CS 309A- Database Management Systems

Recap of the last time

- Modify table

```
ALTER TABLE tablename
--ADD(columnname data_declaration constraints);
--DROP COLUMN columnname;
--MODIFY(columnname new_data_type);
    --CHANGE old_columnname new_columnname data_type;
```

References: ALTER TABLE syntax

http://dev.mysql.com/doc/refman/5.7/en/alter-table.html

Recall for the SELECT queries

- Get data from table
  - SELECT command
  - syntax

```
SELECT   columnlist
FROM     tablelist
[WHERE   conditionlist];
```

The above SELECT statement retrieves all rows that match the specified condition(s) you specified in the WHERE clause.

Arithmetic operators: rule of precedence

You can use arithmetic operators with table attributes in a column list or in a conditional expression.

TABLE 7.7 The Arithmetic Operators

ARITHMETIC OPERATOR	DESCRIPTION
+	Add
-	Subtract
*	Multiply
/	Divide
^	Raise to the power of (some applications use ** instead of ^)

1. Perform operations within parentheses
2. Perform power operations
3. Perform multiplications and divisions
4. Perform additions and subtractions

Logical operators: OR, AND

You can use logical operators to involve multiple conditions in queries

```
SELECT   P_DESCRIPT, P_INDATE, P_PRICE, V_CODE
FROM     PRODUCT
WHERE    V_CODE = 21344 OR V_CODE = 24288;
```

P_DESCRIPT	P_INDATE	P_PRICE	V_CODE
7.25-in. pwr. saw blade	2011-12-13	14.99	21344
9.00-in. pwr. saw blade	2011-11-13	17.49	21344
B&D jigsaw, 12-in. blade	2011-12-30	109.92	24288
B&D jigsaw, 8-in. blade	2011-12-24	99.87	24288
Rat-tail file, 1/8-in. fine	2011-12-15	4.99	21344
Hicut chain saw, 16 in.	2012-02-07	256.99	24288

```
SELECT P_DESCRIPT, P_PRICE, P_INDATE,
V_CODE
FROM   PRODUCT
WHERE  P_INDATE >= '2012-01-20' AND P_PRICE
< 50;
```

p_descript	p_price	p_indate	v_code
7.25-in. pwr. saw blade	14.99	2015-12-13 00:00:00	21344
9.00-in. pwr. saw blade	17.49	2015-11-13 00:00:00	21344
Hrd. cloth, 1/4-in., 2x50	39.95	2016-01-15 00:00:00	23119
Hrd. cloth, 1/2-in., 3x50	43.99	2016-01-15 00:00:00	23119
B&D cordless drill, 1/2-in.	38.95	2016-01-20 00:00:00	25595
Claw hammer	9.95	2016-01-20 00:00:00	21225
Sledge hammer, 12 lb.	14.40	2016-01-02 00:00:00	NULL
Rat-tail file, 1/8-in. fine	4.99	2015-12-15 00:00:00	21344
PVC pipe, 3.5-in., 8-ft	5.87	2016-02-20 00:00:00	NULL
1.25-in. metal screw, 25	6.99	2016-03-01 00:00:00	21225
2.5-in. wd. screw, 50	8.45	2016-02-24 00:00:00	21231

◇ You can use parentheses to combine logical restrictions.

```
SELECT P_DESCRIPT, P_PRICE, P_INDATE, V_CODE
FROM   PRODUCT
WHERE  (P_PRICE < 50 AND P_INDATE >= '2012-01-20')
OR     V_CODE = 24288;
```

p_descript	p_price	p_indate	v_code
7.25-in. pwr. saw blade	14.99	2015-12-13 00:00:00	21344
9.00-in. pwr. saw blade	17.49	2015-11-13 00:00:00	21344
Hrd. cloth, 1/4-in., 2x50	39.95	2016-01-15 00:00:00	23119
Hrd. cloth, 1/2-in., 3x50	43.99	2016-01-15 00:00:00	23119
B&D jigsaw, 12-in. blade	109.92	2015-12-30 00:00:00	24288
B&D jigsaw, 8-in. blade	99.87	2015-12-24 00:00:00	24288
B&D cordless drill, 1/2-in.	38.95	2016-01-20 00:00:00	25595
Claw hammer	9.95	2016-01-20 00:00:00	21225
Sledge hammer, 12 lb.	14.40	2016-01-02 00:00:00	NULL
Rat-tail file, 1/8-in. fine	4.99	2015-12-15 00:00:00	21344
Hicut chain saw, 16 in.	256.99	2016-02-07 00:00:00	24288
PVC pipe, 3.5-in., 8-ft	5.87	2016-02-20 00:00:00	NULL
1.25-in. metal screw, 25	6.99	2016-03-01 00:00:00	21225
2.5-in. wd. screw, 50	8.45	2016-02-24 00:00:00	21231

Practice 1:

- List vendors information (name, contact and phone) that are in the area ‘615’ and have previous order
- List customers name (last name, first name and middle initial) who live in the area ‘615’ or have zero balance
- List products (all attributes) that either have excess inventory (units available (QOH) is at least 50 more than minimum units) or have discount and stocking date was before 01/01/2018.

Logical operators: NOT

- The NOT logical operator is used to find the rows that *do not* match a certain condition.

```
SELECT   *
FROM     PRODUCT
WHERE    NOT (V_CODE = 21344);
```

- The above WHERE clause equals to

```
WHERE    V_CODE <> 21344;
WHERE    V_CODE != 21344;
```

Special operators

- BETWEEN: checks whether attribute value is within a range
- IS NULL: checks whether attribute value is null
- LIKE: checks whether attribute value matches given string pattern
- IN: checks whether attribute value matches any value within a value list
- EXISTS: checks if subquery returns any rows

The BETWEEN special operator

- List all products whose prices are between $50 and $100

```
SELECT *
FROM   PRODUCT
WHERE  P_PRICE BETWEEN 50.00 AND 100.00;
```

P_CODE	P_DESCRIPT	P_INDATE	P_QOH	P_MIN	P_PRICE	P_DISCOUNT	V_CODE
2232/QWE	B&D jigsaw, 8-in. blade	2011-12-24	6	5	99.87	0.05	24288

The IS NULL Special Operator

- List all products that do not have a vendor assigned

```
SELECT P_CODE, P_DESCRIPT, V_CODE
FROM   PRODUCT
WHERE  V_CODE IS NULL;
```

P_CODE	P_DESCRIPT	V_CODE
23114-AA	Sledge hammer, 12 lb.	NULL
PVC23DRT	PVC pipe, 3.5-in., 8-ft	NULL

Wildcard characters

String pattern is given by the characters and wildcards.

Wildcards:

- %: means any and all *following* or *preceding* characters are eligible
  - 'J%' includes all the strings beginning with 'J'
    - i.e., 'Johnson', 'July', 'Jack'
  - '%n' includes all the strings ending with 'n'
    - i.e., 'Johnson', 'Garden', 'Kevin'
- _: means any one character may be substituted for the underscore
  - '_23-456' includes the strings such as '123-456' and '823-456'
  - '_o_es' includes the string s such as 'Jones' and 'Cokes'

The LIKE special operator

- Find all VENDOR rows that contacts' last names begin with Smith

```
SELECT V_NAME, V_CONTACT, V_AREACODE, V_PHONE
FROM   VENDOR
WHERE V_CONTACT LIKE 'Smith%';
```

V_NAME	V_CONTACT	V_AREACODE	V_PHONE
Bryson, Inc.	Smithson	615	223-3234
Dome Supply	Smith	901	678-1419
B&K, Inc.	Smith	904	227-0093

Practice 2:

- Find customer's information whose last name beginning with 'O'
- List products that are related to saw
- Suppose that you want to find a vendor's information, but you cannot remember that the contact's name is spelled '*Orton'* or *'Orten'*. How can you do it?

The IN special operator

- List products provided by vendor 21344 or vendor 24288

```
SELECT *
FROM PRODUCT
WHERE  V_CODE IN (21344, 24288);
```

- The IN operator uses a value list
  - All of the values in the list must have the same data type.

The IN operator can be used with subqueries.

- Suppose that you want to list the V_CODE and V_NAME of only those vendors who provide products.
  - *Step 1:* Find the vendors who provide products in table PRODUCT

```
SELECT V_CODE FROM PRODUCT;
```

  - *Step 2:* Based on the returned set of V_CODE, find their corresponding names in table VENDOR

```
SELECT V_CODE, V_NAME
FROM   VENDOR
WHERE  V_CODE IN (SELECT V_CODE FROM PRODUCT);
```


```
mysql> select v_code, v_name
    -> from vendor
    -> where v_code in (select v_code from product);
+--------+-----------------+
| v_code | v_name          |
+--------+-----------------+
|  21225 | Bryson, Inc.    |
|  21231 | D&E Supply      |
|  21344 | Gomez Bros.     |
|  23119 | Randsets Ltd.   |
|  24288 | ORDVA, Inc.     |
|  25595 | Rubicon Systems |
+--------+-----------------+
6 rows in set (0.00 sec)
```

Practice 3:

Find customers who have generated invoices, list their last name, first name and middle initial

The EXISTS special operator

- EXISTS is used with subquery
  - If a subquery returns any rows, run the main query; otherwise, do not.
- List all vendors, only when there are products with the available quantity no more than the minimum quantity.
  - *Step 1:* Using a subquery to check whether there are products the available quantity no more than the minimum quantity.

```
SELECT * FROM PRODUCT WHERE P_QOH <= P_MIN
```

  - *Step 2:* If the subquery returns some rows, list all vendors.

```
SELECT *
FROM VENDOR
WHERE EXISTS (SELECT * FROM PRODUCT WHERE P_QOH <= P_MIN);
```

Consider another query

- List vendors that they have products with the available quantity less than double the minimum quantity.
  - Use EXISTS again?

```
SELECT *
FROM VENDOR
WHERE EXISTS(SELECT V_CODE FR                    OOH <= 2 * P_MIN);
```

List ALL vendors only when some vendors have products with the available quantity less than double the minimum quantity.

  - No, should use IN

```
SELECT *
FROM VENDOR
WHERE V_CODE IN(SELECT V_CODE FROM PRODUCT WHERE P_QOH <=
2 * P_MIN);
```

Ordering a listing

- ORDER BY clause is useful when listing order is important
- Syntax:

```
SELECT    columnlist
FROM      tablelist
[WHERE    conditionlist]
[ORDER BY columnlist [ASC | DESC]];
```

- Ascending order by default

◇ *Example:* list all products (code, description, price) by their price in ***ascending***

```
SELECT   P_CODE, P_DESCRIPT, P_PRICE
FROM     PRODUCT
ORDER BY P_PRICE;
```

P_CODE	P_DESCRIPT	P_PRICE
54778-2T	Rat-tail file, 1/8-in. fine	4.99
PVC23DRT	PVC pipe, 3.5-in., 8-ft	5.87
SM-18277	1.25-in. metal screw, 25	6.99
SW-23116	2.5-in. wd. screw, 50	8.45
23109-HB	Claw hammer	9.95
23114-AA	Sledge hammer, 12 lb.	14.40
13-Q2/P2	7.25-in. pwr. saw blade	14.99
14-Q1/L3	9.00-in. pwr. saw blade	17.49
2238/QPD	B&D cordless drill, 1/2-in.	38.95
1546-QQ2	Hrd. cloth, 1/4-in., 2x50	39.95
1558-QW1	Hrd. cloth, 1/2-in., 3x50	43.99
2232/QWE	B&D jigsaw, 8-in. blade	99.87
2232/QTY	B&D jigsaw, 12-in. blade	109.92
11QER/31	Power painter, 15 psi., 3-nozzle	109.99
WR3/TT3	Steel matting, 4'x8'x1/6", .5" mesh	119.95
89-WRE-Q	Hicut chain saw, 16 in.	256.99

16 rows in set (0.00 sec)

• *Example:* list all products (code, description, price) by their price in ***descending***

```
SELECT   P_CODE, P_DESCRIPT, P_PRICE
FROM     PRODUCT
ORDER BY P_PRICE DESC;
```

P_CODE	P_DESCRIPT	P_PRICE
89-WRE-Q	Hicut chain saw, 16 in.	256.99
WR3/TT3	Steel matting, 4'x8'x1/6", .5" mesh	119.95
11QER/31	Power painter, 15 psi., 3-nozzle	109.99
2232/QTY	B&D jigsaw, 12-in. blade	109.92
2232/QWE	B&D jigsaw, 8-in. blade	99.87
1558-QW1	Hrd. cloth, 1/2-in., 3x50	43.99
1546-QQ2	Hrd. cloth, 1/4-in., 2x50	39.95
2238/QPD	B&D cordless drill, 1/2-in.	38.95
14-Q1/L3	9.00-in. pwr. saw blade	17.49
13-Q2/P2	7.25-in. pwr. saw blade	14.99
23114-AA	Sledge hammer, 12 lb.	14.40
23109-HB	Claw hammer	9.95
SW-23116	2.5-in. wd. screw, 50	8.45
SM-18277	1.25-in. metal screw, 25	6.99
PVC23DRT	PVC pipe, 3.5-in., 8-ft	5.87
54778-2T	Rat-tail file, 1/8-in. fine	4.99

16 rows in set (0.00 sec)

- List customers using the following **cascading order sequence:**
  1. ORDER BY last name ascending
  2. Within the last names, ORDER BY first name ascending
  3. Within the first and last names, ORDER BY middle initial

```
SELECT *
FROM   CUSTOMER
ORDER  BY CUS_LNAME, CUS_FNAME, CUS_INITIAL;
```

Order from left to right

CUS_CODE	CUS_LNAME	CUS_FNAME	CUS_INITIAL	CUS_AREACODE	CUS_PHONE	CUS_BALANCE
10016	Brown	James	G	615	297-1228	221.19
10011	Dunne	Leona	K	713	894-1238	0.00
10018	Farriss	Anne	G	713	382-7185	216.55
10015	O'Brian	Amy	B	713	442-3381	0.00
10013	Olowski	Paul	F	615	894-2180	536.75
10014	Orlando	Myron		615	222-1672	0.00
10010	Ramas	Alfred	A	615	844-2573	0.00
10012	Smith	Kathy	W	615	894-2285	345.86
10019	Smith	Olette	K	615	297-3809	0.00
10017	Williams	George		615	290-2556	768.93

10 rows in set (0.00 sec)

Practice 4

- List *the most recent* invoices.
  - List the invoices by INV_DATE in descending

- Find the products (description, vendor code, stocking date, price) which were stocked before 2018-01-01 and have prices no more than $50.00. The contents should be listed first by vendor code in ascending, and then by price in descending within the vendor code.

Listing unique values

- If we want to know how many vendors are providing products now
  - Query on VENDOR table is not correct because some vendors may not provide any products right now
  - Query on PRODUCT table and listing V_CODE is not very useful because one vendor may provide many different types of products, which results many duplicate records. You have to filter manually.
  - Use **DISTINCT** to produce a list of values that are different from one another.

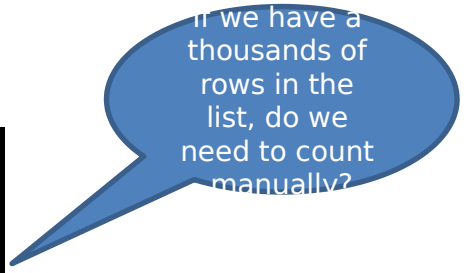
Listing unique values

```
SELECT V_CODE
FROM   PRODUCT;
```

```
+--------+
| V_CODE |
+--------+
|   NULL |
|   NULL |
|  21225 |
|  21225 |
|  21231 |
|  21344 |
|  21344 |
|  21344 |
|  23119 |
|  23119 |
|  24288 |
|  24288 |
|  24288 |
|  25595 |
|  25595 |
|  25595 |
+--------+
16 rows in set (0.00 sec)
```

```
SELECT DISTINCT V_CODE
FROM   PRODUCT;
```

```
+--------+
| V_CODE |
+--------+
|   NULL |
|  21225 |
|  21231 |
|  21344 |
|  23119 |
|  24288 |
|  25595 |
+--------+
7 rows in set (0.00 sec)
```



Thank you & Questions