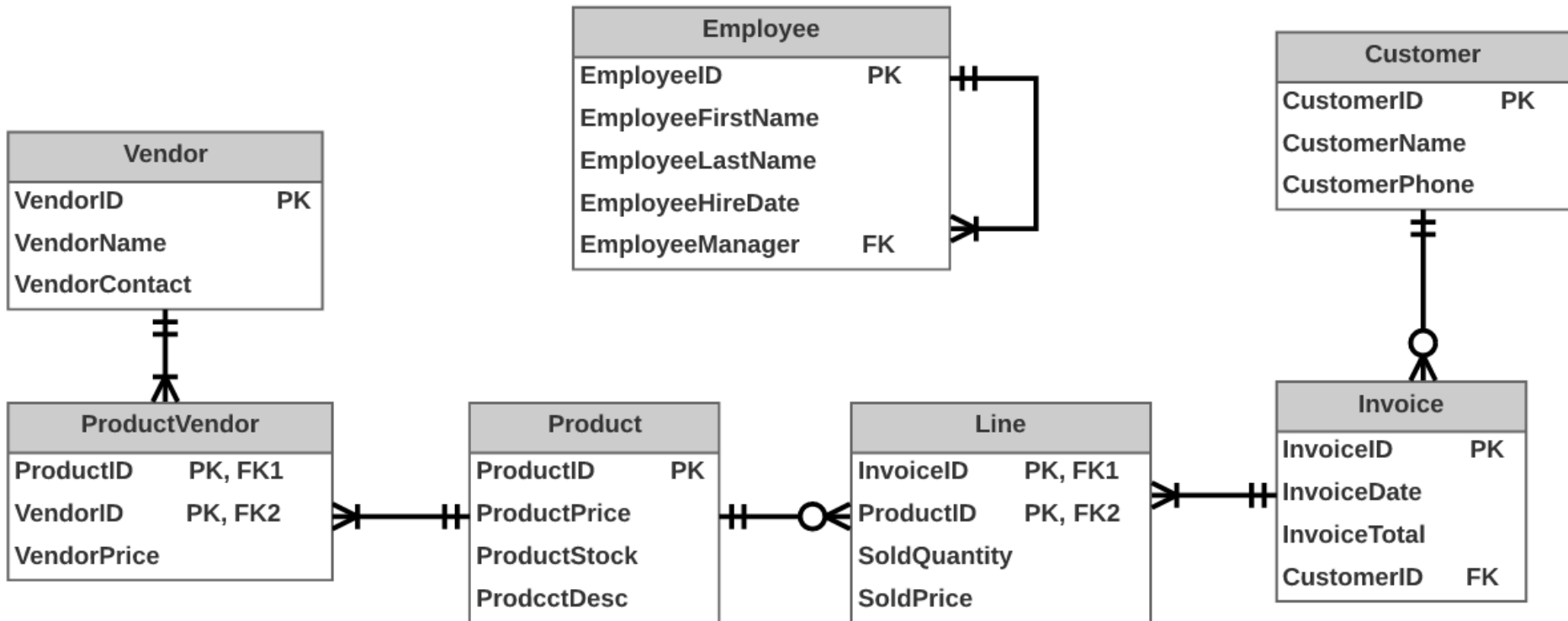


Lecture 7: SQL Basic

BADM/ACCY 352

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We have learned

- ER Modeling & Relational Modeling
- View your data as a set of related tables.

**Let's "talk" to the tables via
SQL!**

SQL

- Structured Query Language.
- Defines the standard of how to interact with relational database.
- Pronounced S-Q-L or “sequel”
- SQL is a “language”, has a simple vocabulary(~ 100 words), yet can be quite powerful

SQL

- SQL functions fit into two broad categories:
 - **Data manipulation language (DML)**
 - Commands to retrieve data from tables
 - Commands to insert, update and delete data
 - **Data definition language (DDL)**
 - Create tables, define PK, FK of tables
- Think about all SQL commands that may be executed in a grocery store purchase.

Learning goals

- proficient in SQL data retrieval
- capable of SQL data insert/delete/edit
- capable of creating a relational database based on relational diagram

SQL Standards and Dialects

- American National Standards Institute (ANSI) prescribes standards for SQL
- Different RDBMS have different SQL dialects: MySQL, SQLServer, Oracle, MS Access, SqlLite.
- Different RDBMS have a lot in common, but each may have different additional functionalities.



- Oracle database is designed for the enterprise customer with a big enough budget and more complex business needs.
- Oracle is a very popular choice with the Fortune 100 list of companies and for larger enterprises.
- Rock solid dependability, reliability, and features



- MySQL is a database that is most commonly used for data driven web sites (eg. Facebook, Wikipedia, Twitter, YouTube).
- It is the most widely used open-source RDBMS.
 - Open source: guarantees end users (individuals, organizations, companies) the freedoms to run, study, share (copy), and modify the software.
- Even though MySQL is used with larger sites, such as Facebook and YouTube, it's not as popular with larger enterprises as Oracle.
- It's owned by Oracle.



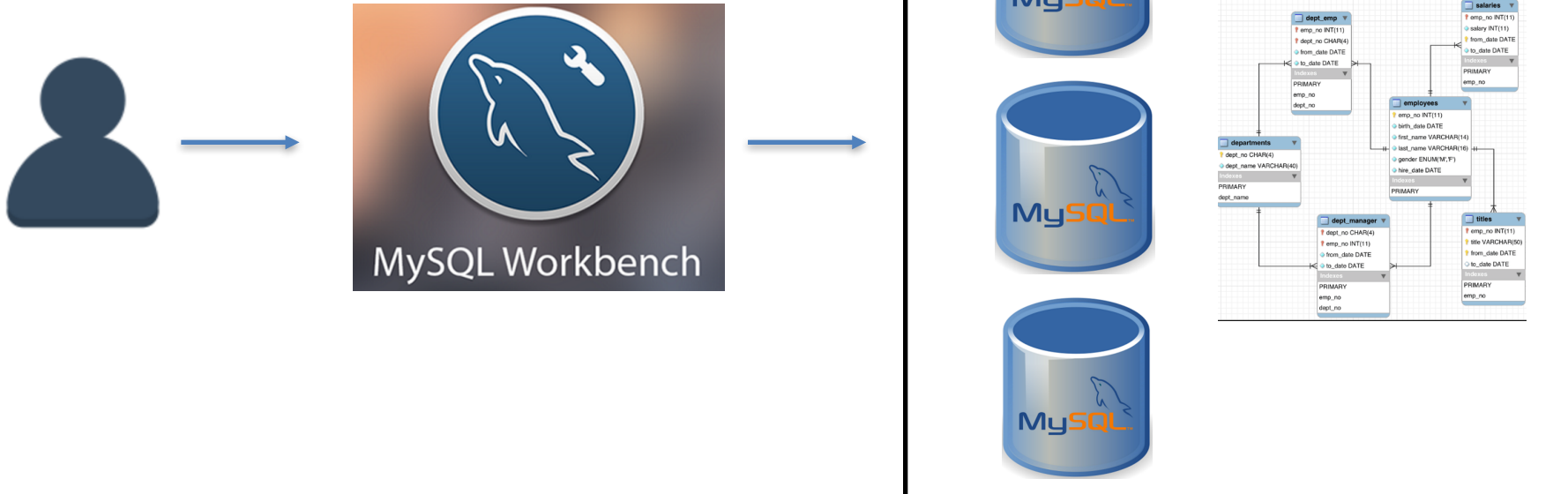
- Like Oracle, it also aims at corporate and enterprise markets, with the pluses of functionality.
- It can only be used on Microsoft Windows platform. You however gain in compatibility with Microsoft Windows and Office.
- It's definitely not a good choice for online project.



- We will learn MySQL because
 - Free
 - Perfect for a quick project launch
- It is named after one of the co-founders (Michael Widenius)'s daughter, My.
- Handles very large databases; very fast performance.
- MySQL customer story:
<https://www.mysql.com/customers/industry/>

MySQL Workbench

- We will be using MySQL Workbench.
- It's a MySQL database design and management tool. (It's not a database)



several useful commands

- Once you connect to the database, you can
- Show all available database

```
SHOW DATABASES;
```

- Specify which database you want to use

```
USE db_name;
```

← Replace db_name with the real
database name

- Show all the tables in that database

```
SHOW TABLES;
```

- By default, SQL statements are terminated with semicolons “;”

Case-sensitive?

- Database and table names are not case sensitive in Windows, and case sensitive in Mac OS and Linux.

EMP

EMP_NUM	EMP_TITLE	EMP_LNAME	EMP_FNAME	EMP_INIT	EMP_DOB	EMP_HIRE_DATE	EMP_AREACODE	EMP_PHONE	EMP_MGR
100	Mr.	Kolmycz	George	D	6/15/1945 0:00	3/15/1985 0:00	615	324-5456	NULL
101	Ms.	Lewis	Rhonda	G	3/19/1965 0:00	4/25/1986 0:00	615	324-4472	100
102	Mr.	VanDam	Rhett		11/14/1958 0:00	12/20/1990 0:00	901	675-8993	100
103	Ms.	Jones	Anne	M	10/16/1974 0:00	8/28/1994 0:00	615	898-3456	100
104	Mr.	Lange	John	P	11/8/1971 0:00	10/20/1994 0:00	901	504-4430	105
105	Mr.	Williams	Robert	D	3/14/1975 0:00	11/8/1998 0:00	615	890-3220	NULL
106	Mrs.	Smith	Jeanine	K	2/12/1968 0:00	1/5/1989 0:00	615	324-7883	105
107	Mr.	Diante	Jorge	D	8/21/1974 0:00	7/2/1994 0:00	615	890-4567	105
108	Mr.	Wiesenbach	Paul	R	2/14/1966 0:00	11/18/1992 0:00	615	897-4358	NULL
109	Mr.	Smith	George	K	6/18/1961 0:00	4/14/1989 0:00	901	504-3339	108
110	Mrs.	Genkazi	Leighla	W	5/19/1970 0:00	12/1/1990 0:00	901	569-0093	108
111	Mr.	Washington	Rupert	E	1/3/1966 0:00	6/21/1993 0:00	615	890-4925	105
112	Mr.	Johnson	Edward	E	5/14/1961 0:00	12/1/1983 0:00	615	898-4387	100
113	Ms.	Smythe	Melanie	P	9/15/1970 0:00	5/11/1999 0:00	615	324-9006	105
114	Ms.	Brandon	Marie	G	11/2/1956 0:00	11/15/1979 0:00	901	882-0845	108
115	Mrs.	Saranda	Hermine	R	7/25/1972 0:00	4/23/1993 0:00	615	324-5505	105
116	Mr.	Smith	George	A	11/8/1965 0:00	12/10/1988 0:00	615	890-2984	108

SELECT command

- **SELECT** command is used to fetch data from relational database.
- Syntax:

```
SELECT columns FROM table;
```

- It retrieves all rows from a table, and return selected columns.
- Example:

```
SELECT EMP_NUM FROM EMP;
```

```
SELECT EMP_LNAME, EMP_FNAME FROM EMP;
```


Asterisk *

- Asterisk can be used as wildcard character to return all columns.

```
SELECT * FROM EMP;
```

Selecting rows with conditional restrictions

- You can select partial table contents by placing restrictions, using **WHERE** clause.
- Syntax:

```
SELECT columns FROM table  
WHERE conditions;
```

For example

```
SELECT EMP_LNAME, EMP_FNAME FROM EMP  
WHERE EMP_NUM = 100;
```

- It returns rows from the EMP table, which satisfy the condition EMP_NUM is 100, and only list EMP_LNAME, EMP_FNAME columns.

How to write a condition?

numerical
comparison

SYMBOL	MEANING
=	Equal to
<	Less than
<=	Less than or equal to
>	Greater than
>=	Greater than or equal to
<> or !=	Not equal to

If you have a condition on a string, such as name, or a date, you need to use a single quotation mark.

```
SELECT EMP_LNAME, EMP_FNAME FROM EMP  
WHERE EMP_LNAME = 'Smith';
```

```
SELECT EMP_LNAME, EMP_FNAME FROM EMP  
WHERE EMP_DOB > '1975-01-01';
```

iClicker question


A SELECT command without a WHERE clause returns?

- a) All the records from a table that match the previous WHERE clause
- b) All the records from a table, or information about all the records
- c) SELECT is invalid without a WHERE clause
- d) Nothing

Logical Comparison Operators: AND, OR

- AND need two conditions


```
SELECT EMP_DOB FROM EMP  
WHERE EMP_LNAME='John' AND EMP_FNAME='Lange';
```



replace AND with OR

- OR need two conditions

```
SELECT EMP_LNAME, EMP_FNAME FROM EMP  
WHERE EMP_NUM=100 OR EMP_NUM=101;
```



replace OR with AND

Logical Comparison Operators: NOT

- NOT need one condition

```
SELECT * FROM EMP  
WHERE NOT EMP_NUM = 101;
```

What about?

```
SELECT * FROM EMP  
WHERE NOT NOT NOT NOT NOT EMP_NUM =101;
```

BETWEEN

- Used to check whether column value is within a range
- Includes end points of the range

```
SELECT * FROM Product  
WHERE P_Price BETWEEN 50.00 AND 100.00;
```

it is the same as

```
SELECT * FROM Product  
WHERE P_Price >= 50.00 AND P_Price <= 100.00;
```


IS NULL

- Used to check if a certain column for the record is NULL

```
SELECT EMP_LNAME, EMP_FNAME FROM EMP  
WHERE EMP_MGR IS NULL;
```

```
SELECT EMP_LNAME, EMP_FNAME FROM EMP  
WHERE EMP_MGR = NULL;
```



LIKE

- Used together with wildcards (% , _) to find patterns within string column.
 - LIKE is case-insensitive
 - % match any string
 - 'J%' matches 'Johnson', 'Joe', 'J1", but not "Ajston'
 - _ match one character
 - 'J_' matches 'Jn', 'J3', but not 'J34';

```
SELECT EMP_LNAME, EMP_FNAME FROM EMP
WHERE EMP_LNAME LIKE 'le%';
```

IN

- Used to check whether attribute value matches any value within a value list

```
SELECT EMP_LNAME, EMP_FNAME FROM EMP  
WHERE EMP_NUM IN (100, 101, 102);
```

- The condition is true if EMP_NUM is in the set of (100, 101, 102). In other words, EMP_NUM can be 100, 101, or 102.

iClicker question

```
SELECT EMP_LNAME, EMP_FNAME FROM EMP  
WHERE EMP_NUM IN (100, 101, 102);
```

Equals to which of the following?

A

```
SELECT * FROM EMP  
WHERE EMP_NUM = 100 OR 101 OR 102;
```

B

```
SELECT * FROM EMP  
WHERE EMP_NUM = 100 OR EMP_NUM = 101 OR EMP_NUM = 102;
```

C

```
SEELCT * FROM EMP  
WHERE EMP_NUM = 100 AND EMP_NUM = 101 AND EMP_NUM = 102;
```

COUNT command

- `COUNT(*)` : count the total number of rows in the returned table.
- How many employees?

```
SELECT COUNT(*) FROM EMP;
```

- How many male employees?

```
SELECT COUNT(*) FROM EMP  
WHERE EMP_TITLE = 'Mr.';
```

Summary

- SELECT statement
 - Syntax: SELECT...FROM...WHERE
 - How to write a condition
 - COUNT function