Introduction to Logical Database Design

Logical database design translates the conceptual model into a schema. This process ensures data integrity and efficiency. It also meets business needs through model translation. Normalization and constraint definition are key steps.

Conceptual vs. Logical Models

Conceptual

High-level overview using ER diagrams.

Logical

Detailed schemas in the relational model.

The focus shifts from concepts to structured implementation.

The Relational Data Model

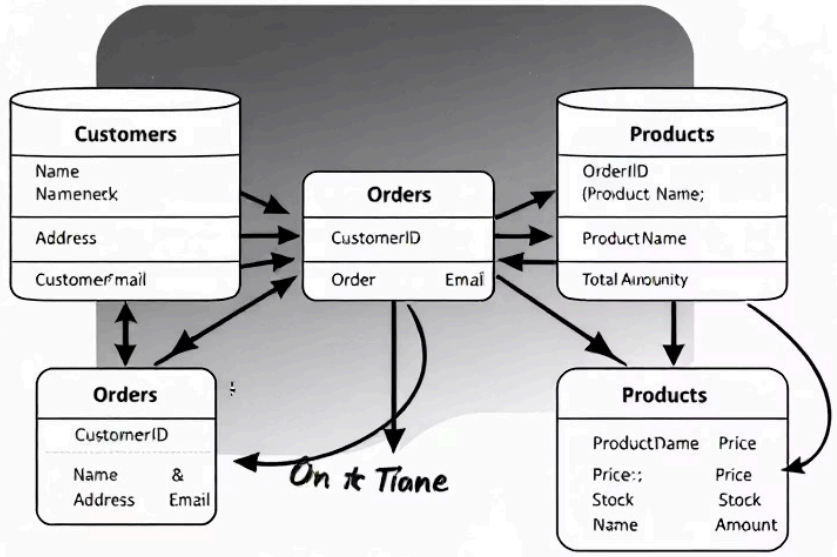
Relations

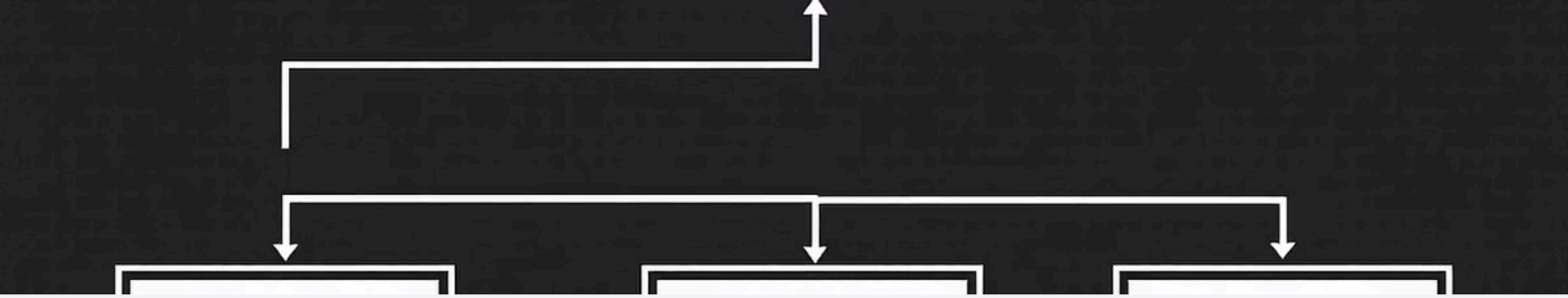
Tuples

Attributes

Domains

Data is represented as a set of related tables.





Relations and Schemas

1

Relation

Named table

2

Schema

Relation's structure

3

Primary Key

Uniquely identifies rows

4

Foreign Key

Links tables

Integrity Constraints: Ensuring Data Quality

Domain Constraints

Entity Integrity

Referential Integrity

Rules maintain data accuracy and consistency. This prevents invalid data entries.

Domain Constraints

Data Type Restriction

Value Range Restriction

Predefined Lists

Restriction on data type and value range. Implemented by the DBMS.

Entity and Referential Integrity

Entity Integrity

Primary Key cannot be null.

Maintains relationship consistency.

Referential Integrity

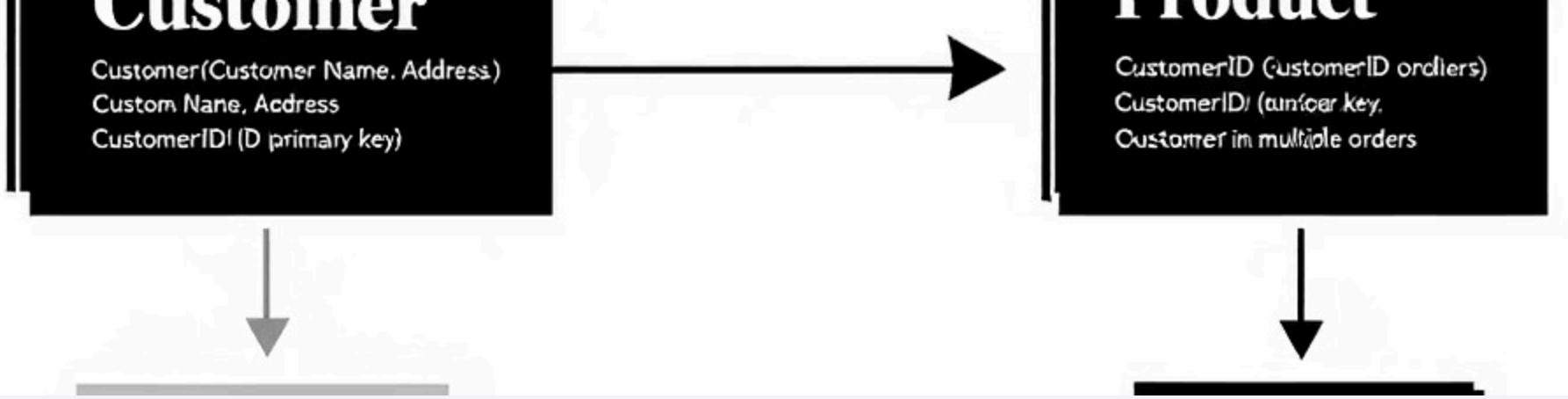
Foreign Key must match a valid Primary Key or be null.

Transforming EERDs into Relations: Entities

Map Entity Type

Attributes to Columns

Identify Primary Key



Transforming EERDs into Relations: Relationships

One-to-Many

Foreign key on the "many" side.

1

One-to-One

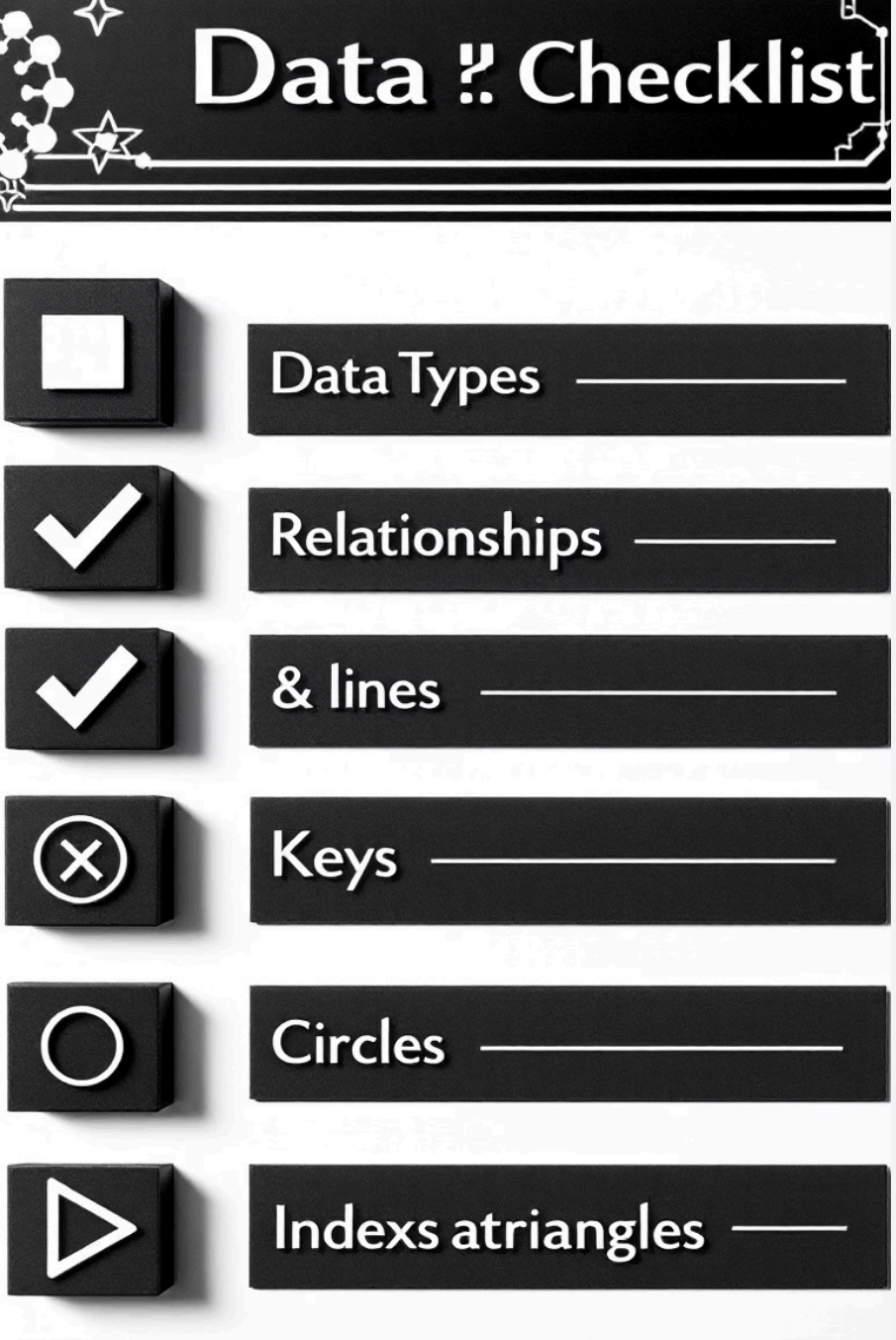
Foreign key in either table.

3

2

Many-to-Many

New relation with foreign keys.



Summary and Best Practices

Data Relationships

Integrity Constraints

Iterative Refinement

Modeling Tools

Logical design is crucial for a robust database. An iterative process refines based on requirements.