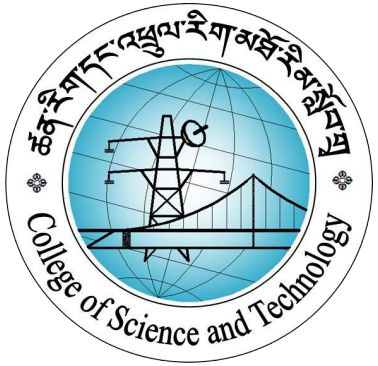


Royal University of Bhutan

DBS101 Database Systems Fundamentals

Lesson 4

Learning Outcomes

1. Explain ACID properties of databases
2. Understand SQL as a standard language for RDBMS.
3. Understand the basic structure of SQL .
4. Write SQL queries to perform basic operations.
5. Write SQL queries to perform set operations.

Transaction

A transaction is a single logical unit of work that accesses and possibly modifies the contents of a database.

ACID Properties

Atomicity

The term atomicity defines that the data remains atomic.

Consistency

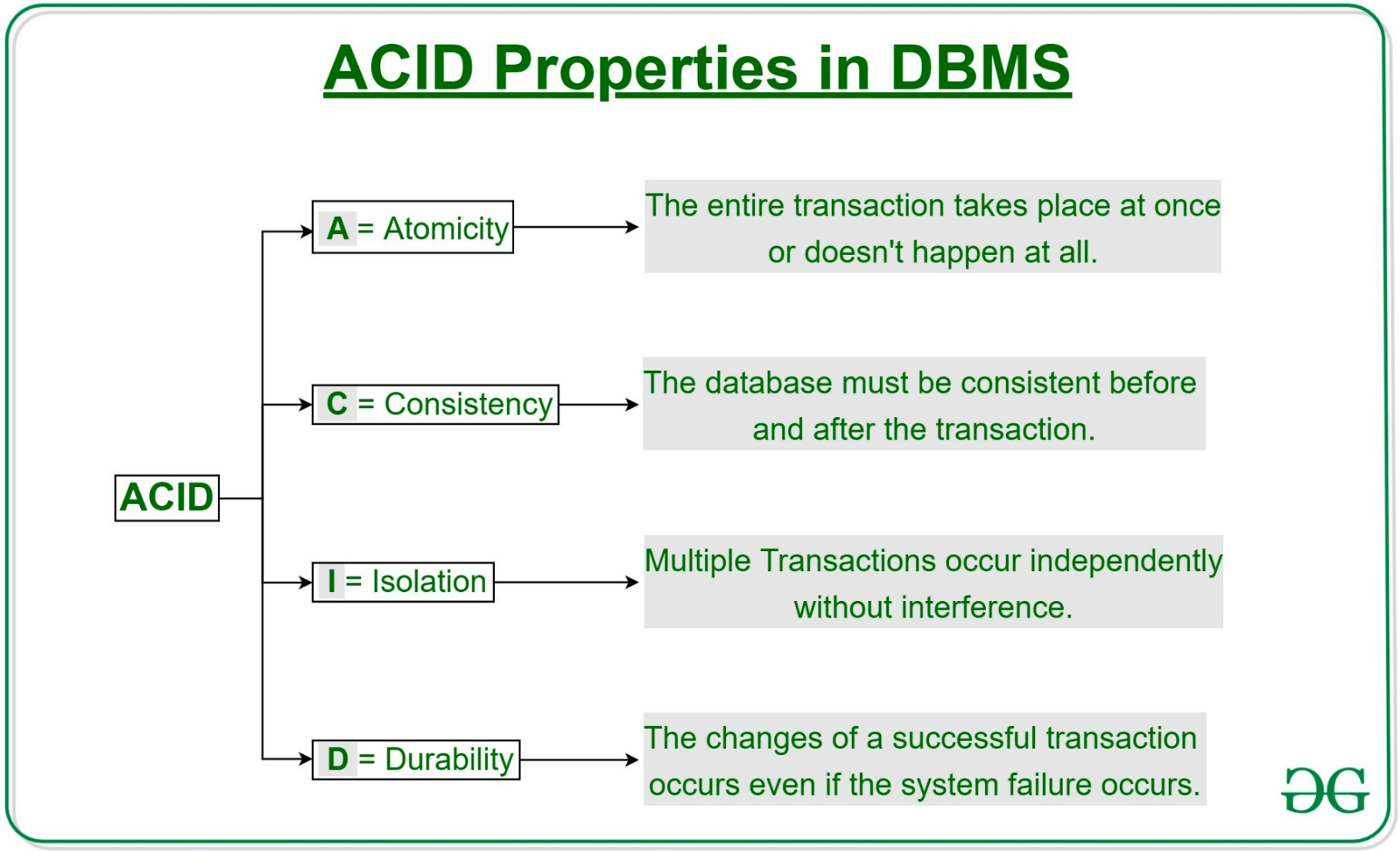
The word consistency means that the value should remain preserved always.

Isolation

The term 'isolation' means separation.

Durability

Durability ensures the permanency of something.


ACID Properties in DBMS
ACID
A = Atomicity
The entire transaction takes place at once or doesn't happen at all.
C = Consistency
The database must be consistent before and after the transaction.
I = Isolation
Multiple Transactions occur independently without interference.
D = Durability
The changes of a successful transaction occurs even if the system failure occurs.

History of SQL

- Originally called Sequel
- Was developed by IBM as a part of System R project in 1970's.

Can anyone tell me what was the System R project?

Parts of SQL

1. DDL
2. DML
3. Integrity
4. View Definition
5. Transaction Control
6. Embedded SQL and dynamic SQL
7. Authorization

SQL Data Definition

1. The schema for each relation.
2. The types of values associated with each attribute.
3. The integrity constraints.
4. The set of indices to be maintained for each relation.
5. The security and authorization information for each relation.
6. The physical storage structure of each relation on disk.

Basic Types: Link

CHAR(10): 'Hello'

- Fixed length 10 character string

VARCHAR(20): 'Hello world'

- Variable length string up to 20 characters

INT: 25

- Integer numeric value

SMALLINT: 10

- Small integer value

NUMERIC(4,2): 10.50

- Fixed point number with 4 digits total, 2 after the decimal point

REAL: 25.35

- Floating point number

DOUBLE PRECISION: 3.1415927

- Very high precision floating point number

FLOAT(5): 25.353

- Floating point number with at least 5 digits precision

Basic Schema Definition

```
create table department(dept name varchar (20),
building varchar (15), budget numeric (12,2), primary
key (dept name));

create table course (course id varchar (7), title
varchar (50), dept name varchar (20), credits numeric
(2,0), primary key (course id), foreign key (dept
name) references department);
```

Basic Structure of SQL Queries

1. Queries on a Single Relation

```
select name
from instructor;
```

2. Queries on Multiple Relations

```
select name, instructor.dept name, building
from instructor, department
where instructor.dept name= department.dept name;
```

Now the Guided Exercises

Practice Your SQL: SQL 50

Practical Report Format on VLE
Deadline: NEXT WEEK AFTER 7 DAYS

10% Mark deduction per day for late submission.

References

ACID Properties in DBMS - javatpoint. (n.d.). www.javatpoint.com. https://www.javatpoint.com/acid-properties-in-dbms

GfG. (2023a, April 21). *ACID properties in DBMS*. GeeksforGeeks. https://www.geeksforgeeks.org/acid-properties-in-dbms/

TechnonTechTV. (2022, October 9). *ER Diagram for Airline Reservation System | Online Airline Reservation System #erdiagram* [Video]. YouTube. https://www.youtube.com/watch?v=FcC8zhtOaSg