



SQL Basics

for **Database** Access in the **OOP** Course



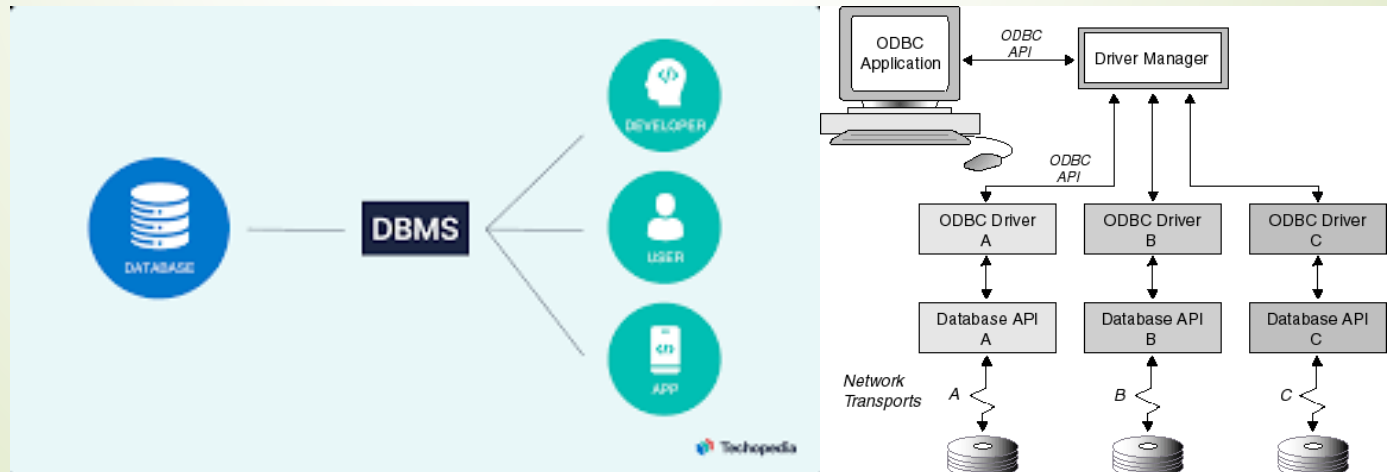
Database Management System (**DBMS**)

- **Independent** software to manage enterprise data
- It facilitates
 - **CRUD** operations, **provides** consistent, reliable data
 - **Faster** data Access **with low-cost** maintenance
 - **Improved** data sharing and data security
 - **Eliminates** data loss, Backup/restore
 - **Effective** data integration, **Scalability** and **flexibility**
 - **Compliance** with privacy regulations
 - **Increased productivity** and **Better decision-making**

Database (DB)

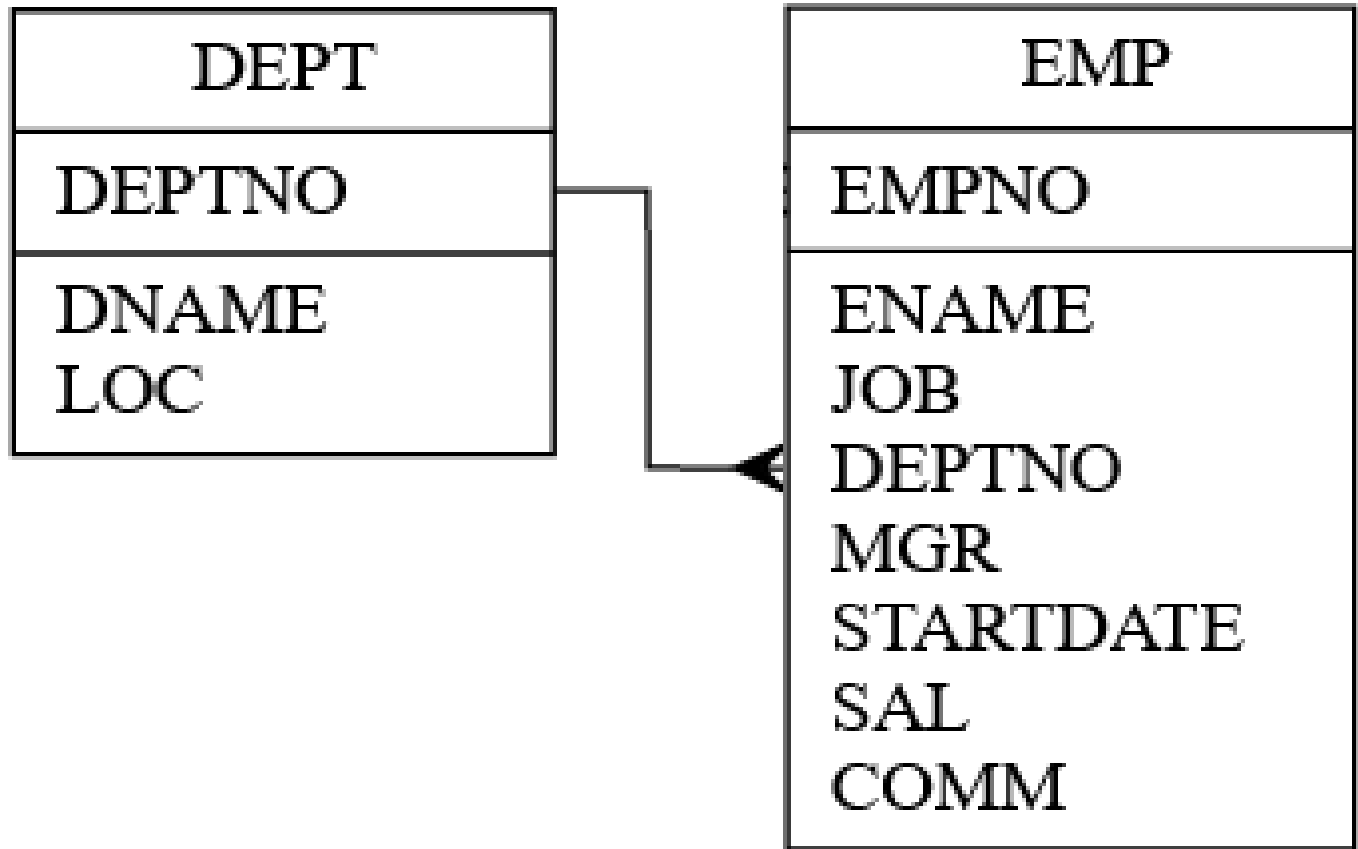
the storehouse of Data

- A database is **an organized collection of structured information, or data, typically stored electronically in a computer system**. A database is usually controlled by a database management system (DBMS).
- ODBC, **open database connectivity** provide single standardized method to connect variety of DBMS's DBs



Data model, ERD or ORM

Object relationship model



Related Data in DB

emps and deps are related on deptno

```
SCOTT SQL>select * from emp;
```

EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO
7369	SMITH	CLERK	7902	17-DEC-80 00:00:00	800		20
7499	ALLEN	SALESMAN	7698	20-FEB-81 00:00:00	1600	300	30
7521	WARD	SALESMAN	7698	22-FEB-81 00:00:00	1250	500	30
7566	JONES	MANAGER	7839	02-APR-81 00:00:00	2975		20
7654	MARTIN	SALESMAN	7698	28-SEP-81 00:00:00	1250	1400	30
7698	BLAKE	MANAGER	7839	01-MAY-81 00:00:00	2850		30
7782	CLARK	MANAGER	7839	09-JUN-81 00:00:00	2450		10
7788	SCOTT	ANALYST	7566	19-APR-87 00:00:00	3000		20
7839	KING	PRESIDENT		17-NOV-81 00:00:00	5000		10
7844	TURNER	SALESMAN	7698	08-SEP-81 00:00:00	1500	0	30
7876	ADAMS	CLERK	7788	23-MAY-87 00:00:00	1100		20
7900	JAMES	CLERK	7698	03-DEC-81 00:00:00	950		30
7902	FORD	ANALYST	7566	03-DEC-81 00:00:00	3000		20
7934	MILLER	CLERK	7782	23-JAN-82 00:00:00	1300		10

14 rows selected.

```
SCOTT SQL>select * from dept;
```

DEPTNO	DNAME	LOC
10	Accounting	NEW YORK
20	IT	DALLAS
30	SALES	CHICAGO
40	OPERATIONS	BOSTON



SQL for RDBMS

Structured Query Language

- Create/Alter/Drop
 - Databases, Tables, and many other object
- Insert into table (column,...) values (data,...)
 - To add new data in table columns
- Select column,... from table where filter order by column,...
 - To retrieve filtered and ordered data columns
- Update table set column,... = newData,... where filter
 - To modify data in table columns
- Delete from table where filter
 - To remove from in table

commit makes changes permanent
rollback undo changes upto last commit

Create table

```
create table table_name
(
    column1_name column1_type,
    column2_name column2_type,
    column3_name column3_type,
    ...
)
```

*may be in one line only, above
preferred in DBMS editor*

SQLite

INTEGER
REAL
TEXT
BLOB

NULL



Insert into *table*

insert into *table_name*

(*column_name, ...*)

values

(*data, ...*)

NULL values

*may be in one line only, two
lines preferred in DBMS editor*



Delete from *table*

delete from *table_name*
where *filter*

*may be in one line only, two
lines preferred in DBMS editor*



Update *table*

update *table_name*

Set *column_name1* = *newdata1*,

column_name2 = *newdata2*,

...

where *filter*

*may be in one line only, multiple
lines preferred in DBMS editor*



Select ... from **table**

select *column_name* [**as** *alias*], ...
from *table_name* | **join** of tabulars
[**where** *filter*]
[**order by** *column*, ...]

expressions, operations and functions
group/aggregate functions

*may be in one line only, four lines
preferred in DBMS editor*



Dynamic statements used within programs/apps

Concatenation of *parts of query strings* and *values of variables* to form a valid SQL statement in a **string object**.

SQL Injection Attacks

Dynamic string objects may be obtained by any method, f-strings, prepared statements, etc

Prepared statements or **stored procedures** should be used for performance and to avoid SQL injections.