

MOTIVATION

- Online Social Networks, e.g., Facebook, Orkut, or MySpace are extremely popular.
 - Centralized client-server-applications: User has no control over his data. All data controlled by server operator.
 - Goal: give back the control over data to the users and enable privacy.
- ⇒ Peer-to-peer Social Network with encryption:



PEERSON – THE CONCEPT [1]

- Build a peer-to-peer infrastructure that implements the most important features of online social networks in a distributed way.
 - Distributing the data on a P2P infrastructure avoids the exclusive control over the data by a central entity.
 - Distributed approach allows to extend the system to delay tolerant networks.
- Include encryption, key management, and access control to prevent unauthorized access in such a distributed setting.
 - Encryption and fine grained access rights enable privacy preserving social networking.

PEERSON – DESIGN AND PROTOTYPE [4]

Two Tiered Architecture

- Lookup system to locate users and content,
- P2P based content exchange system.

Example: Users' reachability info and content location stored as key-value pairs in a distributed hash table (DHT). Once located, content can be directly exchanged among the peers.

Lookup System

Users:

Key: the user's globally unique ID (GUID);
Value: state (online, offline, active), IP address, port number, and additional info, e.g., GPS data.

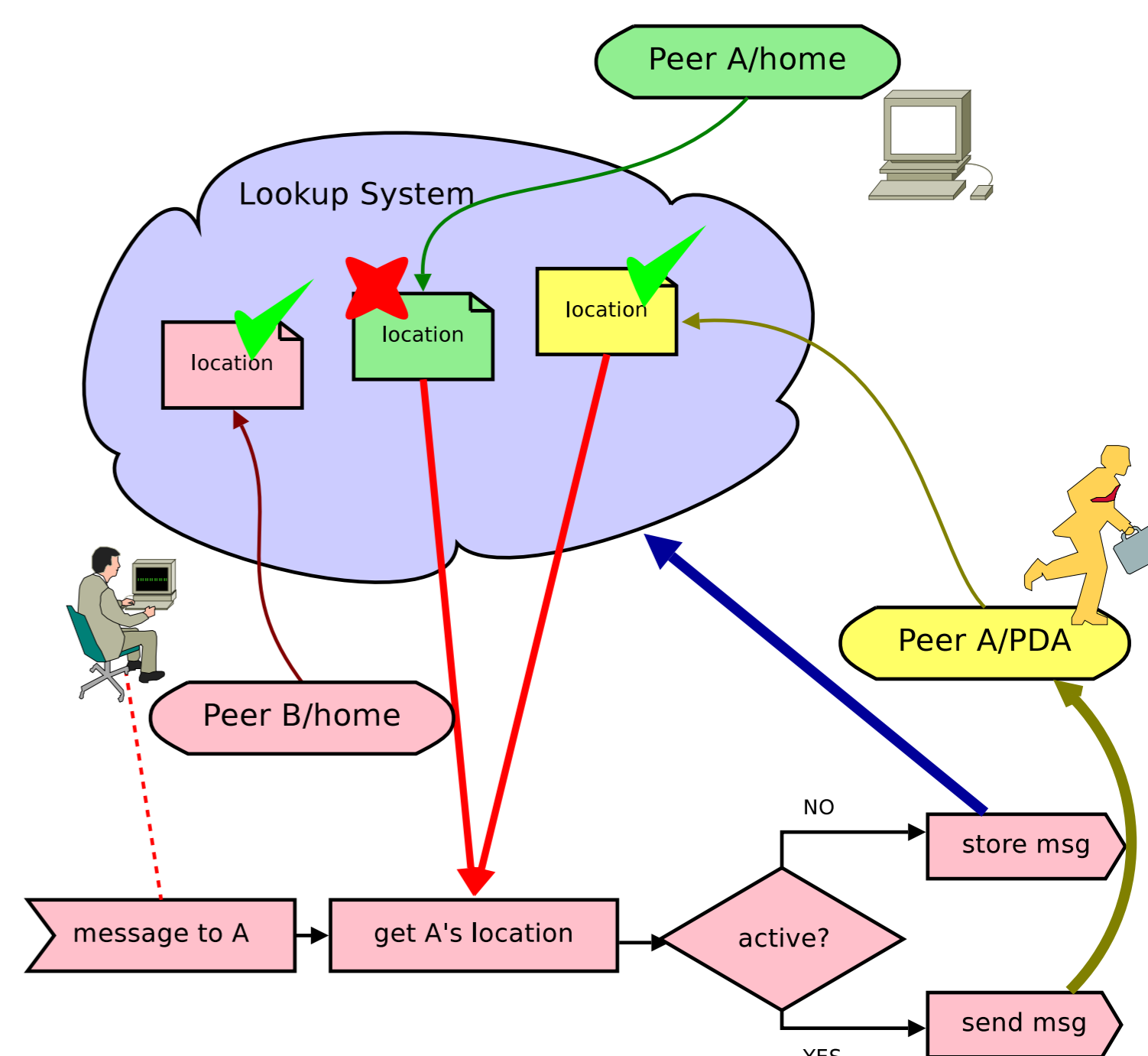
Files:

Key: unique file ID;
Value: list of users that have the file, and version number.

Support for multiple values per key is required.

Content Exchange System

- Download content and send messages.
- **Login/Logout:** User stores a key-value-pair in the DHT with his GUID as key and his current reachability info as value.
- **Announce a file:** User stores a key-value-pair in the DHT with file name as key, and GUID and version number as value.
- **Search for peers:** User sends get(GUID), receives contact info of peer.
- **Search for files:** User asks the DHT "who has the file"; user contacts peer to receive file.
- **Leave a message for offline friend:** User stores special key-value-pair in DHT; value contains the message. Next time the friend logs in she can pick up the message.



EVALUATION – ONGOING WORK

How expensive is privacy? Moving OSNs from client/server to P2P raises a set of questions: Are the response times competitive? Is the content sufficiently available?

Availability of Content

- **What is different for PeerSoN?**
 - Content may not be available 24/7 in a distributed system as users go on and off.
 - User profiles are usually not as popular as songs, movies,...
 - Dynamic content: profiles change, a song or movie doesn't.
 - **Questions:**
 - Content replication: Is it sufficient to do nothing?
 - If not: How many replicas are necessary? Where should they be stored?
 - Influence of users' time zone?
 - **Approach:**
 - System not yet deployed: testing with real data not possible!
 - Experiments on PlanetLab: complex setup and management! Real-world network not required for availability analysis.
- ⇒ **Simulation:** real data hardly available but a simulation can be based on models (can be partially derived from measurements [5]).

Response time measurement: PeerSoN vs. Facebook

- **Question:**
 - Is a distributed social network still usable?
- **Approach:**
 - Delay, latency, and other network related behavior is hard to simulate. Instead we want to measure the response time of our system on a real network.
 - Pick one node, execute all requests necessary to open a friend's profile, and measure how long it takes to receive all data.
 - Repeat the same request for Facebook. And compare!

FUTURE WORK

- Finish evaluation of current PeerSoN implementation.
- Re-implementation of Perl-prototype in Java (usable also on mobile phones).
- Design and implementation of encryption and key-management.
- Explore the options for PeerSoN in delay tolerant environments [3].

COLLABORATORS

Anwitaman Datta and Krzysztof Rzadca (NTU Singapore),
Le Hung Vu (EPFL), Oliver Schneider (FU/T-Labs)
and Pablo Vidales (T-Labs)

REFERENCES

- [1] SONJA BUCHEGGER AND ANWITAMAN DATTA A Case for P2P Infrastructure for Social Networks - Opportunities and Challenges. (to appear) In *Proceedings of WONS 2009, The Sixth International Conference on Wireless On-demand Network Systems and Services 2009*.
- [2] SONJA BUCHEGGER, DORIS SCHIÖBERG, LE HUNG VU, ANWITAMAN DATTA PeerSoN: P2P Social Networking - Early Experiences and Insights. *Proceedings of the Second ACM Workshop on Social Network Systems Social Network Systems 2009, co-located with Eurosys 2009*.
- [3] SONJA BUCHEGGER Delay-Tolerant Social Networking. *Position paper for Extremecom 2009*.
- [4] DORIS SCHIÖBERG A Peer-to-peer Infrastructure for Social Networks. *Diplom Thesis, TU Berlin, 2008*.
- [5] SCHNEIDER, F., FELDMANN, A., KRISHNAMURTHY, B., AND WILLINGER, W. Understanding online social network usage from a network perspective. In *IMC'09: Proceedings of the 2009 Internet Measurement Conference, 2009*. to appear.