

From Sockets and RMI to Web Services



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Overview

- Teaching Network Programming
- Using the Historical Development
- Extending to Web Services
- The Sequence of Projects
- A Demonstration
- For Further Information

Teaching Network Programming

Net-Centric Computing

- Final Report on Computer Science Curricula of the Joint Task Force
- Top-Level Topic

What is it?

- Computer Networking plus Network Programming

Teaching Network Programming

How to teach it?

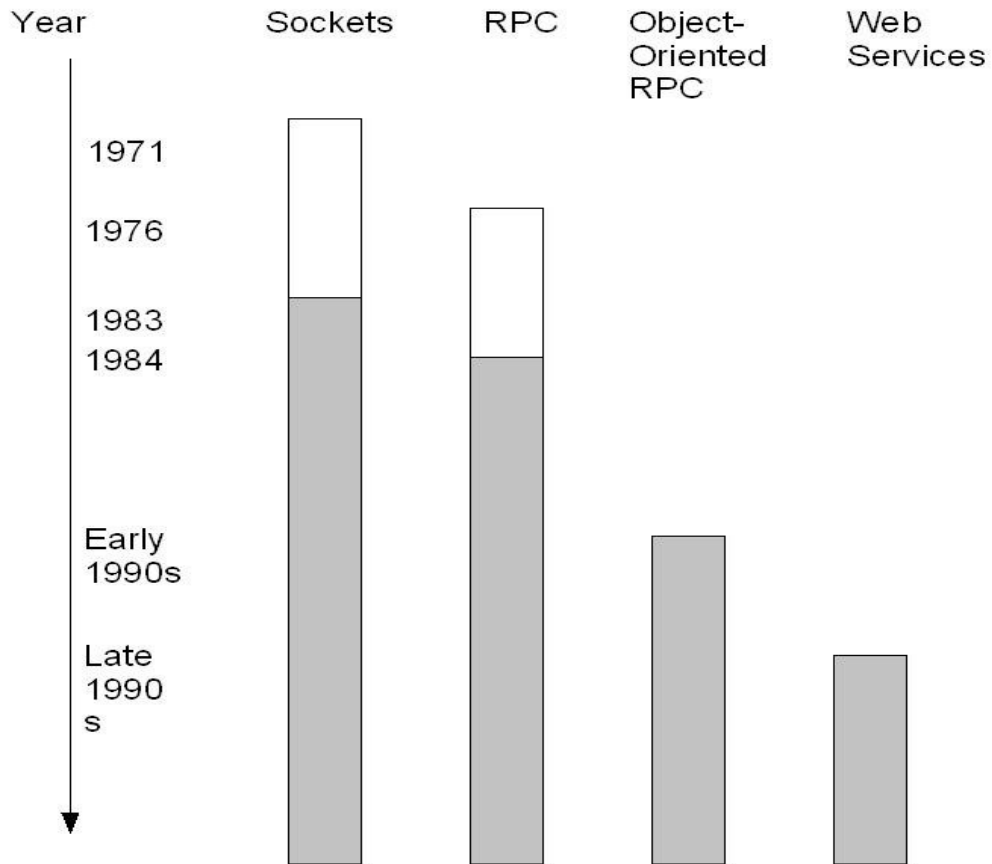
- Excellent Computer Networking Textbooks (e.g. Kurose and Ross)
- Supplement with a series of projects and handouts

Teaching Network Programming

What's novel in our class?

- Historical Development of the Techniques as an Evolving Sequence
- Extend Concepts, Projects, and Historical Development to Web Services

Historical Development



Historical Development

```
... // partial TCP Socket Client
Socket clientSocket = new Socket("hostname", 7788);
DataOutputStream outToServer = new
    dataOutputStream(clientSocket.getOutputStream());
BufferedReader inFromServer = ...
outToServer.writeBytes("Hello world.\n");
String result = inFromServer.readLine();
clientSocket.close();
```

Historical Development

```
... // partial TCP Socket Server
ServerSocket welcomeSocket = new ServerSocket(7788);
while (true) {
    Socket connSocket = welcomeSocket.accept();
    BufferedReader inFromClient = ...;
    DataOutputStream outToClient = ...;
    String input = inFromClient.readLine();
    outToClient.writeBytes(input.toUpperCase());
    ...
}
```

Historical Development

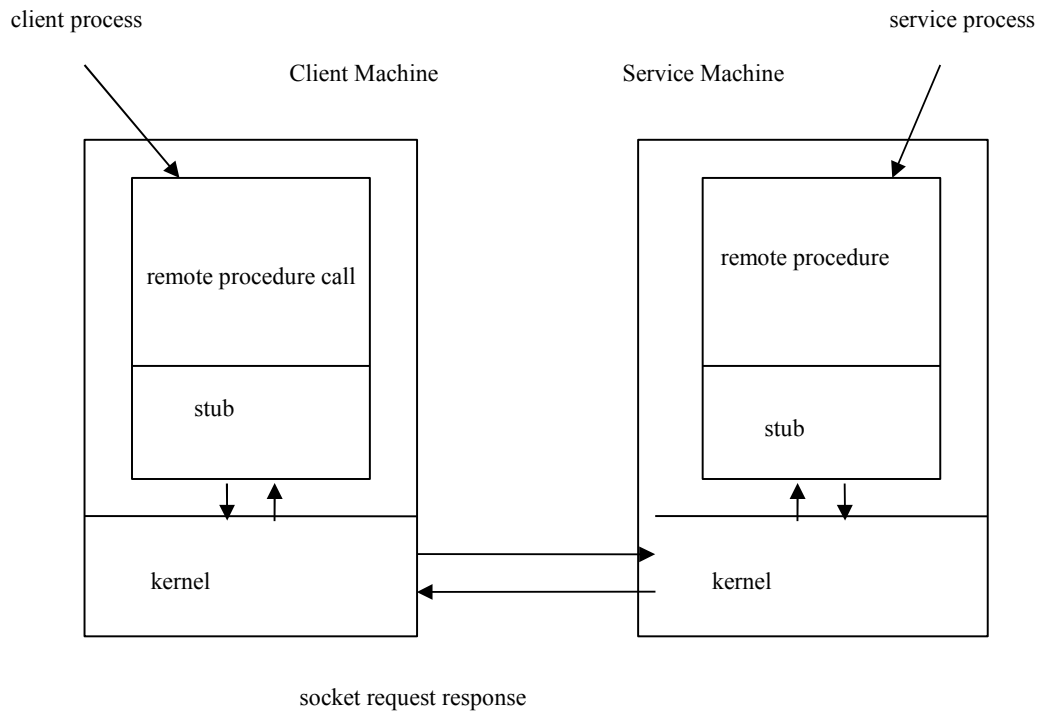


Figure 1: The Steps of a Remote Procedure Call

Historical Development

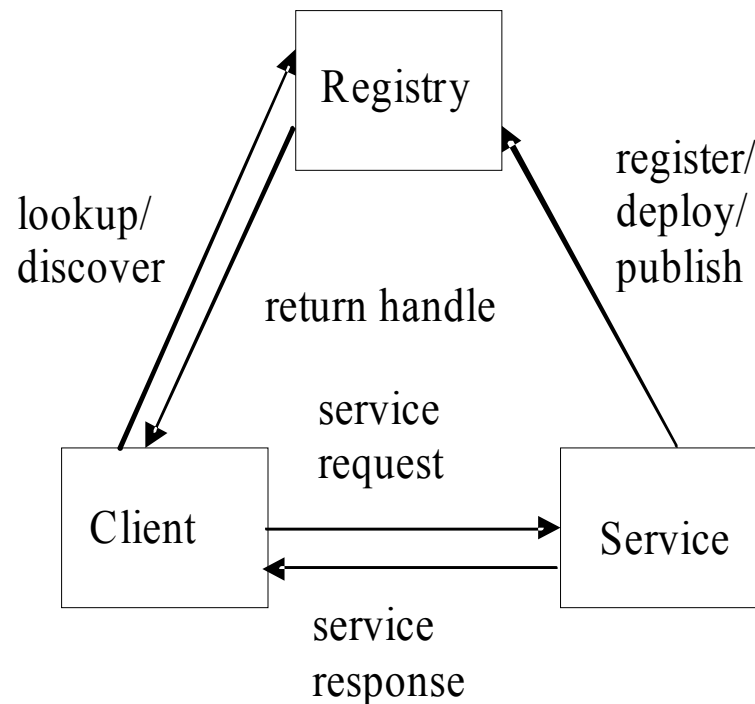
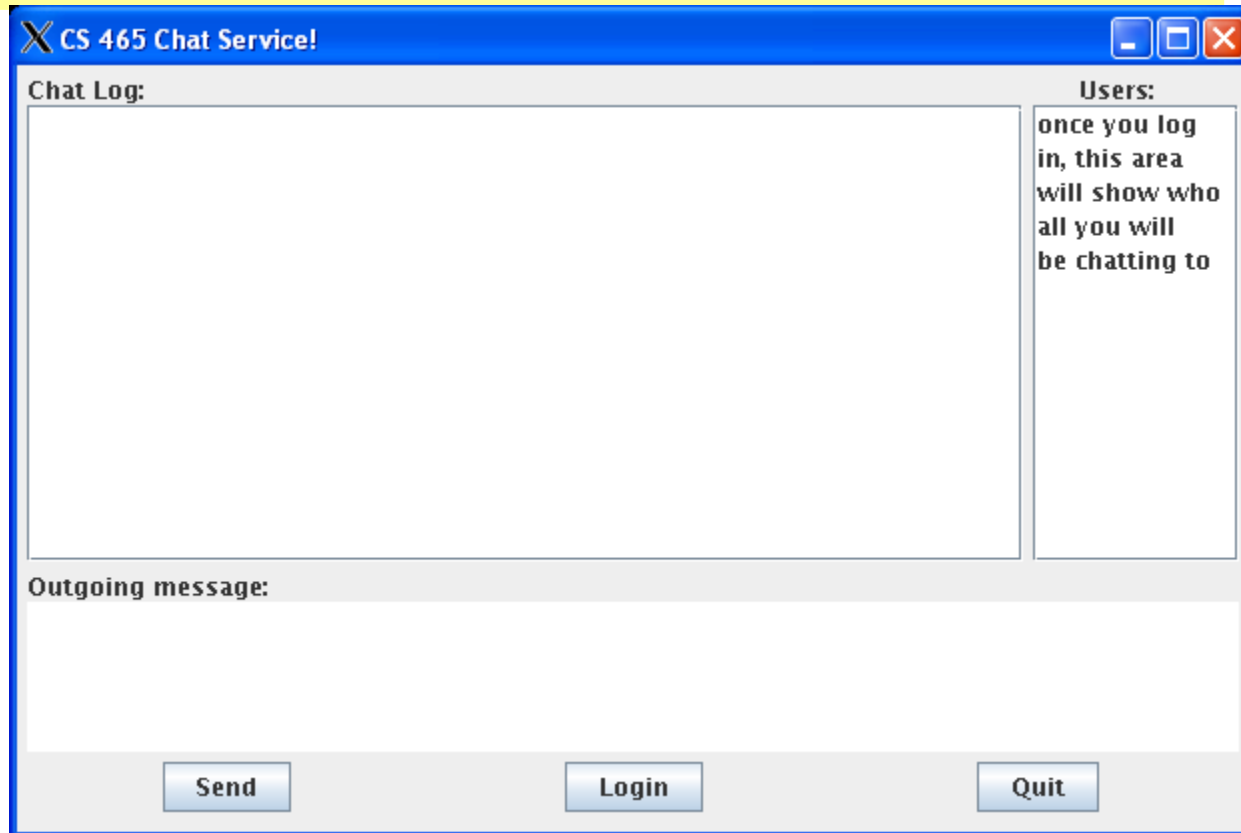


Figure 2: The three parties involved in a remote procedure call.

Historical Development



Historical Development

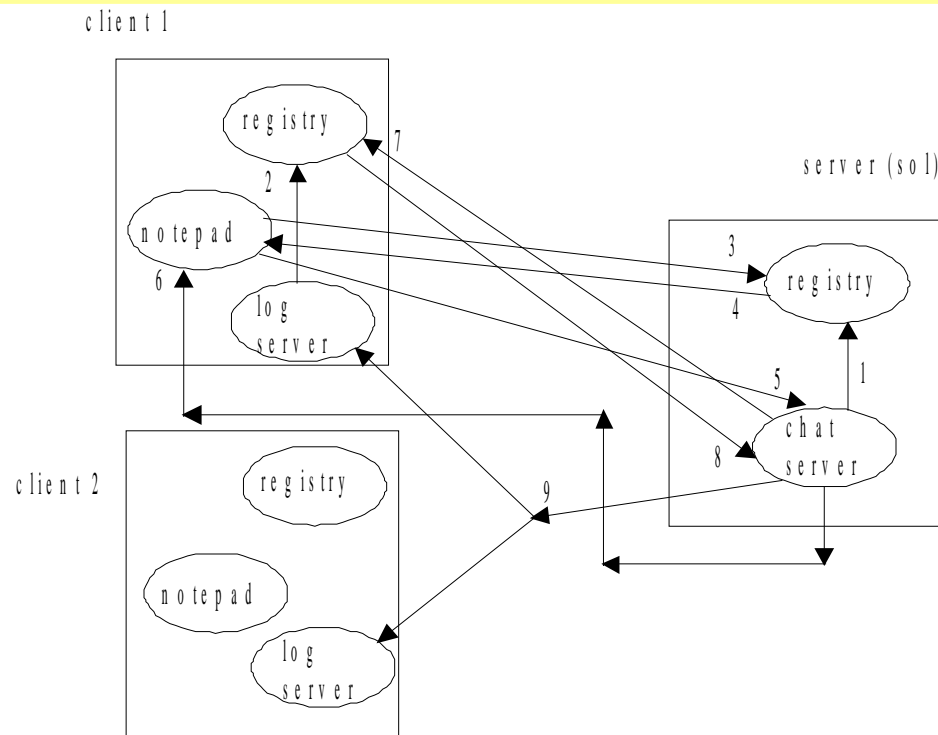


Figure 5: The design and sequence of exchanged messages for the Java RMI implementation of the Chat project.

Historical Development



Conclusions

- Wide-area distributed systems with a foundation of HTTP and XML are developing and converging as web services and grids
- Undergraduate courses for computer science majors in this area are becoming feasible and desirable
- The End-to-End Demonstration is a useful resource for illustrating how a grid can be used in a simple but realistic manner

For Further Information

<http://cs.wcu.edu/~certauthority>

- More End-to-End Demonstration Information
 - more detailed slides
 - explanatory handout
- Grid Computing Course Materials Website

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