Building the Analysis Model 1
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Requirement Analysis

• Focus on “What” not “How”
• Model information, function and behavior
• User’s point of view → Scenario-based models
• How data are transformed → Flow-oriented models
• Objects, attributes, and their relationships → Class-based models
• States of the system and its classes and the impact of events → Behavioral models


Objectives of Analysis models

• Describe the requirements
• Establish the foundation for design and implementation
• Define the verification and validation suites

Rules of Thumb

- Focus on visible requirements
- Increase the understanding
- Delay infrastructure considerations
- Minimize coupling, maximize cohesion
- Value of all stakeholders?
- KISS (Keep It Simple, Sweetie)

Domain Analysis

- Understand the background information so that we can understand the problem
- Acquiring the general information about the domain
- Mastering terminology
- Knowing the players and their attributes
- Getting to know the environment
- Examining the current practice
- Understanding generic versus specific
- Familiarizing with the competitors
**Analysis Approaches**

- Structured approach
  - Separate data from process

- Object-oriented approach
  - Data and process are considered together


**Structured Analysis**

- Data Dictionary
- Data model -> ERD, Semantic object diagram (SOD)
- Flow-oriented model -> Data flow diagram (DFD), Control-flow diagram
- Behavioral model -> State diagram
- Scenario-based model -> Process narrative

**Data Modeling**

- Analyzing data objects independently from processes
- Focusing on the data domain
- Be at the same abstraction level as stakeholder
- Pointing out the relationship among data objects

Data Modeling

• Data Objects
• Data Attributes
• Relationships

Data Objects

Data Object = something that is described by a set of attributes (data item) and that will be manipulated in the system (or software)

– External entities (printer, user, sensor)
– Things (report, display, signal)
– Occurrences or events (alarm, telephone call)
– Roles (manager, clerk)
– Organization units (Accounting Dept, R & D)
– Places (building, manufacturing floor)
– Structures (employee records)

Data Attribute

Aspect, quality, characteristic, or description of the object

object: automobile
attributes:
  make
  model
  body type
  price
  options code
Relationship

A "fact" that must be "remembered" by the system and cannot or is not computed or derived mechanically

– multiple relationships between two data objects are possible
– objects can be related in many different ways


ERD Notation

One common form:

\[ \text{object}_1 \quad \text{relationship} \quad \text{object}_2 \]

Another common form:

\[ \text{object}_1 \quad \text{relationship} \quad \text{attribute} \quad \text{object}_2 \]

Building an ERD

• Level 1—model all data objects (entities) and their “connections” to one another
• Level 2—model all entities and relationships
• Level 3—model all entities, relationships, and the attributes that provide further depth

Data Model: Example

Customer (1,1) places (1,m) request for service (1,1)

standard task table (1,1) generates (1,1) work order (1,1)

work tasks (1,w) consists of (1,1)

materials (1,1) tasks (1,i)