

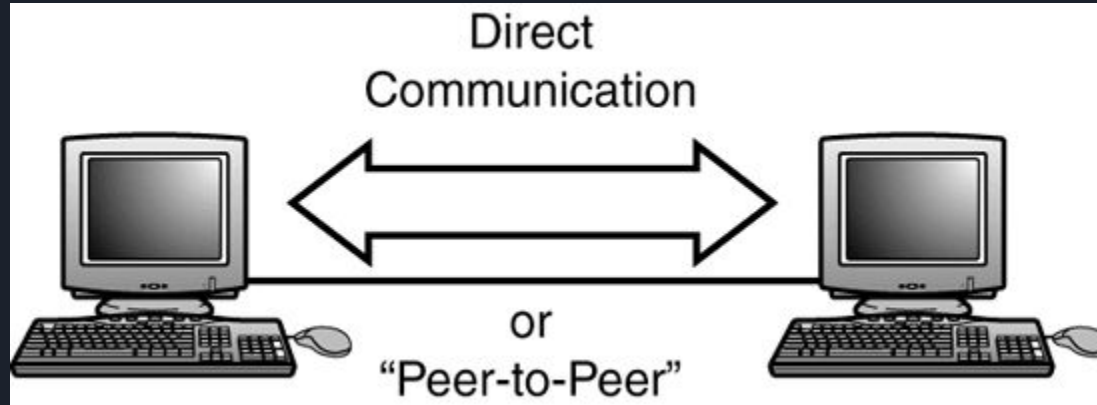
A decorative graphic on the left side of the slide consisting of two overlapping parallelograms. The front one is blue and the back one is a light green color. They are positioned diagonally, with the blue one partially covering the green one.

# Mustache Messaging

By Hudson Gribble and Val Ault

# Concise Abstract

The point of our work was to create a program that sends relatively large files, images, and messages reliably from client to client using UDP protocol.





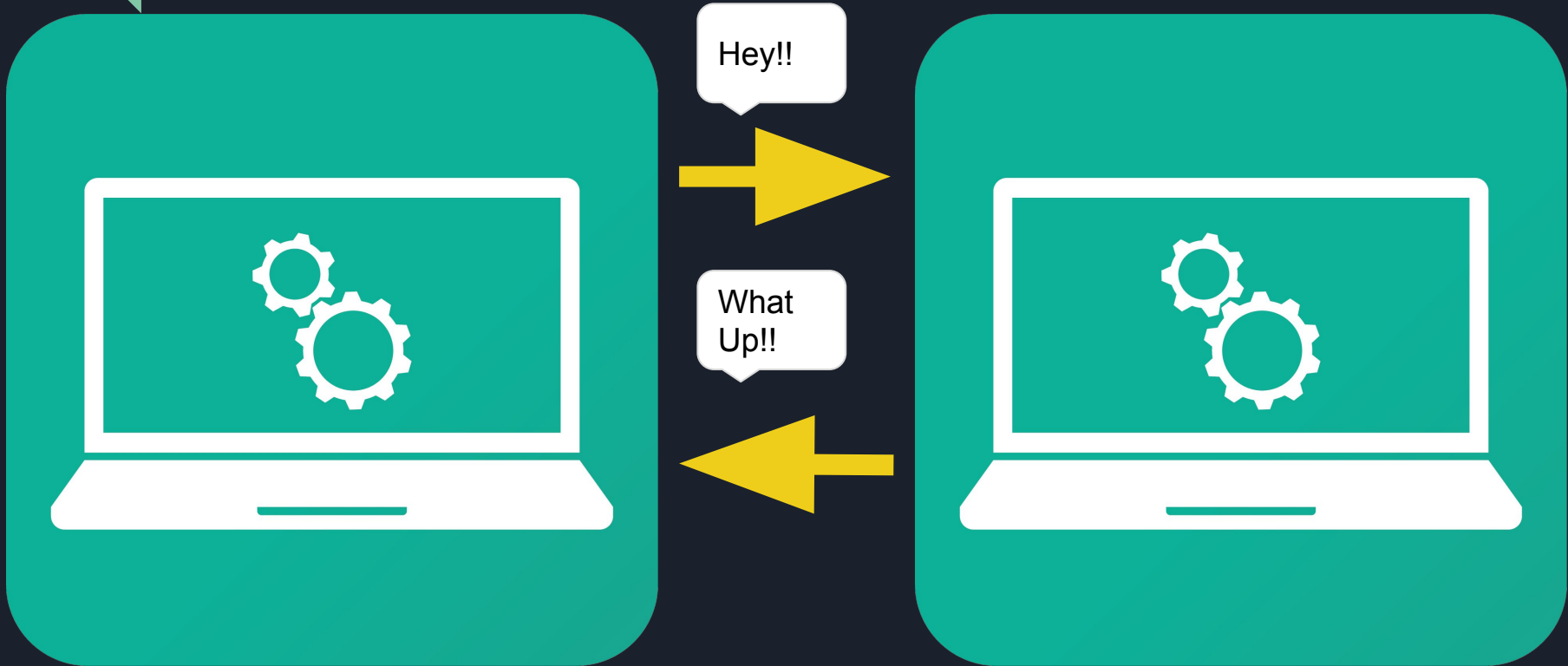
# Problem motivation and design goals

## Goals:

- Support file transfer up to at least 1 GB
- Have a UI that is intuitive and non-technical
- Implement Go-Back-N protocol to ensure reliable data transfer
- Allow multiple clients to chat at the same time

# Approaches

Peer to Peer - each instance of the application is the exact same, able to send and receive





# Approaches

Process: We created 4 types of packets to manage the process of sending a file.

sender:

- handshakeInit - sends a handshake containing fileName, number of Segments for the file
- data - contains one data segment from the file

Receiver:

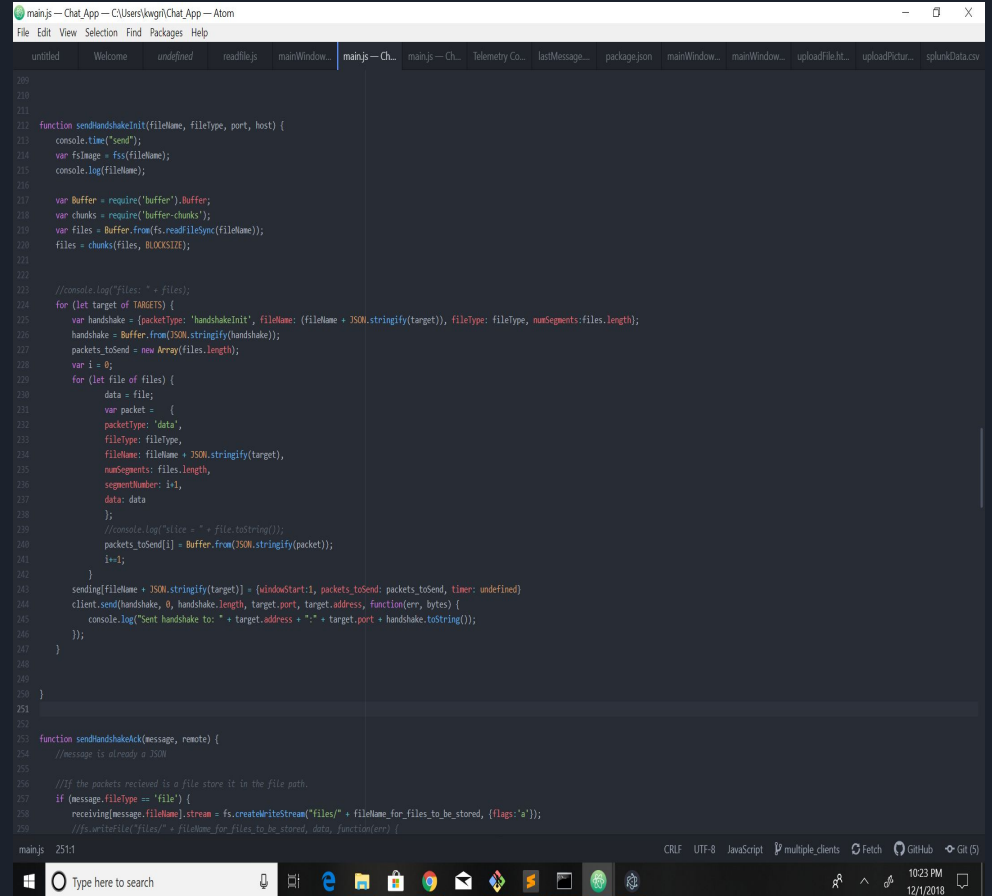
- handshakeAck - lets the sender know the receiver is ready to receive
- dataAck - sends back the highest segment number received so far

# Approaches

The program is driven whenever a function receives one of these packets.

Receiver functions:

- On receive handshakeInit - send a handshakeAck
- On receive data - send a dataAck, append the data to the end of the file



```
main.js — Chat_App — C:\Users\jovgh\Chat_App — Atom
File Edit View Selection Find Packages Help

untitled Welcome undefined readfile.js mainWindow... main.js — Ch... main.js — Ch... telemetry Co... lastMessage... package.json mainWindow... mainWindow... upload@file... upload@Pictu... upload@Data.csv

200
201
202
203 function sendHandshakeInit(filename, fileType, port, host) {
204   console.time("send");
205   var fsImage = fs(filename);
206   console.log(filename);
207
208   var Buffer = require('buffer').Buffer;
209   var chunks = require('buffer-chunks');
210   var files = Buffer.from(fs.readFileSync(filename));
211   files = chunks(files, BLOCKSIZE);
212
213   //console.log("files: " + files);
214   for (let target of TARGETS) {
215     var handshake = {packetType: 'handshakeInit', filename: (filename + JSON.stringify(target)), fileType: fileType, numSegments: files.length};
216     handshake = Buffer.from(JSON.stringify(handshake));
217     packetsToSend = new Array(files.length);
218     var i = 0;
219     for (let file of files) {
220       data = file;
221       var packet = {
222         packetType: 'data',
223         fileType: fileType,
224         filename: filename + JSON.stringify(target),
225         numSegments: files.length,
226         segmentNumber: i+1,
227         data: data
228       };
229       //console.log("file " + i + " file.toString()");
230       packetsToSend[i] = Buffer.from(JSON.stringify(packet));
231       i++;
232     }
233     sending(filename + JSON.stringify(target)) = (windowStart:1, packetsToSend: packetsToSend, timer: undefined)
234     client.send(handshake, 0, handshake.length, target.port, target.address, function(err, bytes) {
235       console.log("Sent handshake to: " + target.address + ":" + target.port + handshake.toString());
236     });
237   }
238 }
239
240 }
241
242
243 function sendHandshakeAck(message, remote) {
244   //message is already a JSON
245
246   //If the packets received is a file store it in the file path.
247   if (message.fileType == 'file') {
248     receiving(message.filename, stream = fs.createReadStream("files/" + filename_for_files_to_be_stored, {flags: 'a'});
249     //fs.writeFile("files/" + filename_for_files_to_be_stored, data, function(err) {
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# Approaches

## Sender functions:

- Send HandshakeInit must be triggered manually (When the user hits send); this function splits the file
- On receive HandshakeAck - send the window (N segments), and then wait for acks; set a timer, when it times out, send the whole window again.
- On receive dataAck - increase windowstart, and send the next packet



# Evaluation plan & results

To test our program, we looked at time to send files and if it could send the whole file even if packets were dropped.

When we dropped 1% of the packets, it still sent files and received them intact.



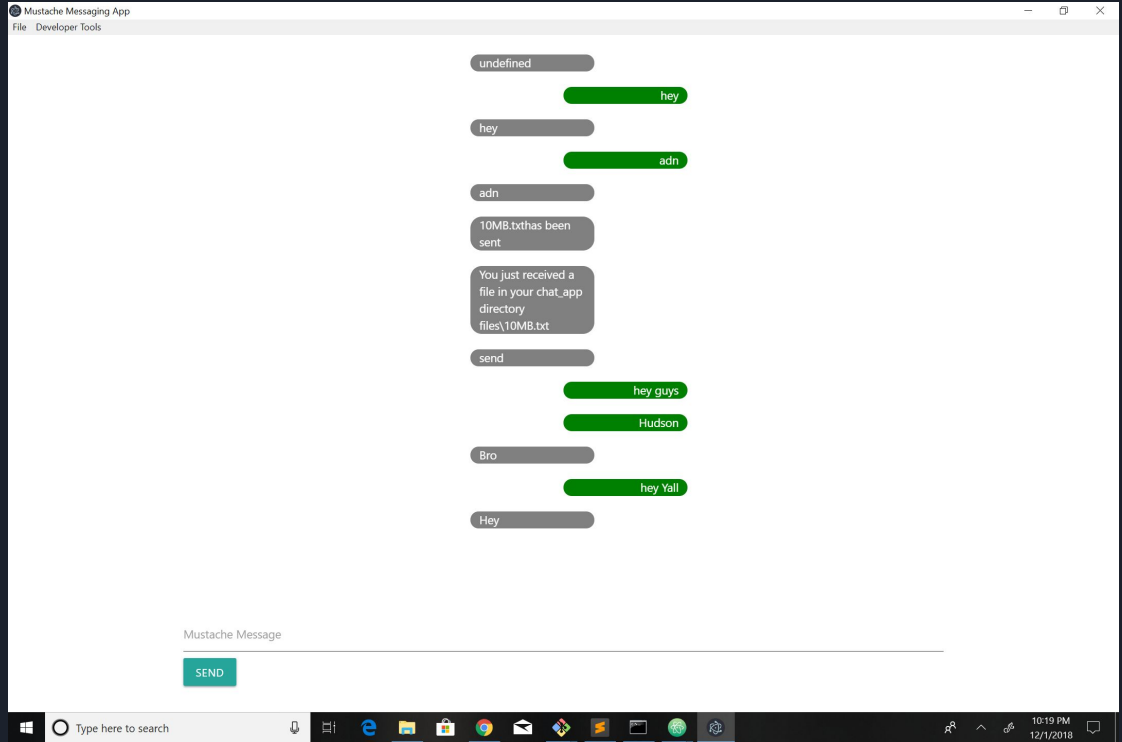


# Evaluation plan & results

File Size	Time to transfer - one machine	Time to transfer - between machines
1 KB	21.9 ms	83 ms
2KB	23.3 ms	93.61 ms
4KB	22.9 ms	115 ms
64KB	55.9 ms	211.626
1 MB	.425 s	1.2s
10 MB	3.137 s	11.0 s
100 MB	27.851 s	116.7 s
500 MB	281 s	
1 GB	658 seconds	

# Conclusion

- It works quite well





# Future Work

- Now it loads the whole file to be sent into RAM at the beginning, so the file size is currently limited by the user's RAM.
  - We could fix that by sending packets as they are read from the file, the same way our receiving function works
- The user experience could be smoother, there are a few graphical glitches to be fixed in future versions.





