Java technologies for Client/Server

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- RMI (Remote Method Invocation)
  - The client application using RMI to communicate with the back-end
- Sockets
  - The client application using socket connection to communicate with the back-end
- JDBC
  - The client application using JDBC to connect the data base server, (Limited business logic on the back-end, unless using Stored procedures)
- HTTP servlet
- Web Services (XML-based Web service protocols (SOAP and WSDL)
- RESTful Web services
- WebSocket

Remote Method Invocation (RMI)

- Java's Remote Method Invocation is used for client and server models.

- RMI is the object oriented equivalent to RPC (Remote procedure call)

- RMI system allows an object running in one Java Virtual Machine (VM) to invoke methods on an object running in another Java VM.

- RMI provides for remote communication between programs written in the Java programming language

- RMI is defined to use only with the Java platform.

Distributed object applications need to do the following

- Locate remote objects

  - obtain references to remote objects

- Communicate with remote objects

  - remote communication looks similar to regular Java method invocations

- Load class definitions for objects that are passed around

  - Because RMI enables objects to be passed back and forth, it provides mechanisms for loading an object's class definitions as well as for transmitting an object's data

  - the basic mechanisms for distributed computing on the Java platform

Advantages of Dynamic Code Loading

- Unique features of RMI is its ability to download the definition of an object's class if the class is not defined in the receiver's Java virtual machine

- All of the types and behavior of an object, previously available only in a single JVM, can be transmitted to another JVM

- The behavior of the objects is not changed when they are sent to another Java virtual machine

- This capability enables new types and behaviors to be introduced into a remote JVM, thus dynamically extending the behavior of an application

Sockets

- TCP provides a reliable, point-to-point communication channel that client-server applications on the Internet use to communicate with each other.

- To communicate over TCP, a client program and a server program establish a connection to one another.

- Each program binds a socket to its end of the connection.

- To communicate, the client and the server each reads from and writes to the socket bound to the connection

What Is a Socket?

- A socket is one end-point of a two-way communication link between two programs running on the network.

- Socket classes are used to represent the connection between a client program and a server program.

- The java.net package provides two classes-- Socket and ServerSocket--that implement the client side of the connection and the server side of the connection, respectively

JDBC

- JDBC is a Java database connectivity technology

- Is an API for the Java language that defines how a client may access a database.

- It provides methods for querying and updating data in a database.

- JDBC is oriented towards relational databases.

- JDBC drivers are client-side adapters (installed on the client machine, not on the server) that convert requests from Java programs to a protocol that the DBMS can understand

Web-server technologies

- HTTP servlet

- Web Services (XML-based Web service protocols (SOAP and WSDL)

- RESTful Web services

WebSocket

- The HTTP(Hypertext Transfer Protocol) is a stateless request-response protocol.

- It makes it very scalable but inefficient and unsuitable for highly interactive real-time web applications.

- A WebSocket is asynchronous, bidirectional, full-duplex messaging implementation over a single TCP connection.

- A full-duplex system allows communication in both directions simultaneously

WebSocket Use Cases

- Chat applications

- Multiplayer games

- Stock trading or financial applications

- Collaborative document editing

- Social networking applications

- JSR 356 — Java API for WebSockets