Data Models

Presented BY:

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Objectives

- Why data models are important
- About the basic data-modeling building blocks
- What business rules are and how they influence database design
- How the major data models evolved
- How data models can be classified by level of abstraction

The Importance of Data Models

- Data models
  - Relatively simple representations, usually graphical, of complex real-world data structures
  - Facilitate interaction among the designer, the applications programmer, and the end user
  - End-users have different views and needs for data
  - Data model organizes data for various users

Data Model Basic Building Blocks

- Entity - anything about which data are to be collected and stored
- Attribute - a characteristic of an entity
- Relationship - describes an association among entities
  - One-to-many (1:M) relationship
  - Many-to-many (M:N or M:M) relationship
  - One-to-one (1:1) relationship
- Constraint - a restriction placed on the data

The Evolution of Data Models

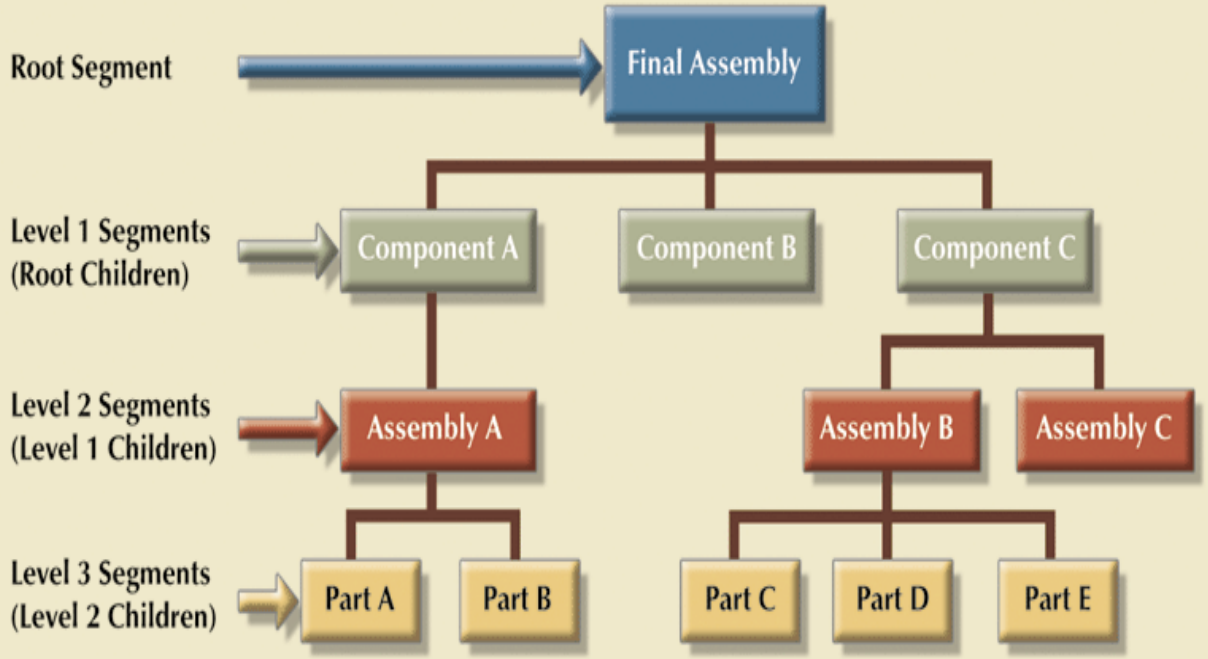
- Hierarchical
- Network
- Relational

The Hierarchical Model

- Developed in the 1960s to manage large amounts of data for complex manufacturing projects
- Basic logical structure is represented by an upside-down “tree”
- The hierarchical structure contains levels, or segments
- Depicts a set of one-to-many (1:M) relationships between a parent and its children segments
  - Each parent can have many children
  - each child has only one parent

The Hierarchical Model

FIGURE 2.1 A hierarchical structure



The Hierarchical Model

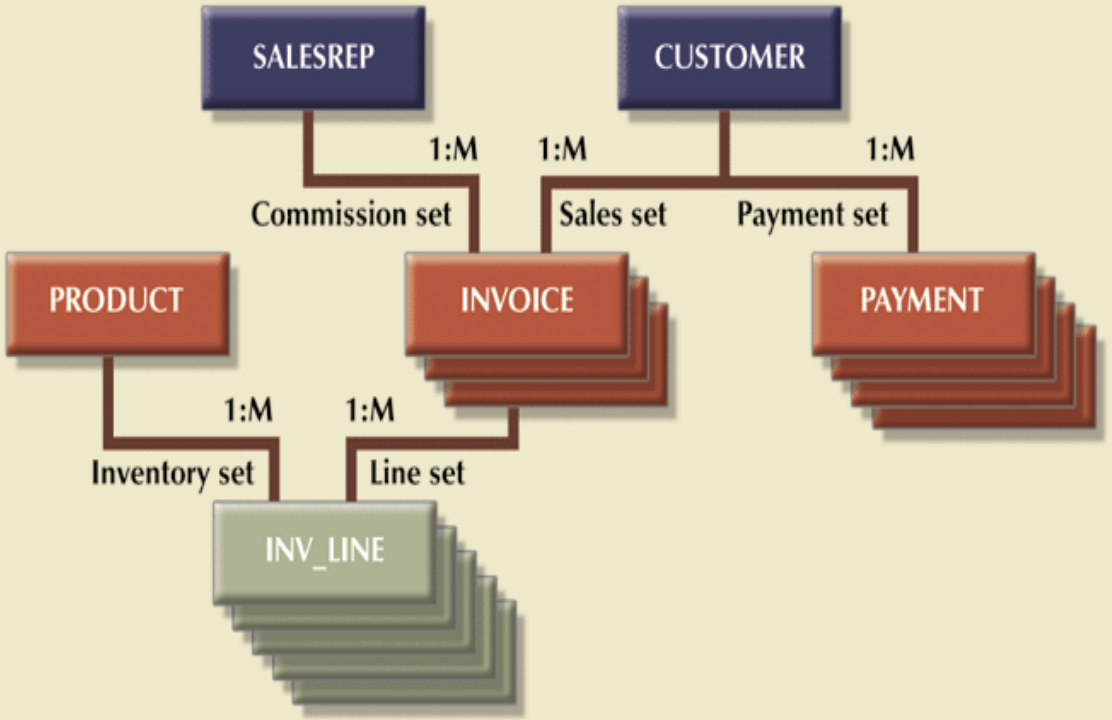
- Disadvantages
  - Complex to implement
  - Difficult to manage
  - Lacks structural independence
  - Implementation limitations
  - Lack of standards

The Network Model

- Created to
  - Represent complex data relationships more effectively
  - Improve database performance
  - Impose a database standard
- Conference on Data Systems Languages (CODASYL)
- Database Task Group (DBTG)

The Network Model

FIGURE 2.2 A network data model



The Network Model

- Disadvantages
  - Too cumbersome
  - The lack of ad hoc query capability put heavy pressure on programmers
  - Any structural change in the database could produce havoc in all application programs that drew data from the database
  - Many database old-timers can recall the interminable information delays

The Relational Model

- Developed by Codd (IBM) in 1970
- Considered ingenious but impractical in 1970
- Conceptually simple
- Computers lacked power to implement the relational model
- Today, microcomputers can run sophisticated relational database software

The Relational Model

- Relational Database Management System (RDBMS)
- Performs same basic functions provided by hierarchical and network DBMS systems, in addition to a host of other functions
- Most important advantage of the RDBMS is its ability to hide the complexities of the relational model from the user

The Relational Model

- Table (relations)
  - Matrix consisting of a series of row/column intersections
  - Related to each other through sharing a common entity characteristic
- Relational diagram
  - Representation of relational database's entities, attributes within those entities, and relationships between those entities

The Relational Model

FIGURE 2.3 Linking relational tables

Database name: Ch02_InsureCo Table name: AGENT (first six attributes)

AGENT_CODE	AGENT_LNAME	AGENT_FNAME	AGENT_INITIAL	AGENT_AREACODE	AGENT_PHONE
501	Alby	Alex	B	713	228-1249
502	Hahn	Leah	F	615	882-1244
503	Okon	John	T	615	123-5589

Link through AGENT_CODE

Table name: CUSTOMER

CUS_CODE	CUS_LNAME	CUS_FNAME	CUS_INITIAL	CUS_AREACODE	CUS_PHONE	CUS_RENEW_DATE	AGENT_CODE
10010	Ramas	Alfred	A	615	844-2573	05-Apr-2006	502
10011	Dunne	Leona	K	713	894-1238	16-Jun-2006	501
10012	Smith	Kathy	W	615	894-2285	29-Jan-2007	502
10013	Olowski	Paul	F	615	894-2180	14-Oct-2006	502
10014	Orlando	Myron		615	222-1672	28-Dec-2006	501
10015	O'Brian	Amy	B	713	442-3381	22-Sep-2006	503
10016	Brown	James	G	615	297-1228	25-Mar-2006	502
10017	Williams	George		615	290-2556	17-Jul-2006	503
10018	Farriss	Anne	G	713	382-7185	03-Dec-2006	501
10019	Smith	Olette	K	615	297-3809	14-Mar-2006	503


THANK
YOU