Relational Databases

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History

- Relational Database Management System (RDBMS)
- Invented by Edgar F. Codd @ IBM
- Today multiple RDBMS exist
- A database is a collection of data, stored in a structured, ordered and logical way
- Paper based databases

The basics

- Tables
- Rows
- Columns
- Relationships
- Datatypes
- Primary and Foreign Keys

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Tables

- Tables store data
- A table is a collection of rows and columns (just like an Excel table)
- Multiple tables can exist in a single database

Rows

- A row of data is equal to an entire record
- Holds all the information about an entity
- Rows are also called 'tuples' in some literature

Columns

- Also referred to as 'Fields'
- A column contains data that represents a record

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Relationships

- Links (Joins) between tables is possible
- Comes down to designing the table(s)
- Key term: normalisation (or normalisation of data)

Datatypes

- Columns in tables have a datatype
- Datatype drives what value(s) a row can have
- Most common datatypes:
  - VARCHAR(<length>)
  - INT
  - DATETIME
  - BLOB (Binary Large OBjects)

Primary & Foreign Keys

- Primary key - used to identify a record (a row of data)
- Foreign key - used to link (join) tables together

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Relational data(base)

- Data that fits into a table - "tabular" data
- Schema is required - makes future planning difficult
- NULL fields? Need to decide ahead of time
- ID - Primary Key (PK) normally with AUTO_INCREMENT

| ID (Primary Key)	Name (VARCHAR(50))	Salary (INT)	Email (VARCHAR(50))	Department (VARCHAR(35))
1	Joe Smith	250000	joe@corp.org	HR
2	Susan Black	27000	susan@corp.org	HR
3	Matt White	NULL	matt@corp.org	Finance

Normalisation of data

- Restructuring the database to remove redundant (duplicate) data
- Improves data integrity

ID	Name	Salary	Email	Department (Foreign Key)
1	Joe Smith	250000	joe@corp.org	1
2	Susan Black	27000	susan@corp.org	1
3	Matt White	19500	matt@corp.org	2

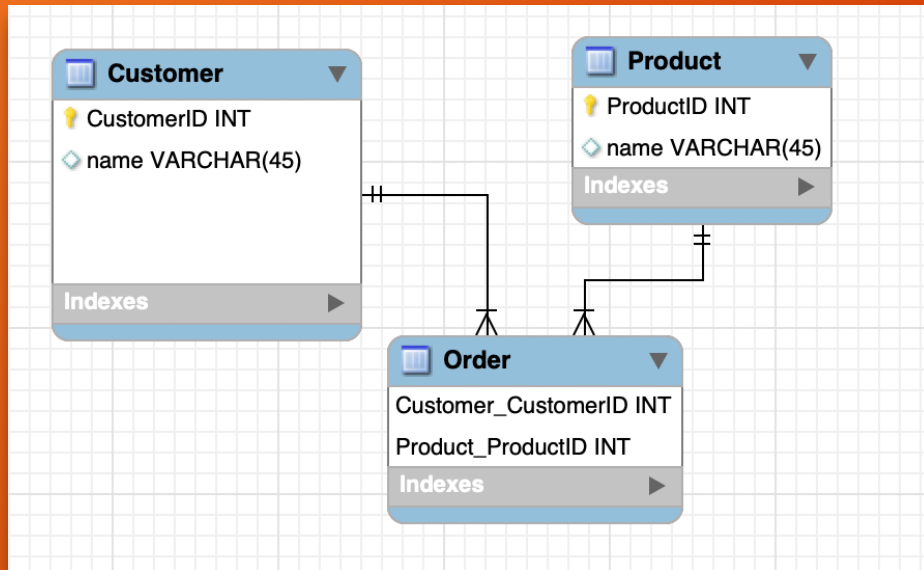| ID (Primary Key)	Dept Name
1	HR
2	Finance
3	Engineering

*one-to-many relationship type

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One - to - One

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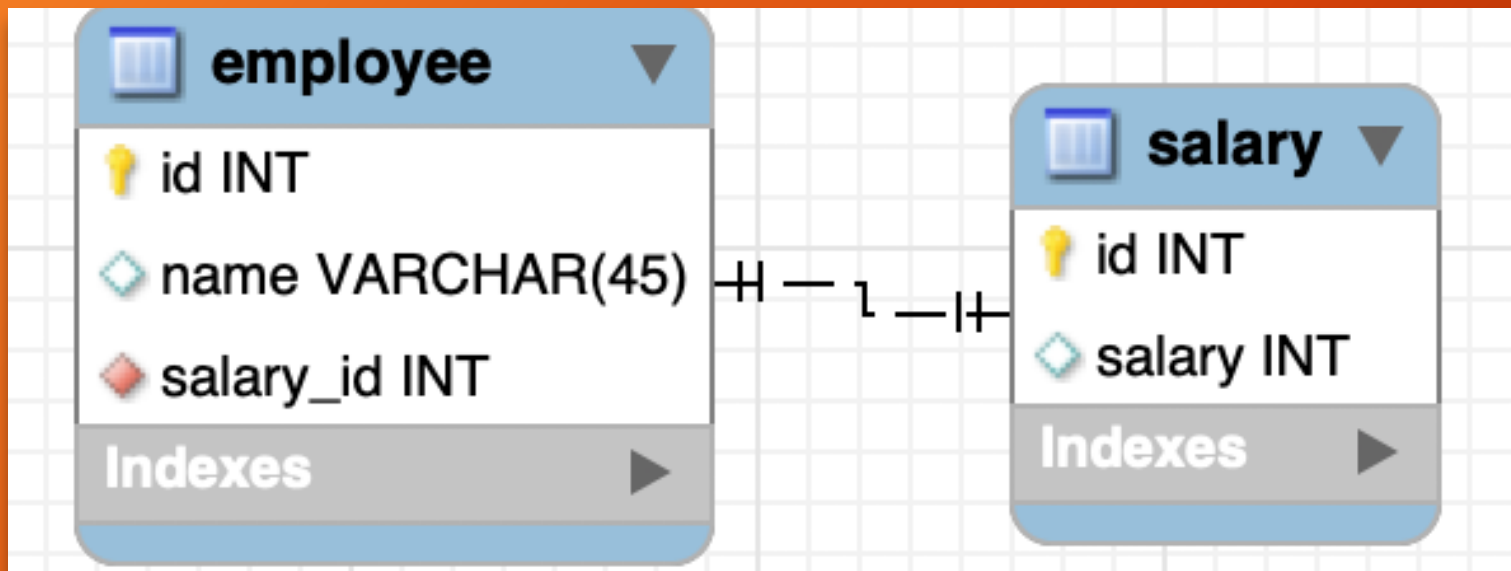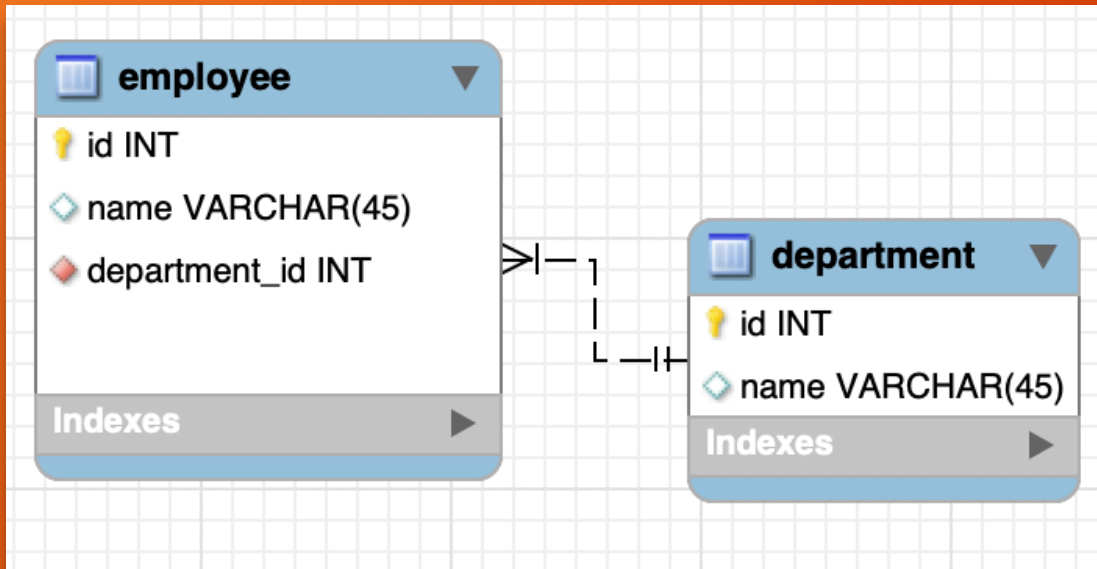
One - to - Many / Many - to - One

Many - to - Many

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RDBMS Providers

- Oracle
- MySQL
- MSSQL
- PostgreSQL
- SQLite
- Microsoft Access
- MariaDB
- Cloud SQL

- AWS RDS
- Azure SQL

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Services that you use everyday

- Netflix
- Spotify
- YouTube
- Booking.com
- Airbnb
- Facebook

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