3. DATA MANIPULATION USING SQL LANGUAGE: SELECT QUERIES AND THEIR BASIC FEATURES

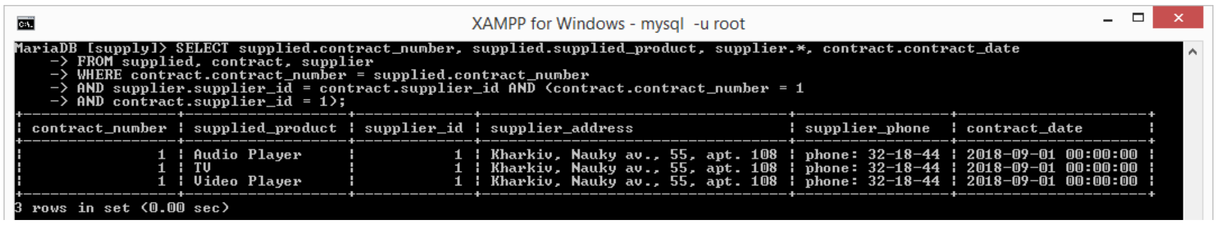
Goal: learn how to use the SQL SELECT statement for data querying, using the MySQL database.

3.1. Create and execute SQL SELECT queries

Query 1. Basic SELECT query

Form a list of goods delivered by supplier 1 (Petrov P. P.) under contract 1 (Figure 3.1).

```
SELECT supplied.contract_number, supplied.supplied_product, supplier.*, contract.contract_date
FROM supplied, contract, supplier
WHERE contract.contract_number = supplied.contract_number
AND supplier.supplier_id = contract.supplier_id AND (contract.contract_number = 1
AND contract.supplier_id = 1);
```



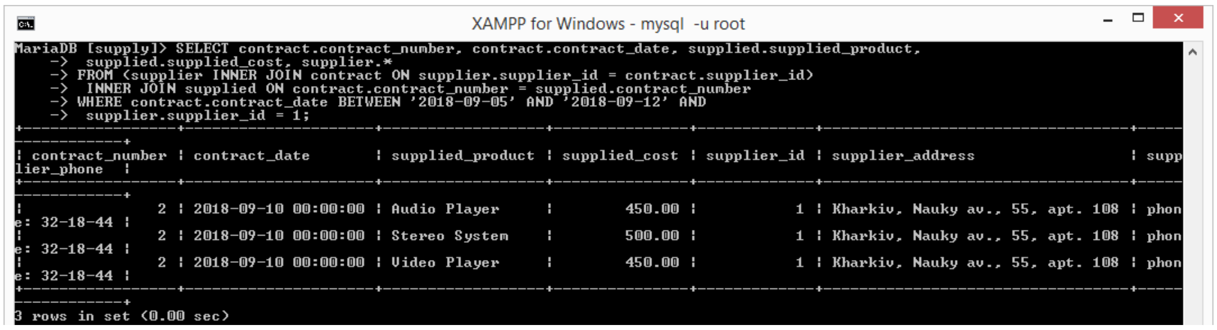
```
MariaDB [supply]> SELECT supplied.contract_number, supplied.supplied_product, supplier.*, contract.contract_date
    -> FROM supplied, contract, supplier
    -> WHERE contract.contract_number = supplied.contract_number
    -> AND supplier.supplier_id = contract.supplier_id AND (contract.contract_number = 1
    -> AND contract.supplier_id = 1);
+-----------------+------------------+-------------+-----------------------------------------+------------------+---------------------+
| contract_number | supplied_product | supplier_id | supplier_address                        | supplier_phone   | contract_date       |
+-----------------+------------------+-------------+-----------------------------------------+------------------+---------------------+
|               1 | Audio Player     |           1 | Kharkiv, Nauky av., 55, apt. 108        | phone: 32-18-44  | 2018-09-01 00:00:00 |
|               1 | TV               |           1 | Kharkiv, Nauky av., 55, apt. 108        | phone: 32-18-44  | 2018-09-01 00:00:00 |
|               1 | Video Player     |           1 | Kharkiv, Nauky av., 55, apt. 108        | phone: 32-18-44  | 2018-09-01 00:00:00 |
+-----------------+------------------+-------------+-----------------------------------------+------------------+---------------------+
3 rows in set (0.00 sec)
```

Figure 3.1

Query 2. SELECT with the BETWEEN clause

Form a list of the goods delivered by supplier 1 (Petrov P. P.) in the period from 2018-09-05 to 09/08/2012 (Figure 3.2).

```
SELECT contract.contract_number, contract.contract_date, supplied.supplied_product,
   supplied.supplied_cost, supplier.*
FROM (supplier INNER JOIN contract ON supplier.supplier_id = contract.supplier_id)
   INNER JOIN supplied ON contract.contract_number = supplied.contract_number
WHERE contract.contract_date BETWEEN '2018-09-05' AND '2018-09-12' AND
   supplier.supplier_id = 1;
```



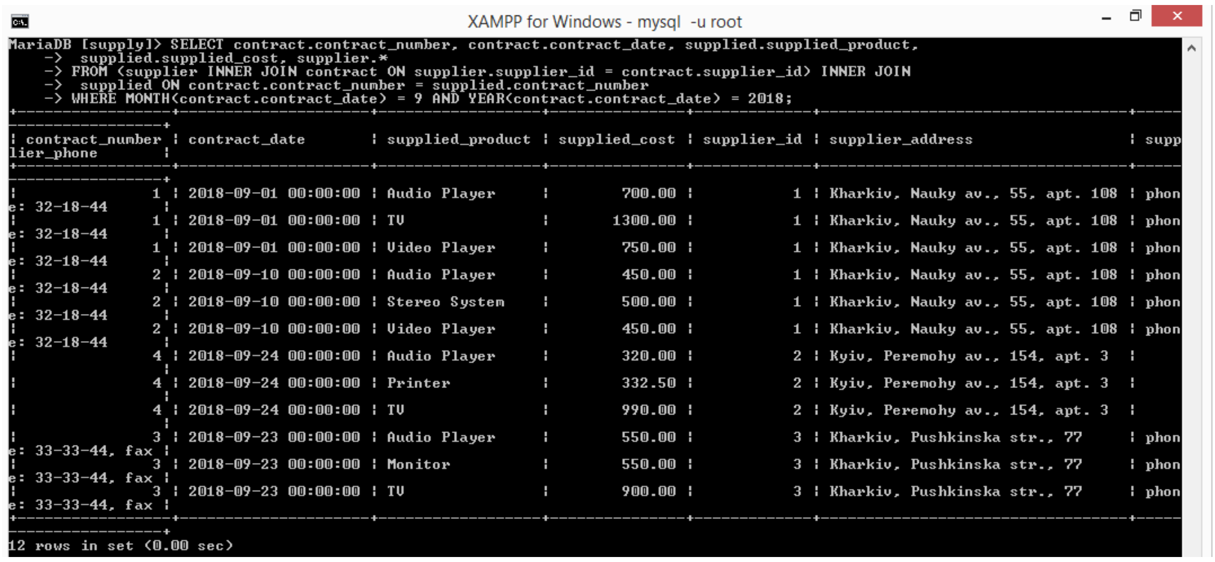
```
MariaDB [supply]> SELECT contract.contract_number, contract.contract_date, supplied.supplied_product,
    ->  supplied.supplied_cost, supplier.*
    -> FROM (supplier INNER JOIN contract ON supplier.supplier_id = contract.supplier_id)
    ->  INNER JOIN supplied ON contract.contract_number = supplied.contract_number
    -> WHERE contract.contract_date BETWEEN '2018-09-05' AND '2018-09-12' AND
    ->  supplier.supplier_id = 1;
+-----------------+---------------------+------------------+---------------+-------------+--------------------------------+-----
-------------+
¦ contract_number ¦ contract_date       ¦ supplied_product ¦ supplied_cost ¦ supplier_id ¦ supplier_address               ¦ supp
lier_phone   ¦
+-----------------+---------------------+------------------+---------------+-------------+--------------------------------+-----
-------------+
¦               2 ¦ 2018-09-10 00:00:00 ¦ Audio Player     ¦        450.00 ¦           1 ¦ Kharkiv, Nauky av., 55, apt. 108 ¦ phon
e: 32-18-44 ¦
¦               2 ¦ 2018-09-10 00:00:00 ¦ Stereo System    ¦        500.00 ¦           1 ¦ Kharkiv, Nauky av., 55, apt. 108 ¦ phon
e: 32-18-44 ¦
¦               2 ¦ 2018-09-10 00:00:00 ¦ Video Player     ¦        450.00 ¦           1 ¦ Kharkiv, Nauky av., 55, apt. 108 ¦ phon
e: 32-18-44 ¦
+-----------------+---------------------+------------------+---------------+-------------+--------------------------------+-----
-------------+
3 rows in set (0.00 sec)
```

Figure 3.2

Query 3. SELECT with the MONTH and YEAR functions

Form a list of goods that were delivered in month 9 of 2018 including the name of the supplier and delivery date (Figure 3.3).

```
SELECT contract.contract_number, contract.contract_date, supplied.supplied_product,
   supplied.supplied_cost, supplier.*
FROM (supplier INNER JOIN contract ON supplier.supplier_id = contract.supplier_id) INNER JOIN
   supplied ON contract.contract_number = supplied.contract_number
WHERE MONTH(contract.contract_date) = 9 AND YEAR(contract.contract_date) = 2018;
```



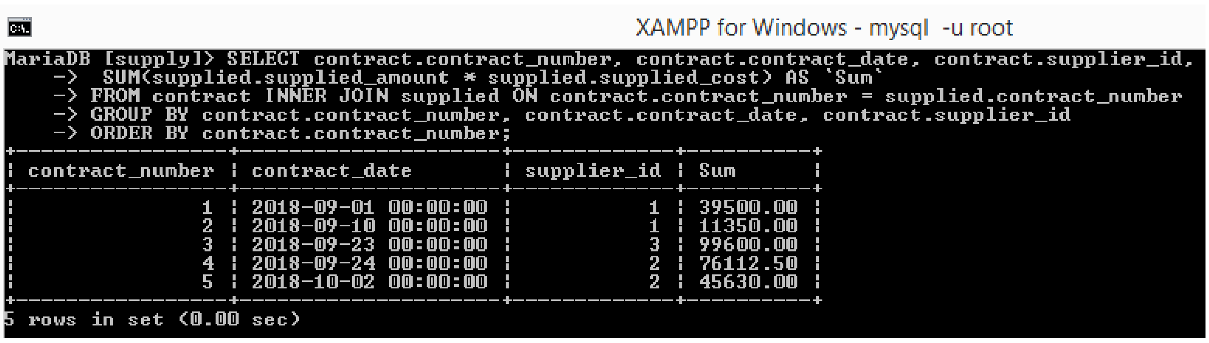
```
MariaDB [supply]> SELECT contract.contract_number, contract.contract_date, supplied.supplied_product,
    ->  supplied.supplied_cost, supplier.*
    -> FROM (supplier INNER JOIN contract ON supplier.supplier_id = contract.supplier_id) INNER JOIN
    ->  supplied ON contract.contract_number = supplied.contract_number
    -> WHERE MONTH(contract.contract_date) = 9 AND YEAR(contract.contract_date) = 2018;
+-----------------+---------------------+------------------+---------------+-------------+--------------------------------+-----
------------------+
¦ contract_number ¦ contract_date       ¦ supplied_product ¦ supplied_cost ¦ supplier_id ¦ supplier_address               ¦ supp
lier_phone        ¦
+-----------------+---------------------+------------------+---------------+-------------+--------------------------------+-----
------------------+
¦               1 ¦ 2018-09-01 00:00:00 ¦ Audio Player     ¦        700.00 ¦           1 ¦ Kharkiv, Nauky av., 55, apt. 108 ¦ phon
e: 32-18-44       ¦
¦               1 ¦ 2018-09-01 00:00:00 ¦ TV               ¦       1300.00 ¦           1 ¦ Kharkiv, Nauky av., 55, apt. 108 ¦ phon
e: 32-18-44       ¦
¦               1 ¦ 2018-09-01 00:00:00 ¦ Video Player     ¦        750.00 ¦           1 ¦ Kharkiv, Nauky av., 55, apt. 108 ¦ phon
e: 32-18-44       ¦
¦               2 ¦ 2018-09-10 00:00:00 ¦ Audio Player     ¦        450.00 ¦           1 ¦ Kharkiv, Nauky av., 55, apt. 108 ¦ phon
e: 32-18-44       ¦
¦               2 ¦ 2018-09-10 00:00:00 ¦ Stereo System    ¦        500.00 ¦           1 ¦ Kharkiv, Nauky av., 55, apt. 108 ¦ phon
e: 32-18-44       ¦
¦               2 ¦ 2018-09-10 00:00:00 ¦ Video Player     ¦        450.00 ¦           1 ¦ Kharkiv, Nauky av., 55, apt. 108 ¦ phon
e: 32-18-44       ¦
¦               4 ¦ 2018-09-24 00:00:00 ¦ Audio Player     ¦        320.00 ¦           2 ¦ Kyiv, Peremohy av., 154, apt. 3  ¦
                  ¦
¦               4 ¦ 2018-09-24 00:00:00 ¦ Printer          ¦        332.50 ¦           2 ¦ Kyiv, Peremohy av., 154, apt. 3  ¦
                  ¦
¦               4 ¦ 2018-09-24 00:00:00 ¦ TV               ¦        990.00 ¦           2 ¦ Kyiv, Peremohy av., 154, apt. 3  ¦
                  ¦
¦               3 ¦ 2018-09-23 00:00:00 ¦ Audio Player     ¦        550.00 ¦           3 ¦ Kharkiv, Pushkinska str., 77     ¦ phon
e: 33-33-44, fax ¦
¦               3 ¦ 2018-09-23 00:00:00 ¦ Monitor          ¦        550.00 ¦           3 ¦ Kharkiv, Pushkinska str., 77     ¦ phon
e: 33-33-44, fax ¦
¦               3 ¦ 2018-09-23 00:00:00 ¦ TV               ¦        900.00 ¦           3 ¦ Kharkiv, Pushkinska str., 77     ¦ phon
e: 33-33-44, fax ¦
+-----------------+---------------------+------------------+---------------+-------------+--------------------------------+-----
------------------+
12 rows in set (0.00 sec)
```

Figure 3.3

Query 4. SELECT with the SUM function

Form a list of contracts (number, date, title) and the total amount for each contract (batch size multiplied by the price per unit and summed up by the contract). The list should be sorted by contract numbers (Figure 3.4).

```
SELECT contract.contract_number, contract.contract_date, contract.supplier_id,
   SUM(supplied.supplied_amount * supplied.supplied_cost) AS `Sum`
FROM contract INNER JOIN supplied ON contract.contract_number = supplied.contract_number
GROUP BY contract.contract_number, contract.contract_date, contract.supplier_id
ORDER BY contract.contract_number;
```



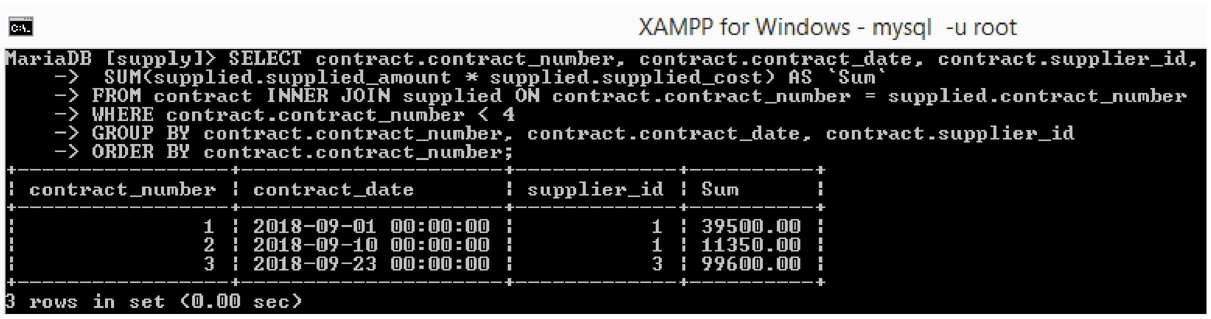
```
MariaDB [supply]> SELECT contract.contract_number, contract.contract_date, contract.supplier_id,
    ->  SUM(supplied.supplied_amount * supplied.supplied_cost) AS `Sum`
    -> FROM contract INNER JOIN supplied ON contract.contract_number = supplied.contract_number
    -> GROUP BY contract.contract_number, contract.contract_date, contract.supplier_id
    -> ORDER BY contract.contract_number;
+-----------------+---------------------+-------------+----------+
| contract_number | contract_date       | supplier_id | Sum      |
+-----------------+---------------------+-------------+----------+
|               1 | 2018-09-01 00:00:00 |           1 | 39500.00 |
|               2 | 2018-09-10 00:00:00 |           1 | 11350.00 |
|               3 | 2018-09-23 00:00:00 |           3 | 99600.00 |
|               4 | 2018-09-24 00:00:00 |           2 | 76112.50 |
|               5 | 2018-10-02 00:00:00 |           2 | 45630.00 |
+-----------------+---------------------+-------------+----------+
5 rows in set (0.00 sec)
```

Figure 3.4

Query 5. SELECT with filtering before grouping

Form a list of contracts (number, date, title) and the total amount for each contract (batch size multiplied by the price per unit and summed up by the contract). The list should be sorted by increasing the total amounts for each contract. After that, the filter must be applied to the list, in order to exclude from the result of the query those records for which the contract number is less than 4 (Figure 3.5).

```
SELECT contract.contract_number, contract.contract_date, contract.supplier_id,
   SUM(supplied.supplied_amount * supplied.supplied_cost) AS `Sum`
FROM contract INNER JOIN supplied ON contract.contract_number = supplied.contract_number
WHERE contract.contract_number < 4
GROUP BY contract.contract_number, contract.contract_date, contract.supplier_id
ORDER BY contract.contract_number;
```



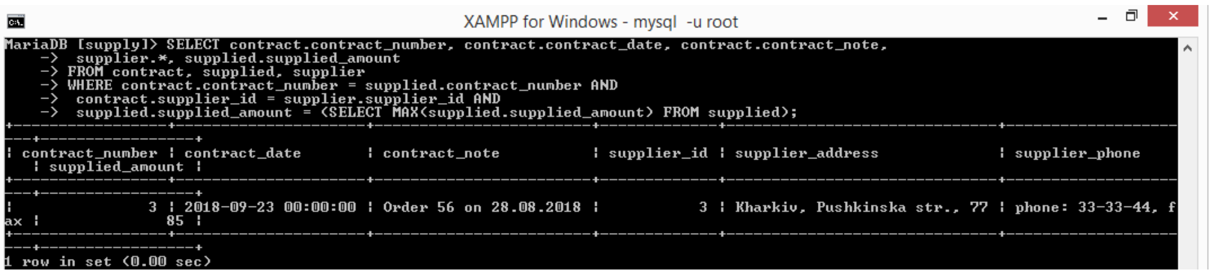
```
MariaDB [supply]> SELECT contract.contract_number, contract.contract_date, contract.supplier_id,
    ->  SUM(supplied.supplied_amount * supplied.supplied_cost) AS `Sum`
    -> FROM contract INNER JOIN supplied ON contract.contract_number = supplied.contract_number
    -> WHERE contract.contract_number < 4
    -> GROUP BY contract.contract_number, contract.contract_date, contract.supplier_id
    -> ORDER BY contract.contract_number;
+-----------------+---------------------+-------------+----------+
| contract_number | contract_date       | supplier_id | Sum      |
+-----------------+---------------------+-------------+----------+
|               1 | 2018-09-01 00:00:00 |           1 | 39500.00 |
|               2 | 2018-09-10 00:00:00 |           1 | 11350.00 |
|               3 | 2018-09-23 00:00:00 |           3 | 99600.00 |
+-----------------+---------------------+-------------+----------+
3 rows in set (0.00 sec)
```

Figure 3.5

Query 6. SELECT with the nested query

Display the information on the largest batch of goods in all contracts with the supplier, as well as the number and the date of the contract (Figure 3.6).

```
SELECT contract.contract_number, contract.contract_date, contract.contract_note,
   supplier.*, supplied.supplied_amount
FROM contract, supplied, supplier
WHERE contract.contract_number = supplied.contract_number AND
   contract.supplier_id = supplier.supplier_id AND
   supplied.supplied_amount = (SELECT MAX(supplied.supplied_amount) FROM supplied);
```



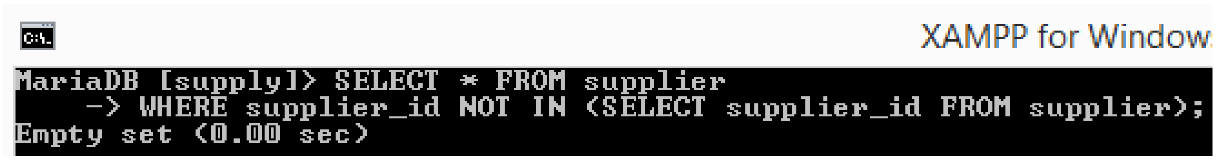
```
MariaDB [supply]> SELECT contract.contract_number, contract.contract_date, contract.contract_note,
    ->  supplier.*, supplied.supplied_amount
    -> FROM contract, supplied, supplier
    -> WHERE contract.contract_number = supplied.contract_number AND
    ->  contract.supplier_id = supplier.supplier_id AND
    ->  supplied.supplied_amount = (SELECT MAX(supplied.supplied_amount) FROM supplied);
+-----------------+---------------------+-------------------------+-------------+-----------------------------+------------------------
---+-----------------+
| contract_number | contract_date       | contract_note           | supplier_id | supplier_address            | supplier_phone
   | supplied_amount |
+-----------------+---------------------+-------------------------+-------------+-----------------------------+------------------------
---+-----------------+
|               3 | 2018-09-23 00:00:00 | Order 56 on 28.08.2018  |           3 | Kharkiv, Pushkinska str., 77 | phone: 33-33-44, f
ax |              85 |
+-----------------+---------------------+-------------------------+-------------+-----------------------------+------------------------
---+-----------------+
1 row in set (0.00 sec)
```

Figure 3.6

Query 7. SELECT with the NOT IN operator

Form a list of suppliers (name and code) with which no contract has been concluded (Figure 3.7).

```
SELECT * FROM supplier
WHERE supplier_id NOT IN (SELECT supplier_id FROM supplier);
```



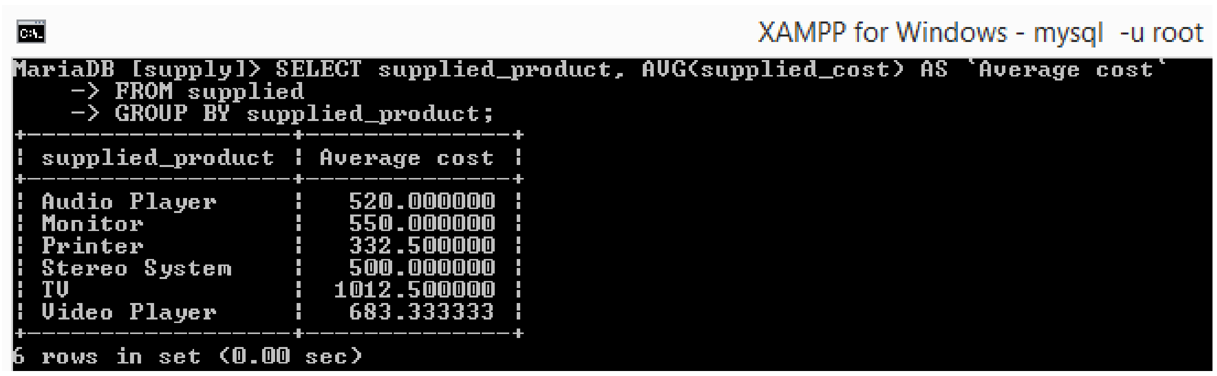
```
MariaDB [supply]> SELECT * FROM supplier
    -> WHERE supplier_id NOT IN (SELECT supplier_id FROM supplier);
Empty set (0.00 sec)
```

Figure 3.7

Query 8. SELECT with the AVG function

Form a list of the names of supplied goods with an indication of the average delivery price per unit (regardless of the supplier) (Figure 3.8).

```
SELECT supplied_product, AVG(supplied_cost) AS `Average cost`
FROM supplied
GROUP BY supplied_product;
```



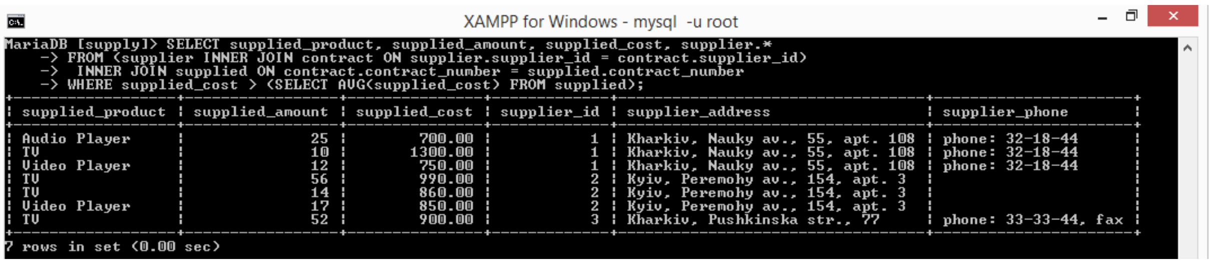
```
MariaDB [supply]> SELECT supplied_product, AVG(supplied_cost) AS `Average cost`
    -> FROM supplied
    -> GROUP BY supplied_product;
+------------------+--------------+
| supplied_product | Average cost |
+------------------+--------------+
| Audio Player     |   520.000000 |
| Monitor          |   550.000000 |
| Printer          |   332.500000 |
| Stereo System    |   500.000000 |
| TV               |  1012.500000 |
| Video Player     |   683.333333 |
+------------------+--------------+
6 rows in set (0.00 sec)
```

Figure 3.8

Query 9. SELECT with filtering by the nested query result

Form a list of goods (name, quantity and price, supplier), for which the price per unit is more than average (Figure 3.9).

```
SELECT supplied_product, supplied_amount, supplied_cost, supplier.*
FROM (supplier INNER JOIN contract ON supplier.supplier_id = contract.supplier_id)
   INNER JOIN supplied ON contract.contract_number = supplied.contract_number
WHERE supplied_cost > (SELECT AVG(supplied_cost) FROM supplied);
```



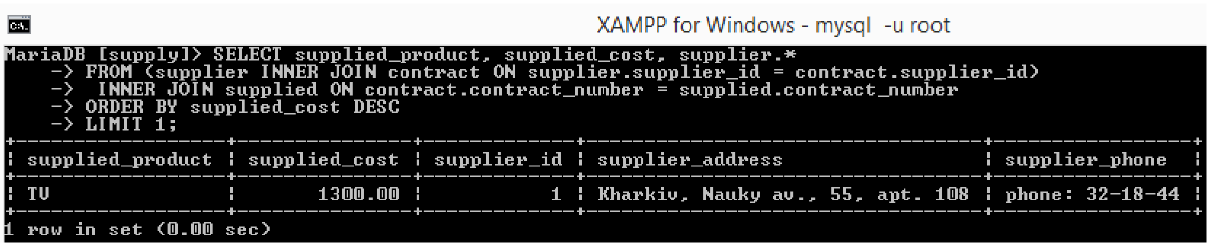
```
MariaDB [supply]> SELECT supplied_product, supplied_amount, supplied_cost, supplier.*
    -> FROM (supplier INNER JOIN contract ON supplier.supplier_id = contract.supplier_id)
    ->  INNER JOIN supplied ON contract.contract_number = supplied.contract_number
    -> WHERE supplied_cost > (SELECT AVG(supplied_cost) FROM supplied);
+------------------+-----------------+---------------+-------------+-------------------------------------+-----------------------+
| supplied_product | supplied_amount | supplied_cost | supplier_id | supplier_address                    | supplier_phone        |
+------------------+-----------------+---------------+-------------+-------------------------------------+-----------------------+
| Audio Player     |              25 |        700.00 |           1 | Kharkiv, Nauky av., 55, apt. 108    | phone: 32-18-44       |
| TV               |              10 |       1300.00 |           1 | Kharkiv, Nauky av., 55, apt. 108    | phone: 32-18-44       |
| Video Player     |              12 |        750.00 |           1 | Kharkiv, Nauky av., 55, apt. 108    | phone: 32-18-44       |
| TV               |              56 |        990.00 |           2 | Kyiv, Peremohy av., 154, apt. 3     |                       |
| TV               |              14 |        860.00 |           2 | Kyiv, Peremohy av., 154, apt. 3     |                       |
| Video Player     |              17 |        850.00 |           2 | Kyiv, Peremohy av., 154, apt. 3     |                       |
| TV               |              52 |        900.00 |           3 | Kharkiv, Pushkinska str., 77        | phone: 33-33-44, fax  |
+------------------+-----------------+---------------+-------------+-------------------------------------+-----------------------+
7 rows in set (0.00 sec)
```

Figure 3.9

Query 10. SELECT with the LIMIT clause

Display information about the five most expensive products (name, price per unit, supplier) (Figure 3.10).

```
SELECT supplied_product, supplied_cost, supplier.*
FROM (supplier INNER JOIN contract ON supplier.supplier_id = contract.supplier_id)
   INNER JOIN supplied ON contract.contract_number = supplied.contract_number
ORDER BY supplied_cost DESC
LIMIT 1;
```



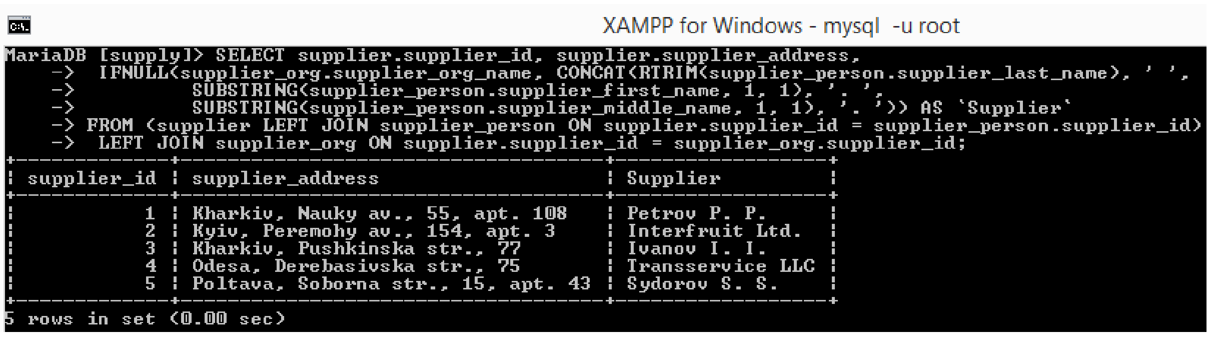
```
MariaDB [supply]> SELECT supplied_product, supplied_cost, supplier.*
    -> FROM (supplier INNER JOIN contract ON supplier.supplier_id = contract.supplier_id)
    ->  INNER JOIN supplied ON contract.contract_number = supplied.contract_number
    -> ORDER BY supplied_cost DESC
    -> LIMIT 1;
+------------------+---------------+-------------+----------------------------------+-----------------+
| supplied_product | supplied_cost | supplier_id | supplier_address                 | supplier_phone  |
+------------------+---------------+-------------+----------------------------------+-----------------+
| TV               |       1300.00 |           1 | Kharkiv, Nauky av., 55, apt. 108 | phone: 32-18-44 |
+------------------+---------------+-------------+----------------------------------+-----------------+
1 row in set (0.00 sec)
```

Figure 3.10

Query 11. SELECT with NULL and string functions

Form a supplier list with code, address, and supplier information. When forming supplier data for individuals, display the surname and initials, and for legal entities – the name (Figure 3.11).

```
SELECT supplier.supplier_id, supplier.supplier_address,
   IFNULL(supplier_org.supplier_org_name, CONCAT(RTRIM(supplier_person.supplier_last_name), ' ',
      SUBSTRING(supplier_person.supplier_first_name, 1, 1), '. ',
      SUBSTRING(supplier_person.supplier_middle_name, 1, 1), '. ')) AS `Supplier`
FROM (supplier LEFT JOIN supplier_person ON supplier.supplier_id = supplier_person.supplier_id)
   LEFT JOIN supplier_org ON supplier.supplier_id = supplier_org.supplier_id;
```



XAMPP for Windows - mysql -u root

```
MariaDB [supply]> SELECT supplier.supplier_id, supplier.supplier_address,
    ->  IFNULL(supplier_org.supplier_org_name, CONCAT(RTRIM(supplier_person.supplier_last_name), ' ',
    ->          SUBSTRING(supplier_person.supplier_first_name, 1, 1), '. ',
    ->          SUBSTRING(supplier_person.supplier_middle_name, 1, 1), '. ')) AS `Supplier`
    -> FROM (supplier LEFT JOIN supplier_person ON supplier.supplier_id = supplier_person.supplier_id)
    ->  LEFT JOIN supplier_org ON supplier.supplier_id = supplier_org.supplier_id;
+-------------+-------------------------------------+-------------------+
| supplier_id | supplier_address                    | Supplier          |
+-------------+-------------------------------------+-------------------+
|           1 | Kharkiv, Nauky av., 55, apt. 108    | Petrov P. P.      |
|           2 | Kyiv, Peremohy av., 154, apt. 3     | Interfruit Ltd.   |
|           3 | Kharkiv, Pushkinska str., 77        | Ivanov I. I.      |
|           4 | Odesa, Derebasivska str., 75        | Transservice LLC  |
|           5 | Poltava, Soborna str., 15, apt. 43  | Sydorov S. S.     |
+-------------+-------------------------------------+-------------------+
5 rows in set (0.00 sec)
```

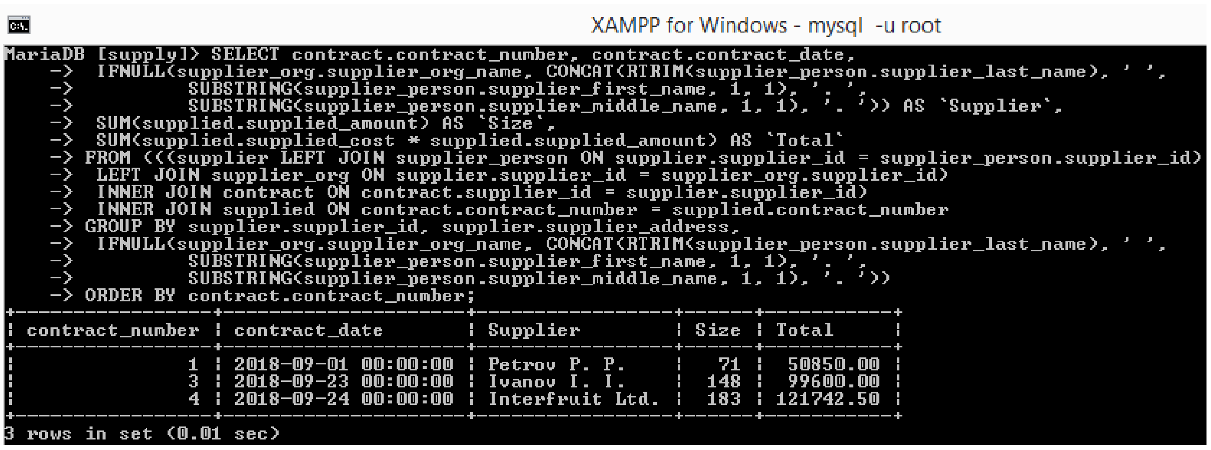
Figure 3.11

Query 12. Complex SELECT with NULL and string functions

Form a list of contracts (include the number, delivery date, and supplier information), the total number of goods delivered and the total amount for each contract. When forming the supplier data for individuals, display the last name and initials, and for legal entities – the name.

The result should contain only those contracts based on which the goods were delivered (e.g., the result of the query should not contain so-called “empty” contracts) (Figure 3.12).

```sql
SELECT contract.contract_number, contract.contract_date,
   IFNULL(supplier_org.supplier_org_name, CONCAT(RTRIM(supplier_person.supplier_last_name), ' ',
      SUBSTRING(supplier_person.supplier_first_name, 1, 1), '. ',
      SUBSTRING(supplier_person.supplier_middle_name, 1, 1), '. ')) AS `Supplier`,
   SUM(supplied.supplied_amount) AS `Size`,
   SUM(supplied.supplied_cost * supplied.supplied_amount) AS `Total`
FROM (((supplier LEFT JOIN supplier_person ON supplier.supplier_id = supplier_person.supplier_id)
   LEFT JOIN supplier_org ON supplier.supplier_id = supplier_org.supplier_id)
   INNER JOIN contract ON contract.supplier_id = supplier.supplier_id)
   INNER JOIN supplied ON contract.contract_number = supplied.contract_number
GROUP BY supplier.supplier_id, supplier.supplier_address,
   IFNULL(supplier_org.supplier_org_name, CONCAT(RTRIM(supplier_person.supplier_last_name), ' ',
      SUBSTRING(supplier_person.supplier_first_name, 1, 1), '. ',
      SUBSTRING(supplier_person.supplier_middle_name, 1, 1), '. '))
ORDER BY contract.contract_number;
```



XAMPP for Windows - mysql -u root

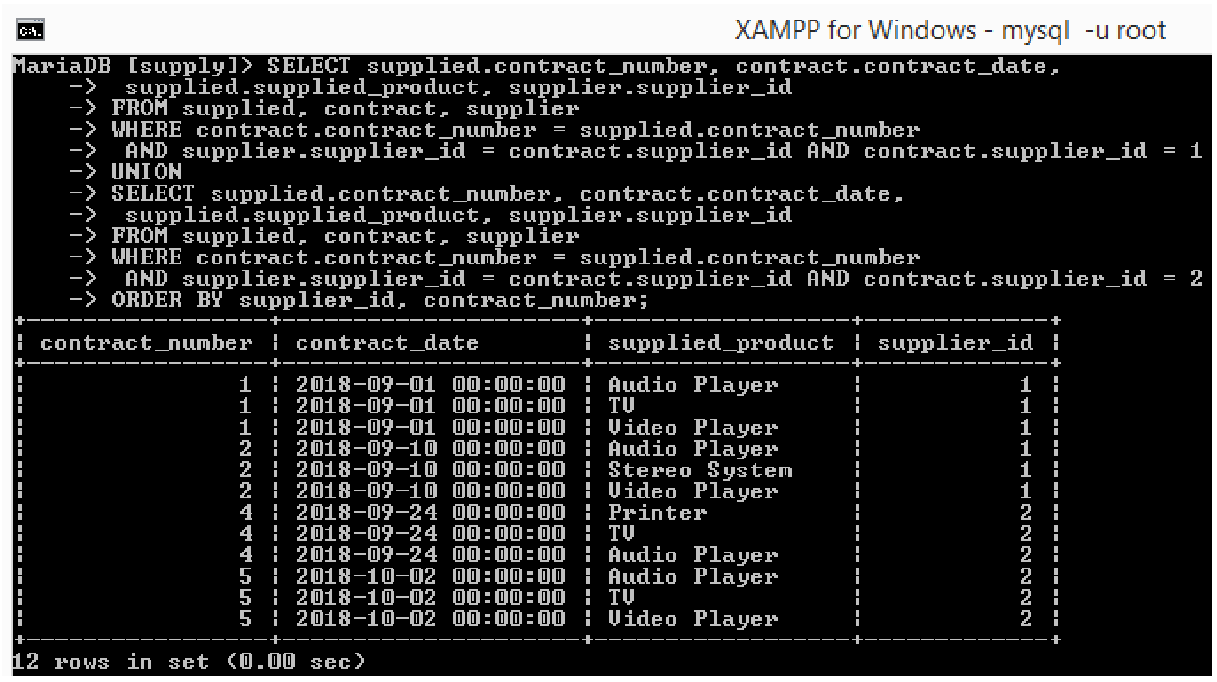
```
MariaDB [supply]> SELECT contract.contract_number, contract.contract_date,
    ->  IFNULL(supplier_org.supplier_org_name, CONCAT(RTRIM(supplier_person.supplier_last_name), ' ',
    ->          SUBSTRING(supplier_person.supplier_first_name, 1, 1), '. ',
    ->          SUBSTRING(supplier_person.supplier_middle_name, 1, 1), '. ')) AS `Supplier`,
    ->  SUM(supplied.supplied_amount) AS `Size`,
    ->  SUM(supplied.supplied_cost * supplied.supplied_amount) AS `Total`
    -> FROM (((supplier LEFT JOIN supplier_person ON supplier.supplier_id = supplier_person.supplier_id)
    ->  LEFT JOIN supplier_org ON supplier.supplier_id = supplier_org.supplier_id)
    ->  INNER JOIN contract ON contract.supplier_id = supplier.supplier_id)
    ->  INNER JOIN supplied ON contract.contract_number = supplied.contract_number
    -> GROUP BY supplier.supplier_id, supplier.supplier_address,
    ->  IFNULL(supplier_org.supplier_org_name, CONCAT(RTRIM(supplier_person.supplier_last_name), ' ',
    ->          SUBSTRING(supplier_person.supplier_first_name, 1, 1), '. ',
    ->          SUBSTRING(supplier_person.supplier_middle_name, 1, 1), '. '))
    -> ORDER BY contract.contract_number;
+-----------------+---------------------+------------------+------+-----------+
| contract_number | contract_date       | Supplier         | Size | Total     |
+-----------------+---------------------+------------------+------+-----------+
|               1 | 2018-09-01 00:00:00 | Petrov P. P.     |   71 |  50850.00 |
|               3 | 2018-09-23 00:00:00 | Ivanov I. I.     |  148 |  99600.00 |
|               4 | 2018-09-24 00:00:00 | Interfruit Ltd.  |  183 | 121742.50 |
+-----------------+---------------------+------------------+------+-----------+
3 rows in set (0.01 sec)
```

Figure 3.12

Query 13. Combining two SELECT queries using the UNION clause

Form a list of goods (with the number of the contract and delivery date) delivered by suppliers 1 (Petrov P. P.) and 2 (Interfruit) (Figure 3.13).

```
SELECT supplied.contract_number, contract.contract_date,
   supplied.supplied_product, supplier.supplier_id
FROM supplied, contract, supplier
WHERE contract.contract_number = supplied.contract_number
   AND supplier.supplier_id = contract.supplier_id AND contract.supplier_id = 1
UNION
SELECT supplied.contract_number, contract.contract_date,
   supplied.supplied_product, supplier.supplier_id
FROM supplied, contract, supplier
WHERE contract.contract_number = supplied.contract_number
   AND supplier.supplier_id = contract.supplier_id AND contract.supplier_id = 2
ORDER BY supplier_id, contract_number;
```



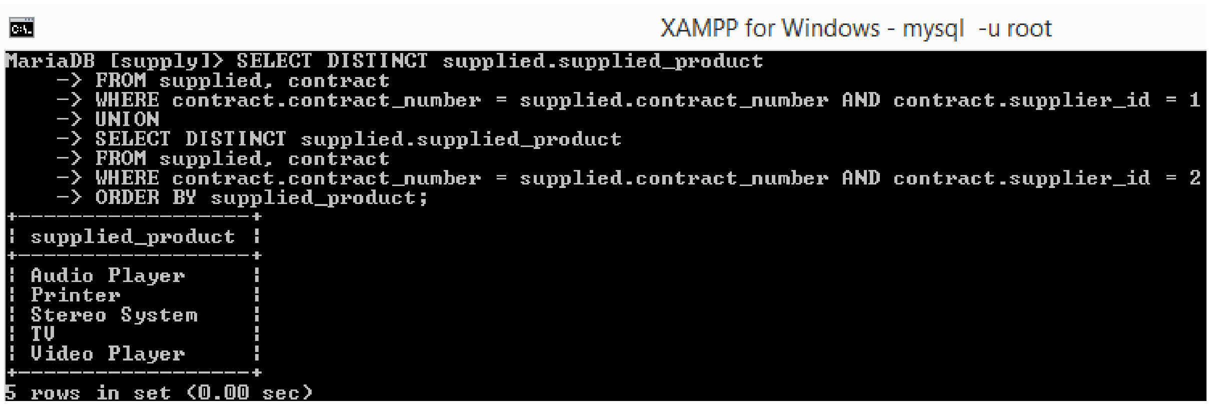
```
MariaDB [supply]> SELECT supplied.contract_number, contract.contract_date,
    ->  supplied.supplied_product, supplier.supplier_id
    -> FROM supplied, contract, supplier
    -> WHERE contract.contract_number = supplied.contract_number
    ->  AND supplier.supplier_id = contract.supplier_id AND contract.supplier_id = 1
    -> UNION
    -> SELECT supplied.contract_number, contract.contract_date,
    ->  supplied.supplied_product, supplier.supplier_id
    -> FROM supplied, contract, supplier
    -> WHERE contract.contract_number = supplied.contract_number
    ->  AND supplier.supplier_id = contract.supplier_id AND contract.supplier_id = 2
    -> ORDER BY supplier_id, contract_number;
+-----------------+---------------------+------------------+-------------+
| contract_number | contract_date       | supplied_product | supplier_id |
+-----------------+---------------------+------------------+-------------+
|               1 | 2018-09-01 00:00:00 | Audio Player     |           1 |
|               1 | 2018-09-01 00:00:00 | TV               |           1 |
|               1 | 2018-09-01 00:00:00 | Video Player     |           1 |
|               2 | 2018-09-10 00:00:00 | Audio Player     |           1 |
|               2 | 2018-09-10 00:00:00 | Stereo System    |           1 |
|               2 | 2018-09-10 00:00:00 | Video Player     |           1 |
|               4 | 2018-09-24 00:00:00 | Printer          |           2 |
|               4 | 2018-09-24 00:00:00 | TV               |           2 |
|               4 | 2018-09-24 00:00:00 | Audio Player     |           2 |
|               5 | 2018-10-02 00:00:00 | Audio Player     |           2 |
|               5 | 2018-10-02 00:00:00 | TV               |           2 |
|               5 | 2018-10-02 00:00:00 | Video Player     |           2 |
+-----------------+---------------------+------------------+-------------+
12 rows in set (0.00 sec)
```

Figure 3.13

Query 14. SELECT with the DISTINCT and UNION clauses

Form a nomenclature of goods (a list of product names) that were supplied only by supplier 1 (Petrov P. P.), or only supplier 2 (Interfruit), or both supplier 1 and supplier 2 (Figure 3.14).

```
SELECT DISTINCT supplied.supplied_product
FROM supplied, contract
WHERE contract.contract_number = supplied.contract_number AND contract.supplier_id = 1
UNION
SELECT DISTINCT supplied.supplied_product
FROM supplied, contract
WHERE contract.contract_number = supplied.contract_number AND contract.supplier_id = 2
ORDER BY supplied_product;
```



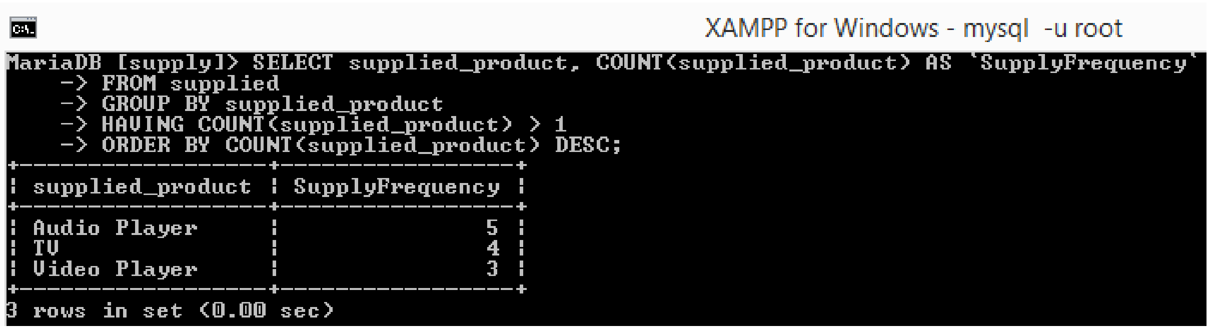
```
XAMPP for Windows - mysql  -u root
MariaDB [supply]> SELECT DISTINCT supplied.supplied_product
    -> FROM supplied, contract
    -> WHERE contract.contract_number = supplied.contract_number AND contract.supplier_id = 1
    -> UNION
    -> SELECT DISTINCT supplied.supplied_product
    -> FROM supplied, contract
    -> WHERE contract.contract_number = supplied.contract_number AND contract.supplier_id = 2
    -> ORDER BY supplied_product;
+------------------+
| supplied_product |
+------------------+
| Audio Player     |
| Printer          |
| Stereo System    |
| TV               |
| Video Player     |
+------------------+
5 rows in set (0.00 sec)
```

Figure 3.14

Query 15. SELECT with the HAVING clause

Generate a list of items that should demonstrate the frequency of deliveries. Include only items that shipped more than once to the list. The list should be sorted by decreasing the supply frequency (Figure 3.15).

```
SELECT supplied_product, COUNT(supplied_product) AS `SupplyFrequency`
FROM supplied
GROUP BY supplied_product
HAVING COUNT(supplied_product) > 1
ORDER BY COUNT(supplied_product) DESC;
```



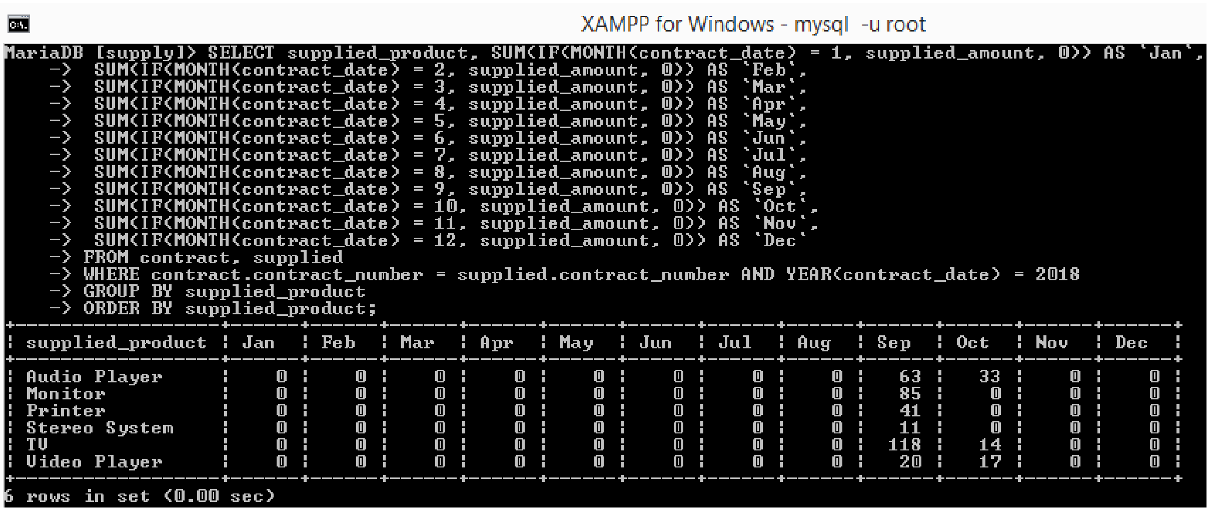
```
XAMPP for Windows - mysql  -u root
MariaDB [supply]> SELECT supplied_product, COUNT(supplied_product) AS `SupplyFrequency`
    -> FROM supplied
    -> GROUP BY supplied_product
    -> HAVING COUNT(supplied_product) > 1
    -> ORDER BY COUNT(supplied_product) DESC;
+------------------+-----------------+
| supplied_product | SupplyFrequency |
+------------------+-----------------+
| Audio Player     |               5 |
| TV               |               4 |
| Video Player     |               3 |
+------------------+-----------------+
3 rows in set (0.00 sec)
```

Figure 3.15

Query 16. SELECT with the IF function

Retrieve data on quantitative dynamics of goods deliveries during 2018. The data should be aggregated in months and presented as a table with lines of product names, and columns are the numbers of months in 2018. At the intersection of a row and a column, the quantity of this product delivered in this month should be displayed (Figure 3.16).

```sql
SELECT supplied_product, SUM(IF(MONTH(contract_date) = 1, supplied_amount, 0)) AS `Jan`,
   SUM(IF(MONTH(contract_date) = 2, supplied_amount, 0)) AS `Feb`,
   SUM(IF(MONTH(contract_date) = 3, supplied_amount, 0)) AS `Mar`,
   SUM(IF(MONTH(contract_date) = 4, supplied_amount, 0)) AS `Apr`,
   SUM(IF(MONTH(contract_date) = 5, supplied_amount, 0)) AS `May`,
   SUM(IF(MONTH(contract_date) = 6, supplied_amount, 0)) AS `Jun`,
   SUM(IF(MONTH(contract_date) = 7, supplied_amount, 0)) AS `Jul`,
   SUM(IF(MONTH(contract_date) = 8, supplied_amount, 0)) AS `Aug`,
   SUM(IF(MONTH(contract_date) = 9, supplied_amount, 0)) AS `Sep`,
   SUM(IF(MONTH(contract_date) = 10, supplied_amount, 0)) AS `Oct`,
   SUM(IF(MONTH(contract_date) = 11, supplied_amount, 0)) AS `Nov`,
   SUM(IF(MONTH(contract_date) = 12, supplied_amount, 0)) AS `Dec`
FROM contract, supplied
WHERE contract.contract_number = supplied.contract_number AND YEAR(contract_date) = 2018
GROUP BY supplied_product
ORDER BY supplied_product;
```


XAMPP for Windows - mysql -u root

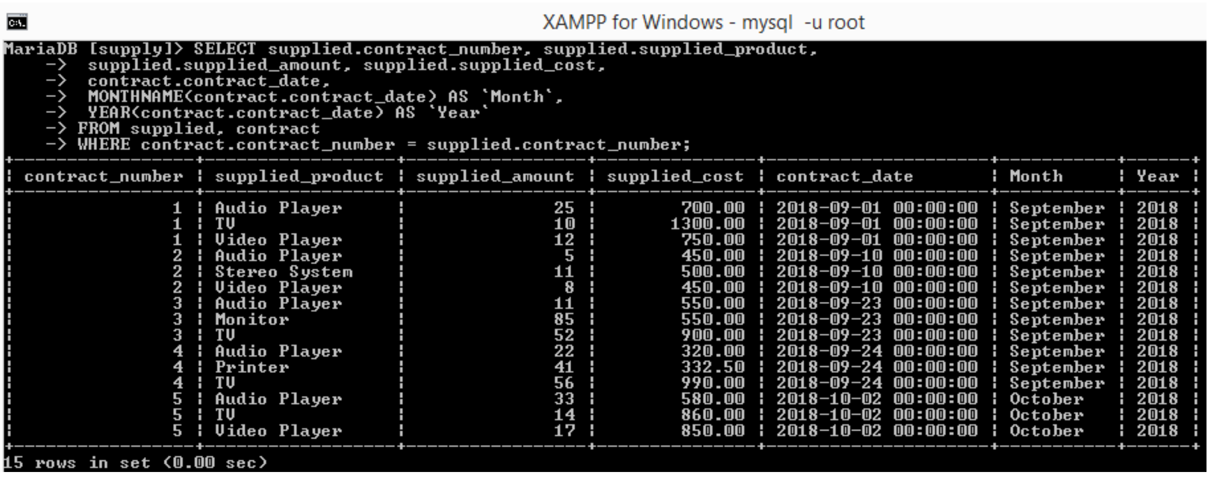
```
MariaDB [supply]> SELECT supplied_product, SUM(IF(MONTH(contract_date) = 1, supplied_amount, 0)) AS `Jan`,
    ->  SUM(IF(MONTH(contract_date) = 2, supplied_amount, 0)) AS `Feb`,
    ->  SUM(IF(MONTH(contract_date) = 3, supplied_amount, 0)) AS `Mar`,
    ->  SUM(IF(MONTH(contract_date) = 4, supplied_amount, 0)) AS `Apr`,
    ->  SUM(IF(MONTH(contract_date) = 5, supplied_amount, 0)) AS `May`,
    ->  SUM(IF(MONTH(contract_date) = 6, supplied_amount, 0)) AS `Jun`,
    ->  SUM(IF(MONTH(contract_date) = 7, supplied_amount, 0)) AS `Jul`,
    ->  SUM(IF(MONTH(contract_date) = 8, supplied_amount, 0)) AS `Aug`,
    ->  SUM(IF(MONTH(contract_date) = 9, supplied_amount, 0)) AS `Sep`,
    ->  SUM(IF(MONTH(contract_date) = 10, supplied_amount, 0)) AS `Oct`,
    ->  SUM(IF(MONTH(contract_date) = 11, supplied_amount, 0)) AS `Nov`,
    ->  SUM(IF(MONTH(contract_date) = 12, supplied_amount, 0)) AS `Dec`
    -> FROM contract, supplied
    -> WHERE contract.contract_number = supplied.contract_number AND YEAR(contract_date) = 2018
    -> GROUP BY supplied_product
    -> ORDER BY supplied_product;
+------------------+------+------+------+------+------+------+------+------+------+------+------+------+
| supplied_product | Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
+------------------+------+------+------+------+------+------+------+------+------+------+------+------+
| Audio Player     |    0 |    0 |    0 |    0 |    0 |    0 |    0 |    0 |   63 |   33 |    0 |    0 |
| Monitor          |    0 |    0 |    0 |    0 |    0 |    0 |    0 |    0 |   85 |    0 |    0 |    0 |
| Printer          |    0 |    0 |    0 |    0 |    0 |    0 |    0 |    0 |   41 |    0 |    0 |    0 |
| Stereo System    |    0 |    0 |    0 |    0 |    0 |    0 |    0 |    0 |   11 |    0 |    0 |    0 |
| TV               |    0 |    0 |    0 |    0 |    0 |    0 |    0 |    0 |  118 |   14 |    0 |    0 |
| Video Player     |    0 |    0 |    0 |    0 |    0 |    0 |    0 |    0 |   20 |   17 |    0 |    0 |
+------------------+------+------+------+------+------+------+------+------+------+------+------+------+
6 rows in set (0.00 sec)
```

Figure 3.16

Query 17. SELECT with the MONTHNAME function

Form a list of supplied goods. For each item in this list, the following information must be shown: contract number, product name, unit number, unit price, delivery date, month name, and year number (Figure 3.17).

```sql
SELECT supplied.contract_number, supplied.supplied_product,
   supplied.supplied_amount, supplied.supplied_cost,
   contract.contract_date,
   MONTHNAME(contract.contract_date) AS `Month`,
   YEAR(contract.contract_date) AS `Year`
FROM supplied, contract
WHERE contract.contract_number = supplied.contract_number;
```



XAMPP for Windows - mysql -u root

```
MariaDB [supply]> SELECT supplied.contract_number, supplied.supplied_product,
    ->  supplied.supplied_amount, supplied.supplied_cost,
    ->  contract.contract_date,
    ->  MONTHNAME(contract.contract_date) AS `Month`,
    ->  YEAR(contract.contract_date) AS `Year`
    -> FROM supplied, contract
    -> WHERE contract.contract_number = supplied.contract_number;
+-----------------+------------------+-----------------+---------------+---------------------+-----------+------+
| contract_number | supplied_product | supplied_amount | supplied_cost | contract_date       | Month     | Year |
+-----------------+------------------+-----------------+---------------+---------------------+-----------+------+
|               1 | Audio Player     |              25 |        700.00 | 2018-09-01 00:00:00 | September | 2018 |
|               1 | TV               |              10 |       1300.00 | 2018-09-01 00:00:00 | September | 2018 |
|               1 | Video Player     |              12 |        750.00 | 2018-09-01 00:00:00 | September | 2018 |
|               2 | Audio Player     |               5 |        450.00 | 2018-09-10 00:00:00 | September | 2018 |
|               2 | Stereo System    |              11 |        500.00 | 2018-09-10 00:00:00 | September | 2018 |
|               2 | Video Player     |               8 |        450.00 | 2018-09-10 00:00:00 | September | 2018 |
|               3 | Audio Player     |              11 |        550.00 | 2018-09-23 00:00:00 | September | 2018 |
|               3 | Monitor          |              85 |        550.00 | 2018-09-23 00:00:00 | September | 2018 |
|               3 | TV               |              52 |        900.00 | 2018-09-23 00:00:00 | September | 2018 |
|               4 | Audio Player     |              22 |        320.00 | 2018-09-24 00:00:00 | September | 2018 |
|               4 | Printer          |              41 |        332.50 | 2018-09-24 00:00:00 | September | 2018 |
|               4 | TV               |              56 |        990.00 | 2018-09-24 00:00:00 | September | 2018 |
|               5 | Audio Player     |              33 |        580.00 | 2018-10-02 00:00:00 | October   | 2018 |
|               5 | TV               |              14 |        860.00 | 2018-10-02 00:00:00 | October   | 2018 |
|               5 | Video Player     |              17 |        850.00 | 2018-10-02 00:00:00 | October   | 2018 |
+-----------------+------------------+-----------------+---------------+---------------------+-----------+------+
15 rows in set (0.00 sec)
```

Figure 3.17

3.2. Questions

1. What SQL statement is used to retrieve data from one or several tables?
2. Show the common structure of the SELECT statement.
3. Which form of the SQL SELECT statement might be used if it is required to display all columns of a certain table?
4. Which construction is used to select records that satisfy search criteria?
5. What keyword is used to exclude duplicate rows?
6. Which construction is used to sort values by single or multiple columns?
7. How the reverse sorting might be implemented?
8. Which keyword is used to limit the range of retrieved records?
9. Which construction is used to group retrieved records?

10. Name the aggregation functions, their purpose, and basic features.
11. How to give the new name to a specific column?
12. What is the purpose of the HAVING keyword? What is the difference between this keyword from WHERE?
13. Name basic arithmetic, logic, and comparison operators, their purpose, and examples of usage.
14. The purpose of the MONTH function and examples of its usage.
15. The purpose of the YEAR function and examples of its usage.
16. The purpose of the IFNULL function and examples of its usage.
17. The purpose of the CONCAT function and examples of its usage.
18. The purpose of the RTRIM function and examples of its usage.
19. The purpose of the SUBSTRING function and examples of its usage.
20. The purpose of the IF function and examples of its usage.
21. Which operator is used to combine the results of two queries?