

# Relational Database

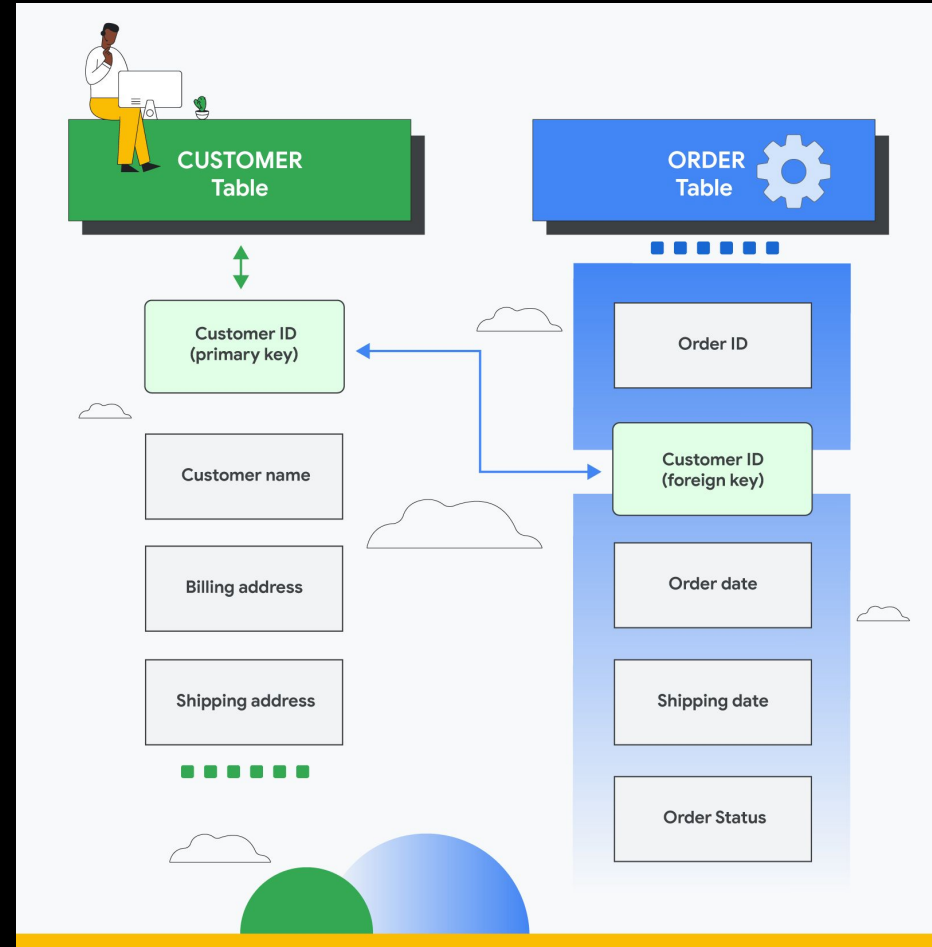
# What is Relational Database?

- **Tables:** columns and rows
- **Links:** primary keys and foreign keys

# The relational database model

- **Attributes (columns):** data type
- **Record (rows):** values
- **Primary Key:** unique identifier
- **Foreign Key:** a reference to a primary key of another table

**Primary key does not allow Null Value and is unique; Foreign key the opposite**



# Non-Relational Database

- **Individual**, independent, and **unconnected**
- **Unstructured** data types
- Examples: **documents** or **rich media files**

# **Benefits of Relational Database**

- **Flexibility**
- **Easy of use**
- **ACID Compliance**
- **Collaboration**
- **Database Normalization**

# ACID

- **Atomicity:** all or nothing
- **Consistency:** if a transaction violates the databases consistency rules, then the entire transaction will fail and will be **rolled back**
  - **roll back:** undo current transaction and return to the last commit
- **Isolation:** all transactions are isolated and don't interfere
- **Durability:** the changes are written to the database once a transaction is complete

# Collaboration

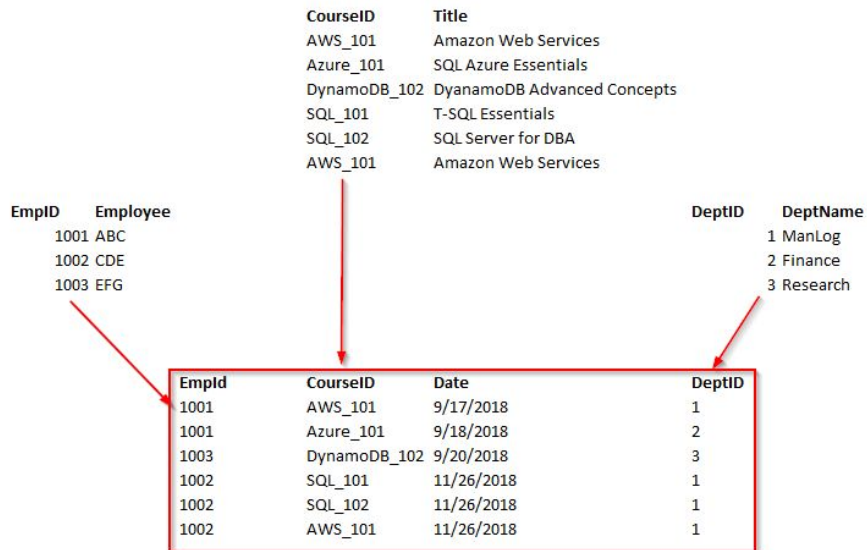
Time	User 1 Actions	User 2 Actions	User 3 Actions
1	Starts Transaction		
2		Starts Transaction	
3			Starts Transaction
4	Updates row 2 in table A		
5		Attempts to update row 2 in table A	
		<i>U2 Is Blocked by U1</i>	
6			Attempts to delete row 2 in table A
			<i>U3 Is Blocked by U1</i>
7	Commits transaction		
		<i>Update completes</i>	<i>U3 Is Blocked by U2</i>
8		Rolls back transaction	
			<i>Delete completes</i>
9			Commits transaction

```
MySQL 8.0 Command Line Client
mysql> LOCK TABLE info_table READ;
Query OK, 0 rows affected (0.00 sec)

mysql> INSERT INTO info_table (name, message)
-> VALUES ('Suzi', 'Hi');
ERROR 1099 (HY000): Table 'info_table' was locked with a READ lock and
can't be updated
```

# Data Normalization

- Structuring database in “**normal forms**”
- Reduce **data redundancy**
- Improve **data integrity**





## Example

