Systems Analysis and Design 10th edition Kendall Solutions Manual

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Chapter 2
Understanding and Modeling Organizational Systems

Key Points and Objectives

1. Organizations are complex systems composed of interrelated and interdependent subsystems.

2. System and subsystem boundaries and environments have an impact on information system analysis and design.

3. Systems are described as either open, with free flowing information, or closed with restricted access to information.

4. A virtual organization is one that has parts of the organization in different physical locations. They use computer networks and communications technology to work on projects. Advantages of a virtual organization are:

   A. Reduced costs of physical facilities
   B. More rapid response to customer needs
   C. Flexibility for employees to care for children or aging parents

5. Enterprise systems or Enterprise Resource Planning (ERP) describes an integrated organizational information system. The software helps the flow of information between the functional areas within the organization.

6. ERP can affect every aspect of the organization, such as:

   A. Design of employees' work
   B. Skills required for job competency
   C. Strategic positioning of the company

7. Many issues must be overcome for the ERP installation is to be declared a success:

   A. User acceptance
   B. Integration with legacy systems and the supply chain
   C. Upgrading functionality (and complexity) of ERP modules
   D. Reorganizing work life of users and decision makers
   E. Expanded reach across several organizations
   F. Strategic repositioning of the company

8. A context-level data flow diagram is an important tool for showing data used and information produced by a system. It provides an overview of the setting or environment the system exists within—which entities supply and receive data/information.

9. The context-level data flow diagram is one way to show scope, or what is to be included in the system. The project has a budget that helps to define scope.

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10. Entity-relationship diagrams help the analyst understand the organizational system and the data stored by the organization.

11. There are three types of entities:

    A. Fundamental entity, describing a person, place, or thing.
    B. Associative entity (also called a gerund, junction, intersection, or concatenated entity), joining two entities. It can only exist between two entities.
    C. Attributive entity, to describe attributes and repeating groups.

12. Relationships are shown with a zero or circle representing none, a vertical line representing one, or crow's foot representing many and can be:

    A. One to one
    B. One to many
    C. Many to many

13. A use case diagram reflects the view of the system from the perspective of a user outside of the system.

14. A use case model partitions the way the system works into behaviors, services, and responses that are significant to the users of the system.

15. A use case diagram has symbols for:

    A. An actor, the role of a user of the system
    B. The use case representing a sequence of transactions in a system

16. There are two kinds of use cases:

    A. Primary, the standard flow of events within a system that describe a standard system behavior
    B. Use case scenarios that describe variations of the primary use case

17. There are four active behavioral relationships:

    A. Communicates—used to connect an actor to a use case.
    B. Includes—describes the situation where a use case contains a behavior that is common to more than one use case.
    C. Extends—describes the situation where one use case possesses the behavior that allows the new use case to handle a variation or exception.
    D. Generalizes—implies that one thing is more typical than the other thing.

18. The steps required to create a use case model are:

    A. Review the business specifications and identify the actors within the problem domain.
    B. Identify the high-level events and develop the primary use cases that describe the events and how actors initiate them.
    C. Review each primary use case to determine possible variations of flow through the use case.

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D. Develop the use case documents for all primary use cases and all important use case scenarios.

19. Use case scenarios are text descriptions of the use case, and may contain the following:

A. The use case name and a unique ID
B. The area of the business
C. The actors
D. The stakeholders
E. The level
F. A brief description of the use case
G. The triggering event
H. The type of trigger, either external or temporal
I. The steps performed for the use case
J. Preconditions, what must have occurred before the use case can start to execute
K. Postconditions, what has been accomplished by the use case
L. Assumptions that have been made for the use case to execute
M. Requirements met by the use case
N. Minimum guarantee
O. Success guarantee
P. Any outstanding issues
Q. An optional priority
R. An optional risk

20. Use case levels describe how global or detailed the use case description is. Levels are:

A. White (like clouds): enterprise level
B. Kite: business unit or department level
C. Blue (sea level): user goals
D. Indigo (or fish): functional or subfunctional
E. Black (or clam): most detailed

21. Use case descriptions are created with these four steps:

A. Use agile stories, problem definition objectives, user requirements, or a features list.
B. Ask about the tasks that must be done.
C. Determine if there are any iterative or looping actions.
D. The use case ends when the customer goal is complete.

22. Use cases are helpful because they:

A. Effectively communicate systems requirements
B. Allow people to tell stories
C. Make sense to nontechnical people
D. Do not depend on a special language
E. Can describe functional requirements
F. Can describe nonfunctional requirements
G. Help analysts define boundaries
H. Can be traceable, allowing analysts to identify links between use cases and other design and documentation tools

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23. The three levels of managerial control are:

    A. Operations management
    B. Middle management
    C. Strategic management

24. In systems analysis and design, collaborative design means that stakeholders who are external (outside clients) as well as those who are internal to the company follow processes to share in designing a system that meets their goals.

25. Each of the three levels of management, different organization structure, leadership style, technological considerations, organization culture, and human interaction all carry implications for the analysis and design of information systems.

Consulting Opportunity 2.1 (p. 21)

The E in Vitamin E Stands for Ecommerce

1. The elements that are interrelated or interdependent are:

   Elements 1 and 2: attracting customers and informing customers.

   Elements 4, 5, 6, and 7: completing transactions, accepting payments, arranging for delivery of goods and services, and supporting customers after the sale.

2. The items that are critical for initial development are elements 1, 2, 4, 5, 6, and 7, mentioned above. Elements 3 and 8 (allowing customers to customize products online, and personalizing the look and feel of the website) may be done at a later date.

3. The elements that should be handled in-house are:

   Elements 1, 2, 3, 4, 6, and 8: attracting customers, informing customers, allowing customers to customize products online, completing transactions with customers, supporting customers after the sale, and personalizing the look and feel of the website.

   These are best done in-house using corporate data and corporate systems. Performing the work in-house allows management to quickly change the information used and presented to the customers, as well as providing control over the system.

   The elements that should be outsourced are 1, 5, and 7: attracting customers, accepting payments, and arranging for delivery of goods and services. Notice that attracting customers falls into both categories. This depends on the nature of advertisement and other ways of attracting customers. If banner ads, those on the top of a Web page, are used, they may be provided by a specialist. The same is true for radio, billboard, magazine, and television ads. Accepting payments is better outsourced, using one or more of the many Web-based payment options or using a traditional credit card.

   Arranging for delivery of goods and services is better done by an outside shipping company (unless the corporation has its own shipping line).

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Some of the other functions of the ecommerce may be outsourced as well. Some corporations have the Web development done by a consulting firm and some have a third party host the website.

Consulting Opportunity 2.2 (p. 40)

Where There's Carbon, There's a Copy

Richard and Harry had failed to consider the impact of tossing out the pink forms on the rest of the system. They did not realize that systems and subsystems are interrelated and interdependent.

In this case, boundaries must be large enough to encompass all affected subsystems. Envisioning system boundaries is not a trivial pursuit. In general, system boundaries that are too large or too small will result in systems being designed without realizing the impact of decisions on other parts of the organization.

Consulting Opportunity 2.3 (p. 41)

Pyramid Power

According to Paul and Ceil, a management information system that required people to share information in ways that were not consistent with the hierarchical structure makes the users of the system feel uncomfortable with the communication flow. This dissatisfaction results in some degree of resistance.

One method for addressing the problem is through the creation of staff positions, whose chief responsibility is to facilitate interdepartmental communication. Another possibility is to standardize as much decision making as possible. If software is handling more decision-making situations, there is less need for interdepartmental communication.

HyperCase Experience 2

1. *What major organizational change recently took place at MRE? What department(s) were involved, and why was the change made?*

   Model Solution: The Management Information Systems and Training departments were merged into a single department. This was done to slim down the organizational structure and increase operational efficiency. Also, top management felt that Training needed new leadership (see Hill, Evans, and Ketcham interviews), and appears to have hopes that the success of the old Management Systems department will now influence the new Training and Management Systems department (see Hill interview).

2. *What are the goals of the Training and Management Information Systems department?*

   Model Solution: Market leadership is a main goal of the organization, and maintaining high quality is a key to attaining this (see Hill). This quality depends upon the ability of MRE to deliver training in a timely fashion and to be able to reasonably keep costs under control while delivering the promised product.

3. *Would you categorize MRE as a service industry, a manufacturer, or both? What kind of "products" does MRE "produce"? Suggest how the type of industry MRE is affects the*

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information system it uses.

Model Solution: MRE is primarily in a service industry. MRE offers consulting services (see corporate description, found on the coffee table in the reception area). They don't "produce" material goods, but they do "create" plans for things like new buildings and computer information systems. They use project teams predominantly to offer consultation to clients. Because MRE offers services and does not engage in manufacturing, they don't rely heavily on manufacturing control or inventory control systems. Instead, this suggests that they need information systems to facilitate project management and help top management monitor progress and trends in client needs and opportunities for new consulting services.

4. *What type of organizational structure does MRE have? What are the implications for MIS?*

Model Solution: From the organizational structure charts in the case it appears that MRE follows a hierarchical structure. However, if one looks at the Training and Management Systems department, you can see that a project structure begins to emerge, because project teams are central to the services provided by each unit. Refer to the organizational chart on the MRE website, found on the computer on the reception area coffee table. Therefore, the implications for MIS are somewhat complex. There needs to be consideration for the superior-subordinate relationships involved, but it may be more crucial here that a system can support the project structure in allowing many users (project team leaders and members, unit managers, and top management) to access and use the system. The central point here is that each user will have different reasons for using the system and access privileges (updating project status, querying client or budget information, checking progress toward project completion, etc.). The superior/subordinate issue will most likely crop up in granting access rights (who gets to see/change what information).

5. *Describe in a paragraph the "politics" of the Training and Management Systems Department at MRE? Who is involved and what are some of the main issues?*

Model Solution: A main political issue in Training and Management Systems is over the merger itself and the future of the new department. Snowden Evans was given the leadership because top management felt the old leadership (Ketcham) was not effective (see Hill interview). Ketcham seems to resent this decision (though he does not actually say that in words), and to some extent a power struggle is taking place (albeit a subdued one). Some of the Training staff are also concerned about being forced to accept changes to suit the Systems unit (see Blandford interview linked from Ketcham). A key factor in the power struggle is Evans' proposal for a computerized project tracking system for Training, which Ketcham is opposed to (either out of spite, fear of change and computer-phobia, or a combination of these). Evans has strong support from division VP Hill, and Ketcham has his company experience and support from the Training staff. In summary, Evans seems to be a "mover," working his way up through the ranks with new ideas and directions, while encountering opposition from the "old guard" like Ketcham. Jimmie Hyatt looms like a legend over the entire organization, and his influence seems to pervade the company (we find his model planes and magazines scattered all over MRE). It is likely that Jimmie will not interfere with many of the details of running MRE due to his "laid-back" nature, but that he will occasionally step in and use his authority, so having his support on major and controversial proposals (like the project tracking system) may be crucial for Evans. However, Hyatt seems difficult to predict and has not clearly chosen sides in the Evans-Ketcham power struggle.

6. *Draw a use case diagram representing the activities of the Webster Design group at MRE when developing site and facility master plans (use the MRE website to obtain your basic information).*

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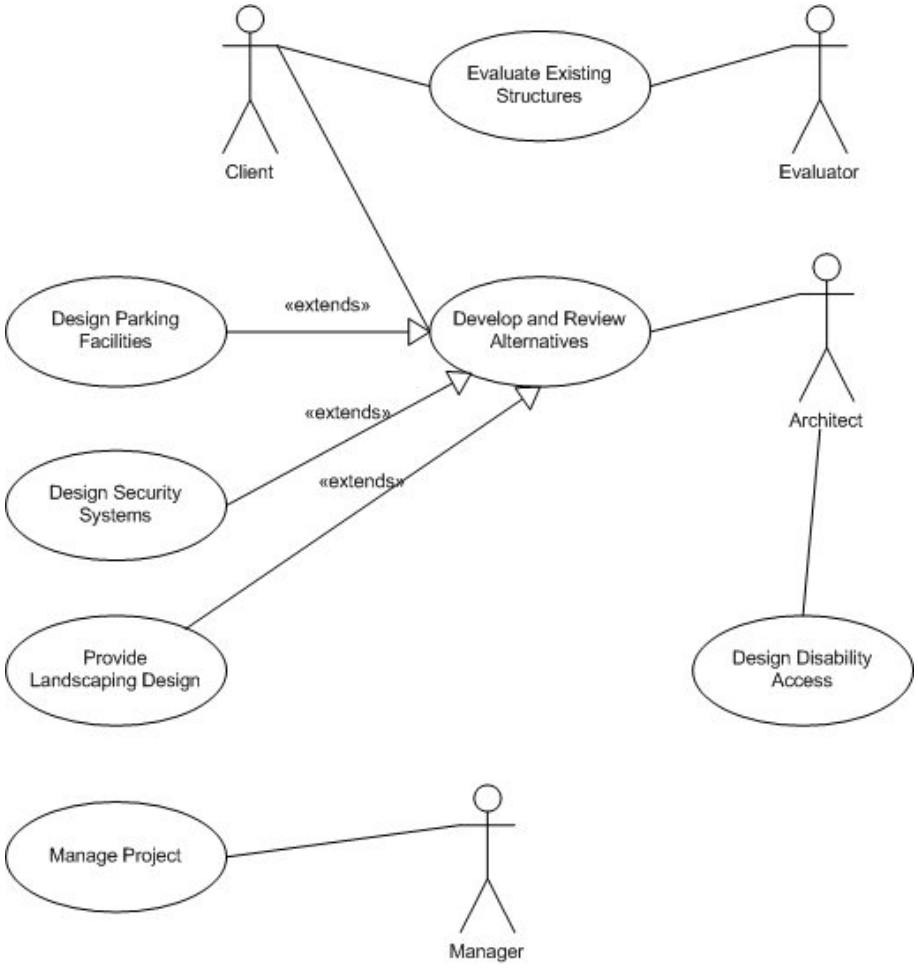
Model Solution: The use case diagram is illustrated below.



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Answers to Review Questions

1. *What are the three groups of organizational fundamentals that carry implications for the development of information systems?*

   The three groups of organizational fundamentals include:

   A. Level of management
   B. Design of organizations
   C. Other factors—leadership style, technology, and organizational subcultures

2. *What is meant by saying that organizational subsystems are interrelated and interdependent?*

   Organizational subsystems are said to be interrelated and interdependent when a change in one subsystem affects other subsystems.

3. *Define the term* organizational boundary.

   An organizational boundary separates the system from its environment.

4. *What are the two main purposes for feedback in organizations?*

   The two main purposes of feedback are (a) system control and (b) formulating and revising organizational goals.

5. *Define openness in an organizational environment.*

   Openness refers to an organization with a relatively free flow of information within its boundaries.

6. *Define closedness in an organizational environment.*

   Closedness refers to an organization with relatively little flow of information within its boundaries.

7. *What is the difference between a traditional organization and a virtual one?*

   A traditional organization is one that has a physical location, whereas a virtual organization has parts of the organization in different locations, connected electronically.

8. *What are the potential benefits and a drawback of a virtual organization?*

   The benefits of a virtual organization are: reduced costs of physical facilities, a more rapid response to customer needs, and flexibility for employees to care for children or aging parents. A drawback is that it is difficult to meet the social needs of virtual workers.

9. *Give an example of how systems analysts could work with users as a virtual team.*

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The example provided in the text allows the analyst to see the software and hardware configuration of the user requesting help.

10. *What are enterprise resource planning (ERP) systems?*

Enterprise systems, often referred to as *Enterprise Resource Planning systems*, is a term used to describe an integrated organizational (enterprise) information system.

11. *What is the main difference between doing business process analysis for ERP and for other types of systems?*

One major difference is that rather than redesigning business processes based on a logical analysis of those processes and how they support the business strategy, and then choosing the IT to support those processes, a large installation of ERP can reverse this by requiring the implementation of new business processes that are embedded in the technology provided.

12. *What problems do analysts often encounter when they try to implement an ERP package?*

One problem that the analyst encounters when trying to implement an ERP package is the difficulty of trying to analyze a system currently in use and then fit an ERP model to the system. Another problem is that the business model does not always match the ERP functionality. The impact is delayed implementation, higher costs, and the loss of user confidence.

13. *What are the two symbols on a use case diagram and what do they represent?*

The two symbols are an actor, the role of a user of the system, and the use case representing a sequence of transactions in a system.

14. *What is a use case scenario?*

A use case scenario is a text description of the flow of events in a use case. There may be alternate scenarios representing conditions that produce variations on the primary scenario.

15. *What are the three main parts of a use case scenario?*

The three main parts of a use case scenario are the use case identifiers and initiators; the steps performed; and the conditions, assumptions, and questions.

16. *What are the four steps in creating a use case description?*

Use case descriptions are created with these four steps:

A. Use agile stories, problem definition objectives, user requirements, or a features list.
B. Ask about the tasks that must be done.
C. Determine if there are any iterative or looping actions.
D. The use case ends when the customer goal is complete.

17. *What are the five altitude metaphors for describing use case on different levels? What do they represent?*

The five altitude metaphors and what they represent are:

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A. White (like clouds): enterprise level
B. Kite: business unit or department level
C. Blue (sea level): user goals
D. Indigo (or fish): functional or subfunctional
E. Black (or clam): most detailed

18. *What does a process represent on a context-level data flow diagram?*

A process represents the whole system on a context-level data flow diagram.

19. *What is an entity on a data flow diagram?*

An entity on a data flow diagram represents an entity that supplies and receives information that is outside of the system.

20. *What is meant by the term* entity-relationship diagram*?*

An entity-relationship diagram is a graphical depiction of organizational system elements and the association among the elements.

21. *What symbols are used to draw E-R diagrams?*

The three symbols used for E-R diagrams are (a) a rectangle to show the entity, (b) a diamond in a rectangle to join two many-to-many entities, and (c) an oval in a rectangle to represent an attribute, especially a repeating group.

22. *List the types of E-R diagrams.*

The types of E-R diagrams are:

A. One-to-one relationship
B. One-to-many relationship
C. Many-to-one relationship
D. Many-to-many relationship

23. *How do an entity, an associative entity, and an attributive entity differ?*

An entity represents a person, place, or thing. An associative entity can only join two fundamental entities. An attributive entity is used to represent an attribute of an entity, often a repeating group, and cannot exist without being linked to a fundamental entity.

24. *List the three broad, horizontal levels of management in organizations.*

The three levels of management in organizations are (a) operations management, (b) middle management, and (c) strategic management.

25. *Who should be involved in collaborative design of information systems?*

Those who should be involved in collaborative design are:

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A. *Those in lower ranks of the organization*
B. *For external collaborations, relevant stakeholders*

26. *How can understanding organizational subcultures help in the design of information systems?*

Organizational subcultures affect information requirements, information availability, use of information, and individual behavior.

27. *How can systems analysis team members use Slack to build or reinforce an organizational culture or subculture.*

By adopting an employer-sanctioned social media platform to foster collaboration and communication among officer workers. It may be more effective than email since employers may interact in a less formal setting, which could help team members to avoid the difficulty of expressing themselves face-to-face in a meeting or even one to one.

Problems

1. *"It's hard to focus on what we want to achieve. I look at what our real competitors, the convenience stores, are doing and think we should copy that. Then a hundred customers come in, and I listen to each of them, and they say we should keep our little store the same, with friendly clerks and old-fashioned cash registers. Then, when I pick up a copy of* SuperMarket News*, they say that the wave of the future is super grocery stores, with no individual prices marked and UPC scanners replacing clerks. I'm pulled in so many directions I can't really settle on a strategy for our grocery store," admits Geoff Walsham, owner and manager of Jiffy Geoff's Grocery Store. In a paragraph, apply the concept of permeable organizational boundaries to analyze Geoff's problem in focusing on organizational objectives.*

Applying the concept of permeable organizational boundaries, Fred is experiencing the problem of defining his organizational boundary. Boundaries exist on a continuum, from extremely permeable, whereby Fred would change his store to function like those of his real competitors or super grocery stores as depicted in the trade journal, to almost impermeable, whereby the store would remain exactly as it is. Fred would like to accept new ideas from the outside, and change for better service to his customers. However, he is undecided to what extent, because if the boundary is too lax, he would endanger his market niche and control over performance would be diminished.

2. *Write seven sentences explaining the right-to-left relationships in Figure 2.8.*

The left to right relationships in Figure 2.8 are:

A. Each employee is assigned to one and only one office. Each office is occupied by one and only one employee.
B. Each cargo aircraft will serve from one to many distribution centers. Each distribution center is served by one and only one cargo aircraft.
C. One systems analyst is assigned to anywhere from zero to many projects. Each project will be developed by one and only one systems analyst.
D. One machine is undergoing anywhere from zero to one scheduled maintenance.

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Scheduled maintenance is being done to one and only one machine.

E. Each salesperson is assigned to anywhere from one to many customers. Each customer may have from one to many salespersons.

F. One home office has one to many employees. Each employee may be assigned from zero to one home office.

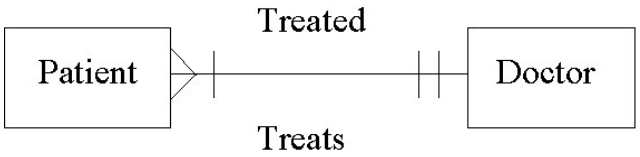
G. Each passenger is flying to many destinations. Each destination will be visited by many passengers.

3. *Draw an entity-relationship diagram of a patient–doctor relationship.*

A. Which of the types of E-R diagrams is it?

B. In a sentence or two, explain why the patient–doctor relationship is diagrammed in this way.

a.



This E-R diagram is a many-to-one (M:1) relationship.

b. A PATIENT is usually treated by one DOCTOR only, but a DOCTOR can have more than one PATIENT.

4. *You began drawing E-R diagrams soon after your entry into the health maintenance organization for which you're designing a system. Your team member is skeptical about using E-R diagrams before design of the database is begun. In a paragraph, persuade your team member that early use of E-R diagrams is worthwhile.*

Early use of E-R diagram will help to:

A. Gain a better understanding of the organization

B. Narrow the scope of the problem to make it more manageable and meaningful

C. Identify the primary entity

5. *Neil is a decision maker for Pepe's Atlantic Sausage Company. Because there are several suppliers of ingredients and their prices fluctuate, he has come up with several different formulations for the various sausages that he makes, depending on the availability of particular ingredients from particular suppliers. He then orders ingredients accordingly twice a week. Even though he cannot predict when ingredients will become available at a particular price, his ordering of supplies can be considered routine.*

a. On what level of management is Neil working? Explain in a paragraph.

b. What attributes of his job would have to change before you would categorize him as working on a different level of management? List them.

Uncover any conflicting data collected through other data gathering methods.

A. Neil is working at the operations management level. He makes decisions using predetermined rules that have predictable outcomes. His responsibility is to manage inventories, a basic task of the organization, which must be accomplished on time and in accordance with organizational constraints.

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B. The following is a list of attributes of Neil's job which would have to change before he can be categorized as working on a different level of management:

a. Decision horizon of long range
b. Decision objectives increase
c. Problem identification becomes more difficult
d. Nature of problems become mainly semi-structured
e. Set of alternatives which are difficult to articulate
f. One-time decision nature
g. Mainly heuristic decision style

6. *Many of the people who work at Pepe's (Problem 5) are extremely dedicated to Pepe's and have devoted their lives to the company. Others feel that the company is behind the times and should use more sophisticated production systems, information systems, and supply chain management to make the company more competitive. Members of a third group feel that what they do is unappreciated. Describe the various subcultures in words. Assign them a name based on their emotions.*

The persons who are loyal to the organization might be called loyalists, best friends, or St. Bernards. Those behind the times may be called ancient, dinosaurs, and so on. Those who feel unappreciated might be called gophers, cogs in the wheel, and so on. Students will undoubtedly supply a menagerie of colorful descriptions.

7. Carson, who is a member of *the human resources department at the Elrod Manufacturing Company plant is constantly being asked by employees how much is taken out of their paychecks for insurance, taxes, medical, mandatory retirement, and voluntary retirement. "It takes up to a few hours every day," says Carson.*

He would like a Web system that would allow employees to use a secure logon to view the information. Carson wants the system to interface with health and dental insurance companies to obtain the amount remaining in the employee's account for the year. He would also like to obtain retirement amounts saved along with investment results. Carson has a high regard for privacy and wants the system to have employees register and give permission to obtain financial amounts from the dental insurance and retirement companies. Draw a use case diagram representing the activities of the employee benefit system.

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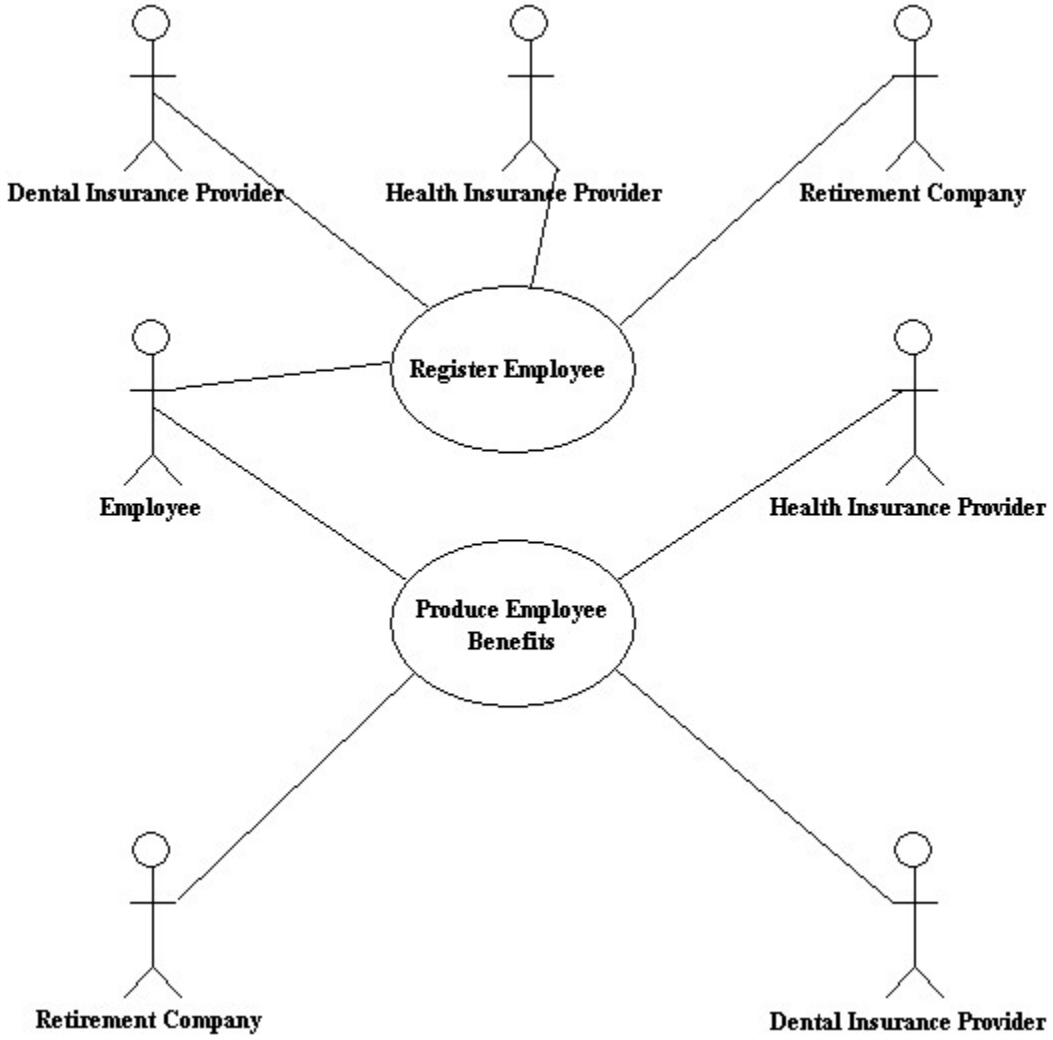

8. *Write up a use case scenario for the use case diagram you constructed for Elrod Manufacturing.*

The use cases are illustrated below. They may vary from student to student. (Continued below.)

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Use case name:	Register Employee	
Area:	Human Resources	
Actors:	Employee, Health Insurance Provider, Dental Insurance Provider, Retirement Company	
Description:	Employee registers to receive financial information about amounts spent and remaining for insurance and retirement benefits	
Stakeholder:	Employee, Human Resources	
Level:	Blue	
Triggering Event:	Employee registers with Human Resources	
Trigger Type:	**X External** **Internal**	
Steps Performed		**Information for Steps**
1. Employee registers for the benefits package program		1. Employee Record
2. Employee is sent legal permission documents to sign		2. Permission forms
3. Employee returns legal permission documents		3. Permission forms
4. Permissions are sent to insurance and retirement companies		4. Permission forms
Preconditions:	Employee has logged on to the Human Resources website	
Postconditions:	Employee has successfully registered to receive financial information	
Assumptions:	Employee has been added to Employee database	
Success Guarantee:	Employee has been able to register	
Minimum Guarantee:	Employee was able to view the register Web page	
Objectives Met:	Allow employees to view updated personal financial information	
Outstanding Issues:	How do the insurance and retirement providers want legal permissions sent? Do paper forms with signatures need to be sent, or are FAX or scan copies sufficient?	
Priority (optional):	8 (out of 10)	
Risk (optional):	7 (out of 10)	

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Use case name:	Produce Employee Benefits	
Area:	Human Resources	
Actors:	Employee, Health Insurance Provider, Dental Insurance Provider, Retirement Company	
Description:	Employee requests financial information about total amounts spent and remaining annual amounts for insurance and retirement benefits	
Stakeholder:	Employee, Human Resources	
Level:	Blue	
Triggering Event:	Employee requests financial information	
Trigger Type:	**X External** **Internal**	
Steps Performed		**Information for Steps**
1. Employee requests financial amounts 2. Health insurance is sent a request for employee amounts 3. Health insurance returns financial amounts 4. Dental insurance is sent a request for employee amounts 5. Dental insurance returns financial amounts 6. Retirement company is sent a request for employee amounts 7. Retirement company returns financial amounts 8. Employee is sent comprehensive information		1. Employee Record 2. Health Provider Number 3. Dental Provider Number 4. Retirement Provider Number 5. Comprehensive information Web page
Preconditions:	Employee has logged on to the Human Resources website	
Postconditions:	Employee has received financial information	
Assumptions:	Employee has successfully registered for the service and all permissions have been received by the service providers	
Success Guarantee:	Employee has been able view their benefit information	
Minimum Guarantee:	Employee was able to logon	
Objectives Met:	Allow employees to view updated personal financial information	
Outstanding Issues:	How should information be transmitted securely to and from providers?	
Priority (optional):	8 (out of 10)	
Risk (optional):	10 (out of 10)	

9. *What level are you creating your use case for Elrod Manufacturing? Choose one of the five altitude metaphors and explain why you chose it.*

The level is blue because it is for a user goal. It is of interest to the users and written for a business activity.

10. *Create a context-level data flow diagram for the Employee Benefit system in Problem 7. Make any assumptions about the data to and from the central process.*

    a. *Do you find this to be better or not as good as explaining the system to Carson than the use case and use case scenarios?*

    b. *Write a brief tutorial or create a short Microsoft PowerPoint presentation for Carson on how to draw context level diagrams. Be sure to define any technical terms, as well as the reasons for drawing a context level diagram early in your visits to Elrod Manufacturing.*

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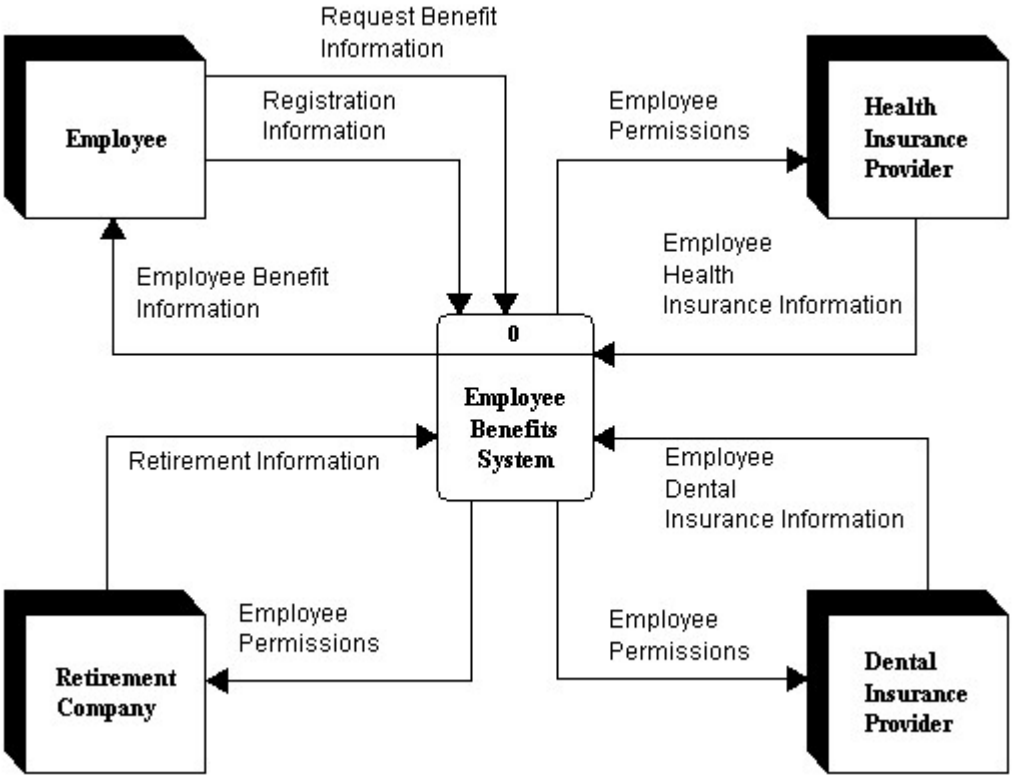
The solution follows.



The answers will vary from student to student. Both diagrams present a useful view of the system. The context-level data flow diagram provides more information as a diagram, but may be too complex for Carson. The use case diagram is a simpler view, but the use case scenario will provide the details of the transactions. The tutorials and Microsoft PowerPoint presentations will vary from student to student, but make sure technical terms, as well as the reasons for drawing a context level diagram are covered.

11. *Draw a use case and write up a use case scenario for getting two or three email accounts. Think about the steps that are needed to ensure security.*\

The use case scenario follows.

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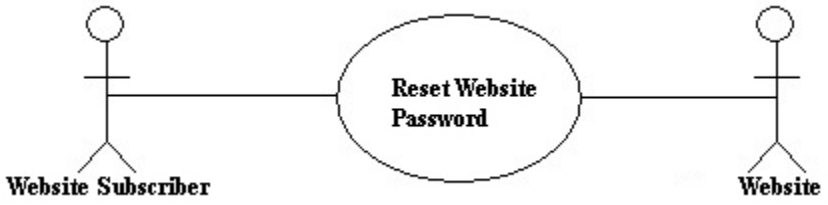
Use case name:	Obtain Email Account	
Area:	New Accounts	
Actors:	Email Applicant, Customer Service	
Description:	Applicant requests one or more email accounts	
Stakeholder:	Email Applicant	
Level:	Blue	
Triggering Event:	Submits Web form	
Trigger Type:	**X External** **Internal**	
Steps Performed		**Information for Steps**
1. Applicant fills out Web form with personal information 2. Applicant agrees to terms of use 3. Applicant is given an email address and password 4. Applicant changes password		1. New Account Web form 2. Terms of use Web page 3. Email Account Web page 4. Password, Email Account record
Preconditions:	Employee has logged on to the New Account website	
Postconditions:	Applicant has an email account	
Assumptions:	Applicant is over the minimum age limit for email accounts	
Success Guarantee:	Applicant has an email address and password	
Minimum Guarantee:	Applicant was able to view website	
Objectives Met:	Provide applicants with email accounts	
Outstanding Issues:	Can the age limit be verified?	
Priority (optional):	9 (out of 10)	
Risk (optional):	8 (out of 10)	

12. *Draw a use case and write up a use case scenario for a user who is trying to log on to a secure site that they subscribe to, but who has forgotten their password.*



The use case scenario follows.

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Use case name:	Password Reset	
Area:	Website Login	
Actors:	Website Subscriber, Website	
Description:	Website subscriber has forgotten password	
Stakeholder:	Website Subscriber	
Level:	Blue	
Triggering Event:	Click on Forgot Password link	
Trigger Type:	**X External** **Internal**	
Steps Performed		**Information for Steps**
1. Website subscriber clicks on Forgot Password link 2. Website subscriber enters registered email into text box 3. System sends website subscriber password reset email 4. Website subscriber logs into personal email 5. Website subscriber opens email 6. Website subscriber clicks on password reset link 7. Web browser opens to password reset link page 8. Website subscriber enters password twice and confirms 9. System resets password		1. Reset password link on login page 2. Password reset page 3. Reset link sent acknowledgement 4. Email login page 5. Opened email 6. Password reset link in email 7. Web browser opens to password reset page 8. Password creating page 9. New password creation acknowledgement
Preconditions:	Employee has clicked on password reset ink	
Postconditions:	Applicant has an email account and subscription	
Assumptions:	Applicant has access to email account to access password reset link	
Success Guarantee:	Applicant has an accessible email account	
Minimum Guarantee:	Applicant was able to view website	
Objectives Met:	Reset passwords for subscribers	
Outstanding Issues:	Can subscribers re-use a previously stored password?	
Priority (optional):	9 (out of 10)	
Risk (optional):	8 (out of 10)	

13. *Research work-sanctioned social media platforms that are available in your area. Choose one (Slack, for example) and write two paragraphs discussing (1) the benefits and (2) the drawbacks. Finally, in a paragraph, write an opinion about whether you would like to work in a company that uses Slack or another work-sanctioned social media solution, and state why or why not.*

A real use case for *Skype for Business* is below.

Benefits:

A. Availability status (Green, Yellow, Red) lets users know if the person is at the computer, as well as setting away messages.
B. People respond to instant messages faster than email
C. Can have more than two people in a conversation, great for collaborating
D. Video conferencing and screen sharing capabilities
E. Conversations can be archived like email
F. Conversations can be informal and work as well as over the phone

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Drawbacks

A. Adoption may be slow at first. Widespread adoption is required for culture change.

B. If conversations are not archived, it may violate data retention policies.

Opinions will vary from student to student.

Group Exercise

1. *Break up into groups of five. Assign one person to be the website designer, one to write copy for a company's product, one to keep track of customer payments, one to worry about distribution, and one to satisfy customers who have questions about using the product. Then select a simple product (one that does not have too many different versions). Good examples are a disposable camera, a DVD player, a box of candy, and a specialty travel hat. Now spend 20 minutes trying to explain to the website designer what to put on the website. Describe in about three paragraphs what experience your group had in coordination. Elaborate on the interrelatedness of subsystems in the organization (your group).*

   The results from this exercise will vary from group to group, and with the product selected. The students should realize that the customer service, the inventory control system, shipping, and the accounts receivable system are interrelated with the operation of the website.

2. *In a small group, develop a use case and a use case scenario for making air, hotel, and car reservations for domestic travel.*

   The use case scenarios will vary from group to group. A suggested use case diagram follows.

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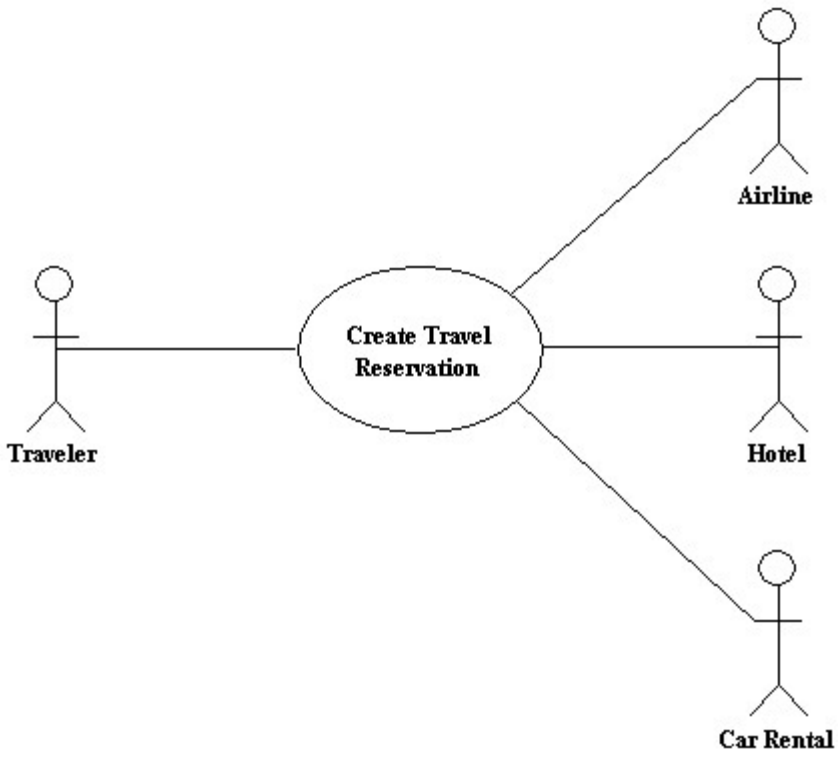

The use case scenario is below. This may vary widely from group to group and in the amount of detail the group decides to include. Some groups may have car selection broken down into car features, such as GPS navigation and so on. There may also be airline meal selections. Hotels may have room selection pages as well.

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Use case name:	Create Travel Reservation	
Area:	Reservations	
Actors:	Traveler, Airline, Hotel, Car Rental	
Description:	Traveler makes an airline, hotel, and car rental reservation	
Stakeholder:	Traveler, Airline, Hotel, Car Rental Companies	
Level:	Kite	
Triggering Event:	Submits Reservation Web form	
Trigger Type:	**X External** **Internal**	
Steps Performed		**Information for Steps**
1. Traveler submits a Web form with departing and arriving destinations, dates, and number of travelers 2. Traveler selects flights 3. Traveler makes flight seat selections 4. Traveler selects hotel 5. Traveler selects rental car 6. Traveler confirms reservation 7. Traveler receives confirmation numbers 8. Traveler receives email confirmation		1. Preliminary Trip Web form 2. Available Flights database table 3. Flight Seat database table 4. Available hotel database table 5. Rental Car database table 6. Credit Card Company Verification 7. Reservation database tables 8. Reservation database tables, Customer Record
Preconditions:	Traveler has logged on to travel site	
Postconditions:	Traveler has multiple reservations	
Assumptions:	Traveler has a valid credit card with a sufficient balance to cover travel cost	
Success Guarantee:	Traveler has confirmed reservations	
Minimum Guarantee:	Traveler was able to view website	
Objectives Met:	Allow travelers to make a comprehensive reservation	
Outstanding Issues:	Should tour packages or cruise packages be included? Should the traveler be prompted to enroll in trip insurance?	
Priority (optional):	10 (out of 10)	
Risk (optional):	8 (out of 10)	

3. *Change your answer in Group Project 2 to include foreign travel. How does the use case and use case scenario change?*

   The use case diagram may include a currency conversion service. The use case scenario may change in the language that is chosen as well as currency conversion. Multiple currencies may be used if the traveler is flying to different countries. The accommodations may include bed and breakfast establishments as well.

4. *With your group, draw a context-level data flow diagram of your school's or university's registration system. Label each entity and process. Discuss why there appear to be different ways to draw the diagram. Reach consensus as a group about the best way to draw the diagram and defend your choice in a paragraph. Now, working with your group's members, follow the appropriate steps for developing an E-R diagram and create one for your school or university registration system. Make sure your group indicates whether the relationship you depict is one-to-one, one-to-many, many-to-one, or many-to-many.*

   Please note that the solutions provided below are intentionally brief. Actual context-level data flow diagrams and entity-relationship diagrams will vary for each school or university.

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The context diagram should have external entities of Student, Registration, an entity that collects the student fee, and so on. The entity-relationship diagram should include Student, Class, and perhaps Course and Textbook entities.

There are many different ways to draw the diagram since the data flow names may vary and external entities may be placed anywhere around the diagram. External entities may also appear on both sides of the central process.

5. *Research Slack, the work group social media platform, with your group.*
   a. *In a paragraph, answer the questions: How does an organization subscribe to it? What are the benefits? What are the drawbacks?*
   b. *Have your group write two paragraphs: one on the benefits and one on the drawbacks of using work-sanctioned social media such as Slack.*
   c. *In a third paragraph conclude your write-up by offering a recommendation on whether or not to adopt Slack for your in-class group (assume that the necessary hardware and software resources are available to support it).*

Answers will vary from group to group, but all can get started by navigating to Slack.com.

Central Pacific University—Problems

1. *Use Microsoft Visible or Analyst to view and print the context-level data flow diagram for the computer inventory system, as Chip and Anna did.*

   Students select CPU Context Level from the Visible Analyst open diagram dialogue box or open the CPU Context Level from Visio.

2. *Use the Repository feature to view the entry for the central process.*

   Double click on the central process in Visible Analyst to view the repository entry for it. The first screen is shown on the next page. The corresponding Repository Web page name is **Personal Computer System.**

3. *Use Visio or Visible Analyst to view and print the entity-relationship diagram for the computer inventory system.*

   The diagram name is **Computer System First Draft**.

4. *Explain why the external entities on the context-level diagram are not found on the entity-relationship diagram.*

   The context diagram shows *external* entities, those that supply data or receive information from the system. The entity relationship diagram contains *data* entities, those that the system keeps track of. These become system files or portions of the database.

   Sometimes external entities, such as the customer, become data entities because a file of customers is maintained. Other external entities, such as management, are not stored in a file (there would be no series of records for management).

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5. *Explain why the entities MANAGEMENT and FACULTY are found on both sides of the process on the context-level diagram.*

   Management and faculty are found on both sides of the context-level diagram because they are supplying and receiving information from the system. They could have been included only once with arrows wrapping around the sides of the diagram, but that would present a cluttered drawing.

6. *Use Microsoft Visio or Visible Analyst to view and print the use case diagram for the computer inventory system.*

   The name of the diagram is CPU Use Case Diagram.

7. *Add the following actors and use cases to the use case diagram:*
   - A. *FACULTY actor in the lower left side of the use case diagram.*
   - B. *Connect the FACULTY actor to the QUERY TRAINING CLASSES use case.*
   - C. *Because the computers may have software installed for a specific computer lab, the clerical support staff may be responsible for installing software on the computers. Connect the CLERICAL SUPPORT actor to the ADD SOFTWARE use case.*
   - D. *Add two new use cases below the QUERY TRAINING CLASSES use case: QUERY SOFTWARE EXPERT and below it, QUERY SOFTWARE INFORMATION.*
   - E. *Connect the FACULTY actor to the QUERY SOFTWARE EXPERT and QUERY SOFTWARE INFORMATION use cases.*
   - F. *Connect the MANAGEMENT actor to the QUERY SOFTWARE EXPERT use case.*

   The diagram is illustrated on the next page.

8. *Add the INSTALL DESKTOP COMPUTER use case to the upper right area of the diagram. This use case extends the ADD NEW COMPUTER use case.*

   Refer to the diagram illustrated below.

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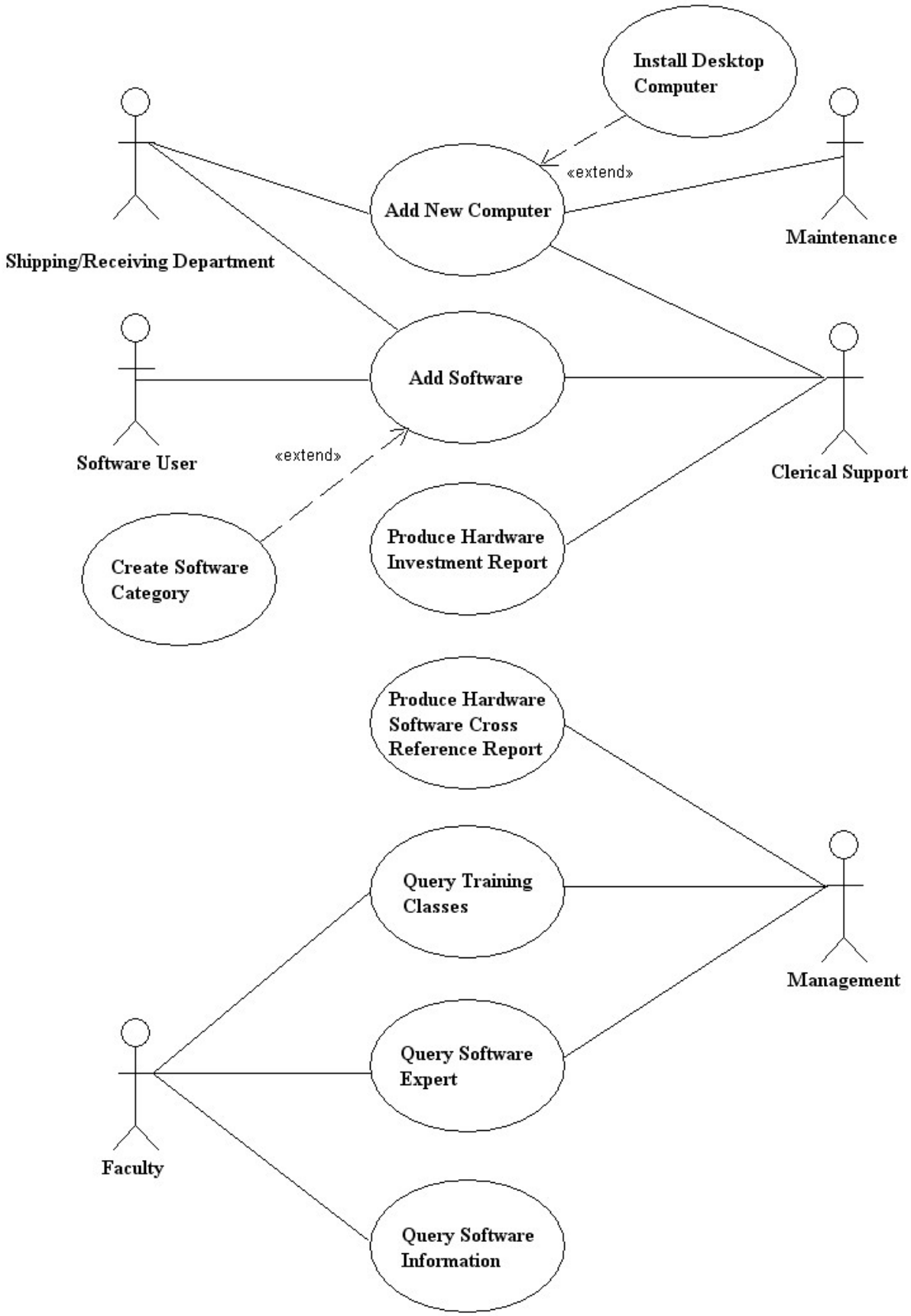

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9. *Add a use case description for the ADD SOFTWARE use case. It should contain the following information:*
   A. *Obtain the use case name and actors from the use case diagram. The stakeholder and level are the same as those in Figure E2.4.*
   B. *The description should be: add new software to the Software database table and print an installation listing.*
   C. *The activity is started (triggered) when the user clicks the Add Software menu item.*
   D. *The steps performed and information for steps are:*
      Software is keyed into the new system and validated
      Software received form
      Software is added to the Software Master
      Software Master
      The Software Installation List is produced
      Software Master, Order
      The software user is notified about installed software
      Order
   E. *Preconditions are that software has been received. Postconditions are that the software has been added to the database and reports have been created. Assumptions are that the user has successfully logged on with access to Add Software entry screen. A success guarantee is that the software has been added to the database and required report printed. A minimum guarantee is that the software has been received. The objectives met are to add and install new software. The outstanding issue is how to determine which software to install on which machines. The priority is high and the risk is medium.*

Use case name:	Add Software	
Area:	Computer System	
Actors:	Software User, Clerical Support	
Description:	Adds new software to the computer system	
Stakeholder:	Faculty, Student, Staff	
Level:	Blue	
Triggering Event:	Add Software menu clicked	
Trigger Type:	**X External** **Internal**	
<u>Steps Performed</u>		**<u>Information for Steps</u>**
1. Software is keyed into the new system and validated		1. Software received form
2. Software is added to the Software Master		2. Software Master
3. The Software Installation List is produced		3. Software Master, Order
4. The software user is notified about installed software		4. Order
Preconditions:	Software has been received	
Postconditions:	Software has been added to the database	
Assumptions:	User has successfully logged on with access to Add Software screen	
Success Guarantee:	Software has been successfully added to the database	
Minimum Guarantee:	Software is available to add	
Objectives Met:	Add software to the Software Master	
Outstanding Issues:	Does the old software have to be retained	
Priority (optional):	High	
Risk (optional):	Medium	

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10. *Write a use case description for the PRODUCE HARDWARE SOFTWARE CROSS REFERENCE REPORT use case. Use the use case diagram to determine the heading information, making any reasonable assumptions. The steps would be to read a software record, use that information to read the hardware-software relational table, then read the hardware record. Use the hardware record to print a line, accumulating totals. Print subtotals and grand totals.*

    This is a medium priority, low risk activity. Preconditions are that all the information must have been previously added to the appropriate database tables. Postconditions are that the report has been printed. Assumptions are that all the information on the database tables is correct. A success guarantee would be the report has been successfully created. A minimum guarantee would be the report could not be printed. The objectives met are to produce information about what software is found on which machine. Outstanding issues are what if the software is older and is not currently installed on any machines, how should the report be produced: printed, on a PDF file, or should it really be a query for one software package.

Use case name:	Produce Hardware Software Cross Reference Report	
Area:	Computer System	
Actors:	Management	
Description:	Produces a report showing what software is included on which machines	
Stakeholder:	Management, Faculty, Staff	
Level:	Blue	
Triggering Event:	Reports: Software Cross Reference Report menu item clicked	
Trigger Type:	**X External** **Internal**	
Steps Performed		**Information for Steps**
1. Read a software record		1. Software record
2. Use the software record to read the hardware-software relational table		2. Hardware-software relational table
3. Read the hardware record		3. Hardware record
4. Use the hardware record to print a line, accumulating totals		4. Hardware record
5. Print subtotals and grand totals		5. Accumulated totals
Preconditions:	All the information must have been previously added to the appropriate database tables	
Postconditions:	The report has been printed	
Assumptions:	All the information on the database tables is correct	
Success Guarantee:	The report has been successfully created	
Minimum Guarantee:	The report could not be printed	
Objectives Met:	Produce information about what software is found on which machine	
Outstanding Issues:	What if the software is older and is not currently installed on any machines, how should the report be produced: printed, on a PDF file, or should it really be a query for one software package	
Priority (optional):	Medium	
Risk (optional):	Low	

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11. *Write the use case description for the PRODUCE HARDWARE INVESTMENT REPORT use case. Use the use case diagram to define the header information. The steps involve reading each hardware record, counting the number of machines and totaling the amount invested in them for each computer model. When the computer brand changes, produce subtotals with a grand total at the end of the report. All information comes from the Hardware Master database table. Make any reasonable assumptions about preconditions, postconditions, assumptions, success guarantee, minimum guarantee, objectives met, outstanding issues, priority, and risk.*

Use case name:	Produce Hardware Investment Report	
Area:	Computer System	
Actors:	Clerical Support	
Description:	Produce a report showing the dollar amount invested in computer hardware	
Stakeholder:	Management	
Level:	Blue	
Triggering Event:	Reports: Hardware Investment Report menu item clicked	
Trigger Type:	**X External** **Internal**	
Steps Performed		**Information for Steps**
1. Read each hardware record		1. Hardware Master database table
2. Count the number of machines and totaling the amount invested in them for each computer model		2. Hardware Master database table
3. When the computer brand changes, produce subtotals		3. Hardware Master database table
4. Produce a grand total at the end of the report		4. Hardware Master database table
Preconditions:	All computer information must be up-to-date on the Hardware Master	
Postconditions:	The report has been printed	
Assumptions:	The information on the Hardware Master is valid	
Success Guarantee:	The report has been printed	
Minimum Guarantee:	The report has not been printed	
Objectives Met:	Report on the total amount invested in hardware	
Outstanding Issues:	None	
Priority (optional):	High	
Risk (optional):	Low	

12. *Write the use case description for the QUERY TRAINING CLASSES use case. Use the use case diagram to define the header information. The steps involve entering information on the Web form, validating the information, and storing the data on a Training Request database table. Make any reasonable assumptions about preconditions (such as if the software has to have been already purchased), postconditions, assumptions, success guarantee, minimum guarantee, objectives met, outstanding issues, priority (would this be a high priority task), and risk.*

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Use case name:	Query Training Classes	
Area:	Training	
Actors:	Faculty, Management	
Description:	Produce a Web query of all training classes offered	
Stakeholder:	Faculty, Staff, Training Staff	
Level:	Blue	
Triggering Event:	The Training Class Offering link has been clicked	
Trigger Type:	**X External** **Internal**	
<u>Steps Performed</u> 1. Enter information on the Web form 2. Validate the Web form information 3. Store the data on the Training Request database table		**<u>Information for Steps</u>** 1. Training Request Web form 2. Training Request Web form 3. Training Request database table
Preconditions:	Software must have been purchased and training staff available	
Postconditions:	Training class has been requested	
Assumptions:	User has successfully logged onto the system	
Success Guarantee:	Training class has been requested	
Minimum Guarantee:	User can logon to the system	
Objectives Met:	Allow faculty and staff to request training classes	
Outstanding Issues:	None	
Priority (optional):	Medium	
Risk (optional):	Low	

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EPISODE 2

CPU CASE

ALLEN SCHMIDT, JULIE E. KENDALL, AND KENNETH E. KENDALL

Picturing the Relationships

"So the project involves more than simply performing maintenance work on the current programs," Chip says. "Are we using a formal methodology for analyzing and designing the new system?"

"Yes," replies Anna. "We are also using Microsoft Visio to create and modify the diagrams and some simple repository information. We also have a CASE tool, Visible Analyst, to analyze and design the system.[1] We've recently installed the products on the computer in the office."

With a few easy mouse clicks, Anna comes to a context-level data flow diagram (see Figure E2.1). "It's very useful to begin thinking of the system this way," Anna says as they look at the diagram on the screen.

Chip agrees, saying, "I can very easily see what you think is happening with the system. For instance, I see that the external entity Management supplies hardware and software inquiries and receives the corresponding responses in return. It shows the system within the larger organization."

"I've also drawn a preliminary E-R diagram of the system," Anna says as she brings up the entity-relationship diagram onscreen (see Figure E2.2). "It may need modification as we learn more about the system."

"Yes, the many-to-many and one-to-many relationships are very clear when you look at this," Chip says, viewing the screen.

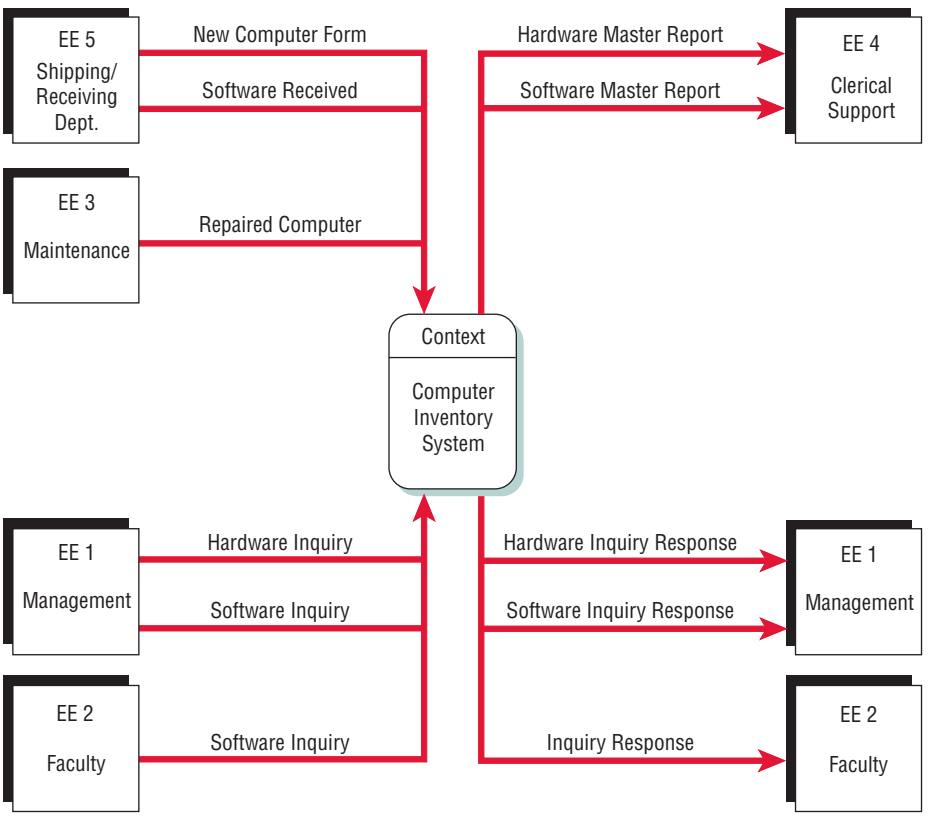

FIGURE E2.1

Context-level data flow diagram, current system.

[1]For more details on how to begin using Visible Analyst, see Allen Schmidt, *Working with Visible Analyst*, 2nd ed. (Upper Saddle River, NJ: Prentice Hall, 2004).

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FIGURE E2.2

Entity-relationship diagram, current system.

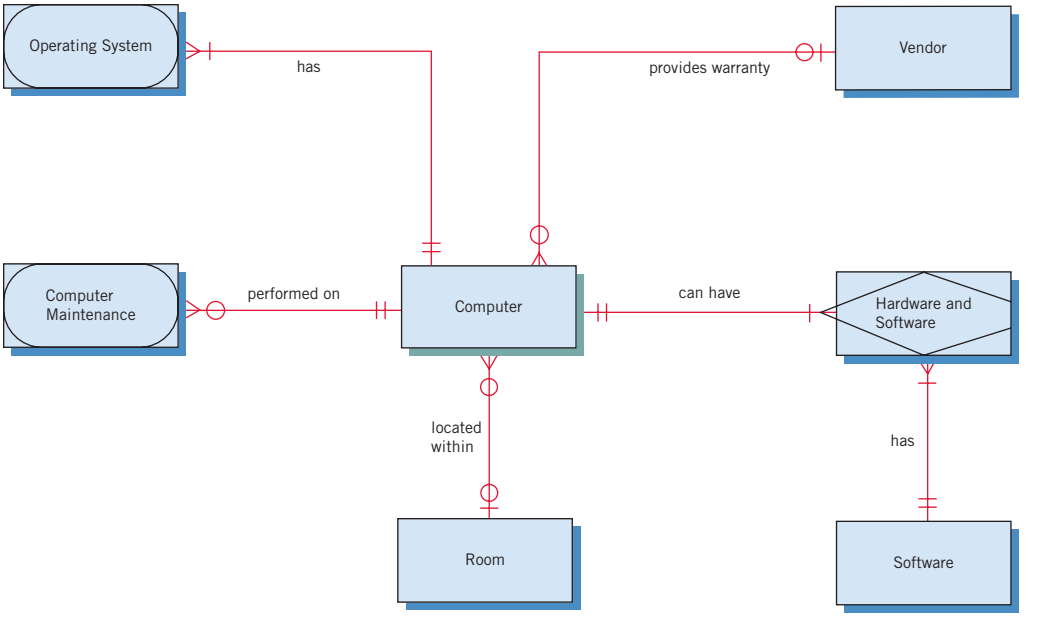
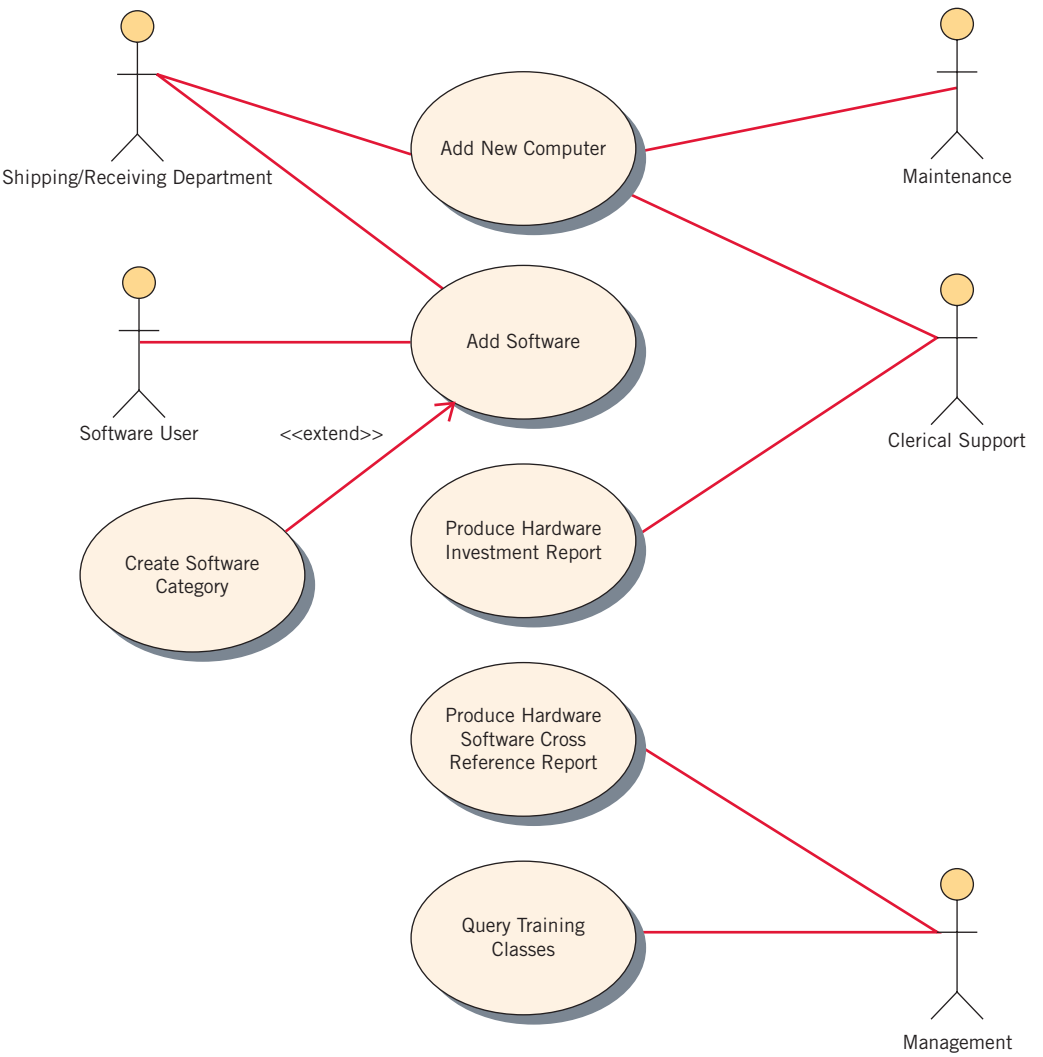


FIGURE E2.3

Use case diagram for the CPU computer system.



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Use case name:	Add New Computer
Area:	Computer Inventory
Actors:	Shipping/Receiving Department, Maintenance
Stakeholder:	Faculty, Student, Staff
Level:	Blue
Description:	Add a new computer and generate a list of all machines for software installation
Trigger:	Add Computer menu choice clicked
Trigger Type:	☑ **External** ☐ **Temporal**
Steps Performed (Main Path)	**Information for Steps**
1. Information is entered about new computers.	Invoice and specification sheets
2. Computer is added to Computer Master.	
3. Pending orders are updated with computers that have been received.	Computer Master
4. Produce the Installation Listing report for all desktop models.	Pending Order database table
5. Produce Software Installation Listing report showing all standard. software for all received computers.	Computer Master
	Computer Master
Preconditions:	Computer has been received by the receiving department.
Postconditions:	A computer has been added to the database and reports have been generated.
Assumptions:	User has successfully logged on with access to Add Computer screen.
Success Guarantee:	A computer has been added to the database and required reports printed.
Minimum Guarantee:	Computer has been received and will be added later.
Objectives Met:	Add and install new computers.
Outstanding Issues:	What course of action should be taken when pending computers do not match those received.
Priority (optional):	High
Risk (optional):	Medium

FIGURE E2.4

Use case scenario for the CPU computer system.

"There is one more view of the system," continues Anna, opening the use case diagram. "This is the preliminary use case diagram for our system (see Figure E2.3). We are going to use it to obtain some valuable feedback from the users. The use cases are not all complete, but I can show you one of them." Anna clicks on the use case symbol, displaying the use case description in the repository shown in Figure E2.4.

"You've got a good start here," Chip continues as he eyes the use case description. "This helps to understand the activities that take place. Let's get to work and see what needs to be done next."

Exercises

E-1. Use Microsoft Visio or Visible Analyst to view and print the context-level data flow diagram for the computer inventory system, as Chip and Anna did.

E-2. Use the Repository feature or the Repository web page to view the entry for the central process.

E-3. Use Microsoft Visio or Visible Analyst to view and print the entity-relationship diagram for the computer inventory system.

E-4. Explain why the external entities on the context-level diagram are not found on the entity-relationship diagram.

E-5. Explain why the entities MANAGEMENT and FACULTY are found on both sides of the process on the context-level diagram.

E-6. Use Microsoft Visio or Visible Analyst to view and print the use case diagram for the computer inventory system.

E-7. Make the following changes to the use case diagram:

a. Add the FACULTY actor to the lower-left side of the use case diagram.

b. Connect the FACULTY actor to the QUERY TRAINING CLASSES use case.

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c. Since the computers may have software installed for a specific computer lab, the clerical support staff may be responsible for installing software on the computers. Connect the CLERICAL SUPPORT actor to the ADD SOFTWARE use case.
d. Add two new use cases below the QUERY TRAINING CLASSES use case: QUERY SOFTWARE EXPERT and, below it, QUERY SOFTWARE INFORMATION.
e. Connect the FACULTY actor to the QUERY SOFTWARE EXPERT and QUERY SOFTWARE INFORMATION use cases.
f. Connect the MANAGEMENT actor to the QUERY SOFTWARE EXPERT use case.

E-8. Add the INSTALL DESKTOP COMPUTER use case to the upper-right area of the diagram. This use case extends the ADD NEW COMPUTER use case.

E-9. Add a use case description for the ADD SOFTWARE use case. It should contain the following information:
a. Obtain the use case name and actors from the use case diagram. The stakeholder and level are the same as those in Figure E2.3.
b. The description should be: Add new software to the Software database table and print an installation listing.
c. The activity is started (triggered) when the user clicks the Add Software menu item.
d. The steps performed and information for steps are:

Software is keyed into the new system and validated	Software received form
Software is added to the Software Master	Software Master
The Software Installation List is produced	Software Master, Order
The software user is notified about installed software	Order

e. Preconditions are that software has been received. Postconditions are that the software has been added to the database and reports have been created. Assumptions are that the user has successfully logged on with access to the Add Software entry screen. A success guarantee is that the software has been added to the database and the required report printed. A minimum guarantee is that the software has been received. The objectives met are to add and install new software. The outstanding issue is how to determine which software to install on which machines. The priority is high and the risk is medium.

E-10. Write a use case description for the PRODUCE HARDWARE SOFTWARE CROSS REFERENCE REPORT use case. Use the use case diagram to determine the heading information, making any reasonable assumptions. The steps would be to read a software record, use that information to read the hardware–software relational table, and read the hardware record. Use the hardware record to print a line, accumulating totals. Print subtotals and grand totals. This is a medium-priority, low-risk activity. Preconditions are that all the information must have been previously added to the appropriate database tables. Postconditions are that the report has been printed. Assumptions are that all the information on the database tables is correct. A success guarantee would be that the report has been successfully created. A minimum guarantee would be that the report could not be printed. The objectives met are to produce information about what software is found on which machine. Outstanding issues are: If the software is older and is not currently installed on any machines, how should the report be produced: printed, in a PDF file, or should it really be a query for one software package?

E-11. Write the use case description for the PRODUCE HARDWARE INVESTMENT REPORT use case. Use the use case diagram to define the header information. The steps involve reading each hardware record, counting the number of machines, and totaling the amount invested in them for each computer model. When the computer brand changes, produce subtotals, with a grand total at the end of the report. All information comes from the Hardware Master database table. Make any reasonable assumptions about preconditions, postconditions, assumptions, success guarantee, minimum guarantee, objectives met, outstanding issues, priority, and risk.

E-12. Write the use case description for the QUERY TRAINING CLASSES use case. Use the use case diagram to define the header information. The steps involve entering information on the Web form, validating the information, and storing the data on a Training Request database table. Make any reasonable assumptions about preconditions (such as if the software have to be already purchased), postconditions, assumptions, success guarantee, minimum guarantee, objectives met, outstanding issues, priority (would this be a high priority task), and risk.

The exercises preceded by a www icon indicate value-added material that is available from www.pearsonhighered.com/kendall. Students can download a sample Microsoft Visio, Visible Analyst, Microsoft Project, or a Microsoft Access file that can be used to complete the exercises. Alternatively, many of the exercises can be accomplished manually if software is unavailable.

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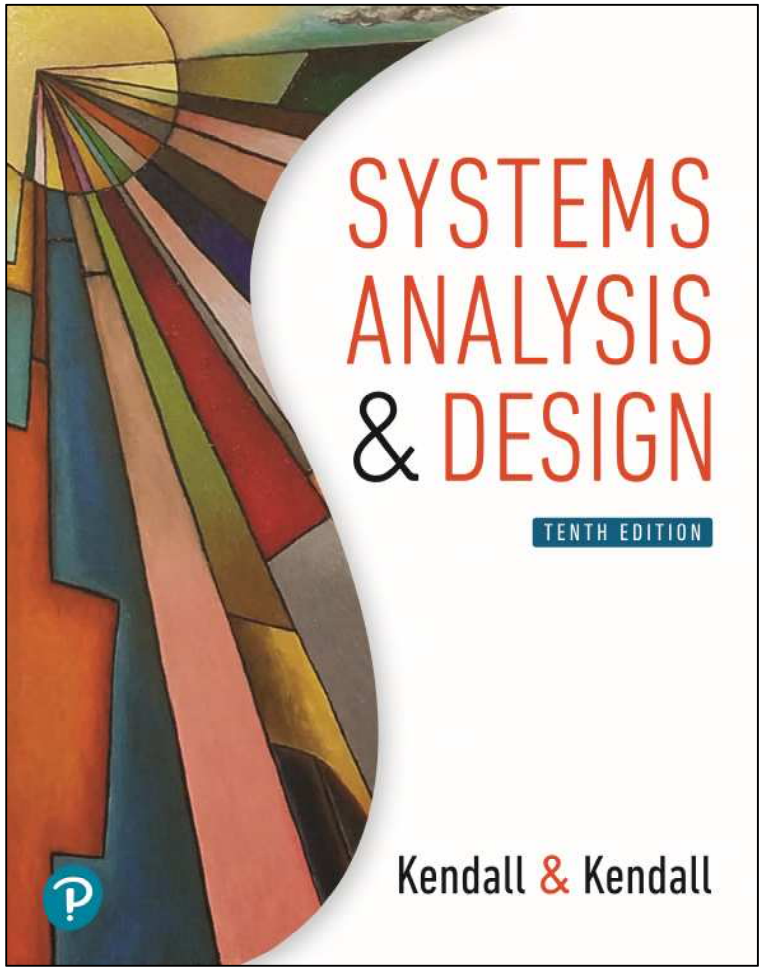
Tenth Edition



Chapter 2

Understanding and Modeling Organizational Systems

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Learning Objectives

2.1 Understand that organizations and their members are systems and that analysts need to take a systems perspective.

2.2 Depict systems graphically using context-level data flow diagrams, and entity-relationship models, use cases, and use case scenarios.

2.3 Recognize that different levels of management require different systems.

2.4 Comprehend that organizational culture impacts the design of information systems.

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Three Main Forces Interacting to Shape Organizations

- Levels of management
- Design of organizations
- Organizational cultures

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Organizations are Composed of Interrelated Subsystems

- Influenced by levels of management decision makers that cut horizontally across the organizational system
  - Operations
  - Middle management
  - Strategic management
- Influenced by organizational cultures and subcultures

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Major Topics

- Organizations as systems
- Depicting systems graphically
  - Data flow diagram
  - Entity-relationship model
  - Use case modeling
- Levels of management
- Organizational culture

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Organizations as Systems

- Conceptualized as systems designed to accomplish predetermined goals and objectives
- Composed of smaller, interrelated systems serving specialized functions
- Specialized functions are reintegrated to form an effective organizational whole

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Interrelatedness and Independence of Systems

- All systems and subsystems are interrelated and interdependent
- All systems process inputs from their environments
- All systems are contained by boundaries separating them from their environments
- System feedback for planning and control
- An ideal system self-corrects or self-regulates itself

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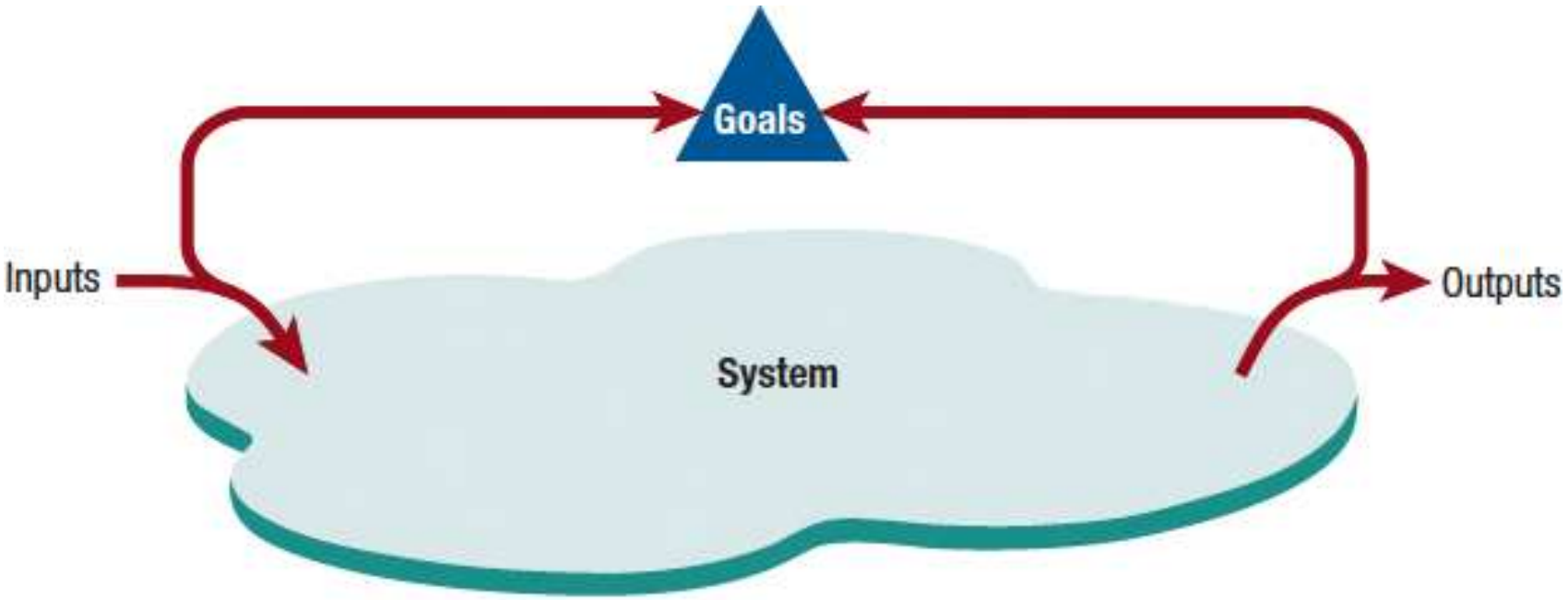
Figure 2.1 System Outputs Serve as Feedback That Compares Performance with Goals



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Organizational Environments

- Community
  - Physical location
  - Demographic profile (education, income)
- Economic
  - Market factors
  - Competition
- Political
  - State and local government
- Legal
  - Federal, state, regional, local laws, and guidelines

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Virtual Organizations and Virtual Teams

- A virtual organization has parts of the organization in different physical locations
- Computer networks and communications technology are used to bring virtual teams together to work on projects

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Benefits of Virtual Organizations and Teams

- Possibility of reducing costs of physical facilities
- More rapid response to customer needs
- Helping virtual employees to fulfill their familial obligations to children or aging parents

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Taking a Systems Perspective

- Allows system analyst to understand businesses they will come into contact with
- It is important that members of subsystems realize that they are interrelated with other subsystems
- Problems occur when each manager thinks that his/her department is the most important
- Bigger problems may occur when that manager rises through the ranks

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Figure 2.2 Taking a Systems Perspective

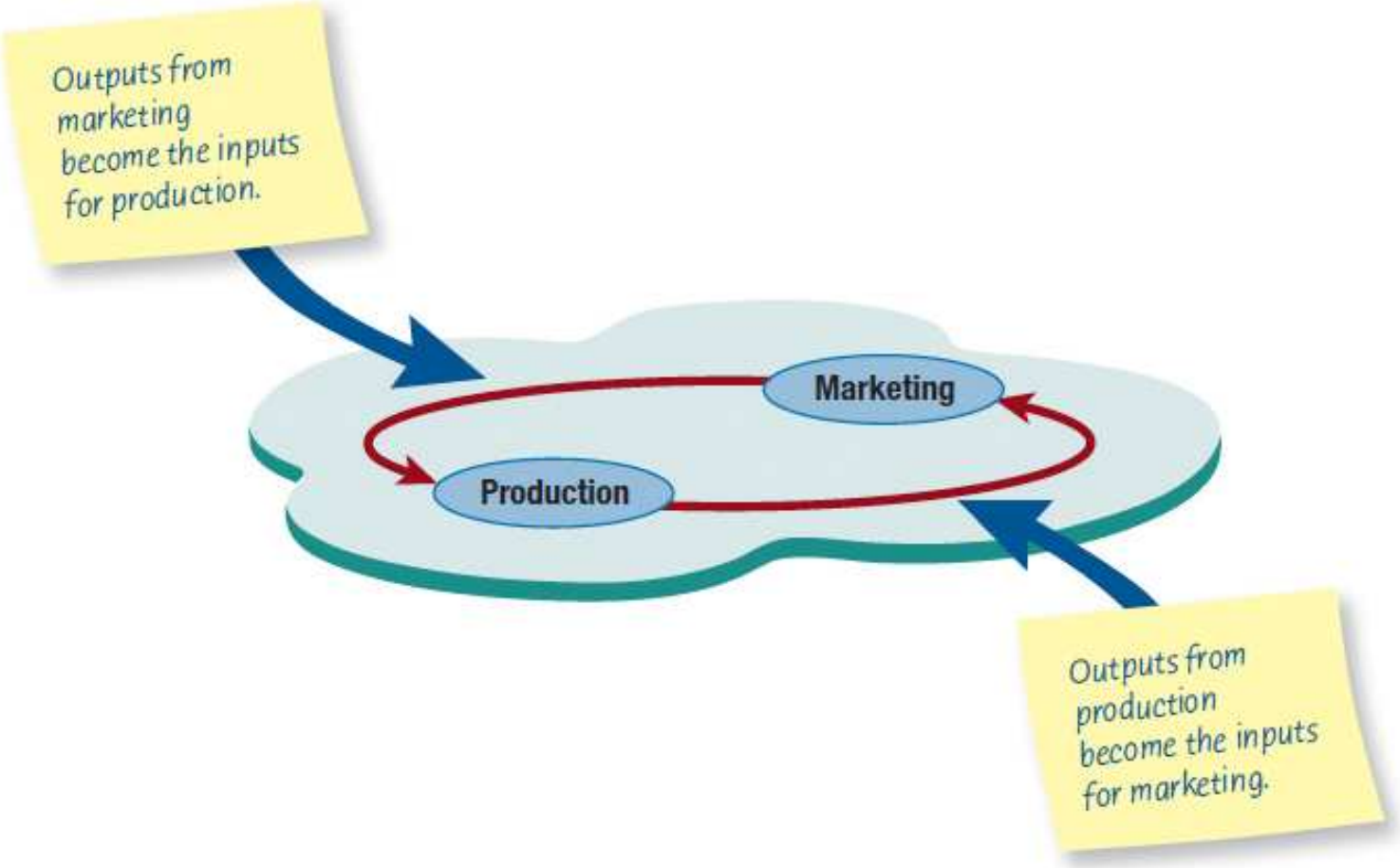

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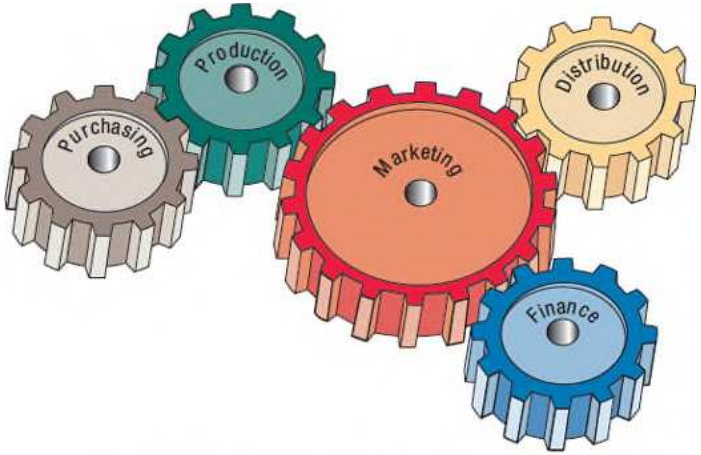
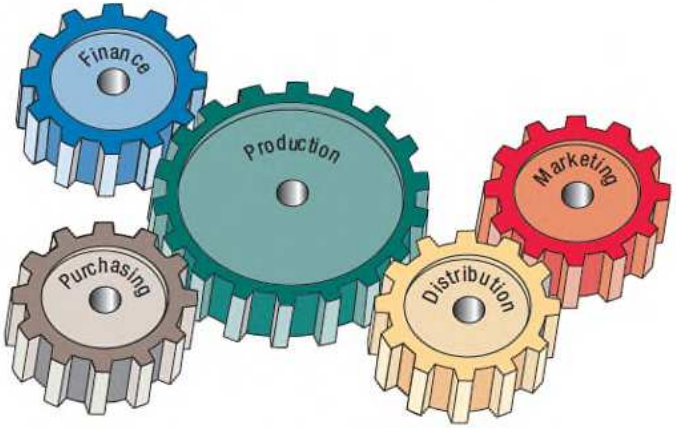
Figure 2.3 Perspective of Functional Managers



How a Marketing Manager May View the Organization



How a Production Manager May See the Organization

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Enterprise Resource Planning

- Enterprise Resource Planning (ERP) is an integrated organizational information system
- Software that helps the flow of information between the functional areas within the organization
- Recently ERP systems are moving to cloud computing

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ERP and the Organization

- ERP can affect every aspect of the organization, including:
  - Design of employees' work
  - Skills required for job competency
  - Strategic positioning of the company

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Issues to Be Overcome for ERP Success

- Many issues must be overcome for the ERP installation is to be declared a success:
  - User acceptance
  - Integration with legacy systems and the supply chain
  - Upgrading functionality (and complexity) of ERP modules
  - Reorganizing work life of users and decision makers
  - Expanded reach across several organizations
  - Strategic repositioning of the company

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Depicting Systems Graphically

- Context-level data flow diagrams
- Entity-relationship model
- Use case modeling

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Context-Level Data Flow Diagrams

- Focus is on the data flowing into and out of the system and the processing of the data
- Shows the scope of the system:
  - What is to be included in the system
  - The external entities are outside the scope of the system

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Figure 2.4 The Basic Symbols of a Data Flow Diagram

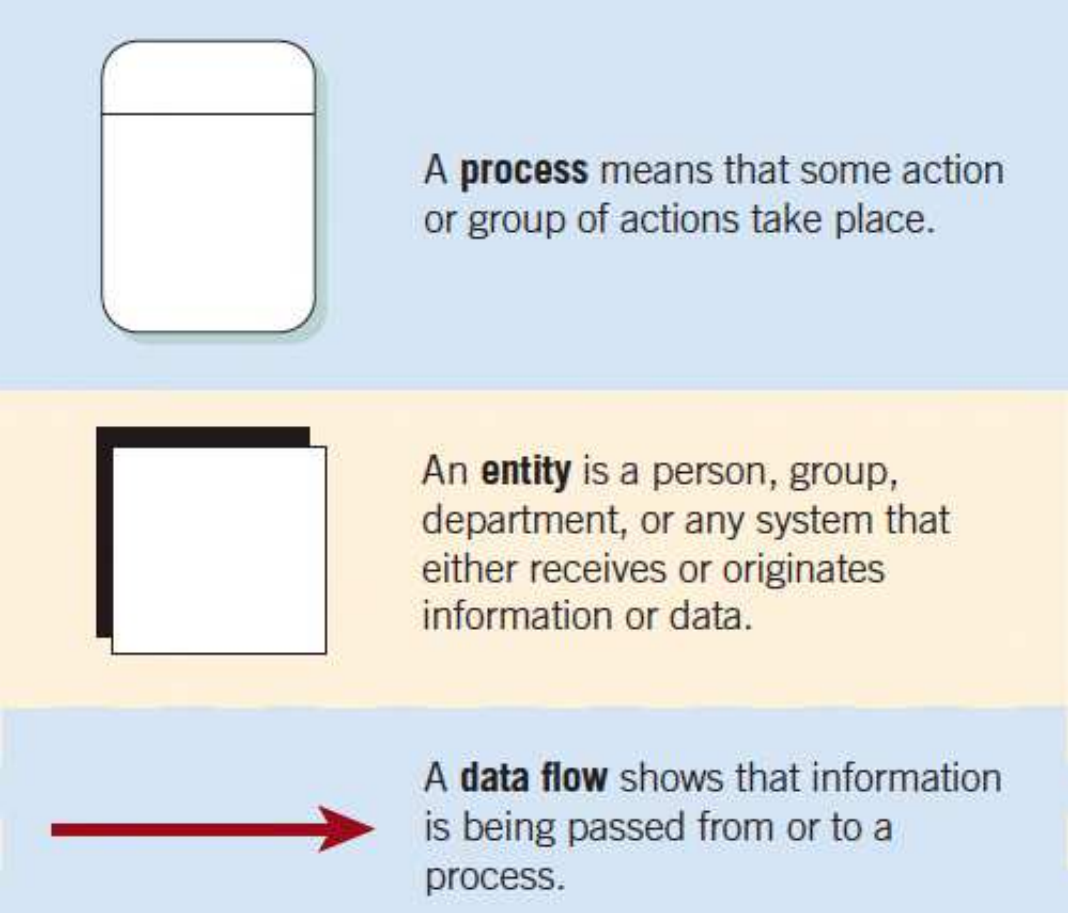

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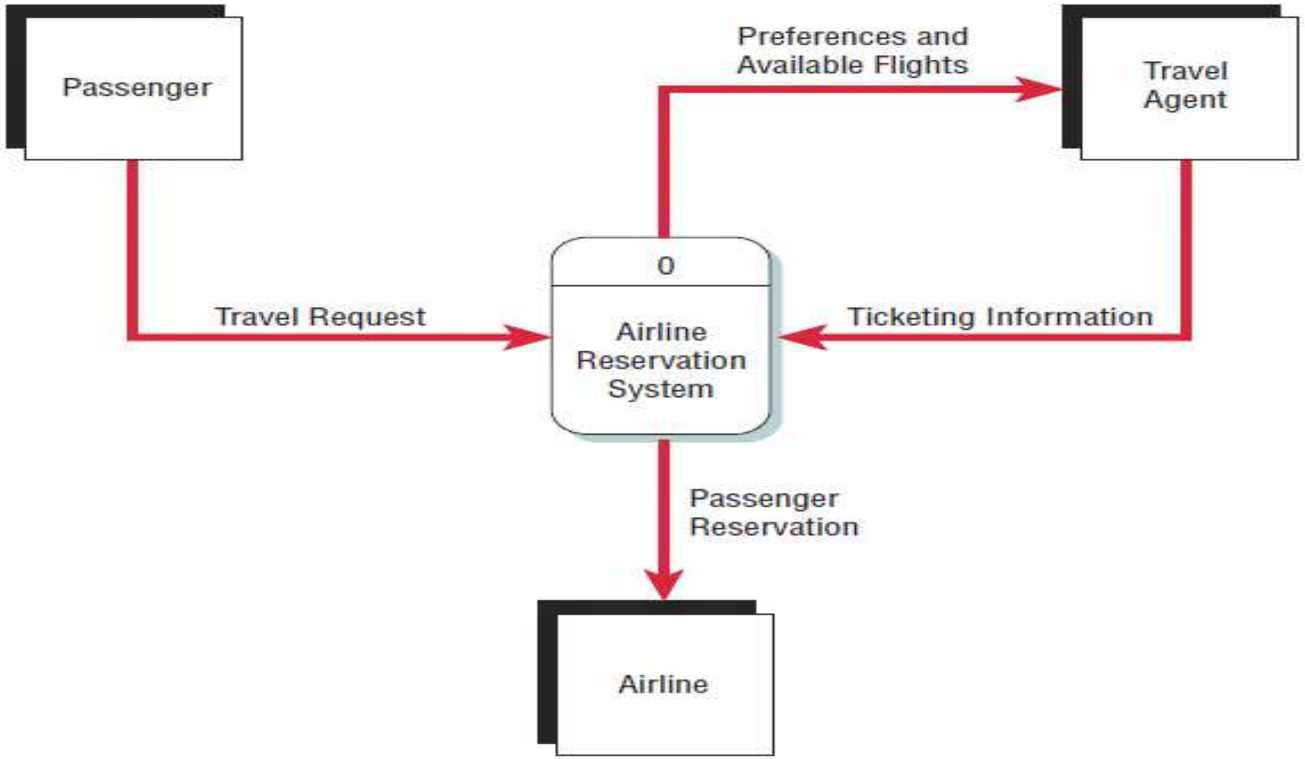
Figure 2.5 Airline Reservation System

A context-level data flow diagram for an airline reservation system



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Entity-Relationship Model

- Focus is on the entities and their relationships within the organizational system
- Another way to show the scope of a system

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Relationships

- Relationships show how the entities are connected
- Three types of relationships:
  - One-to-one
  - One-to-many
  - Many-to-many

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Figure 2.7 Entity-Relationship Example

An entity-relationship diagram showing a many-to-one relationship

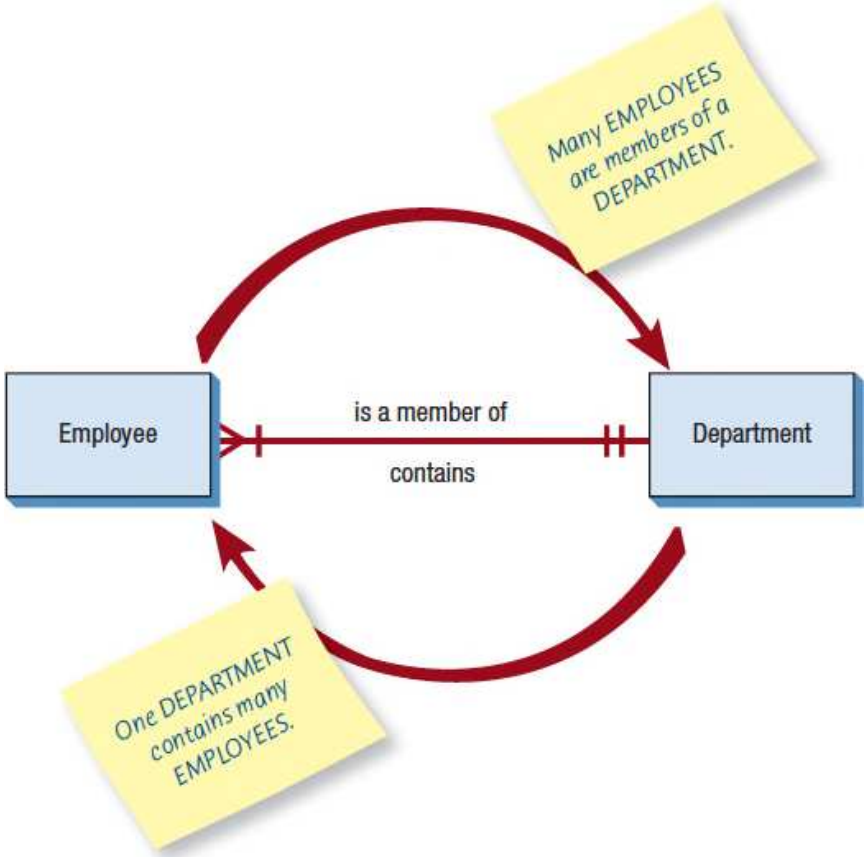

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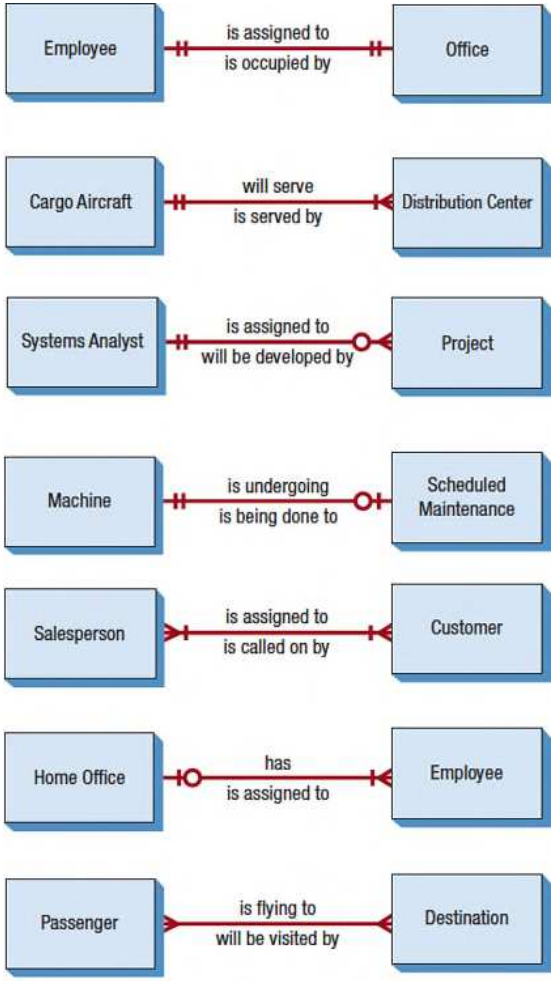
Figure 2.8 Examples of Different Types of Relationships in E-R Diagrams



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Entities

- Fundamental entity
- Associative entity
- Attributive entity

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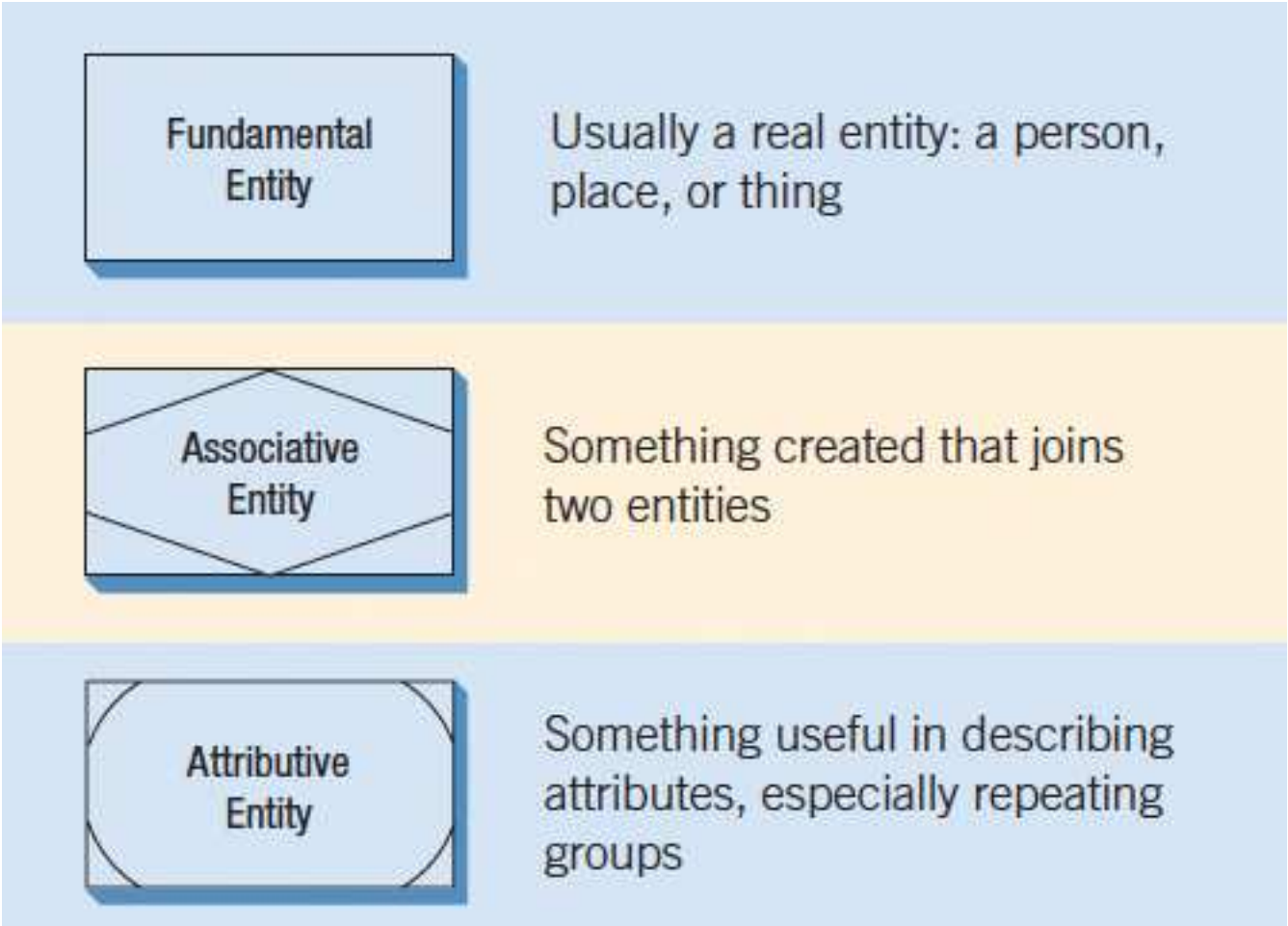
Figure 2.9 Three Different Types of Entities Used in E-R Diagrams



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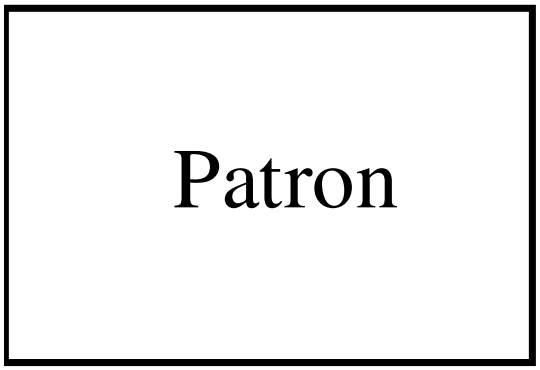
Attributes

- Data attributes may be added to the diagram.



Patron Name
Patron address
Patron phone
Patron credit card

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Creating Entity-Relationship Diagrams

- List the entities in the organization
- Choose key entities to narrow the scope of the problem
- Identify what the primary entity should be
- Confirm the results of the above through data gathering

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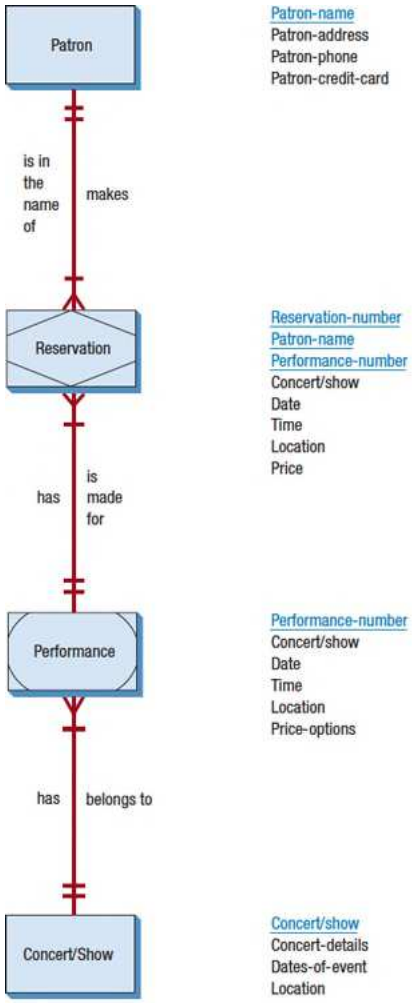
Figure 2.12 A More Complete E-R Diagram Showing Data Attributes of the Entities



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Use Case Modeling

- Part of the unified modeling language (UML)
- Describes **what** a system does without describing **how** the system works
- A view of the system requirements
- Analyst works with business experts to develop requirements

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Use Case Diagram

- Actor
  - Refers to a particular role of a user of the system
  - Similar to external entities; they exist outside of the system
- Use case symbols
  - An oval indicating the task of the use case
- Connecting lines
  - Arrows and lines used to diagram behavioral relationships

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Actor

- Divided into two groups
  - Primary actors:
    - Supply data or receive information from the system
    - Provide details on what the use case should do
  - Supporting actors:
    - Help to keep the system running or provide help
    - The people who run the help desk, the analysts, programmers, and so on

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A Use Case Always Provides Three Things

- An actor that initiates an event
- The event that triggers a use case
- The use case that performs the actions triggered by the event

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Use Case Relations (1 of 2)

- Behavioral relationships
  - Communicates
    - Used to connect an actor to a use case
  - Includes
    - Describes the situation in which a use case contains behavior that is common to more than one use case

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Use Case Relations (2 of 2)

- Behavioral relationships [continued]
  - Extends
    - Describes the situation in which one use case possesses the behavior that allows the new case to handle a variation or exception from the basic use case
  - Generalizes
    - Implies that one thing is more typical than the other thing

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Figure 2.13 Four Types of Behavioral Relationships and the Lines Used to Diagram Each

Relationship	Symbol	Meaning
Communicates		An actor is connected to a use case using a line with no arrowheads.
Includes	<< include >>	A use case contains a behavior that is common to more than one other use case. The arrow points to the common use case.
Extends	<< extend >>	A different use case handles exceptions from the basic use case. The arrow points from the extended to the basic use case.
Generalizes		One UML "thing" is more general than another "thing." The arrow points to the general "thing."

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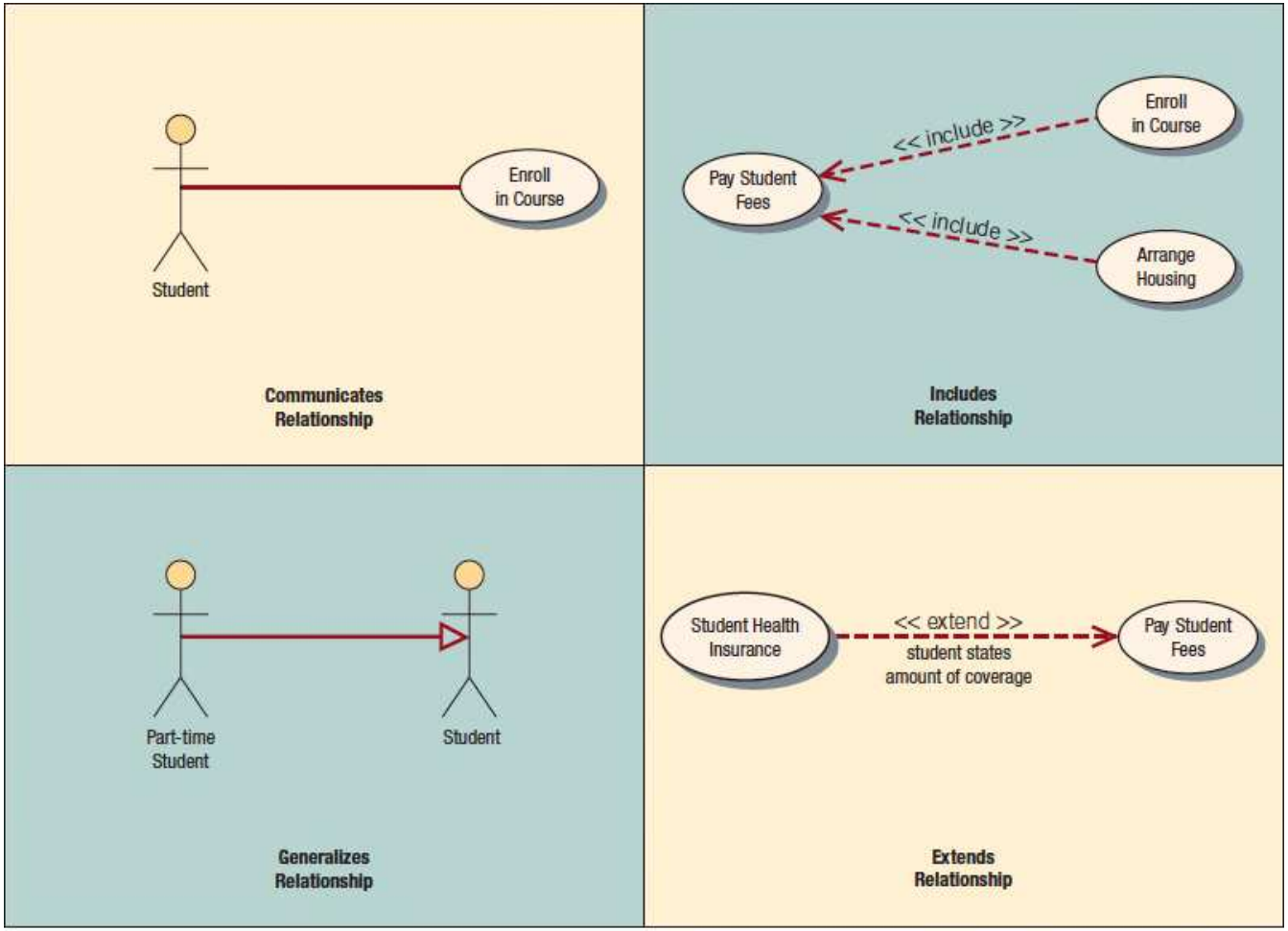
Figure 2.14 Actors, Use Cases, and Relationships for a Student Enrollment Example



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Scope

- System scope defines its boundaries:
  - What is in or outside the system
  - Project has a budget that helps to define scope
  - Project has a start and an end time
- Actors are always outside of scope
- Communication lines are the boundaries and define the scope

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Developing Use Case Diagrams

- Review the business specifications and identify the actors involved
- Identify the high-level events and develop the primary use cases that describe those events and how the actors initiate them
- Review each primary use case to determine the possible variations of flow through the use case
- The context-level data flow diagram could act as a starting point for creating a use case

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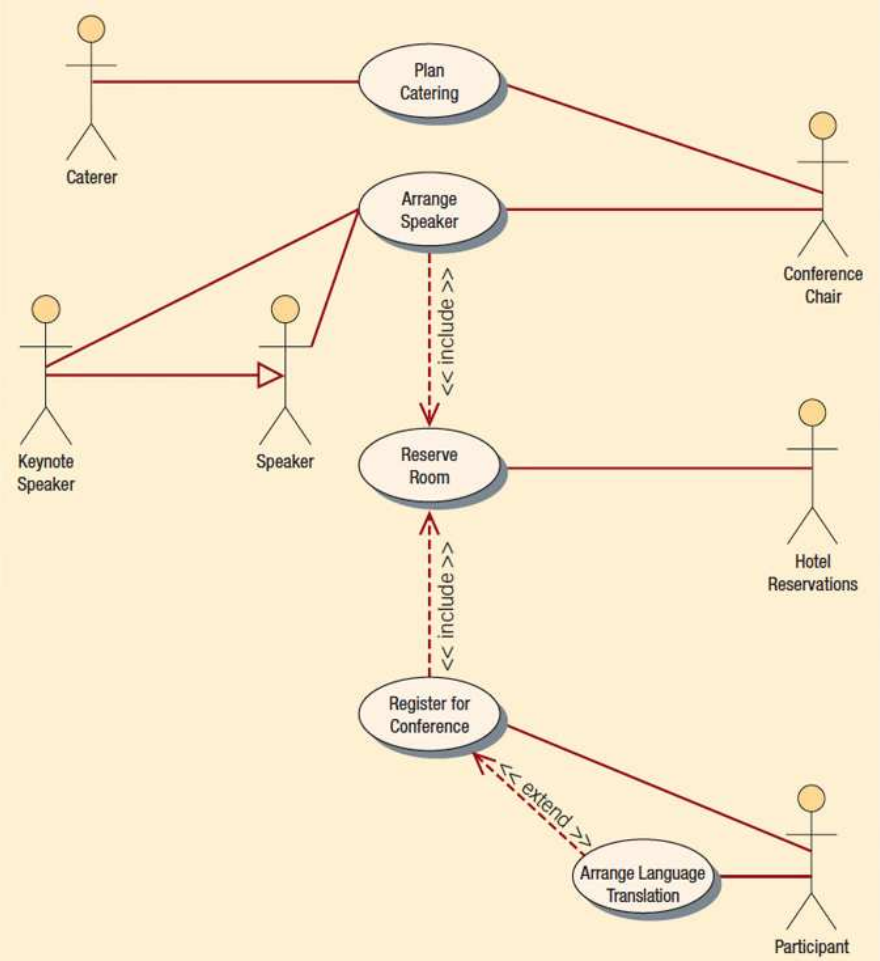
Figure 2.15 A Use Case Diagram Representing a System Used to Plan a Conference



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Developing the Use Case Scenarios

- The description of the use case
- Three main areas:
  - Use case identifiers and initiators
  - Steps performed
  - Conditions, assumptions, and questions

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Figure 2.16 A Use Case Scenario is Divided into Three Sections

Use case name:	Register for Conference	**UniqueID:**	**Conf RG 003**
Area:	Conference Planning		
Actor(s):	Participant		
Stakeholder:	Conference Sponsor, Conference Speakers		
Level:	Blue		
Description:	Allow conference participant to register online for the conference using a secure website.		
Triggering Event:	Participant uses Conference Registration website, enters userID and password, and clicks the logon button.		
Trigger type:	External Temporal		
Steps Performed (Main Path)		**Information for Steps**	
1. Participant logs in using the secure web server.		userID, Password	
2. Participant record is read and password is verified.		Participant Record, userID, Password	
3. Participant and session information is displayed on the Registration web page.		Participant Record, Session Record	
4. Participant enters information on the Registration Web form and clicks **Submit** button.		Registration Web Form	
5. Registration information is validated on the Web server.		Registration Web Form	
6. Registration Confirmation page is displayed to confirm registration information.		Confirmation Web Page	
7. Credit card is charged for registration fees.		Secure Credit Card Web Page	
8. Add Registration Journal record is written.		Confirmation Web Page	
9. Registration record is updated on the Registration Master.		Confirmation Web Page, Registration Record	
10. Session record is updated for each selected session on the Session Master.		Confirmation Web Page, Session Record	
11. Participant record is updated for the participant on the Participant Master.		Confirmation Web Page, Participant Record	
12. Successful Registration Confirmation web page is sent to the participant.		Registration Record Confirmation Number	
Preconditions:	Participant has already registered and has created a user account.		
Postconditions:	Participant has successfully registered for the conference.		
Assumptions:	Participant has a browser and a valid userID and password.		
Success Guarantee:	Participant has registered for the conference and is enrolled in all selected sessions.		
Minimum Guarantee:	Participant was able to logon.		
Requirements Met:	Allow conference participants to be able to register for the conference using a secure website.		
Outstanding Issues:	How should a rejected credit card be handled?		
Priority:	High		
Risk:	Medium		

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Use Case Header Area

- Has a name and a unique ID
- Include application area
- List actors
- Include stakeholders
- Include the level
- Has a brief description of the use case

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Use Case Levels

- Use case levels describe how global or detailed the use case description is:
  - White (like clouds): enterprise level
  - Kite: business unit or department level
  - Blue (sea level): user goals
  - Indigo (or fish): functional or subfunctional
  - Black (or clam): most detailed

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Alternative Scenarios

- Extensions or exceptions to the main use case
- Number with an integer, decimal point, integer
- Steps that may or may not always be used

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Use Case Footer Area

- Preconditions—need to be met before use case can be performed
- Postconditions or the state of the system after the use case has finished
- Assumptions
- Minimal guarantee
- Success guarantee
- Outstanding issues
- Optional priority and risk

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Four Steps Used to Create Use Cases

- Use agile stories, problem definition objectives, user requirements, or a features list
- Ask about the tasks that must be done
- Determine if there are any iterative or looping actions
- The use case ends when the customer goal is complete

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Why Use Case Diagrams Are Helpful

- Identify all the actors in the problem domain
- Actions that need to be completed are also clearly shown on the use case diagram
- The use case scenario is also worthwhile
- Simplicity and lack of technical detail

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Figure 2.18 The Main Reasons for Writing Use Cases are Their Effectiveness in Communicating with Users and Their Capturing of User Stories

- Use cases effectively communicate systems requirements because the diagrams are kept simple.
- Use cases allow people to tell stories.
- Use case stories make sense to nontechnical people.
- Use cases do not depend on a special language.
- Use cases can describe most functional requirements (such as interactions between actors and applications).
- Use cases can describe nonfunctional requirements (such as performance and maintainability) through the use of stereotypes.
- Use cases help analysts define boundaries.
- Use cases can be traceable, allowing analysts to identify links between use cases and other design and documentation tools.

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Figure 2.19 Management in Organizations Exists on Three Horizontal Levels

Operational control, managerial planning and control, and strategic management.

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Operations Control

- Make decisions using predetermined rules that have predictable outcomes
- Oversee the operating details of the organization

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Managerial Planning and Control

- Make short-term planning and control decisions about resources and organizational objectives
- Decisions may be partly operational and partly strategic

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Strategic Management

- Look outward from the organization to the future
- Make decisions that will guide middle and operations managers
- Work in highly uncertain decision-making environment
- Faced with semistructured problems
- Define the organization as a whole

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Managerial Levels

- Different organization structure
- Leadership style
- Technological considerations
- Organization culture
- Human interaction
- All carry implications for the analysis and design of information systems

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Collaborative Design

- External and internal stakeholders follow processes to share in designing a system to meet their goals
- Giving power to those who possess a technical or strategic expertise

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Organizational Culture

- Organizations have cultures and subcultures
- Learn from verbal and nonverbal symbolism

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Technology Impact on Culture

- Technology is changing the culture of organizations and teams
- Slack is an employer-sanctioned social media platform, or workplace-messaging app
- Public and private channels
- Direct or group messages

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Summary (1 of 2)

- Organizational fundamentals
  - Organizations as systems
  - Levels of management
  - Organizational culture
- Graphical representation of systems
  - DFD
  - ERD
  - Use case diagrams and scenarios

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Summary (2 of 2)

- Levels of managerial control
  - Operational
  - Middle management
  - Strategic
- Organizational culture

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