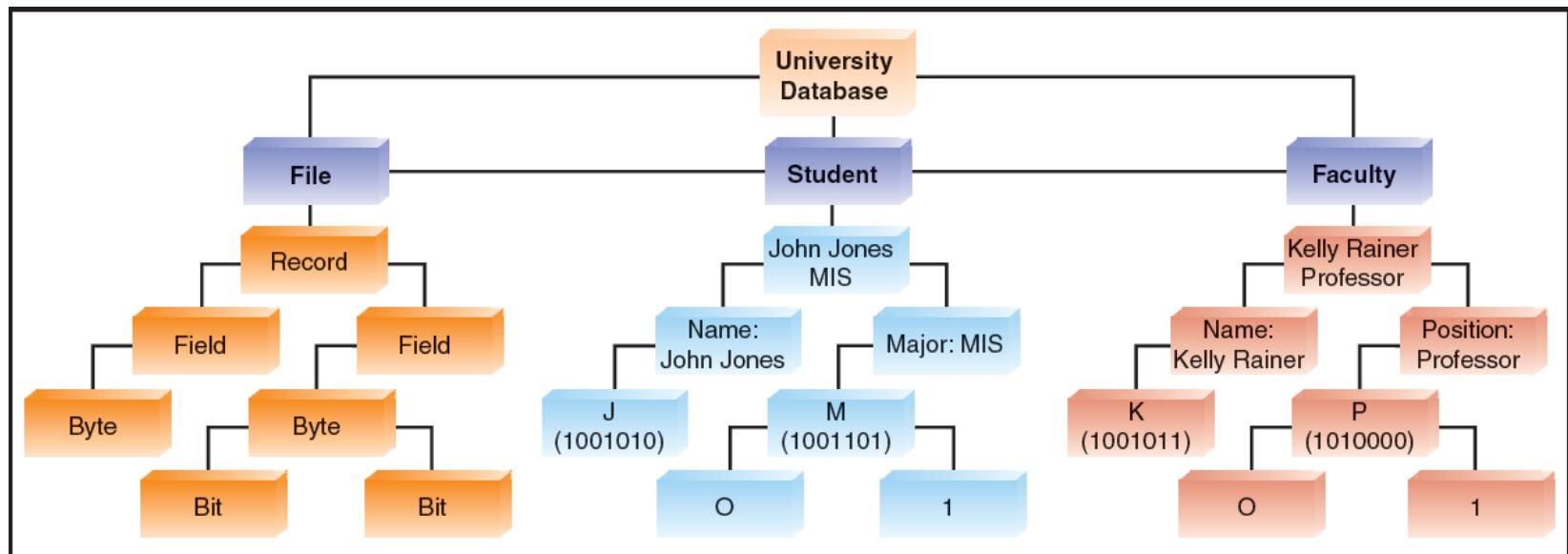
Figure 5.1 Database Management System.



Data Hierarchy

- Bit
- Byte
- Field
- Record
- Data File or Table
- Database

Figure 5.2 Hierarchy of data for a computer-based file.



Data Hierarchy

- Bit (binary digit): represents the smallest unit of data a computer can process and it consists only of a 0 or a 1.
- Byte: A group of eight bits represents a single character (letter, number, or symbol).
- Field: A column of data containing a logical grouping of characters into a word, a small group of words (e.g., last name, social security number, etc.).

Data Hierarchy

- **Record:** A logical grouping of related fields in a row (e.g., student's name, the courses taken, the date, and the grade).
- **Data File or Table:** logical grouping columns and multiple rows. of related records is called a data file or a table similar in appearance to a spreadsheet in Excel consisting of multiple
- **Database:** logical grouping of related data files (database tables).

The Relational Database Model

- Key Terms
 - Database Management System
 - Relational Database Model
 - Entity
 - Instance
 - Attribute
 - Primary Key
 - Foreign or Secondary Keys

The Relational Database Model

- **Relational Database Model:** is based on the concept of two-dimensional tables and is usually designed with a number of related tables with each of these tables contains records (listed in rows) and attributes (listed in columns).
- **Entity:** a person, place, thing, or event (e.g., customer, an employee, or a product).
- **Instance of an entity:** refers to each row (or record) in a relational table, which is a specific, unique representation of the entity.

The Relational Database Model

- **Attribute:** each characteristic or quality of a particular entity.
- **Primary Key:** a field in a database that uniquely identify each record so that it can be retrieved, updated, and sorted.
- **Secondary Key:** a field that has some identifying information, but typically does not identify the record with complete accuracy and therefore cannot serve at the Primary Key.
- **Foreign Key:** a field (or group of fields) in one table that uniquely identifies a row of another table. It is used to establish and enforce a link between two tables.

Figure 5.3 Student database example.

The screenshot shows a Microsoft Access application window titled "Microsoft Access". The menu bar includes File, Edit, View, Insert, Format, Records, Tools, Window, and Help. A toolbar with various icons is visible above the main area. The main window displays a table named "Table1 : Table" with the following data:

	Student Name	Student ID	Major	GPA	Graduation Date
1	Sally Adams	111-12-4321	Finance	2.94	5/12/2005
2	John Jones	420-33-9834	Accounting	3.45	12/5/2005
3	Jane Lee	241-35-7432	MIS	3.17	5/12/2005
4	Kevin Durham	021-79-6679	Economics	2.77	5/12/2005
5	Juan Rodriguez	335-77-5124	Marketing	3.52	12/5/2005
6	Stella Zubnicki	408-99-5798	Operations Man	3.37	8/5/2005
7	Ben Jones	422-89-0011	Finance	3.11	5/12/2005

The status bar at the bottom shows "Record: 1 of 8" and "db2 : D...". The title bar says "Datasheet View".

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Chapter 5

Data and Knowledge Management

Chapter Outline

1. Managing Data
2. The Database Approach
3. **Big Data**
4. **Data Warehouses and Data Marts**

5.3 Big Data

- Defining Big Data
- Characteristics of Big Data
- Entity-relationship diagram model (ERD).

Defining Big Data (1 of 2)

- Difficult to define Big Data
- Two descriptions

Big Data Definition From Gartner Research

- Diverse, high-volume, high-velocity information assets that require new forms of processing to enable enhanced decision making, insight discovery, and process optimization. (www.gartner.com)

Big Data Definition From Big Data Institute

vast data sets that:

- Exhibit variety
- Includes structured, unstructured, and semi-structured data
- Are generated at high velocity with an uncertain pattern
- Do not fit neatly into traditional, structured, relational databases
- Can be captured, processed, transformed, and analyzed in a reasonable amount of time only by sophisticated information systems.
- (www.the-bigdatainstitute.com)

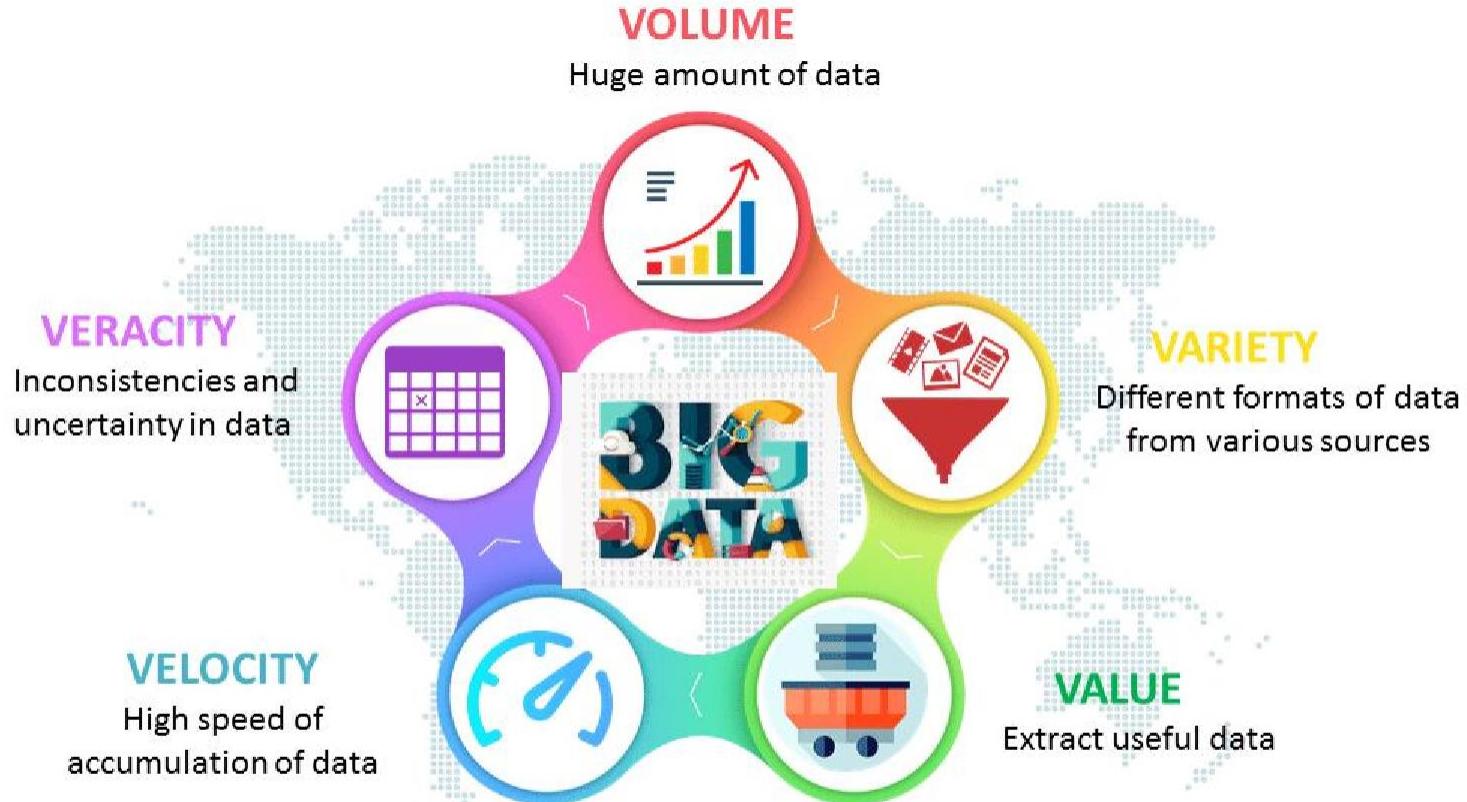
Defining Big Data (2 of 2)

- Big Data Generally Consist of:
 - Traditional enterprise data
 - Machine-generated/sensor data
 - Social Data
 - Images captured by billions of devices located around the world
 - Digital cameras, camera phones, medical scanners, and security cameras

Characteristics of Big Data

- **Volume:** incredible volume of data.
- **Velocity:** the rate at which data flow into an organization is rapidly increasing and it is critical because it increases the speed of the feedback loop between a company and its customers.
- **Variety:** big Data formats change rapidly and can include satellite imagery, broadcast audio streams, digital music files, Web page content.
- **Value:** the amount of valuable, reliable data that needs to be stored, processed, analyzed to find insights.
- **Veracity:** means the degree of reliability that the data has to offer.

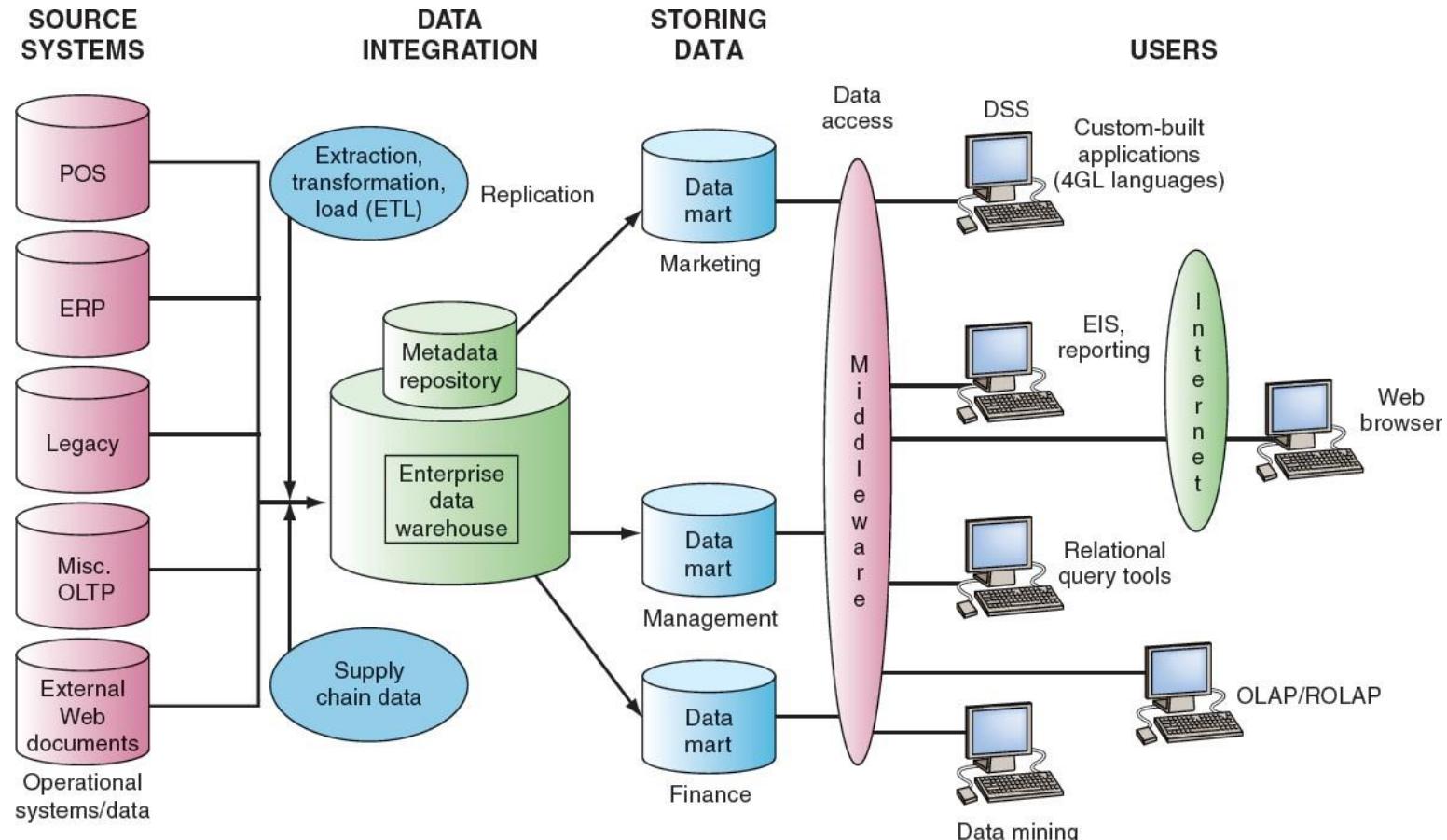
Characteristics of Big Data



Describing Data Warehouses & Data Marts (1 of 2)

- Data Warehouse
 - A repository of historical data that are organized by subject to support decision makers in the organization
- Data Mart
 - A low-cost, scaled-down version of a data warehouse designed for end-user needs in a strategic business unit (SBU) or individual department.

FIGURE 5.4 Data warehouse framework.



Describing Data Warehouses & Data Marts (2 of 2)

- Basic characteristics of data warehouses and data marts
 - Organized by business dimension or subject
 - Use online analytical processing (OLAP)
 - Integrated
 - Time variant
 - Nonvolatile
 - Multidimensional

Describing Data Warehouses & Data Marts (2 of 2)

- Basic characteristics of data warehouses and data marts
 - Organized by business dimension or subject: Data are organized by subject. For example, by customer, vendor, product, price level, and region. This arrangement differs from transactional systems, where data are organized by business process, such as order entry.
 - Use online analytical processing (OLAP): databases use online transaction processing (OLTP), where business transactions are processed online as soon as they occur.

Describing Data Warehouses & Data Marts (2 of 2)

- Basic characteristics of data warehouses and data marts
 - **Integrated:** Data are collected from multiple systems and then integrated around subjects.
 - **Time variant:** Data warehouses and data marts maintain historical data (i.e., data that include time as a variable). Unlike transactional systems, which maintain only recent data (such as for the last day, week, or month), a warehouse or mart may store years of data. Organizations utilize historical data to detect deviations, trends, and long-term relationships.

Describing Data Warehouses & Data Marts (2 of 2)

- Basic characteristics of data warehouses and data marts
- Nonvolatile: Data warehouses and data marts are nonvolatile—that is, users cannot change or update the data.
 - Multidimensional: Typically the data warehouse or mart uses a multidimensional data structure. Recall that relational databases store data in two-dimensional tables.

FIGURE 5.5 Relational databases.

(a) 2016

Product	Region	Sales
Nuts	East	50
Nuts	West	60
Nuts	Central	100
Screws	East	40
Screws	West	70
Screws	Central	80
Bolts	East	90
Bolts	West	120
Bolts	Central	140
Washers	East	20
Washers	West	10
Washers	Central	30

(b) 2017

Product	Region	Sales
Nuts	East	60
Nuts	West	70
Nuts	Central	110
Screws	East	50
Screws	West	80
Screws	Central	90
Bolts	East	100
Bolts	West	130
Bolts	Central	150
Washers	East	30
Washers	West	20
Washers	Central	40

(c) 2018

Product	Region	Sales
Nuts	East	70
Nuts	West	80
Nuts	Central	120
Screws	East	60
Screws	West	90
Screws	Central	100
Bolts	East	110
Bolts	West	140
Bolts	Central	160
Washers	East	40
Washers	West	30
Washers	Central	50

FIGURE 5.6 Data cube.

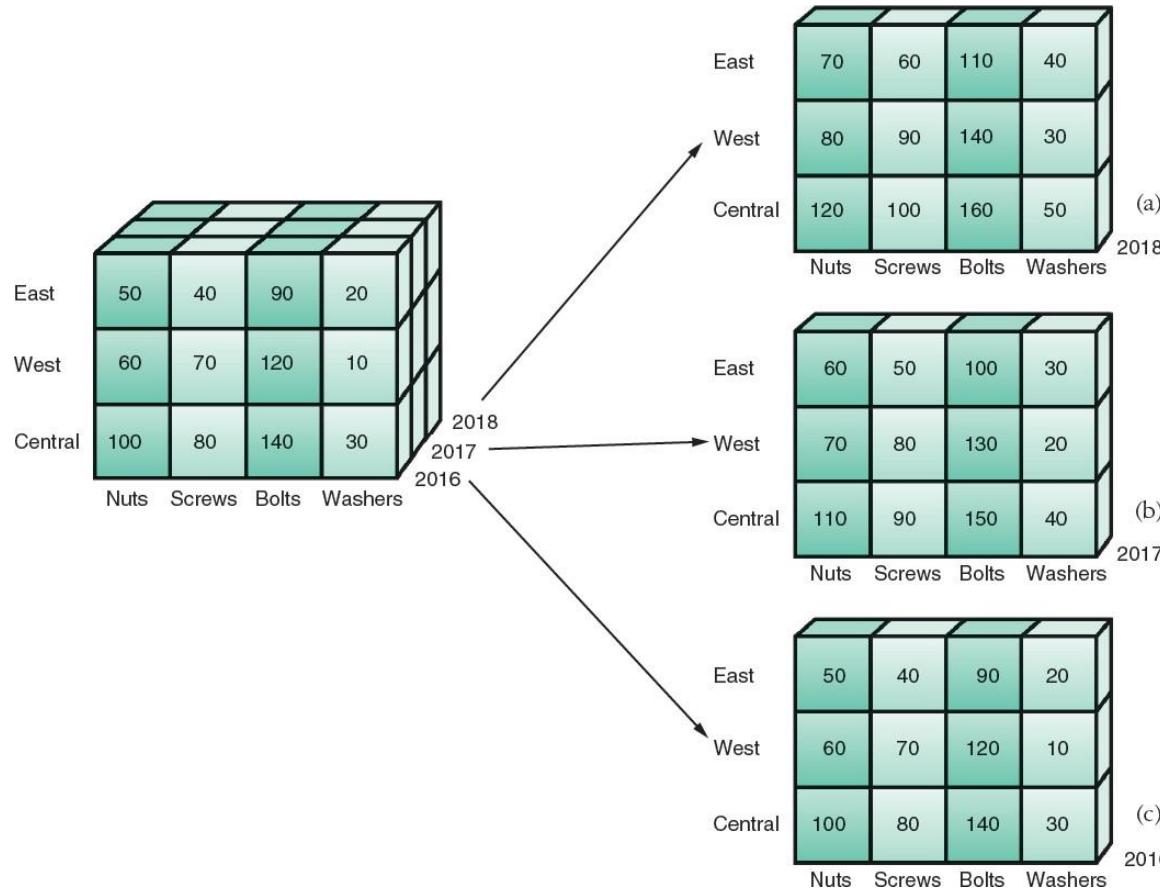
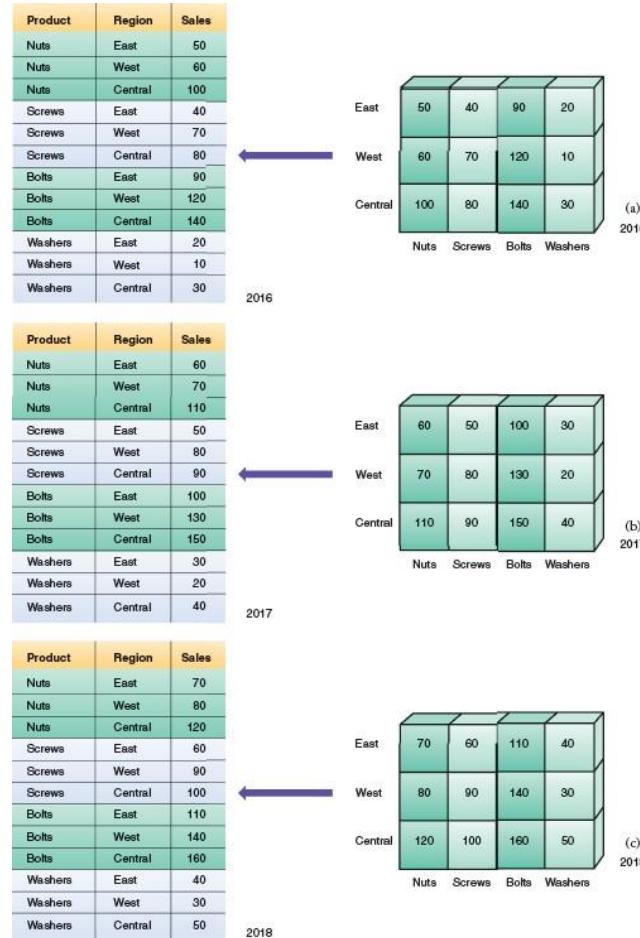


FIGURE 5.7 Equivalence between relational and multidimensional databases.



Entity Relationship Modeling

- Entity Relationship Diagram (ERD)
- Business Rules
- Data Dictionary
- Relationships
 - Unary, Binary, Ternary
- Cardinality
 - Connectivity

Entity Relationship Modeling

- **Entity Relationship Diagram (ERD):** A process by which designers plan and create databases using an entity–relationship diagram.
- **ER Diagrams:** consist of entities, attributes, and relationships.
- **Business Rules:** precise descriptions of policies, procedures, or principles in any organization that stores and uses data to generate information. Business rules are derived from a description of an organization's operations, and help create and enforce business processes in that organization.

Entity Relationship Modeling

- **Data Dictionary:** provides information on each attribute, such as its name, if it is a key, part of a key, or a non-key attribute, the type of data expected (alphanumeric, numeric, dates, etc.), and valid values.
- **Relationships:** illustrate an association between entities.
- **Degree of a Relationship:** indicates the number of entities associated with a relationship.
 - **Unary Relationship:** exists when an association is maintained within a single entity.
 - **Binary Relationship:** exists when two entities are associated.
 - **Ternary Relationship:** exists when three entities are associated.

Entity Relationship Modeling

- **Modality:** refers to the minimum number of times an instance of one entity can be associated with instances in the related entity.
- **Cardinality:** refers to the maximum number of times an instance of one entity can be associated with an instance in the related entity. Cardinality can be mandatory single, optional single, mandatory many, or optional many.

FIGURE 5.9 Cardinality and Modality Symbols



FIGURE 5.10 One-to-one Relationship

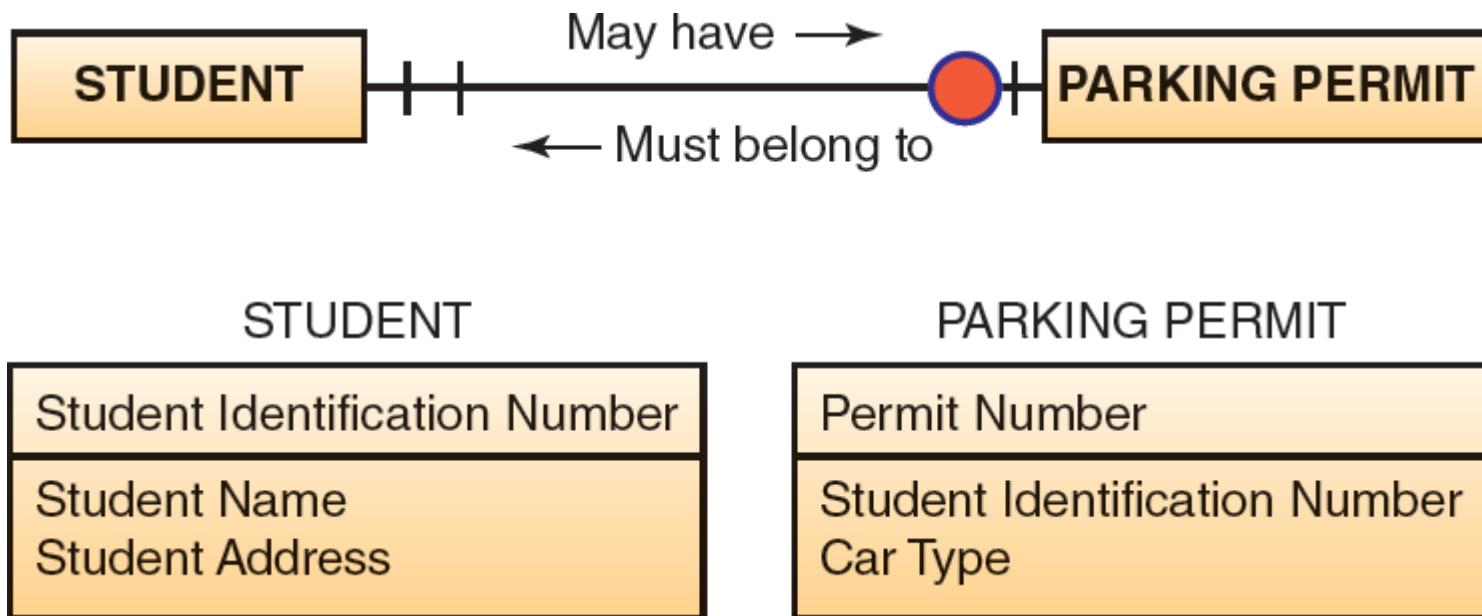


FIGURE 5.11 One-to-Many Relationship

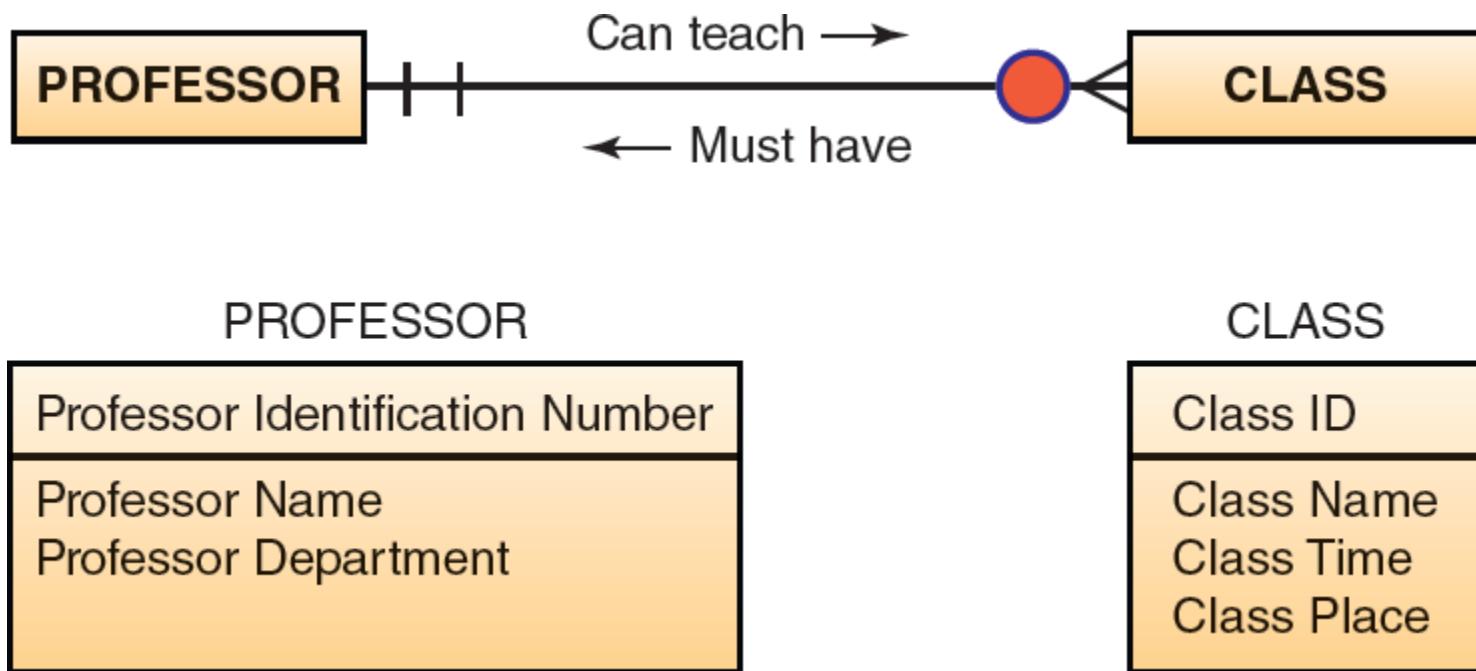
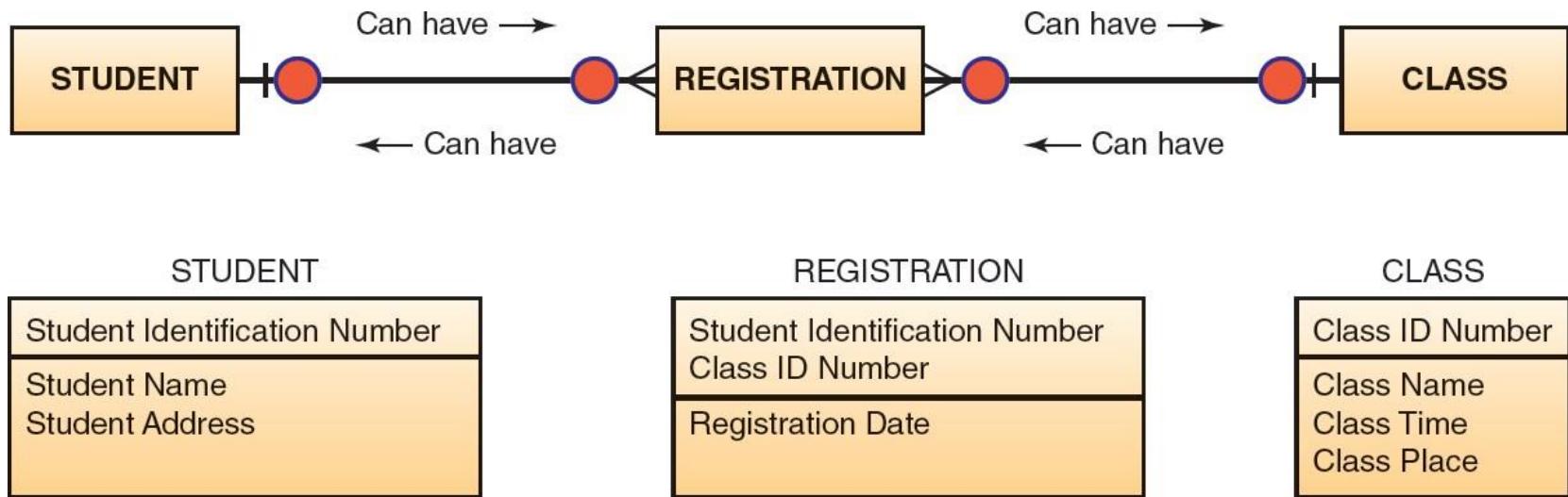
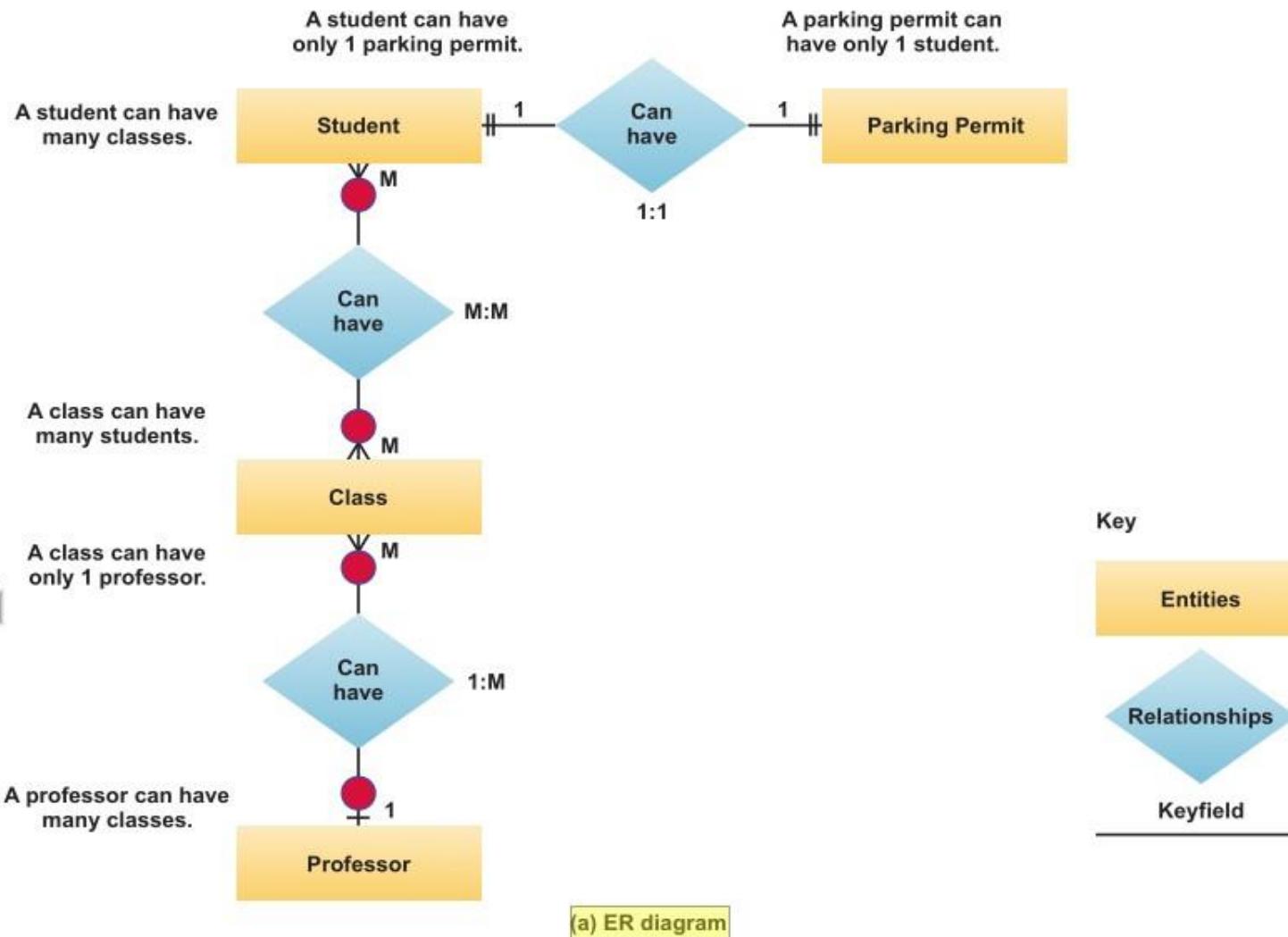


FIGURE 5.12 Many-to-Many Relationship



Entity Relationship Modeling



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Chapter 7

E-Business and E-Commerce

7.1 Overview of E-Business and E-Commerce

- Definitions and Concepts
- Types of E-Commerce
- Major E-Commerce Mechanisms
- Benefits and Limitations of E-Commerce

Definitions and Concepts (1 of 2)

- **Electronic Commerce**
 - The process of buying, selling, transferring, or exchanging products, services, or information via computer networks, including the Internet.
- **Electronic Business (e-business)**
 - A much broader concept than e-commerce
 - Servicing customers, collaborating with business partners, and performing electronic transactions within an organization

Definitions and Concepts (2 of 2)

- **Degree of digitization:** The extent to which the commerce has been transformed from physical to digital which can relate to both **the product or service** being sold and **the delivery agent** or intermediary. In other words, **the product can be either physical or digital, and the delivery agent can also be either physical or digital.**
- **Brick-and-Mortar organizations:** organizations that exist as purely physical organizations.

Definitions and Concepts (2 of 2)

- **Virtual Organizations:** all dimensions of the organization are digital and they engage in pure electronic commerce only.
- **Clicks-and-Mortar Organizations:** organizations that are partial electronic commerce (EC) combining both virtual and physical dimensions.

Types of E-Commerce

- Business-to-consumer (B2C)
- Business-to-business (B2B)
- Consumer-to-consumer (C2C)
- Business-to-employee (B2E)
- E-Government
- Mobile commerce (M-commerce)
- Social commerce
- Conversational commerce

Types of E-Commerce

- Business-to-consumer (B2C): the sellers are organizations, and the buyers are individuals.
- Business-to-business (B2B): both the sellers and the buyers are business organizations. B2B comprises the vast majority of EC volume.

Types of E-Commerce

- Consumer-to-consumer (C2C): an individual sells products or services to other individuals.
- Business-to-employee (B2E): an organization uses EC internally to provide information and services to its employees.

Types of E-Commerce

- **E-Government:** E-government is the use of Internet technology in general and e-commerce in particular to deliver information and public services to citizens.
- **Mobile commerce (M-commerce):** e-commerce that is conducted entirely in a wireless environment.

Types of E-Commerce

- **Social commerce:** The delivery of electronic commerce activities and transactions through social computing.
- **Conversational commerce:** Also called **chat commerce**, refers to electronic commerce using messaging and chat apps to offer a daily choice, often personalized, of a meal, product, or service.

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Chapter 7

E-Business and E-Commerce

7.1 Overview of E-Business and E-Commerce

- Definitions and Concepts
- Types of E-Commerce
- Major E-Commerce Mechanisms
- Benefits and Limitations of E-Commerce

E-Commerce Business Models (1 of 2)

- Online direct marketing
- Electronic tendering system
- Name-your-own-price
- Find-the-best-price
- Affiliate marketing
- Viral marketing
- Group purchasing (e-coops)

E-Commerce Business Models (2 of 2)

- Online Auctions
- Product customization
- Electronic marketplaces
- Bartering online
- Deep discounters
- Membership

E-Commerce Business Models (1 of 2)

- **Online direct marketing:** Manufacturers or retailers sell directly to customers. Very efficient for digital products and services. Can allow for product or service customization (www.dell.com).
- **Electronic tendering system:** Businesses request quotes from suppliers.
- **Name-your-own-price:** Customers decide how much they are willing to pay. An intermediary tries to match a provider (www.priceline.com).

E-Commerce Business Models (1 of 2)

- **Find-the-best-price:** Customers specify a need; an intermediary compares providers and shows the lowest price. Customers must accept the offer in a short time, or they may lose the deal (www.hotwire.com).
- **Affiliate marketing:** Vendors ask partners to place logos (or banners) on partner's site. If customers click on logo, go to vendor's site, and make a purchase, then the vendor pays commissions to the partners

E-Commerce Business Models (1 of 2)

- **Viral marketing:** Recipients of your marketing notices send information about your product to their friends.
- **Group purchasing (e-coops):** (e-coops) Small buyers aggregate demand to create a large volume; the group then conducts tendering or negotiates a low price

E-Commerce Business Models (2 of 2)

- **Online Auctions:** Companies run auctions of various types on the Internet. Very popular in C2C, but gaining ground in other types of EC as well (www.ebay.com).
- **Product customization:** Customers use the Internet to self configure products or services. Sellers then price them and fulfill them quickly (build-to-order) (www.jaguar.com).

E-Commerce Business Models (2 of 2)

- **Electronic marketplaces:** Transactions are conducted efficiently (more information to buyers and sellers, lower transaction costs) in electronic marketplaces (private or public)
- **Bartering online:** Intermediary administers online exchange of surplus products and/or company receives “points” for its contribution, which it can use to purchase other needed items (www.bbu.com).

E-Commerce Business Models (2 of 2)

- **Deep discounters:** Company offers deep price discounts. Appeals to customers who consider only price in their purchasing decisions (www.half.com)
- **Membership:** Only members can use the services provided, including access to certain information, conducting trades, etc. (www.egreetings.com)

Major E-Commerce Mechanisms

- Electronic catalogs
- Electronic auctions
- E-storefronts
- E-malls
- E-marketplaces

Major E-Commerce Mechanisms

- **Electronic catalogs:** consist of a product database, a directory and search capabilities, and a presentation function. They are the backbone of most e-commerce sites.
- **Electronic auctions:** **Auction:** a competitive buying and selling process in which prices are determined dynamically by competitive bidding.

Major E-Commerce Mechanisms

- **Forward Auctions:** sellers solicit bids from many potential buyers and prices tend to increase over time.
- **Reverse Auctions:** one buyer, usually an organization, wants to purchase a product or a service and buyer posts a request for quotation (RFQ) on its Web site or on a third party site. Prices tend to decrease over time.

Major E-Commerce Mechanisms

- **E-storefronts:** a Web site that represents a single store.
- **E-malls:** (also known as a cybermall or an e-mall) a collection of individual shops consolidated under one Internet address and they are closely associated with B2C electronic commerce.
- **E-marketplaces: (e-marketplace):** a central, virtual market space on the Web where many buyers and many sellers can conduct e-commerce and e-business activities.

Benefits and Limitations of E-Commerce

Benefits

- National and International markets are more Accessible
- Lowers costs of processing, distributing, and retrieving information
- Provides access to a vast number of products and services 24/7
- Deliver information, services, and products to people in cities, rural areas, and developing countries

Limitations

- Lack of universally accepted security standards
- In less-developed countries telecommunications bandwidth is often insufficient, and Web access is expensive
- Perceptions that e-commerce is insecure
- Unresolved legal issues
- Lacks a critical mass of buyers and sellers

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Lecture 8

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Chapter 10

Information Systems within the Organization

Learning Objectives

1. Explain the purpose of transaction processing systems.
2. Explain the types of support information systems can provide for each functional area of the organization.
3. Identify advantages and drawbacks to businesses implementing an enterprise resource planning system.
4. Describe the three main business processes supported by ERP systems.

Chapter Outline

1. Transaction Processing Systems
2. Functional Area Information Systems
3. Enterprise Resource Planning (ERP) Systems
4. ERP Support for Business Processes

10.1 Transaction Processing Systems (TPS)

Transaction: any business event that generates data worthy of being captured and stored in a database (e.g., product manufactured, a service sold, a person hired, and a payroll check generated)

Transaction Processing System (TPS): supports the monitoring, collection, storage, and processing of data from the organization's basic business transactions, each of which generates and collects data continuously, in real time.

10.1 Transaction Processing Systems (TPS)

Online Transaction Processing (OLTP): business transactions are processed online as soon as they occur, and system performs these tasks in real time by means of online technologies.

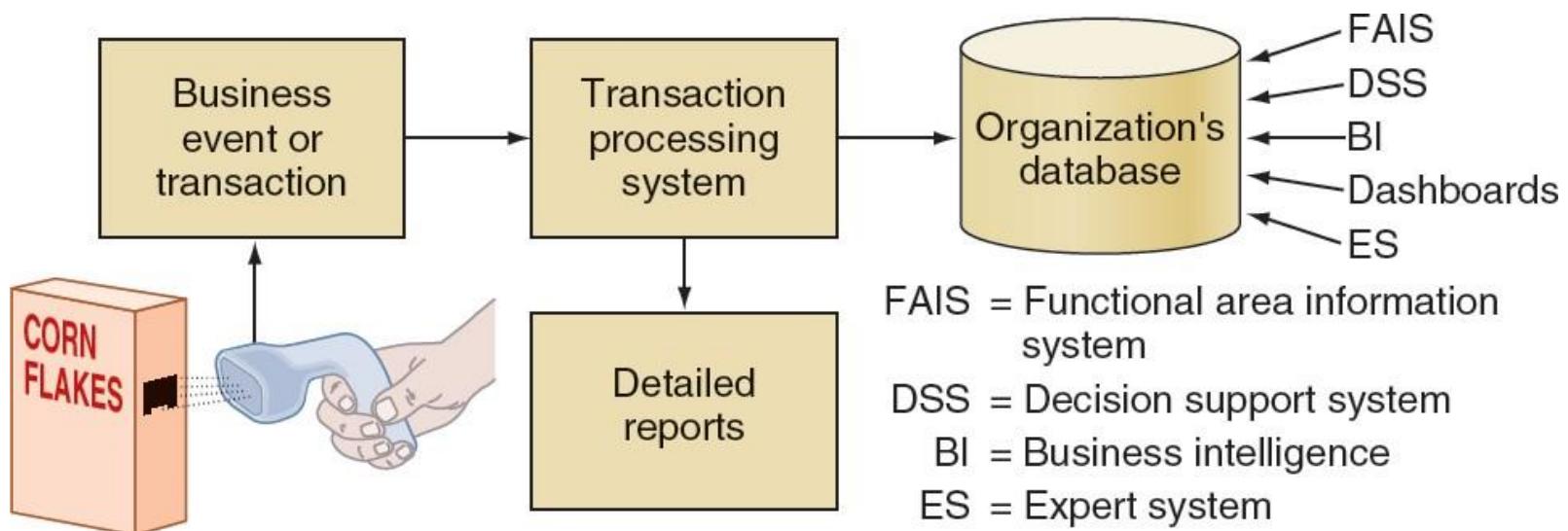
Source Data Automation: a process in which organizations try to automate the TPS data entry as much as possible because of the large volume involved.

Batch Processing: the firm collects data from transactions as they occur, placing them in groups or batches then prepares and processes the batches periodically.

Transaction Processing Systems (TPS)

- Transaction Processing System (TPS)
 - Continuous ‘real-time’ data collection
 - Efficiently handle high volumes of data and large variations in those volumes
 - Avoid errors and downtime
 - Record results accurately and securely
 - Maintain privacy and security
 - Source data automation
 - Batch processing

Figure 10.1 How transaction processing systems manage data.



10.2 Functional Area Information Systems

- Information Systems for Accounting and Finance
- Information Systems for Marketing
- Information Systems for Production/Operations Management
- Information Systems for Human Resource Management

Information Systems for Accounting and Finance

Accounting and finance functional areas are used to manage money flows into, within, and out of organizations. This mission is very broad because money is involved in all organizational functions.

Some selected activities of the accounting/finance functional area:

Financial Planning and Budgeting

Managing Financial Transactions

Investment Management

Control and Auditing

Financial Planning and Budgeting

Financial Planning and Budgeting: Appropriate management of financial assets and is an important part of managerial planning for both acquiring and utilizing resources.

- **Financial and economic forecasting:** Knowledge about the availability and cost of money a key ingredient for successful financial planning including flow projections which inform organizations what funds they need, when they need them, and how they will acquire them.

- **Budgeting:** allocates the organization's financial resources among participants and activities allowing management to distribute resources in the way that best supports the organization's mission and goals.

Managing Financial Transactions

Managing Financial Transactions: accounting/finance software packages that are integrated with other functional areas (e.g., Peachtree offers a sales ledger, a purchase ledger, a cash book, sales order processing, invoicing, stock control, a fixed assets register, etc.).

Organizations, business processes, and business activities operate with, and manage, financial transactions.

- **Global stock exchanges**
- **Managing multiple currencies**
- **Virtual close**
- **Expense management automation (EMA)**

Managing Financial Transactions

- **Global stock exchanges:** Financial markets operate in global, 24/7/365, distributed electronic stock exchanges that use the Internet both to buy and sell stocks and to broadcast real-time stock prices.
- **Managing multiple currencies:** Financial and accounting systems utilize financial data from different countries to convert currencies (with conversion ratios that constantly flux) in seconds.

Managing Financial Transactions

- **Virtual close:** the ability to close the books (accounting records) quickly at any time, on very short notice (rather than quarterly) which provides almost real-time information on the organization's financial health.
- **Expense management automation (EMA):** systems that automate the data entry and processing of travel and entertainment expenses through Web-based applications that enable companies to quickly and consistently collect expense information, enforce company policies and contracts, and reduce unplanned purchases as well as airline and hotel expenses.

Investment Management

Investment Management: Systems for managing organization investments in stocks, bonds, real estate, and other assets that are subject to complex regulations and tax laws, which vary from one location to another.

Control and Auditing

- **Control and Auditing:** effectively control their finances and financial statements.

Let us examine some of the most common forms of financial control.

- **Budgetary control:** managers at various levels monitor departmental expenditures and compare them against the budget and the operational progress of corporate plans.
- **Auditing:** monitoring how the organization's monies are being spent and assessing the organization's financial health.

Control and Auditing

- **Two basic purposes of Audits**
 - Monitor how the organization's monies are being spent.
 - Access the organization's financial health.
- **Financial ratio analysis:** monitoring the company's financial health by assessing a set of financial ratios including liquidity ratios (the availability of cash to pay debt), activity ratios (how quickly a firm converts noncash assets to cash assets), debt ratios (measure the firm's ability to repay long-term debt), and profitability ratios (measure the firm's use of its assets and control of its expenses to generate an acceptable rate of return).

Information Systems for Marketing

- It is impossible to overestimate the importance of customers to any organization. Therefore, any successful organization must understand its customers' needs and wants and then develop its marketing and advertising strategies around them.
- Information systems provide numerous types of support to the marketing function. In fact, customer-centric organizations are so important that we devote one half of **Chapter 11** to this topic.

N.B. Chapter 11 - Customer Relationship Management and Supply Chain Management (Out of Scope)

Information Systems for Production/ Operations Management (POM)

The POM function in an organization is responsible for the processes that transform inputs into useful outputs as well as for the overall operation of the business.

- **In-House Logistics and Materials Management:** Logistics management deals with ordering, purchasing, inbound logistics (receiving), and outbound logistics (shipping) activities.

Information Systems for Production/ Operations Management (POM)

Related activities to In-House Logistics and Materials Management include inventory management and quality control.

- **Inventory Management:** determines how much inventory an organization should maintain.
- **Quality Control:** provide information about the quality of incoming material and parts, as well as the quality of in-process semifinished and finished products. These systems record the results of all inspections and compare the actual results to established metrics. They also generate periodic reports containing information about quality.

Information Systems for Production/ Operations Management (POM)

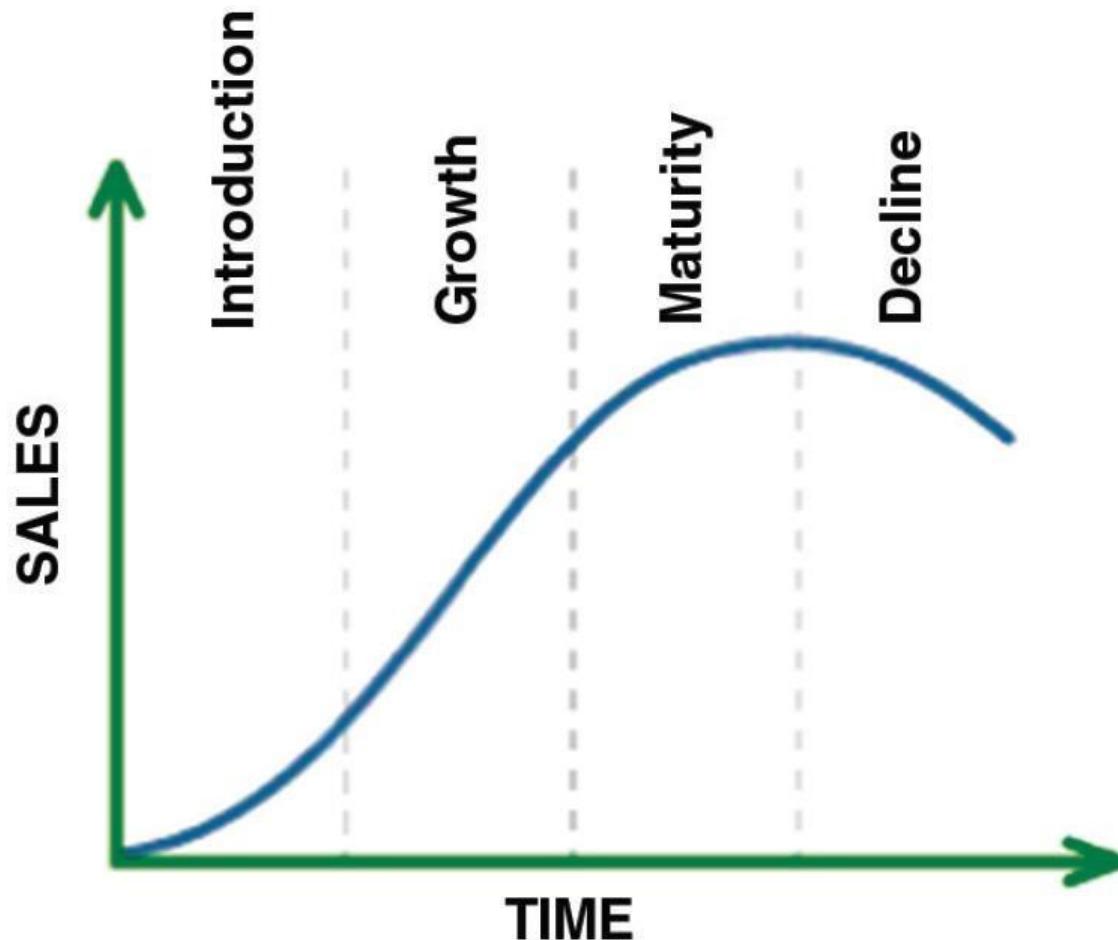
- **Planning Production and Operations:** POM planning is supported by IT. POM planning has evolved from material requirements planning (MRP), to manufacturing resource planning (MRP II), to enterprise resource planning (ERP).
- **Computer-Integrated Manufacturing (CIM):** also called (digital manufacturing) is an approach that integrates various automated factory systems. CIM has three basic goals: (1) simplify all manufacturing technologies and techniques, (2) automate as many of the manufacturing processes as possible, and (3) integrate and coordinate all aspects of design, manufacturing, and related functions via computer systems.

Information Systems for Production/ Operations Management (POM)

- **Product Life Cycle Management (PLM):** is a business strategy that enables manufacturers to share product-related data that support product design and development and supply chain operations.

PLM applies Web-based collaborative technologies to product development. By integrating formerly disparate functions, such as a manufacturing process and the logistics that support it, PLM enables these functions to collaborate, essentially forming a single team that manages the product from its inception through its completion.

Figure 10.2 Product life cycle.



Information Systems for Human Resource Management

- **Recruitment:** systems that assist human resource personnel in finding potential employees, evaluating them, and deciding which ones to hire.
- **Human Resources Development:** IS that assist human resource personnel in helping new hires become part of the corporate human resources pool through evaluation and development.
- **Human Resources Planning and Management:** Managing human resources in large organizations requires extensive planning and detailed strategy.

Information Systems for Human Resource Management

Human Resources Planning and Management

- Payroll and employees' records: HR department is responsible for payroll preparation. This process is typically automated with paychecks being printed or money being transferred electronically into employees' bank accounts.
- Benefits administration: Employees' work contributions to their organizations are rewarded by wages, bonuses, and other benefits. Benefits include health and dental care, pension contributions, wellness centers, and childcare centers.
- Employee relationship management: Some companies are developing employee relationship management (ERM) applications like a call center for employees' problems.

Figure 10.1 Activities Supported by Functional Area Information Systems (FAIS)

Accounting and Finance
Financial planning—and cost of money
Budgeting—allocates financial resources among participants and activities
Capital budgeting—financing of asset acquisitions
Managing financial transactions
Handling multiple currencies
Virtual close—the ability to close the books at any time on short notice
Investment management—managing organizational investments in stocks, bonds, real estate, and other investment vehicles
Budgetary control—monitoring expenditures and comparing them against the budget
Auditing—ensuring the accuracy of the organization's financial transactions and assessing the condition of the organization's financial health
Payroll
Marketing and Sales
Customer relations—know who customers are and treat them like royalty
Customer profiles and preferences
Sales force automation—using software to automate the business tasks of sales, thereby improving the productivity of salespeople
Production/Operations and Logistics
Inventory management—when to order new inventory, how much inventory to order, and how much inventory to keep in stock

Figure 10.1 Activities Supported by Functional Area Information Systems (FAIS)

Quality control—controlling for defects in incoming material and defects in goods produced

Materials requirements planning—planning process that integrates production, purchasing, and inventory management of interdependent items (MRP)

Manufacturing resource planning—planning process that integrates an enterprise's production, inventory management, purchasing, financing, and labor activities (MRP II)

Just-in-time systems—a principle of production and inventory control in which materials and parts arrive precisely when and where needed for production (JIT)

Computer-integrated manufacturing—a manufacturing approach that integrates several computerized systems, such as computer-assisted design (CAD), computer-assisted manufacturing (CAM), MRP, and JIT

Product life cycle management—business strategy that enables manufacturers to collaborate on product design and development efforts, using the Web

Human Resource Management

Recruitment—finding employees, testing them, and deciding which ones to hire

Performance evaluation—periodic evaluation by superiors

Training

Employee records

Benefits administration—retirement, disability, unemployment, etc.

Figure 10.3 Examples of information systems supporting the functional areas.

ACCOUNTING	FINANCE	HUMAN RESOURCES	PRODUCTION/ OPERATIONS	MARKETING	STRATEGIC
Auditing, Budgeting	Investment Management	Benefits Administration, Performance Evaluation	Quality Control, Inventory Management	Customer Relations, Sales Force Automation	TACTICAL
Payroll, Accounts Payable, Accounts Receivable	Manage Cash, Manage Financial Transactions	Maintain Employee Records	Order Fulfillment, Order Processing	Set Pricing, Profile Customers	OPERATIONAL

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Chapter 10

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Chapter Outline

1. Transaction Processing Systems
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3. Enterprise Resource Planning (ERP) Systems
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10.3 Enterprise Resource Planning (ERP) Systems

ERP Systems: designed to correct a lack of communication among the functional area IS and they adopt a business process view of the overall organization to integrate the planning, management, and use of all of an organization's resources, employing a common software platform and database.

Enterprise Application Integration (EAII) System: integrates existing systems by providing software, called middleware, that connects multiple applications allowing existing applications to communicate and share data.

ERP II Systems

ERP II systems are interorganizational ERP systems that provide Web-enabled links among a company's key business system and its customers, suppliers, distributors, and other relevant parties

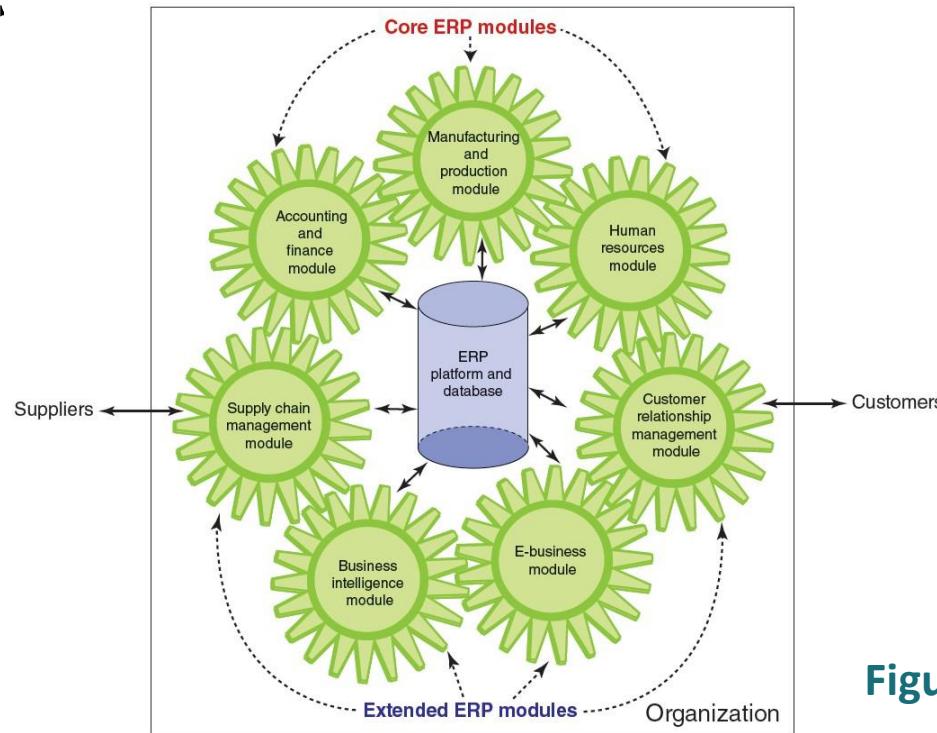


Figure 10.4 ERP II System

ERP II Systems Cont.

Core ERP Modules

Financial Management. These modules support accounting, financial reporting, performance management, and corporate governance. They manage accounting data and financial processes such as general ledger, accounts payable, accounts receivable, fixed assets, cash management and forecasting, product-cost accounting, cost-center accounting, asset accounting, tax accounting, credit management, budgeting, and asset management.

Operations Management. These modules manage the various aspects of production planning and execution such as demand forecasting, procurement, inventory management, materials purchasing, shipping, production planning, production scheduling, materials requirements planning, quality control, distribution, transportation, and plant and equipment maintenance.

Human Resource Management. These modules support personnel administration (including workforce planning, employee recruitment, assignment tracking, personnel planning and development, and performance management and reviews), time accounting, payroll, compensation, benefits accounting, and regulatory requirements.

Extended ERP Modules

Customer Relationship Management. (Discussed in detail in Chapter 11.) These modules support all aspects of a customer's relationship with the organization. They help the organization to increase customer loyalty and retention, and thus improve its profitability. They also provide an integrated view of customer data and interactions, helping organizations to be more responsive to customer needs.

Supply Chain Management. (Discussed in detail in Chapter 11.) These modules manage the information flows between and among stages in a supply chain to maximize supply chain efficiency and effectiveness. They help organizations plan, schedule, control, and optimize the supply chain from the acquisition of raw materials to the receipt of finished goods by customers.

Business Intelligence. (Discussed in detail in Chapter 12.) These modules collect information used throughout the organization, organize it, and apply analytical tools to assist managers with decision making.

E-Business. (Discussed in detail in Chapter 7.) Customers and suppliers demand access to ERP information including order status, inventory levels, and invoice reconciliation. Further, they want this information in a simplified format that can be accessed via the Web. As a result, these modules provide two channels of access into ERP system information—one channel for customers (B2C) and one for suppliers and partners (B2B).

Table 10.2 ERP Modules

Core ERP Modules

- ***Financial Management:*** modules support accounting, financial reporting, performance management, and corporate governance. They manage accounting data and financial processes such as general ledger, accounts payable, accounts receivable, fixed assets, etc.
- ***Operations Management:*** modules manage the aspects of production planning and execution such as demand forecasting, procurement, inventory management, materials purchasing, shipping, production planning, production scheduling, materials requirements planning, quality control, distribution, transportation, and plant and equipment maintenance.

Core ERP Modules Cont.

- ***Human Resource Management (HRM):*** modules support personnel administration (including workforce planning, employee recruitment, assignment tracking, personnel planning and development, and performance management and reviews), time accounting, payroll, compensation, benefits accounting, and regulatory requirements.

Extended ERP Modules

Customer Relationship Management (CRM): modules support all aspects of a customer's relationship with the organization. They help the organization to increase customer loyalty and retention, and thus improve its profitability. They also provide an integrated view of customer data and interactions, helping organizations to be more responsive to customer needs.

Supply Chain Management (SCM): modules manage the information flows between and among stages in a supply chain to maximize supply chain efficiency and effectiveness. They help organizations plan, schedule, control, and optimize the supply chain from the acquisition of raw materials to the receipt of finished goods by customers.

Extended ERP Modules Cont.

Business Intelligence (BI): modules collect information used throughout the organization, organize it, and apply analytical tools to assist managers with decision making.

E-Business: customers and suppliers demand access to ERP information including order status, inventory levels, and invoice reconciliation. Furthermore, they want this information in a simplified format that can be accessed via the Web. As a result, these modules provide two channels of access into ERP system information—one channel for customers (B2C) and one for suppliers and partners (B2B).

Benefits and Limitations of ERP Systems

- Major Benefits of ERP Systems
- Major limitations of ERP implementations
- Major causes of ERP implementation failure

Major Benefits of ERP Systems

- **Organizational Flexibility and Agility:** ERP systems break down many former departmental and functional silos of business processes, information systems, and information resources making organizations more flexible, agile, and adaptive.
- **Decision Support:** provide essential information on business performance across functional areas which significantly improves managers' ability to make better, more timely decisions.
- **Quality and Efficiency:** ERP systems integrate and improve an organization's business processes, generating significant improvements in the quality of production, distribution, and customer service.

Major Limitations of ERP Implementations

- **Business Processes Predefined by Best Practices:** may require companies need to change their existing business processes to fit the predefined business processes incorporated into the ERP software.
- **Difficult to Implement:** ERP systems can be extremely complex, expensive, and time consuming to implement.

Major Causes of ERP Implementation Failure

- Failure to involve affected employees in the planning and development phases and in change management processes.
- Trying to do too much too fast in the conversion process.
- Insufficient training in the new work tasks required by the ERP system.
- The failure to perform proper data conversion and testing for the new system.

Implementing ERP Systems

- **On-Premise ERP Implementation**
 - **Vanilla Approach:** a company implements a standard ERP package, using the package's built-in configuration options.
 - **Custom Approach:** a company implements a more customized ERP system by developing new ERP functions designed specifically for that firm.
 - **Best of Breed Approach:** combines the benefits of the vanilla and customized systems while avoiding the extensive costs and risks associated with complete customization.

Implementing ERP Systems Cont.

- **Software-as-a-Service (SaaS) ERP Implementations**

Companies can acquire ERP systems without having to buy a complete software solution (i.e., on-premise ERP implementation). Many organizations are utilizing software-as-a-service (SaaS in [Chapter 13](#) and [Technology Guide 3](#)) to acquire cloud-based ERP systems. (Cloud computing in [Technology Guide 3](#).)

- Three major advantages of using a cloud-based ERP system.
- Three major disadvantages of using cloud-based ERP systems.

Three major advantages of using a cloud-based ERP system are:

- The system can be used from any location that provides Internet access.
- Companies using cloud-based ERP avoid the initial hardware and software expenses that are typical of on-premise implementations.
- Cloud-based ERP solutions are scalable, meaning it is possible to extend ERP support to new business processes and new business partners (e.g., suppliers) by purchasing new ERP modules.

Three major disadvantages of using cloud-based ERP systems are:

- It is not clear whether cloud-based ERP systems are more secure than on-premise systems.
- Companies that adopt cloud-based ERP systems sacrifice their control over a strategic IT resource.
- Lack of control over IT resources when the ERP system experiences problems.

10.4 ERP Support for Business Processes

- **The Procurement, Fulfillment, and Production Processes**
 - **Procurement Process:** originates when a company needs to acquire goods or services from external sources, and it concludes when the company receives and pays for them.
 - **Order Fulfillment Process:** (order-to-cash process) process in which the company sells goods to a customer originating when the company receives a customer order, and concluding when the company receives a payment from the customer.

10.4 ERP Support for Business Processes

- **The Procurement, Fulfillment, and Production Processes**
 - **Production Process:** occurring only in companies that produce physical goods, this process follows one of two strategies: make-to-stock and make-to-order.
- **Interorganizational Processes: ERP with SCM and CRM**
 - SCM and CRM.
 - ERP SCM.
 - ERP CRM.

Figure 10.5 Departments and documents flow in the procurement process.

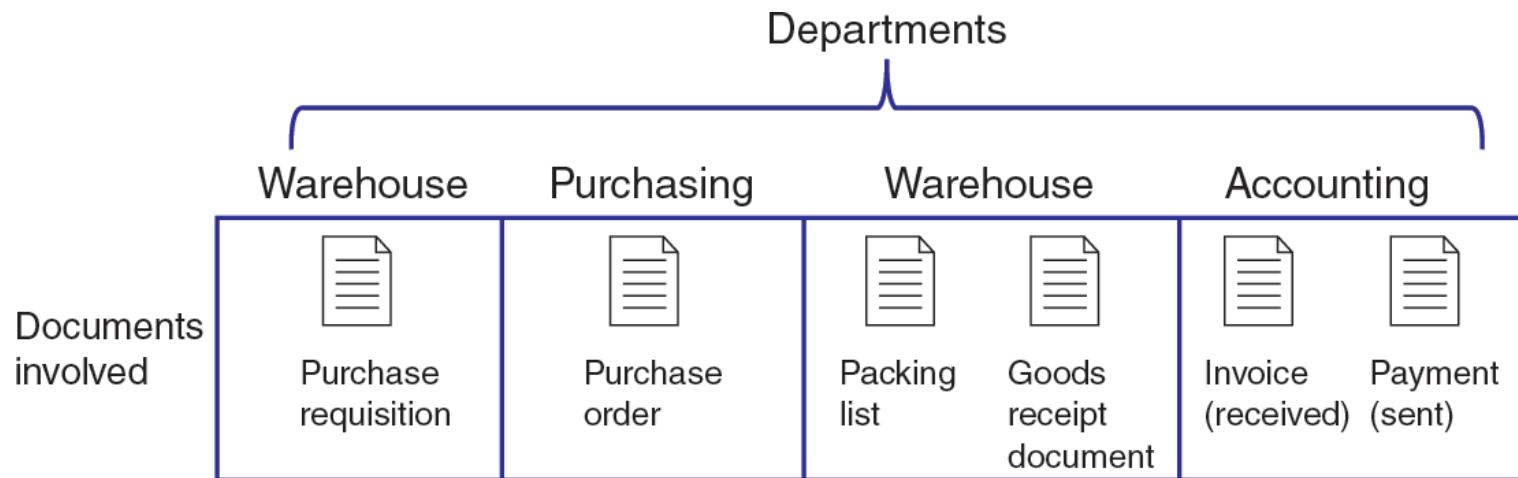


Figure 10.6 Departments and documents flow in the fulfillment process.

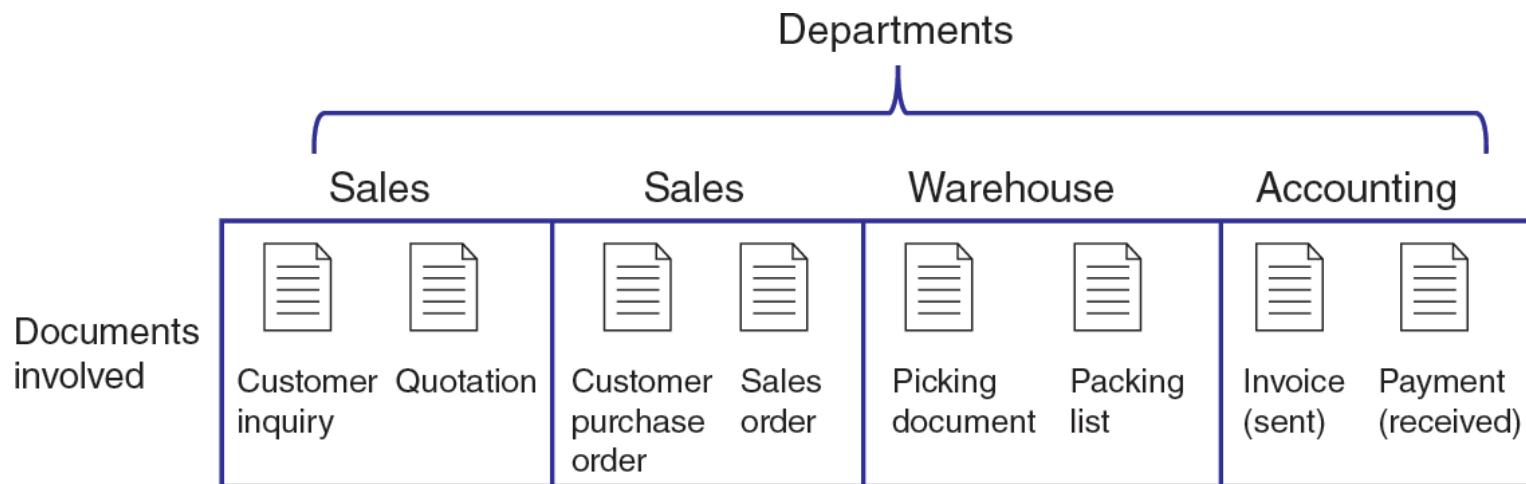


Figure 10.7 Departments and documents flow in the production process.

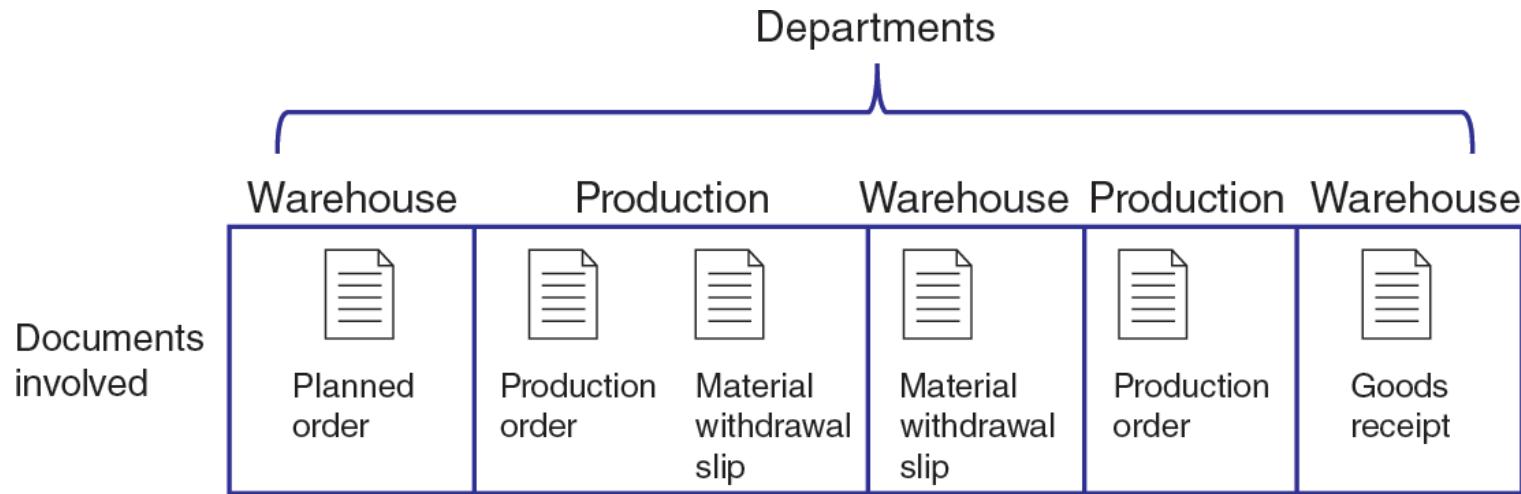
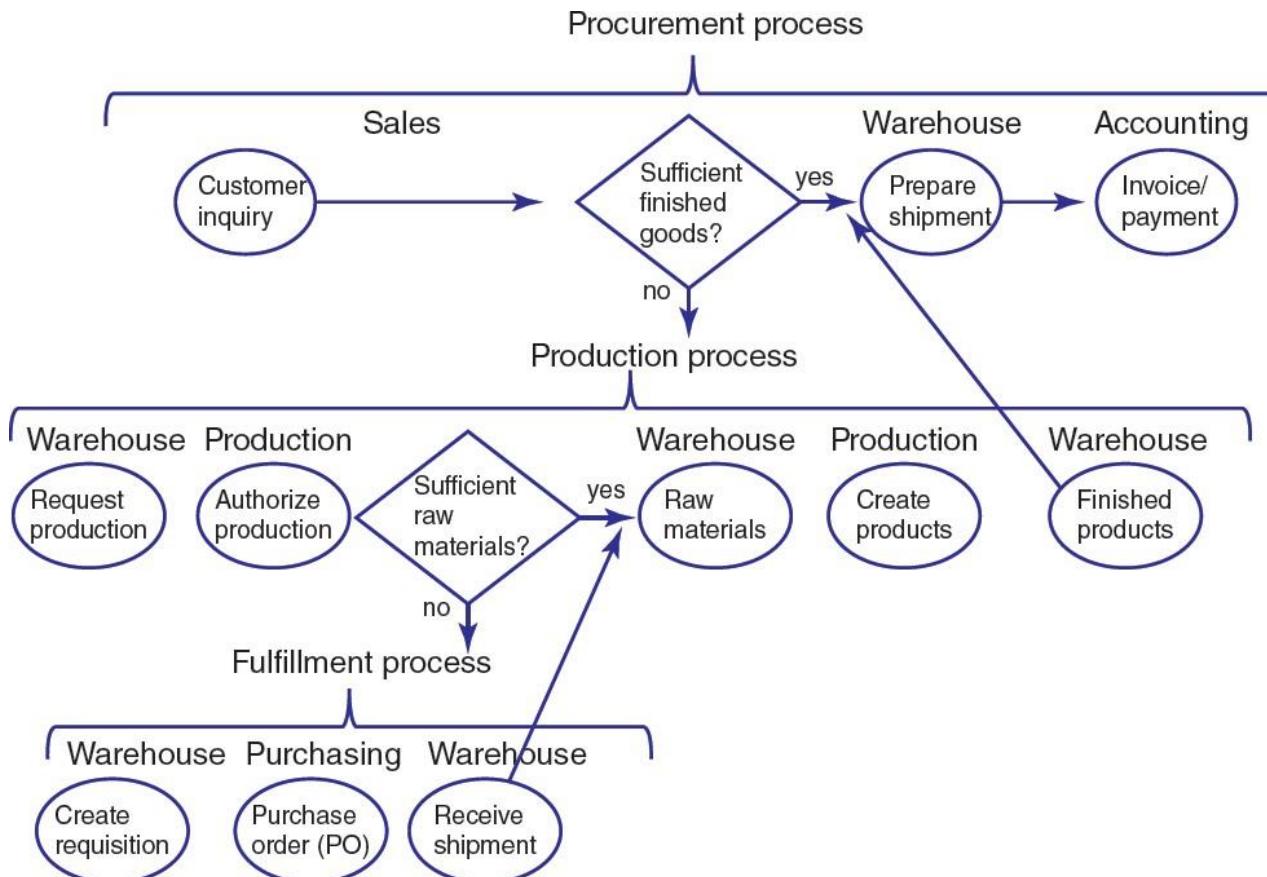


Figure 10.8 Integrated processes with ERP systems.



Interorganizational Processes: ERP with SCM and CRM

- **SCM and CRM** processes help multiple firms in an industry coordinate activities such as the *production-to-sale* of goods and services. Let's consider a chain of grocery stores whose supply chain must properly manage perishable goods. On the one hand, store managers need to stock only the amount of perishable products that they are reasonably sure to sell before the products' expiration dates. On the other hand, they do not want to run out of stock of any products that customers need.

Interorganizational Processes: ERP with SCM and CRM

- **ERP SCM** systems have the capability to place automatic requests to buy fresh perishable products from suppliers in real time. That is, as each perishable product is purchased, the system captures data on that purchase, adjusts store inventory levels, and transmits these data to the grocery chain's Warehouse as well as the products' vendors. The system executes this process by connecting the point-of-sale barcode-scanning system with the Warehouse and Accounting departments, as well as with the vendors' systems. In addition, SCM systems utilize historical data to predict when fresh products need to be ordered before the store's supply becomes too low.

Interorganizational Processes: ERP with SCM and CRM

- **ERP CRM** systems also benefit businesses by generating forecasting analyses of product consumption based on critical variables such as geographical area, season, day of the week, and type of customer. These analyses help grocery stores coordinate their supply chains to meet customer needs for perishable products. Going further, CRM systems identify particular customer needs and then utilize this information to suggest specific product campaigns. These campaigns can transform a potential demand into sales opportunities, and convert sales opportunities into sales quotations and sales orders. This process is called the *demand-to-order process*.

Reports

All IS produce reports: TPS, FAIS, ERP, CRM, BI, and so on.. These reports generally fall into three categories: *routine*, *ad-hoc (on-demand)*, and *exception*.

- 1. Routine reports:** are produced at scheduled intervals. They range from hourly quality control reports to daily reports on absenteeism rates. Although routine reports are extremely valuable to an organization, managers frequently need special information that is not included in these reports. At other times, they need the information that is normally included in routine reports.

Reports

- 2. Ad-hoc reports (on-demand):** include requests for the following types of information:
- **Drill-down reports:** display a greater level of detail. For example, a manager might examine sales by region and decide to “drill down” to more detail by focusing specifically on sales by store and then by salesperson.
 - **Key-indicator reports:** summarize the performance of critical activities. For example, a Chief Financial Officer (CFO) might want to monitor cash flow and cash on hand.
 - **Comparative reports:** compare, for example, the performances of different business units or of a single unit during different times.

Reports

3. **Exception reports:** include only information that falls outside certain threshold standards. To implement management by exception, management first creates performance standards. The company then creates systems to monitor performance (via the incoming data about business transactions such as expenditures), compare actual performance to the standards, and identify exceptions to the standards. The system alerts managers to the exceptions via exception reports.

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