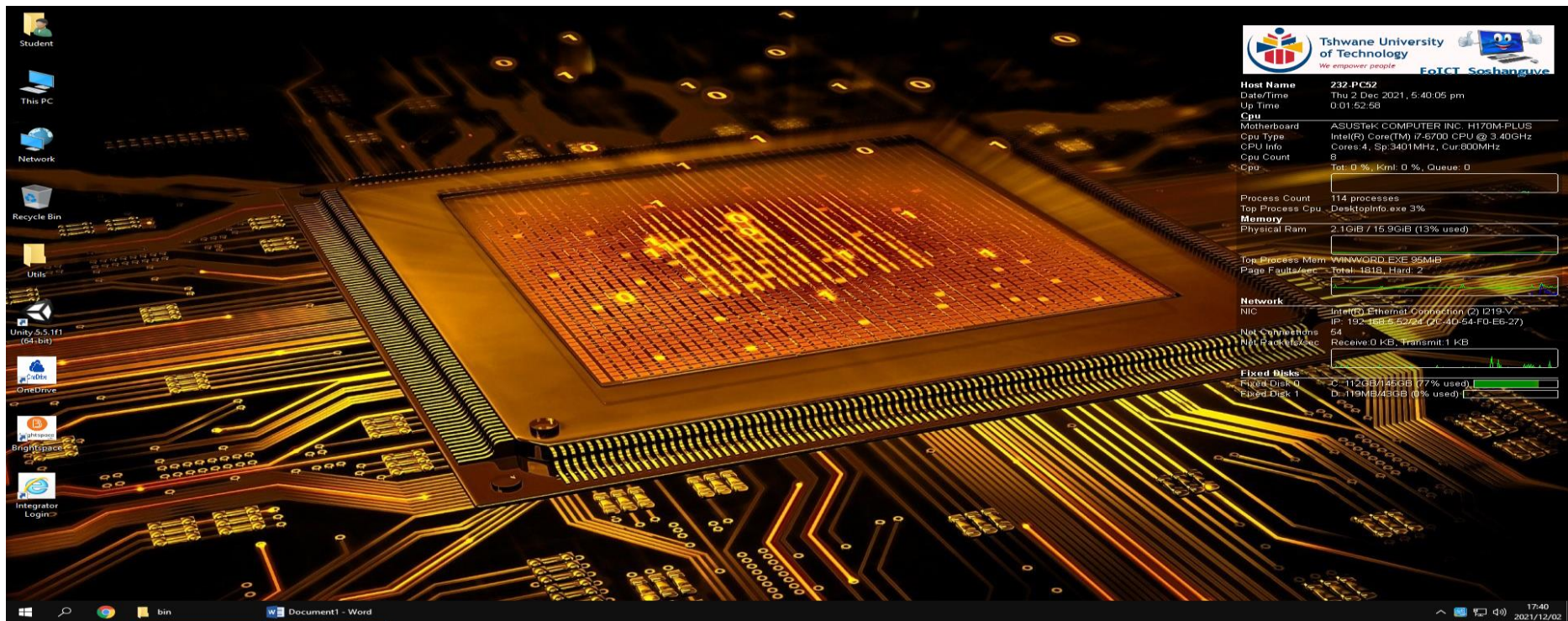**Tutorial**

The purpose of this tutorial is to demonstrate a clien\server application that interacts with the database. The application was developed in lab 10-232 in Soshanguve South campus.

A. Server machine details

The Server

The IP Address:

192.168.5.52

B. Start MySQL

Step 1

Search for XAMP
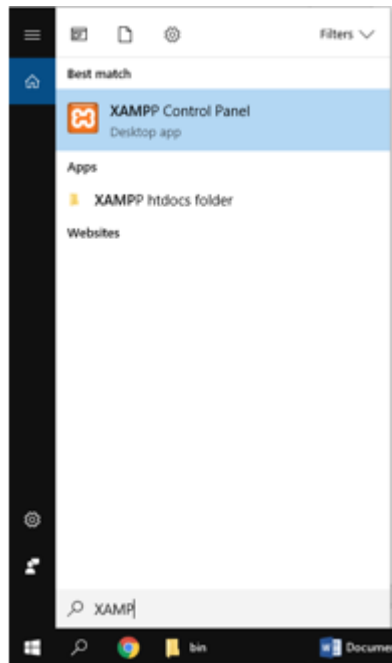
Click on XAMP Control Panel
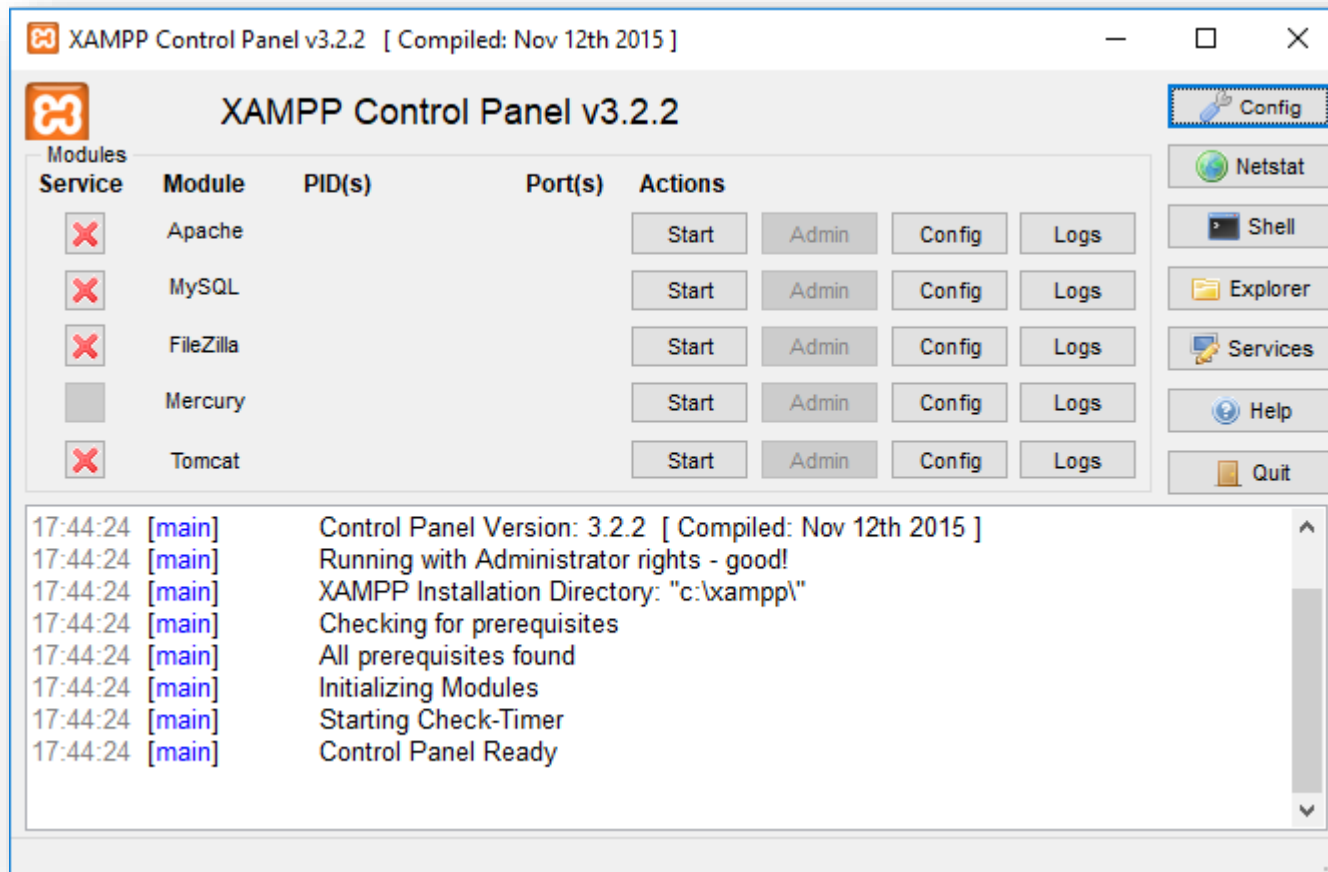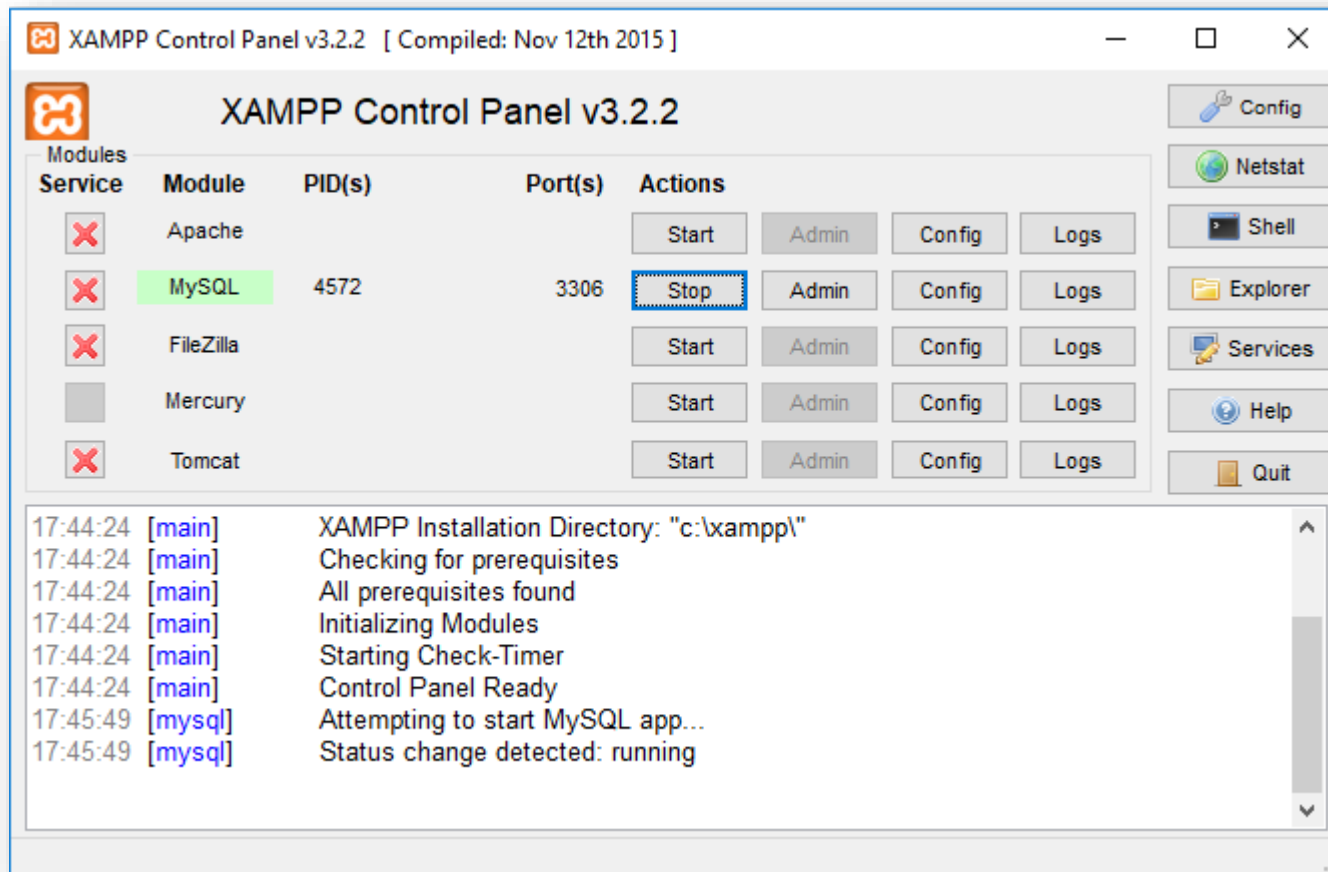
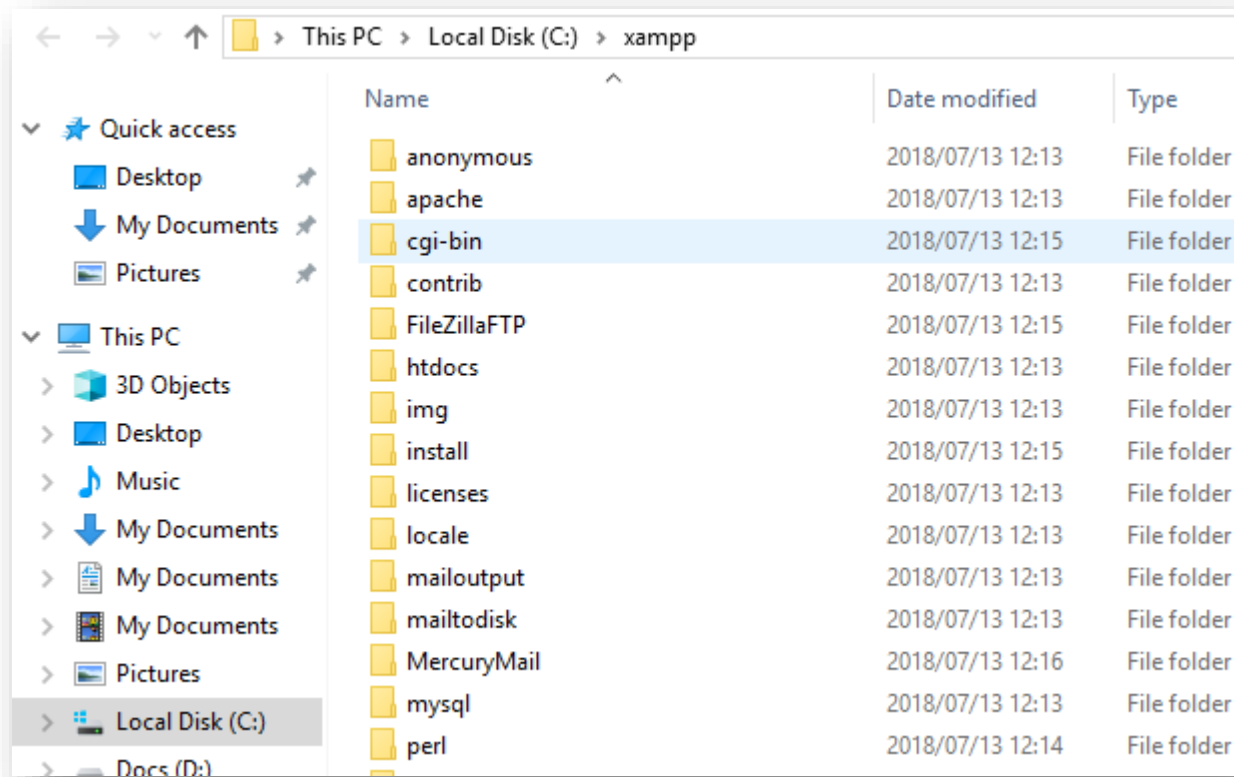Click on the **Start** button opposite **MySQL**.

MySQL has started.

C. Access MySQL via the command line

Step 1

Still on the XAMP window, click on Explorer folder.

Step 2

Open the **mysql** folder.
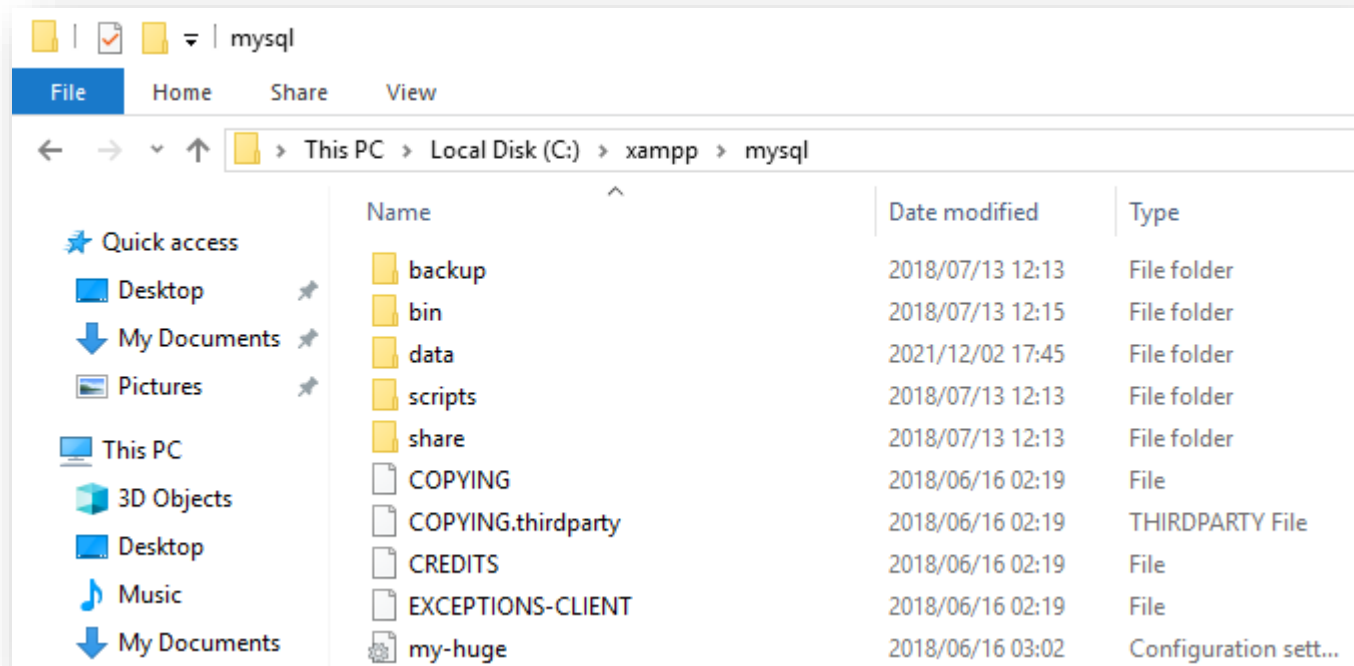
Step 3
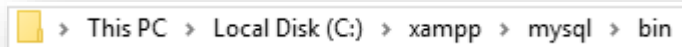
Open the **bin** folder.
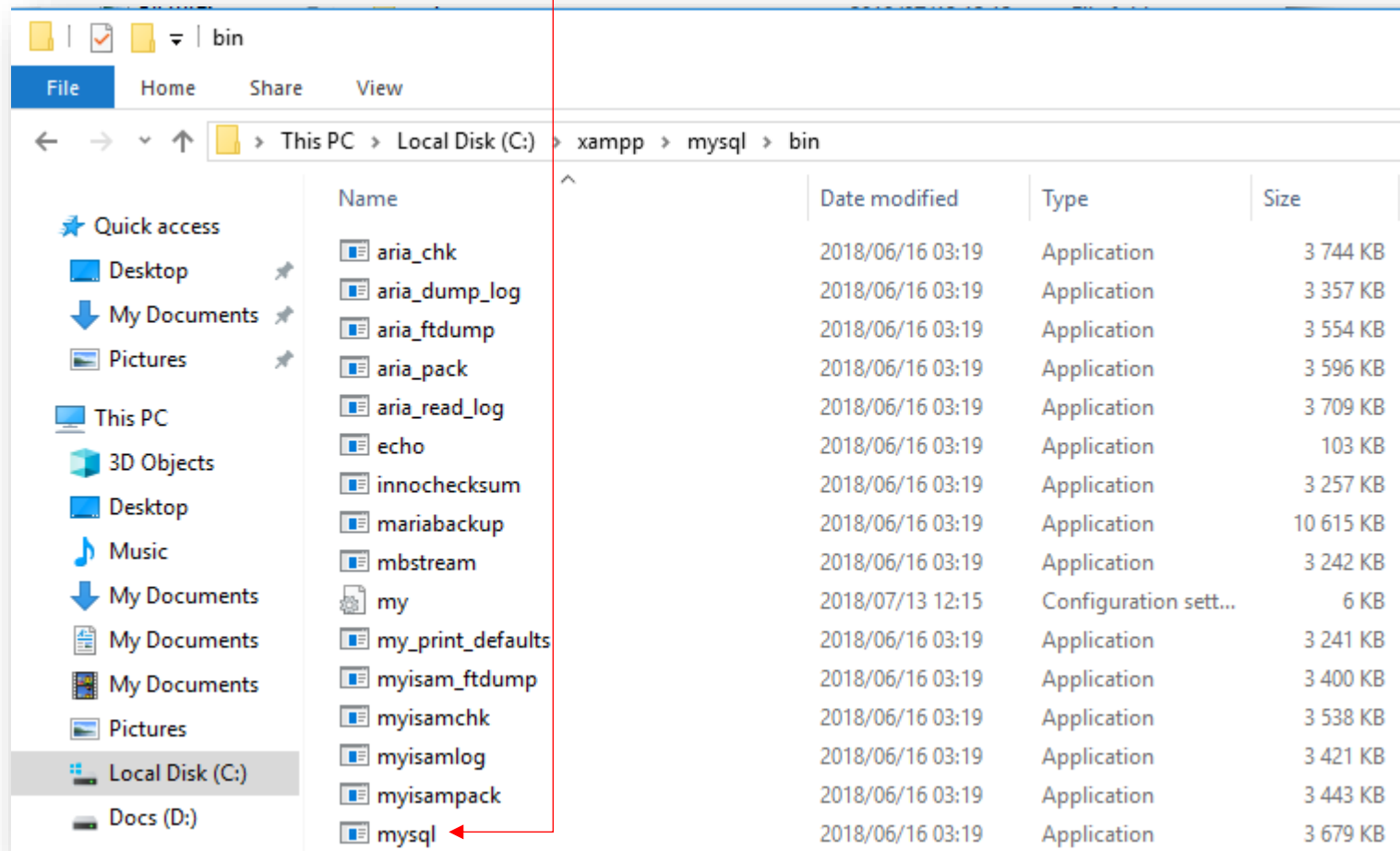
Step 4
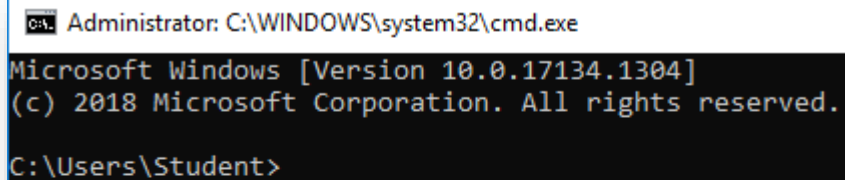
Copy the address.

> This PC > Local Disk (C:) > xampp > mysql > bin

Step 5

Start the command line.

Administrator: C:\WINDOWS\system32\cmd.exe

```
Microsoft Windows [Version 10.0.17134.1304]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Users\Student>
```

Step 6

Change directory to the copied location.

Step 7

Login to MySQL server as the **root** user. Type **mysql –u root –p**. When prompted for password, just press the enter button.

Step 8

Create a new user called **student** with **123** as the password.

```
MariaDB [(none)]> CREATE USER 'student'@'localhost' IDENTIFIED BY '123';
Query OK, 0 rows affected (0.00 sec)

MariaDB [(none)]>
```
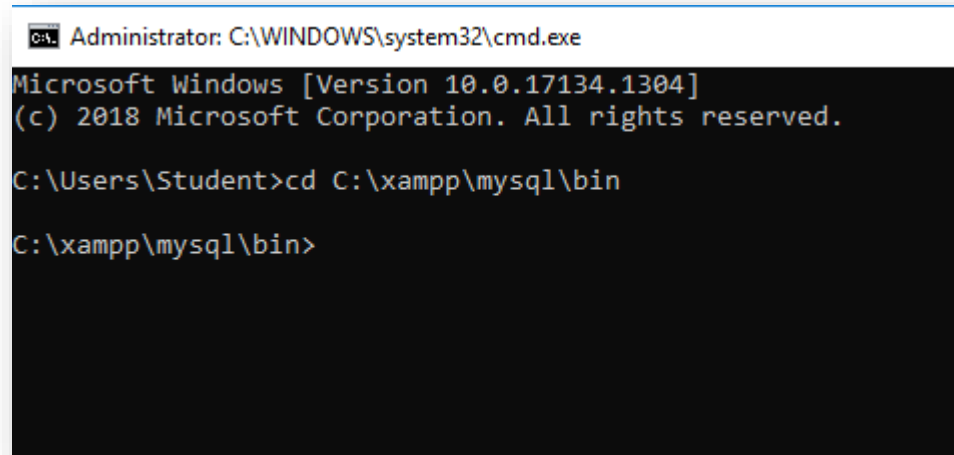
Step 9

Grant the user all the privileges.

```
MariaDB [(none)]> GRANT ALL PRIVILEGES ON *.* TO 'student'@'localhost';
Query OK, 0 rows affected (0.00 sec)

MariaDB [(none)]>
```

Step 10

Reload the privileges.

```
MariaDB [(none)]> FLUSH PRIVILEGES;
Query OK, 0 rows affected (0.00 sec)

MariaDB [(none)]>
```

Step 11

Create a database called **items_db**.

```
MariaDB [(none)]> CREATE DATABASE items_db;
Query OK, 1 row affected (0.00 sec)

MariaDB [(none)]>
```

Step 12

Use the database.

```
MariaDB [(none)]> USE items_db;
Database changed
MariaDB [items_db]>
```

Step 13

Create a table called **items_tbl**.

```
MariaDB [(none)]> USE items_db;
Database changed
MariaDB [items_db]> CREATE TABLE items_tbl
    -> (
    -> id INT NOT NULL PRIMARY KEY,
    -> description VARCHAR(50) NOT NULL,
    -> price DEC(6,2) NOT NULL
    -> )
    -> ;
Query OK, 0 rows affected (0.23 sec)

MariaDB [items_db]>
```

Step 14

Populate the table with data.

```
MariaDB [items_db]> INSERT INTO items_tbl
    -> VALUES
    -> (111, "OMO", 35.90),
    -> (222, "SURF", 45.50),
    -> (333, "COLGATE", 25.90)
    -> ;
Query OK, 3 rows affected (0.04 sec)
Records: 3  Duplicates: 0  Warnings: 0

MariaDB [items_db]>
```

Step 15

Display all the data.

```
MariaDB [items_db]> SELECT * FROM items_tbl;
+-----+-------------+-------+
| id  | description | price |
+-----+-------------+-------+
| 111 | OMO         | 35.90 |
| 222 | SURF        | 45.50 |
| 333 | COLGATE     | 25.90 |
+-----+-------------+-------+
3 rows in set (0.00 sec)

MariaDB [items_db]>
```
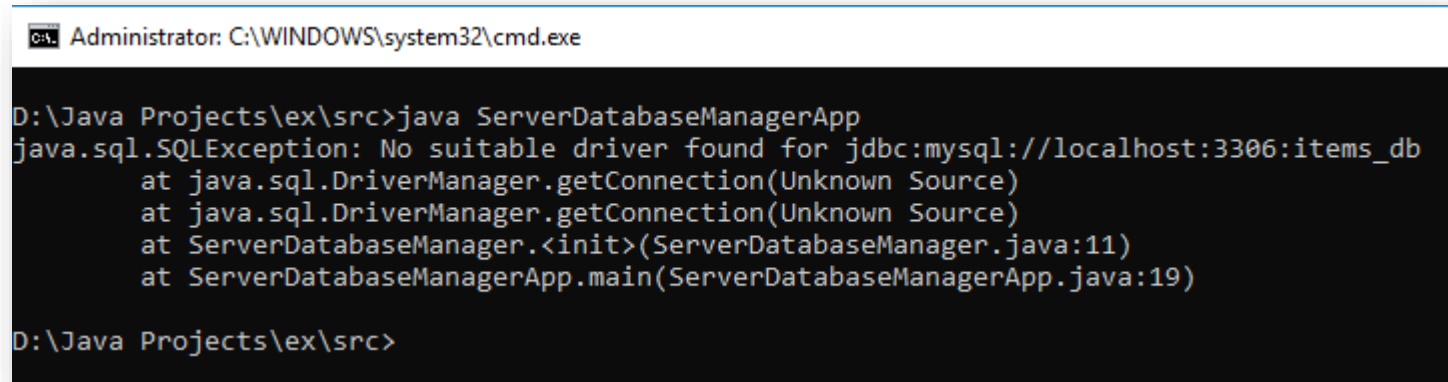
D. Create the Server application

ServerDatabaseManager.java

```java
import java.sql.Connection;
import java.sql.ResultSet;
import java.sql.PreparedStatement;
import java.sql.DriverManager;
import java.sql.SQLException;

public class ServerDatabaseManager {
    private Connection connection;

    public ServerDatabaseManager(String url, String username, String password) throws SQLException {
        connection = DriverManager.getConnection(url, username, password);
    }

    public ResultSet getItems(String queryStatement) throws SQLException {
        ResultSet results;
        PreparedStatement statement;

        statement = connection.prepareStatement(queryStatement);
        results = statement.executeQuery();

        return results;
    }
}
```

ServerDatabaseManagerApp

When running the application you are likely to get the following exception.

```
Administrator: C:\WINDOWS\system32\cmd.exe

D:\Java Projects\ex\src>java ServerDatabaseManagerApp
java.sql.SQLException: No suitable driver found for jdbc:mysql://localhost:3306:items_db
        at java.sql.DriverManager.getConnection(Unknown Source)
        at java.sql.DriverManager.getConnection(Unknown Source)
        at ServerDatabaseManager.<init>(ServerDatabaseManager.java:11)
        at ServerDatabaseManagerApp.main(ServerDatabaseManagerApp.java:19)

D:\Java Projects\ex\src>
```

Download the following J-Connector drivers (classes):

mariadb-java-client-2.7.4

Store in the D drive and rename to **mariadb_jconnector**
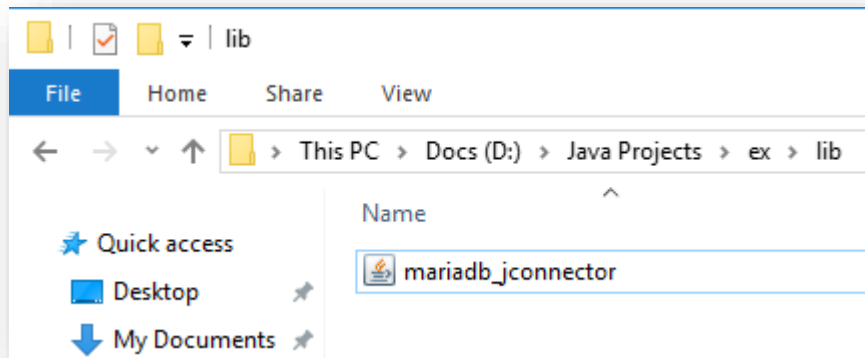
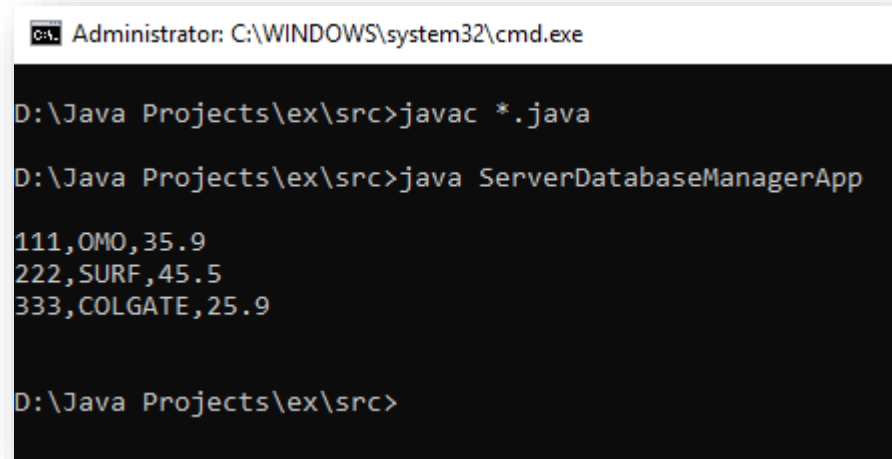On the command line, set the **classpath** to this jar file.

Compile and run your classes again

E. Modify the server application to accept requests.

```java
import java.sql.Connection;

import java.sql.ResultSet;

import java.sql.PreparedStatement;

import java.sql.DriverManager;

import java.sql.SQLException;

import java.net.ServerSocket;

import java.net.Socket;

import java.io.*;


public class ServerDatabaseManagerApp {

        public static void main(String[] args) {

                String url = "jdbc:mysql://localhost:3306/items_db";

                String username = "student";

                String password = "123";

                String queryStatement = "SELECT * FROM items_tbl";

                String data = "";

                ServerDatabaseManager sdbM = null;

                ResultSet results;

                ServerSocket s = null;
```

```java
Socket socket = null;

BufferedReader in = null;

PrintWriter out = null;

String response;


//open connection

try {

        s = new ServerSocket(9191);

        System.out.println("s = " + s);


        socket = s.accept();

        System.out.println("socket = " + socket);


        in = new BufferedReader(new InputStreamReader(socket.getInputStream()));

        out = new PrintWriter(new BufferedWriter(new OutputStreamWriter(socket.getOutputStream())), true);


        sdbM = new ServerDatabaseManager(url, username, password);


        while(true){

                //read the query
```

```
                    queryStatement = in.readLine();


                    //get the items from the database
                    results = sdbM.getItems(queryStatement);


                    //generate response
                    response = generateResponse(results);


                    //send response back
                    out.println(response);

            }
    } catch (SQLException ex){
            ex.printStackTrace();
    } catch(IOException ioe){
            ioe.printStackTrace();
    }       finally {
            System.out.println("GoodBye!!!");
            try {
                    socket.close();
            } catch(IOException ioe){
```

```java
                    ioe.printStackTrace();

            }

        }

    }


    private static String generateResponse(ResultSet results) throws SQLException {

        String data = "";


        //iterate through the items
        while(results.next()){

                    int id = results.getInt("id");

                    String desc = results.getString("description");

                    double price = results.getDouble("price");


                    data = data + id + "," + desc + "," + price + "\n";

        }


        return data;

    }

}
```
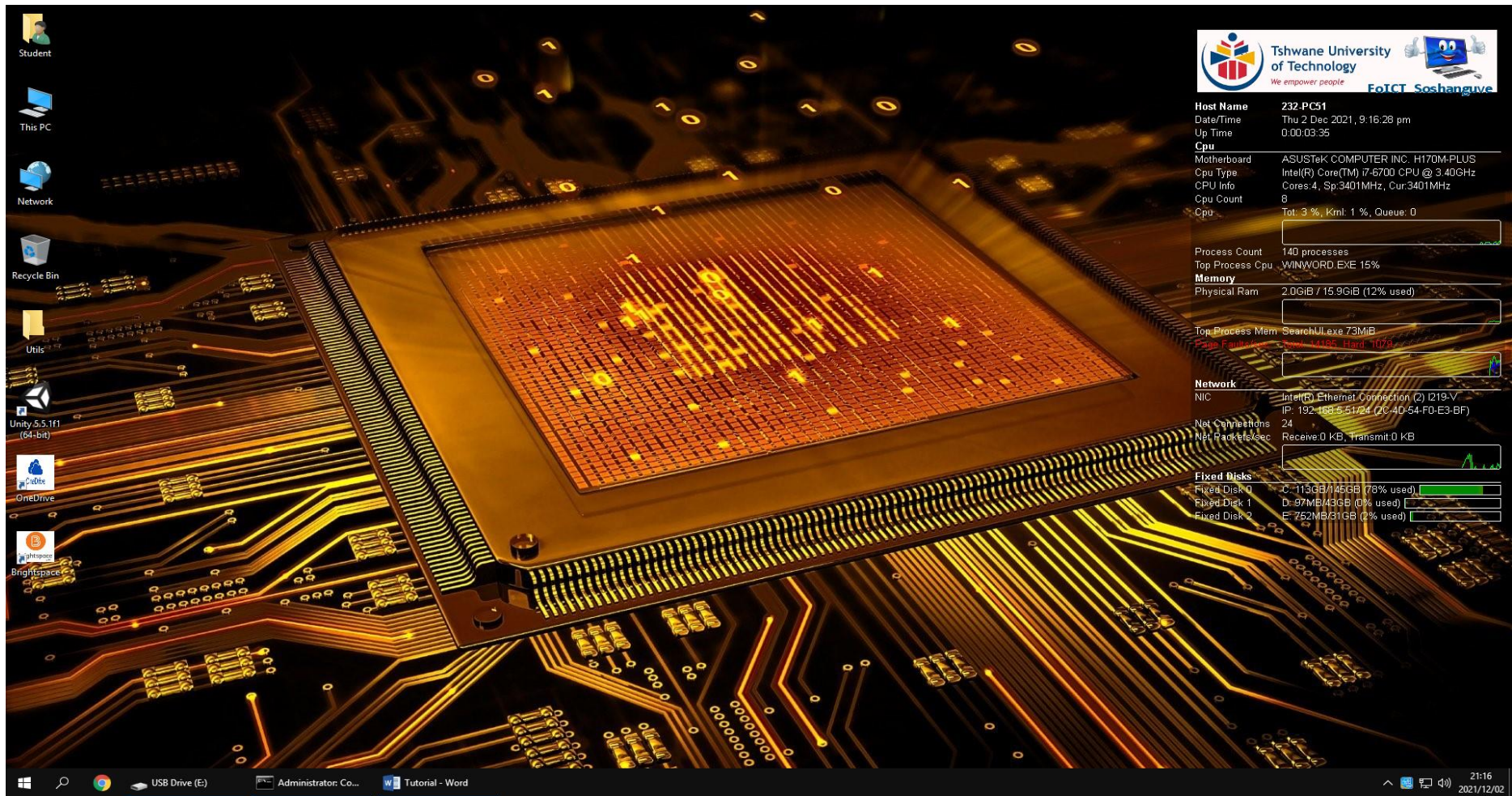
F. The client machine details

The client: PC number 51

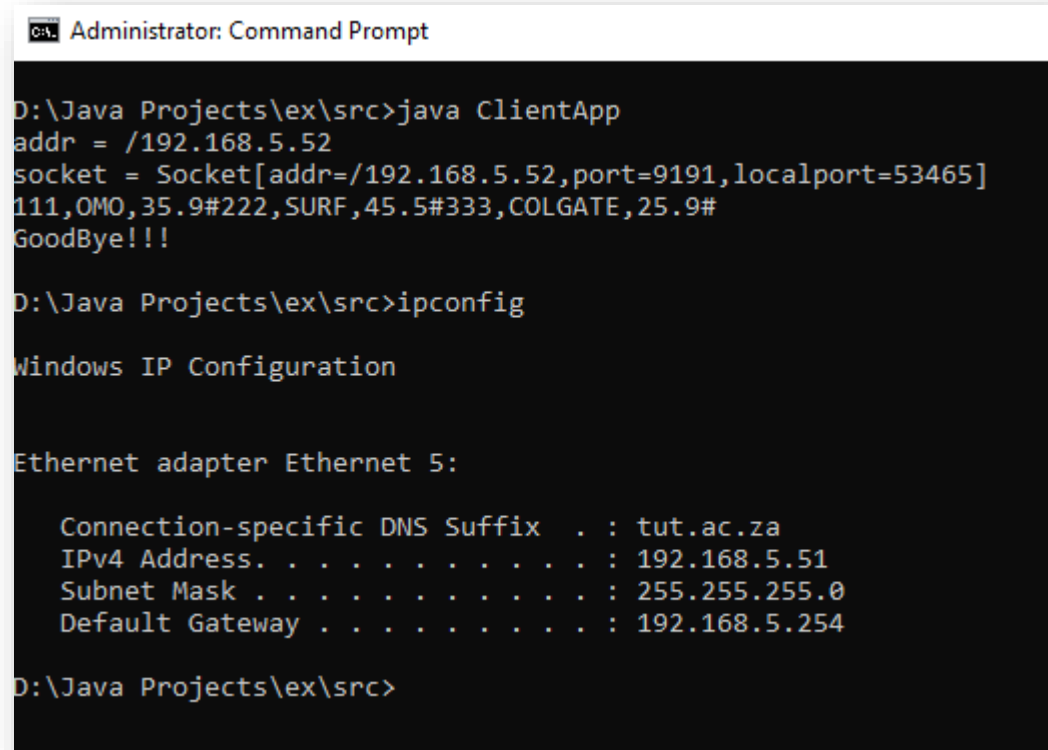**IP address**

192.168.5.51

The code of the client PC machine

```java
import java.io.*;

import java.net.*;


public class ClientApp {

        public static void main(String[] args){

                InetAddress addr = null;

                Socket socket = null;

                BufferedReader in = null;

                PrintWriter out = null;

                //query string

                String queryString = "SELECT * FROM items_tbl";

                String response;


                try {

                        addr = InetAddress.getByName("192.168.5.52");

                        System.out.println("addr = " + addr);


                        socket = new Socket(addr, 9191);

                        System.out.println("socket = " + socket);
```

```java
        //reading stream

        in = new BufferedReader(new InputStreamReader(socket.getInputStream()));


        //writing stream

        out = new PrintWriter(new BufferedWriter(new OutputStreamWriter(socket.getOutputStream())), true);


        //send the sql query

        out.println(queryString);


        //get the response

        response = in.readLine();


        //display response

        System.out.println(response);
    } catch(IOException ioe){

        ioe.printStackTrace();
    }        finally {

        System.out.println("GoodBye!!!");

        try {

                socket.close();
```
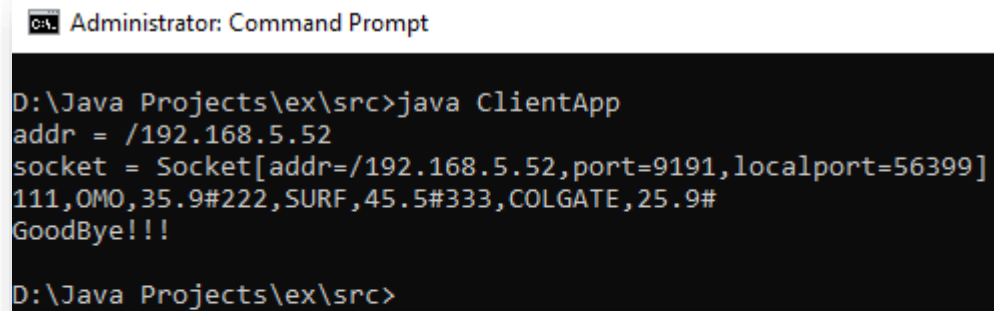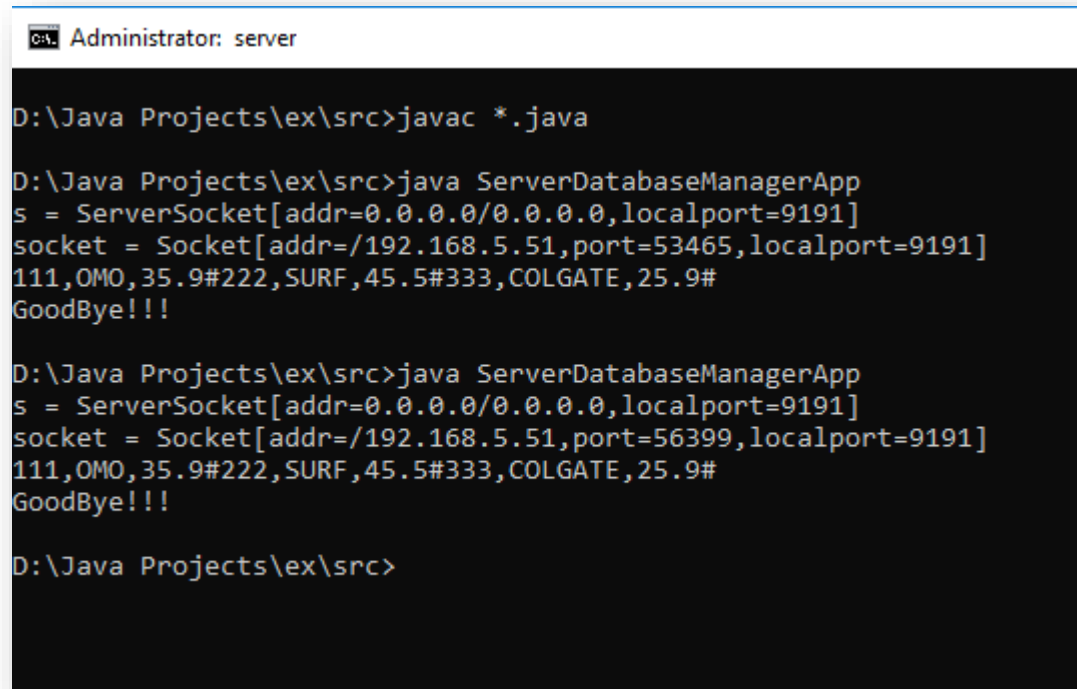
```
                } catch(IOException ioe){

                        ioe.printStackTrace();

                }

            }

        }

}
```

Output:

Server side output:

```
Administrator: server

D:\Java Projects\ex\src>javac *.java

D:\Java Projects\ex\src>java ServerDatabaseManagerApp
s = ServerSocket[addr=0.0.0.0/0.0.0.0,localport=9191]
socket = Socket[addr=/192.168.5.51,port=53465,localport=9191]
111,OMO,35.9#222,SURF,45.5#333,COLGATE,25.9#
GoodBye!!!

D:\Java Projects\ex\src>java ServerDatabaseManagerApp
s = ServerSocket[addr=0.0.0.0/0.0.0.0,localport=9191]
socket = Socket[addr=/192.168.5.51,port=56399,localport=9191]
111,OMO,35.9#222,SURF,45.5#333,COLGATE,25.9#
GoodBye!!!

D:\Java Projects\ex\src>
```