# **Systems Analysis and Design Twelfth Edition**

# **Phase 1: Systems Planning**

# **A Guide to the Instructor’s Manual:**

We designed the Instructor’s Manual to supplement and enhance your teaching experience with classroom activities and a cohesive chapter summary.

This document is organized chronologically, using the same main heading in **red** that you see in the textbook. Under each heading you will find (in order): Lecture Notes that summarize the section, Figures and Boxes found in the section, if any, Teaching Tips, and Classroom Activities. Pay special attention to teaching tips and activities geared toward quizzing your students and enhancing their critical thinking skills.

In addition to the Instructor’s Manual, the Instructor Companion Site also contains PowerPoint Presentations, Solutions to Exercises, Figures, Test Banks, and other materials to aid you as an instructor.

**1: Phase 1: Systems Planning**

LECTURE NOTES

* Use the Gantt chart as a starting point for a discussion about systems development
* Inform that systems planning is the first of five phases in the systems development life cycle
* Indicate that the systems planning phase explains how systems projects get started, how to evaluate a project proposal to determine its feasibility, and how to use project management tools and techniques
* Discuss the deliverable for the systems planning phase

FIGURES: Gantt chart screenshot on Page 1

CLASSROOM ACTIVITIES

1. Group Activity: Ask students if they have ever used Gantt charts, and ask them to explain when they have used them. Also ask for examples of other task sets that might lend themselves to Gantt charts (planning a vacation, buying and installing a new kitchen faucet, etc.)

# **Systems Analysis and Design Twelfth Edition**

# **Chapter 1: Introduction to Systems Analysis and Design**

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# **Learning Objectives**

Students will have mastered the material in Chapter One when they can:

* Describe the impact of information technology on society
* Describe the five main components of an information system
* Explain Internet business strategies and

relationships, including B2C and B2B

* Explain how to use business profiles and models
* Understand the seven types of information systems used in business
* Describe the types of information the four classes of users need
* Distinguish among structured analysis, object- oriented analysis, and agile systems development methods
* List the tools that enable the systems analyst to develop, manage, and maintain large-scale information systems
* Explain the seven main functions of the

information technology department

* Describe the roles and responsibilities of a systems analyst within the enterprise

# **[1.1: Information Technology](#_EX_4:_What_is Microsoft Excel 2007?)**

# LECTURE NOTES

* Use Figure 1-1 as a starting point for a discussion about how information technology affects the society
* Discuss the benefits of using information by an organization
* Discuss the importance of information technology in a global economy
* Define information technology (IT)
* Discuss the role of information technology in an organization’s success
* Use Figure 1-2 to discuss job opportunities available in IT
* Define an information system
* Provide an overview of systems analysis and design
* Discuss the role of systems analysts

FIGURES: 1-1. 1-2

TEACHING TIPS

Explain the way in which information systems are used. In business, clerks, sales representatives, accountants, supervisors, managers, executives, and customers all use information systems, either directly or indirectly. Information systems support daily, short-term, and long-term activities.

Talk over the history of information technology and how it has evolved. From Herman Hollerith and IBM to tablets and smartphones, generate excitement about the endless possibilities of IT in the 21st century.

CLASSROOM ACTIVITIES

1. Quick Quiz: Assign Question 1 on page 42.

2. Quick Quiz: Assign Question 2 on page 42.

3. Critical Thinking: What characteristics would make an individual a strong systems analyst?

# **1.2: Information Systems**

LECTURE NOTES

* Define system and mission-critical system
* Explain in what way data is different from information
* Use Figure 1-4 to identify the key components of an information system
* Define hardware
* Discuss Moore’s Law
* Define software, and show that system software is different from application software
* Describe enterprise applications by providing examples such as order processing systems, payroll systems, and company communication networks
* Differentiate between a horizontal system and a vertical system
* Define legacy systems
* Redefine data using a typical payroll system as an example
* Describe processes
* Define stakeholders and users (end users)
* FIGURES: 1-3, 1-4, 1-5, 1-6

TEACHING TIPS

Using Figure 1-6, illustrate a payroll system that stores data in related tables.

Elucidate the prediction of Gordon Moore, a cofounder of Intel, and update that this prediction was valid for 50 years.

Explain that system software manages the hardware components of a system. It also controls the flow of data, provides data security, and manages network operations. Offer examples of system software, which include: Windows, UNIX, Mac OS, and Linux (operating systems); personal firewalls (security software); and file viewers, file compression utilities, disk scanners, and screen savers (utility programs).

CASE IN POINT 1.1: Data Breaches

A data breach occurs when a hacker gains illegal access to a system and steals personal data, such as credit card numbers or home addresses. With more of our information stored in the cloud, data breaches are becoming increasingly common. Research recent news articles about large-scale data breaches, summarize why they occurred, and suggest how they might be prevented in the future.

CLASSROOM ACTIVITIES

1. Class Discussion: Ask students for examples of mission-critical systems.

2. Class Discussion: Challenge students to give examples of data and information. Encourage them to explain why they classified each example as they did.

3. Class Discussion: Ask students to suggest processes that might be used to perform a simple operation, such as selling an item in a grocery store.

4. Critical Thinking: Which is more widely available and less expensive: horizontal or vertical systems? Why?

5. Quick Quiz: Assign Question 5 on page 42

# **1.3: Internet Business Strategies**

LECTURE NOTES

* Define ecommerce (electronic commerce)
* Discuss the use of an app
* Describe B2C ecommerce, and point out the types of companies that participate in B2C ecommerce
* Discuss how B2C ecommerce is changing traditional business models
* Describe B2B ecommerce, and point out the advantages of B2B ecommerce
* Describe electronic data interchange (EDI)
* Differentiate between B2C (business-to-consumer) ecommerce and B2B (business-to-business) ecommerce
* Define supply chain

TEACHING TIPS

Mention that B2C ecommerce involves the sale of products or services to the general public. In addition to allowing customers to compare and buy products, some B2C websites offer access to product reviews, chat rooms, and other product-related information.

Explain that B2B ecommerce consists of the sale and exchange of products and services between businesses.

CLASSROOM ACTIVITIES

1. Class Discussion: Ask students to describe their B2C experiences. What types of services or products (such as travel, hobbies, electronic products, and so on) did they purchase? How satisfied were they with the transaction? Why?

2. Critical Thinking: Assign Discussion Topic 1 on page 42.

3. Quick Quiz: Assign Question 4 on page 42.

4 Projects to Assign: Assign Project 2 on page 42.

# **1.4: Modeling Business Operations**

LECTURE NOTES

* Define business profile
* Define business process
* Define business process model (BPM)
* Describe business process modeling notation (BPMN)

FIGURES: 1-7, 1-8, 1-9

TEACHING TIPS

Discuss the use of business process models (BPM) in providing visual representations of business processes using Figure 1-7.

Use Figure 1-8 to illustrate a business process modeling notation (BPMN).

CLASSROOM ACTIVITIES

1. Class Discussion: Ask students for examples of business processes for registration of classes at their university.

2. Quick Quiz: Assign Question 3 on page 42.

# **1.5: Business Information Systems**

LECTURE NOTES

* Specify the types of systems
* Define enterprise computing
* Discuss the main objective of enterprise computing
* Define enterprise resource planning (ERP), and discuss its advantages and disadvantages
* Use Figure 1-10 to show an example of an ERP solution that can boost productivity
* Describe transaction processing (TP) systems, and use Figure 1-11 to show the tasks processed by a TP system
* Discuss business support systems and management information systems (MIS)
* Discuss radio frequency identification (RFID) technology with the help of Figure 1-12
* Discuss the important feature of business support systems
* Characterize the knowledge base and inference rules that make up knowledge management systems
* Use Figure 1-13 to explain a knowledge management system
* Give examples of user productivity systems
* Define groupware
* Discuss the use of personal digital assistants
* Discuss the need for systems integration

FIGURES: 1-10, 1-11, 1-12, 1-13, 1-14, 1-15

CASE IN POINT 1.2: Autonomous Vehicles

Imagine you work for a large automotive company. Your manager asks you to look into integrating a digital assistant into a new vehicle for the next production year. How would understanding your company’s business profile help you complete this task?

TEACHING TIPS

Enterprise Resource Planning (ERP) systems are used by most organizations today to increase efficiencies and maximize effectiveness of operations.

Explain the reason for ERP systems to be considered essential for integrating business processes, improving data security, and helping managers make key decisions. For example, a truck manufacturer can use ERP to forecast customer demand for his trucks at several locations. Mention several of the key vendors of ERP systems and discuss how an understanding of these systems is required in most organizations.

Explain that management information systems evolved from transaction processing systems as a way to organize information for managers. Management information systems can produce detailed reports that list transactions, summary reports that consolidate data, or exception reports that identify data outside of normal conditions.

CLASSROOM ACTIVITIES

1. Group Activity: Ask students if they have ever used a website that uses a knowledge base and to list their experiences with such websites.

2. Quick Quiz: Assign Question 5 on page 42.

# **1.6: Organizational Information Models**

LECTURE NOTES

* Use Figure 1-16 to describe a typical organizational model
* Point out why a systems analyst must understand a company’s organizational model
* Describe strategic plans
* Discuss the top and middle levels of management as well as knowledge workers
* Describe the roles of supervisors and team leaders
* Define operational employees
* Describe the empowerment trend

FIGURE: 1-16

TEACHING TIPS

Organizational levels affect not only the type of information needed; it also defines the presentation of information. A night shift supervisor can be given raw columns of data. A report for a top manager, however, often requires an artistic title page, a summary page, and several pages of graphical presentations complete with footnotes.

Point out how the information required by middle managers is different from the information required by top managers. While top managers make strategic decisions, some say that middle managers make tactical decisions, determining specific programs and plans to meet stated objectives. As businesses expand and new companies grow, middle managers are in increasing demand.

Explain that supervisors make operational decisions that involve a company’s day-to-day activities. These decisions should be consistent with and support the decisions made by middle management. Top managers often have far less computer experience than middle managers and supervisors.

CLASSROOM ACTIVITIES

1. Projects to Assign: Assign Project 1 on page 42.

2. Quick Quiz: Assign Question 6 on page 42.

3. Critical Thinking: Assign Discussion Topic 2 on page 42.

# **1.7: Systems Development**

LECTURE NOTES

* List the different systems development methods
* Using Figure 1-17, introduce and differentiate structured analysis, object-oriented (O-O) analysis, and agile (or adaptive) methods
* Define structured analysis and systems development life cycle (SDLC)
* Clarify the reason for structured analysis being called a predictive approach and a process-centered technique
* Describe the concept of business rules, and use Figure 1-18 to illustrate a process model
* Discuss data flow diagrams (DFD)
* Point out that the SDLC describes activities and functions employed in all systems development, regardless of the approach used
* Introduce waterfall model, and define deliverable
* List the steps in the SDLC model
* Describe the systems planning phase
* Explain the concept of systems request
* Discuss preliminary investigation
* Outline feasibility study and explain its importance
* Describe the purpose of systems analysis phase along with the first step of the phase and its deliverable
* Describe the purpose of systems design phase
* Define system design specification
* Describe the systems implementation phase, and discuss systems evaluation
* Describe the systems support and security phase, and define scalable design
* Describe objects
* Define class and properties
* Use Figure 1-20 to show how an object inherits properties from its class
* Define methods with respect to O-O analysis
* Discuss the role of a message in O-O analysis
* Use Figure 1-21 to depict how planning, analysis, and design tasks interact continuously to generate prototypes that can be tested in a typical O-O development model
* Discuss agile methods and iterative development
* Define spiral model
* Discuss the advantages and disadvantages of agile methods
* Describe joint application development (JAD) and rapid application development (RAD)
* Define prototyping and prototype
* Point out the disadvantage of prototyping
* Define computer-aided systems engineering (CASE) (also called computer-aided software engineering) and CASE tools

FIGURES: 1-17, 1-18, 1-19, 1-20, 1-21, 1-22, 1-23, 1-24, 1-25

TEACHING TIPS

Point out that the SDLC is formalized in many organizations, with detailed instructions outlining reporting requirements, specific tasks that must occur in each phase, and individual responsibilities. The goal of structured analysis and the SDLC is to create a system with the desired capabilities, within budget, and on time.

Point out how perceived problems can be different from actual problems. Benefits of a new system can be intangible, such as greater customer satisfaction, or tangible, such as reduced expenses. A compelling benefit can be the cost of *not* acting; a bank’s installation of an ATM may not yield positive cash benefit, but consider the impact that not installing an ATM would have on business.

Explain that during systems analysis, the current system is studied by developers, user’s requirements (requirements modeling) are determined, and a solution (systems requirement document) is recommended. The time spent on this phase of the SDLC usually is quite short when compared with the rest of the project.

Mention that some experts feel an impartial third party who has not been actively involved in the design of the system should do the systems evaluation. Users and systems analysts may have a tendency to test only what has been designed; a third party is more likely to discover a procedure or type of data that has been overlooked.

During the systems support and security phase, explain that a systems analyst reviews the system, identifies errors, identifies enhancements, monitors system performance, and protects the system. When systems implementation is complete, the key issue is whether the system performs as advertised. Experienced systems analysts find that the worst situation occurs when management or users have changed their expectations, and these changes are not reflected in the new system. The best insurance against this problem is frequent communication between and feedback from all participants throughout the SDLC. Point out that information systems development is a continuing process.

Students may need help differentiating between JAD and RAD. A JAD session is a lengthy, structured, group work meeting in which users and IT professionals discuss an aspect of a systems development project. The goal is to obtain group agreement on an issue. RAD is the concept of developing software during the system development process. Prototyping is a common RAD technique.

TEACHING TIPS

Explain that a prototype allows users to work with a system before it is completed to make sure it meets their needs. Prototypes and test data commonly are used to see how a complex system will work before committing large amounts of time and money. Prototyping is rarely used in small businesses.

Explain that CASE tools increase the efficiency of systems development. CASE tools can exist independently or be integrated together. CASE technology allows programmers to retrieve commonly used algorithms from a central repository and combines them together to form modules. CASE tools can be used to design a program in a condensed form of English and then automatically generate code in a programming language. One disadvantage of CASE tools is that they can take a long time to learn them.

CLASSROOM ACTIVITIES

1. Projects to Assign: Assign Project 3 on page 42.

2. Quick Quiz: Assign Questions 8 and 9 on page 42.

3. Critical Thinking: Agile methods are quickly becoming a preferred development approach. Ask students to compare and contrast the agile approach with the structured and object-oriented analysis methods.

4. Class Discussion: Ask students if a kind of prototyping could be used before deciding on a personal course of action (such as whether or not to take a part-time job).

# **1.8: The Information Technology Department**

LECTURE NOTES

* Discuss information technology (IT) department
* Use Figure 1-26 to discuss a typical IT organization in a company that has networked PCs, enterprise-wide databases, centralized processing, and web-based operations
* Describe technical support
* Describe the application development group, listing the members of a development team and characterizing a popular model for information systems development
* Discuss systems support and security; point out the responsibilities of the systems support and security group
* Define help desk, and clarify the role of user support specialists
* Outline database administration, and discuss the importance of continuous attention and technical support for mission-critical database applications
* Define network administration and point out the responsibilities of network administration
* Define web support, and point out the tasks performed by web support specialists
* Discuss the responsibilities of a quality assurance (QA) team

FIGURE: 1-26

TEACHING TIPS

A help desk specialist is an entryway into the information technology (IT) field. Almost all organizations provide their employees with some type of help desk assistance. Within most companies, this job is one of the least technical. Some of the job requirements may include the following:

1) Solve procedural and software questions both in person and over the telephone

2) Develop and maintain help desk operations manuals

3) Assist in training new help desk personnel

The type of questions one might encounter as a help desk specialist depends on the setting. In most instances, a help desk specialist must be informed about major software packages in use. Entry-level positions primarily answer calls from people with questions. Other positions, however, provide additional assistance and assume further responsibilities, often demanding greater knowledge and problem-solving skills that can serve as a springboard to more advanced positions in the IT field.

CASE IN POINT 1.3: Global Hotels and Momma's Motels

Suppose you work in the IT department of Global Hotels, a multinational hotel chain. Global Hotels runs several specialized business support systems, including a guest reservations system that was developed in-house to meet the requirements of a large company with worldwide operations. Guests can make one-stop online reservations by visiting Global’s website, which has links to all major travel industry sites. Global Hotels just acquired Momma’s, a regional chain of 20 motels. Momma’s uses a vertical reservations package suitable for small- to medium-sized businesses and a generic accounting and finance package. Should Momma’s use Global Hotels’ information systems or continue with its own? In your answer, consider issues such as business profiles, business processes, system interactivity, and e-commerce. What additional information would be helpful to you in making a recommendation?

CLASSROOM ACTIVITIES

1. Critical Thinking: Assign Discussion Topic 4 on page 42.

# **1.9****: The Systems Analyst**

LECTURE NOTES

* Discuss the roles and responsibilities of a systems analyst
* Point out the skills (including critical thinking skills) and educational background a systems analyst must posses
* Use Figure 1-27 to show that the INCOSE is one of the leading organizations offering systems analysts a wealth of information, news, training, communities, and more
* Discuss the importance of strong oral and written communication skills to be possessed by systems analysts
* Discuss the importance of critical thinking skills and use Figure 1-28 to show the website for The Critical Thinking Community that provides encouragement and resource for critical thinkers
* Point out the need for certification and use Figure 1-29 to show that employers like to hire people who can think logically and effectively
* Point out the strong demand for systems analysts, noting the horizon of opportunities available for systems analysts
* List job titles that may involve responsibilities of a systems analyst
* Point out the importance of company organization when evaluating prospective
* Describe the role of a systems analyst based on company size
* Discuss the importance of considering salary, location, and future growth
* Define corporate culture and use Figure 1-30 to show the attractive corporate culture of Salesforce
* List the key trends that disrupt information technology
* Discuss bring your own device movement (BYOD)
* Discuss product-oriented and service-oriented firms

FIGURES: 1-27, 1-28, 1-29, 1-30

TEACHING TIPS

Systems analysts are the liaison between users and IT professionals. They convert user requests into technical specifications. To be effective, a systems analyst must:

1) have state-of-the-art technical knowledge

2) be familiar with business operations

3) have excellent communications and interpersonal skills

The primary focus of this work is to design and develop new hardware and software systems and to incorporate new technologies. A successful systems analyst must be willing to embrace new technologies and be prepared for continual learning. Typically, systems analysts are more involved in design issues than in day-to-day coding. Systems analyst is a somewhat arbitrary title, however, as companies have varying definitions for the role.

Explain that duties of the systems analyst can vary. In small- and medium-sized businesses, the systems analyst also may be a programmer. The role of the systems analyst is critical. The systems analyst must understand the business’ and the users’ needs, as well as the technical aspects of system and program development.

Emphasize the importance of interpersonal skills in the work of the systems analyst. Despite the importance of the relationship between IT professionals, such as the systems analyst, and users, such as business managers, the bond can be contentious.

Minimum educational requirement for systems analysts is a bachelor’s degree, but many people opt for a master’s degree. Point out the opportunities available on the Internet to update technical knowledge and skills.

Benefits of certification include:

1) Proof of professional achievement

2) Enhancement of job opportunities

3) Opportunity for advancement

Explain that certifications are developed by a sponsoring organization, which include computer equipment and software vendors, independent training companies, and professional organizations.

TEACHING TIPS

Explain that bring your own device movement (BYOD) allows employees to bring their own devices to access an organization’s data and perform operations. If any problem occurs in these devices, the IT department will not be in charge.

A QUESTION OF ETHICS

You are enjoying your job as a summer intern in the IT department of a local company. At lunch yesterday, several people were discussing ethical issues. You learned that some of them belong to IT organizations that have ethical codes to guide members and set professional standards. For example, your supervisor belongs to the Association for Computing Machinery (ACM), which has over 100,000 members from more than 100 countries and a website at acm.org. Your supervisor said that the ACM code of ethics is important to her and would definitely influence her views. On the other hand, one of the senior programmers believes that his own personal standards would be sufficient to guide him if ethical questions were to arise. Because you are excited about your career as an IT professional, you decide to visit ACM’s website to examine the code of ethics and make up your own mind. After you do so, would you tend to agree more with your supervisor or with the senior programmer?

CLASSROOM ACTIVITIES

1. Class Discussion: Ask students to think through other ways in which systems analysts can maintain their skills.

2. Projects to Assign: Assign Project 4 on page 42.

3. Projects to Assign: Assign Project 5 on page 42.

4. Quick Quiz: Assign Question 10 on page 42.

5. Critical Thinking: Assign Discussion Topic 5 on page 42.

**1.10: Summary**

* Point out that information technology (IT) refers to the combination of hardware, software, and services that people use to manage, communicate, and share information
* Describe the essential components of an information system
* Discuss the importance offering a mix of products, technical and financial services, consulting, and customer support
* Explain the responsibilities of a systems analyst
* Describe a typical organization structure
* Discuss the popular system development approaches
* Describe the functions of the IT department
* Explain the important characteristics of a systems analyst
* Discuss some key trends in information technology

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| --- | --- |
| **Key Terms**   * agile methods * app * application lifecycle management (ALM) * application software * artificial intelligence * B2B (business-to-business) * B2C (business-to-consumer) * bring your own device (BYOD) * business model * business process * business process model (BPM) * business process modeling notation (BPMN) * business profile * business rules * business support systems * CASE tools * certification * class * computer-aided software engineering (CASE) * computer-aided systems engineering (CASE) * corporate culture * critical thinking skills * data * data center * data flow diagram (DFD) * deliverable * ecommerce (electronic commerce) * electronic data interchange (EDI) * empowerment * enterprise application * enterprise computing * enterprise resource planning (ERP) * feasibility study * groupware * hardware * help desk * horizontal system * inference rule * information * information system * information technology (IT) * integrated development environments (IDE) * users * iterative * knowledge base | * legacy systems * machine learning * management information systems (MIS) * mission-critical system * modeling * Moore's Law * NoSQL databases * objects * object-oriented (O-O) analysis * personal digital assistant * preliminary investigation * processes * product lifecycle management (PLM) * product-oriented * properties * prototype * radio frequency identification (RFID) * requirements engineering * scalable * service-oriented * software * spiral model * stakeholders * strategic plans * structured analysis * supply chain * supply chain management (SCM) * system * system design specification * system requirements document * system software * systems analysis and design * systems analysis phase * systems analyst * systems design phase * systems development life cycle (SDLC) * systems implementation phase * systems planning phase * systems request * systems support and security phase * technical support * transaction processing (TP) systems * user productivity system * vertical system * waterfall model |

# **[End of Chapter Material](#_End_of_Chapter_)**

**Chapter Exercises:** The Chapter Exercises include questions, discussion topics, and projects that reinforce concepts and provide opportunities to practice skills.

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