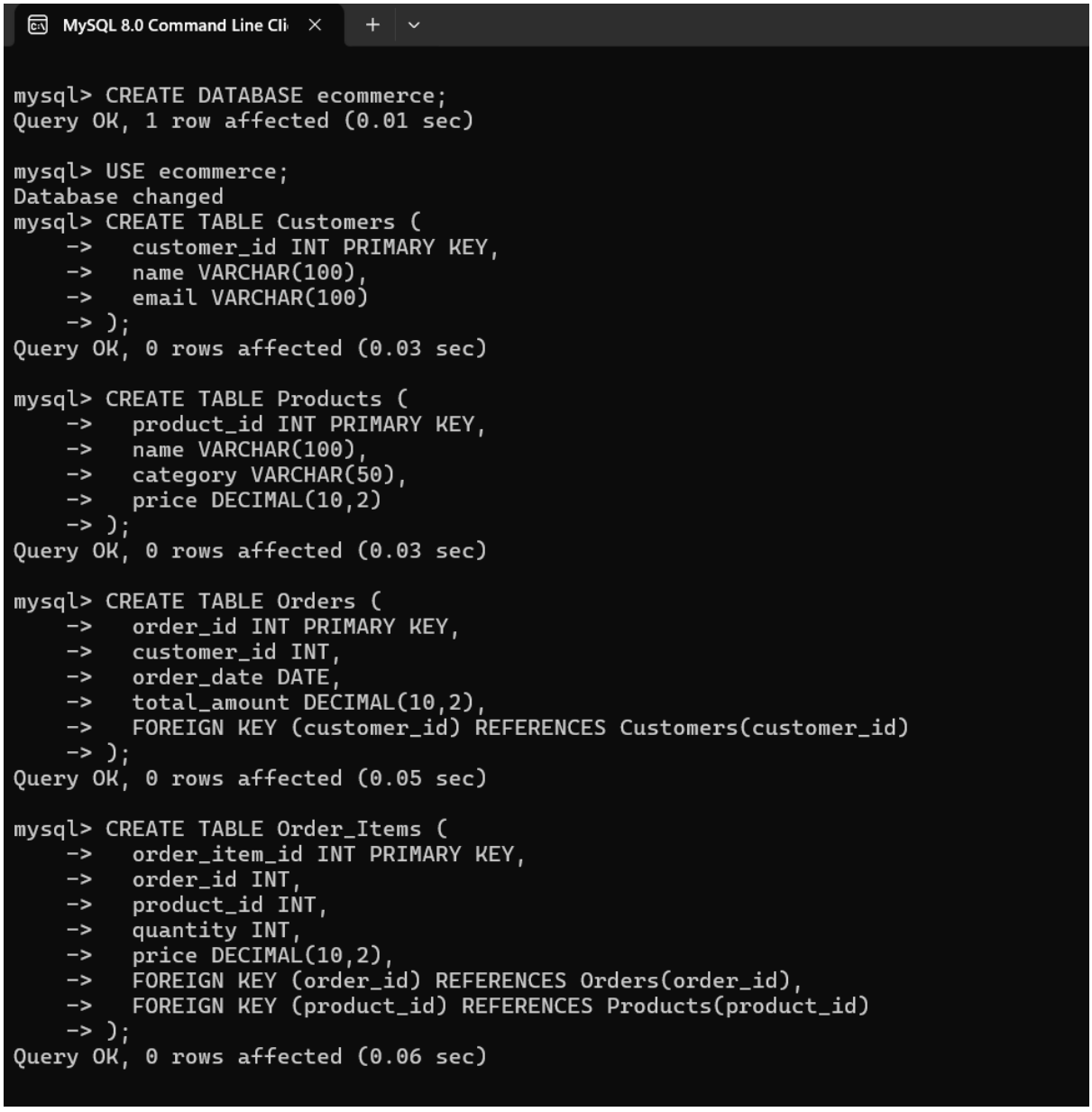
SQL Data Analysis using MySQL

Sql code:

```
CREATE DATABASE ecommerce;
USE ecommerce;
CREATE TABLE Customers (
  customer_id INT PRIMARY KEY,
  name VARCHAR(100),
  email VARCHAR(100)
);

CREATE TABLE Products (
  product_id INT PRIMARY KEY,
  name VARCHAR(100),
  category VARCHAR(50),
  price DECIMAL(10,2)
);
CREATE TABLE Orders (
  order_id INT PRIMARY KEY,
  customer_id INT,
  order_date DATE,
  total_amount DECIMAL(10,2),
  FOREIGN KEY (customer_id) REFERENCES Customers(customer_id)
);

CREATE TABLE Order_Items (
  order_item_id INT PRIMARY KEY,
  order_id INT,
  product_id INT,
  quantity INT,
```

```
  price DECIMAL(10,2),
  FOREIGN KEY (order_id) REFERENCES Orders(order_id),
  FOREIGN KEY (product_id) REFERENCES Products(product_id)
);
```



insert data manually:

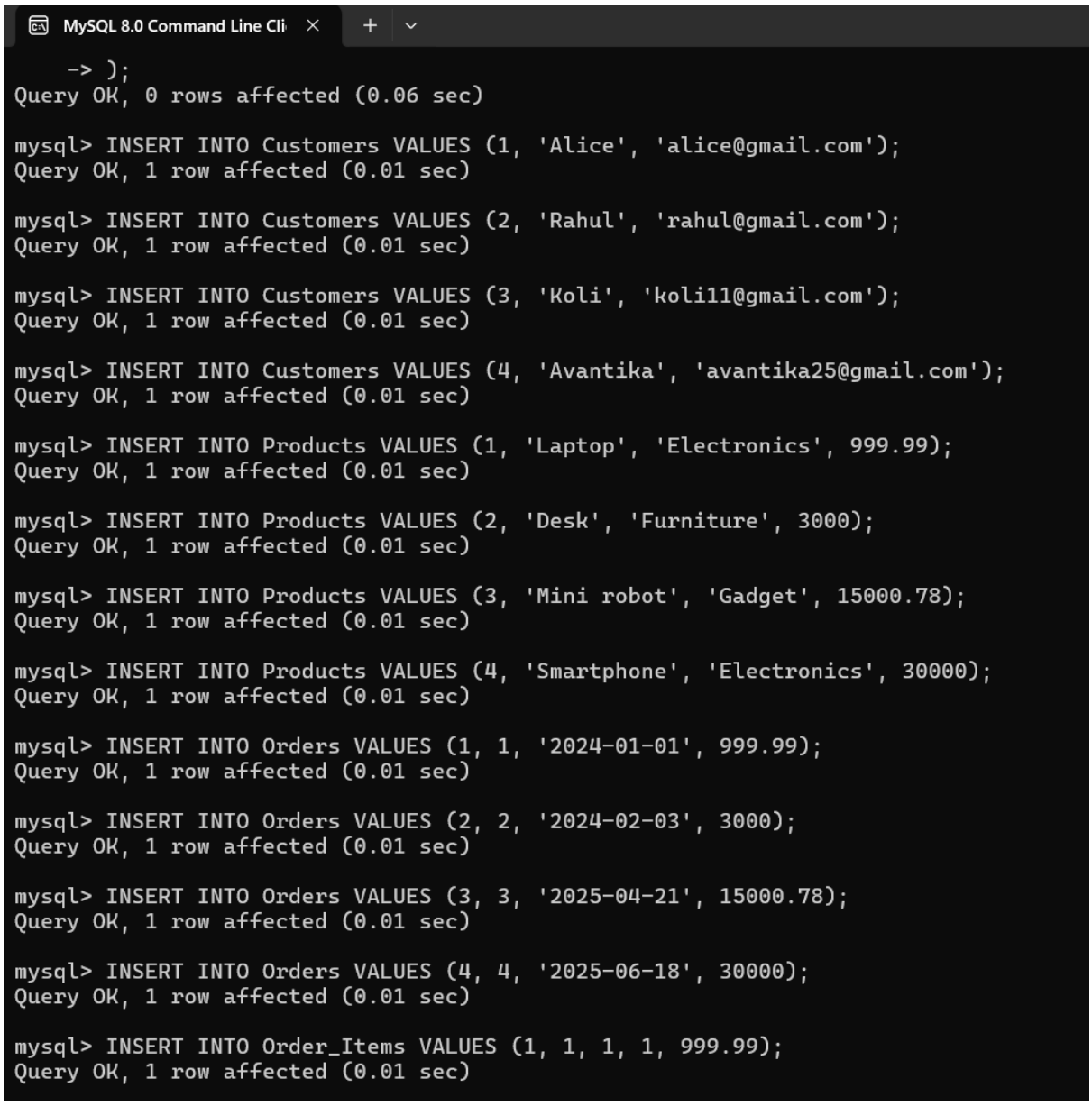
sql code:

INSERT INTO Customers VALUES (1, 'Alice', 'alice@gmail.com'); ..(like this more)

INSERT INTO Products VALUES (1, 'Laptop', 'Electronics', 999.99); ..(like this more)

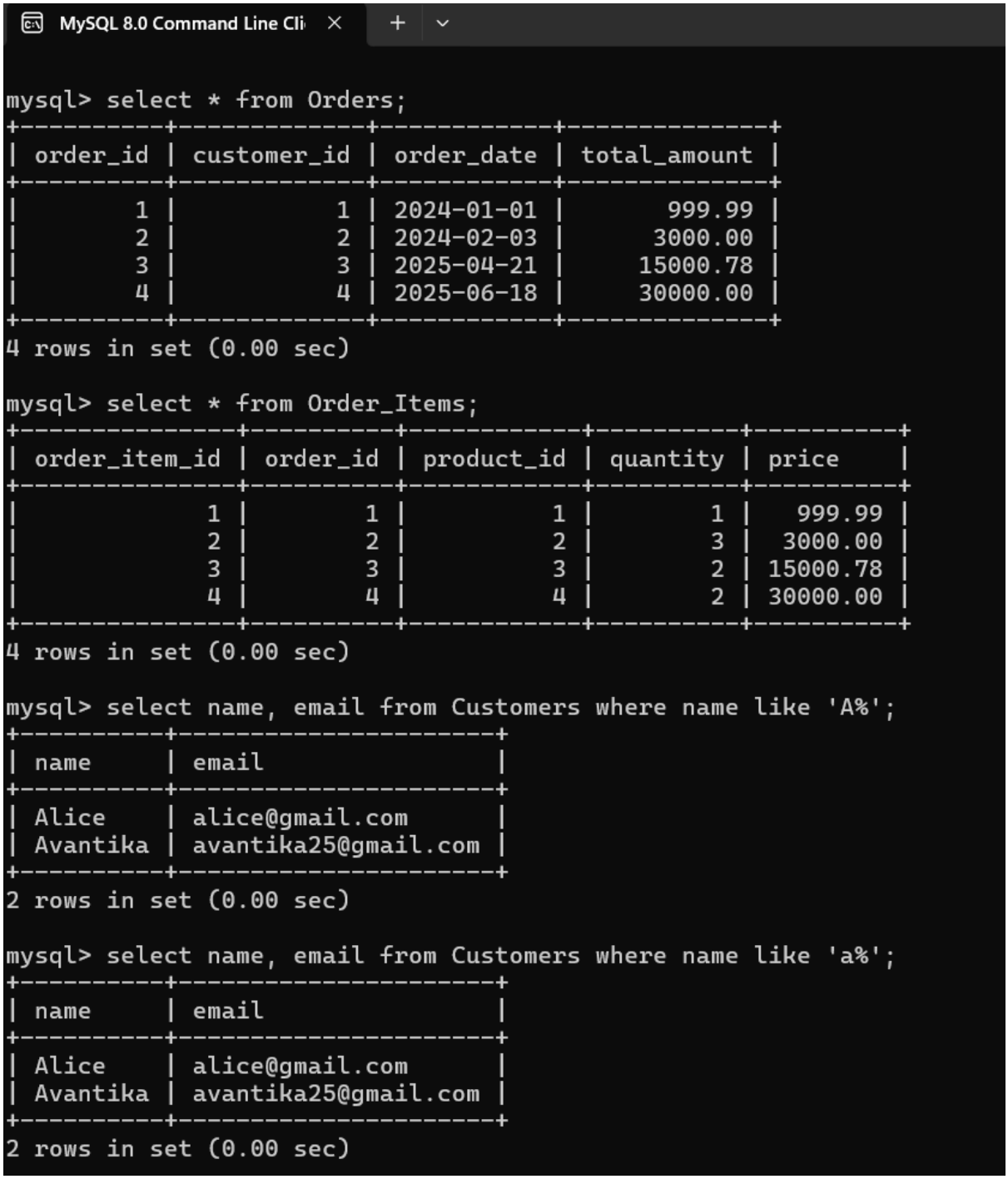
INSERT INTO Orders VALUES (1, 1, '2024-01-01', 999.99); ..(like this more)

INSERT INTO Order_Items VALUES (1, 1, 1, 1, 999.99); ..(like this more)



MySQL 8.0 Command Line Cli

```
mysql> INSERT INTO Order_Items VALUES (2, 2, 2, 3, 3000);
Query OK, 1 row affected (0.01 sec)

mysql> INSERT INTO Order_Items VALUES (3, 3, 3, 2, 15000.78);
Query OK, 1 row affected (0.01 sec)

mysql> INSERT INTO Order_Items VALUES (4, 4, 4, 2, 30000);
Query OK, 1 row affected (0.01 sec)

mysql> select * from Customers;
+-------------+----------+----------------------+
| customer_id | name     | email                |
+-------------+----------+----------------------+
|           1 | Alice    | alice@gmail.com      |
|           2 | Rahul    | rahul@gmail.com      |
|           3 | Koli     | koli11@gmail.com     |
|           4 | Avantika | avantika25@gmail.com |
+-------------+----------+----------------------+
4 rows in set (0.00 sec)

mysql> select * from Products;
+------------+------------+-------------+----------+
| product_id | name       | category    | price    |
+------------+------------+-------------+----------+
|          1 | Laptop     | Electronics |   999.99 |
|          2 | Desk       | Furniture   |  3000.00 |
|          3 | Mini robot | Gadget      | 15000.78 |
|          4 | Smartphone | Electronics | 30000.00 |
+------------+------------+-------------+----------+
4 rows in set (0.00 sec)

mysql> select * from Orders;
+----------+-------------+------------+--------------+
| order_id | customer_id | order_date | total_amount |
+----------+-------------+------------+--------------+
|        1 |           1 | 2024-01-01 |       999.99 |
|        2 |           2 | 2024-02-03 |      3000.00 |
|        3 |           3 | 2025-04-21 |     15000.78 |
|        4 |           4 | 2025-06-18 |     30000.00 |
+----------+-------------+------------+--------------+
```



a. Basic Query

Sql code:

SELECT name, email FROM CustomersWHERE name LIKE 'A%';

b. JOIN + GROUP BY + Aggregates

Sql code

SELECT c.name, SUM(o.total_amount) AS total_spent

FROM Customers c

```
JOIN Orders o ON c.customer_id = o.customer_id
GROUP BY c.name;
```

c. Subquery

Sql code:

```
SELECT name FROM Customers
WHERE customer_id IN (
  SELECT customer_id FROM Orders
  GROUP BY customer_id
  HAVING SUM(total_amount) > (
    SELECT AVG(total_amount) FROM Orders
  )
);
```

d. Create a View

Sql code:

```
CREATE VIEW customer_summary AS
SELECT c.name, COUNT(o.order_id) AS total_orders, SUM(o.total_amount) AS total_spent
FROM Customers c
JOIN Orders o ON c.customer_id = o.customer_id
GROUP BY c.name;
```

e. Optimize with Indexes

sql code:

```
CREATE INDEX idx_customer_id ON Orders(customer_id);
CREATE INDEX idx_order_date ON Orders(order_date);
```

MySQL 8.0 Command Line Cli

```
mysql> INSERT INTO Order_Items VALUES (2, 2, 2, 3, 3000);
Query OK, 1 row affected (0.01 sec)

mysql> INSERT INTO Order_Items VALUES (3, 3, 3, 2, 15000.78);
Query OK, 1 row affected (0.01 sec)

mysql> INSERT INTO Order_Items VALUES (4, 4, 4, 2, 30000);
Query OK, 1 row affected (0.01 sec)

mysql> select * from Customers;
+-------------+----------+----------------------+
| customer_id | name     | email                |
+-------------+----------+----------------------+
|           1 | Alice    | alice@gmail.com      |
|           2 | Rahul    | rahul@gmail.com      |
|           3 | Koli     | koli11@gmail.com     |
|           4 | Avantika | avantika25@gmail.com |
+-------------+----------+----------------------+
4 rows in set (0.00 sec)

mysql> select * from Products;
+------------+------------+-------------+----------+
| product_id | name       | category    | price    |
+------------+------------+-------------+----------+
|          1 | Laptop     | Electronics |   999.99 |
|          2 | Desk       | Furniture   |  3000.00 |
|          3 | Mini robot | Gadget      | 15000.78 |
|          4 | Smartphone | Electronics | 30000.00 |
+------------+------------+-------------+----------+
4 rows in set (0.00 sec)

mysql> select * from Orders;
+----------+-------------+------------+--------------+
| order_id | customer_id | order_date | total_amount |
+----------+-------------+------------+--------------+
|        1 |           1 | 2024-01-01 |       999.99 |
|        2 |           2 | 2024-02-03 |      3000.00 |
|        3 |           3 | 2025-04-21 |     15000.78 |
|        4 |           4 | 2025-06-18 |     30000.00 |
+----------+-------------+------------+--------------+
```

MySQL 8.0 Command Line Cli

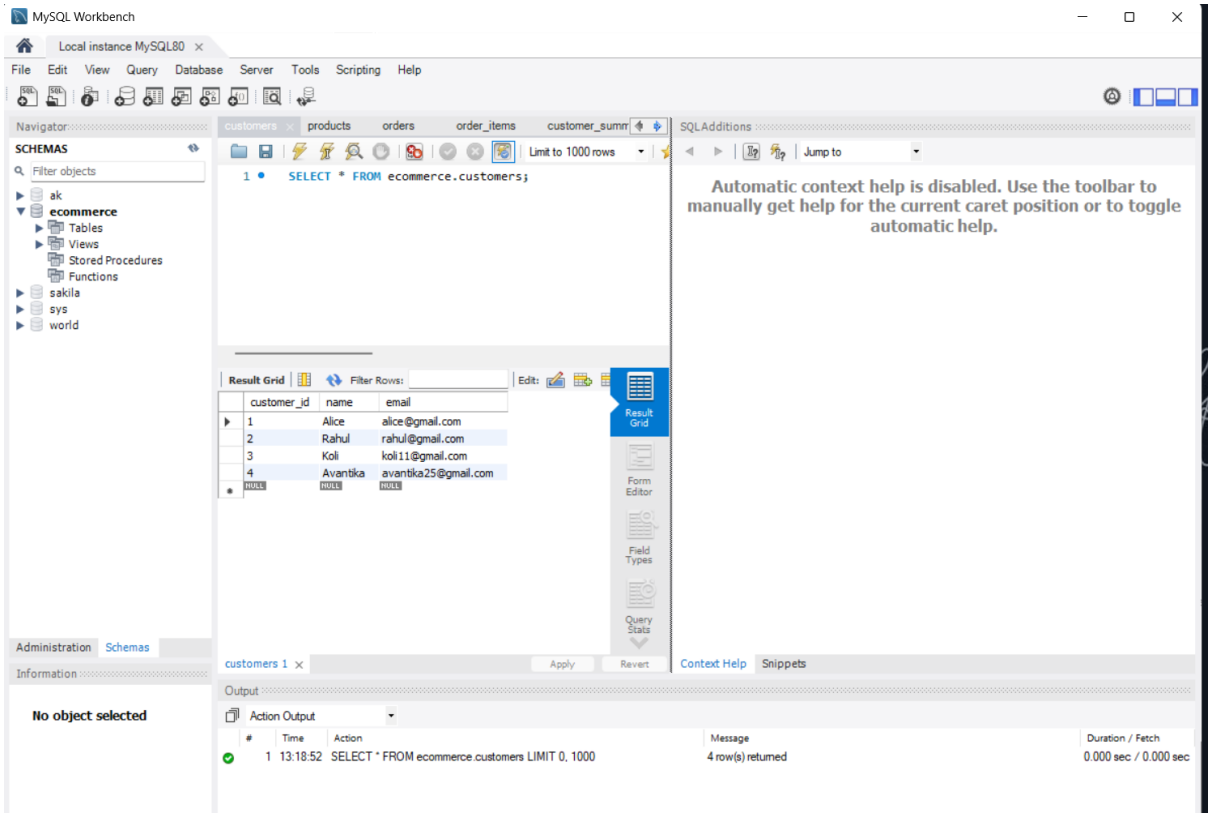
```
mysql> select * from Orders;
+----------+-------------+------------+--------------+
| order_id | customer_id | order_date | total_amount |
+----------+-------------+------------+--------------+
|        1 |           1 | 2024-01-01 |       999.99 |
|        2 |           2 | 2024-02-03 |      3000.00 |
|        3 |           3 | 2025-04-21 |     15000.78 |
|        4 |           4 | 2025-06-18 |     30000.00 |
+----------+-------------+------------+--------------+
4 rows in set (0.00 sec)

mysql> select * from Order_Items;
+---------------+----------+------------+----------+----------+
| order_item_id | order_id | product_id | quantity | price    |
+---------------+----------+------------+----------+----------+
|             1 |        1 |          1 |        1 |   999.99 |
|             2 |        2 |          2 |        3 |  3000.00 |
|             3 |        3 |          3 |        2 | 15000.78 |
|             4 |        4 |          4 |        2 | 30000.00 |
+---------------+----------+------------+----------+----------+
4 rows in set (0.00 sec)

mysql> select name, email from Customers where name like 'A%';
+----------+---------------------+
| name     | email               |
+----------+---------------------+
| Alice    | alice@gmail.com     |
| Avantika | avantika25@gmail.com |
+----------+---------------------+
2 rows in set (0.00 sec)

mysql> select name, email from Customers where name like 'a%';
+----------+---------------------+
| name     | email               |
+----------+---------------------+
| Alice    | alice@gmail.com     |
| Avantika | avantika25@gmail.com |
+----------+---------------------+
2 rows in set (0.00 sec)
```

```
MySQL 8.0 Command Line Cli

mysql> select c.name, sum(o.total_amount) as total_spent from Customers c;
ERROR 1054 (42S22): Unknown column 'o.total_amount' in 'field list'
mysql> select c.name, sum(o.total_amount) as total_spent from Customers c join Orders o on c.customer_id=o.customer_id group by c.name;
+----------+-------------+
| name     | total_spent |
+----------+-------------+
| Alice    |      999.99 |
| Rahul    |     3000.00 |
| Koli     |    15000.78 |
| Avantika |    30000.00 |
+----------+-------------+
4 rows in set (0.00 sec)

mysql> select name from Customers where customer_id in ( select customer_id from Orders group by customer_id having sum(total_amount) > ( select avg(total_a
mount) from Orders) );
+----------+
| name     |
+----------+
| Koli     |
| Avantika |
+----------+
2 rows in set (0.01 sec)

mysql> create view customer_summary as select c.name, count(o.order_id_ as total_orders, sum(o.total_amount) as total_spent from Customers c join Orders o o
n c.customer_id = o.customer_id groupby c.name;
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near 'a
s total_orders, sum(o.total_amount) as total_spent from Customers c join Orders' at line 1
mysql> create view customer_summary as select c.name, count(o.order_id) as total_orders, sum(o.total_amount) as total_spent from Customers c join Orders o o
n c.customer_id = o.customer_id group by c.name;
Query OK, 0 rows affected (0.01 sec)

mysql> select * from customer_summary;
+----------+--------------+-------------+
| name     | total_orders | total_spent |
+----------+--------------+-------------+
| Alice    |            1 |      999.99 |
| Rahul    |            1 |     3000.00 |
| Koli     |            1 |    15000.78 |
| Avantika |            1 |    30000.00 |
+----------+--------------+-------------+
```

```
MySQL 8.0 Command Line Cli

mysql> CREATE INDEX idx_customer_id ON Orders(customer_id);
Query OK, 0 rows affected (0.06 sec)
Records: 0  Duplicates: 0  Warnings: 0

mysql> CREATE INDEX idx_order_date ON Orders(order_date);
Query OK, 0 rows affected (0.04 sec)
Records: 0  Duplicates: 0  Warnings: 0
```

```
mysql> SHOW INDEX FROM Orders;
+--------+------------+----------------+--------------+-------------+-----------+-------------+----------+--------+------+------------+---------+----------
-----+---------+------------+
| Table  | Non_unique | Key_name       | Seq_in_index | Column_name | Collation | Cardinality | Sub_part | Packed | Null | Index_type | Comment | Index_com
ment | Visible | Expression |
+--------+------------+----------------+--------------+-------------+-----------+-------------+----------+--------+------+------------+---------+----------
-----+---------+------------+
| orders |          0 | PRIMARY        |            1 | order_id    | A         |           4 |     NULL |   NULL |      | BTREE      |         |
     | YES     | NULL       |
| orders |          1 | idx_customer_id |            1 | customer_id | A         |           4 |     NULL |   NULL | YES  | BTREE      |         |
     | YES     | NULL       |
| orders |          1 | idx_order_date  |            1 | order_date  | A         |           4 |     NULL |   NULL | YES  | BTREE      |         |
     | YES     | NULL       |
+--------+------------+----------------+--------------+-------------+-----------+-------------+----------+--------+------+------------+---------+----------
-----+---------+------------+
```

```
mysql> EXPLAIN SELECT * FROM Orders WHERE customer_id = 1;
+----+-------------+--------+------------+------+-----------------+-----------------+---------+-------+------+----------+-------+
| id | select_type | table  | partitions | type | possible_keys   | key             | key_len | ref   | rows | filtered | Extra |
+----+-------------+--------+------------+------+-----------------+-----------------+---------+-------+------+----------+-------+
|  1 | SIMPLE      | Orders | NULL       | ref  | idx_customer_id | idx_customer_id | 5       | const |    1 |   100.00 | NULL  |
+----+-------------+--------+------------+------+-----------------+-----------------+---------+-------+------+----------+-------+
1 row in set, 1 warning (0.00 sec)

mysql> SELECT * FROM Customers;
+-------------+----------+----------------------+
| customer_id | name     | email                |
+-------------+----------+----------------------+
|           1 | Alice    | alice@gmail.com      |
|           2 | Rahul    | rahul@gmail.com      |
|           3 | Koli     | koli11@gmail.com     |
|           4 | Avantika | avantika25@gmail.com |
+-------------+----------+----------------------+
4 rows in set (0.00 sec)

mysql> SELECT * FROM Orders WHERE total_amount > 500;
+----------+-------------+------------+--------------+
| order_id | customer_id | order_date | total_amount |
+----------+-------------+------------+--------------+
|        1 |           1 | 2024-01-01 |       999.99 |
|        2 |           2 | 2024-02-03 |      3000.00 |
|        3 |           3 | 2025-04-21 |     15000.78 |
|        4 |           4 | 2025-06-18 |     30000.00 |
+----------+-------------+------------+--------------+
4 rows in set (0.00 sec)

mysql>
```


MySQL Workbench
Local instance MySQL80
File Edit View Query Database Server Tools Scripting Help
Navigator
SCHEMAS
Filter objects
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ecommerce
Tables
Views
Stored Procedures
Functions
sakila
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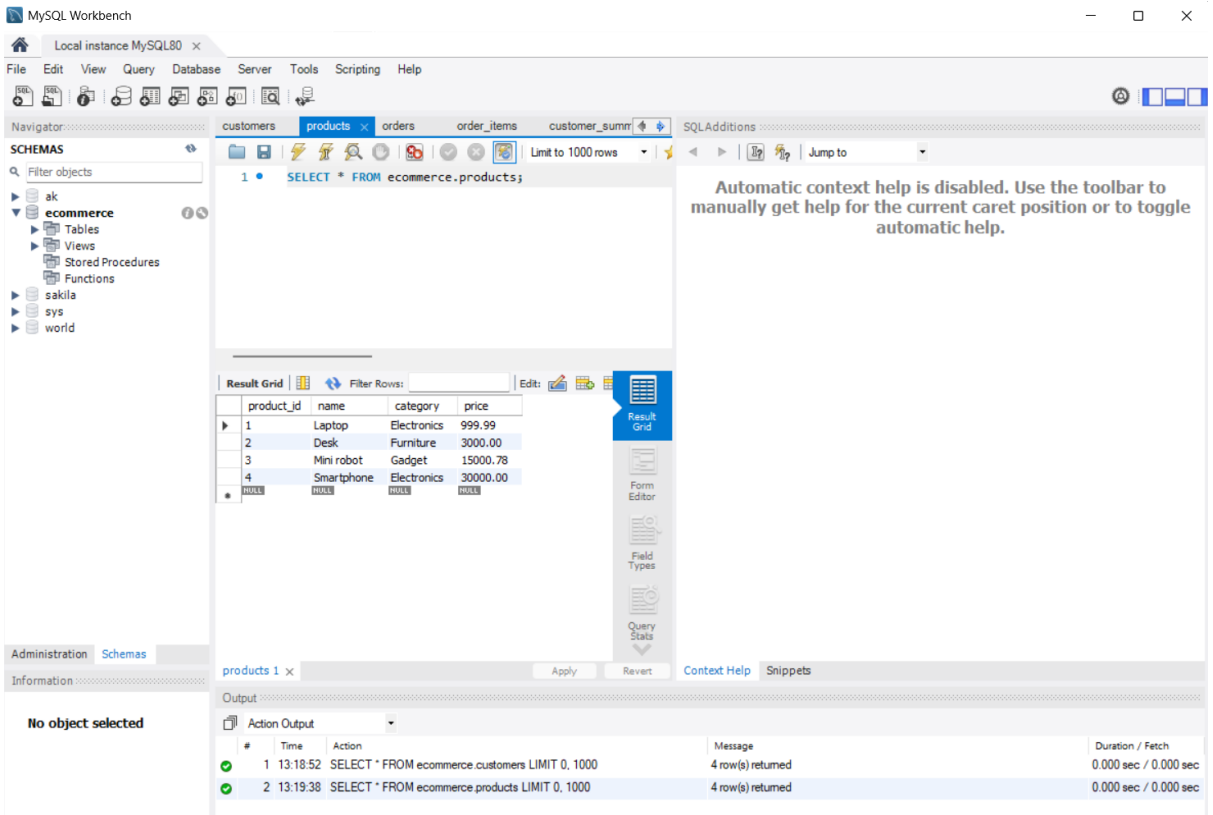
world
customers products orders order_items customer_summ
SQLAdditions
Limit to 1000 rows
Jump to
1 SELECT * FROM ecommerce.customers;
Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.
Result Grid
Filter Rows:
Edit:
customer_id name email
1 Alice alice@gmail.com
2 Rahul rahul@gmail.com
3 Koli koli11@gmail.com
4 Avantika avantika25@gmail.com
Result Grid
Form Editor
Field Types
Query Stats
Administration Schemas
Information
No object selected
customers 1
Apply
Revert
Context Help
Snippets
Output
Action Output
Time Action Message Duration / Fetch
1 13:18:52 SELECT * FROM ecommerce.customers LIMIT 0, 1000 4 row(s) returned 0.000 sec / 0.000 sec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Filter objects
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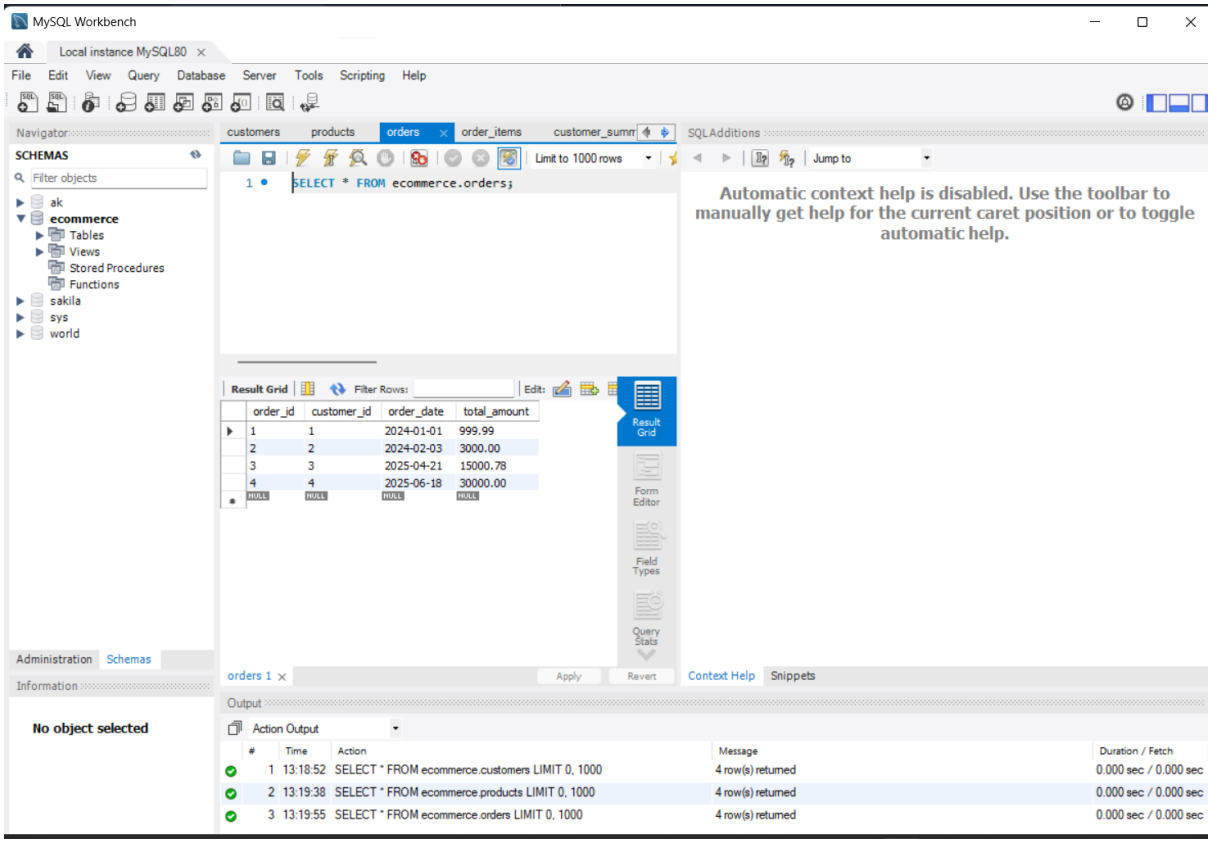
Tables
Views
Stored Procedures
Functions
sakila
sys
world
customers products orders order_items customer_summ
SQLAdditions
Limit to 1000 rows
Jump to
1 SELECT * FROM ecommerce.products;
Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.
Result Grid
Filter Rows:
Edit:
product_id name category price
1 Laptop Electronics 999.99
2 Desk Furniture 3000.00
3 Mini robot Gadget 15000.78
4 Smartphone Electronics 30000.00
Result Grid
Form Editor
Field Types
Query Stats
Administration Schemas
Information
No object selected
products 1
Apply
Revert
Context Help
Snippets
Output
Action Output
Time Action Message Duration / Fetch
1 13:18:52 SELECT * FROM ecommerce.customers LIMIT 0, 1000 4 row(s) returned 0.000 sec / 0.000 sec
2 13:19:38 SELECT * FROM ecommerce.products LIMIT 0, 1000 4 row(s) returned 0.000 sec / 0.000 sec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customers products orders order_items customer_summ
SQLAdditions
Limit to 1000 rows
Jump to
1 SELECT * FROM ecommerce.orders;
Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.
Result Grid
Filter Rows:
Edit:
order_id customer_id order_date total_amount
1 1 2024-01-01 999.99
2 2 2024-02-03 3000.00
3 3 2025-04-21 15000.78
4 4 2025-06-18 30000.00
Result Grid
Form Editor
Field Types
Query Stats
Administration Schemas
Information
No object selected
orders 1
Apply
Revert
Context Help
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Output
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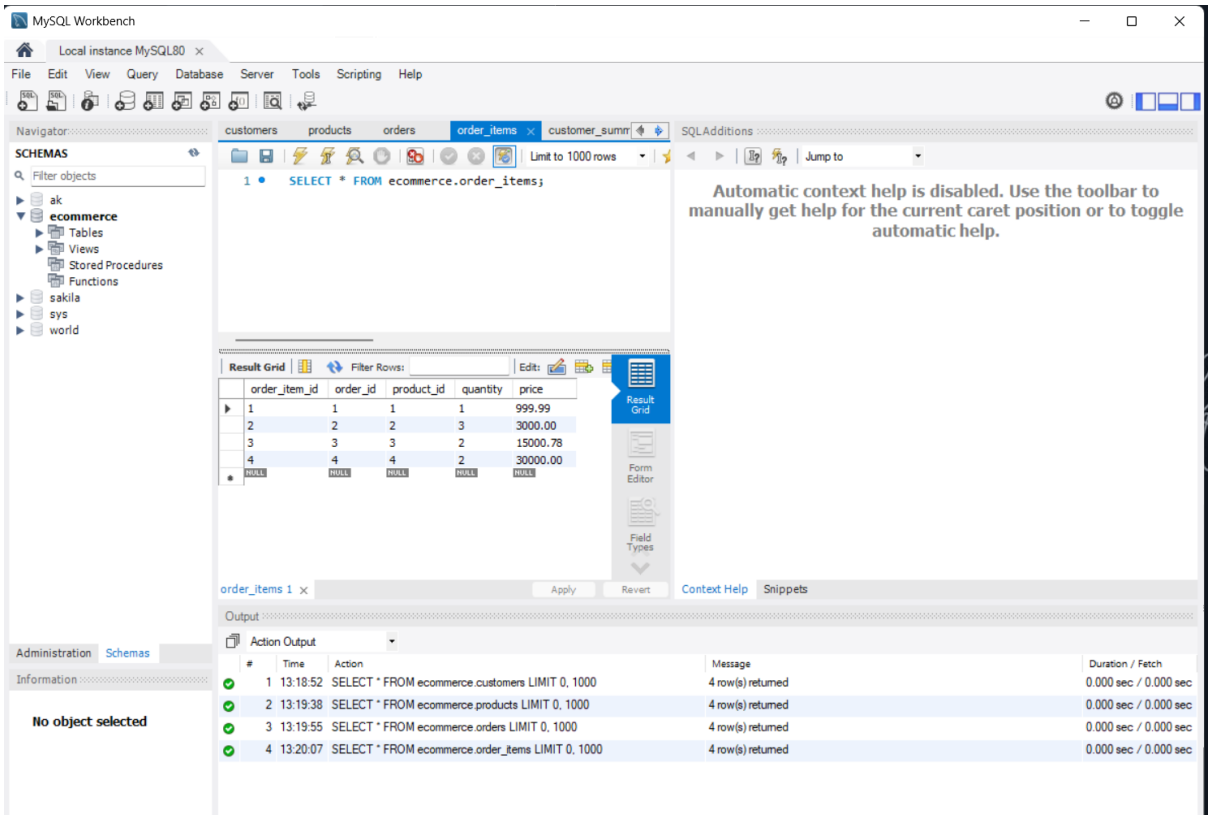
Time Action Message Duration / Fetch
1 13:18:52 SELECT * FROM ecommerce.customers LIMIT 0, 1000 4 row(s) returned 0.000 sec / 0.000 sec
2 13:19:38 SELECT * FROM ecommerce.products LIMIT 0, 1000 4 row(s) returned 0.000 sec / 0.000 sec
3 13:19:55 SELECT * FROM ecommerce.orders LIMIT 0, 1000 4 row(s) returned 0.000 sec / 0.000 sec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customers products orders order_items customer_summ
SQLAdditions
Limit to 1000 rows
Jump to
1 SELECT * FROM ecommerce.order_items;
Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.
Result Grid
Filter Rows:
Edit:
order_item_id order_id product_id quantity price
1 1 1 1 999.99
2 2 2 3 3000.00
3 3 3 2 15000.78
4 4 4 2 30000.00
Result Grid
Form Editor
Field Types
Administration Schemas
Information
No object selected
order_items 1
Apply
Revert
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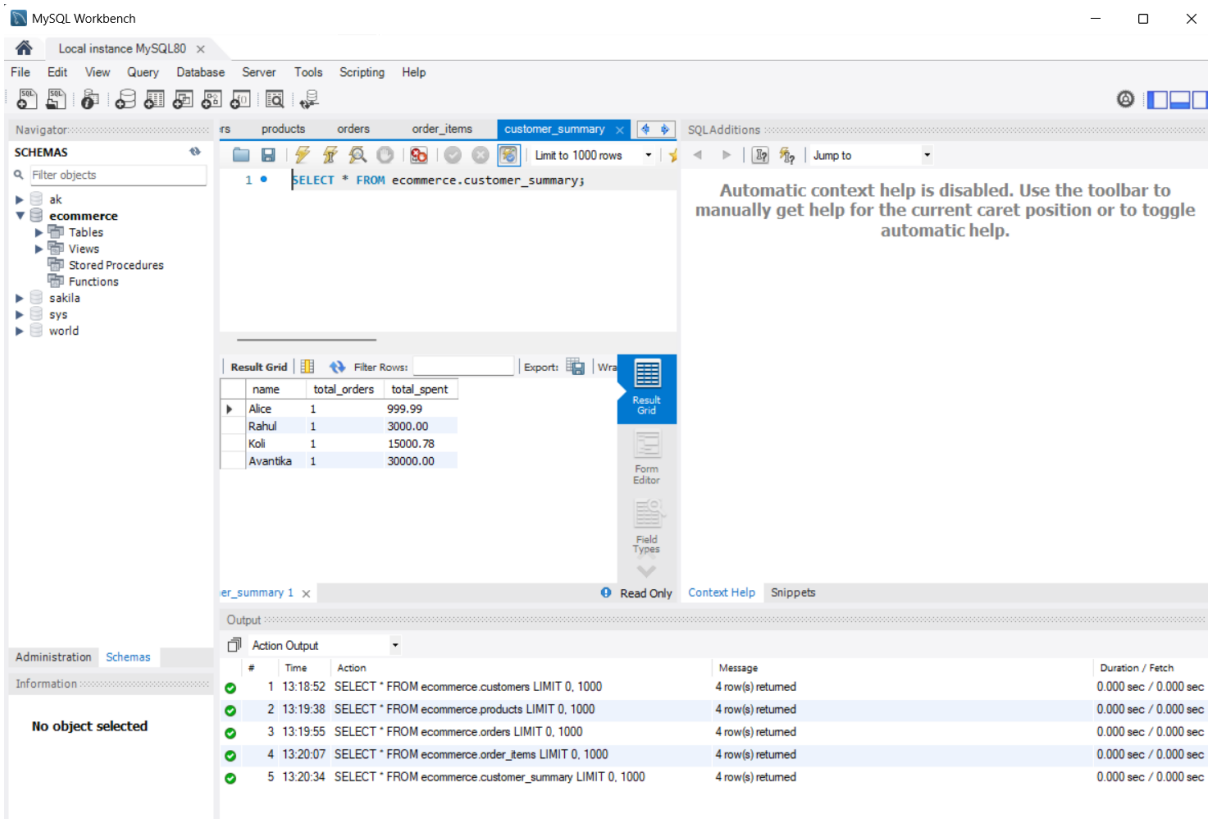
2 13:19:38 SELECT * FROM ecommerce.products LIMIT 0, 1000 4 row(s) returned 0.000 sec / 0.000 sec
3 13:19:55 SELECT * FROM ecommerce.orders LIMIT 0, 1000 4 row(s) returned 0.000 sec / 0.000 sec
4 13:20:07 SELECT * FROM ecommerce.order_items LIMIT 0, 1000 4 row(s) returned 0.000 sec / 0.000 sec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sakila
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world
products orders order_items customer_summary
SQLAdditions
Limit to 1000 rows
Jump to
1 SELECT * FROM ecommerce.customer_summary;
Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.
Result Grid
Filter Rows:
Export:
name total_orders total_spent
Alice 1 999.99
Rahul 1 3000.00
Koli 1 15000.78
Avantika 1 30000.00
Result Grid
Form Editor
Field Types
Read Only
Context Help
Snippets
Output
Action Output
Time Action Message Duration / Fetch
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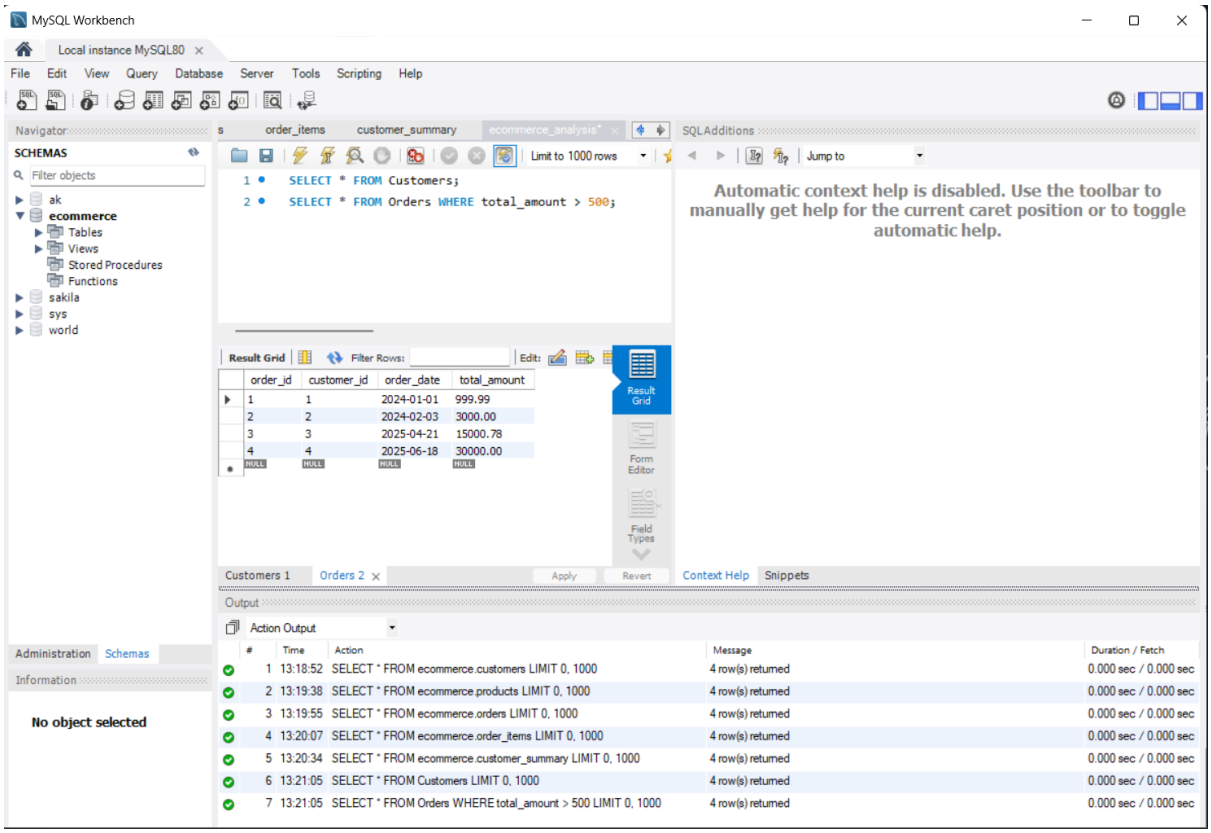
3 13:19:55 SELECT * FROM ecommerce.orders LIMIT 0, 1000 4 row(s) returned 0.000 sec / 0.000 sec
4 13:20:07 SELECT * FROM ecommerce.order_items LIMIT 0, 1000 4 row(s) returned 0.000 sec / 0.000 sec
5 13:20:34 SELECT * FROM ecommerce.customer_summary LIMIT 0, 1000 4 row(s) returned 0.000 sec / 0.000 sec
Administration Schemas
Information
No object selected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sakila
sys
world
order_items customer_summary ecommerce_analysis*
SQLAdditions
Limit to 1000 rows
Jump to
1 SELECT * FROM Customers;
2 SELECT * FROM Orders WHERE total_amount > 500;
Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.
Result Grid
Filter Rows:
Edit:
order_id customer_id order_date total_amount
1 1 2024-01-01 999.99
2 2 2024-02-03 3000.00
3 3 2025-04-21 15000.78
4 4 2025-06-18 30000.00
Result Grid
Form Editor
Field Types
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Apply
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3 13:19:55 SELECT * FROM ecommerce.orders LIMIT 0, 1000 4 row(s) returned 0.000 sec / 0.000 sec
4 13:20:07 SELECT * FROM ecommerce.order_items LIMIT 0, 1000 4 row(s) returned 0.000 sec / 0.000 sec
5 13:20:34 SELECT * FROM ecommerce.customer_summary LIMIT 0, 1000 4 row(s) returned 0.000 sec / 0.000 sec
6 13:21:05 SELECT * FROM Customers LIMIT 0, 1000 4 row(s) returned 0.000 sec / 0.000 sec
7 13:21:05 SELECT * FROM Orders WHERE total_amount > 500 LIMIT 0, 1000 4 row(s) returned 0.000 sec / 0.000 sec
Administration Schemas
Information
No object selected