

CSCI 5408

DATA MANAGEMENT AND WAREHOUSING

LAB ASSIGNMENT - 4

Banner ID: B00948977

Git Assignment Link :

https://git.cs.dal.ca/sukumaran/csci5408_f23_b00948977_balaji_sukumaran

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Problem Statement 1: Create a local database with – User table (attributes – id, name, email, phone, address)

Created the User table in local database.

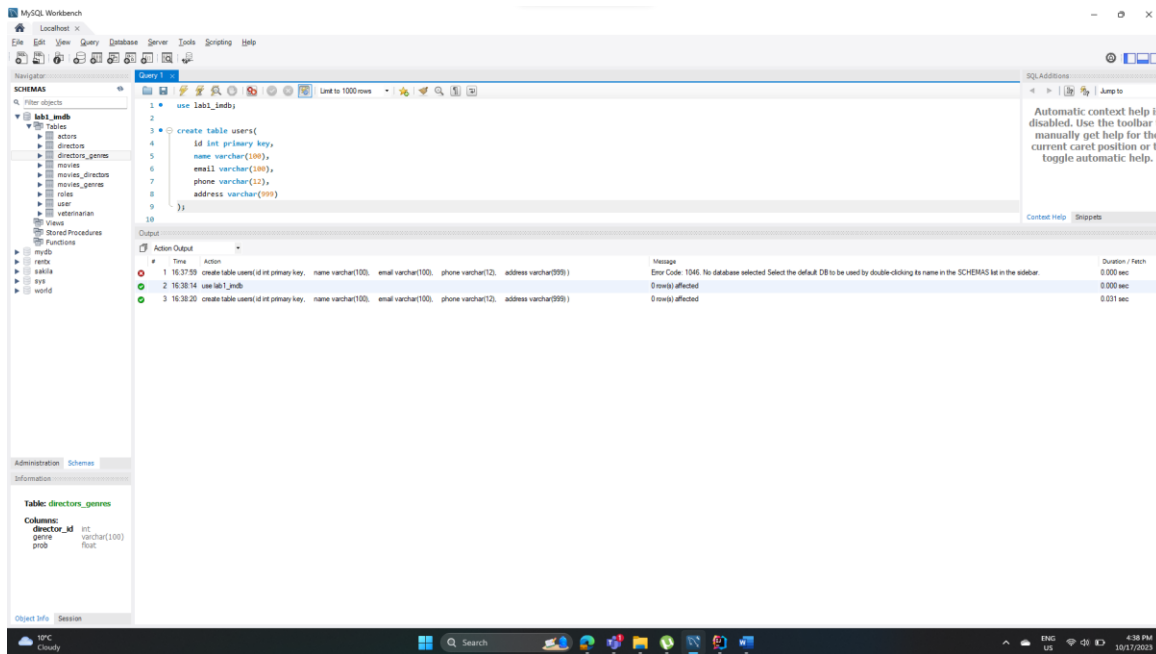


Figure 1: create statement for user in local database

Inserted sample data in user table

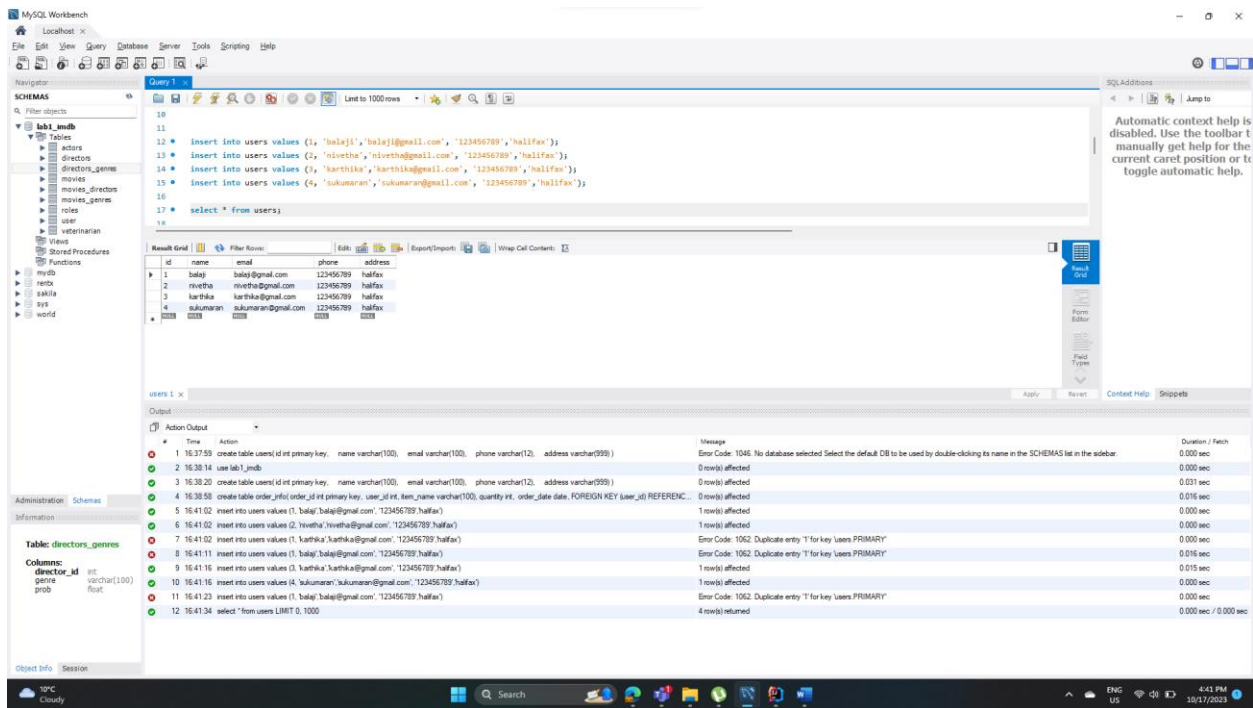


Figure 2: Sample data for users table

Order_info table (order_id, user_id,item_name, quantity, order_date)

Created the order info table in local database

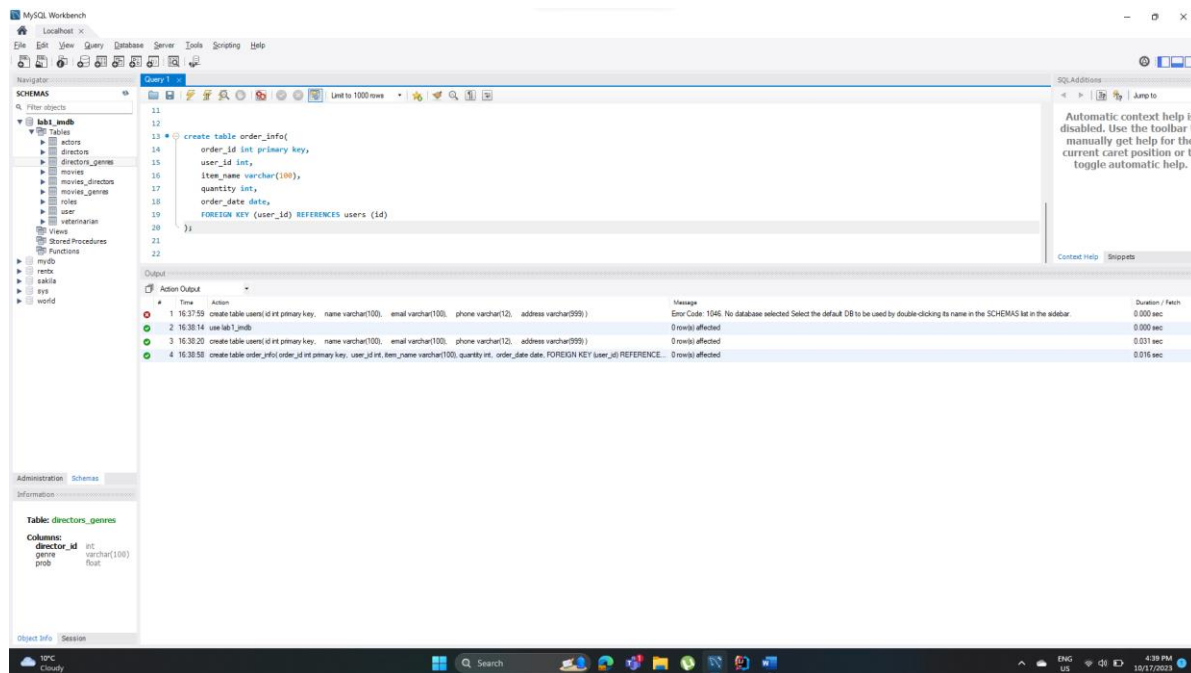


Figure 3: create statment for order_info table in local database

Problem Statement 2: Create a remote database in G C P with Inventory table (item_id,item_name, available_quantity)

Created a GCP MySql instance

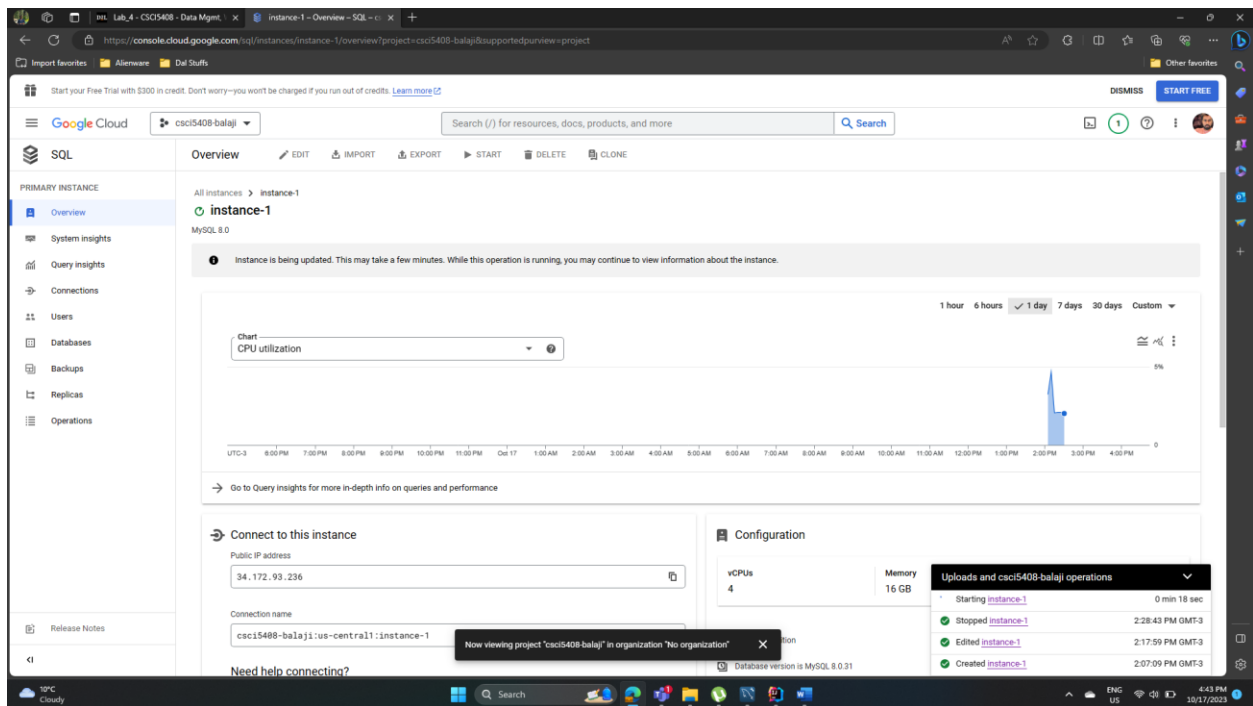


Figure 4: Screenshot of GCP MySql instance

Created an Inventory table in the remote MySql instance and inserted sample data

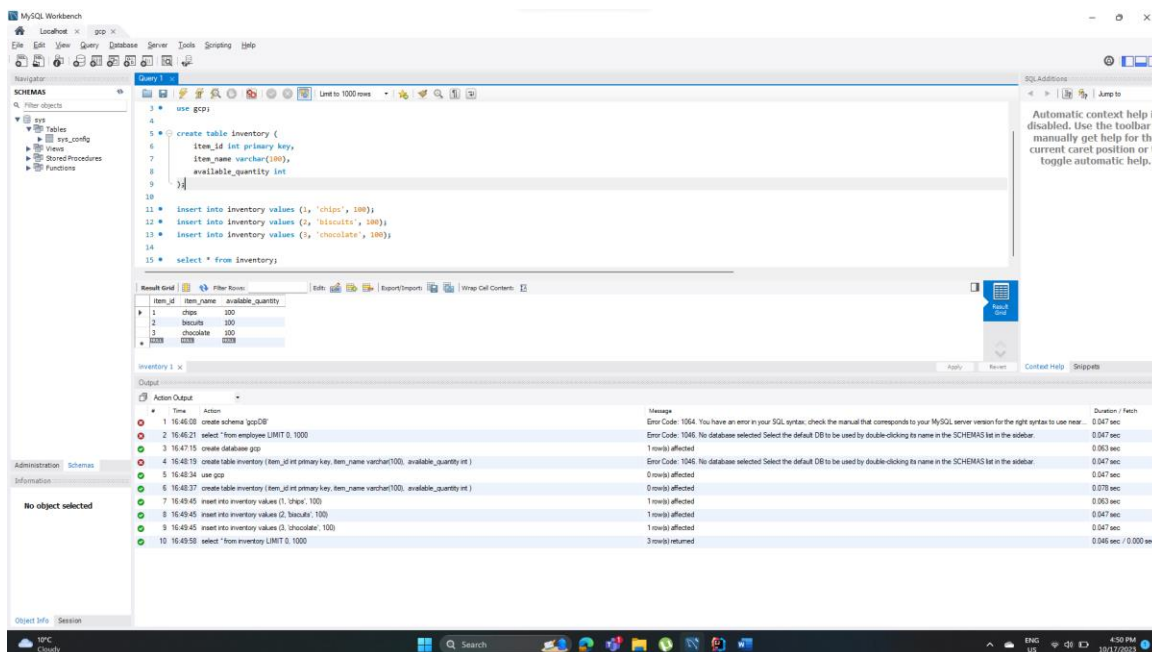


Figure 5: Create and insert commands for inventory table

Problem Statement 3: Write a Java program that –

- Fetches item details from the remote database
- Creates an order in local database
- Writes the updated quantity back to the remote database

Created a Java program

```

1 import java.sql.Connection;
2 import java.sql.DriverManager;
3 import java.sql.ResultSet;
4 import java.sql.SQLException;
5 import java.sql.Statement;
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```

Figure 6: java program main method

Turned the profiling on and used `show profiles` to get the intermediate durations

The screenshot displays a Java IDE with a project named "DistributedVslLocalDB". The main editor shows a Java file with the following code:

```
119 System.out.println("item_id: " + resultSet.getString(@columnName("item_id")));
120 System.out.println("item_name: " + resultSet.getString(@columnName("item_name")));
121 System.out.println("available_quantity: " + resultSet.getString(@columnName("available_quantity")));
122 }
123 resultSet.close();
124 }
125 printDuration(stmt);
126 }
127 } catch (SQLException e) {
128     e.printStackTrace();
129 }
130 }
131 }
132 }
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200 }
```

The code defines a custom annotation `@columnName` and a method `printDuration` that prints the duration of a SQL statement. The `main` method is a placeholder for a test.

The bottom status bar shows the IDE is running on a Windows machine, with the project name "DistributedVslLocalDB" and the file "DistributedVslLocalDB.java" open.

Figure 7: method to print the SQL execution duration

Which executes the following business logic in order:

1. Get the inventory details – touches the remote DB

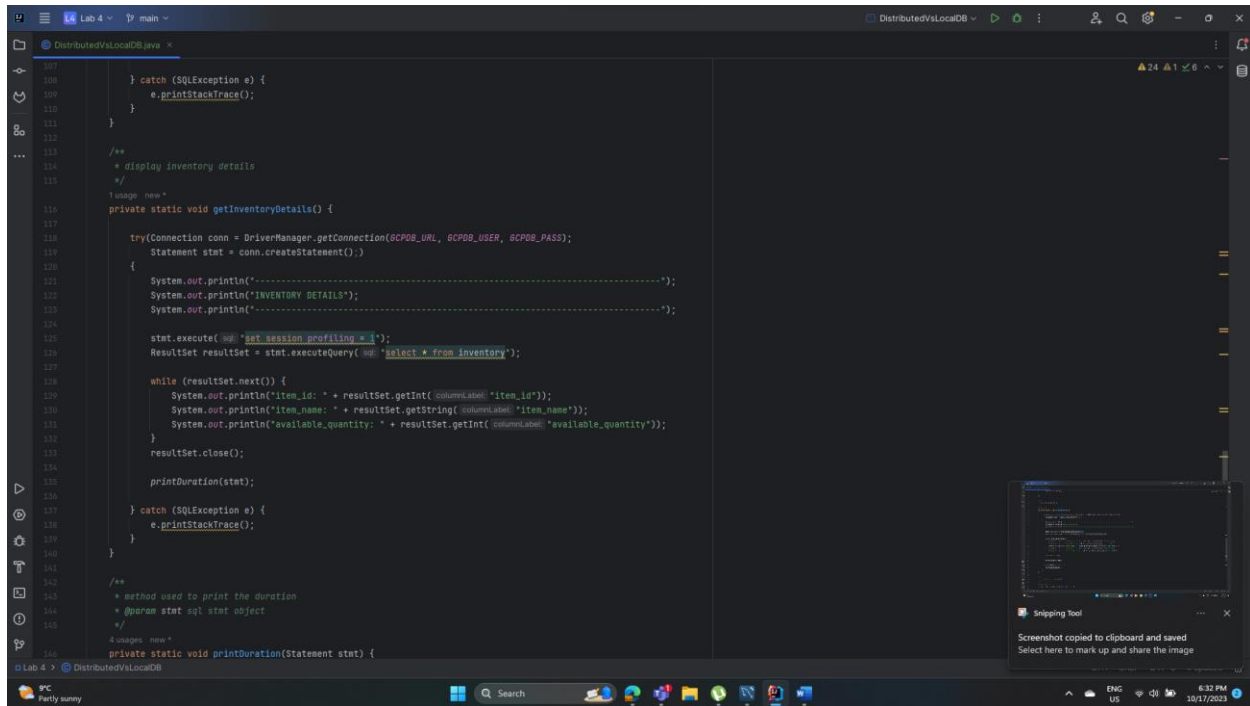


Figure 8: method to get the remote inventory details

2. Create the order – touches the local DB

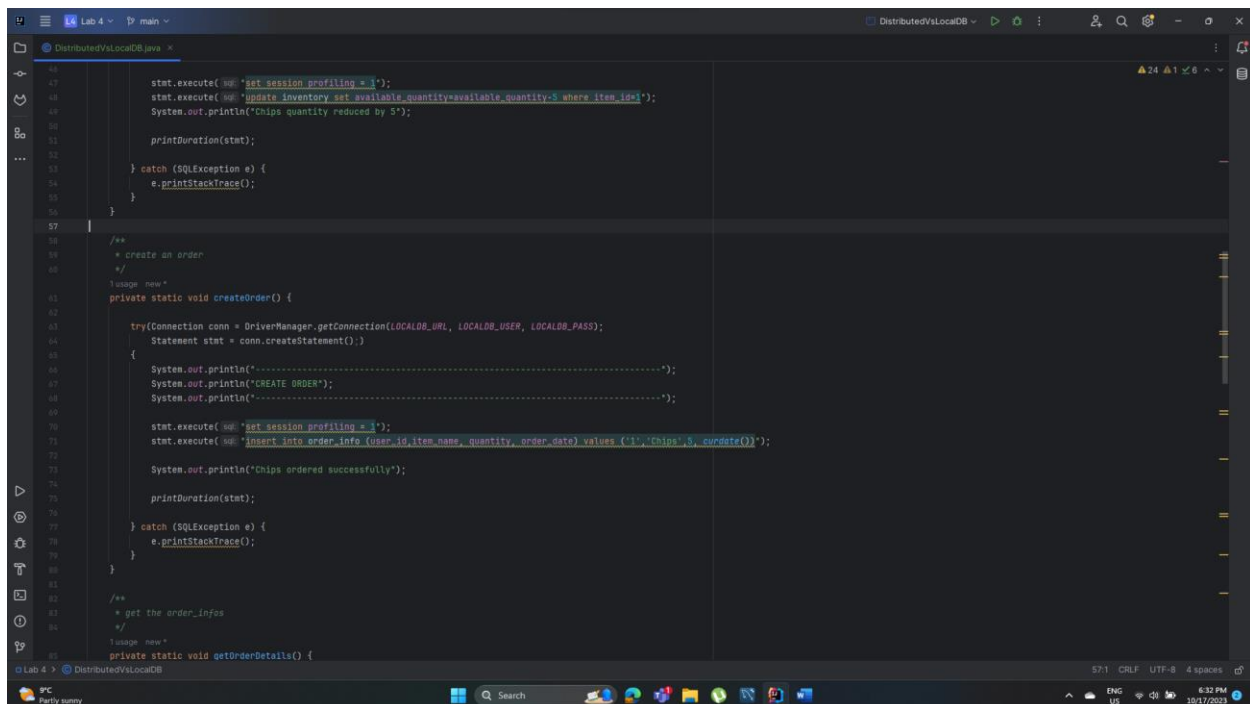
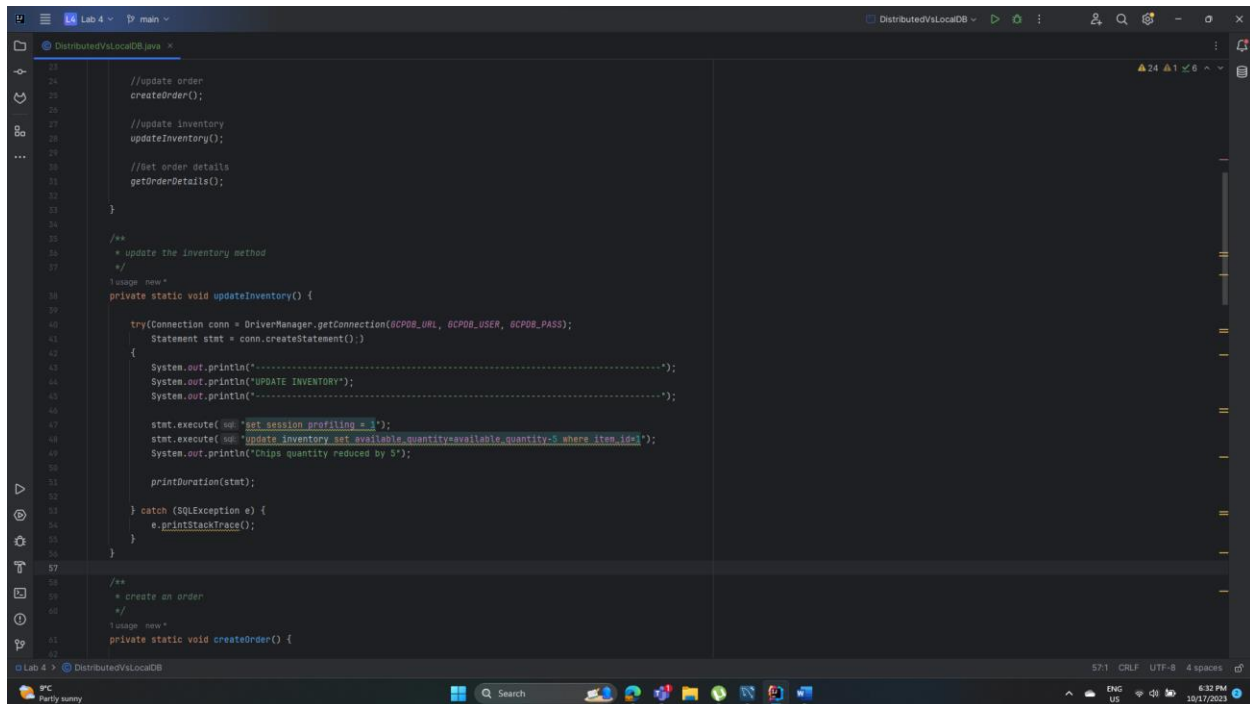


Figure 9: method to create the order

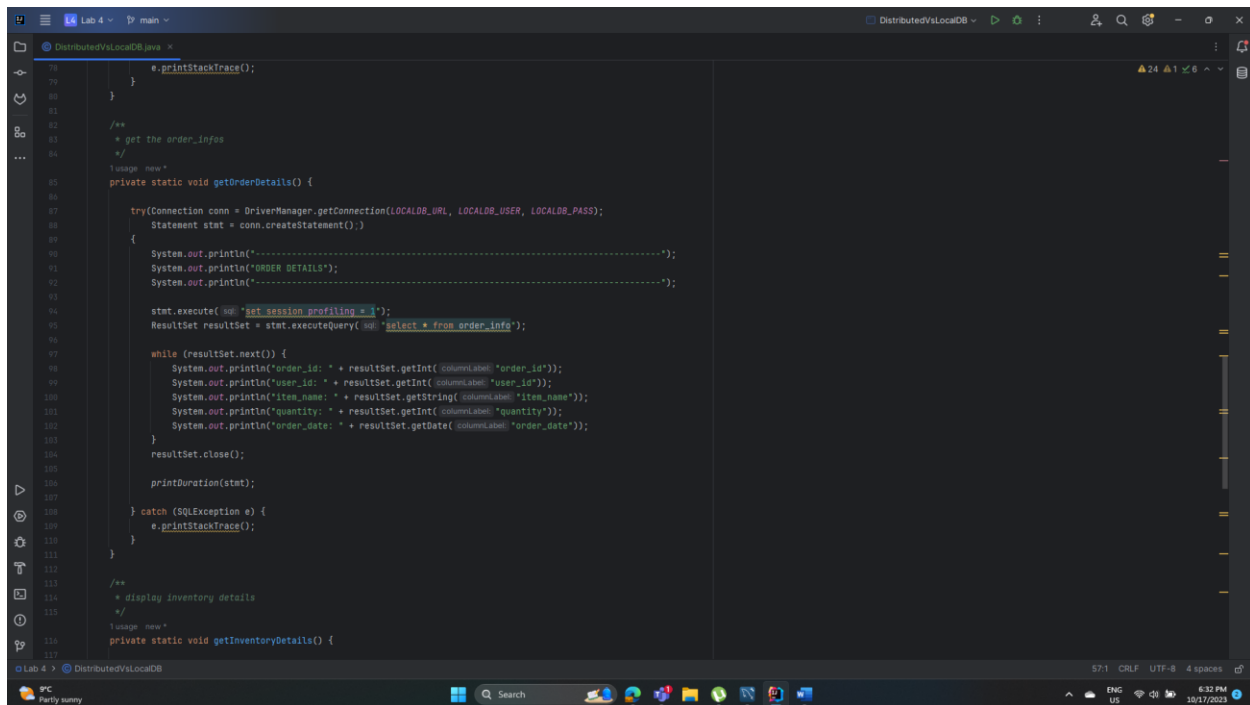
3. Update the inventory – touches the remote DB



```
24 //update order
25 createOrder();
26
27 //update inventory
28 updateInventory();
29
30 //Get order details
31 getOrderDetails();
32
33 }
34
35 /**
36  * update the inventory method
37  */
38 //usage new
39 private static void updateInventory() {
40
41     try(Connection conn = DriverManager.getConnection(GCPDB_URL, GCPDB_USER, GCPDB_PASS);
42         Statement stat = conn.createStatement())
43     {
44         System.out.println(".....");
45         System.out.println("UPDATE INVENTORY");
46         System.out.println(".....");
47
48         stat.execute("set session profiling = 1");
49         stat.execute("update inventory set available_quantity=available_quantity-5 where item_id=1");
50         System.out.println("chips quantity reduced by 5");
51
52         printDuration(stat);
53     } catch (SQLException e) {
54         e.printStackTrace();
55     }
56 }
57
58 /**
59  * create an order
60  */
61 //usage new
62 private static void createOrder() {
```

Figure 10: method to update the remote inventory

4. Get the order details - touches the local DB



```
78     e.printStackTrace();
79 }
80
81 /**
82  * get the order_info
83  */
84 //usage new
85 private static void getOrderDetails() {
86
87     try(Connection conn = DriverManager.getConnection(LOCALDB_URL, LOCALDB_USER, LOCALDB_PASS);
88         Statement stat = conn.createStatement())
89     {
90         System.out.println(".....");
91         System.out.println("ORDER DETAILS");
92         System.out.println(".....");
93
94         stat.execute("set session profiling = 1");
95         ResultSet resultSet = stat.executeQuery("select * from order_info");
96
97         while (resultSet.next()) {
98             System.out.println("order_id: " + resultSet.getInt(columnLabel("order_id")));
99             System.out.println("user_id: " + resultSet.getInt(columnLabel("user_id")));
100             System.out.println("item_name: " + resultSet.getString(columnLabel("item_name")));
101             System.out.println("quantity: " + resultSet.getInt(columnLabel("quantity")));
102             System.out.println("order_date: " + resultSet.getDate(columnLabel("order_date")));
103         }
104         resultSet.close();
105
106         printDuration(stat);
107     } catch (SQLException e) {
108         e.printStackTrace();
109     }
110 }
111
112 /**
113  * display inventory details
114  */
115 //usage new
116 private static void getInventoryDetails() {
```

Figure 11: Method to get the order details

Problem Statement 4: Print query execution time at every step.

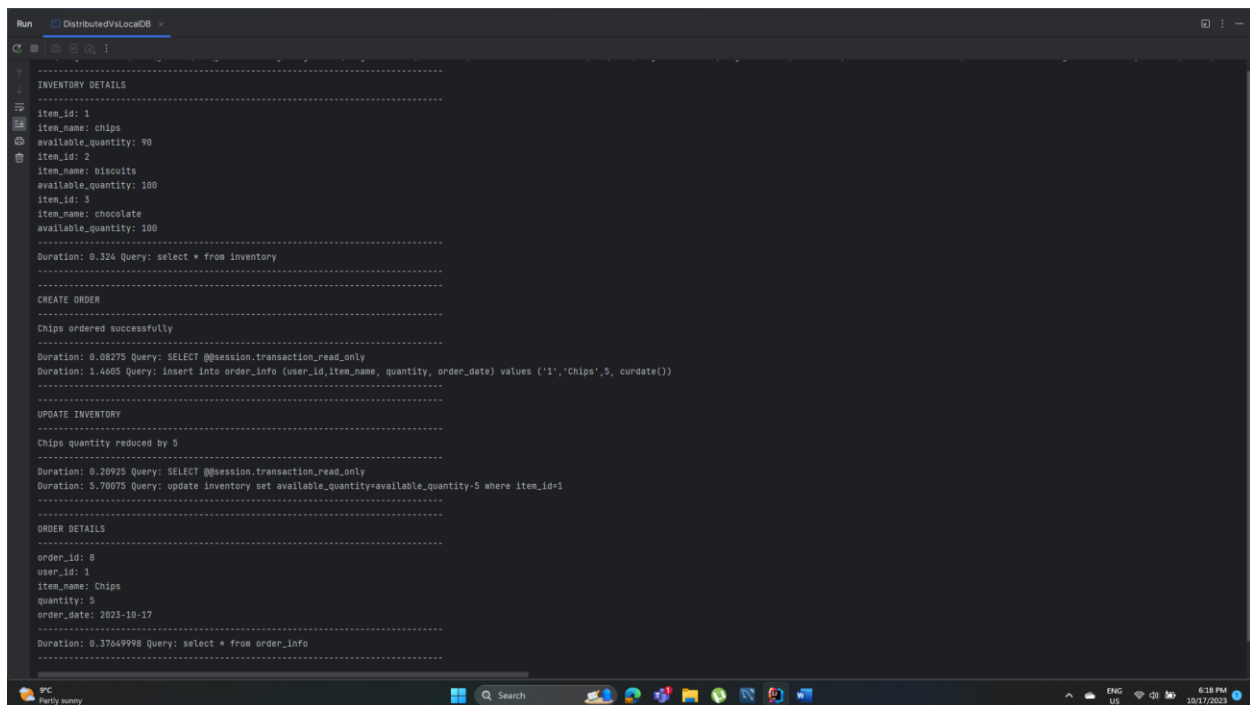
(try to deduce the reason behind the time differences)

Note: converted the duration to **X1000** for readability

As we can see here the time taken to insert into the local DB table order_info took only 1.4605 whereas the updating the remote inventory took 5.70075 which is significantly higher than the local,

reason could be the following,

Since the remote DB is in different geographical location than the local, delay could be due to the **network latency** to fetch from different geographical location or **Network setup** in the local works best for the locally executed java program than the network setup of remote Database



```
Run DistributedVsLocalDB
INVENTORY DETAILS
-----
item_id: 1
item_name: chips
available_quantity: 90
item_id: 2
item_name: biscuits
available_quantity: 100
item_id: 3
item_name: chocolate
available_quantity: 100
-----
Duration: 0.324 Query: select * from inventory
-----
CREATE ORDER
-----
Chips ordered successfully
-----
Duration: 0.08275 Query: SELECT @@session.transaction_read_only
Duration: 1.4605 Query: insert into order_info (user_id,item_name, quantity, order_date) values ('1','Chips',5, curdate())
-----
UPDATE INVENTORY
-----
Chips quantity reduced by 5
-----
Duration: 0.20925 Query: SELECT @@session.transaction_read_only
Duration: 5.70075 Query: update inventory set available_quantity=available_quantity-5 where item_id=1
-----
ORDER DETAILS
-----
order_id: 8
user_id: 1
item_name: Chips
quantity: 5
order_date: 2023-10-17
-----
Duration: 0.37649998 Query: select * from order_info
-----
```

Figure 12: Java program output