

VanillaCore Walkthrough

Part 1

Introduction to Database Systems

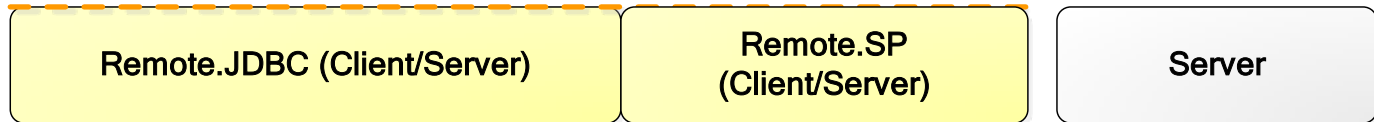
DataLab

CS, NTHU

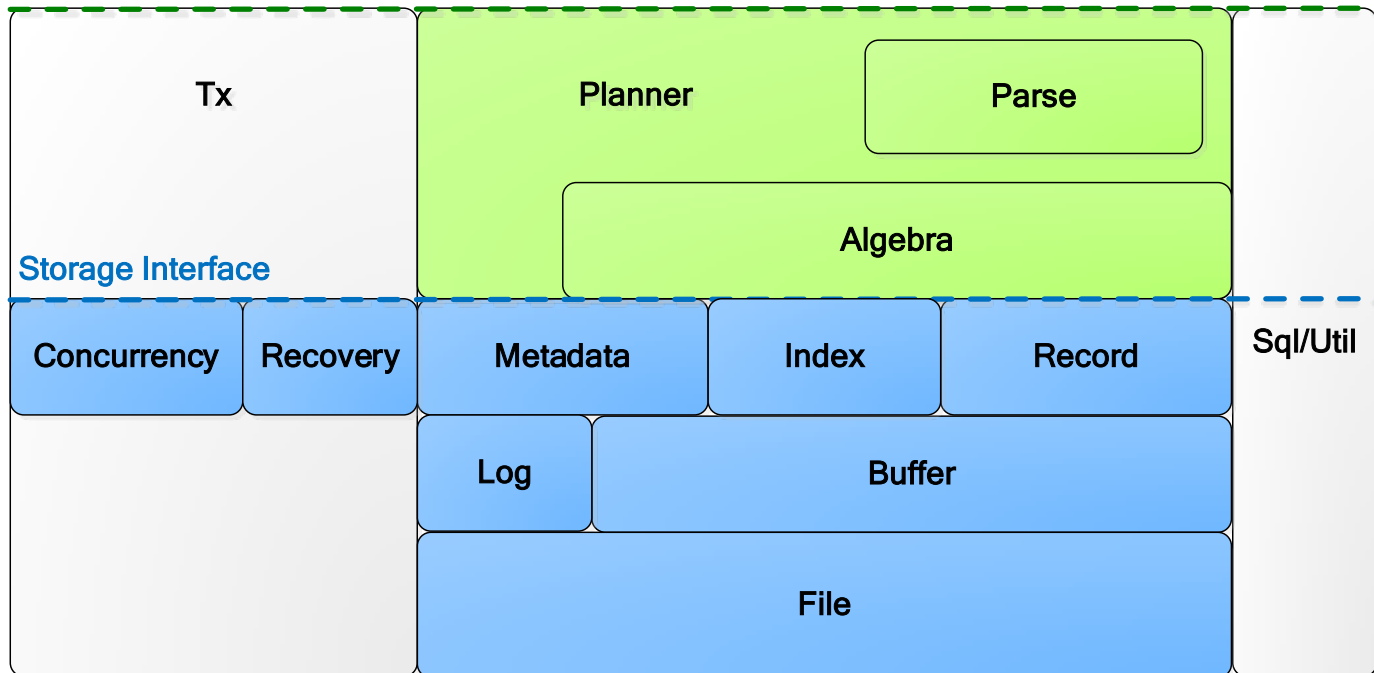
The Architecture

VanillaDB

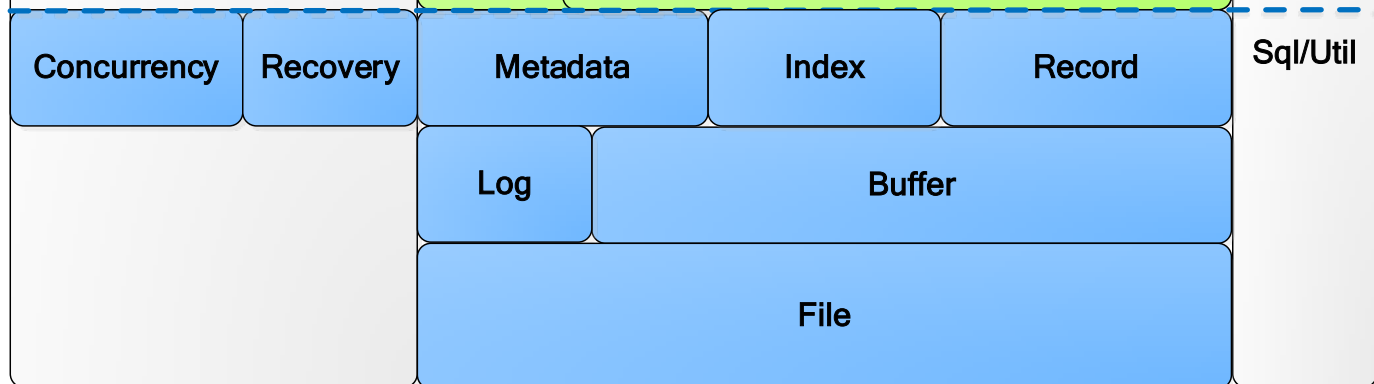
JDBC/SP Interface (at Client Side)



Query Interface

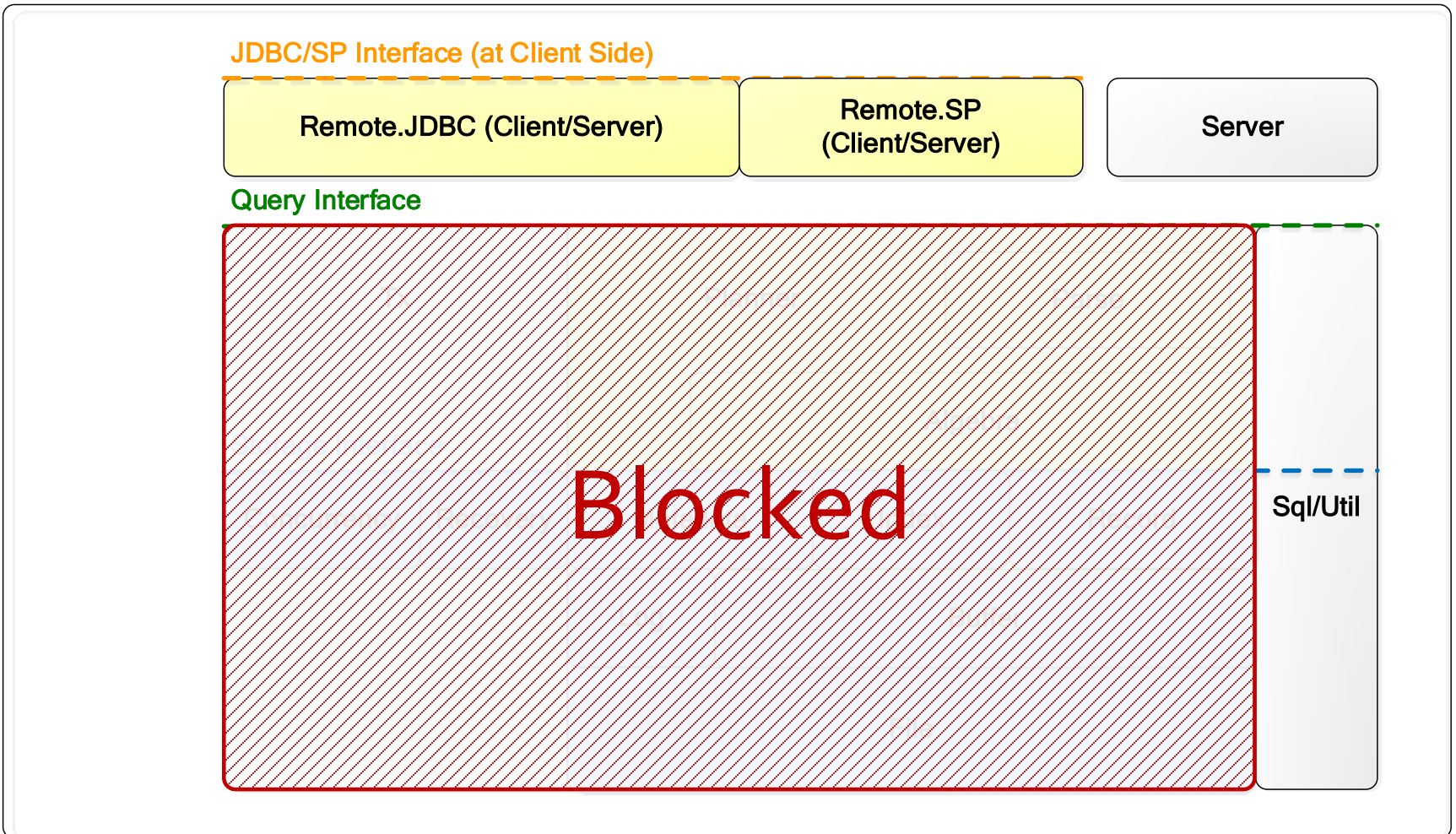


Storage Interface



The Architecture

VanillaDB



Outline

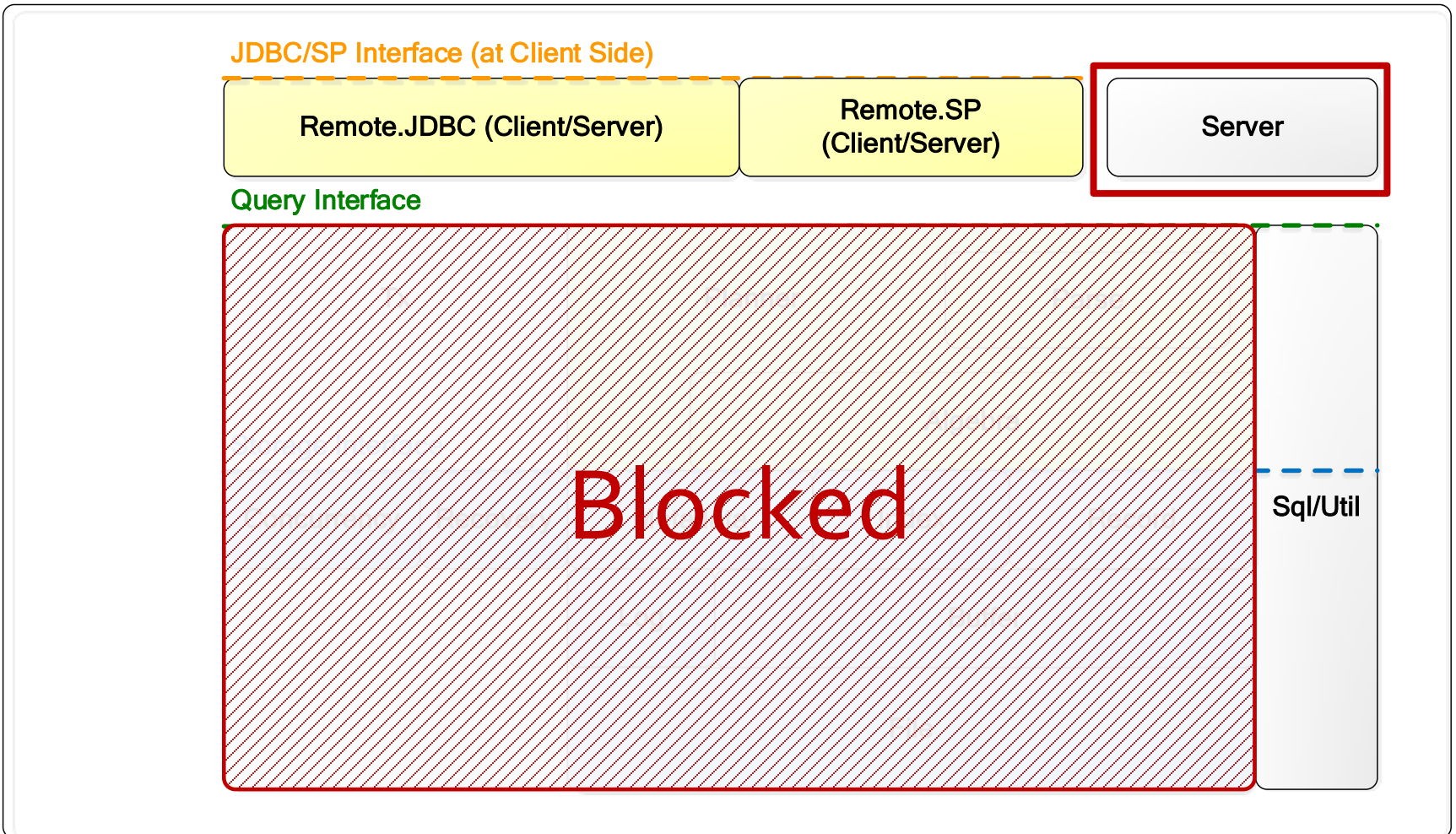
- Server package
- Remote package
- SQL package

Outline

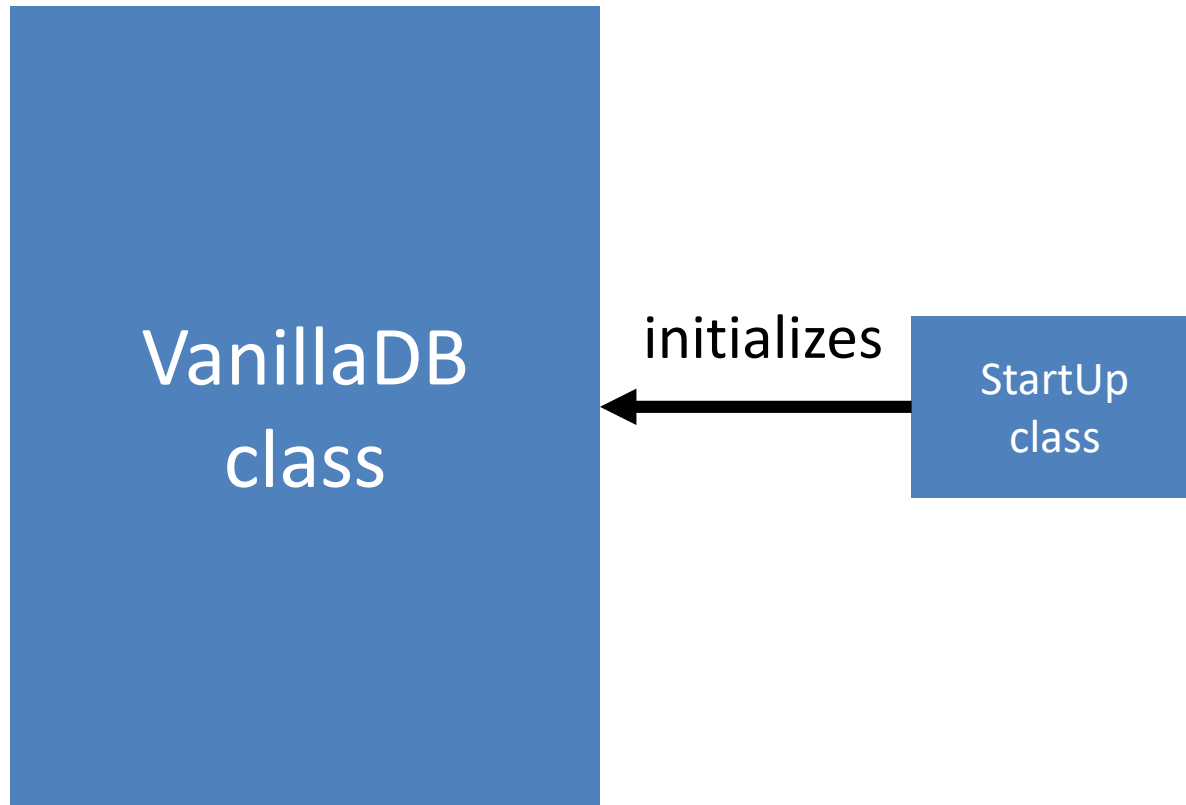
- Server package
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Where are we?

VanillaDB



server Package



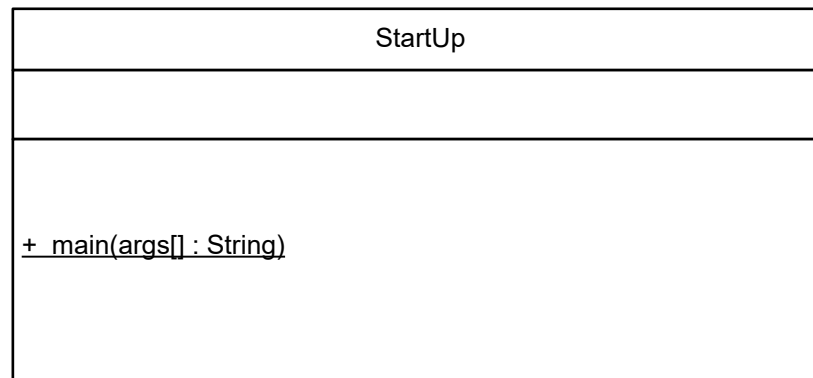
VanillaDb

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

VanillaDb
<ul style="list-style-type: none"><u>+ init(dirName : String)</u><u>+ isInit() : 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>

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

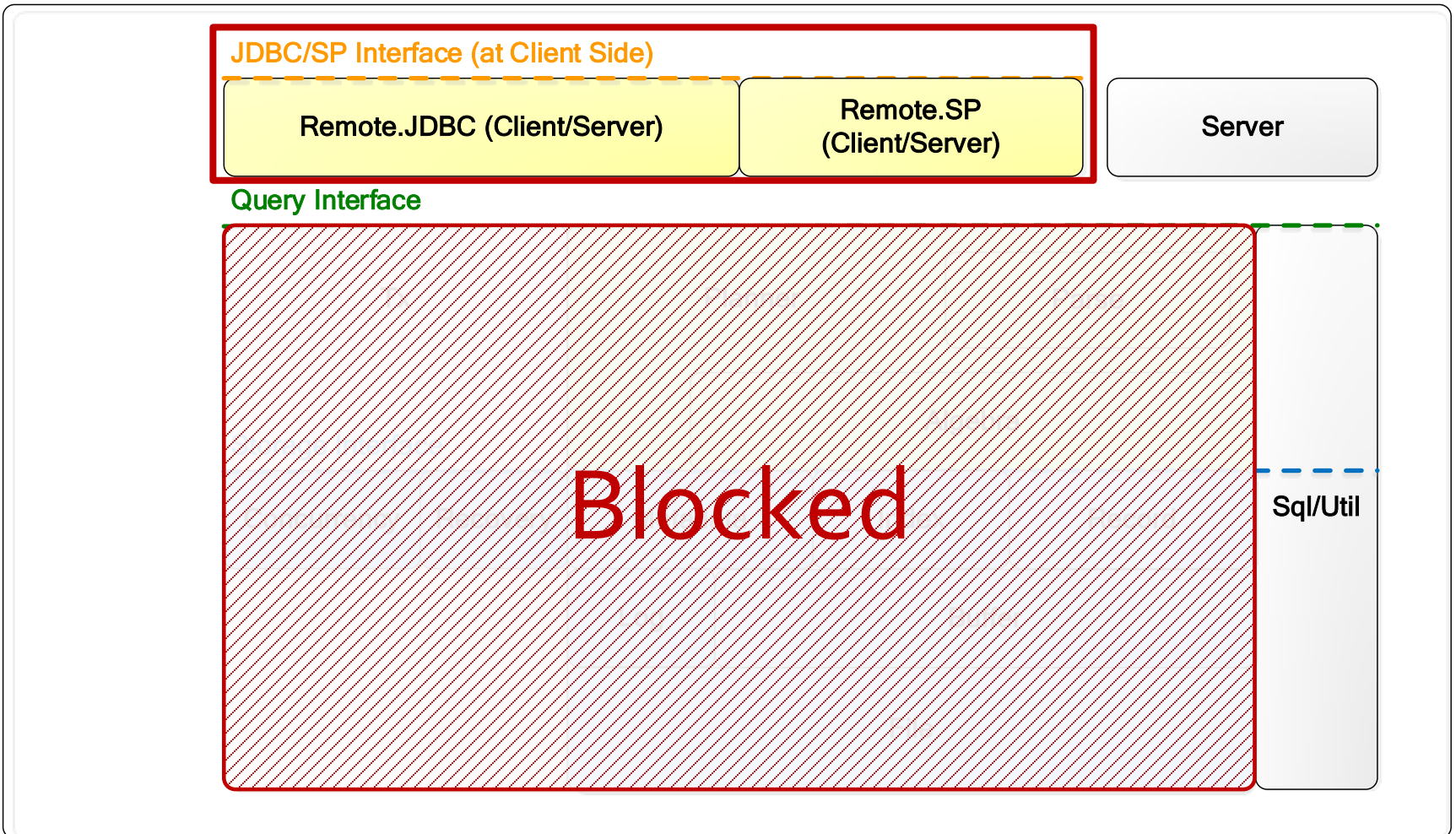


Outline

- Server package
- **Remote package**
- SQL 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



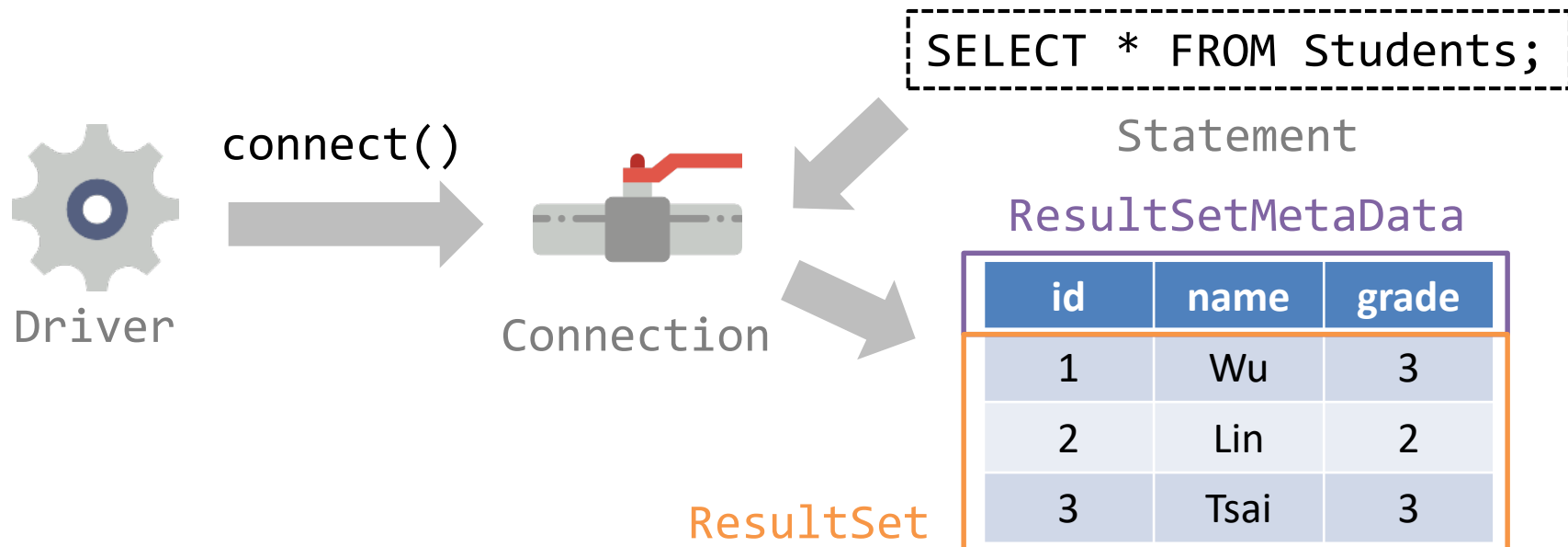
JDBC
Package



Stored Procedure
Package

JDBC

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



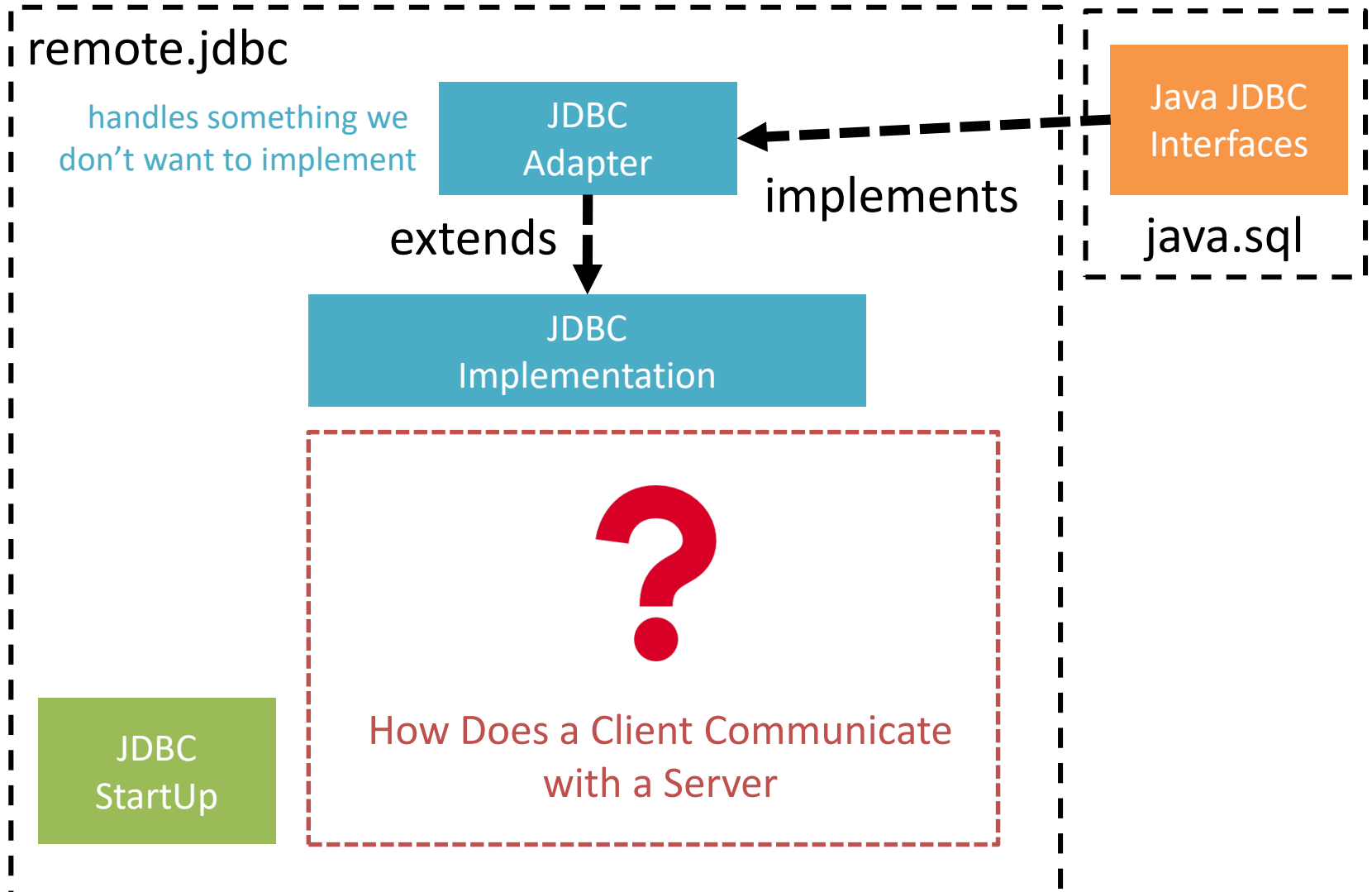
```

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.

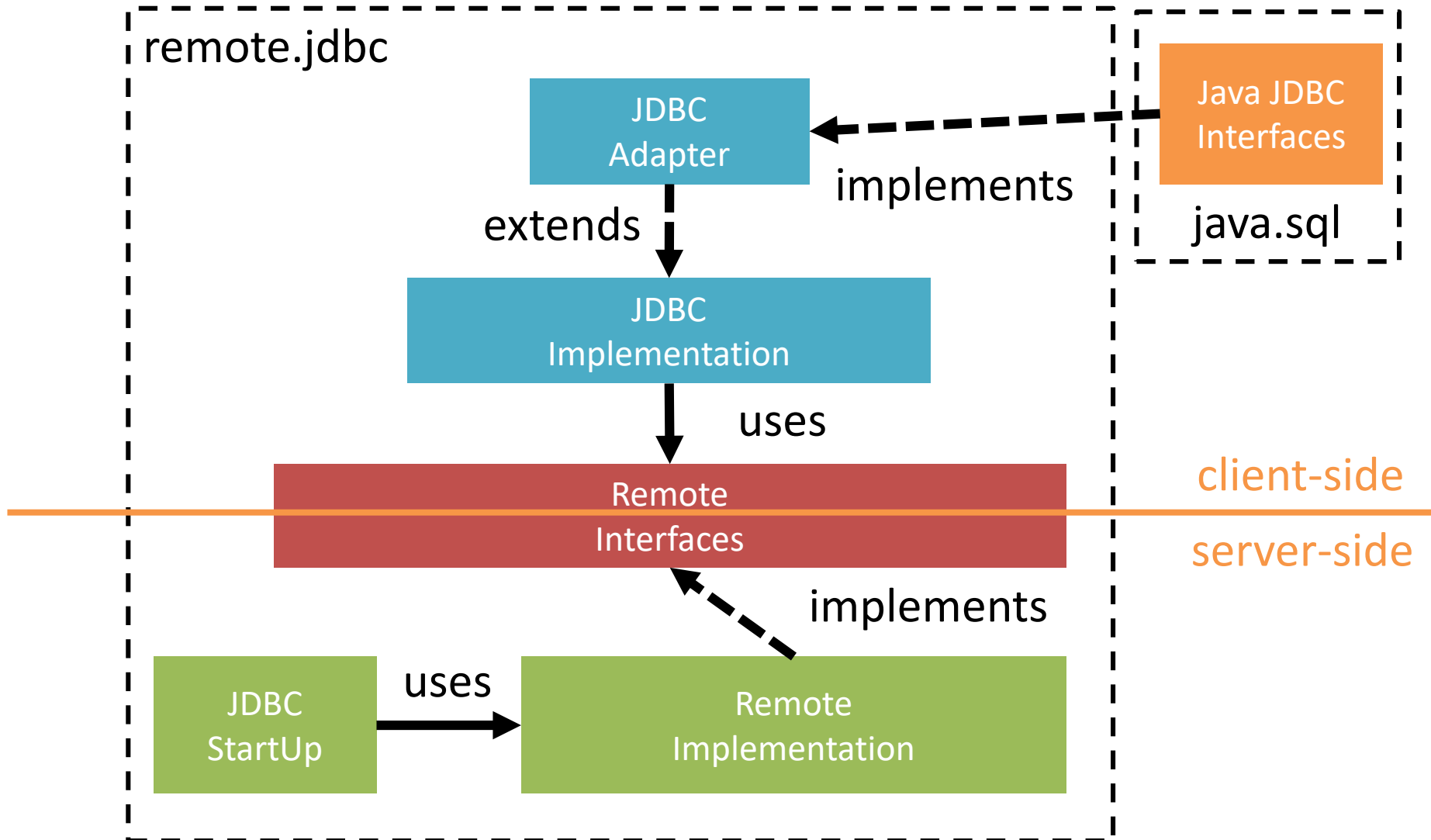
RMI Example

```
public interface API {  
    int[] sort(int[] numbers);  
}
```

```
public class Server implements API {  
    @Override  
    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

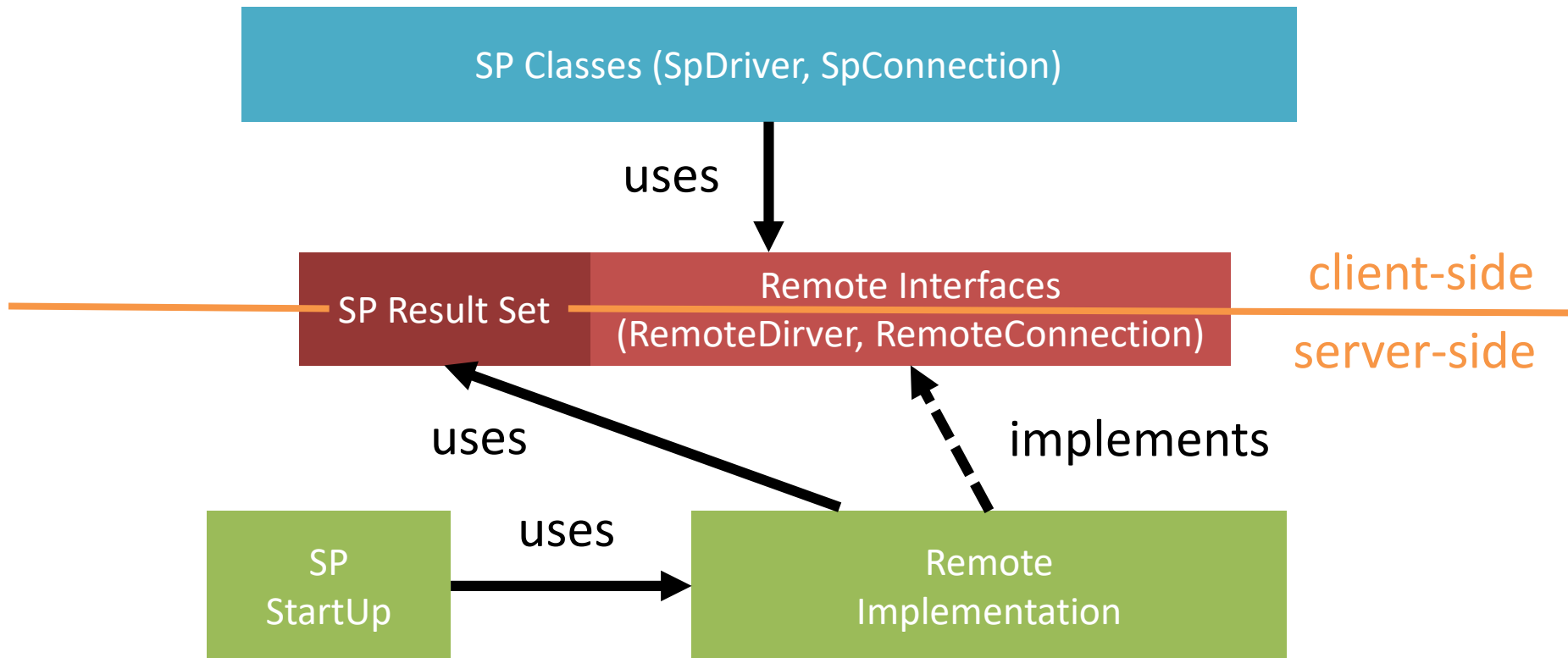


JDBC
Package



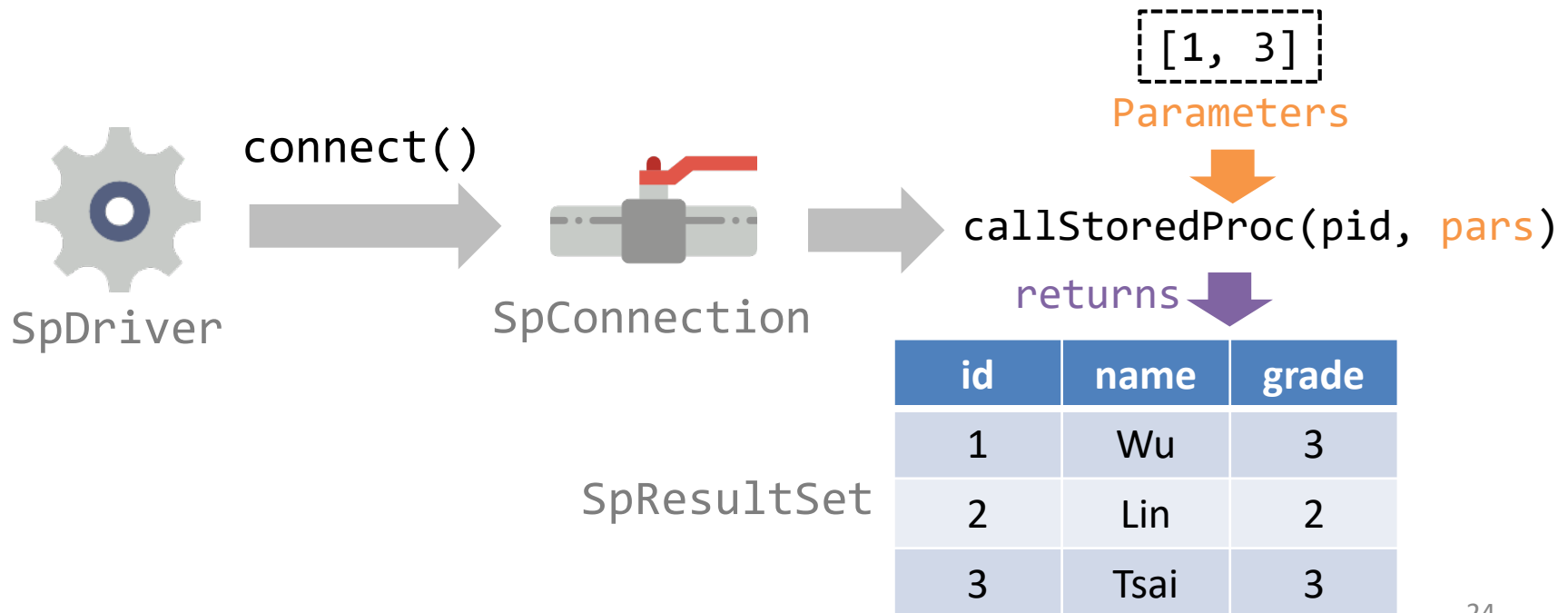
Stored Procedure
Package

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

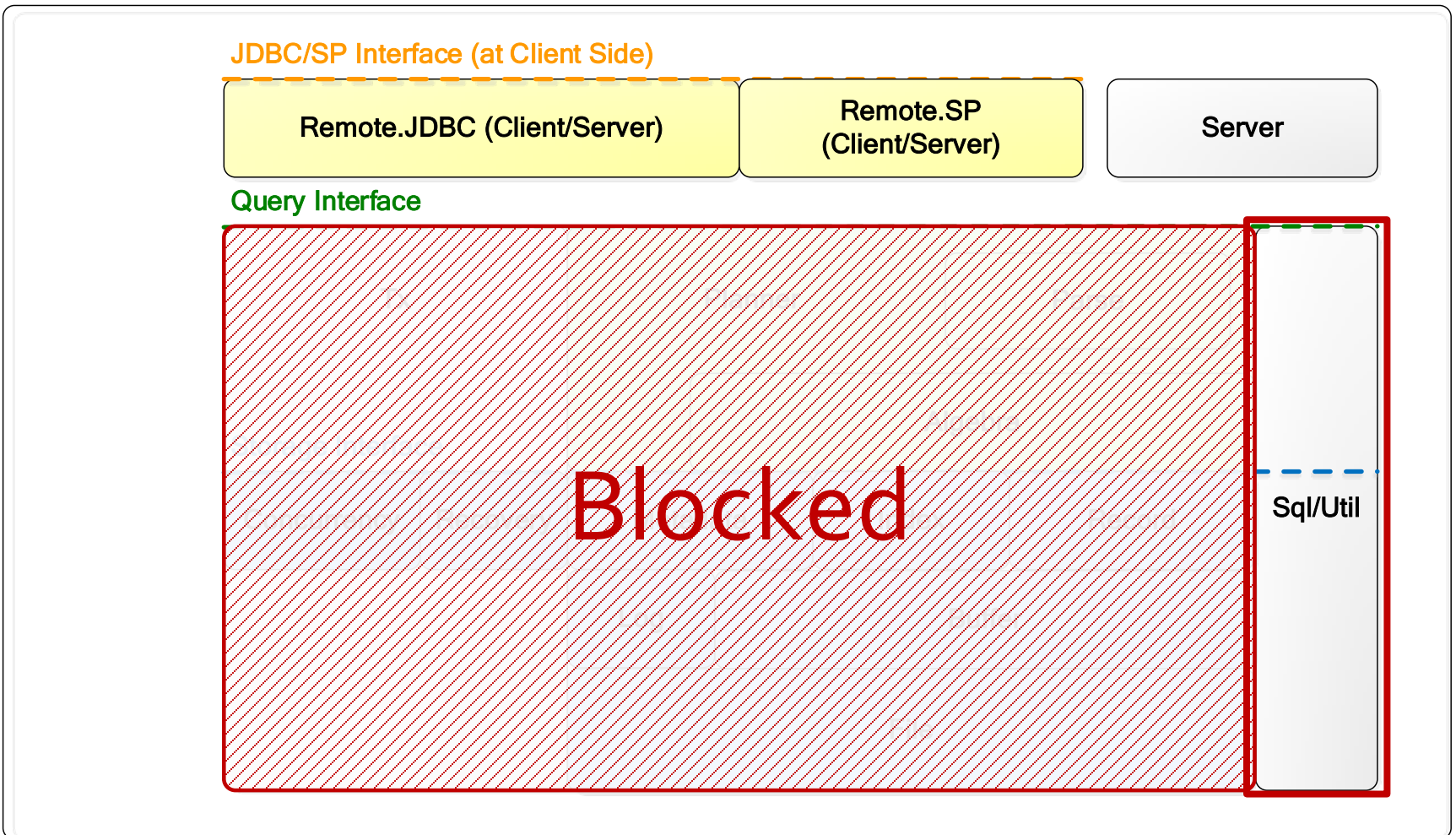


Outline

- Server package
- Remote package
- SQL package

Where are we?

VanillaDB



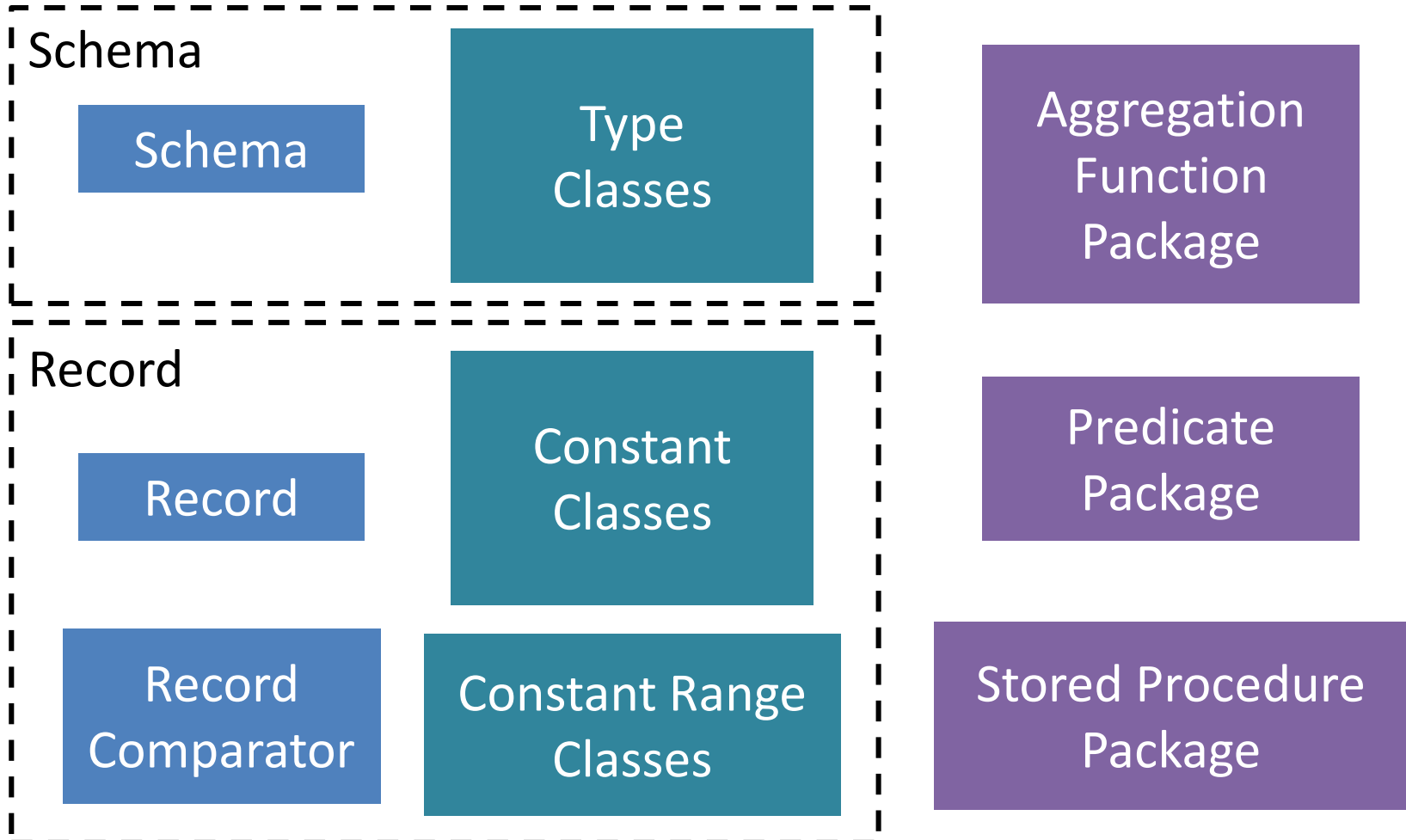
Schema & Records

blog_id	url	created	author_id
33981	ms.com/...	2012/10/31	729
33982	apache.org/...	2012/11/15	4412

← Schema

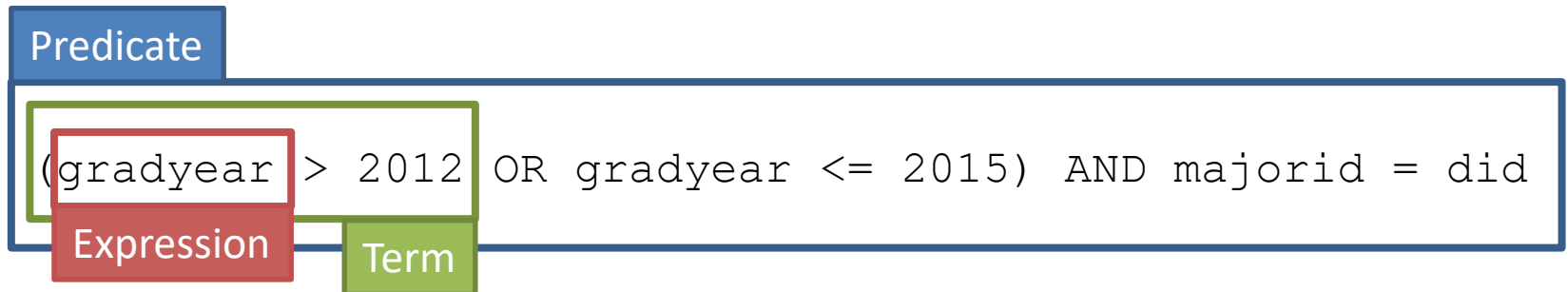
← Record

sql Package

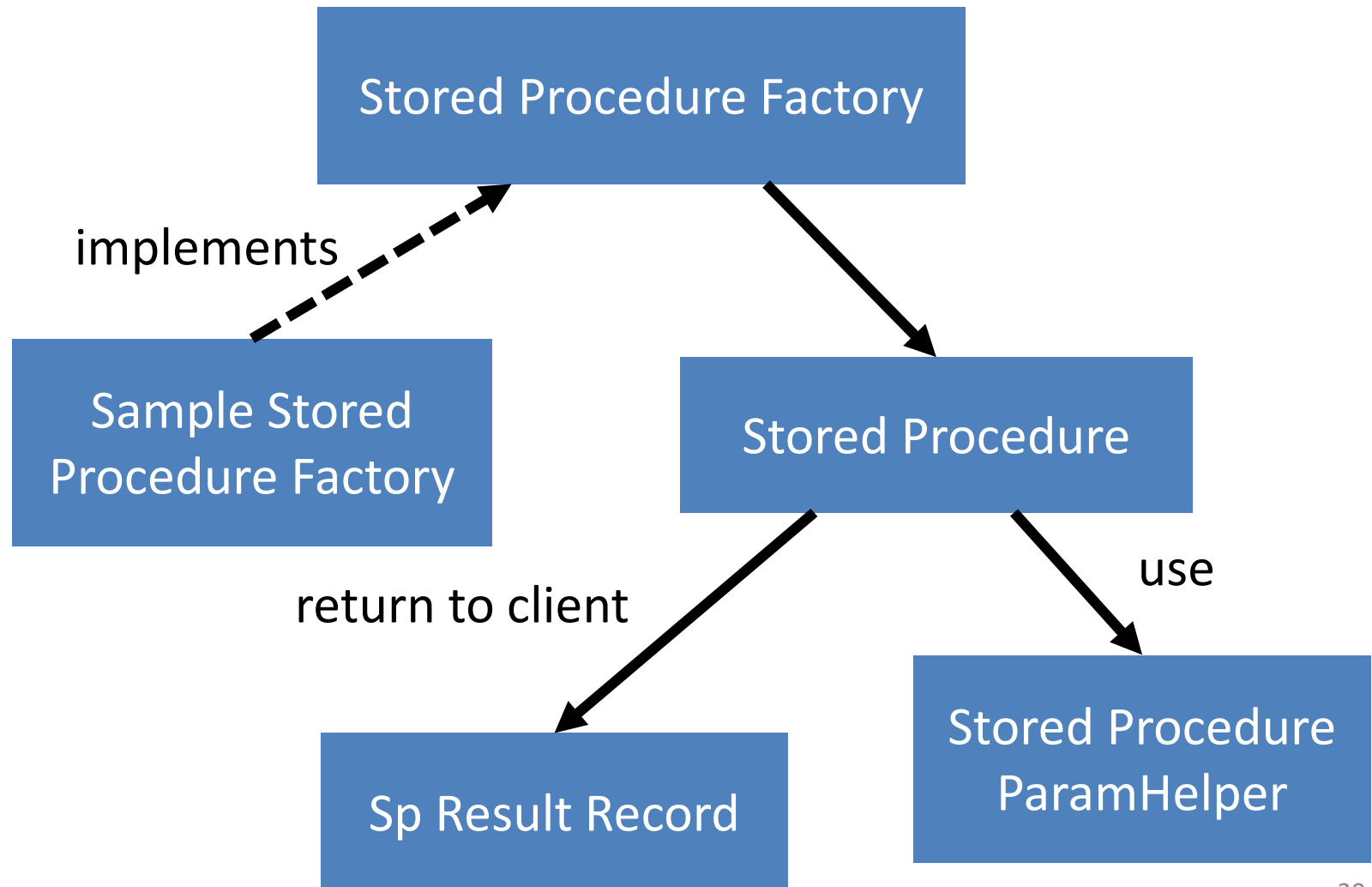


Predicates

- An **expression** consists of constants, field names, or their operations
- A **term** is a comparison between two expressions
- A **predicate** is a Boolean combination of terms



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.

