

VanillaCore Walkthrough

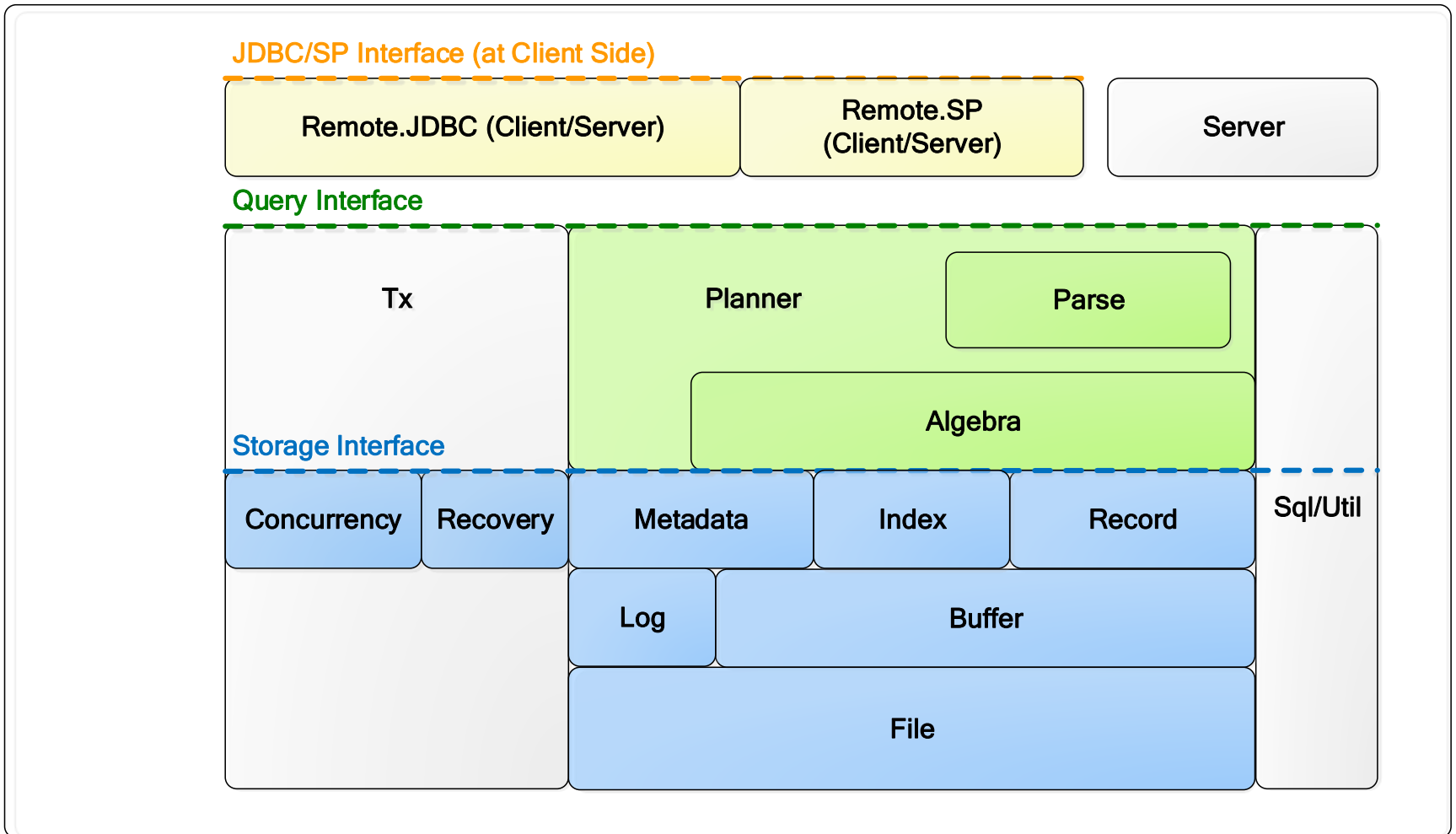
Part 1

Introduction to Database Systems
2023

DataLab, CS, NTHU

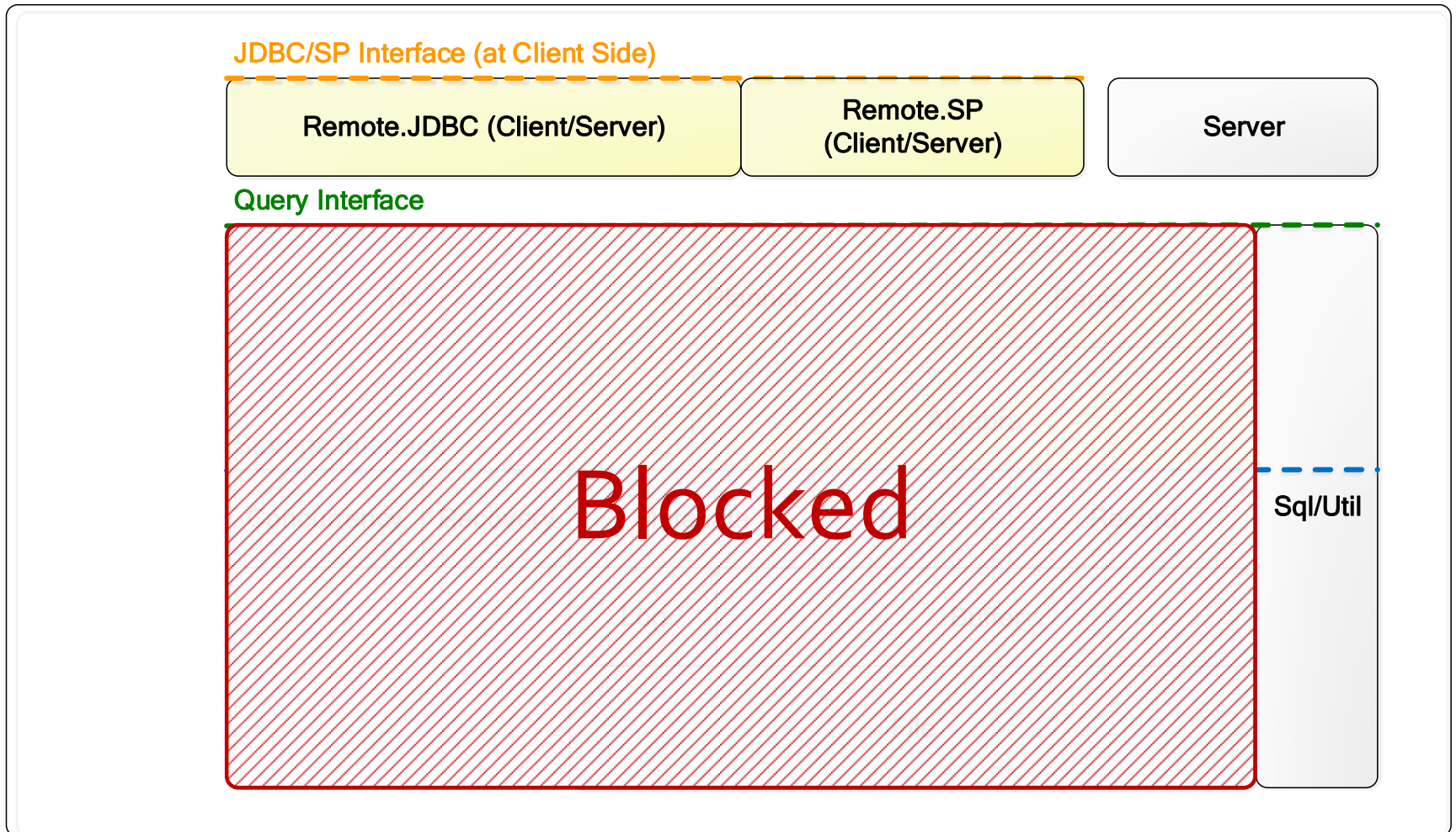
The Architecture

VanillaDB



The Architecture

VanillaDB



Outline

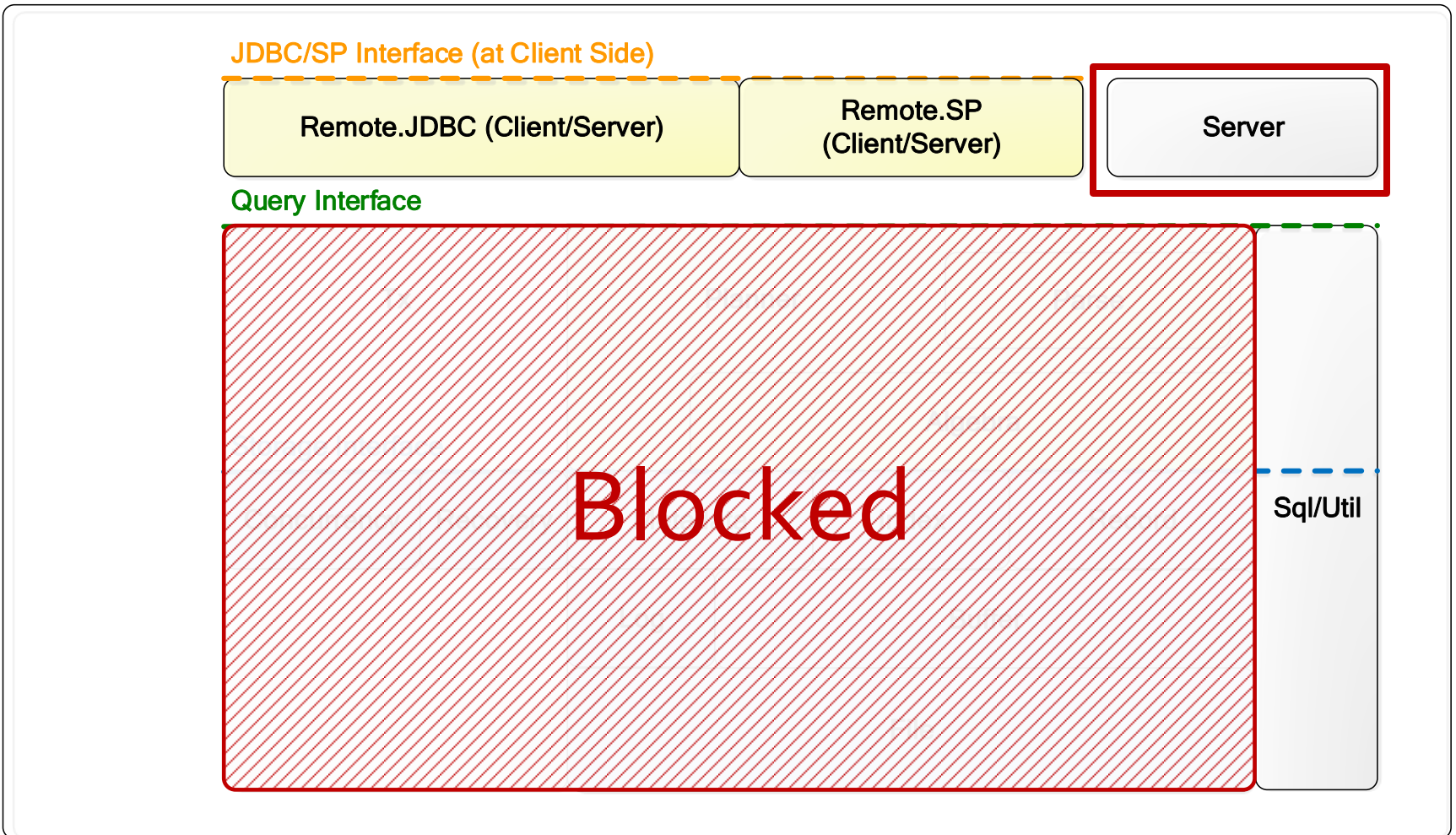
- Server package
- Remote package

Outline

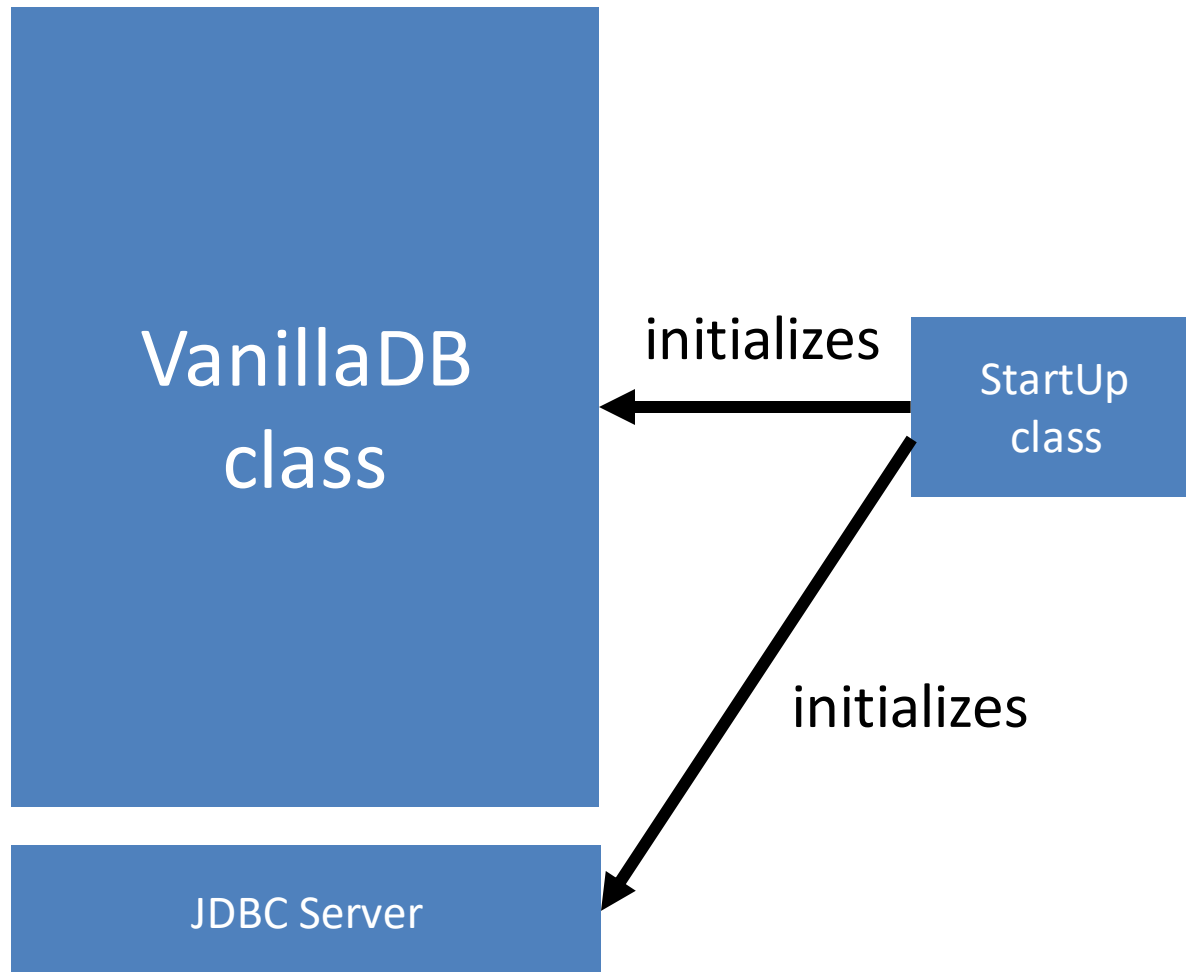
- Server package
- Remote package

Where are we?

VanillaDB

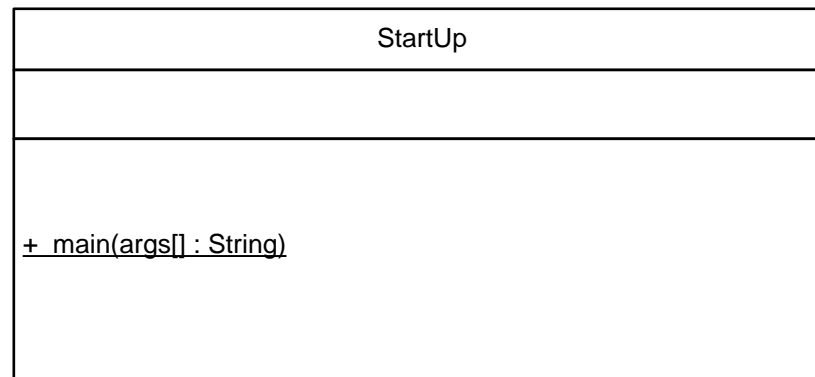


server Package



StartUp

- StartUp provides `main()` that runs VanillaCore as a **JDBC** server
 - Calls `VanillaDB.init()`
 - Sharing global resources through static variables
 - Binds `RemoteDriver` to RMI registry
 - Thread per connection



VanillaDb

- There are four types of methods
 - Initialization
 - Global getters
 - Factory methods
 - Profiler

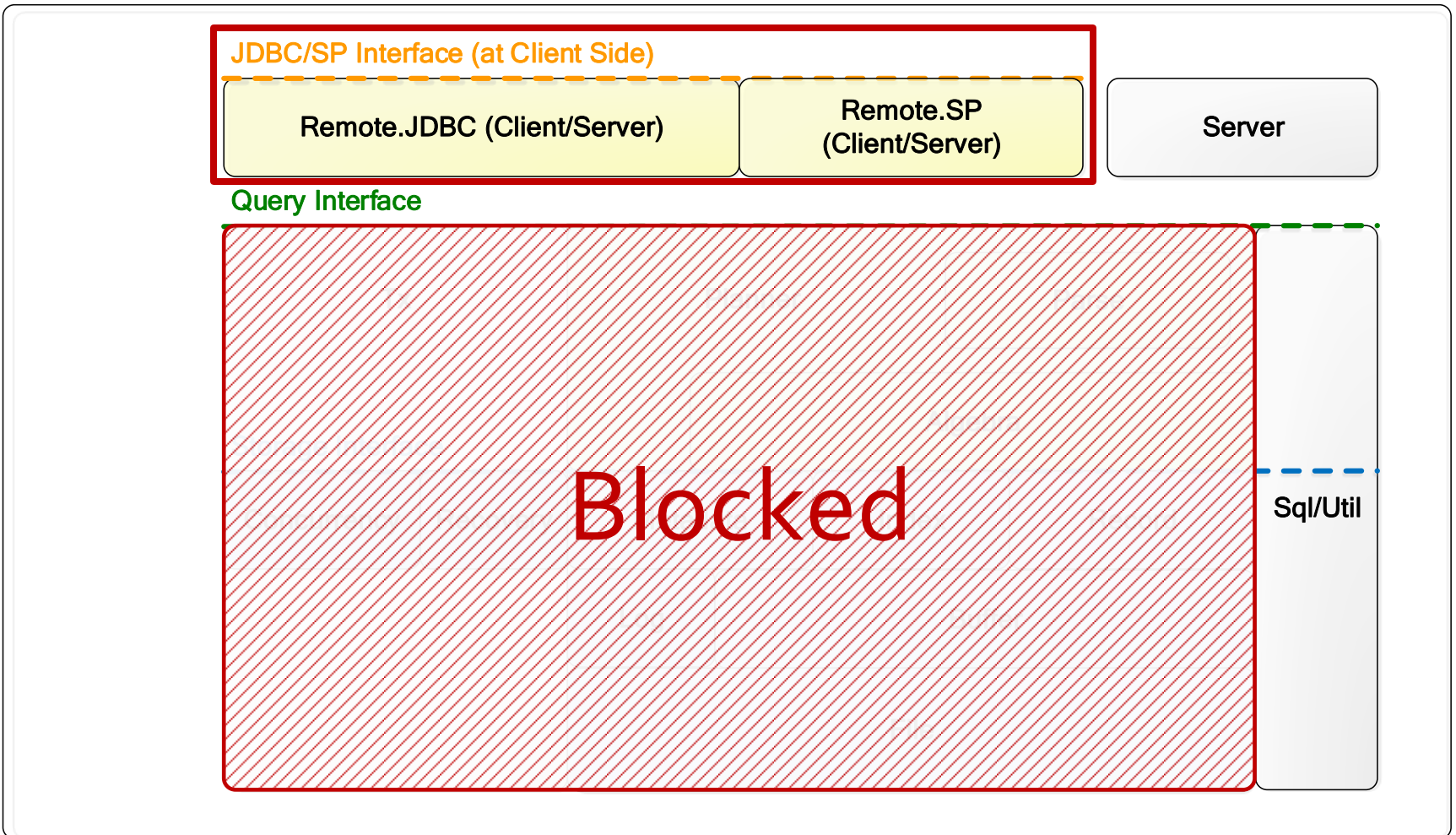
VanillaDb
<u>+ init(dirName : String)</u> <u>+ isInitd() : boolean</u> <u>+ initFileMgr(dirname : String)</u> <u>+ initFileAndLogMgr(dirname : String)</u> <u>+ initTaskMgr()</u> <u>+ initTxMgr()</u> <u>+ initCatalogMgr(isnew : boolean, tx : Transaction)</u> <u>+ initStatMgr(tx : Transaction)</u> <u>+ initSPFactory()</u> <u>+ initCheckpointingTask()</u> <u>+ fileMgr() : FileMgr</u> <u>+ bufferMgr() : BufferMgr</u> <u>+ logMgr() : LogMgr</u> <u>+ catalogMgr() : CatalogMgr</u> <u>+ statMgr() : StatMgr</u> <u>+ taskMgr() : TaskMgr</u> <u>+ txMgr() : TransactionMgr</u> <u>+ spFactory() : StoredProcedureFactory</u> <u>+ newPlanner() : Planner</u> <u>+ initAndStartProfiler()</u> <u>+ stopProfilerAndReport()</u>

Outline

- Server package
- Remote package

Where are we?

VanillaDB



remote Package

A solid purple rectangular box containing the text 'JDBC Package' in white.

JDBC
Package

A solid purple rectangular box containing the text 'Stored Procedure Package' in white.

Stored Procedure
Package

remote Package



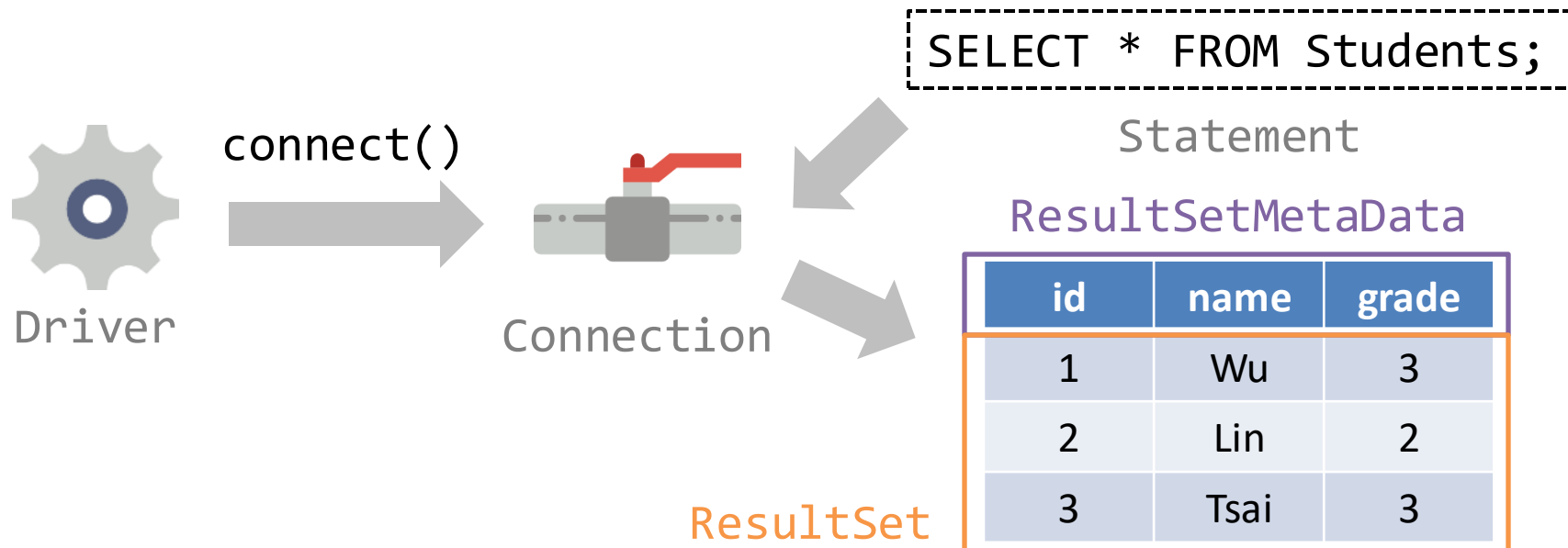
JDBC
Package



Stored Procedure
Package

JDBC

- Java Database Connectivity (JDBC) is an API for Java, that defines how a client may access a database.



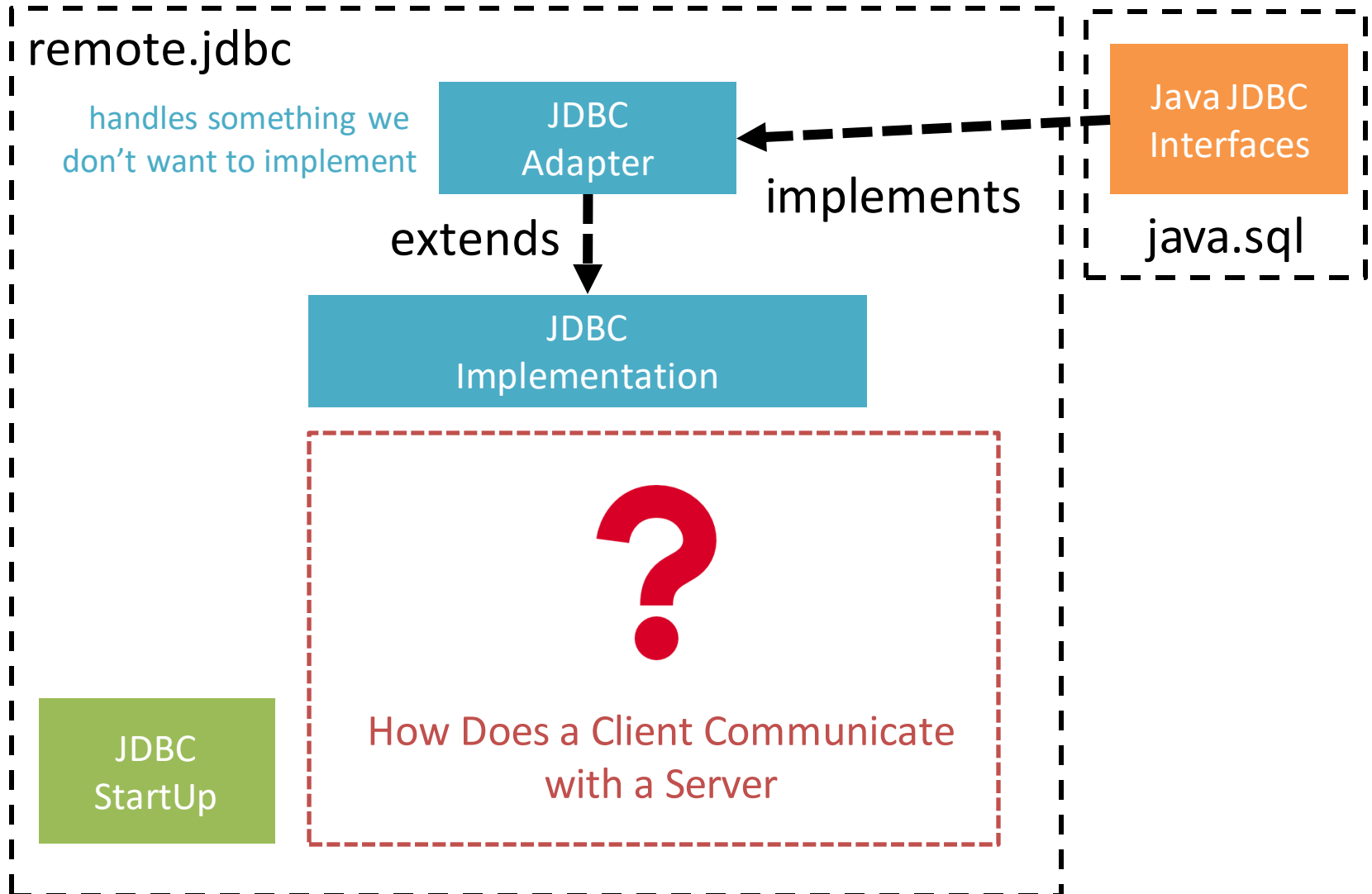
```

Connection conn = null;
try {
    // Step 1: connect to database server
    Driver d = new JdbcDriver();
    conn = d.connect("jdbc:vanilladb://localhost", null);
    conn.setAutoCommit(false);
    conn.setReadOnly(true);
    // Step 2: execute the query
    Statement stmt = conn.createStatement();
    String qry = "SELECT s-name, d-name FROM departments, "
    + "students WHERE major-id = d-id";
    ResultSet rs = stmt.executeQuery(qry);
    // Step 3: loop through the result set
    rs.beforeFirst();
    System.out.println("name\tmajor");
    System.out.println("-----\t-----");
    while (rs.next()) {
        String sName = rs.getString("s-name");
        String dName = rs.getString("d-name");
        System.out.println(sName + "\t" + dName);
    }
    rs.close();
} catch (SQLException e) {
    e.printStackTrace();
} finally {
    try {
        // Step 4: close the connection
        if (conn != null)
            conn.close();
    } catch (SQLException e) {
        e.printStackTrace();
    }
}
}

```

JDBC Program: Finding Major

remote.jdbc Package



RMI

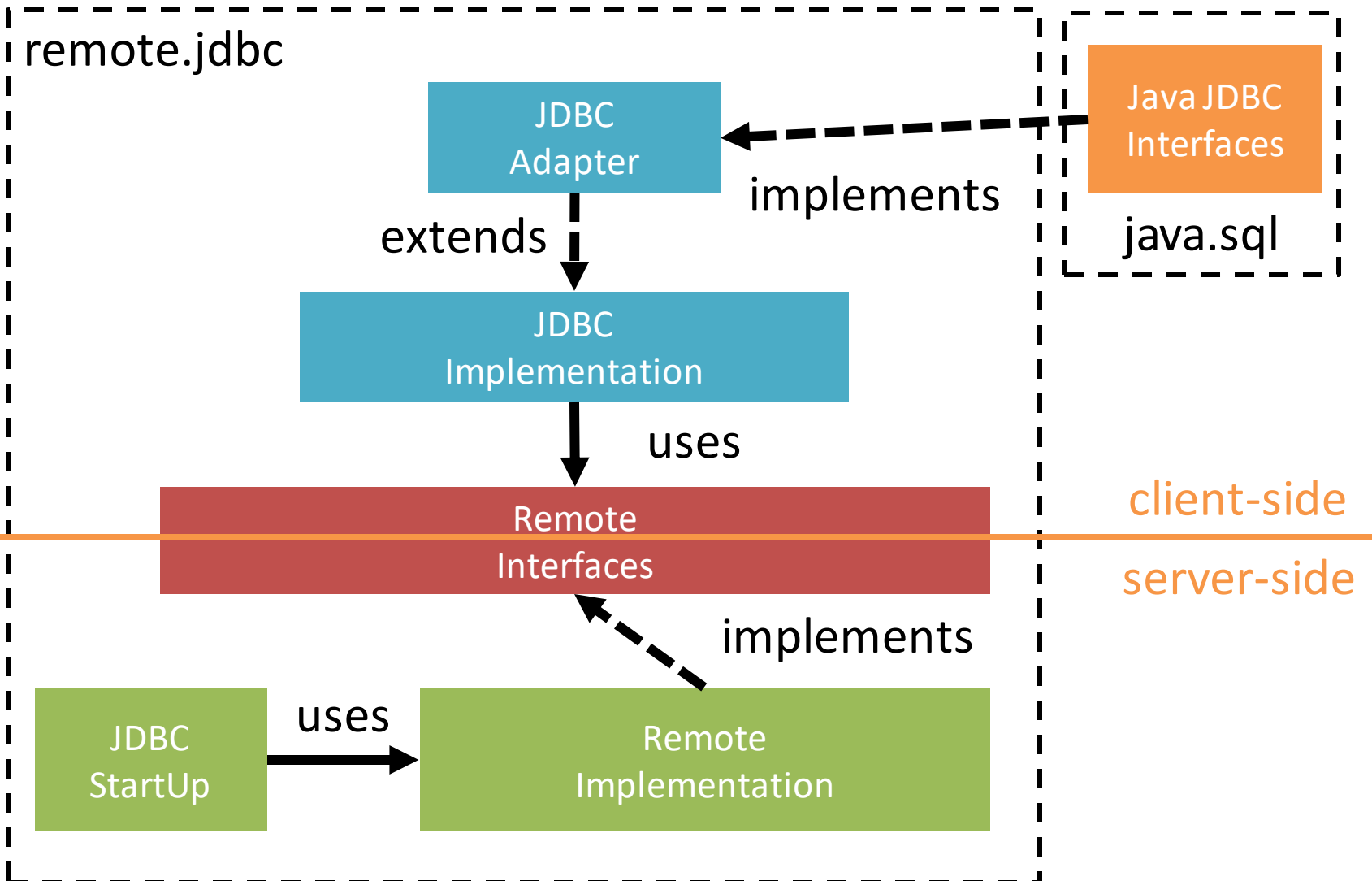
- VanillaCore uses Java Remote Method Invocation (RMI) for communication.
 - It makes a program able to call a method on other program without knowing the implementation of the method.

RMI Example

```
public class Server {  
    public int[] sort(int[] numbers) {  
        int[] array = Arrays.copyOf(numbers, numbers.length);  
        Arrays.sort(array);  
        return array;  
    }  
}
```

```
public class Client {  
    public static void main(String[] args) {  
        ...  
        Registry reg = LocateRegistry.getRegistry(host);  
        API api = (API) reg.lookup(regName);  
        array = api.sort(array);  
    }  
}
```

remote.jdbc Package



remote Package

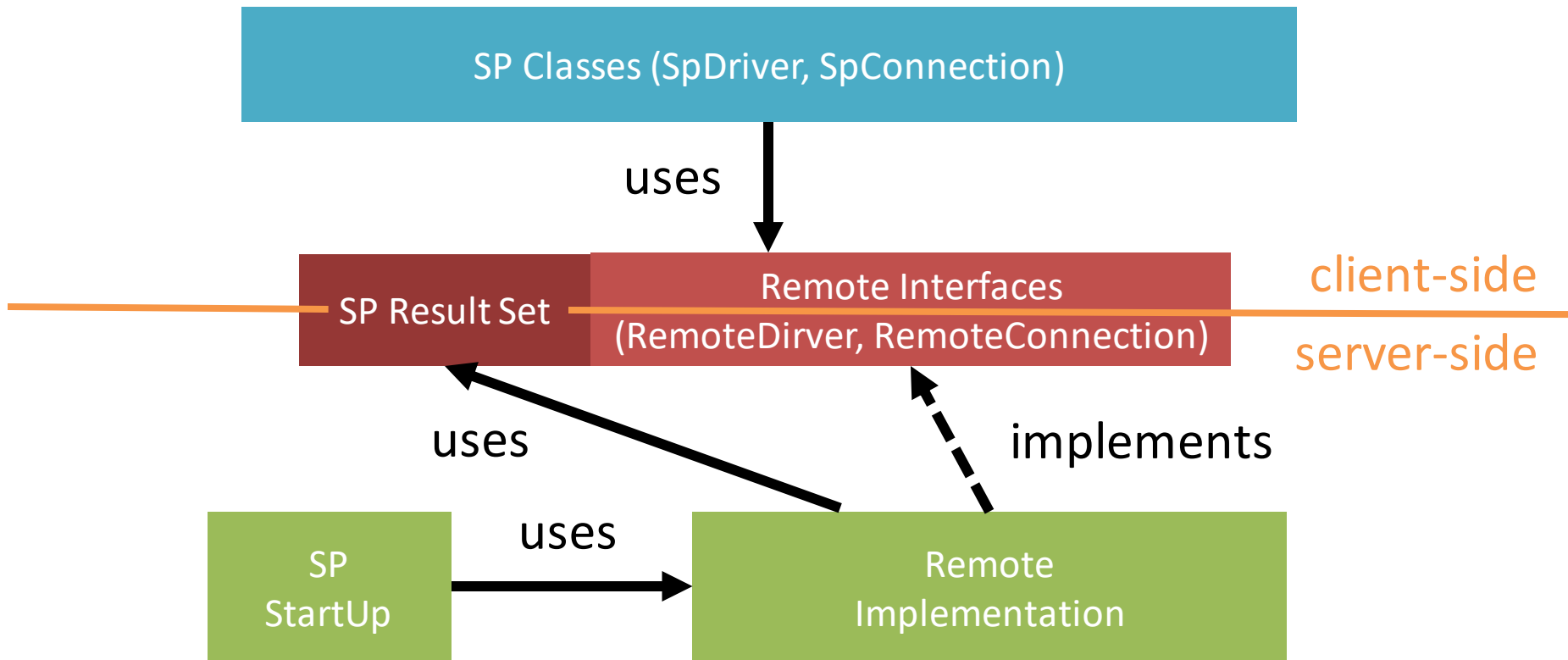


JDBC
Package



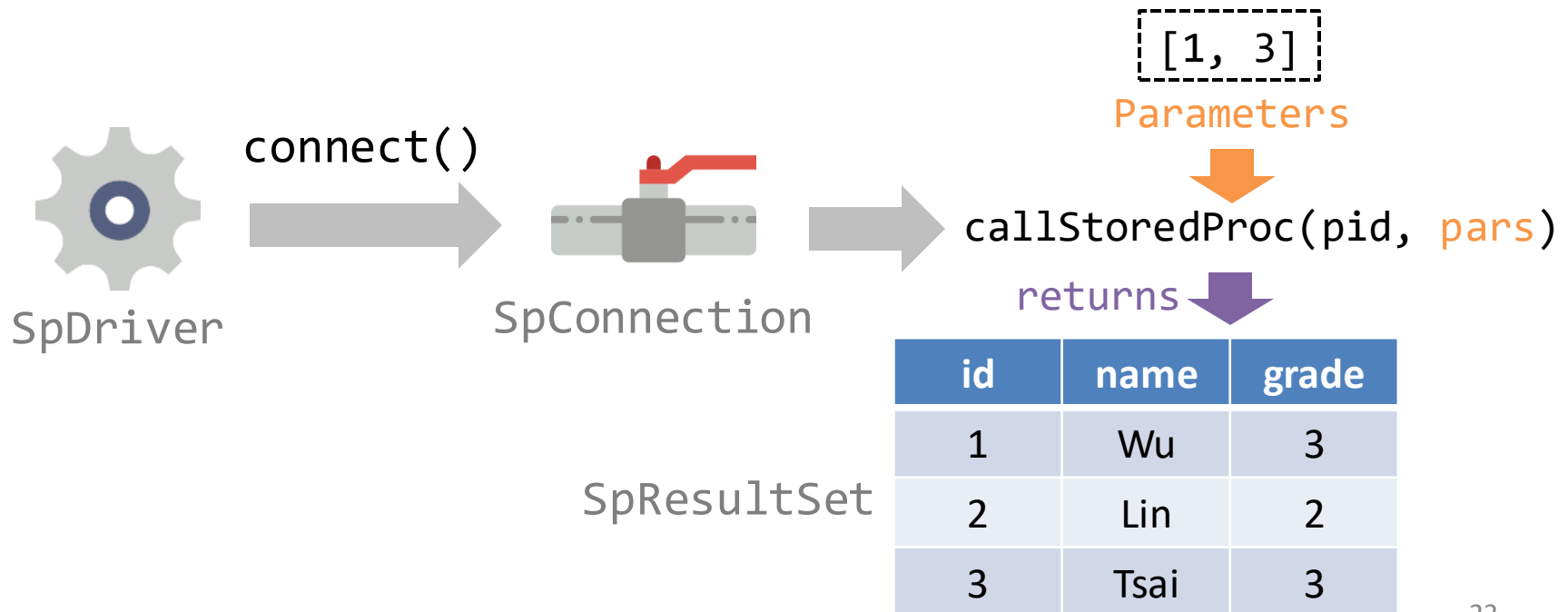
Stored Procedure
Package

remote.storedprocedure Package

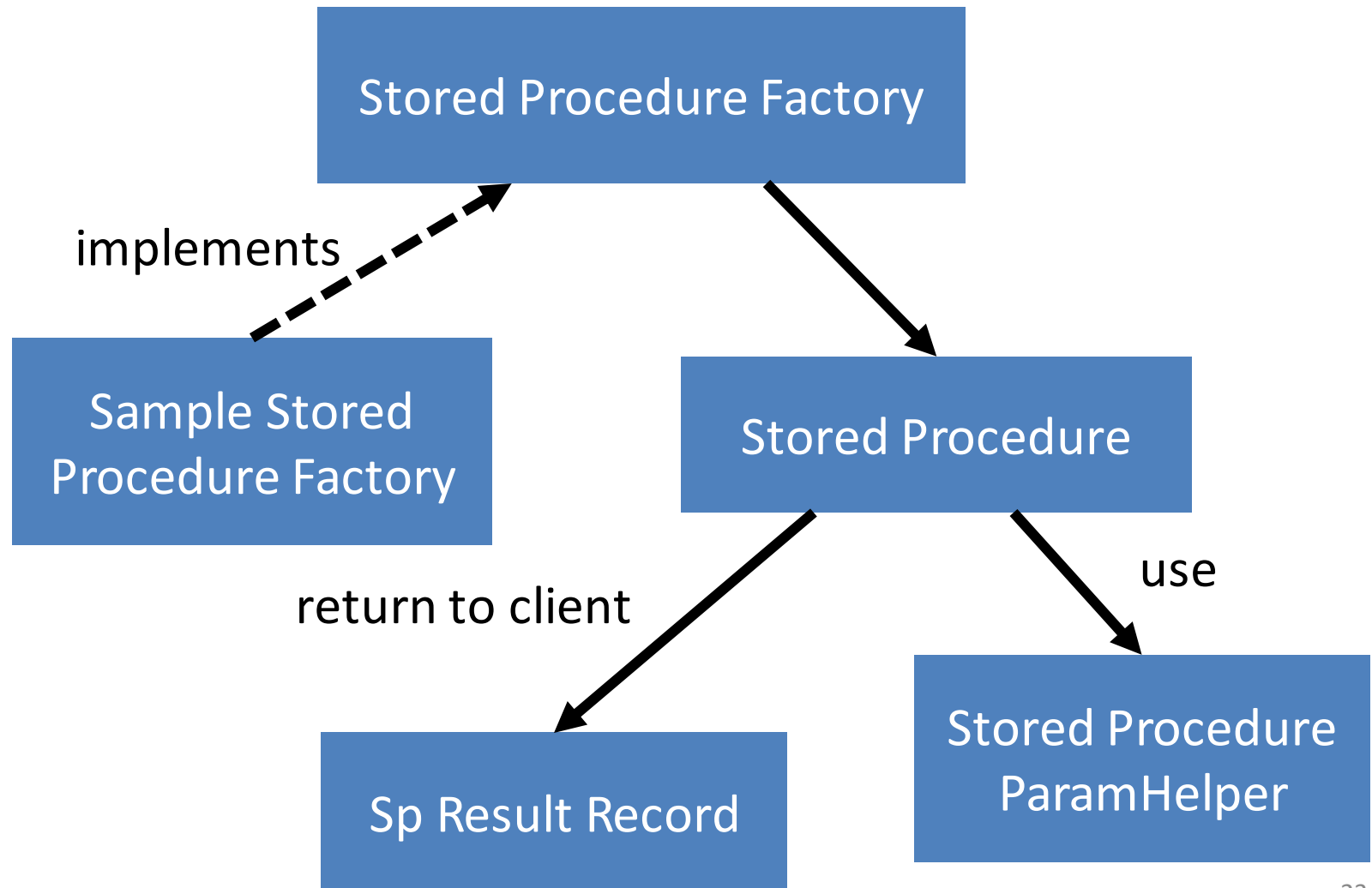


Calling Stored Procedure

- To call a stored procedure from clients, it first establishes a connection from the driver.
 - Then send the parameters via the connection



sql.storedprocedure Package



Factory Pattern

- A factory takes care of which implementation should be used.
- The clients only need to pass the parameters to it and wait the results.

