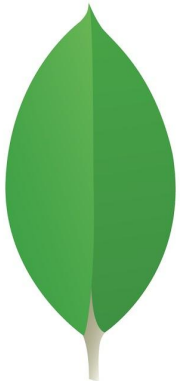
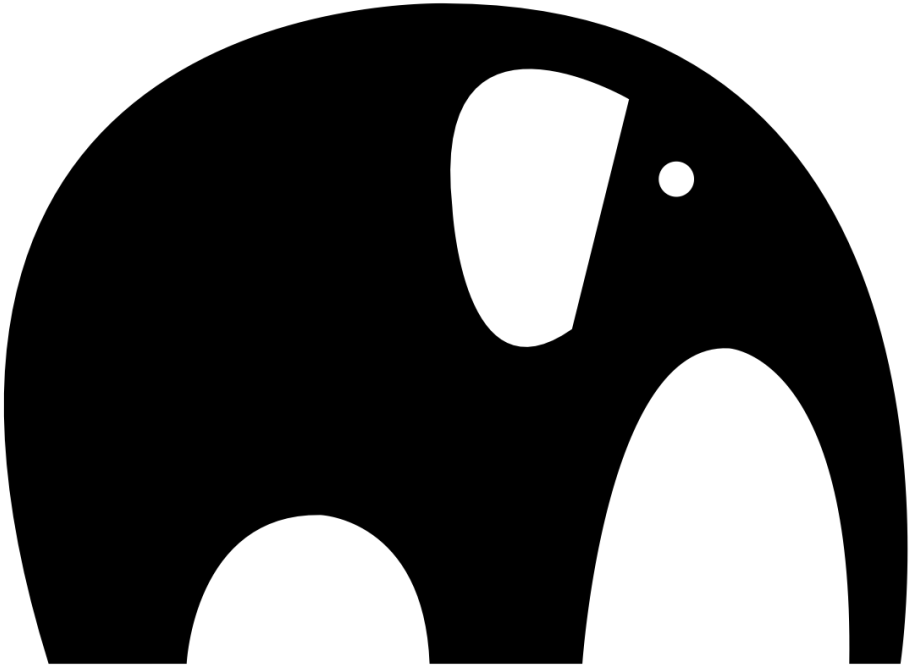
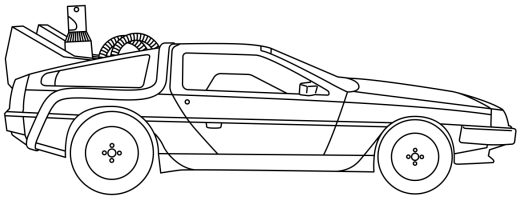
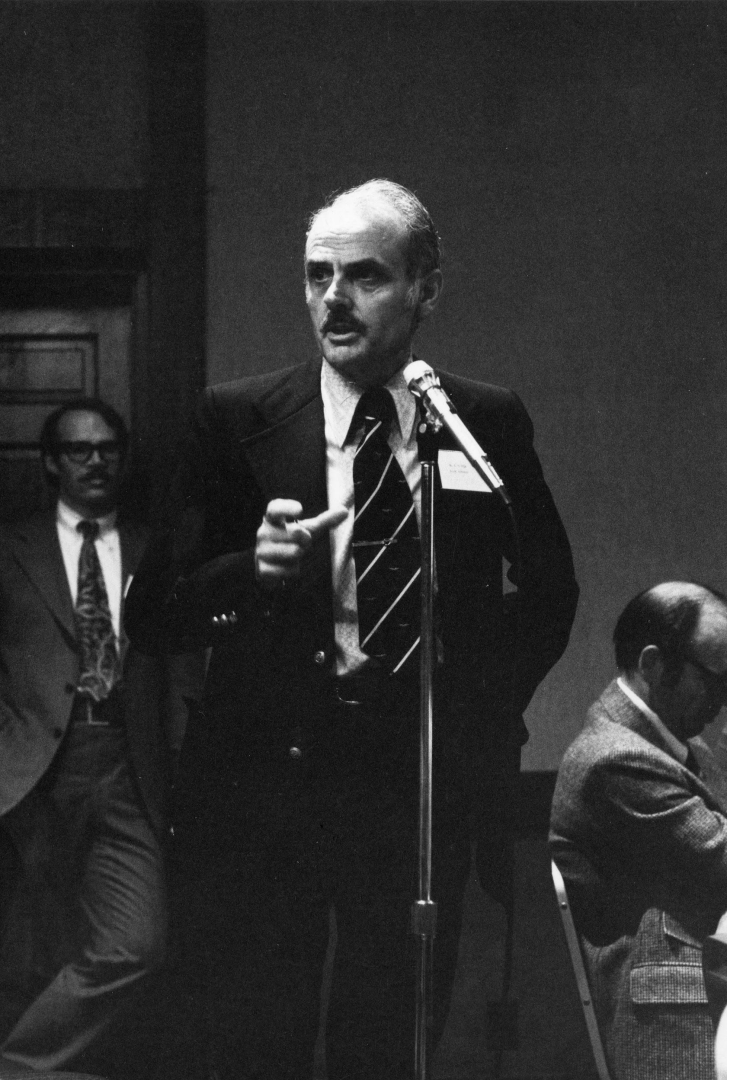
Postgres vs MongoDB
Comparing the Relational and Document model



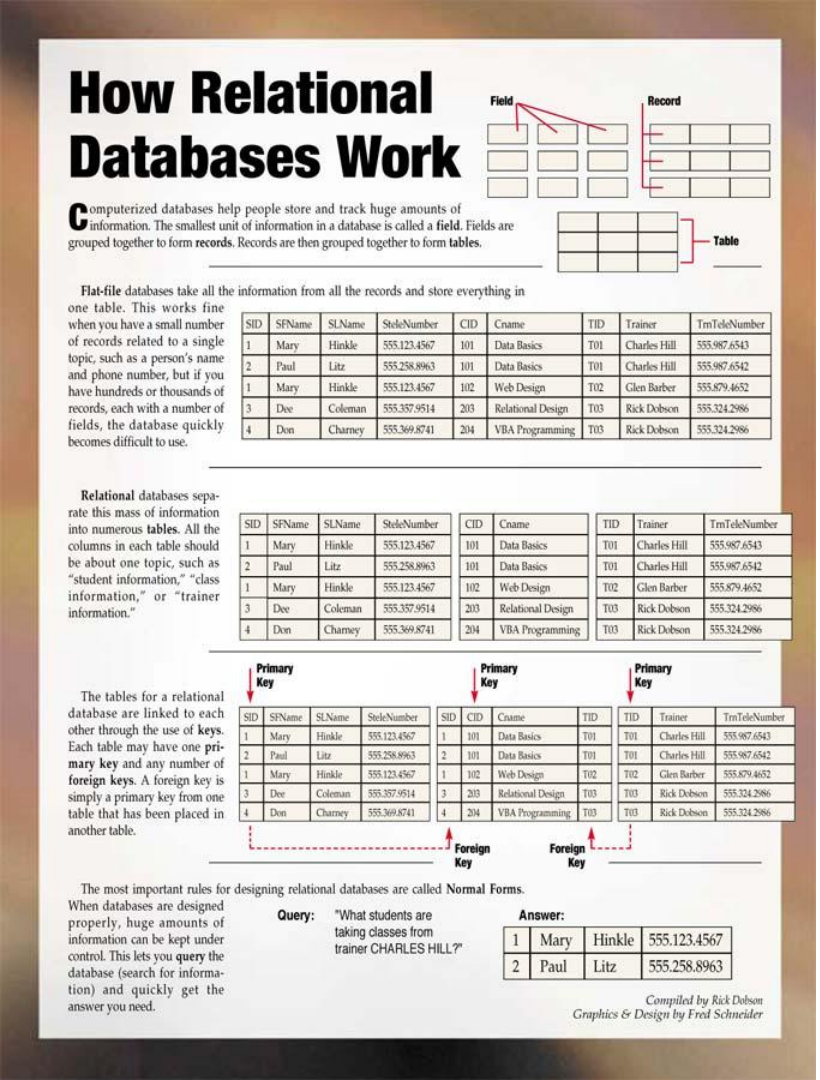


Grand Old S.Q.L.





A relational database is a database organized using the relational model of data.



How Relational Databases Work

Computerized databases help people store and track huge amounts of information. The smallest unit of information in a database is called a **field**. Fields are grouped together to form **records**. Records are then grouped together to form **tables**.

Flat-file databases take all the information from all the records and store everything in one table. This works fine when you have a small number of records related to a single topic, such as a person's name and phone number, but if you have hundreds or thousands of records, each with a number of fields, the database quickly becomes difficult to use.

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3	Dee	Coleman	555.357.9514	203	Relational Design	T03	Rick Dobson	555.324.2986
4	Don	Charney	555.369.8741	204	VBA Programming	T03	Rick Dobson	555.324.2986

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The tables for a relational database are linked to each other through the use of **keys**. Each table may have one **primary key** and any number of **foreign keys**. A foreign key is simply a primary key from one table that has been placed in another table.

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The most important rules for designing relational databases are called **Normal Forms**. When databases are designed properly, huge amounts of information can be kept under control. This lets you **query** the database (search for information) and quickly get the answer you need.

Query: "What students are taking classes from trainer CHARLES HILL?"

Answer:

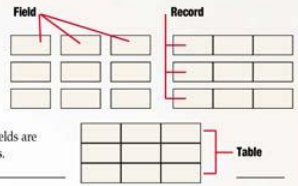
1	Mary	Hinkle	555.123.4567
2	Paul	Litz	555.258.8963

Compiled by Rick Dobson
Graphics & Design by Fred Schneider

The **relational model** organizes data into one or more tables of columns and rows.

Rows are also called records or tuples.

How Relational Databases Work



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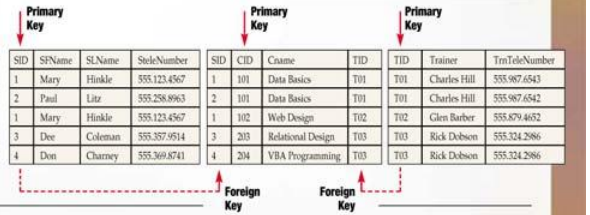

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Answer:

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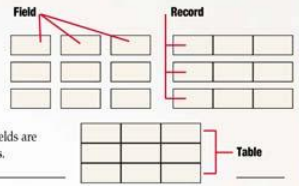
Compiled by Rick Dobson
Graphics & Design by Fred Schneider

Generally, **each table represents one "entity type"** (such as a person, product or concept).

How Relational Databases Work



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Primary Key

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Primary Key

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Primary Key

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Foreign Key

Foreign Key

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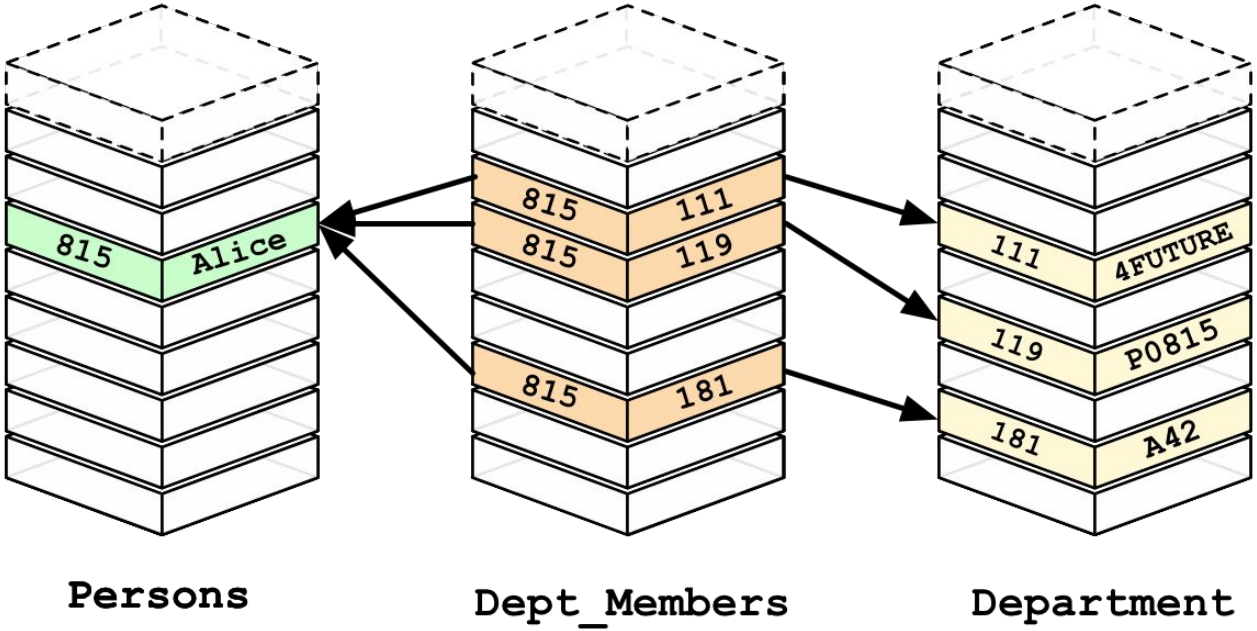
Query: "What students are taking classes from trainer CHARLES HILL?"

Answer:

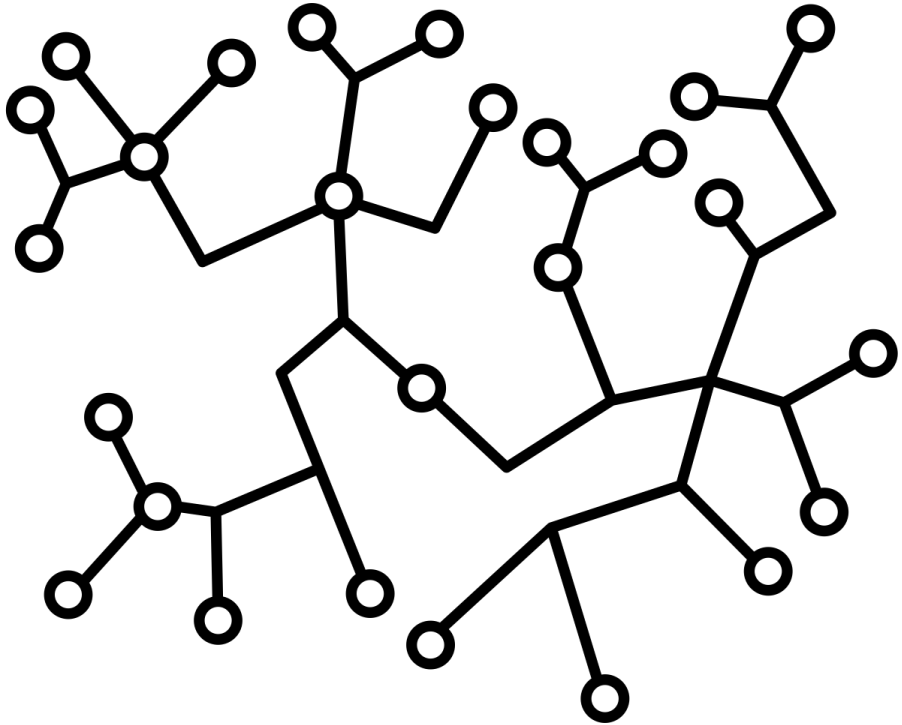
1	Mary	Hinkle	555.123.4567
2	Paul	Litz	555.258.8963

Compiled by Rick Dobson
Graphics & Design by Fred Schneider

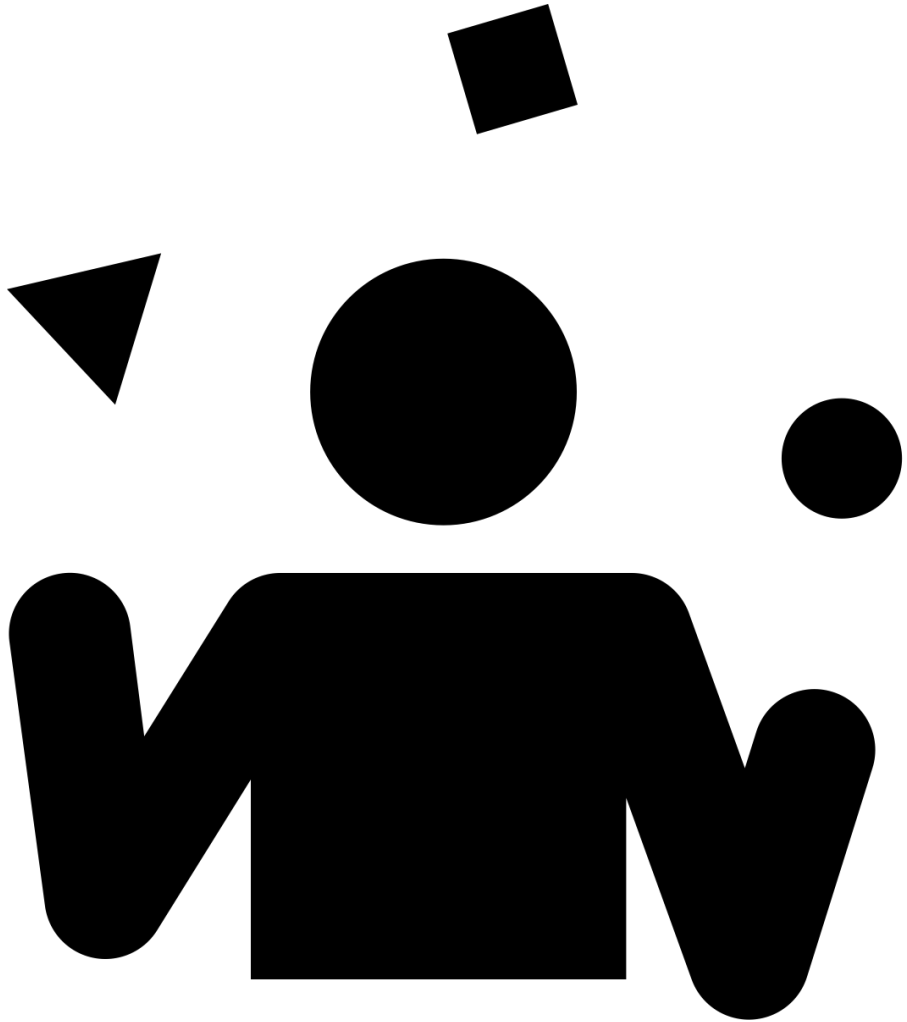
The rows represent instances of that type of entity and the **columns represent values attributed to that instance** (person's name, product S/N).



Through relationships we can define logical connections between different tables.



Data relationships of arbitrary complexity can be represented by a simple set of concepts.



S.Q.L. CRUD OPERATIONS

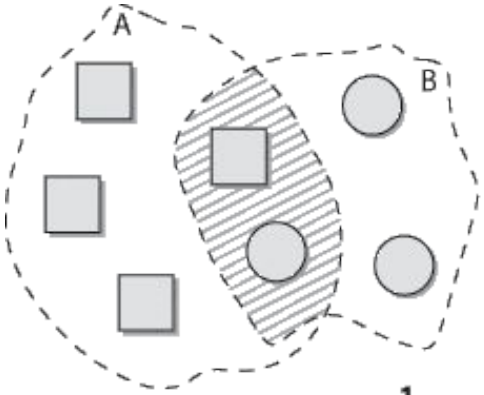
CREATE: `INSERT INTO TABLE_NAME VALUES (value1, value2);`

READ: `SELECT * FROM table;`

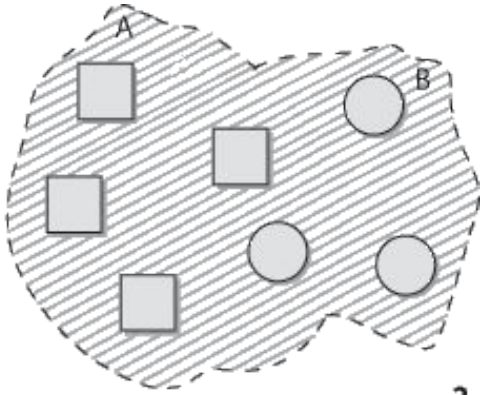
UPDATE: `UPDATE table_name SET column1 = value1, column2 = value2`

DELETE: `DELETE FROM table_name WHERE [condition];`

Relational algebra



1



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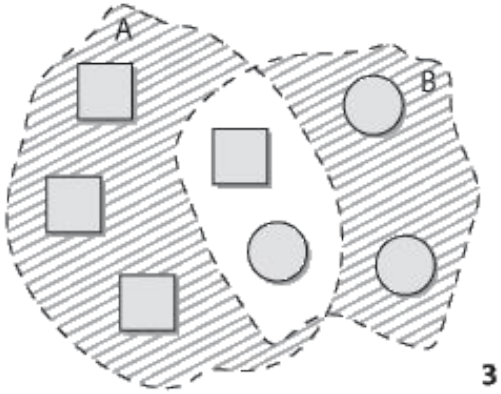

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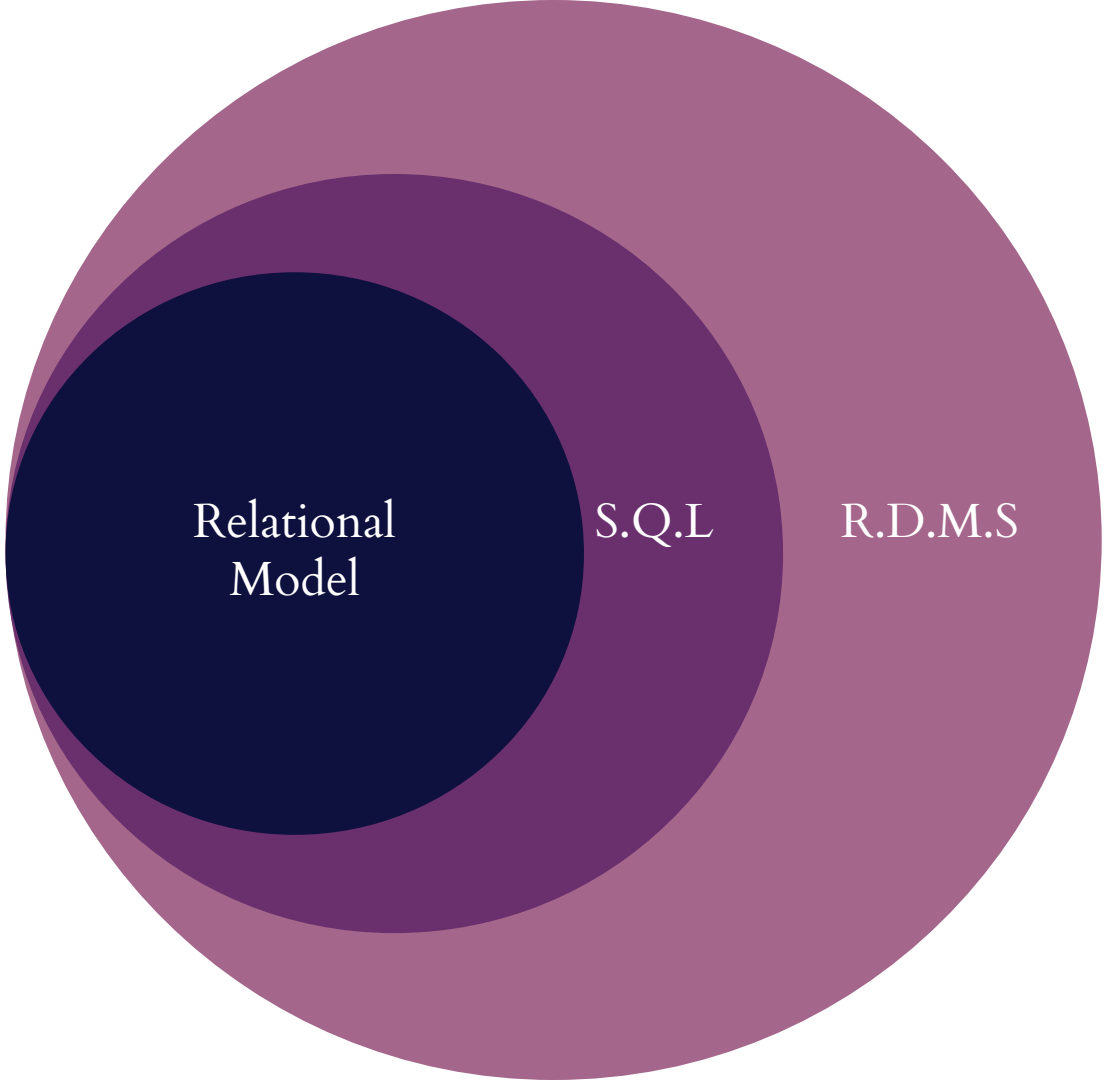
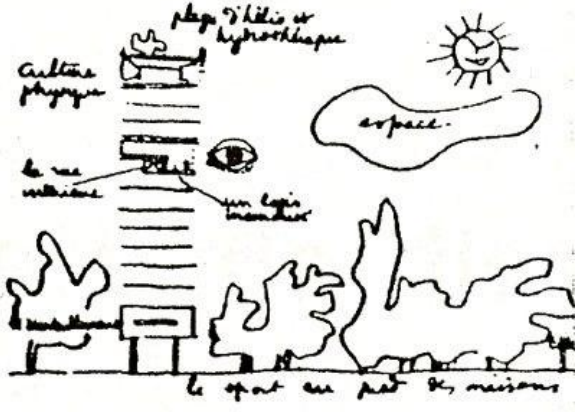
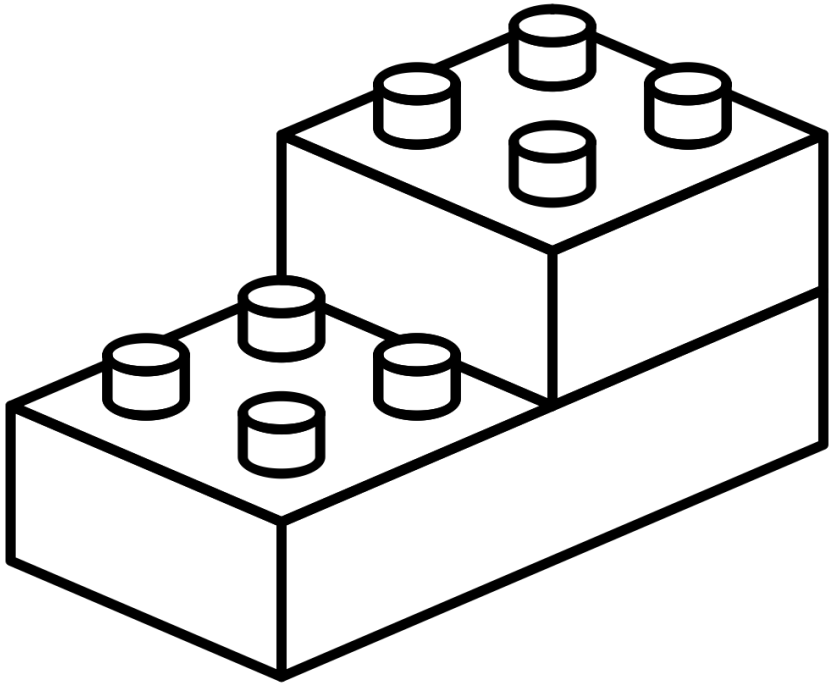

Relational
Model
S.Q.L
R.D.M.S

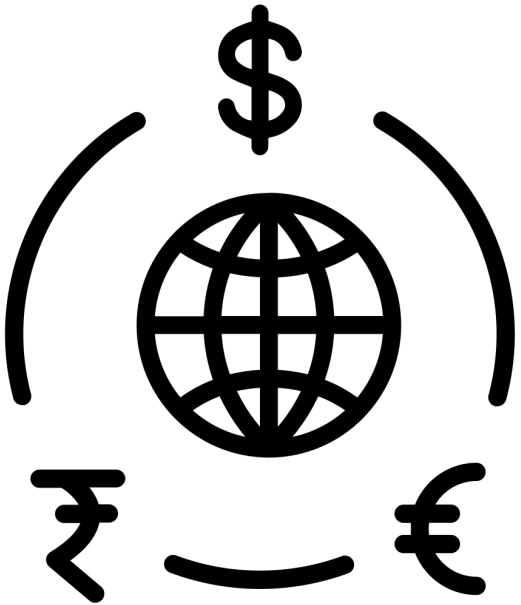
Codd's view of what qualifies as an RDBMS is summarized in 12 rules



1. The foundation rule
2. The guaranteed access rule
3. Systematic treatment of null values
4. Dynamic online catalog based on the relational model
5. The comprehensive data sublanguage rule
6. The view updating rule
7 High-level insert, update, and delete
8. Physical data independence
10. Integrity independence
11. Distribution independence
12. The nonsubversion rule

RACLE®





A transfer of funds from one bank account to another.

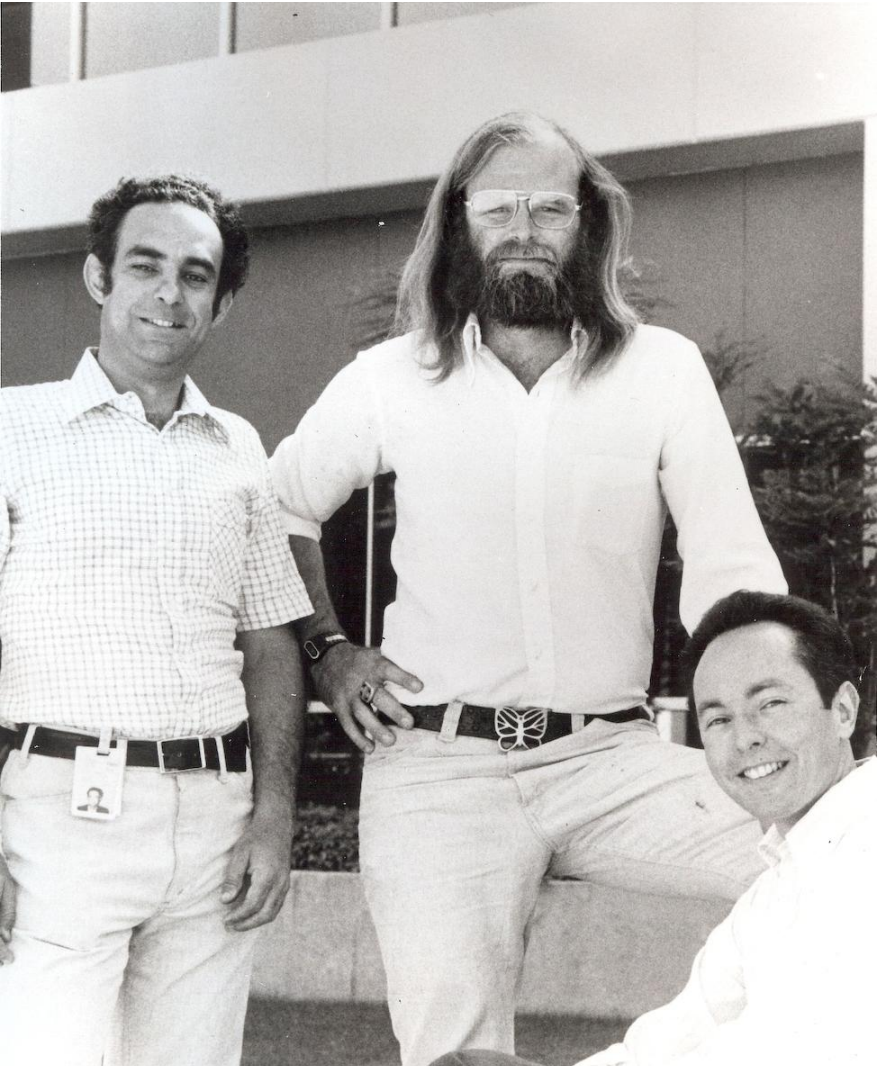
In the context of databases, a single logical operation on the data is called a transaction.

Atomicity

Requires that each transaction be "all or nothing".

Consistency

Any transaction will bring the database from one valid state to another.

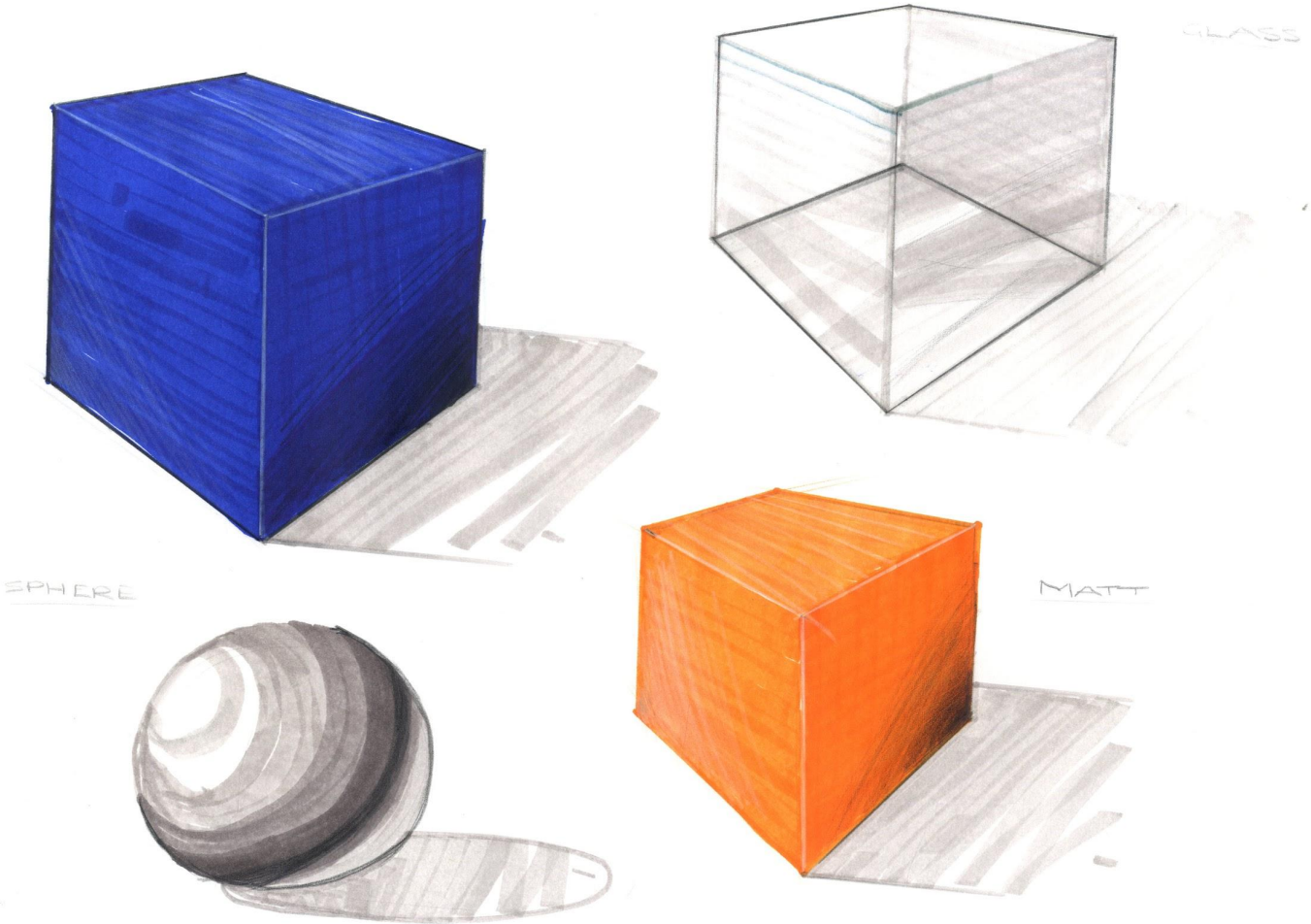


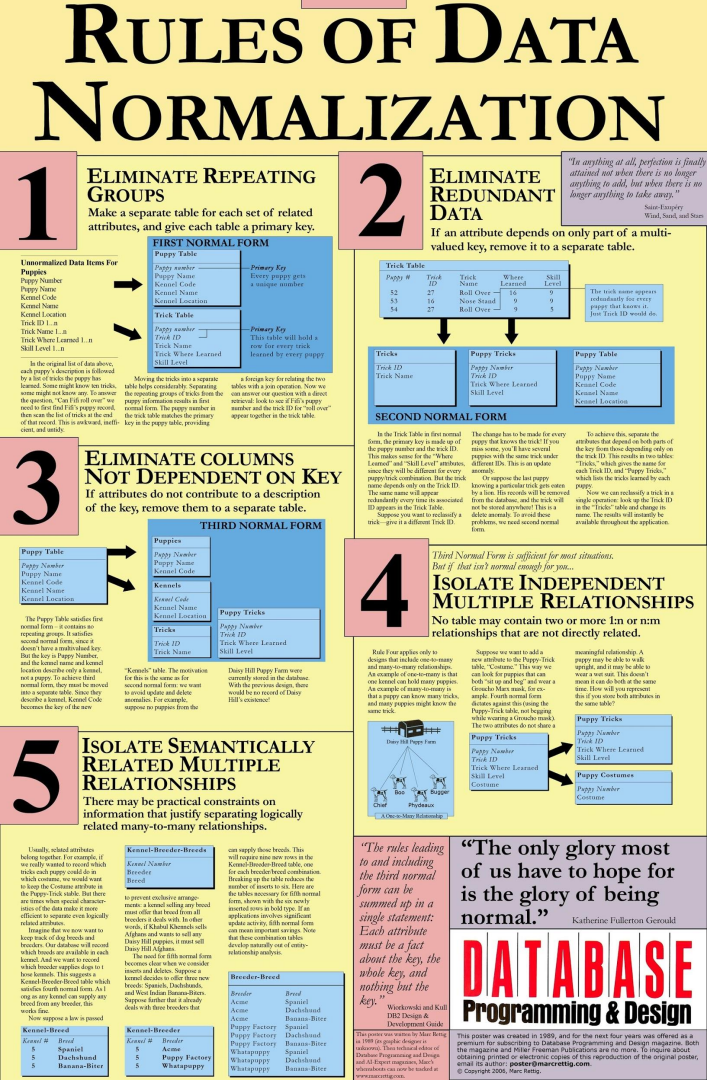
Isolation

Running transactions in parallel or sequentially will lead to the same system state.

Durability

Ensures that once a transaction has been committed, it will remain so.


GLASS
SPHERE
MATT



First normal form:

First normal form deals with the "shape" of a record.

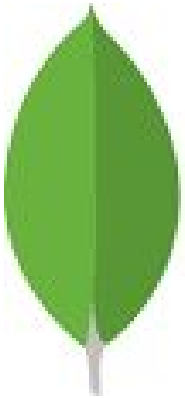
All occurrences of a record type must contain the same number of fields.

This is a matter of definition and not a design guideline.

Relational database theory does not support records having a variable number of fields

If only there were a way...
If only there were a way...
J.J. Seymour

nosql



mongoDB

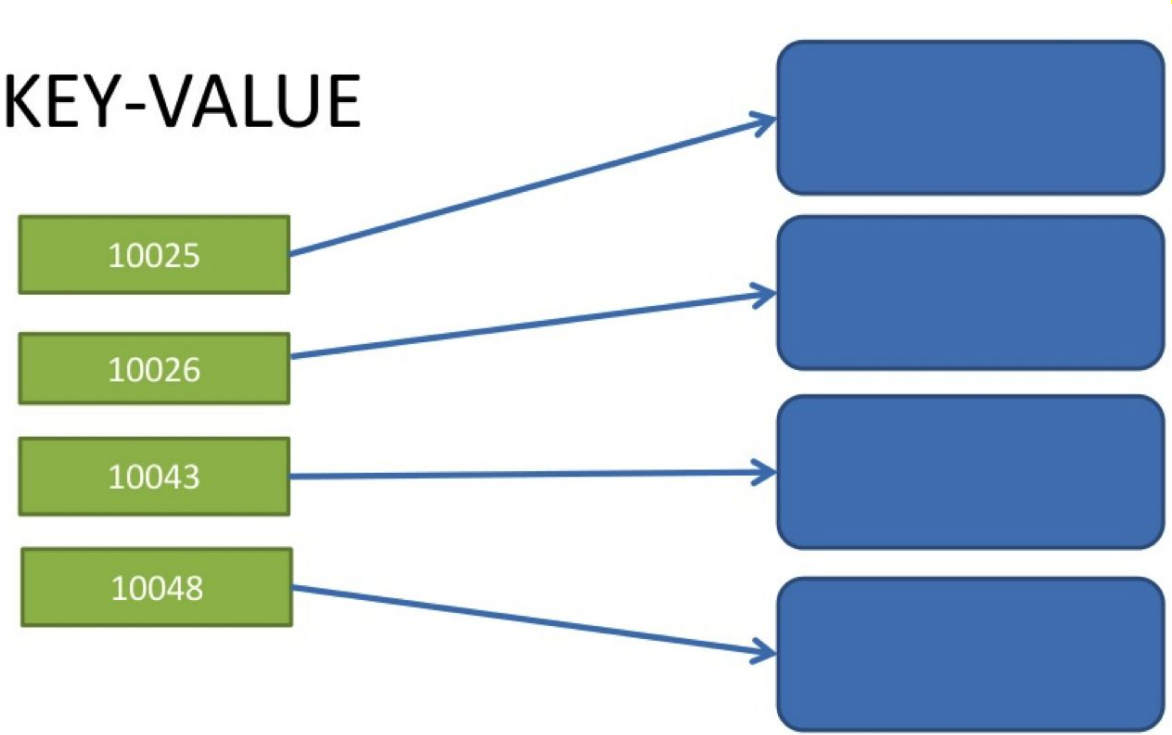
Started in 2007

Humongous

- Dwight Merriman
- Eliot Horowitz
- Kevin Ryan

The Basics

Documents store key-value pairs with no predefined schema



Example:

```
 //message
{
     from: “Rachel”,
     to: [“Jason”, “Tracy”],
     content: “You guys watch the new Sherlock episode??? ”,
     time: New.Date()
}
```

Or...

```
{
    from: “Rachel”,
    to: [“Jason”, “Tracy”],
    content: “MUST. DISCUSS.”,
    time: New.Date(),
    benedict_cumberbatch: true
}
```

Another example:

```
//book
{
    ISBN: 9781909621598,
    title: “Through the Looking-Glass”,
    author: “Lewis Carroll”,
    publisher: {
        name: Macmillan,
        location: United Kingdom
        }
}
```

Sharding

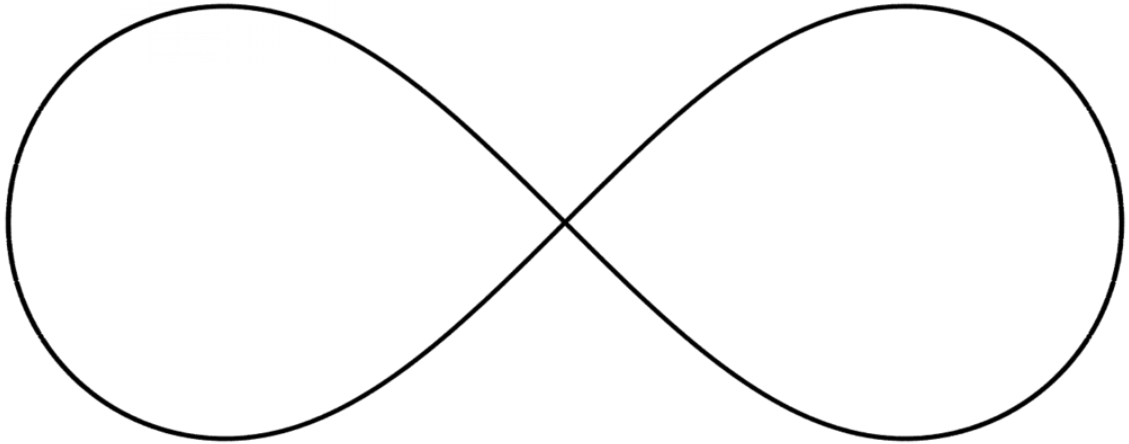
a method for distributing data across multiple servers

Scaling: Vertical vs Horizontal

Security

Built in scaling

Integrity



Schema flexibility

Feeling nostalgic but consistent

Feeling cool but random