W2 Modeling Data in the Organization

This presentation provides an overview of database modeling within an organization. We'll cover database models, the E-R model, modeling organizational rules, entities, attributes, and relationships. The goal is to provide a solid foundation for effective data management.

Introduction to Database Models

A database model is a logical structure defining data storage, organization, and manipulation. Common types include hierarchical, network, relational, object-oriented, and NoSQL models. Using database models ensures data integrity, consistency, efficiency, and scalability.

Hierarchical
Tree-like structure

Network
Many-to-many relationships

Relational
Data organized in tables

The E-R Model

The Entity-Relationship (E-R) model is a visual way to represent entities, attributes, and relationships in a database. Key components include entities, attributes, and relationships. E-R diagrams use rectangles for entities, ovals for attributes, and diamonds for relationships.

☐ Entity

◯ Attribute

◇ Relationship

| Data Collection | → | 1 | → | 3. Decision Point |

Modeling Organizational Rules

Business rules are constraints, policies, and procedures governing data. Data constraints, relationship constraints, and operational rules are types of business rules. Modeling business rules ensures data accuracy, compliance, and better decision-making.

🔒 Data Constraints   🔗 Relationship Constraints   ⚙️ Operational Rules

Modeling Entities

An entity is a person, place, thing, event, or concept about which data is collected. Strong entities exist independently. Weak entities depend on another entity. Clear and descriptive names are essential when naming entities.
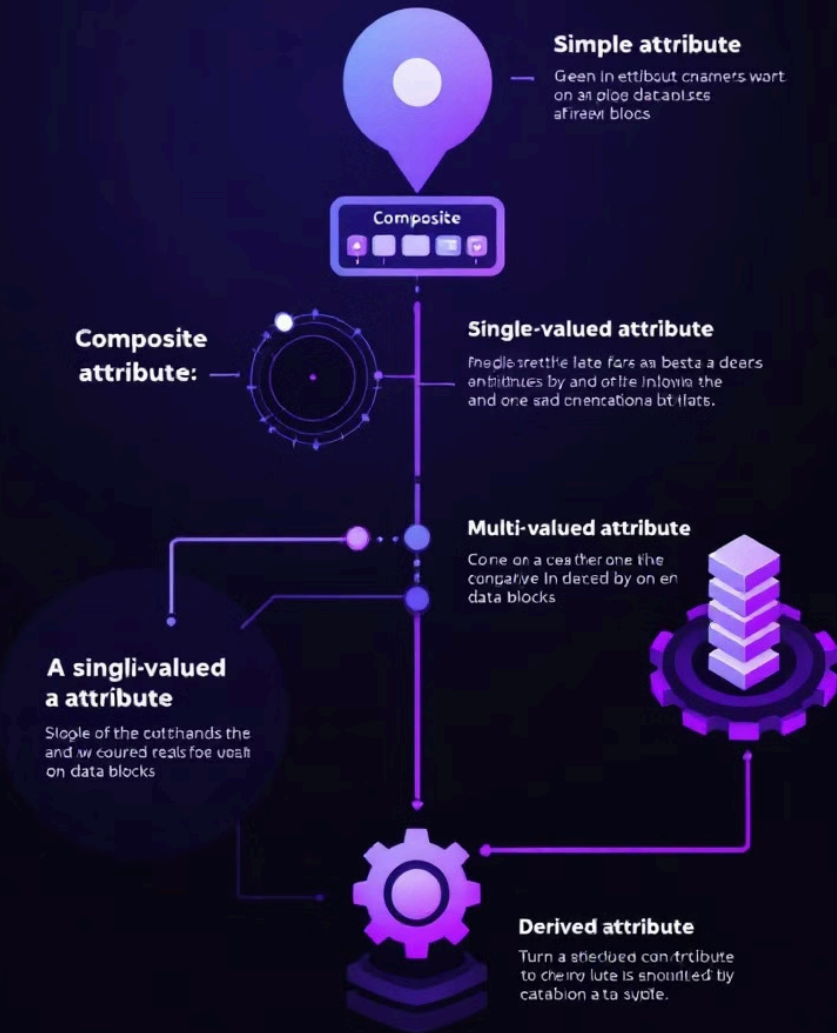
Strong Entity

Exists independently

Weak Entity

Dependent on another entity

Modeling Attributes

An attribute is a characteristic or property of an entity. Attributes can be simple, composite, single-valued, multi-valued, or derived. Primary keys uniquely identify each entity instance, while foreign keys link entities in different tables.

1 Simple
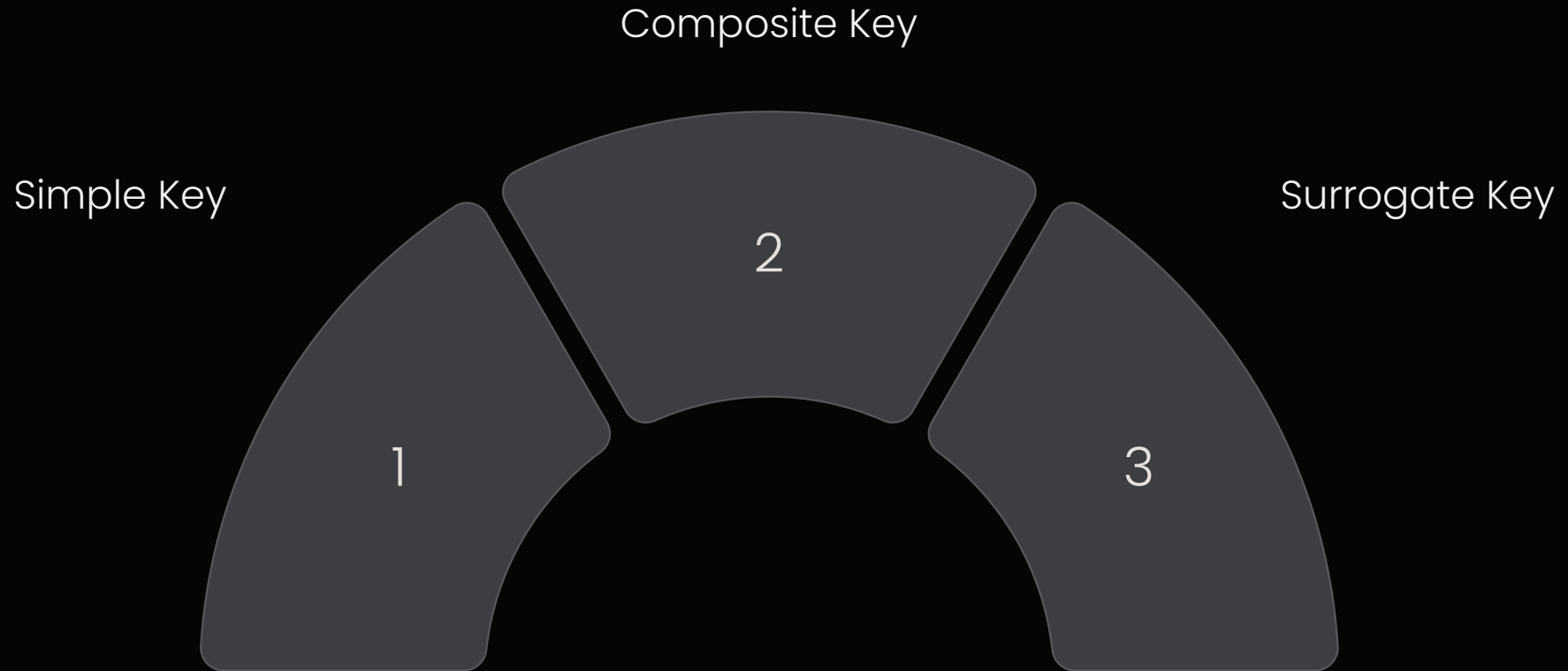Atomic, cannot be divided

2 Composite
Can be divided

3 Multi-Valued
Holds multiple values

Primary Keys

A primary key is a unique identifier for each record in a table. Simple keys, composite keys, and surrogate keys are types of primary keys. Primary keys must be unique and non-null and should not change over time.

Composite Key

Simple Key

Surrogate Key

2

1

3

Modeling Relationships

A relationship is an association between entities. One-to-one, one-to-many, many-to-one, and many-to-many are types of relationships. Cardinality constraints specify the minimum and maximum number of instances related.
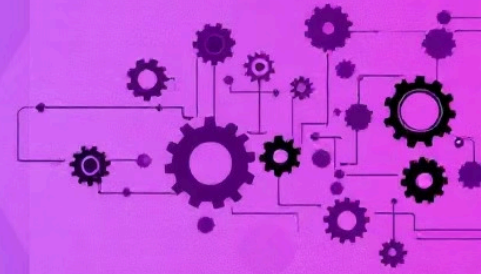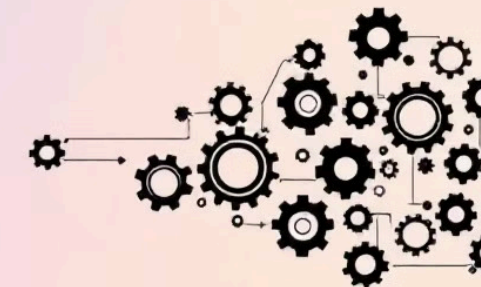
One-to-One

One-to-Many

Many-to-Many

Practical Examples

Modeling a customer relationship management (CRM) system and designing a database for a library management system are practical examples. Organizations use these models for data management and decision-making. Consider a CRM system with Customers, Contacts, and Opportunities entities.

| 1 | CRM System |
| 2 | Library System |

Summary and Q&A

We covered database models, the E-R model, modeling organizational rules, entities, attributes, and relationships. Effective data modeling improves data quality and database design. Now, let's address any questions and discuss further learning resources.

- Key Concepts Recap
- Q&A Session
- Next Steps