

Information engineering

BUSINESS RULES AND NAMING
CONVENTIONS

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Business Rules

- Statements that define or constrain some aspect of the business
- Assert business structure
- Control/influence business behavior
- Expressed in terms familiar to end users
- Automated through DBMS software

A Good Business Rule Is:

- Declarative—what, not how
- Precise—clear, agreed-upon meaning
- Atomic—one statement
- Consistent—internally and externally
- Expressible—structured, natural language
- Distinct—non-redundant
- Business-oriented—understood by business people

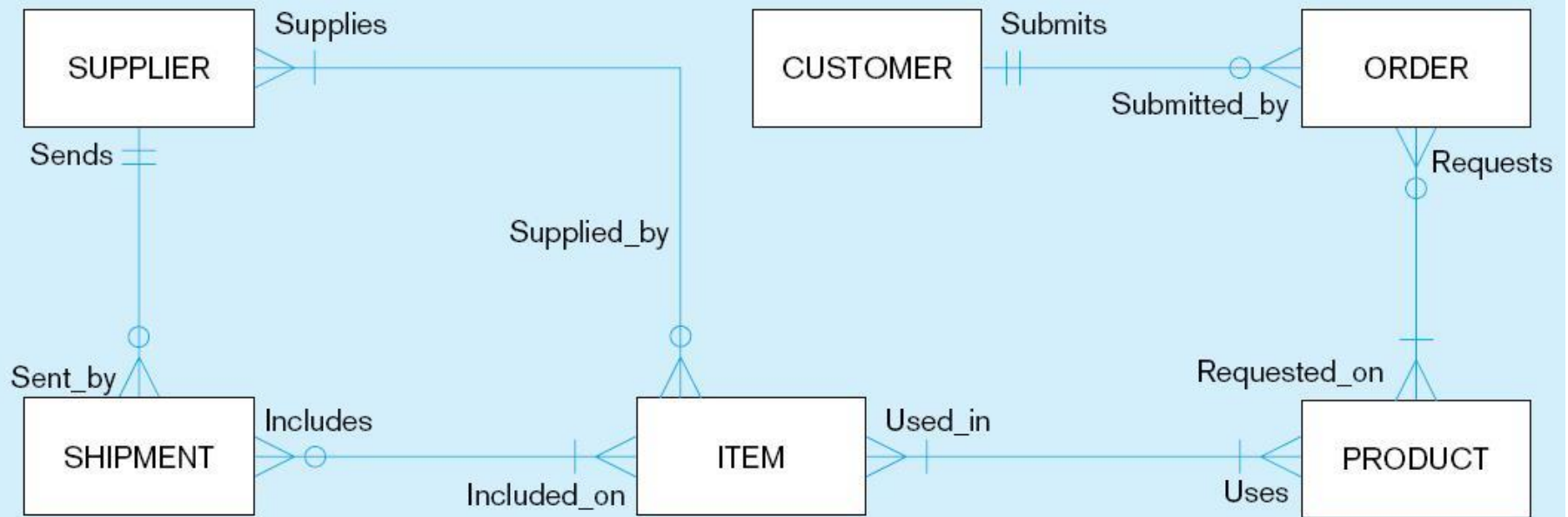
A Good Data Name Is:

- Related to business, not technical, characteristics
- Meaningful and self-documenting
- Unique
- Readable
- Composed of words from an approved list
- Repeatable
- Follows standard syntax

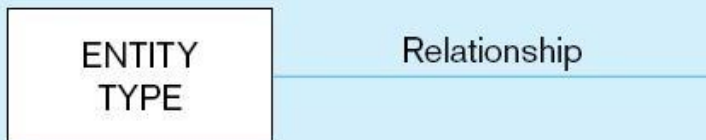
Data Definitions

- Explanation of a term or fact
 - Term—word or phrase with specific meaning
 - Fact—association between two or more terms
- Guidelines for good data definition
 - Gathered in conjunction with systems requirements
 - Accompanied by diagrams
 - Concise description of essential data meaning
 - Achieved by consensus, and iteratively refined

Product order E-R Diagram



Key



Cardinalities

—||—
Mandatory One

—|<—
Mandatory Many

—○|—
Optional One

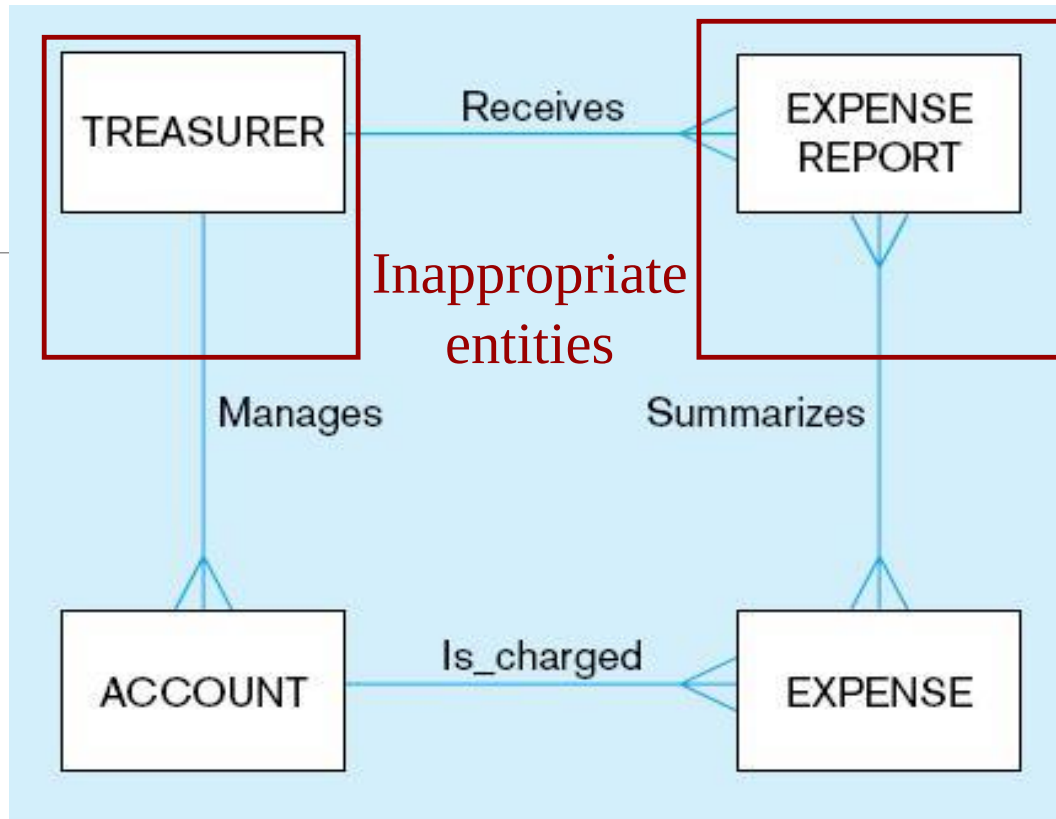
—○<—
Optional Many

What Should an Entity Be?

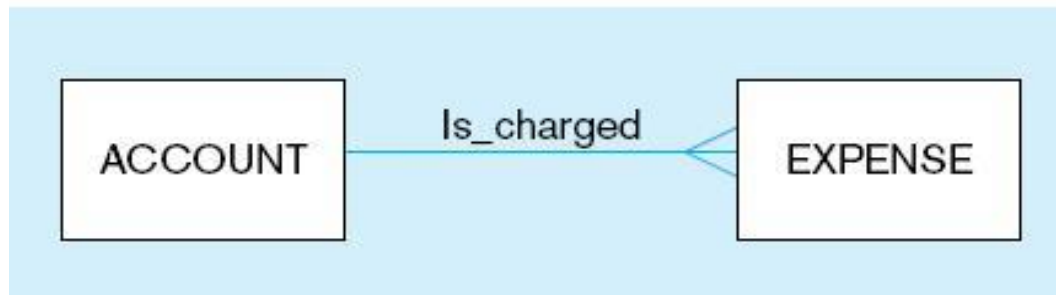
- SHOULD BE:
 - An object that will have many instances in the database
 - An object that will be composed of multiple attributes
 - An object that we are trying to model
- SHOULD NOT BE:
 - A user of the database system
 - An output of the database system (e.g., a report)

Example of inappropriate entities

**System
user**



**System
output**



**Appropriate
entities**

Attributes

- Attribute—property or characteristic of an entity or relationship type
- Classifications of attributes:
 - Required versus Optional Attributes
 - Simple versus Composite Attribute
 - Single-Valued versus Multivalued Attribute
 - Stored versus Derived Attributes
 - Identifier Attributes

Identifiers (Keys)

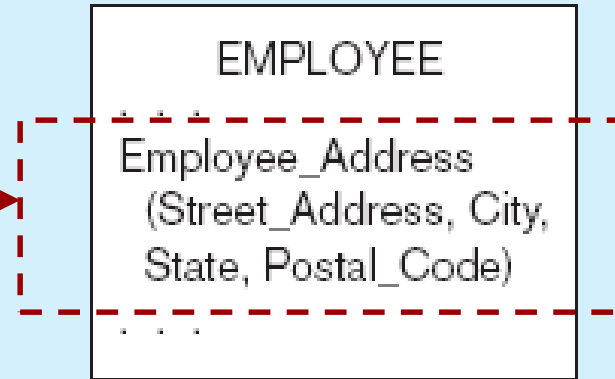
- Identifier (Key)—an attribute (or combination of attributes) that uniquely identifies individual instances of an entity type
- Simple versus Composite Identifier
- Candidate Identifier—an attribute that could be a key...satisfies the requirements for being an identifier

Characteristics of Identifiers

- Will not change in value
- Will not be null
- No intelligent identifiers (e.g., containing locations or people that might change)
- Substitute new, simple keys for long, composite keys

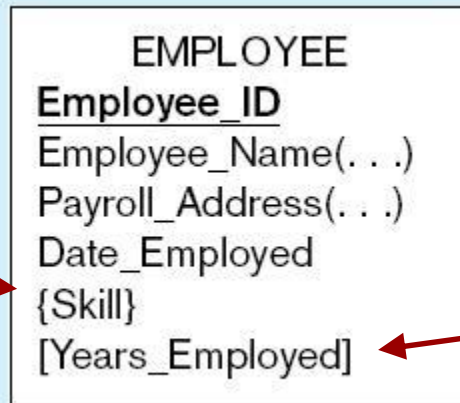
A composite attribute

**An attribute
broken into
component parts**



Entity with **multivalued** attribute (Skill)
and **derived** attribute (Years_Employed)

Multivalued
an employee can have
more than one skill



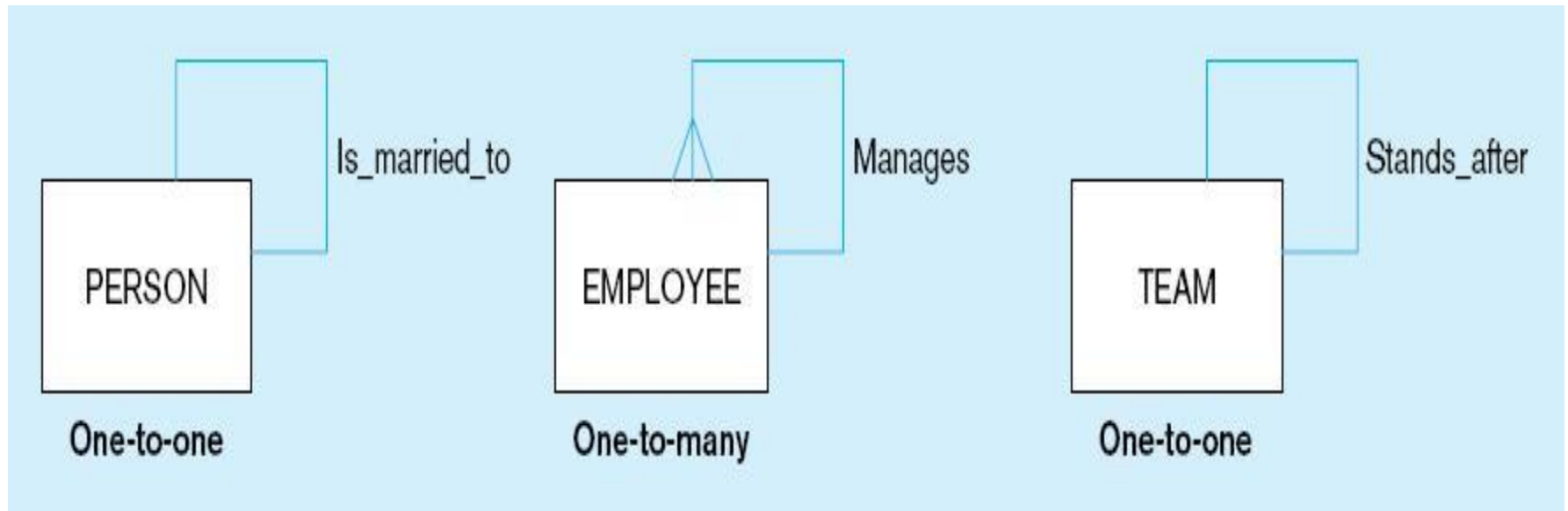
Derived
from date
employed and
current date

Cardinality Constraints

- Cardinality Constraints—the number of instances of one entity that can or must be associated with each instance of another entity
- Minimum Cardinality
 - If zero, then optional
 - If one or more, then mandatory
- Maximum Cardinality
 - The maximum number

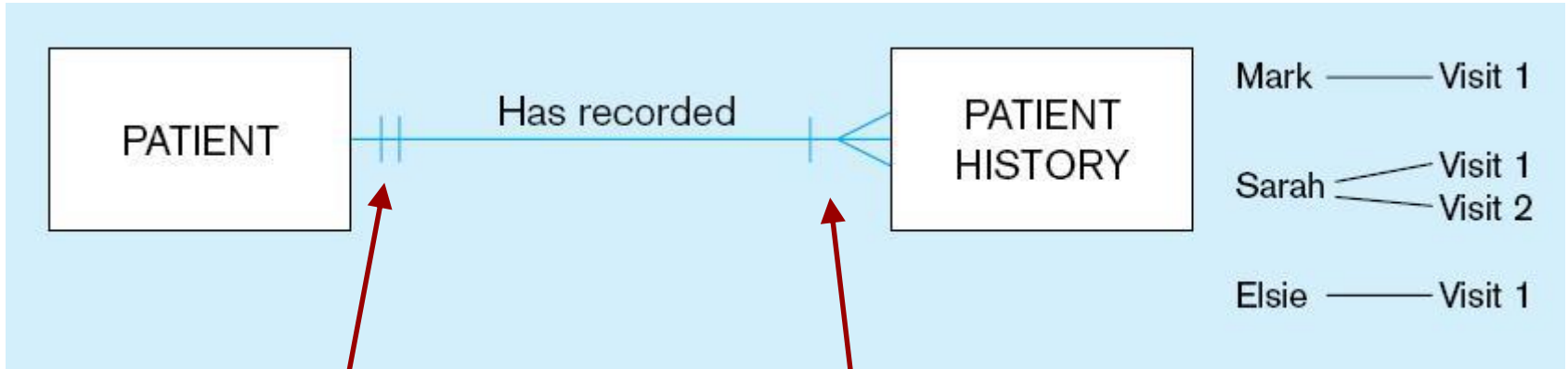
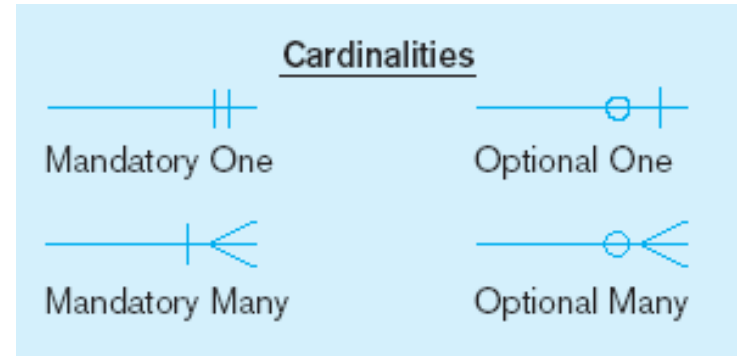
Examples of relationships of different degrees

a) Unary relationships



Examples of cardinality constraints

a) Mandatory cardinalities

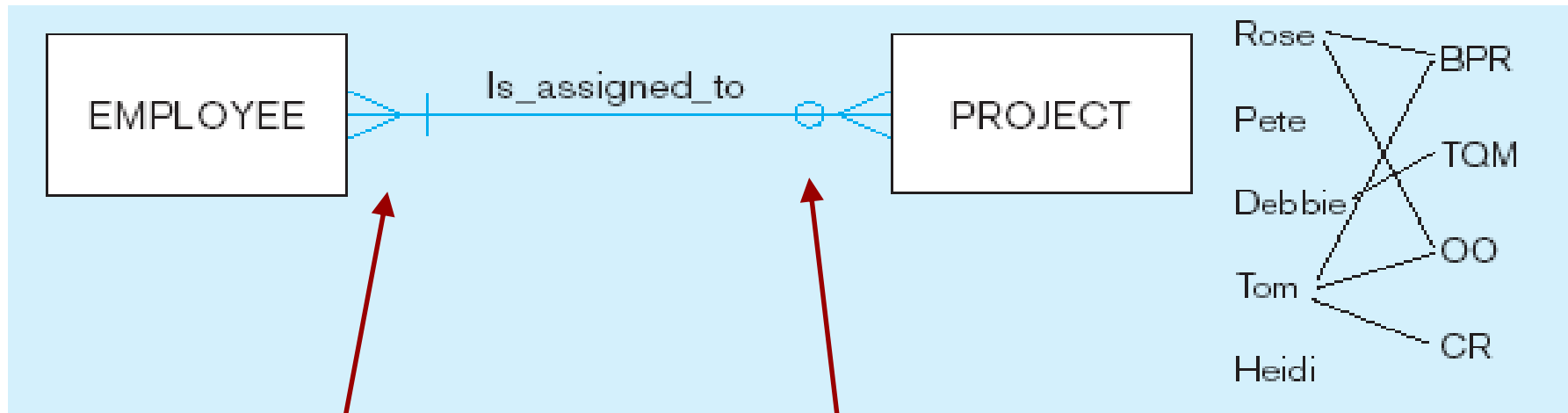
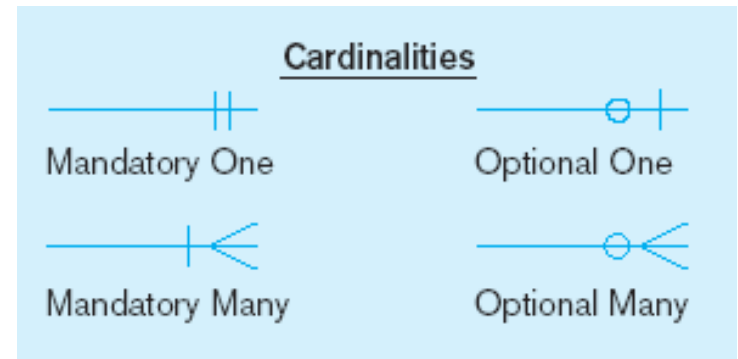


A patient history is recorded for one and only one patient

A patient must have recorded at least one history, and can have many

Examples of cardinality constraints (cont.)

b) One optional, one mandatory

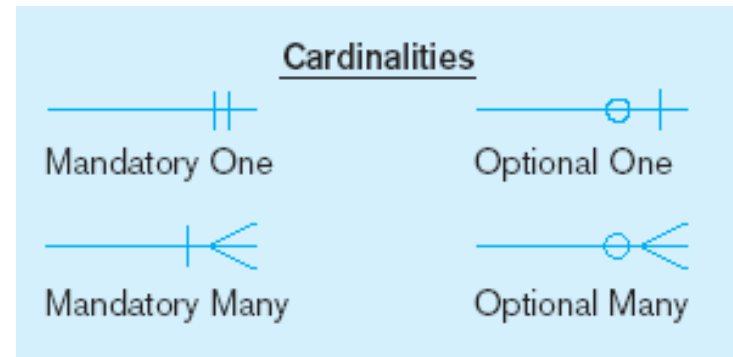


A project must be assigned to at least one employee, and may be assigned to many

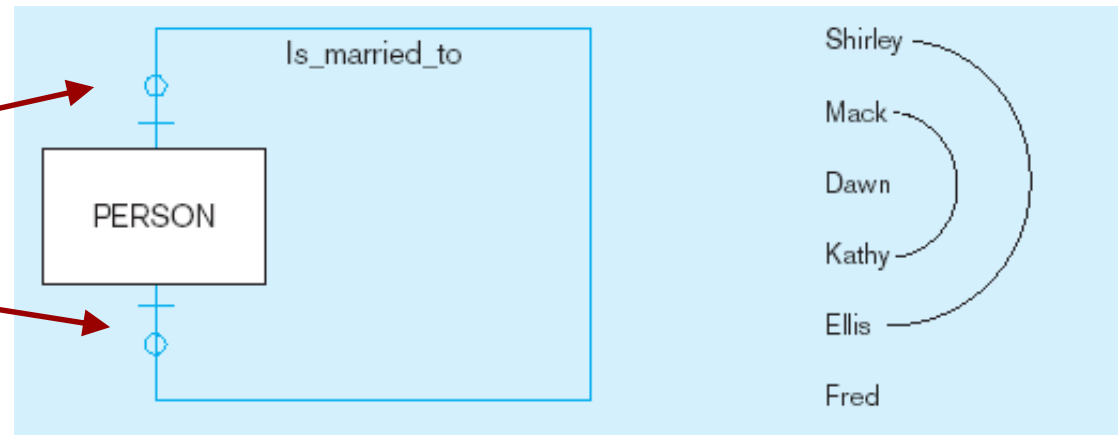
An employee can be assigned to any number of projects, or may not be assigned to any at all

Examples of cardinality constraints (cont.)

c) Optional cardinalities



A person is
married to at most
one other person,
or may not be
married at all



Relational Keys

Superkey

- A column, or a set of columns, that uniquely identifies a record within a table.

Candidate Key

- Superkey (K) such that no proper subset is a superkey within the table.
- In each record, values of K uniquely identify that record (*uniqueness*).
- No proper subset of K has the uniqueness property (*irreducibility*).

Relational Keys

Primary Key

- Candidate key selected to identify records uniquely within table.

Alternate Keys

- Candidate keys that are not selected to be primary key.

Foreign Key

- Column, or set of columns, within one table that matches candidate key of some (possibly same) table.

Relational Integrity

Null

- Represents value for a column that is currently unknown or not applicable for record.
- Deals with incomplete or exceptional data.
- Represents the absence of a value and is not the same as zero or spaces, which are values.

Relational Integrity

Entity Integrity

- In a base table, no column of a primary key can be null.

Referential Integrity

- If FK exists in a table, either FK value must match a candidate key value of some record in its home table or FK value must be wholly null.

References

Modern Database management Hoffer, Prescott, Mcfadden Pearson Education, Inc. Publishing as Prentice Hall