

The Relational Model

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Relational Model

- The relational model is the most widely used in modern DBMS
 - IBM's DB2, Informix, Oracle, Sybase, Microsoft Access and SQL Server, MySQL, PostgreSQL
- Introduced by Edgar Codd in 1970
- Differences from ER model:
 - Only one structure (relations) rather than two (entities and relationships)
 - Logical rather than conceptual
 - Based on mathematical framework that formally describes queries of relations

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Relations

- **Relations** are the main construct in the relational model
- Two components:
 - **Relation instance** is a table with rows and columns
 - A **relation schema** describes the columns of the table

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Relation Schema

- The schema defines a relation in terms of:
 - The relation name
 - The name of each column (or field)
 - The domain of each field
- Example:
 - `Students(sid: integer, name: string, login: string, age: integer, gpa: real)`

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Relation Instance

- An **instance** of a relation is a set of records or tuples
 - Each record has the same fields as defined in the schema
 - Relation instance = relation table
- Every record in a table is unique
 - No two records can have every field value equivalent
- Strictly speaking, no ordering on records or fields
 - In practice, ordering fields is often useful

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Domain Constraints

- The domains of the fields specify conditions that a relation must satisfy
 - A record is valid only if its values are in the specified domains
- More formally:
 - $R(f_1:D_1, \dots, f_n:D_n)$ is a relation schema
 - D_i is a name for a set of values Dom_i
 - $\{ \langle f_1:d_1, \dots, f_n:d_n \rangle \mid d_1 \in Dom_1, \dots, d_n \in Dom_n \}$ is a valid relation instance of R
 - Any record $\langle f_1:d_1, \dots, f_n:d_n \rangle$ for which there is some i such that $d_i \notin Dom_i$ is invalid

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