Essentials of Systems Analysis and Design Second Edition Joseph S. Valacich Joey F. George Jeffrey A. Hoffer Chapter 1 The Systems Development Environment Learning Objectives Define information systems analysis and design Discuss the modern approach to systems analysis and design Describe the organizational role of the systems analyst Learning Objectives Describe four types of information systems: Transaction Processing Systems (TPS) Management Information Systems (MIS) Decision Support Systems (DSS) Expert Systems (ES) Describe the information systems development life cycle (SDLC) Learning Objectives Discuss alternatives to the systems development life cycle Discuss the role of computer aided software engineering (CASE) tools in systems development Chapter Preview Systems Analysis is a proven method to help business utilize information to its fullest Systems Development Life Cycle (SDLC) Central to Information Systems Development Information Systems Analysis and Design A method used by companies to create and maintain systems that perform basic business functions Main goal is to improve employee efficiency by applying software solutions to key business tasks A structured approach must be used in order to ensure success Information Systems Analysis and Design Systems Analyst performs analysis and design based upon: 1) Understanding of organization's objectives, structure and processes 2) Knowledge of how to exploit information technology for advantage Fig 1-1 illustrates the Systems Development Life Cycle, a four-phased approach used throughout this text Systems Analysis and Design: Core Concepts Major goal: to improve organizational systems by developing or acquiring software and training employees in its use Application software, or a system, supports organizational functions or processes Systems Analysis and Design: Core Concepts System: Turns data into information and includes: Hardware and system software Documentation and training materials Job roles associated with the system Controls to prevent theft or fraud The people who use the software to perform their jobs Figure 1-2 illustrates all the components of a system Software Engineering Process A process used to create an information system Consists of: Methodologies A sequence of step-by-step approaches that help develop the information system Techniques Processes that the analyst follows to ensure thorough, complete and comprehensive analysis and design Tools Computer programs that aid in applying techniques System A system is an interrelated set of business procedures used within one business unit working together for a purpose A system has nine characteristics A system exists within an environment A boundary separates a system from its environment Characteristics of a System Components Interrelated Components Boundary Purpose Environment Interfaces Constraints Input Output Important System Concepts Decomposition The process of breaking down a system into smaller components Allows the systems analyst to: Break a system into small, manageable subsystems Focus on one area at a time Concentrate on component pertinent to one group of users Build different components at independent times Important System Concepts Modularity Process of dividing a system into modules of a relatively uniform size Modules simplify system design Coupling Subsystems that are dependent upon each other are coupled Coherence Extent to a subsystem, which performs a single function A Modern Approach to Systems Analysis and Design Systems Integration Allows hardware and software from different vendors to work together Enables procedural language systems to work with visual programming systems Visual programming environment uses client/server model Data and Processes Three key components of an

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information system Data Data Flows Processing Logic Data vs. Information Data Raw facts Information Derived from data Organized in a manner that humans can understand Data and Processes Data Understanding the source and use of data is key to good system design Various techniques are used to describe data and the relationship amongst data Data Flows Groups of data that move and flow through the system Data and Processes Data Flows (Continued) Include description of sources and destination for each data flow Processing Logic Describe steps that transform data and events that trigger the steps Approaches to Systems Development Process-Oriented Approach Focus is on flow, use and transformation of data in an information system Involves creating graphical representations such as data flow diagrams and charts Data are tracked from sources, through intermediate steps and to final destinations Natural structure of data is not specified Disadvantage: data files are tied to specific applications Approaches to Systems Development Data-Oriented Approach Depicts ideal organization of data, independent of where and how data are used Data model describes kinds of data and business relationships among the data Business rules depict how organization captures and processes the data Databases and Application Independence Database Shared collection of logically related data Organized to facilitate capture, storage and retrieval by multiple users Centrally managed Designed around subjects Customers Suppliers Application Independence Separation of data and definition of data from applications Role of the Systems Analyst Study problems and needs of an organization Determine best approach to improving organization through use of: People Methods Information technology Help system users and managers define their requirements for new or enhanced systems Role of the Systems Analyst Assess options for system implementation In-house development Outsourced development Outsourced development and operation Commercial application For in-house projects, work on a team of analysts and developers Skills of a Successful Systems Analyst Analytical Understanding of organizations Problem-solving skills System thinking Ability to see organizations and information systems as systems Technical Understanding of potential and limitations of technology Skills of a Successful Systems Analyst Managerial Ability to manage projects, resources, risk and change Interpersonal Effective written and oral communication skills Types of Information Systems and Systems Development Transaction Processing Systems (TPS) Automate handling of data about business activities (transactions) Management Information Systems (MIS) Converts raw data from transaction processing system into meaningful form Decision Support Systems (DSS) Designed to help decision makers Provides interactive environment for decision making Types of Information Systems and Systems Development Expert Systems (ES) Replicates decision-making process Knowledge representation describes the way an expert would approach the problem Cycle System Development Methodology Standard process followed in an organization Consists of: Analysis Design Implementation Maintenance Cycle Series of steps used to manage the phases of development for an information system Consists of four phases: Planning and Selection Analysis Design Implementation and Operation Cycle Phases are not necessarily sequential Each phase has a specific outcome and deliverable Individual companies use customized life cycle Phases of the Systems Development Life Cycle Systems Planning and Selection Two Main Activities Identification of need Investigation and determination of scope Systems Analysis Study of current procedures and information

systems Determine requirements Generate alternative designs Compare alternatives Recommend best alternative Systems Development Life Cycle System Design Logical Design Concentrates on business aspects of the system Physical Design Technical specifications Implementation and Operation Implementation Hardware and software installation Programming User Training Documentation Systems Development Life Cycle Operation System changed to reflect changing conditions System obsolescence Evolutionary model SDLC Approaches to Development Prototyping Building a scaled-down working version of the system Advantages: Users are involved in design Captures requirements in concrete form Rapid Application Development (RAD) Utilizes prototyping to delay producing system design until after user requirements are clear Approaches to Development Joint Application Design (JAD) Users, Managers and Analysts work together for several days System requirements are reviewed Structured meetings Summary Information systems analysis and design Process of developing and maintaining an information system Modern approach to systems analysis Process-Oriented Data-Oriented Summary Role of Systems Analyst Four types of information systems Transaction Processing (TPS) Management Information Systems (MIS) Decision Support (DSS) Expert Systems (ES) Summary Systems Development Life Cycle (SDLC) Systems Planning and Selection Systems Analysis Systems Design Systems Implementation Alternatives to Systems Development Life Cycle Prototyping Rapid Application Development (RAD) Joint Application Design (JAD) Quiz Choose a business transaction you undertake regularly, such as using an ATM machine, buying groceries at the supermarket, or buying a ticket for a university's basketball game. For this transaction, define the data, draw the dataflow diagram, and describe processing logic.

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