University Of Science And Technology Of Hanoi

Distributed Systems

Practical Work 2: File Transfer System Using XML - RPC

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1. Overview

XML-RPC is a simple protocol for carrying out remote procedure calls (RPC) over TCP/IP. It uses two standards of the internet, Hypertext Transfer Protocol (HTTP) and eXtensible Markup Language (XML) to create a standard way of calling remote web services and receiving a response.
This allows software to communicate across different operating systems and environments by making procedure calls over the internet. For example, a client can send an XML-encoded request via HTTP POST to a server, which then executes the requested procedure and returns the result in an XML-encoded response.

This project implements a file transfer system using the XML - RPC protocol, allowing clients to upload, download, and manage files on a server, as well as send messages. Unlike traditional socket programming, XML - RPC abstracts network communication into remote procedure calls, making it easier to develop and maintain.

2. Design of the RPC Service

2.1. RPC Protocol

We use XML-RPC because it allows procedure calls over HTTP using XML-encoded requests and responses.

Advantages:

- Platform-independent
- Built-in support in Python (xmlrpc.server and xmlrpc.client)
- Automatic marshalling/unmarshalling of Python types to XML-RPC compatible types (strings, integers, arrays, binary)

2.2. Server Design

The server is based on SimpleXMLRPCServer.

Functions registered for RPC:

- upload_file: Receive a file from the client
- download_file: Send a file to the client
- add_file: Create a text file on the server
- send_message: Receive a message from the client

All server files are stored in a dedicated folder: server_files/. The server runs indefinitely, listening for incoming client RPC calls.

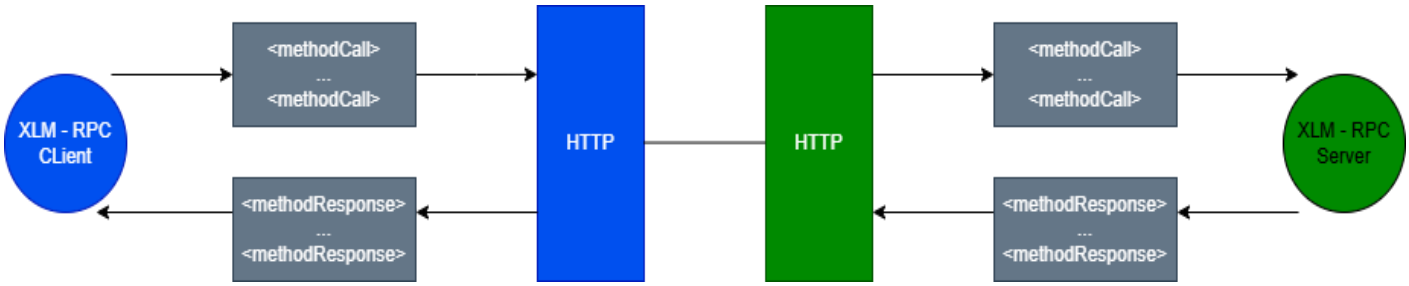
2.3 Client Design

The client uses xmlrpc.client.ServerProxy to connect to the server. The client provides a menu-driven interface for users to perform actions:

- Upload a file
- Download a file
- Add a file on the server
- Send a message

Each menu option calls the corresponding RPC function on the server.

3. Diagram



methodCall: XML wrapper for client request
methodResponse: XML wrapper for server reply
Encoding / Decoding: Convert data to/from XML
HTTP Layer: Transport layer for sending requests and responses

The XML - RPC diagram illustrates the full lifecycle of a remote procedure call between a client and server. The client constructs a structured XML request (methodCall) containing the method name and parameters, then transmits it over HTTP.
The server decodes the XML, executes the desired function, and returns the result in a methodResponse XML structure. Both sides rely on XML - RPC libraries to handle encoding, decoding, and network transport.

4. Conclusion

The XML - RPC file transfer system demonstrates a method of transferring files and messages between client and server. Using XML - RPC simplifies communication, removes the need to manually manage sockets, and supports binary file transfer with built - in encoding.