

## Motivation

- Historically, Instant Messaging (IM) systems have been implemented using the traditional Client-Server model of networking.
- Unfortunately, the scalability of these IM systems is limited by the clients' reliance on the systems' servers.
- Additionally, the systems' reliability and security are determined by the servers.

## P2P IM Description

- In an effort to resolve the problems associated with Client-Server IM, we investigated the feasibility of implementing an IM system using the Peer-to-Peer (P2P) network paradigm..
- To accomplish this transition from Client-Server IM to P2P IM, we had to distribute the server's functionality amongst the participating peers in the system.

But how was this functionality distributed...

## Research Questions

### 1.) What will the underlying P2P network topology be?

- Potential topologies for P2P IM are fully connected, unstructured, unstructured with superpeer coordination, DHT-based, etc.
- The chosen topology directly affects how the IM system's functionality is implemented.

### 2.) How will peers be discovered by other peers?

- In P2P IM, each peer must independently determine the network location of the other peers it is interested in communicating with.
- Potential solutions: a dedicated naming service, a static addressing scheme, a managed, dynamic addressing scheme, etc.

### 3.) How will peers authenticate themselves to other peers?

- Peers must authenticate themselves to other peers.
- Potential solutions: a dedicated authentication service (e.g., a ticket-based system), peer-level authentication (e.g., Needham-Schroeder), etc.



Figure 1. P2P IM login screen



Figure 2. P2P IM (abstract view)

## Conclusions

- We have discovered that an IM system can be effectively implemented using a P2P architecture.
- We have also discovered a fundamental tradeoff in P2P networks: scalability and reliability are increased at the cost of additional complexity in the participating peers.

## Future Work

The focus of our work this semester was to implement a working prototype. As a result, we have not performed an exhaustive exploration of the design space for our system. In our future work, we plan to investigate additional implementation options. Additionally, we would like to make our system more resilient to clients acting maliciously (e.g., dropping traffic, providing inaccurate routing information, etc.).