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There are 3 main programs that make up our peer to peer project. Those files are

- DirectoryServer.java
- P2PClient.java
- P2PServer.java

Data Structures Used

```
byte[] sendData = new byte[1024];
```
and various other byte arrays.

These are used to store the data transmitted by the packets being sent from server to client and vice versa

```
Hashtable<String, String> contentList = new Hashtable<String, String>();
```

This hashtable is used to store the key pair values of the JPG files to the appropriate server location

P2PServer.java

The P2PServer file first updates and informs the directory server of what JPG files it has and then it waits for the P2PClient to connect to it and request a JPG file that it wants.

P2PServer has 2 methods it makes uses of.

- InformAndUpdate
- TCPServer

static void InformAndUpdate(String jpg, int port)

Description

- Informs and updates the directory servers of what jpg files it has via UDP connection

Parameters

- String jpg: name of the jpg file it has
- Int port: the port number used to connect the servers and clients

static void TCPServer(int port)

Description

- Waits for the client to connect to the server. It then listens for requests from the client and sends the appropriate JPG file.

Parameters

- Int port: port number used to establish connection

This method contains a try catch used for exception. The server will try to read what the client is requesting and attempt to send it. If the socket times out, socket is already closed or file can not be read or found, it will output a statement in the console with a short description of the error that took place.

P2PClient.java

The P2PClient will request a JPG file from the directory server. The Directory Server will then reply with an IP address with which the client can find the requested JPG file. P2PClient then connects to the P2PServer via a TCP connection where it requests and receives the JPG file

There are 2 methods in P2PClient.java

- RequestJpg
- ConnectToHost

static String RequestJpg(String jpgName, int port)

Description

- Requests the JPG file from the directory server

Parameters

- String jpgName: name of the JPG file the client is requesting
- Int port: the port number of the directory server

Returns

- A string that is the IP address to the P2P server

static void ConnectToHost(String IPAddress, String jpgName, int port)

Description

- Connects to the P2PServer and requests the JPG file from it

Parameters

- String IPAddress: the IP address of the server
- String jpgName: name of the file the client requests
- Int port: the port number of the p2pserver

DirectoryServer.java

The DirectoryServer.java file runs the directory server. The program contains a main loop which is used to accept requests for JPG files from the P2PClient and Inform/Update Packets from P2PServer. Once it receives data from either the P2PClient or P2PServer, it determines what actions to take depending on the data it receives. If it receives a client request for a JPG file, it returns the IP address of the P2PServer that has the JPG. When it receives a packet to inform/update, it updates a hash table that contains the names of the JPG files on the server

```
private static int hashKeyStringToInt(String stringKey)
```

Description

- Method is used to determine the ID of the 4 servers

Parameters

- String stringKey: used to determine the ID of the 4 servers

Returns

- The Server's ID