Data Modeling: an Overview

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Design software

- Specification of Requirements
- Program Design
  - User Interfaces(External Design)
  - Algorithms(Internal Design)
- Data Design
  - Data Structure
  - Initial Data Creation
  - Data Maintenance Process

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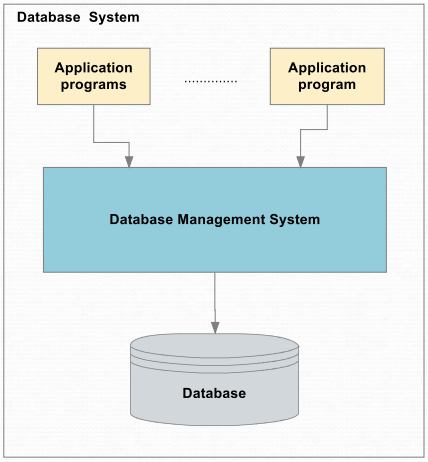
Database System components

- Database: multi-purpose shared and integrated data
- Database Management System: software that enables users to create and maintain database
- Application programs: programs to access database for certain tasks by sending requests to DBMS



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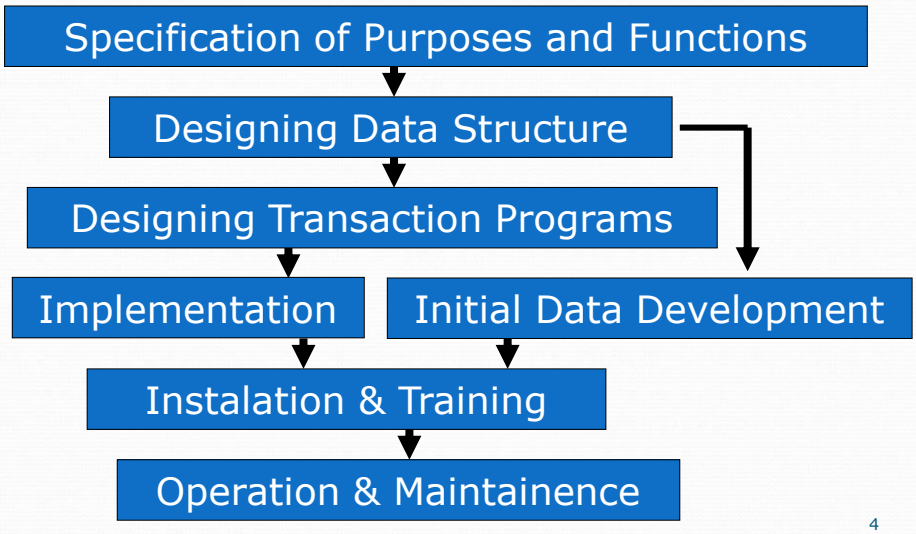
Database System Development process by DOA



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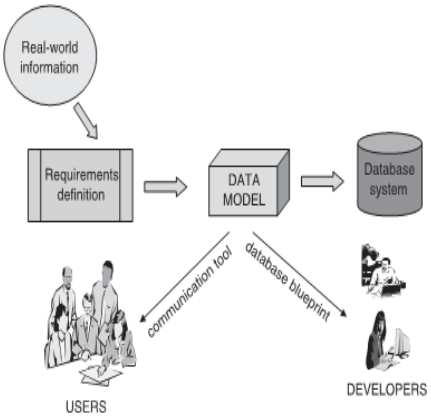
Data Model

- Data Model is an abstract model that describe how data Is presented and accessed
- Data Model serves as:
  - Communication tool with users
  - Database blueprint of the database system for the developers



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Data Modeling in the process

- Data Modeling :
  - Provides a method and means for describing the real-world information requirements in a manner understandable to the stakeholder in an organization
  - Is a techniques for exploring the data structures needed to supports an organization
  - Can be applied to representation of the information requirements at various level

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Why Data Modeling?

Figure from Data Modeling Fundamentals

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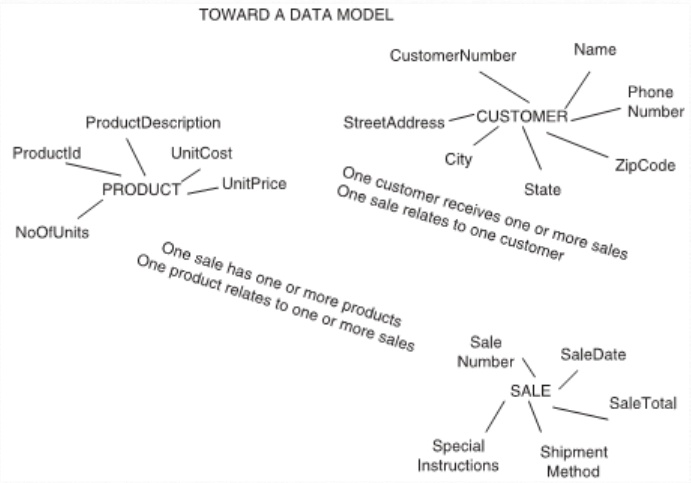
Why Data Modeling?



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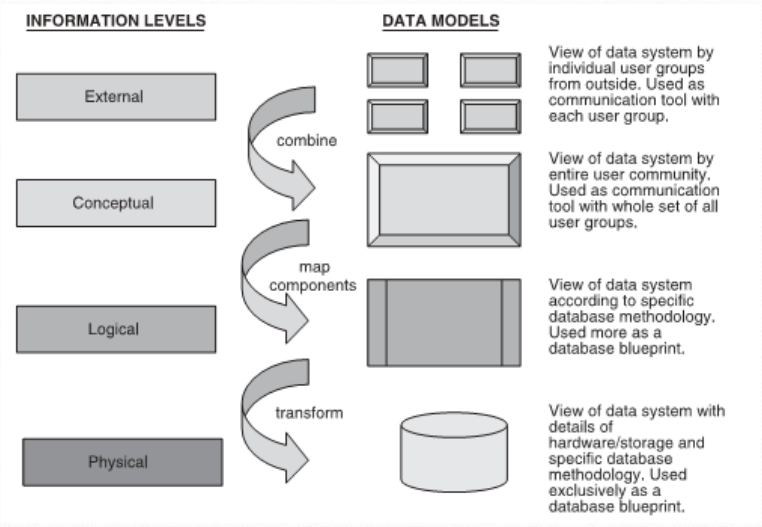
Information Levels and Data Models



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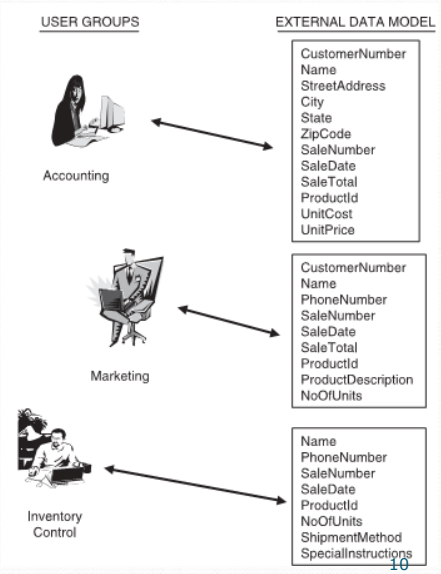
External Data Model

- Database from viewpoints of different user groups



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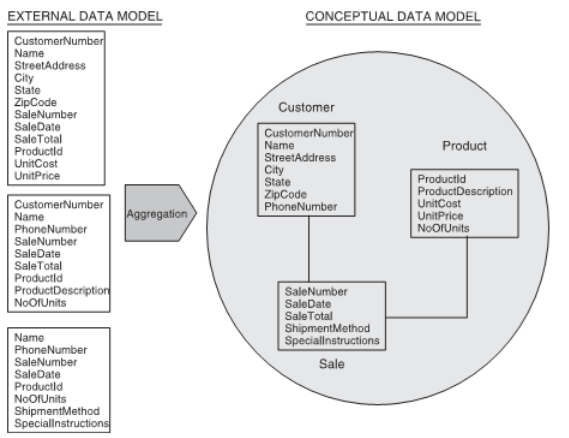
Conceptual Data Model

- Communication tool with the user community
- No detail data structure
- Can represent the information requirements of the whole organization



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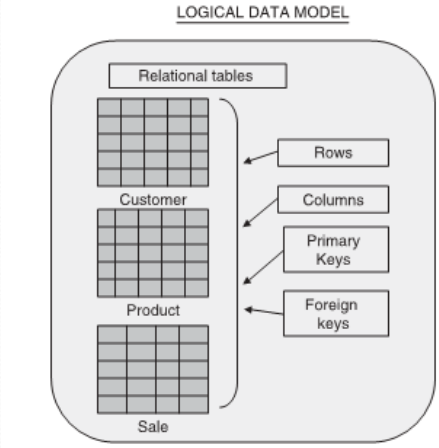
Logical Data Model

- Might be DBMS specific
- Use as the database blueprint, support the implementation purpose



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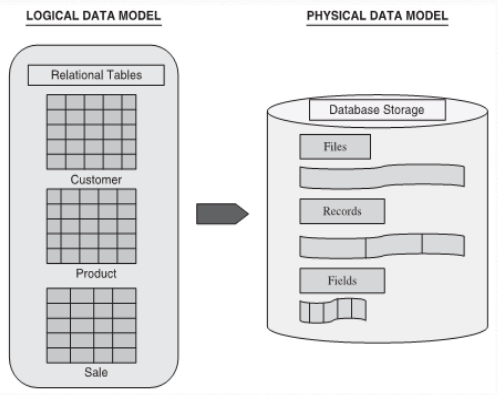
Physical Data Model

- Act as blueprint for the implementation of the database system
- Consider the DBMS as well as the hardware environment in which the database system gets implemented



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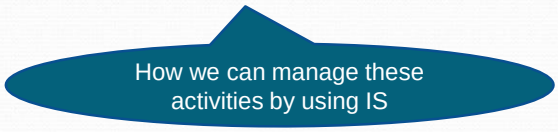
Decision of an IS and Requirement Analysis

- Selection of Target World
- Investigation of the target world and specify the issues to be solved by the system
- Analysis of the issues and specify the system requirements

Purposes of Profit-base IS

- IS for Profit Organization
  - Maximizing Profit
  - Profit = Income - Expense
  - Supporting Activities to increase Income(More Customers, Higher Customer Satisfaction, Sales)
  - Supporting Activities to decrease Expense(Effective Use of Resources, Business Flow Tuning)
  - Compliance and Security Control



Purposes of non-Profit IS

- IS for non-Profit Organization
  - Maximizing Quality and Quantity of Services
  - Supporting Activities to improve Services(Higher Customer Satisfaction)
  - Supporting Activities to decrease Expense(Effective Use of Resources, Activity Flow Tuning)
  - Compliance and Security Control

From Purposes to Strategy and Tactics

- Listing up strategies how to attain the purposes
  - How to extend customers
  - How to increase Customer Satisfaction
  - How to find useless facilities or activities
  - How to win the business games
  - How to forecast the market trend
  - How to detect illegal or unsecure activities
  - Other effective use of IS

Selection of Target World

- Select one from
  - Social Information System
  - Current Social Issues(Environment Issue, Swine/bird flu, World Depression,…)
  - Business world you want to join
  - Business world you want to contribute as SE
  - Business world that IS are useful

For example(Recommendation)

- Ship Construction Companies
  - A big ship is a future city
  - Every thing is controlled by computers
- Automobile companies
  - Current car is controlled by computers
  - The kernel is an information System
- Retail Sale business
  - Making differences with IT

For example(Recommendation)

- Distribution Business
  - Survives by new business models
  - Business Models supported by IS
- Environment Business
  - Preserving the nature
  - Environment control of industry is a hot topic
- Military Operation
  - IT is a key to win

For example(Recommendation)

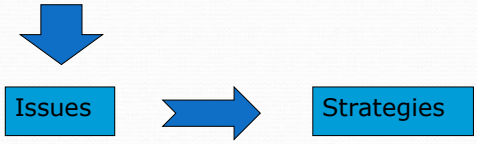
- IS for R&D Management
  - Research Management is Information Management
  - Consistency Management of Theme, Results and Applications
- Paradigm「Ubiquitous」
  - Computing anytime and anywhere
  - The key is an IS
- Transportation IS
  - Everything should be controlled by IS
- IS for MOT(Management of Technology)
  - IP(Intellectual Property), Know-how
  - Knowledge management system is one of ISs

For example(Recommendation)

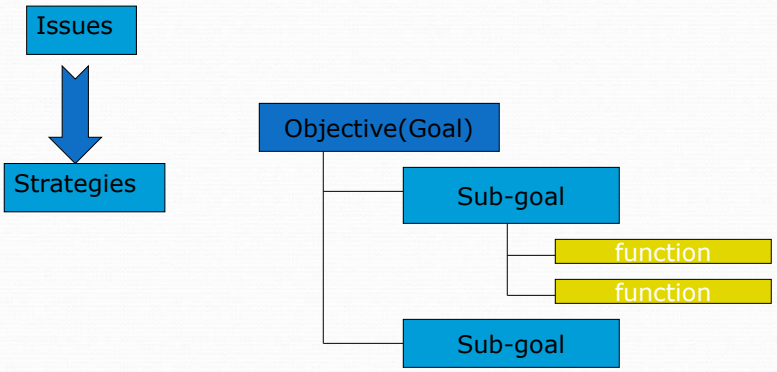
- Publishing Business
  - Publishing business is Information Business
- ETB(Education & Training Business) is a typical Information Business
  - eLearning is a new trend of ETB and supported by LMS(IS)
- Banking and Financial Business
  - Overcome the problems in legacy IS
  - Reformation of organizations drives IS problems

Investigation of Business worlds

- Collect various materials introducing business worlds
- Select some keywords describing the target world
- Understand these keywords
- Select one theme and investigate it deeply



List up the system requirements by breakdown (Top down approach)



Sample IS

Library Automation System

- Changing roles of library toward network age
- Competition of eLibrary construction
- eLibrary manages materials or information
- New unit of management in library
- What is the best user interface of library system
- Financial base of library activities
- Integration of New media and traditional media
- What is the profession for library staffs, IT or library science.

Objectives of Library System

- **CF(Customer Satisfaction)**=data+system+services
- **CF for the Data**
  - **Comprehensiveness of information**
  - **Freshness of Information**
  - **Reliability of Information**
- **CF for the System**
  - **User Friendliness of Interface**
  - **Efficiency of retrievals**
  - **Accessibility**
- **CF for the additional Services**
  - **Copy, ILL, and Social activities**

Objectives of Library System

- Reduction of Management Cost
  - Extension of automatic services
  - Automatic data collection and reporting
- Collaboration of other libraries
  - ILL
  - Sharing database
  - Union catalog
  - Partial Responsibility of collections

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