Database Foundations

3-4
Attributes
Roadmap

- Conceptual and Physical Data Models
- Business Rules
- Entities
- Attributes
- Unique Identifiers
- Relationships
- Validating Relationships
- Tracking Data Changes over Time
- Validating Data Using Normalization

You are here
Objectives

This lesson covers the following objectives:

• Identify attributes

• Identify mandatory, optional, volatile, and nonvolatile attributes

• Describe the Barker, Bachman, and Information Engineering notations
Attributes

- Attributes describe entities and are the specific information that must be known.
- It is a single-valued property detail of an entity.
Attribute Characteristics

• Attributes are shown within the entity box on the ERD.
• Attribute names are singular and mixed case or lowercase.
• The name of the attribute should not include the entity’s name, because attributes are qualified with the entity name.
• Attributes are classified as one of the following:
  – Mandatory (nulls are not allowed), indicated by *
  – Optional (nulls are allowed), indicated by a lowercase o
Volatile and Nonvolatile Attributes

- Volatile attributes are unstable attributes. Example: Age
- Nonvolatile attribute are stable attributes. Example: Birth Date
Mandatory and Optional Attributes

- Mandatory attributes must have a value.
- Optional attributes cannot have a value and can be blank.
Single and Composite Attributes

• Single or atomic attributes are attributes that cannot be divided into subparts.

• Composite attributes are attributes that can be divided into smaller subparts that represent basic attributes with independent meanings of their own.
Single-Valued and Multi-Valued Attributes

- Single-valued attributes can have a single value at a particular instance of time.  
  Example: Student Last Name

- Multi-valued attributes can have more than one value at one time.  
  Example: Student Address
Barker Notation: Rules for Drawing Entities

• An entity is represented as a round-cornered rectangle.
• An entity must be named, and the name must be placed inside the entity in the upper-left corner.
• The entity name should be in uppercase form.
• The entity name should be in singular form.

EMPLOYEE
Barker Notation: Rules for Drawing Attributes

- The attributes must be written so that everyone, not just developers, can understand them.
- Attributes must be written with the first letter of each word in uppercase and the rest in lowercase.
- A symbol representing the type of attribute should be placed next to each attribute.

**EMPLOYEE**

- # Id
- * First Name
- * Last Name
- * Date of Birth
- * Telephone Number
Barker Notation: Rules for Drawing Relationships

• A relationship can exist between a maximum of two entities.
• A relationship can exist on the same entity.
• A relationship has two perspectives.
• Both perspectives of a relationship must be labeled.
Bachman Notation

• Entity (represented by a box)
• Attributes
• Relationship lines

EMPLOYEE
*Id
*First Name
  Last Name
Date of Birth
Telephone Number
Information Engineering Notation

An EMPLOYEE works only in one DEPARTMENT. A DEPARTMENT contains zero or more EMPLOYEES.

- zero or more
- zero or one
- one or more
- only one
# Data Model Notations

<table>
<thead>
<tr>
<th>Notation</th>
<th>Barker Notation</th>
<th>Bachman Notation</th>
<th>Information Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero or one</td>
<td><img src="image" alt="Barker Notation" /></td>
<td><img src="image" alt="Bachman Notation" /></td>
<td><img src="image" alt="Information Engineering" /></td>
</tr>
<tr>
<td>One only</td>
<td><img src="image" alt="Barker Notation" /></td>
<td><img src="image" alt="Bachman Notation" /></td>
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<td><img src="image" alt="Information Engineering" /></td>
</tr>
<tr>
<td>Primary Key/Unique key</td>
<td>#</td>
<td>P</td>
<td></td>
</tr>
</tbody>
</table>
Data Model Notations: Examples

Barker Notation

Bachman Notation

Information Engineering Notation

EMPLOYEE

works in

contains

DEPARTMENT

EMPLOYEE

works in

contains

DEPARTMENT

EMPLOYEE

works in

contains

DEPARTMENT

EMPLOYEE

works in

contains

DEPARTMENT
Summary

In this lesson, you should have learned how to:

• Identify attributes

• Identify mandatory, optional, volatile, and nonvolatile attributes

• Describe the Barker, Bachman, and Information Engineering notations