ENIGMACAMP
IT BOOTCAMP

TO STORE A DATA EFFICIENTLY

DATABASE

DATABASE PROVIDER

SQL Based

ORACLE DATABASE

MySQL

PostgreSQL

Many more.....

mongoDB.

cassandra

WHERE DO THEY STORE THE DATA?

Still in here!!! As a file

```
➜ platform ll
total 3056
-rw-rw----  1 anggaraditya  admin    13K Feb  4  2019 DATABASECHANGELOG.frm
-rw-rw----  1 anggaraditya  admin   8.5K Feb  4  2019 DATABASECHANGELOGLOCK.frm
-rw-rw----  1 anggaraditya  admin    96K Jun 17 18:11 databasechangelog.ibd
-rw-rw----  1 anggaraditya  admin    96K Jun 17 18:11 databasechangeloglock.ibd
-rw-rw----  1 anggaraditya  admin    61B Feb  4  2019 db.opt
-rw-rw----  1 anggaraditya  admin   8.6K Feb  4  2019 sys_jwt_role.frm
-rw-rw----  1 anggaraditya  admin    96K Feb  4  2019 sys_jwt_role.ibd
-rw-rw----  1 anggaraditya  admin   8.6K Feb  4  2019 sys_jwt_role_menu.frm
-rw-rw----  1 anggaraditya  admin    96K Feb  4  2019 sys_jwt_role_menu.ibd
-rw-rw----  1 anggaraditya  admin    13K Feb  4  2019 sys_menu.frm
-rw-rw----  1 anggaraditya  admin    96K Apr  9 20:26 sys_menu.ibd
-rw-rw----  1 anggaraditya  admin   8.6K Feb  4  2019 sys_menu_service.frm
-rw-rw----  1 anggaraditya  admin    96K Mar 11  2019 sys_menu_service.ibd
-rw-rw----  1 anggaraditya  admin   8.4K Feb  4  2019 sys_response_mapping.frm
-rw-rw----  1 anggaraditya  admin    96K Feb  4  2019 sys_response_mapping.ibd
-rw-rw----  1 anggaraditya  admin   8.7K Jun 17 18:11 sys_role.frm
-rw-rw----  1 anggaraditya  admin    96K Jul  1 13:54 sys_role.ibd
-rw-rw----  1 anggaraditya  admin   8.8K Mar  6  2019 sys_role_menu.frm
-rw-rw----  1 anggaraditya  admin    96K Apr 10 16:05 sys_role_menu.ibd
-rw-rw----  1 anggaraditya  admin   8.6K Feb  4  2019 sys_role_service.frm
-rw-rw----  1 anggaraditya  admin    96K Mar  8  2019 sys_role_service.ibd
-rw-rw----  1 anggaraditya  admin   8.6K Feb  4  2019 sys_running_number.frm
-rw-rw----  1 anggaraditya  admin    96K Feb  4  2019 sys_running_number.ibd
-rw-rw----  1 anggaraditya  admin   8.4K Feb  4  2019 sys_service.frm
-rw-rw----  1 anggaraditya  admin    96K Mar  8  2019 sys_service.ibd
-rw-rw----  1 anggaraditya  admin    13K Jun 17 18:11 sys_user.frm
-rw-rw----  1 anggaraditya  admin    96K Jul 25 16:48 sys_user.ibd
-rw-rw----  1 anggaraditya  admin   8.6K Feb  4  2019 sys_user_role.frm
-rw-rw----  1 anggaraditya  admin    96K Jul  1 13:55 sys_user_role.ibd
➜ platform
```

TABLE & FIELDS & RECORDS

Fields

Records

user_name	name	pass_word
jonok	Jono Karjono	c558452fd1292ffc0505cbd69128c33a41dc4c0d75b8061db187e769ea1d2773
masting	testing name	af004748d882780c75395c59a5a15332d5e9cc21d5279e50e8027d5182eb7992
sangkuriang	Sang Kuriang	c558452fd1292ffc0505cbd69128c33a41dc4c0d75b8061db187e769ea1d2773
sangpenakluk	Sang Penakluk	8152441b3ea2ca142c517201f534bb08c46e7bf462d23d082a8c052eb59f7ae6
sangpencerah	Angga	8152441b3ea2ca142c517201f534bb08c46e7bf462d23d082a8c052eb59f7ae6
sangpencetan	Sang Pencetan	8152441b3ea2ca142c517201f534bb08c46e7bf462d23d082a8c052eb59f7ae6
sangpencipta	Sang Pencipta	8152441b3ea2ca142c517201f534bb08c46e7bf462d23d082a8c052eb59f7ae6
sangpisang	Angga	8152441b3ea2ca142c517201f534bb08c46e7bf462d23d082a8c052eb59f7ae6
testing	testing name	9c2a9597c2946e4457116d6e39c06e5eeebe444e6d221081a34068b4e7d5c603

Table

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SQL : STRUCTURE QUERY LANGUAGE

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LEARN BY DOING!! THIS PRESENTATION WON'T FIT THE WHOLE SQL

Angga Raditya

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NORMALIZATIONS

THE PROBLEMS

Student in a Enigma University

name character varying (100)	birth_place character varying (30)	birth_date date	gender character varying (1)	subject character varying (50)	major character varying (50)
Tony Blank	Jakarta	1945-08-17	M	Database System, Algorithm, Data Structure	Information Technology
Elon Musk	Jakarta	1971-06-28	M	Algorithm, Data Structure	Information Technology
Nicola Tesla	Bandung	1856-07-10	M	Electro Magnetics Field, Electro Dynamics	Electrical Engineering
Alan Turing	Surabaya	1912-06-23	M	Philosophy, Commercial Law	Information Technology

Try Query Student who learn “Algorithm”

WHY NORMALIZED?

name character varying (100)	birth_place character varying (30)	birth_date date	gender character varying (1)	subject character varying (50)	major character varying (50)
Tony Blank	Jakarta	1945-08-17	M	Database System	Information Technology
Elon Musk	Jakarta	1971-06-28	M	Algorithm	Information Technology
Nicola Tesla	Bandung	1856-07-10	M	Electro Magnetics Field	Electrical Engineering
Alan Turing	Surabaya	1912-06-23	M	Database System	Information Technology
Bill Gates	Seattle	1955-10-28	M	Algorithm	Information Technology
Tony Blank	Jakarta	1945-08-17	M	Algorithm	Information Technology

Imagine there is 2000 student in that place, and the subject is 30 each major, there is 5 Major

2000*30*5=300000 records

There will be Hundreds Thousand word “Algorithm”, “Information Technology”, etc...

WHY NORMALIZED?

- An ASCII character in 8-bit ASCII encoding is 8 bits (1 byte), though it can fit in 7 bits.
- An ISO-8895-1 character in ISO-8859-1 encoding is 8 bits (1 byte).
- A Unicode character in UTF-8 encoding is between 8 bits (1 byte) and 32 bits (4 bytes).
- A Unicode character in UTF-16 encoding is between 16 (2 bytes) and 32 bits (4 bytes), though most of the common characters take 16 bits. This is the encoding used by Windows internally.
- A Unicode character in UTF-32 encoding is always 32 bits (4 bytes).
- An ASCII character in UTF-8 is 8 bits (1 ...

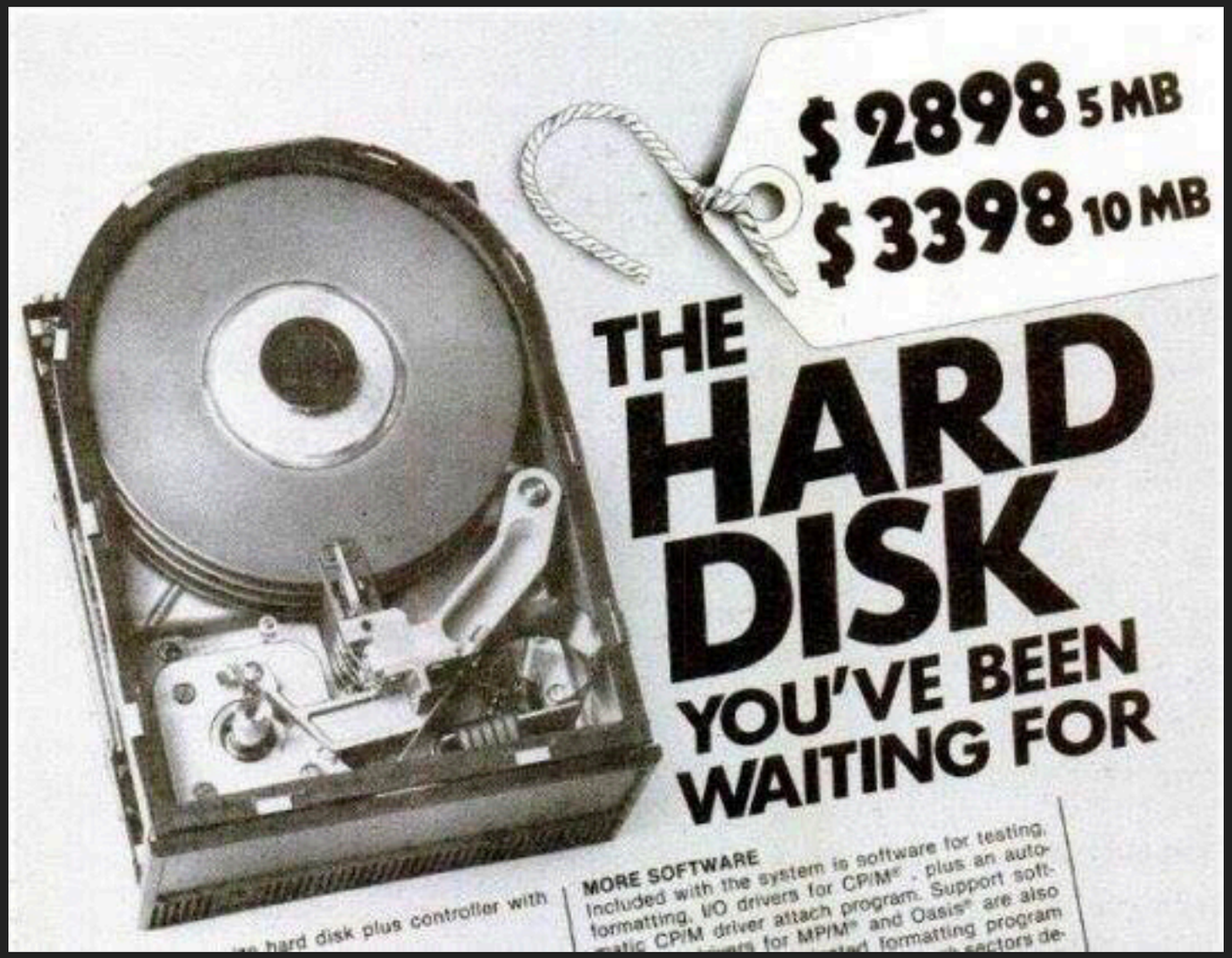
300000 word of “Algorithm” will use

“Algorithm” = 9 * 1 byte = 9 byte

300000*9 byte = 2700000 byte=2.7 MB

How About “Information Technology”, “Database System”, etc……

WHY NORMALIZED?



Back then, this box is SOOOOO EXPENSIVE!!!

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REDUCE DUPLICATION, LETS MAKE IT CLEAN AND EASY TO UNDERSTAND, LETS DO NORMALISATION

Angga Raditya

UNNORMALIZED FORM (UNF)

name character varying (100)	birth_place character varying (30)	birth_date date	gender character varying (1)	subject character varying (50)	major character varying (50)
Tony Blank	Jakarta	1945-08-17	M	Database System, Algorithm, Data Structure	Information Technology
Elon Musk	Jakarta	1971-06-28	M	Algorithm, Data Structure	Information Technology
Nicola Tesla	Bandung	1856-07-10	M	Electro Magnetics Field, Electro Dynamics	Electrical Engineering
Alan Turing	Surabaya	1912-06-23	M	Philosophy, Commercial Law	Information Technology

Must be Atomic

1NF

name character varying (100)	birth_place character varying (30)	birth_date date	gender character varying (1)	subject character varying (50)	major character varying (50)
Tony Blank	Jakarta	1945-08-17	M	Algorithm	Information Technology
Elon Musk	Jakarta	1971-06-28	M	Data Structure	Information Technology
Tony Blank	Jakarta	1945-08-17	M	Data Structure	Information Technology
Elon Musk	Jakarta	1971-06-28	M	Algorithm	Information Technology
Alan Turing	Surabaya	1912-06-23	M	Commercial Law	Law
Nicola Tesla	Bandung	1856-07-10	M	Electro Dynamics	Electrical Engineering
Nicola Tesla	Bandung	1856-07-10	M	Electro Magnetics Field	Electrical Engineering
Alan Turing	Surabaya	1912-06-23	M	Philosophy	Law
Tony Blank	Jakarta	1945-08-17	M	Database System	Information Technology

2NF

name character varying (100)	birth_place character varying (30)	birth_date date	gender character varying (1)	subject character varying (50)	major character varying (50)
Tony Blank	Jakarta	1945-08-17	M	1	Information Technology
Elon Musk	Jakarta	1971-06-28	M	2	Information Technology
Tony Blank	Jakarta	1945-08-17	M	2	Information Technology
Elon Musk	Jakarta	1971-06-28	M	1	Information Technology
Alan Turing	Surabaya	1912-06-23	M	4	Law
Nicola Tesla	Bandung	1856-07-10	M	6	Electrical Engineering
Nicola Tesla	Bandung	1856-07-10	M	7	Electrical Engineering
Alan Turing	Surabaya	1912-06-23	M	5	Law
Tony Blank	Jakarta	1945-08-17	M	3	Information Technology

id [PK] integer	subject_name character varying (100)
1	Algorithm
2	Data Structure
3	Database System
4	Commercial Law
5	Philosophy
6	Electro Dynamics
7	Electro Magnetic Fields

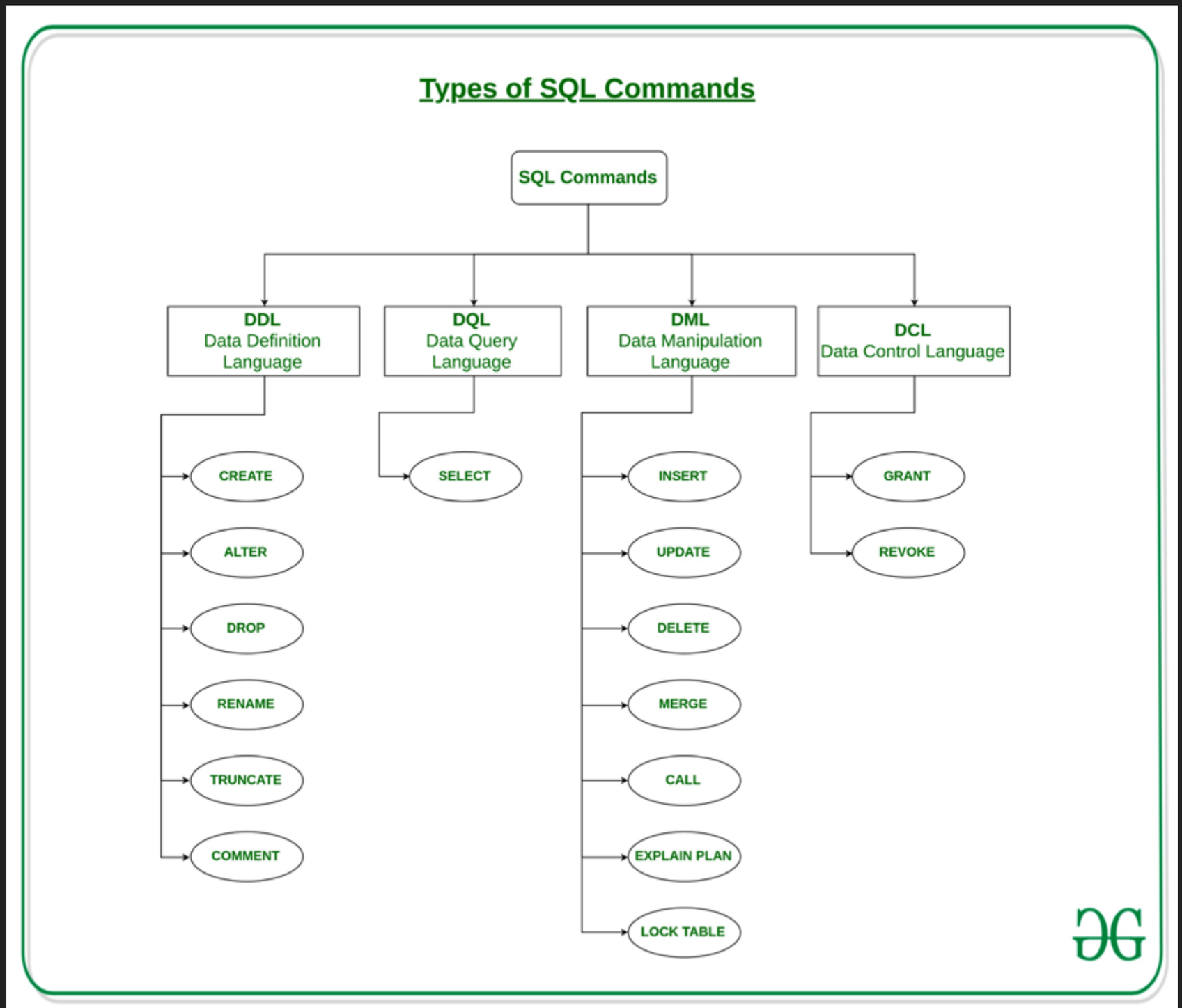
3NF

id [PK] integer	name character varying (100)	birth_place character varying (30)	birth_date date	gender character varying (1)
1	Tony Blank	Jakarta	1945-08-17	M
2	Elon Musk	Jakarta	1971-06-28	M
3	Nicola Tesla	Bandung	1856-07-10	M
4	Alan Turing	Surabaya	1912-06-23	M

id [PK] integer	subject_name character varying (100)
1	Algorithm
2	Data Structure
3	Database System
4	Commercial Law
5	Philosophy
6	Electro Dynamics
7	Electro Magnetic Fields

id [PK] integer	student_id integer	subject_id integer
1	1	1
2	1	2
3	1	3
4	2	1
5	2	2
6	3	6
7	3	7
8	4	4
9	4	5

SQL


Types of SQL Commands
SQL Commands
DDL
Data Definition Language
DQL
Data Query Language
DML
Data Manipulation Language
DCL
Data Control Language
CREATE
ALTER
DROP
RENAME
TRUNCATE
COMMENT
SELECT
INSERT
UPDATE
DELETE
MERGE
CALL
EXPLAIN PLAN
LOCK TABLE
GRANT
REVOKE

DATA DEFINITION LANGUAGE

- CREATE
- ALTER
- DROP

DATA MANIPULATION LANGUAGE

- SELECT :

  SELECT *column1*, *column2*, ...
  FROM *table_name*
  WHERE *condition*
  ORDER BY column1 ASC, column2 DESC, …;

- INSERT :

  INSERT INTO *table_name* (*column1*, *column2*, *column3*, ...)
  VALUES (*value1*, *value2*, *value3*, ...);

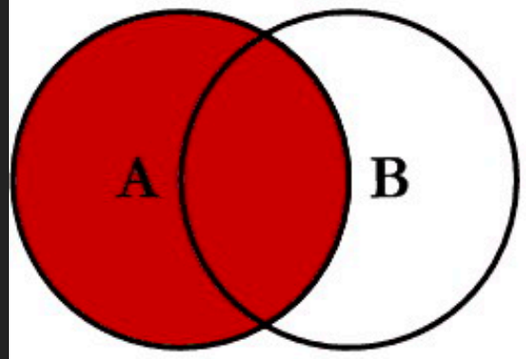
- UPDATE :

  UPDATE *table_name*
  SET *column1 = value1*, *column2 = value2*, ...
  WHERE *condition*;

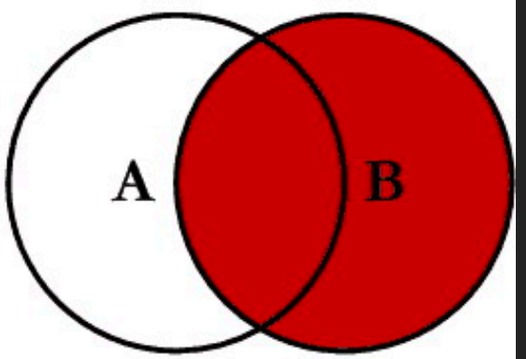
- DELETE :

  DELETE FROM *table_name* WHERE *condition*;

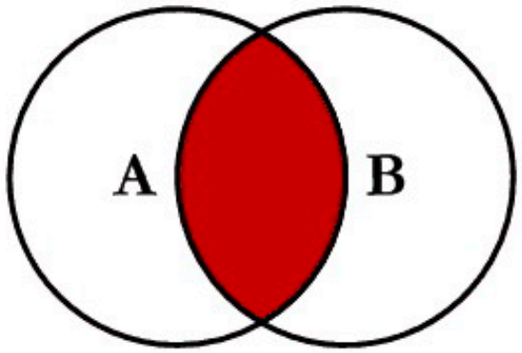
SQL JOINS



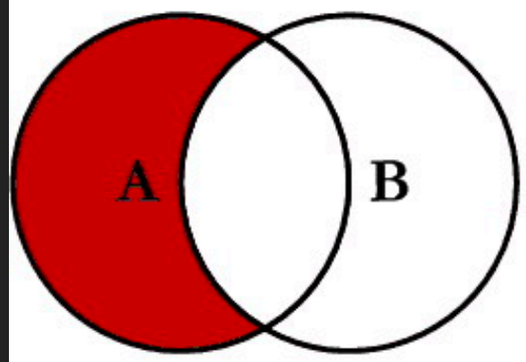

```
SELECT <select_list>
FROM TableA A
LEFT JOIN TableB B
ON A.Key = B.Key
```



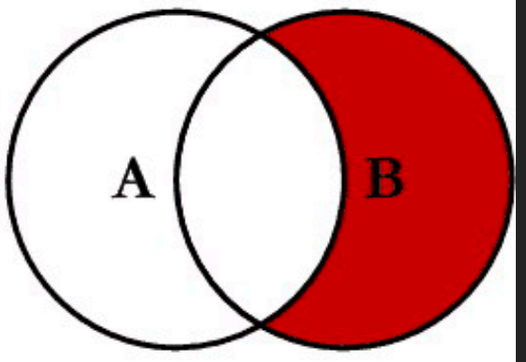

```
SELECT <select_list>
FROM TableA A
RIGHT JOIN TableB B
ON A.Key = B.Key
```



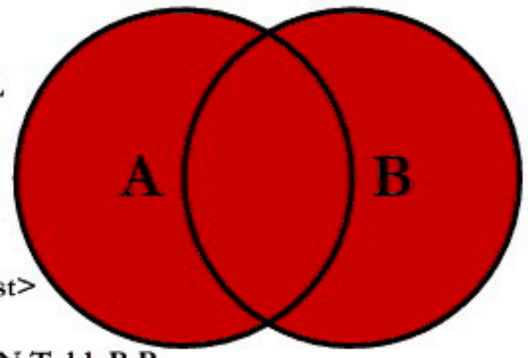

```
SELECT <select_list>
FROM TableA A
INNER JOIN TableB B
ON A.Key = B.Key
```



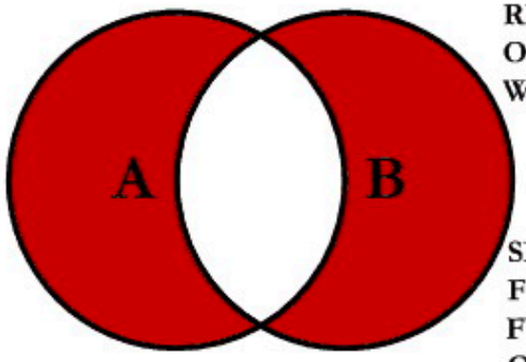

```
SELECT <select_list>
FROM TableA A
LEFT JOIN TableB B
ON A.Key = B.Key
WHERE B.Key IS NULL
```




```
SELECT <select_list>
FROM TableA A
RIGHT JOIN TableB B
ON A.Key = B.Key
WHERE A.Key IS NULL
```




```
SELECT <select_list>
FROM TableA A
FULL OUTER JOIN TableB B
ON A.Key = B.Key
```




```
SELECT <select_list>
FROM TableA A
FULL OUTER JOIN TableB B
ON A.Key = B.Key
WHERE A.Key IS NULL
OR B.Key IS NULL
```

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AGGREGATE

- SUM
- COUNT
- AVG
- GROUP BY
- HAVING vs WHERE

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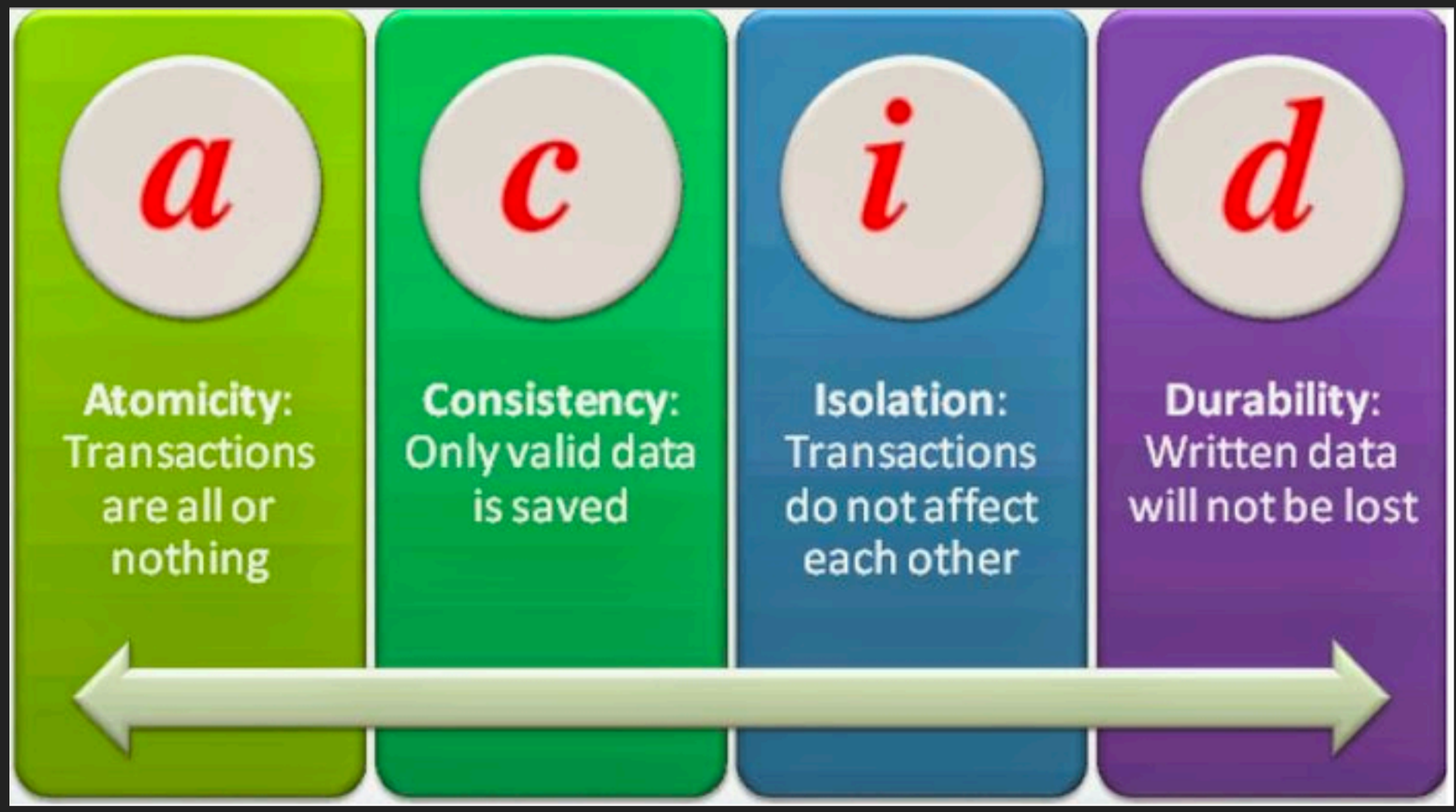
ACID

ACID


a
c
i
d
Atomicity: Transactions are all or nothing
Consistency: Only valid data is saved
Isolation: Transactions do not affect each other
Durability: Written data will not be lost

A.C.I.D

- Atomicity : A transaction is a single unit of operation. You either execute it entirely or do not execute it at all. There cannot be partial execution.
- Consistency : Once the transaction is executed, it should move from one consistent state to another.
- Isolation : Transaction should be executed in isolation from other transactions (no Locks). During concurrent transaction execution, intermediate transaction results from simultaneously executed transactions should not be made available to each other. (Level 0,1,2,3)
- Durability : After successful completion of a transaction, the changes in the database should persist. Even in the case of system failures.