

COMP208 - Group Software Project

Group X

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1

Project Proposal

1.1 Introduction

The proposed project is a simple, privacy oriented social network, which demands zero security knowledge on behalf of its users. In order to ensure security and privacy in the face of nation state adversaries the system must be unable spy on its users even if it wants to or server operators are ordered to.

We feel that obscuring the content of messages isn't enough, because suspicion may, and often does, fall upon people not for what they say, but to whom they are speaking. Our system will therefore not merely hide the content of messages, but the recipient of messages too. Hiding the fact that an IP address sent a message is out of scope, but hiding which user/keypair did so is.

citation needed

The system will provide the following functionality:

- A user may add friends
- A user may IM with fellow users
- A user may IM anonymously with fellow users
- A user may post messages to all their friends on their wall (think FB)
- A user may request to post messages to all of a friends friends on a friends page (think FB wall, permission is required because a user cannot know who their friend (or anyone) is friends with)

The server operator will have access to the following information:

- Which IP uploaded which message (although they will be ignorant of its content)
- Which IPs are connecting to the server as clients
- What times a specific IP connects ¹

¹While this will aid in tying an IP address to a person, it is deemed acceptable because it is not useful information unless the persons private key is compromised.

Talk about TLS, end-to-end crypto

A third party logging all traffic between all clients and a server will have access to the following information:

- Who connects to the server, whether they upload or download information ²

The benefits we feel this system provides over current solutions are the following:

- Server operators can not know who talks with whom
- Server operators can not know the content of messages
- Server operators can not know which message is intended for which user
- Server operators can not know who is friends with whom
- Third parties sniffing the connections can not know anything the server operator cannot know (this isn't unique, but is worth stating).

In order to ensure nobody can tell who is talking with whom we will base our security model on the idea of shared mailboxes, as seen in practice at alt.anonymous.messages ³. In this model one posts a message by encrypting it using the public key of the recipient, and posting it in a public location. In this model one reads a message by downloading all messages from that location, and attempting to decrypt them all using ones private key. Our protocol will build atop this simple premise, and the the server will be a mere repository of messages, the real work occurring wholly in the client.

1.2 Summary of protocol

pretty dataflow diagrams

Creating an account is done by generating an RSA keypair, and choosing a name. An unencrypted (but signed) message is then posted to the server associating that keypair with that name. In this way, by knowing the public key of someone, you may discover their name in the service, but not vice versa.

this is ridiculous and unneeded, see later todo item for the reasons why.

Connecting for the first time Every encrypted message stored on the server is downloaded⁴ and messages matching your public key are decrypted. Decrypted messages are used to build a database of information known to you. Undecryptable messages are discarded. (if someone retroactively grants you permission to view something they publish it as a new message with an old timestamp)

Connecting subsequently The client requests every message from the last time they connected (sent by the client, not stored by the server) up to the present. Decryptable messages are used to update the local DB, others are discarded.

²size correlation attacks could be used here if the message content is known

³<https://groups.google.com/forum/#!forum/alt.anonymous.messages>

⁴clients use bittorrent to lighten server load?

Continued connection During a session the client requests updates from the server every 1-5 seconds (configurable by the user).

Adding a friend is performed by having a friend email (or otherwise transference) you their public key. This is input to the system, and it finds their name (via public posting that occurred when registering). You may now interact with that person. They may not interact with you until they receive your public key.⁵

Talking with a friend or posting on your wall is achieved by writing a message, signing it with your private key, and encrypting one copy of it with each of the recipients public keys before posting it to the server.

Posting to a friends wall may be requested by sending a specially formatted message to that friend (all handled by the GUI, like much else here), when that friend logs in they will receive your request to post on their wall and may confirm or deny it. If they confirm then they take your (signed) message and transmit it to each of their friends as previously described (authentication is entirely based on crypto signatures, so it doesn't matter who posts the message).⁶

1.3 Tasks and Challenges

What would need to be done:

- Server
 - stores messages sent to it by clients
 - sends stored messages to clients at request (either the whole lot, or messages from within a certain timeframe)
- Client
 - handle decryption/encryption
 - sends data to the server
 - maintains a local DB built from decrypted messages
 - displays a nice GUI that hides everything from the user

1.4 Task Partitioning

- D. Breslin
 - Task 1
 - Task 3
- L. Thomas

Replace task partitioning placeholders

⁵This is the one part that will be difficult for normal users, however any protocol by which the server stores and serves public keys is entirely unsuitable as a MitM would be trivial on behalf of the server operators

⁶This is required because it is impossible for one to know who their friends friends are.

- Task 2
- Task 4

Talk about how much data one would need to sync, how this can be mitigated. For example, the only messages of interest to you when you register are unencrypted messages. Due to this allow requesting all unencrypted messages from the server and discourage users from posting messages to people not yet on the network.

choose programming language

Talk more about tools, specifically about communication between group members

update with names of associated works as project continues

1.5 Proposed Tools

Git, with a central (private) repository hosted on github will be used for version control. The language used will be fortran on punchcards.

1.6 Deliverables

- Protocol documentation for developers writing third party clients
- Windows and Linux executable: client
- Windows and Linux executable: server
- Full source for server, client, and any associated works

Appendices

Appendix A

Deadlines

- **2014-01-31** topic and team
- **2014-02-14** requirements
- **2014-03-14** design
- **2014-05-09** portfolio & individual submission

Appendix B

Licence

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Todo list

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Full author list

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