Decentralized Social Networking
Programmable Open Mobile Internet (POMI) 2020

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Biggest (Last?) Personal Computer Revolution

10x cheaper, 10x more users
3-Tier Architecture

My key, cache, window into my digital cloud:
ID, personality, assets, and the internet

Personalize the generic PC,
borrow the power, display, keyboard, memory, etc

PC, TV
at home, on the road, in hotels, on the plane
Ad-Supported Social Networking
Ownership, Privacy?

Google Voice voicemails appearing in public search results

JULY 26, 2009...8:11 AM
Anti-Obama comments on Facebook get aide fired

May 20, 2009 1:57 PM
EMT Fired After Posting Murder Victim Photo

March 10, 2009, 1:42 AM
Eagles Employee Fired for Facebook Post

February 26, 2009 2:27 PM PST
Facebook entry gets office worker fired

EULA reserves the right to change the EULA
Convenience? Data silos

Our Personal Cloud

Web
facebook
myspace.com
Gmail
shutterfly
iTunes
flickr
LinkedIn
Loopt
dropbox

PC

Friends’ List
Economics of Super-Giant Star Topology?

YouTube May Lose $470 Million In 2009: Analysts

Credit Suisse Report Estimates Video Site Will Generate $240 Million In Revenue

Todd Spangler -- Multichannel News, 4/3/2009 3:43:00 PM EDT
Openness?

Apple blocks competitive products from iPhone App Store--surprised?

Google Voice Thoroughly Banned From the iPhone; So Much for an Open Platform
The Omniscient Monopoly
Ad-Supported Social Networking

- Privacy
- Data ownership
- Data silos
- Cost of infrastructure for super-giant star technologies
- Closed proprietary systems
Decentralized across different administration domains

- Choice of **privacy**—owned home server, paid vendor, ad-supported vendor

**Open** API for distributed applications across administration domains

**Trustworthy:** Sharing with fine-grain access control

Online social networking without reservations!

Inter-operability between MySpace & Facebook (like AT&T & Verizon)
Hypotheses

An open, high-level API and platform makes decentralized applications easy to develop.

A safe haven with access control PAYS
- in situ social networking
- privacy-sensitive apps

Decentralization is more scalable and cost effective.
Strategy

- Develop infrastructure
- Basic Applications
- In Situ Social Networking
- Research Consortium
- Open API
- Release Real Apps & Experiment

- Privacy apps
- affordable
- easy to use
- easy to devel
Decentralized Social Networking Architecture

Big-Brother Portal

Unencrypted Data & Computation

Web Browser

Junction Platform

3rd Party

Encrypted & Anonymous Data, Computation, Messaging

Personal-Cloud Butler

PrPl (Private-Public) Infrastructure

Personal-Cloud Butler

Personal-Cloud Butler

Unencrypted Data & Computation
Personal Cloud Butler: Mediates access to personal data
Manages a semantic index pointing to data hosted anywhere
Social Multi-Database

Personal-Cloud Butler

Social Database

PrPl Index
OpenID Manager

Data Manager

Mobile client API

Contact
Photo
GPS
Music

SociaLite: Social DB Language

Data Steward API

home server
facebook
imap

Friends’ Butlers

iPhone
Android
SociaLite: Language for a Social Multi-Database

- A distributed declarative social database language
- Based on Datalog: programs are declared as rules
  - Example:
    FOAF(?p) :- FRIEND(?p)
    FOAF(?p) :- FRIEND(?x), FOAF(?x)(?p)
    FOAF-CurrLocation(?p,?l) :- FOAF(?p), CurrLocation(?p)(?l)
  - Supports composition, recursion
  - Hides distribution details: Messaging, credentials
  - Declarative: easy to optimize: caching, approximation, incrementality
Basic Application: Peops

- Friends all run their own Butlers
- Harvested friends from Facebook
- Display selected friends photos, GPS locations
- Single query → personal Butler
  - Butler contacts other Butlers to return results
In-Situ Social Networking

- Extract groups from email (Jaccard similarity metrics)
- Ask users for group names
- Pre-populate with email attachments
- Access control: OpenID
- Suggest new group members
- Add new contents
Proof of Concept on Planetlab

Distributed SociaLite query of tagged photos over the planet with 100 nodes (20,000 photos total from Facebook)
Junction: Platform for Ad Hoc P2P Apps

Yahoo Poker

server-side scripting

http://www.yahoo.com/poker/sessionid=234
http://www.yahoo.com/poker/sessionid=123

Web Browser

html/css/js

XMPP

generic, anonymous

junction://sb/sessionID=234 (by invitation)

Activity Director

Activity Director

Activity Director

Activ Script

Cross-Platform Native app
{ ad: "edu.stanford.prpl.poker",
  friendlyName: "PrPl Poker",
  roles: { "player": { platforms:
    { android: { package: "edu.stanford.prpl.poker",
    },
    { web: { url: "http://prpl.stanford.edu/poker/play" }
    }
  }
  "table": { platforms:
    { web: { url: "http://prpl.stanford.edu/poker/table" } animations
  }
  "dealer": { platforms:
  }}}}
Ad-Hoc Game Between Phones

Start Activity
Invite: QR code

Accept with a snap
Download software
Join activity
Rolling Dice (with Replacement)

1. **Commit**
   Each picks a random $r$, declares $g^r \mod p$
   where $g$, $p$ are agreed upon.

2. **Give to owner**
   If not owner, reveal $r$. Owner calculates value of die as
   $(r_a + r_b + r_c) \mod 6$.

3. **Reveal**
   Owner makes his $r$ public.

4. **Verify**
   A revealed $r$ is only valid if $g^r$ matches $g^r$ from step 1.
Collaborative YouTube

- Web: < 250 lines of JS
  ~50 lines of Junction
- Phone: < 200 lines of JAVA
  ~60 lines of Junction

To play a video, first open the YouTube application. Once you've found a video to play, long-press it and select 'share', followed by JunctionTube.

WebPhone

Messaging

JunctionTube

Gmail

Facebook

Email

Share this video via
Real-Life Application Ideas

Edu-Games
- easy to develop
- easy to use
- affordable

Campus Biggest-Loser
- easy to develop
- easy to use
- Privacy apps

Shopping Social
- easy to develop
- easy to use
- Privacy apps
- $
Music Social: Jinzora

Share and discover music
Buy music
Online Social Networking without Reservations

Inter-operability between MySpace & Facebook