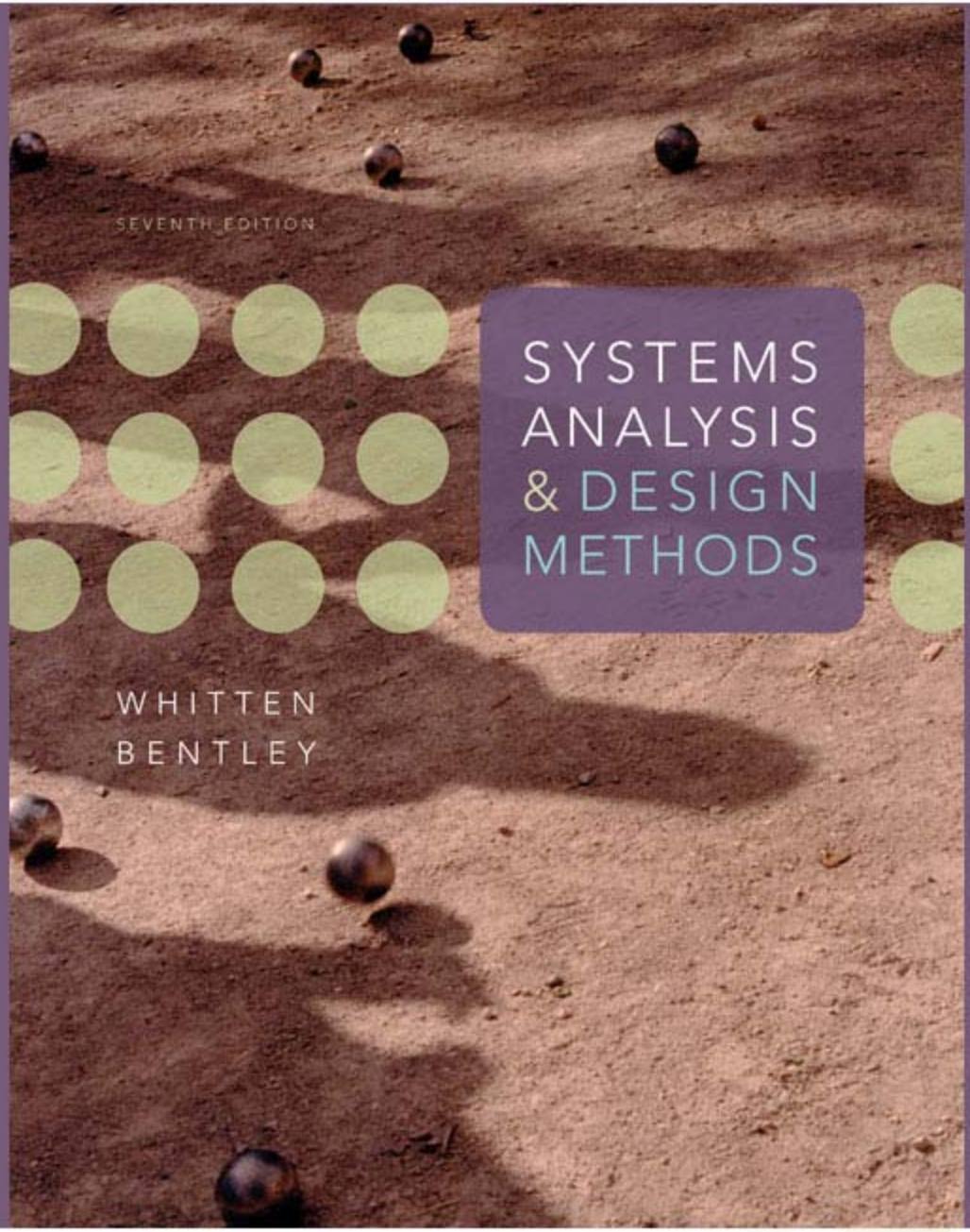
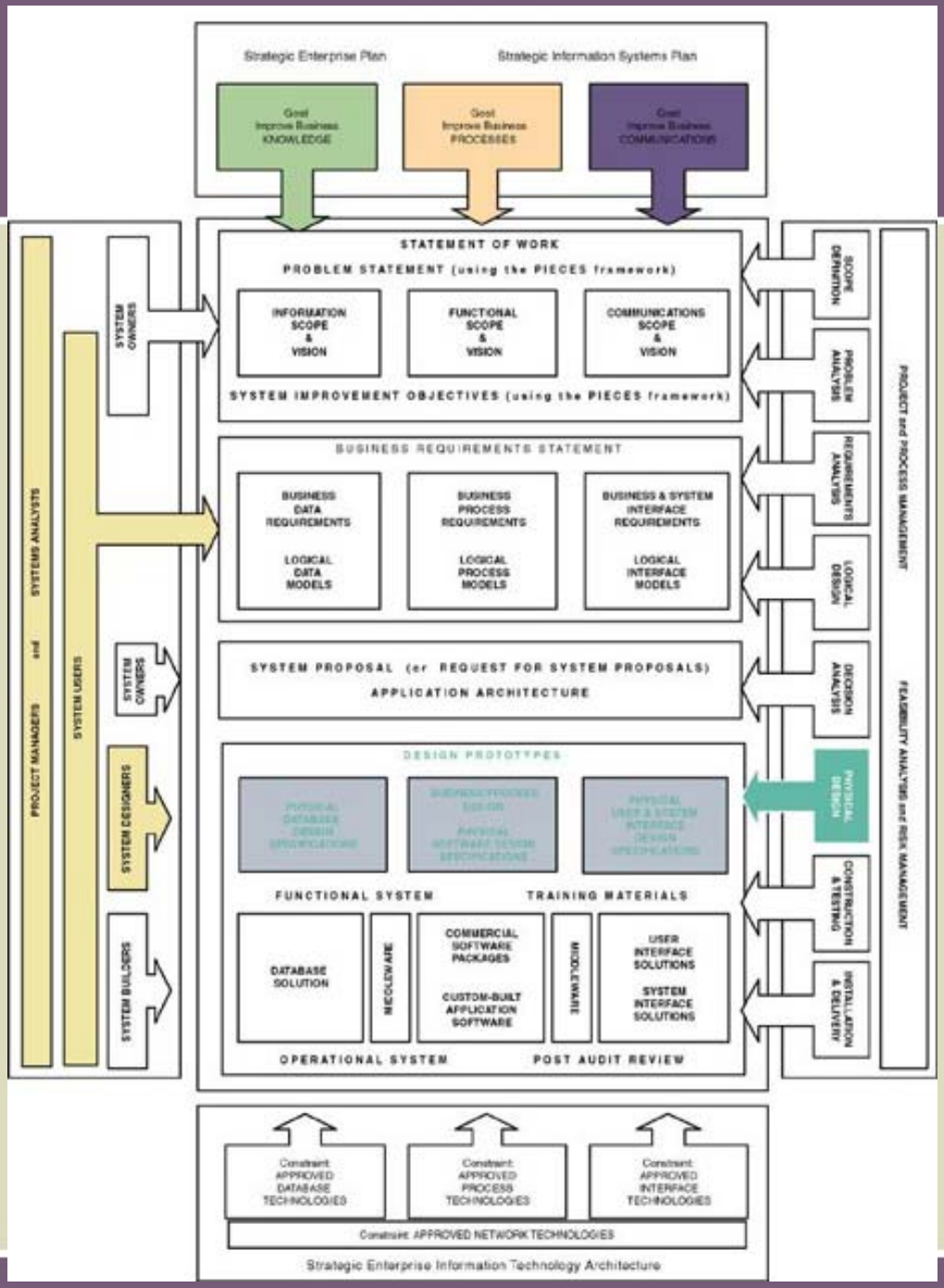

SEVENTH EDITION
SYSTEMS ANALYSIS & DESIGN METHODS
WHITTEN
BENTLEY

Objectives

- Describe the design phase in terms of your information building blocks.
- Identify and differentiate between several systems design strategies.
- Describe the design phase tasks in terms of a computer-based solution for an in-house development project.
- Describe the design phase in terms of a computer-based solution involving procurement of a commercial systems software solution.


Strategic Enterprise Plan
Strategic Information Systems Plan
Goal
Improve Business
KNOWLEDGE
Goal
Improve Business
PROCESSES
Goal
Improve Business
COMMUNICATIONS
STATEMENT OF WORK
PROBLEM STATEMENT (using the PIECES framework)
INFORMATION SCOPE & VISION
FUNCTIONAL SCOPE & VISION
COMMUNICATIONS SCOPE & VISION
SYSTEM IMPROVEMENT OBJECTIVES (using the PIECES framework)
BUSINESS REQUIREMENTS STATEMENT
BUSINESS DATA REQUIREMENTS
LOGICAL DATA MODELS
BUSINESS PROCESS REQUIREMENTS
LOGICAL PROCESS MODELS
BUSINESS & SYSTEM INTERFACE REQUIREMENTS
LOGICAL INTERFACE MODELS
SYSTEM PROPOSAL (or REQUEST FOR SYSTEM PROPOSALS)
APPLICATION ARCHITECTURE
DESIGN PROTOTYPES
FUNCTIONAL SYSTEM
TRAINING MATERIALS
DATABASE SOLUTION
MIDDLEWARE
COMMERCIAL SOFTWARE PACKAGES
CUSTOM-BUILT APPLICATION SOFTWARE
MIDDLEWARE
USER INTERFACE SOLUTIONS
SYSTEM INTERFACE SOLUTIONS
OPERATIONAL SYSTEM
POST AUDIT REVIEW
PROJECT MANAGERS and SYSTEMS ANALYSTS
SYSTEM USERS
SYSTEM OWNERS
SYSTEM OWNERS
SYSTEM DESIGNERS
SYSTEM BUILDERS
SCOPE DEFINITION
PROBLEM ANALYSIS
REQUIREMENTS ANALYSIS
LOGICAL DESIGN
DECISION ANALYSIS
PHYSICAL DESIGN
CONSTRUCTION & TESTING
INSTALLATION & DELIVERY
PROJECT and PROCESS MANAGEMENT
FEASIBILITY ANALYSIS and RISK MANAGEMENT
Constraint: APPROVED DATABASE TECHNOLOGIES
Constraint: APPROVED PROCESS TECHNOLOGIES
Constraint: APPROVED INTERFACE TECHNOLOGIES
Constraint: APPROVED NETWORK TECHNOLOGIES
Strategic Enterprise Information Technology Architecture

System Design

Systems design – the specification of a detailed computer-based solution.

- Also called **physical design**.
- systems analysis emphasizes the business problem
- systems design emphasizes the technical or implementation concerns of the system.

System Design Approaches

- Model-Driven
  - Modern structured design
  - Information engineering
  - Prototyping
  - Object-oriented
- RAD
- JAD

Model-Driven Approaches

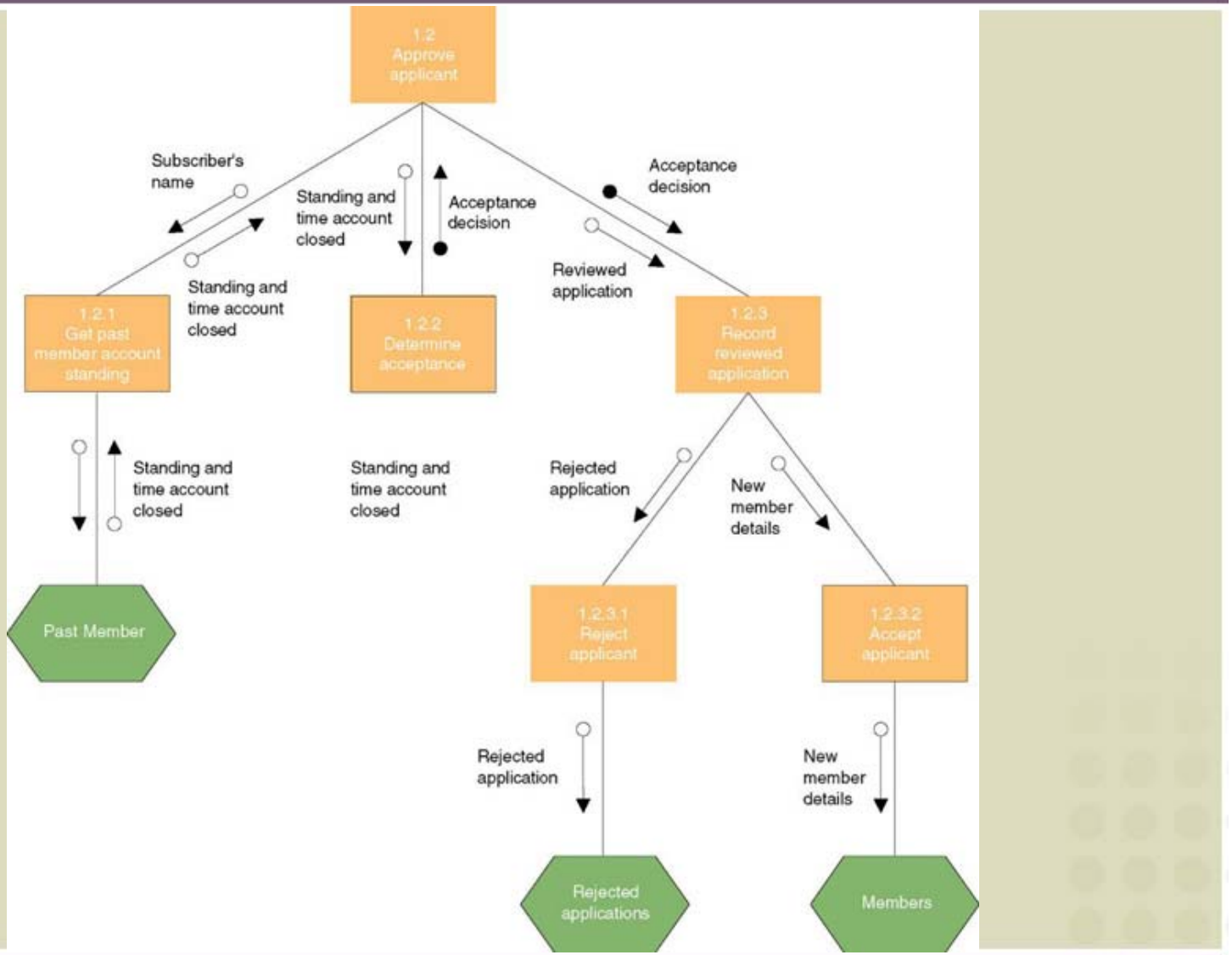
Model-driven strategy – a system design approach that emphasizes drawing system models to document technical and implementation aspects of a system.

Model-Driven Approaches – Modern Structured Design

Modern structured design – a system design technique that decomposes the system's processes into manageable components.

- Synonyms (although technically inaccurate) are top-down program design and structured programming.
- Design in a top-down hierarchy of modules
- Easier to implement and maintain (change).
- Modules should be highly cohesive
  - Accomplish one function only
- Modules should be loosely coupled
  - Minimally dependent on one another

Structure Chart

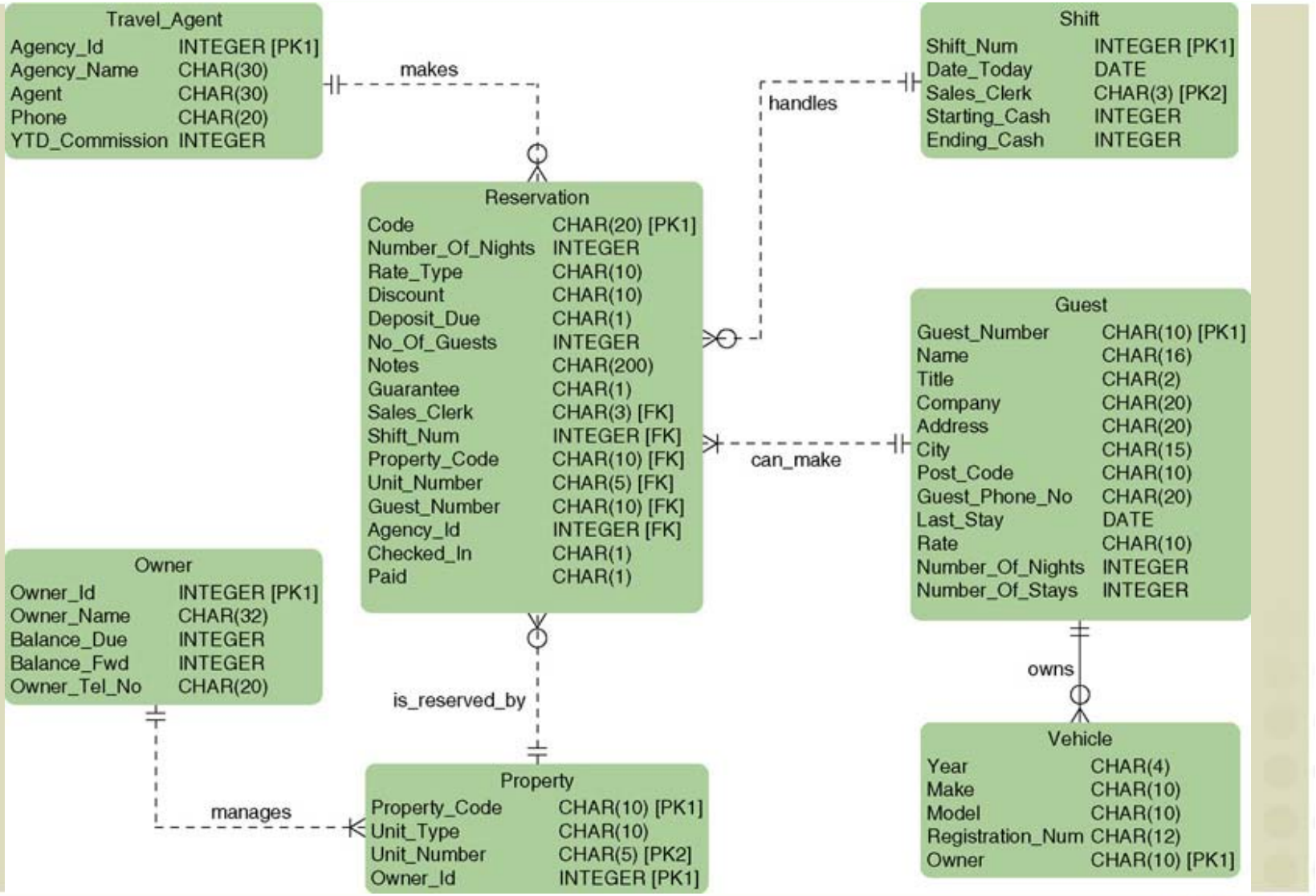


Model-Driven Approaches – Information Engineering

Information engineering (IE) – a model-driven and data-centered, but process-sensitive technique for planning, analyzing, and designing information systems. IE models are pictures that illustrate and synchronize the system's data and processes.

- The primary tool of IE is a data model diagram.

Physical Entity Relationship Diagram



Model-Driven Approaches – Prototyping

Prototype – a small-scale, incomplete, but working sample of a desired system

Iterative process involving a close working relationship between the designer and the users.

Key Benefits:

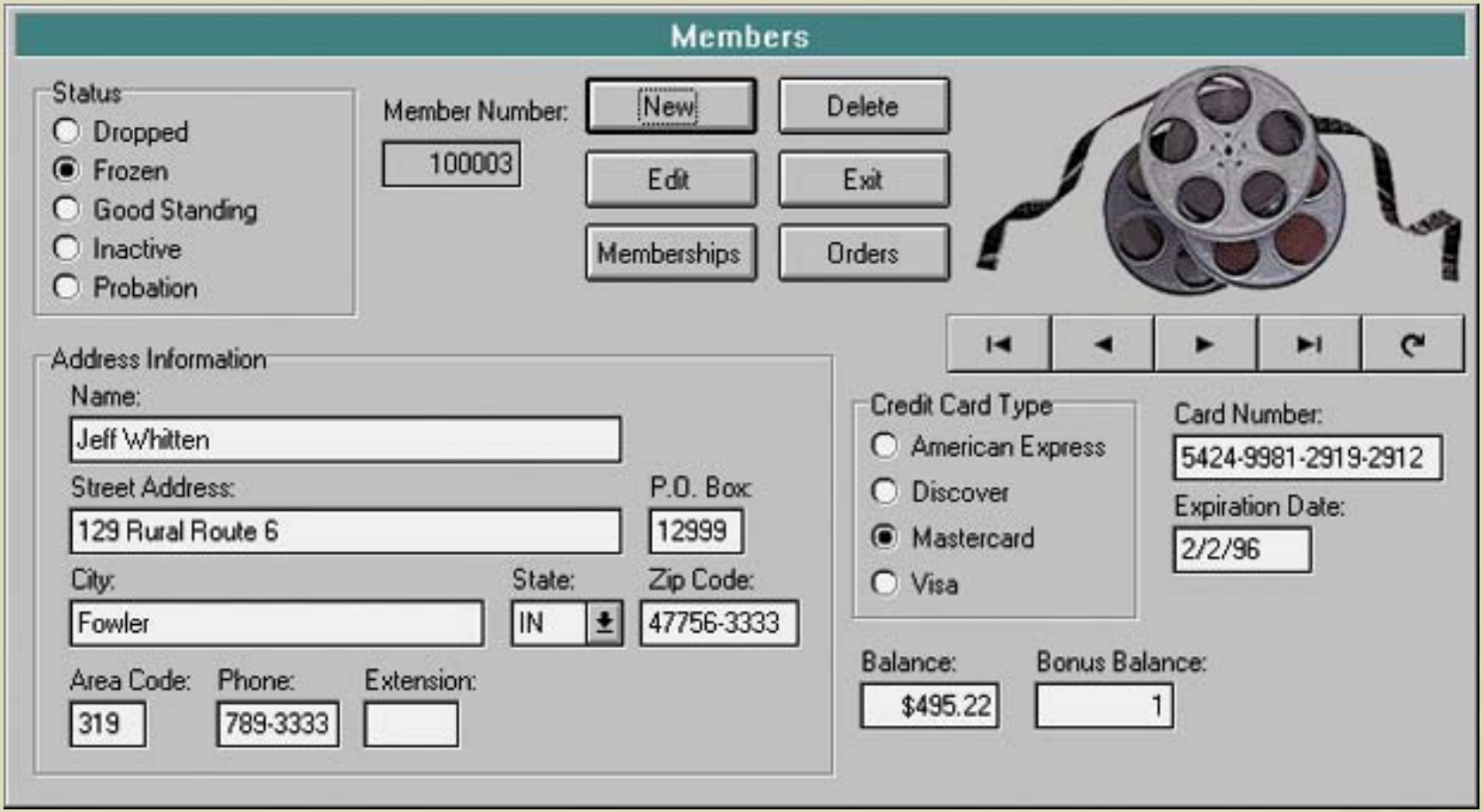
- Encourages and requires active end-user participation.
- Iteration accommodates end-users who tend to change their minds.
- Endorses philosophy that end-users won't know what they want until they see it.
- Active model that end-users can interact with.
- Errors can be detected earlier.
- Can increase creativity as it allows for quicker user feedback.
- Accelerates several phases of the life cycle.

Model-Driven Approaches – Prototyping

Disadvantages and Pitfalls:

- Encourages “code, implement, and repair” life cycle that cause maintenance nightmares.
- Still need systems analysis phases, but so easy to skip.
- Cannot completely substitute a prototype for a paper specification (like architect without a blueprint).
- Numerous design issues are not addressed by prototyping.
- Often leads to premature commitment to a design.
- Scope and complexity of the system can expand out of control.
- Can reduce creativity in designs .
- Often suffer from slower performance because of language considerations (rapidly becoming a non-issue).

Prototype screen

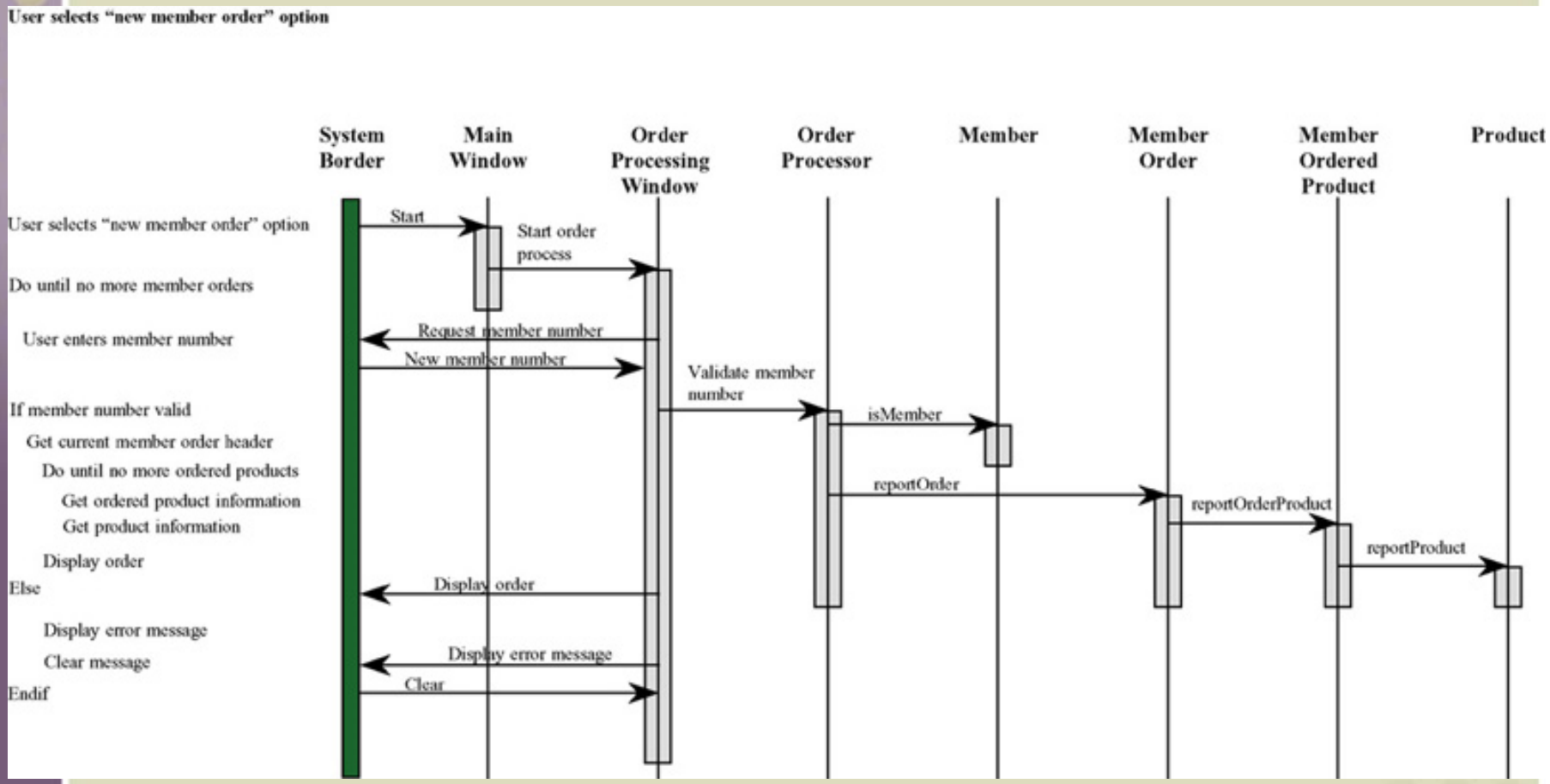


Model-Driven Approaches – Object-Oriented Design

Object-oriented design (OOD) techniques are used to refine the object requirements definitions identified earlier during analysis, and to define design specific objects.

- Extension of object-oriented analysis
- Attempt to eliminate the separation of concerns about data and process.

Object-Oriented Design Model



Rapid Application Development (RAD)

Rapid application development (RAD) – a systems design approach that utilizes structured, prototyping, and JAD techniques to quickly develop systems.

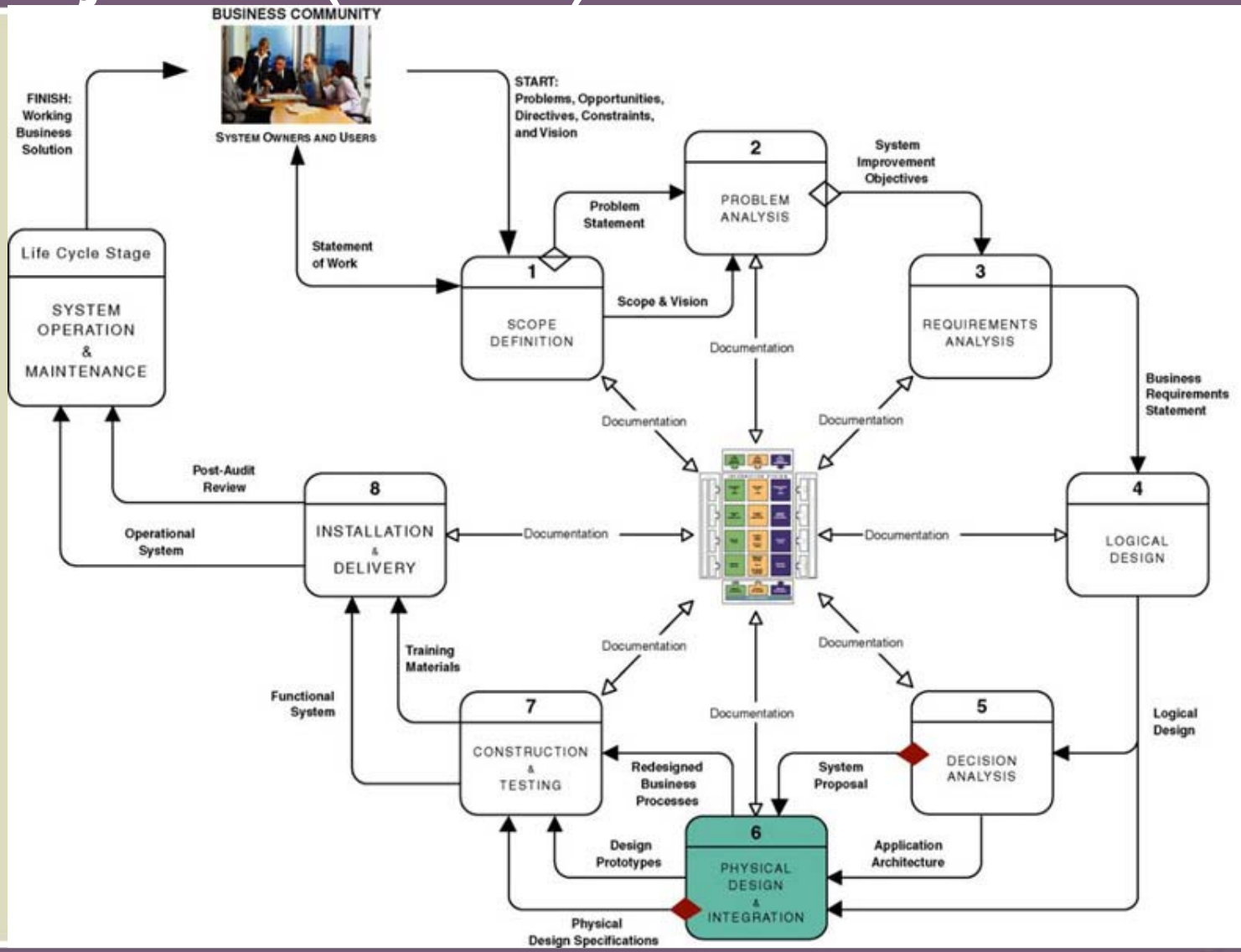
- The merger of various structured techniques to accelerate systems development
  - Data-driven information engineering
  - Prototyping
  - Joint application development

Joint Application Development (JAD)

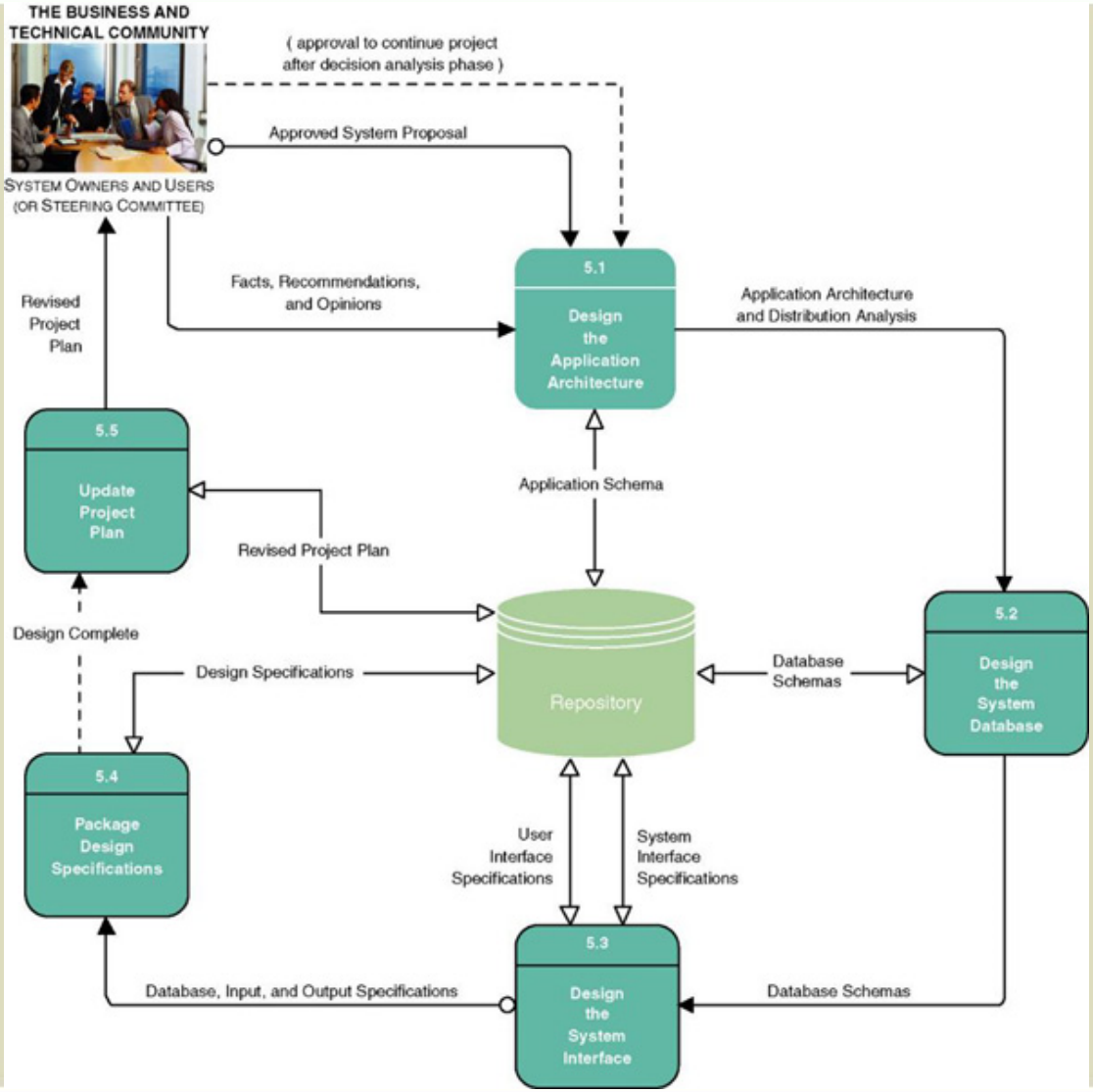
Joint Application Development (JAD) is a technique that complements other systems analysis and design techniques by emphasizing *participative development* among system owners, users, designers, and builders.

During the JAD sessions for systems design, the systems designer will take on the role of facilitator for possibly several full-day workshops intended to address different design issues and deliverables.

In-House Development Projects (Build)



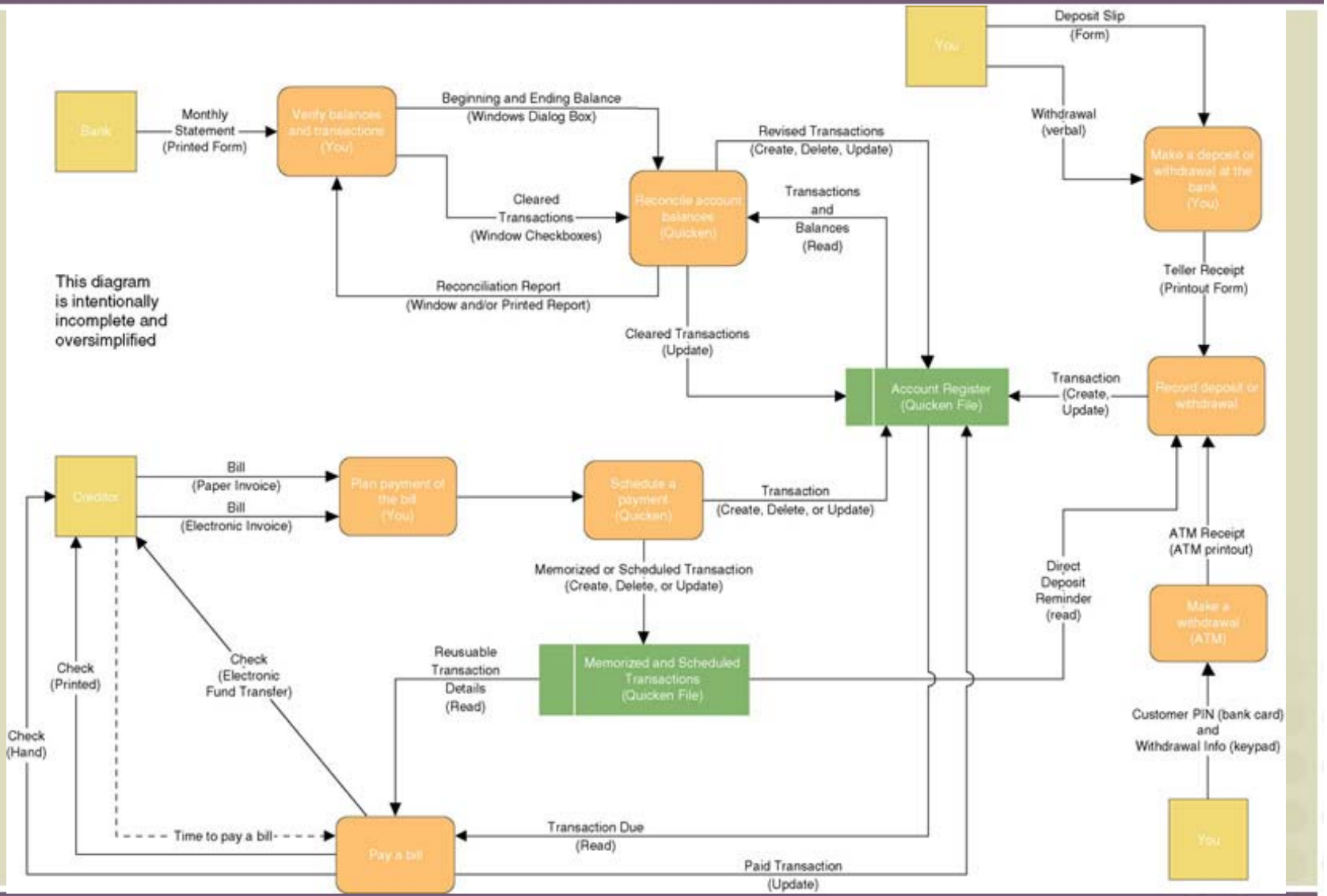
System Design Tasks For In-House Development



System Design Tasks For In-House Development (Build)

- Design the Application Architecture
  - Define technologies to be used by (and used to build) one, more, or all information systems.
  - Revise models as physical models
- Design the System Databases
  - Database schema
  - Optimized for implementation DBMS
- Design the System Interface
  - Input, output, and dialogue specifications
  - Prototypes
- Package Design Specifications
  - Specifications to guide programmers
- Update Project Plan

Physical Data Flow Diagram



Output Prototype Screen

QuickReport version 1.0

Page 1 of 1 | Exit

Member Response to Video Title Selection of the Month

Page number 1
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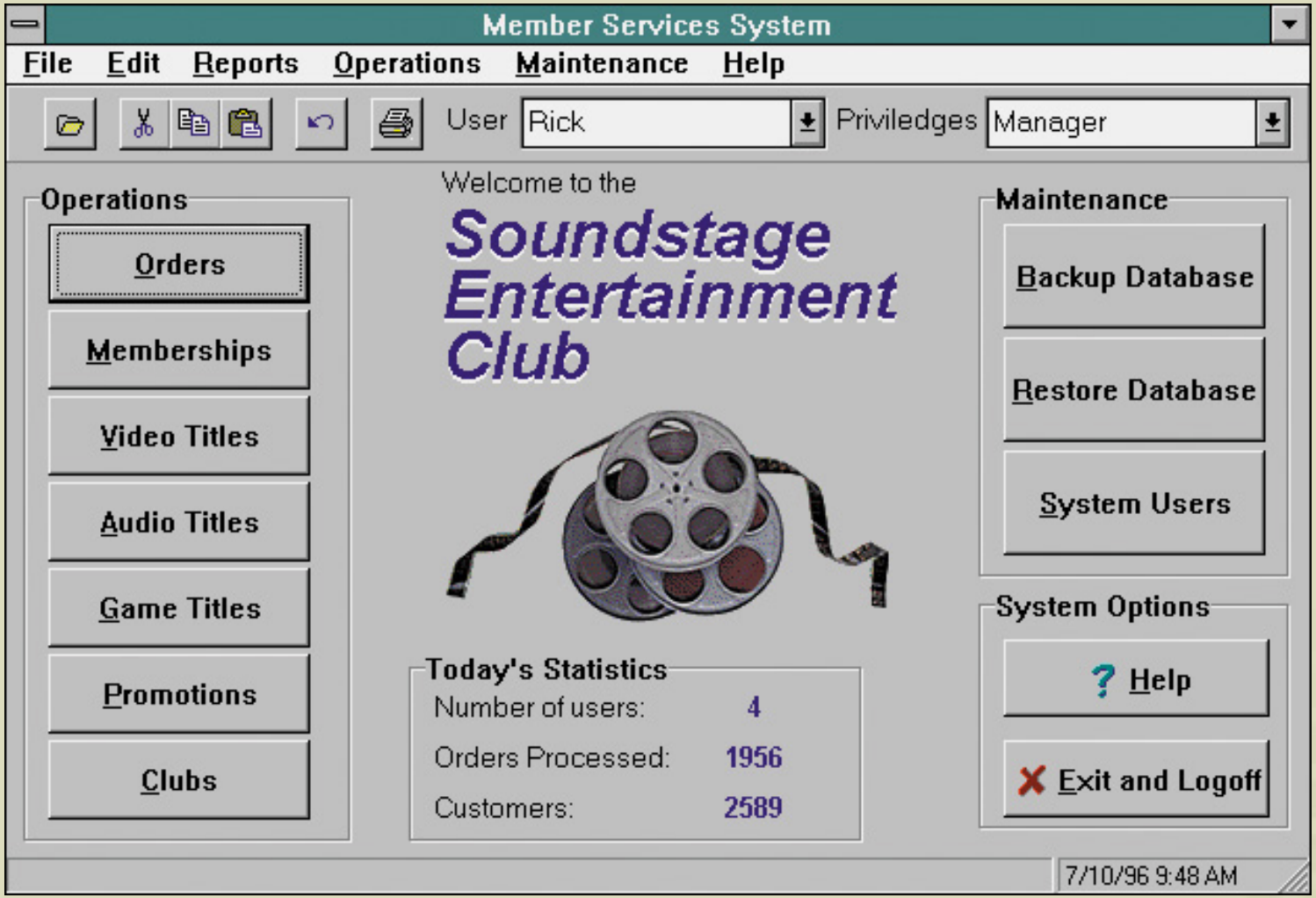
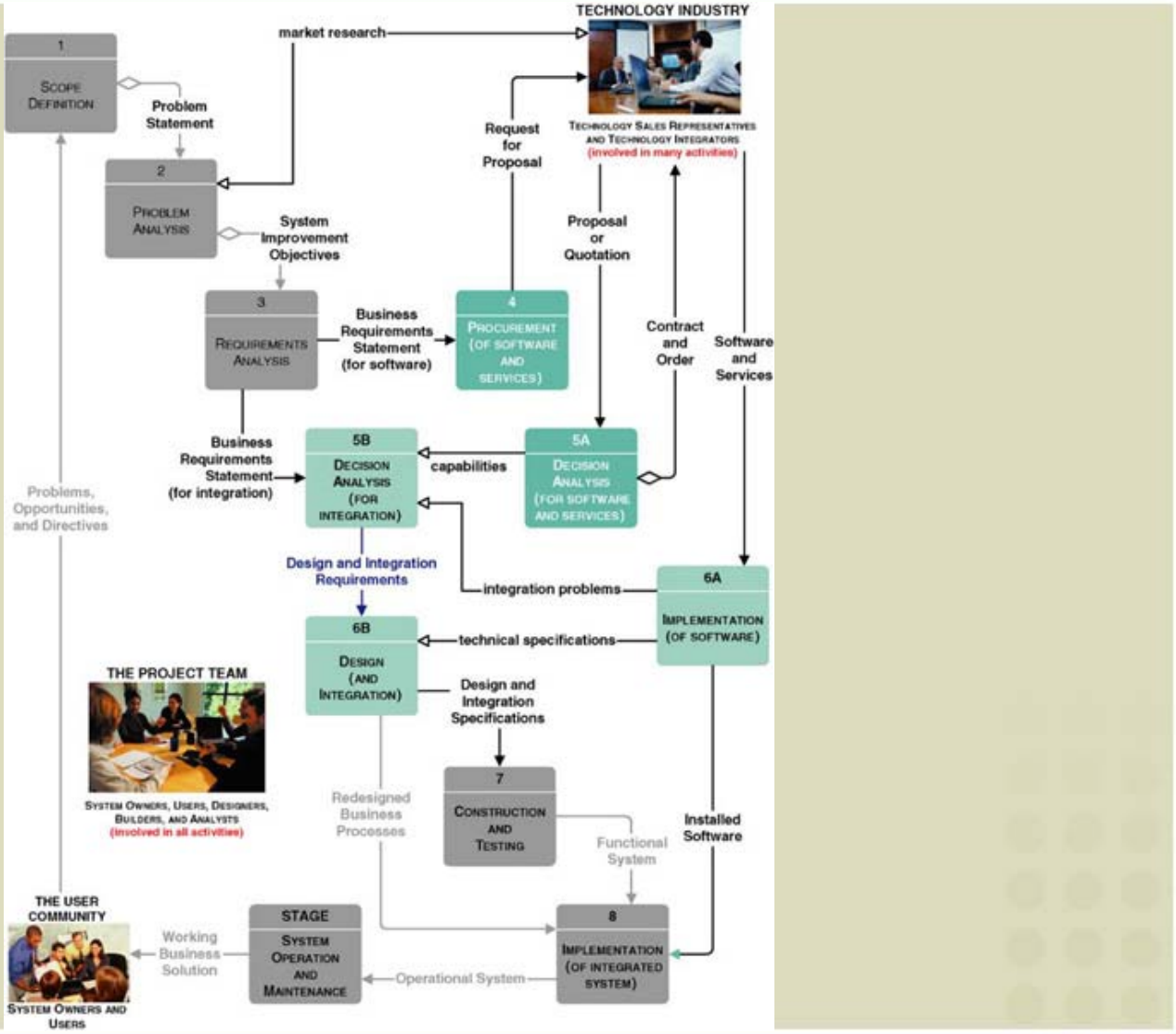
Category	Potential Orders	Selection of the Month	Alternate Selection	Selection of Month + Alternatives	Number of Orders
Action Adventure	6342	2410	824	241	2867
Animated	3577	1538	644	154	1241
Comedy	954	181	38	18	716
Documentary	1486	877	45	88	477
Drama	540	389	54	39	58
Western	104	9	54	1	40
Horror	920	99	23	409	2501
Musical	209	40	78	289	103
Science Fiction	4590	2011	899	2200	5329
Sports	288	288	277	121	387

Sum of Potential Orders	***19010***
Sum of Selection of the Month	***7842***
Sum of Alternate Selections	***2936***
Sum of Selection of the Month + Alternatives	***3560***
Total Number of Orders	***13719***

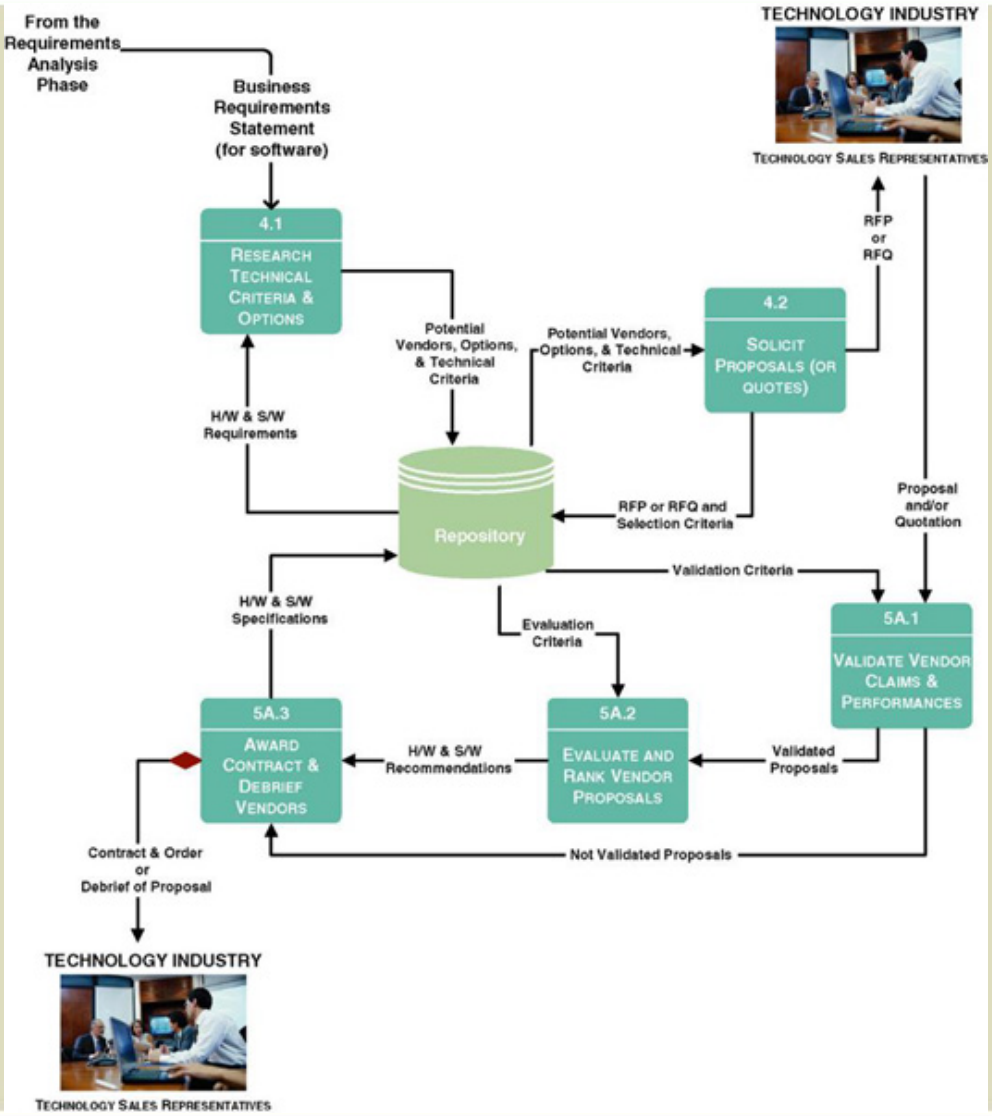
Dialogue Interface Prototype Screen



System Design For "Buy" Solutions



Tasks for Procurement Phase



Tasks for Procurement Phase

- Research Technical Criteria and Options
- Solicit Proposals or Quotes from Vendors
- Validate Vendor Claims and Performances
- Evaluate and Rank Vendor Proposals
- Award Contract and Debrief Vendors

Research Technical Criteria and Options

- Magazines and journals
- Internal standards may exist for hardware and software selection.
- Information services are primarily intended to constantly survey the marketplace for new products and advise prospective buyers on what specifications to consider.
- Trade newspapers and periodicals offer articles and experiences on various types of hardware and software that you may be considering.

Solicit Proposals (or Quotes) From Vendors

Request for Proposals (RFP) – used to communicate requirements and desired features to prospective vendors. Several different vendors and/or products are candidates. They will respond with a proposal.

Request for Quotations (RFQ) – used when you have already decided on a specific product that can be acquired from multiple sources. They respond with a price quotation.

Typical Request For Proposal Outline

I. Introduction
   A. Background
   B. Brief summary of needs
   C. Explanation of RFP document
   D. Call for action on part of vendor

II. Standards and instructions
   A. Schedule of events leading to contract
   B. Ground rules that will govern selection decision
      1. Who may talk with whom and when
      2. Who pays for what
      3. Required format for a proposal
      4. Demonstration expectations
      5. Contractual expectations
      6. References expected
      7. Documentation expectations

Typical Request For Proposal Outline (cont.)

III. Requirements and features
   A. Hardware
      1. Mandatory requirements, features, and criteria
      2. Essential requirements, features, and criteria
      3. Desirable requirements, features, and criteria
   B. Software
      1. Mandatory requirements, features, and criteria
      2. Essential requirements, features, and criteria
      3. Desirable requirements, features, and criteria
   C. Service
      1. Mandatory requirements
      2. Essential requirements
      3. Desirable requirements
IV. Technical questionnaires
V. Conclusion

Validate Vendor Claims and Performances

- Review vendor proposals and eliminate any that does not meet all mandatory requirements.
- Validate the vendor claims and promises against validation criteria.
  - User References
  - Technical Manuals
  - Demonstrations

Evaluate and Rank Vendor Proposals

- Feasibility assessment
- Scoring system
  - ***Hard-dollar costs*** – you will have to pay to the selected vendor.
  - ***Soft-dollar costs*** – additional costs you will incur if you select a particular vendor (to overcome a shortcoming, etc.)

Award Contract and Debrief Vendors

- Negotiate contract with selected vendor.
- Debrief vendors that submitted losing proposals.
  - Not to offer a second chance.
  - But to inform them of precise weaknesses in their proposals and/or products.

Impact of Buy Decision on Remaining Life-Cycle Phases

- Must integrate or interface the new system to other existing systems.
- Decision Analysis
  - Make revisions in models to reflect purchased solution.
  - Implement purchased solution.
  - Integration problems lead to revised business requirements statements.
- Design
  - Technical specification for a subset of programs to integrate purchased and built solutions.