

# Database Design

History of the Database



ACADEMY

# Objectives

This lesson covers the following objectives:

- Describe the evolution of the database and give an example of its role in the business world
- Name important historical contributions in database development and design
- List and explain the three major steps in the database development process

# Purpose

History provides perspective for where we are today in information technology. The next time you use your computer, your video gaming system, or your smart phone, you will realize how far we've come to get to this point and what events brought us here.

Data Modeling is the first step in database development. This lesson includes an overview of the content that is covered in the remainder of the course.

# History of the Database Timeline

**1960s:** Computers become cost effective for private companies, and storage capacity increases.

**1970-72:** E. F. Codd proposes the relational model for databases, disconnecting the logical organization from the physical storage.

**1976:** P. Chen proposes the entity relationship model (ERM) for database design.

# History of the Database Timeline (cont.)

**Early 1980s:** The first commercially-available relational database systems start to appear at the beginning of the 1980s with Oracle Version 2.

**Mid-1980s:** SQL (structured query language) becomes "intergalactic standard."

**Early 1990s:** An industry shakeout begins with fewer surviving companies. Oracle survives.

# History of the Database Timeline (cont.)

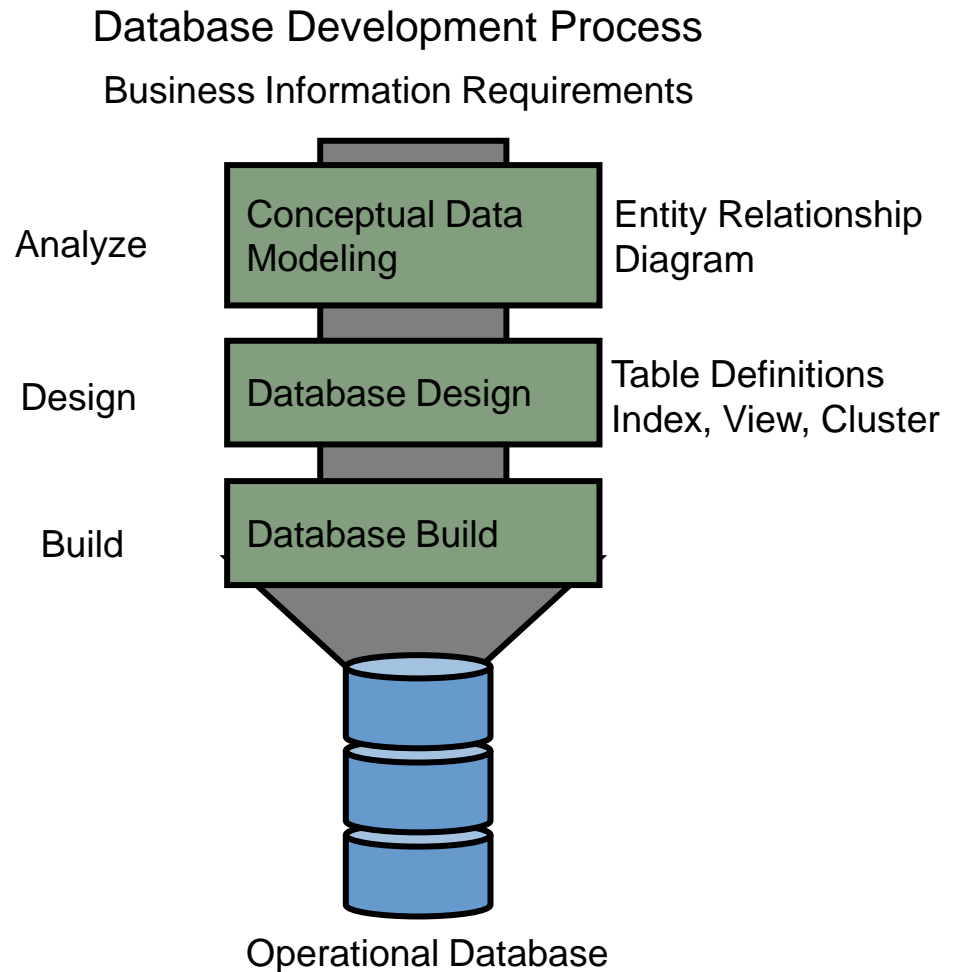
**Mid-1990s:** Kaboom! The usable Internet/World Wide Web (WWW) appears. A mad scramble ensues to allow remote access to computer systems with legacy data.

**Late 1990s:** The large investment in Internet companies helps create a tools-market boom for Web/Internet/DB connectors.

**Early 21st century:** Solid growth of DB applications continues. Examples: commercial websites (yahoo.com, amazon.com, google.com), government systems (Bureau of Citizenship and Immigration Services, Bureau of the Census), art museums, hospitals, schools, etc.

# Question: What Does Data Modeling Have to do with a Database?

Data modeling is the first step in the database development process. It involves collecting and analyzing the data that a business needs to track, and then diagramming the organization of that data in an Entity Relationship Diagram.



# Database Development Process

Data modeling begins by researching the information requirements of a business.

Example: Here is a set of information requirements.

I manage the Human Resources Department for a large company. We need to store data about each of our company's employees. We need to track each employee's first name, last name, job or position, hire date and salary. For each employee on commission, we also need to track his potential commission.



## Database Development Process (cont.)

Each employee is assigned a unique employee number.

Our company is divided into departments. Each employee is assigned to a department -- for example, accounting, sales, or development. We need to know the department responsible for each employee and the department location. Each department has a unique number.

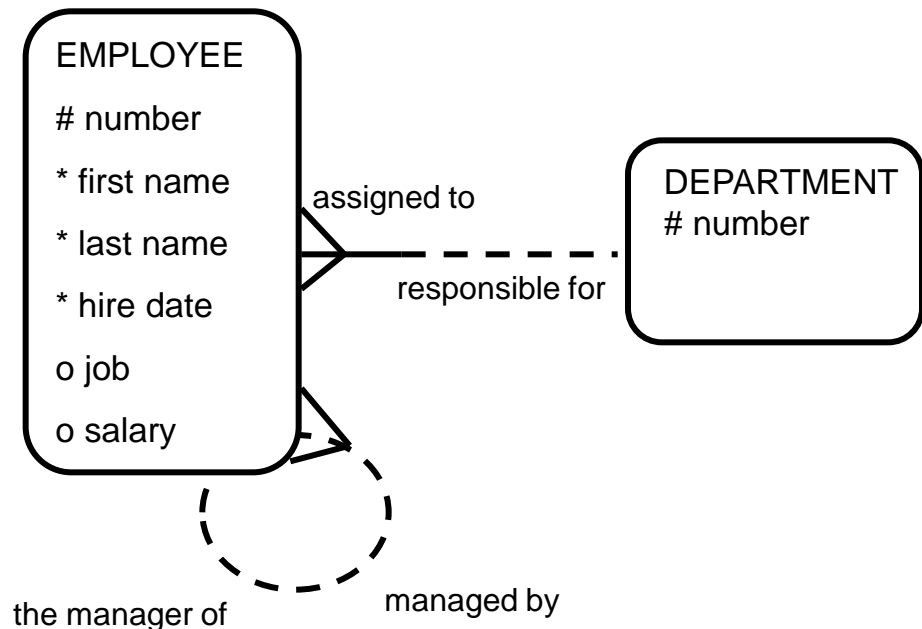
Some of the employees are managers. We need to know each employee's manager and all of the employees that are managed by each manager.

# Database Development Process (cont.)

An entity relationship diagram should completely capture and accurately model the organization's information needs and support the functions of the business.

## EXAMPLE

The following entity relationship diagram represents the information requirements of the Human Resources Department.



## Database Development Process (cont.)

Step two, the database design phase of the development process, translates the information modeled on the entity relationship diagram to a table instance chart.

## Database Development Process (cont.)

The table instance chart lists the design specifications of the information and has the following components:

- Table name
- Column names
- Keys: a primary key (PK) is the unique identifier for each row of data; a foreign key (FK) links data in one table to the data in a second table by referring to the PK column in the second table
- Nulls: indicates if a column must contain a value (mandatory)

## Database Development Process (cont.)

- Unique: indicates if the value contained in a column is unique within the table
- Datatype: identifies the definition and format of the data stored in each column

# Database Development Process (cont.)

Structured Query Language (SQL) commands are used to build the physical structure of the database.

## DATABASE BUILD—Step Three

```
SQL>CREATE TABLE department
2      (deptno      NUMBER(5)      NOT NULL PRIMARY KEY,
3       name        VARCHAR2(25)   NOT NULL,
4       loc         VARCHAR2(30)   NOT NULL);
```

```
SQL>CREATE TABLE employees
2      (empno      NUMBER(9)      NOT NULL PRIMARY KEY,
3       fname      VARCHAR2(15)   NOT NULL,
4       lname      VARCHAR2(20)   NOT NULL,
5       job        VARCHAR2(15),
6       hiredt     DATE            NOT NULL,
7       sal        NUMBER(9,2),
8       comm       NUMBER(9,2),
9       mgr        NUMBER(2)      REFERENCES EMPLOYEES
10      deptno     NUMBER(5)      REFERENCES DEPARTMENT);
```

# Database Development Process (cont.)

SQL is also used to populate, access, and manipulate the data within the relational database.

## DATABASE BUILD—Step Three

```
SQL>CREATE TABLE department
2   (deptno      NUMBER(5)      NOT NULL PRIMARY KEY,
3   name         VARCHAR2(25)   NOT NULL,
4   loc          VARCHAR2(30)   NOT NULL);
```

```
SQL>CREATE TABLE employees
2   (empno       NUMBER(9)      NOT NULL PRIMARY KEY,
3   fname        VARCHAR2(15)   NOT NULL,
4   lname        VARCHAR2(20)   NOT NULL,
5   job          VARCHAR2(15),
6   hiredate     DATE           NOT NULL,
7   salary       NUMBER(9,2),
8   commission   NUMBER(9,2),
9   manager      NUMBER(2)      REFERENCES EMPLOYEES
10  deptno       NUMBER(5)      REFERENCES DEPARTMENT);
```

# Terminology

Key terms used in this lesson included:

- Datatype
- Foreign key (FK)
- Nulls
- Primary key (PK)
- Table instance chart
- Unique



# Summary

In this lesson, you should have learned how to:

- Describe the evolution of the database and give an example of its role in the business world
- Name important historical contributions in database development and design
- List and explain the three major steps in the database development process