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OS: Windows 10
Language: python 3.7

Designing the Protocol

This ftp server and ftp client uses python's sockets to send and receive messages.

What kinds of messages will be exchanged across the control channel?
There are 2 ports. One port is for sending/receiving control signals. This port number is designated when the program is executed (e.g. python serv.py 3456). Another port is for sending/receiving data. This port number = control port + 69.
The types of messages that will be exchanged across the control channel will be commands that are sent from the client,status code response and result for 'ls' command from the server.

Sending a message (Format/size of messages)
When sending a message, a message header is created and appended to the message to tell the receiver how many bytes they will be receiving. The header will have a fixed size of 10 bytes that will contain the size of the message. The header is then prepended to the message with the actual message to be sent. When the message is being sent, the program will keep track of the number of bytes sent so that it will know when to stop sending data.

How should the other side respond to the messages?
Before receiving the message, the receiver would have a fixed buffer size of 10 bytes. When the first 10 bytes of the message is sent, the receiver would know the size of the incoming message. Since the receiver now knows the size of the message, the receiver will keep receiving data until it reaches the known size.

How to avoid overflowing the TCP buffers.
To avoid overflowing the TCP buffers, two buffers would be created, a temporary buffer to receive data from a packet and a receiving buffer to hold all the data. When receiving data, the temporary buffer would receive the incoming data from a packet, add the data to the receiving buffer, and then the temporary buffer would empty itself to be ready to receive new data. This process repeats until the message is completely sent.

What message exchanges have to take place in order to setup a file transfer channel?

The ftp server and ftp client use response codes based on the http response codes to setup a file transfer channel.
- For the ‘get’ command, before a file transfer channel is setup, the server checks to see if the file exists. If the file exists, the server sends a response code ‘200’ to the client, saying that the file is found and would prepare a channel to transfer the file. Once the file transfer channel is setup, the server sends code ‘200’ to tell the client that the channel is ready to connect. When the client connects to the channel, they begin transferring the file.
- For the ‘put’ command, the client checks to see if the file exists. If the file exists, the client sends the command to the server. After receiving the ‘put’ command, the server prepares a channel to transfer the file. Once the file transfer channel is setup, the server sends a response code ‘200’ to tell the client that the channel is ready to connect. When the client connects to the channel, they begin transferring the file.

The response codes are

- 404 – The file has not been found on the server
- 200 – Everything is fine and to continue with the procedure
- 500 – Server Error, the server cannot open a port for some reason