How to work with tables

HIERARCHICAL AND RECURSIVE QUERIES IN SQL SERVER

SQL

Dominik Egarter
Data Engineering Enthusiast

General SQL statements

- Create a table
- Insert data into a table
- Update fields in a table
- Drop a table
- Delete the content of a table
- Change the structure of a table

Creating a table

General structure:

```
CREATE TABLE Person(
  ID INT NOT NULL,
    Name CHAR(32)
);
```

General data types (more information):

- INT representing numbers
- CHAR representing a string

[1] https://docs.microsoft.com/en-us/sql/t-sql/data-types/data-types-transact-sql?view=sql-server-2017

Insert and update a table

Inserting data:

```
INSERT INTO ___ VALUES (___, ___);
```

```
INSERT INTO Person VALUES ('1', 'Smith');
```

Updating data:

```
UPDATE ___
    SET ___ = ___
    WHERE ___ = ___;
```

```
UPDATE Person
    SET Name = 'Anderson'
    WHERE ID = 1;
```

Delete and drop a table

Delete the rows of a table:

```
DELETE FROM ___
    WHERE ___ = ___;
```

```
DELETE FROM Person
    WHERE ID = 1;
```

Drop a table:

```
DROP TABLE ___
```

```
DROP TABLE Person
```

Change a table structure

Add a column:

```
ALTER TABLE ___
    ADD ___ DATATYPE;
```

```
ALTER TABLE Person
    ADD new DATATYPE;
```

Delete a column:

```
ALTER TABLE ___
    DROP COLUMN ___
```

```
ALTER TABLE Person
    DROP COLUMN old
```

Let's practice!

HIERARCHICAL AND RECURSIVE QUERIES IN SQL SERVER

Working with relational data models

HIERARCHICAL AND RECURSIVE QUERIES IN SQL SERVER

SQL

Dominik Egarter
Data Engineering Enthusiast

Basics about relational data models

> The relational database model is the most widely used database model, which is the standard in database development.

A relational data model consists of:

- Tables
- Attributes
- Relations
- Relational algebra

Tables and attributes

Properties:

- Every table has a name (e.g., **Personal_Data**)
- Each column describes an attribute (e.g., **ID, Name, Birthday**)
- Each row consists of data

ID	Name	Birthday
1	Adam Smith	1.3.1978
2	Anna Jones	23.8.1991
3	Paul Williams	2.5.1954
4	Jessica Anderson	2.5.1954

Create relations

A relation is created by:

- **primary key**
- **foreign key**

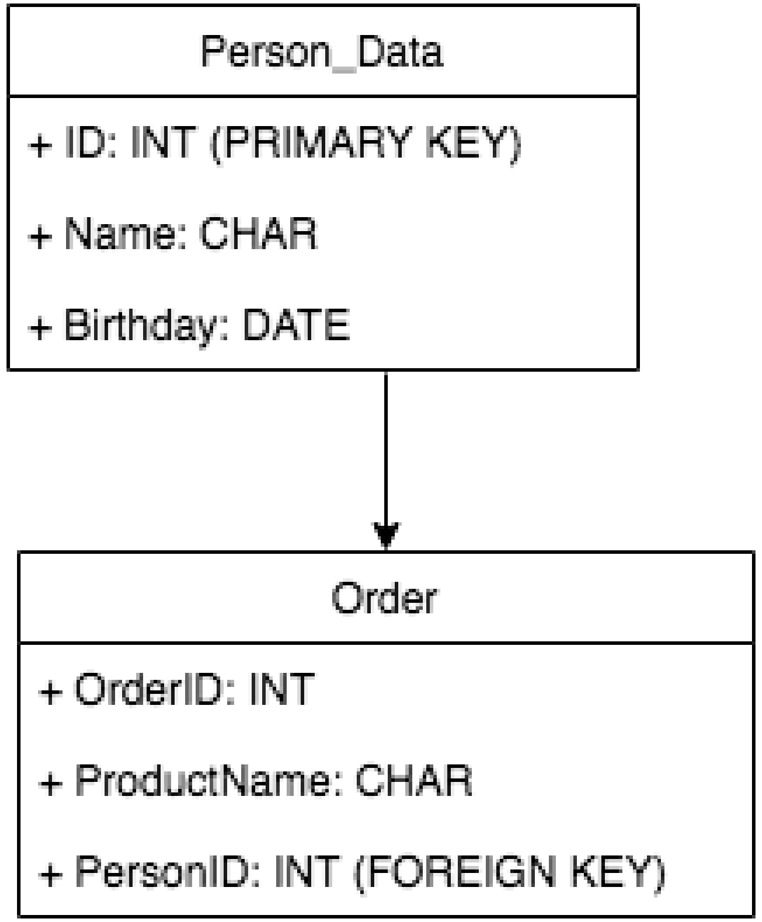
Properties of **primary keys:**

- unique
- each row has a primary key

Properties of **foreign keys:**

- primary key of another table

Example: Order history



Person_Data

+ ID: INT (PRIMARY KEY)

+ Name: CHAR

+ Birthday: DATE

Order

+ OrderID: INT

+ ProductName: CHAR

+ PersonID: INT (FOREIGN KEY)

Define primary and foreign keys

Primary key:

```
fieldName fieldType NOT NULL PRIMARY KEY,
```

e.g., for table `Person_Data` : `ID INT NOT NULL PRIMARY KEY`

Foreign key:

```
fieldName fieldType FOREIGN KEY REFERENCES tableName(primaryKey)
```

e.g., `newID INT FOREIGN KEY REFERENCES Person_Data(ID)`

Relational algebra

> Relational algebra is a formal language for relational databases and makes it possible to form a new relation from two or more relations.

Examples:

- SELECT
- UNION
- DIFFERENCE
- JOIN

Let's practice!

Working with hierarchical data models

HIERARCHICAL AND RECURSIVE QUERIES IN SQL SERVER

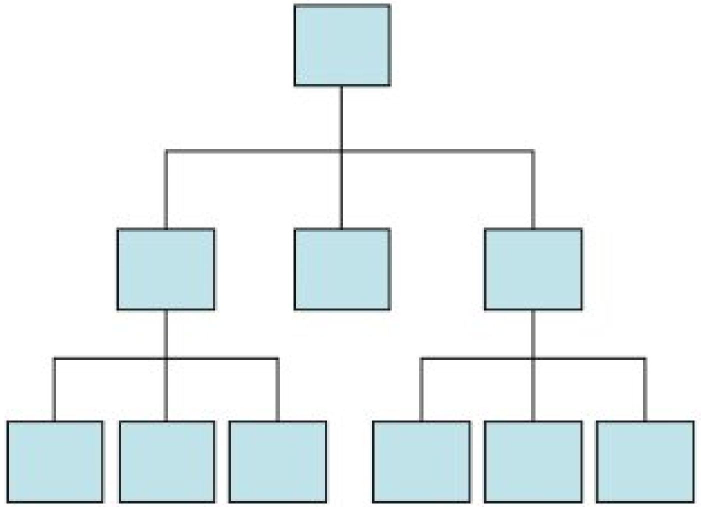
SQL

Dominik Egarter
Data Engineering Enthusiast

The hierarchical data model

Properties of hierarchical data models:

- Represented as a tree structure
- Has one root element
- Each child record has one parent record



Advantages:

- Simple to understand
- Fast to select

Disadvantages:

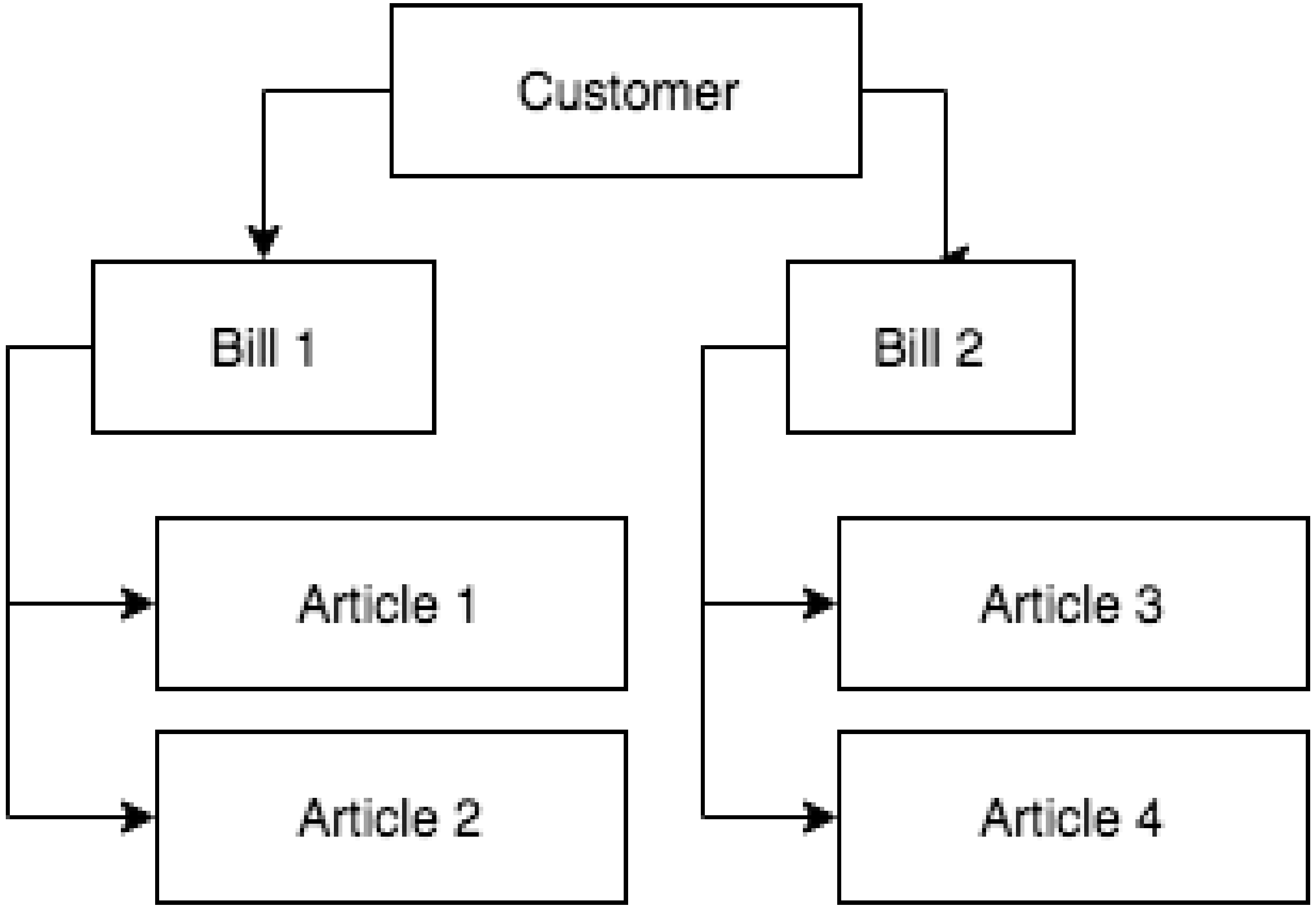
- Rigidly constructed
- Complicated to change structure

Example of hierarchical data model

Customer-bill-article relation:

> One customer can have several bills and each bill can have several articles

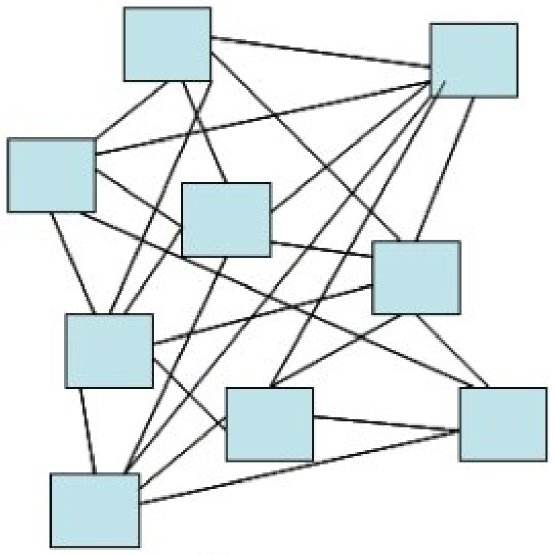
```
CREATE TABLE Customer (
    ID INT NOT NULL);
CREATE TABLE Bill (
    BillID INT NOT NULL,
      CustomerID INT);
CREATE TABLE Article (
    ArticleID INT NOT NULL,
      BillID INT);
```



The networked data model

Properties of networked data models:

- Similar to hierarchical data models
- many-to-many relation
- Many search paths exists



Advantages:

- No strict hierarchy
- Many solution paths
- Many real-world examples

Disadvantage:

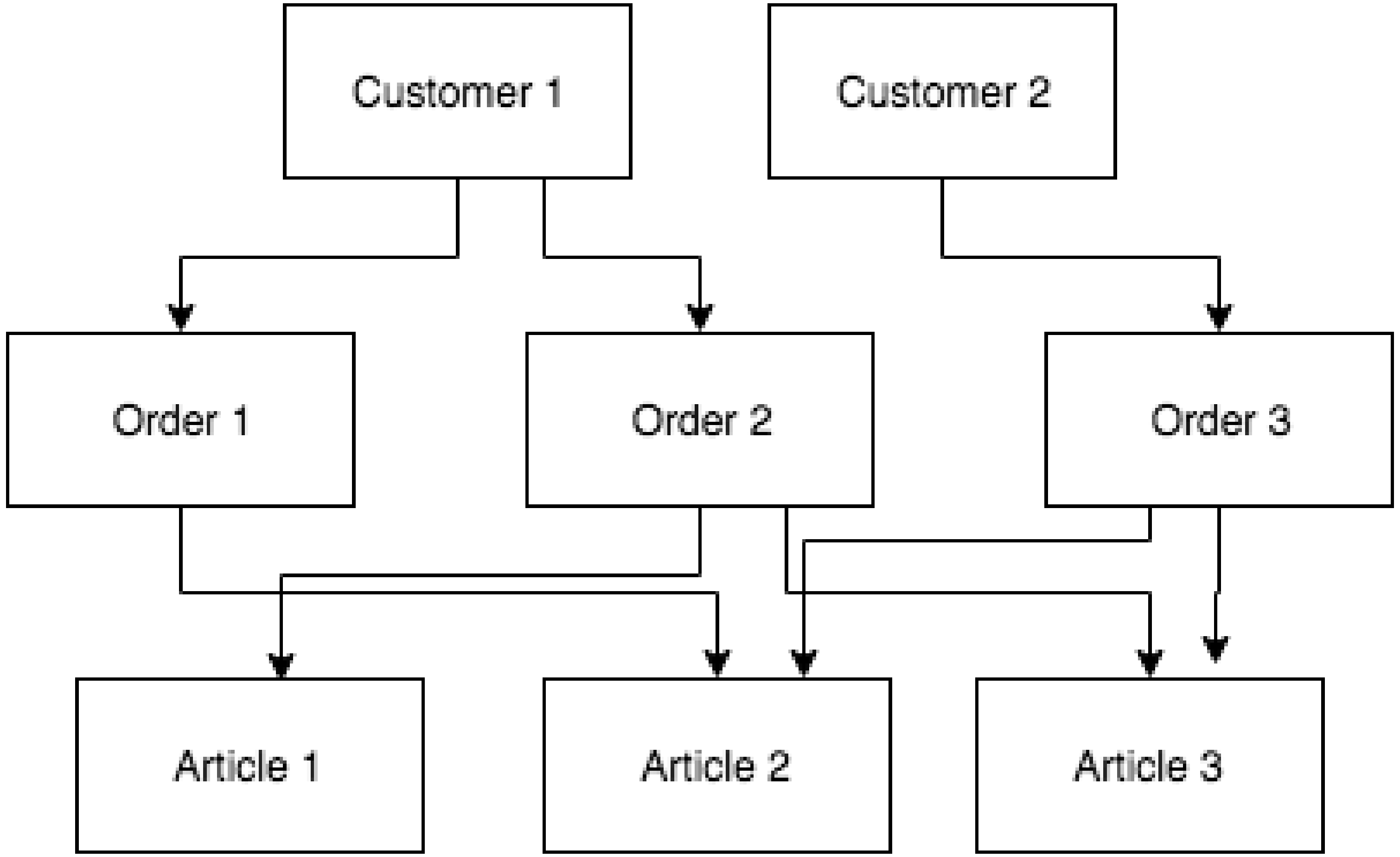
- Clarity decreases for large data models

Example of networked data models

Customer-order-article relation:

> Many customers can have several orders and each order can have several articles.

```
CREATE TABLE Customer (
    ID INT NOT NULL);
CREATE TABLE Order (
    OrderID INT NOT NULL,
      CustomerID INT);
CREATE TABLE Article (
    ArticleID INT NOT NULL,
      OrderID INT);
```



Let's practice!

HIERARCHICAL AND RECURSIVE QUERIES IN SQL SERVER