Whiteboard Notes

Materials

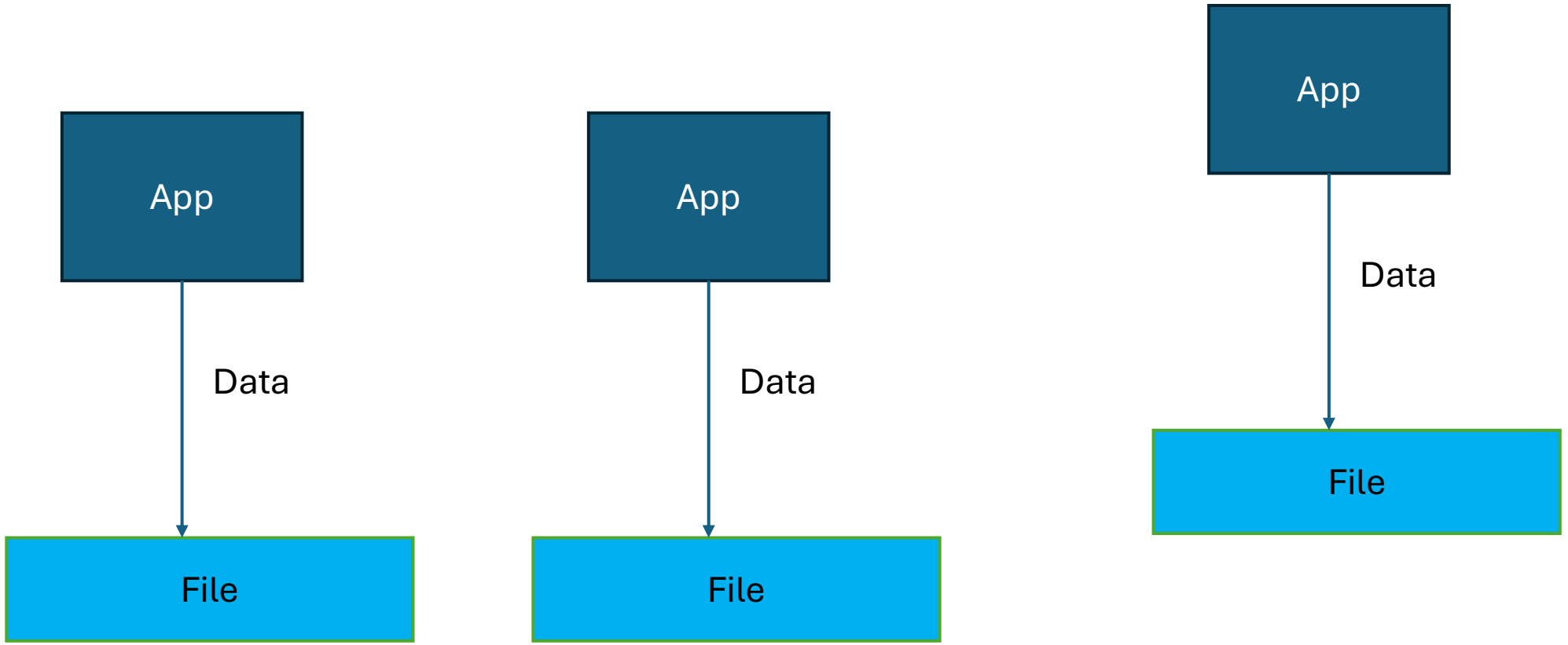
- https://github.com/nagabhushan1/eb

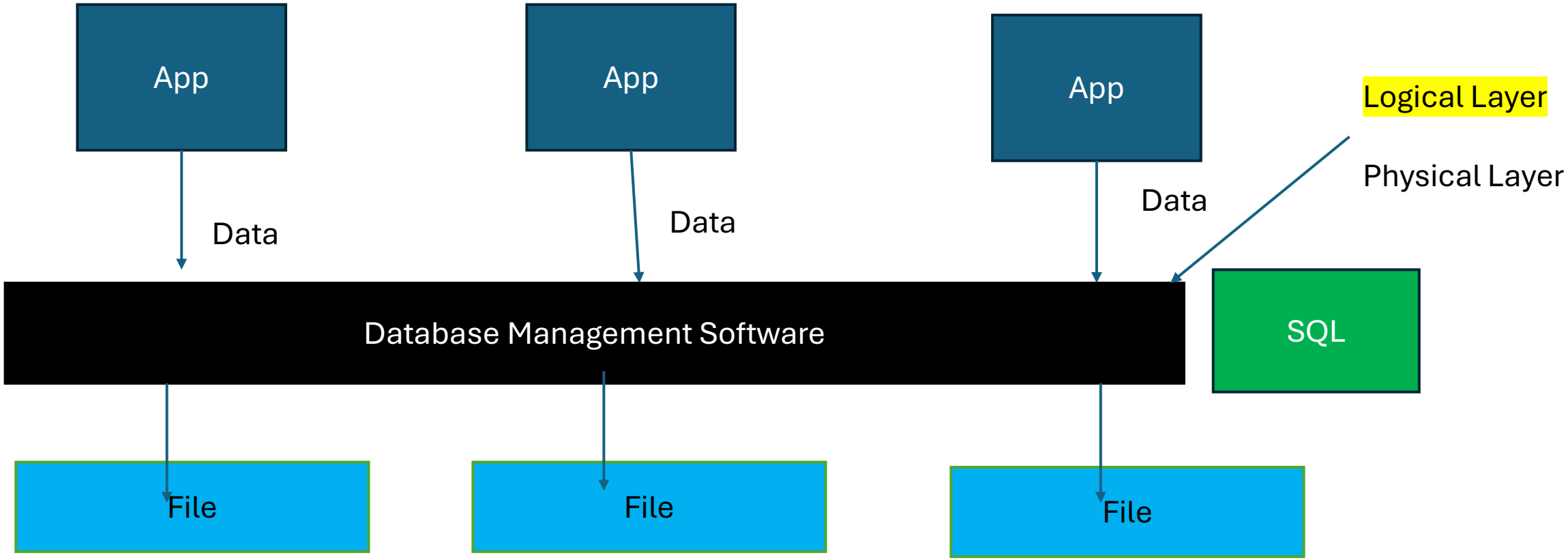
- https://codeshare.io/amLyeW

Data

- Data is the most important part of the application.
- Database is the common denominator for any application – No matter which language that was built with
- What is centric to any application is data.
- All data needs to be stored - from day 1
- Developer needs to honor 2 principles
  - Data Independence – Data needs to be independent of the application which created it
  - Data Persistence – Data should outlive the process / application which generated it

Good old days



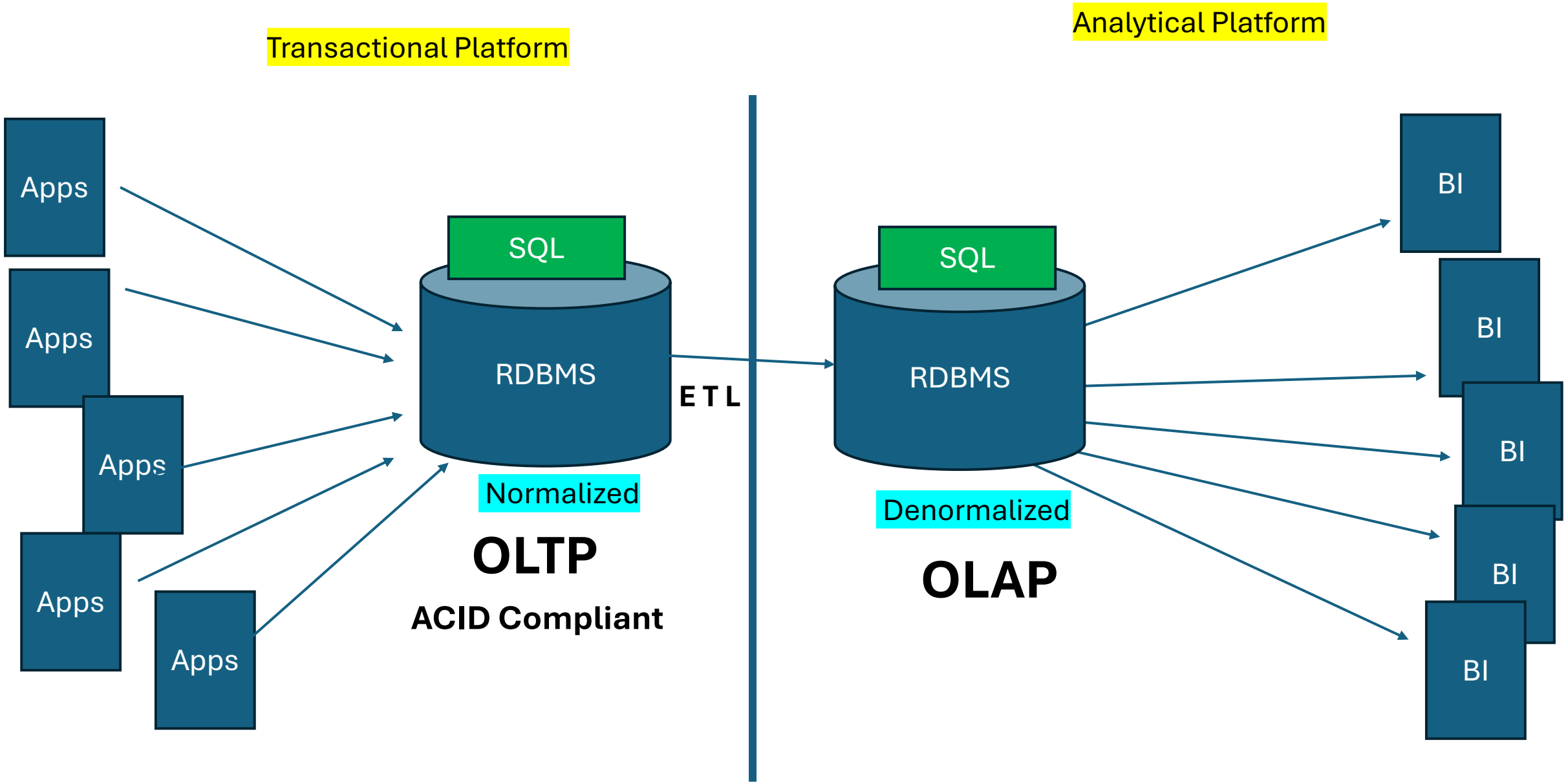


Oracle / MySQL / DB2 / Postgres / MSSQL / SQL Lite / Cloud SQL / RDS

3 main components in a Relational Data Model

- Collection of database objects (Tables, Views, Index, Procedures)
- Set of operators
- Set of integrity rules

Data Engineering World (Traditional)



Operators

- Operators are keywords / special symbols that will help us in performing operations on data. We can compare, combine and manipulate data using these operators
  - Arithmetic Operators
  - Relational Operators (Comparison Operators)
  - Logical Operators
  - Special Operators

Datatypes – Important points

- Infinity – Special constant for floating point numbers (binary float, binary double), represents values that are mathematically infinite (divide by zero)

- Nan – Not a Number → Not equal to anything → represents undefined or invalid mathematical operation

- Null → Absence of value (Unknown value) → Anything which is NULL is unknown

- Zero → A definite numerical value (It means nothing in arithmetic, however it is still a real number stored in a database)

```
SQL> select 5 + 0 as with_zero, 5 + NULL as with_null from dual;

 WITH_ZERO  WITH_NULL
---------- ----------
         5
```

```
SQL> select cast(0 as binary_double) / cast(0 as binary_double) from dual ;

CAST(0ASBINARY_DOUBLE)/CAST(0ASBINARY_DOUBLE)
---------------------------------------------
                                          Nan
```

```
SQL> select cast(1 as binary_double) / cast(0 as binary_double) from dual ;

CAST(1ASBINARY_DOUBLE)/CAST(0ASBINARY_DOUBLE)
---------------------------------------------
                                          Inf
```

Default date format in Oracle

DD-MON-YY

```
SQL> select sysdate from dual;

SYSDATE
---------
15-SEP-25

SQL>
```

Data Integrity

- Clean, correct and consistent data !
- Enforced using Constraints
- Constraints are used to prevent invalid data from being entered into your tables. Constraints are enforced on table columns!
  - Not Null
  - Unique
  - Primary Key
  - Foreign Key
  - Check

SQL Sub Languages (Sections)

- If a user has to perform operations on data, they use SQL.
- SQL has sub sections
  - DDL – Data Definition Language
    - CREATE, ALTER, DROP, TRUNCATE, RENAME (> ORACLE 9i)
  - DML – Data Manipulation Language
    - INSERT, UPDATE, DELETE, MERGE (ORACLE)
  - DQL – Data Query Language / DRL – Data Retrieval Language
    - **SELECT**
  - DCL – Data Control Language
    - GRANT, REVOKE
  - TCL – Transaction Control Language
    - COMMIT, ROLLBACK, SAVEPOINT

All DDLs are auto committed

Oracle Functions

- Functions are used to perform a specific task
- 2 types of Functions
  - Inbuilt Functions (Predefined Functions)
  - User Defined Functions

- 4 types of Predefined Functions
  - Number Functions
  - Date Functions
  - String Functions
  - Aggregate Functions

Joins

- Joins are used to retrieve data from multiple tables.

- Types of Joins
  - Equi Join / Inner Join → Matching rows only
  - Self Join → Joining a table to itself
  - Non Equi Join → Nonmatching rows
    - Left Outer Join → All rows from left table + matching rows
    - Right Outer Join → All rows from right table + matching rows
    - Full Outer Join → → All rows from left table + All rows from right table + matching rows

- *Note: In Oracle, we can also retrieve data from multiple tables without using join condition*

Subquery

- Single Row Subquery → Child query returns single value
- Multiple Row Subquery → Child query returns multiple values
  - We use “IN”, “ANY”, “ALL” operators in multiple row subqueries

Views

- View is a database object which is a virtual table and doesn’t store any data.
    - 2 types
        - Simple View
        - Complex View → Created by using multiple base tables
    - Read-Only Views
    - Materialized Views

Set Operators

- Also called Vertical Joins
  - UNION
  - UNION ALL
  - INTERSECT
  - MINUS