

# Building a Social Networking Future Without Big Brother

Monica Lam



Ben Dodson, Michael Fischer,  
Sudheendra Hangal, Matthew Nasielski,  
Debangsu Sengupta, Jiwon Seo,  
Seok-Won Seong, Seng Keat Teh

# Vision: 3-Tier Architecture

天  
Tian  
(Heaven)

servers



data



人  
Ren  
(Man)



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

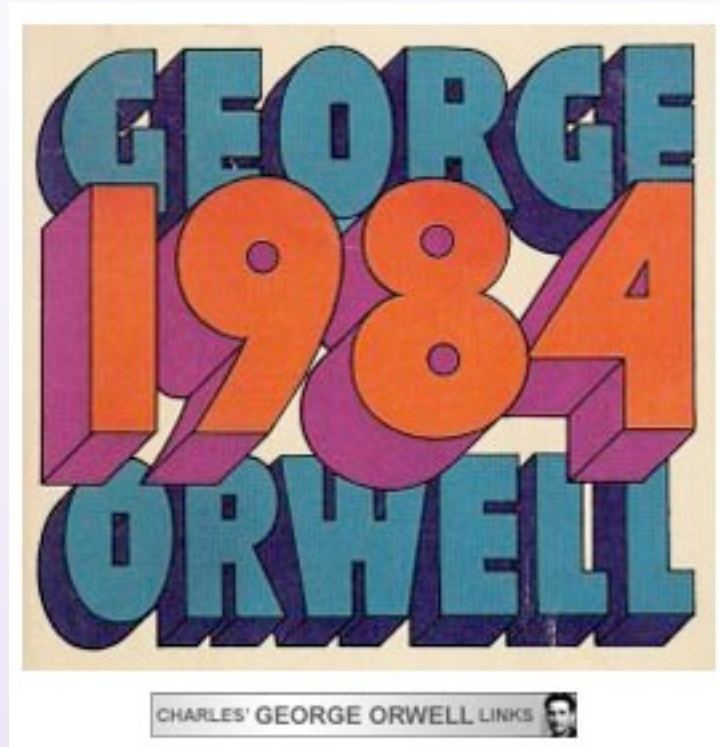
Personalize the generic PC,  
borrow the power, display, keyboard, memory, etc

地  
Di  
(Earth)



PC,TV  
at home, on the road,  
in hotels, on the plane

# The Omniscient Monopoly



# What's happening today ...

## Facebook party ends in chaos after 60 gatecrash event

Last Updated: 7:04PM GMT 20 Dec 2008

## Police use Facebook to nab burglar

Wed Jan 14, 11:30 am ET



September 13, 2008 4:58 PM PDT

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

## The Very Curious Microsoft-Facebook User Data Relationship

by Michael Arrington on November 14, 2008

100 Comments 

February 17, 2009 11:08 PM PST

## Facebook backs down on privacy terms

# Mission

**To create choice.**

# Solution: Decentralization

**Infrastructure & API:  
Open, horizontal, modular,  
enabling individuals**

**vs.**

**vertical, monopolistic**

# Technical Challenges

**Distributed systems have not made it!**

**End user:** Easy to use, deploy, manage, secure

**App developers:** Easy to write apps

# Adoption Challenge

**Make Sharing with Privacy Easy.**

**Make Privacy Fun.**

**Make Privacy Pay.**



# Social Networking 1.0

## **Application-centric design**

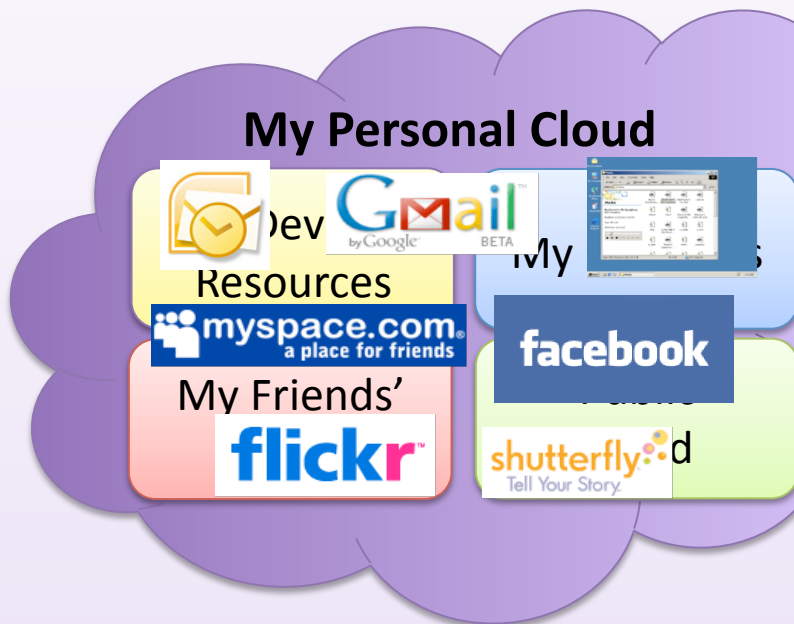
- Facebook, MySpace, LinkedIn, Yahoo, Google, Apple, ...
- Flickr, Shutterfly, Picasa, Adobe, Ning, ...
- Twitter, Tumblr, Crowdvine, Friendfeed, ...
- Hi5, WAYN, Friendster, Frengo, Bebo, Plaxo, ...
- 3Jam, Zintin, Loopt, ...

**Strengths: convenience, available everywhere, free**

## **Weaknesses**

- Data lock-in, loss of data ownership and privacy
- Disparate data sources
- Inconvenient to upload data and relations
- Inefficient, hard to scale

# Person-Centric, In-Situ, Decentralized Social Networking



## Unified personal cloud

- Unified view of all my stuff accessible on any device
- Federated storage system

## Multiple identities

- Fine-grain access control

## In-situ social networking

- Connects via normal actions (email, sms, phone, playing music)

**Distributed servers ← Personal Cloud Butlers**

- Home servers (like Tivo)
- Passive encrypted back up

# Personal-Cloud Butler

## **Privacy and confidentiality**

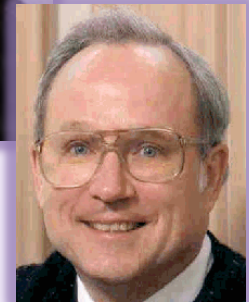
- Lives at home
- Knows all confidential info

## **Intelligent assistance**

- Saves you time
- Shows discretion, suggests ideas

## **Social networking**

- Gossips and negotiates with other Butlers
- Mediates all accesses
- Provides plausible deniability



# PrPI Infrastructure



Directory Service

iPhone

Android

Mobile client API

Photo Sharing

Personal Yelp

Movie Date

Music

Guest Services

Server plug-in APIs

Device Manager

GUI

Data Manager

Semantic Web Index

AAA

Personal Cloud Butler

Friends' Butlers

Data Steward API

imap

facebook

Yelp

# Distributed apps are hard to write!

## Development Platform

Many applications: (distributed) database query + GUI

Database: access rights embedded with every tuple

Distributed Datalog query: abstracts away distribution

supports recursion, persistence, incrementality

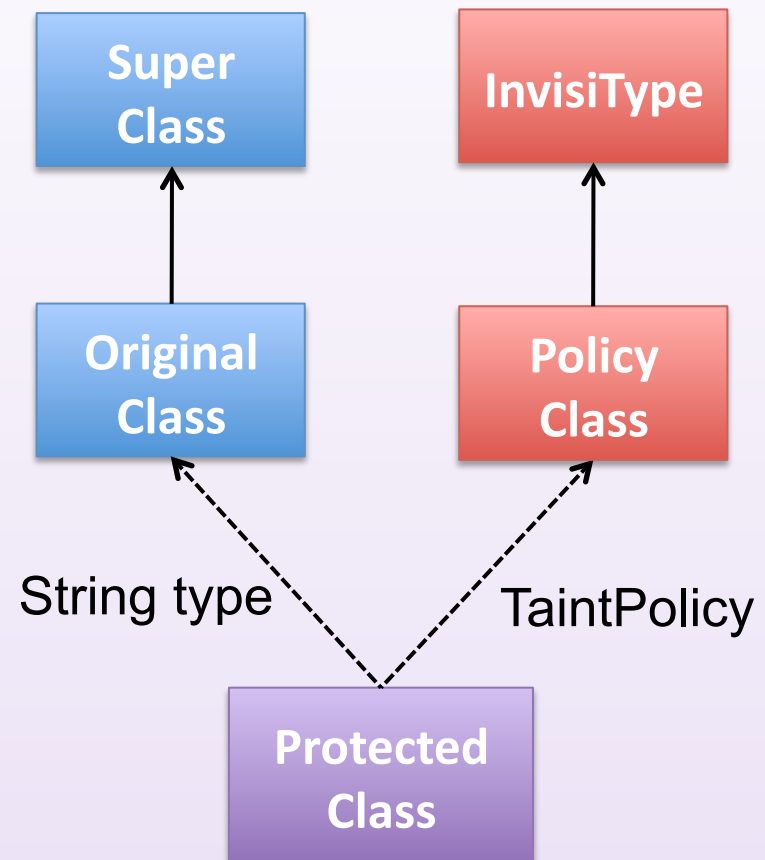
Example:

- $\text{FOAF}(\text{?p}) \text{ :- FRIEND}(\text{?p})$
- $\text{FOAF}(\text{?p}) \text{ :- FRIEND}(\text{?x}), \text{FOAF}[\text{?x}](\text{?p})$

# Butler: Target of Attacks

## InvisiType: Object-Oriented Security Policies

- 3<sup>rd</sup> party plug-ins, mobile code
- Object-oriented safety checks
  - Taint for SQL injection, XSS
  - Access control
- Enforced by language runtime
  - No changes to 3<sup>rd</sup> party code
- Implemented for Python
- Ex: MoinMoin wiki engine
  - 92K lines of code + 200 extensions
  - Added 150 lines of code
  - < 1% overhead
  - 11 XSS and 3 access control bugs



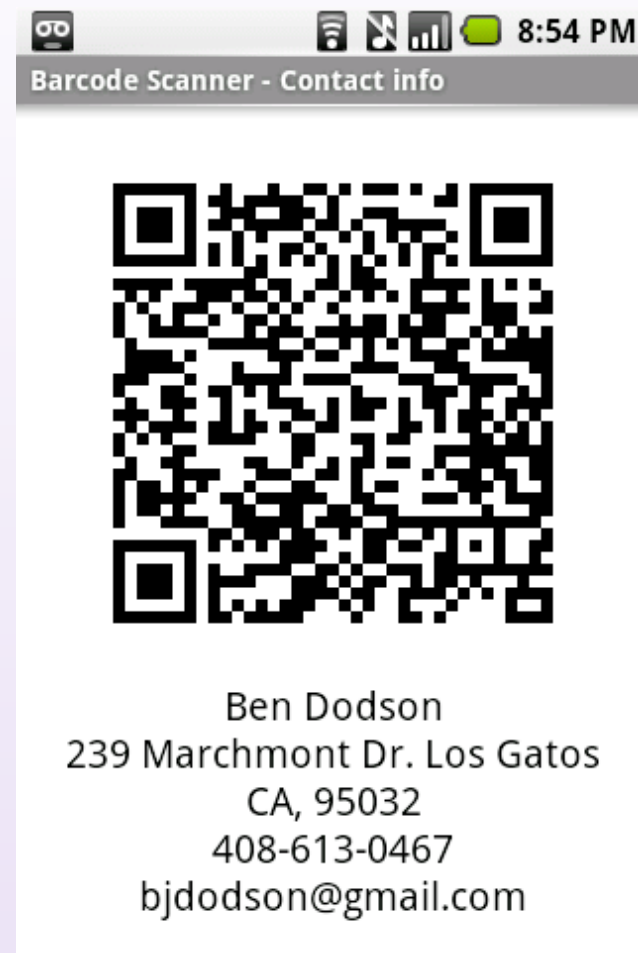
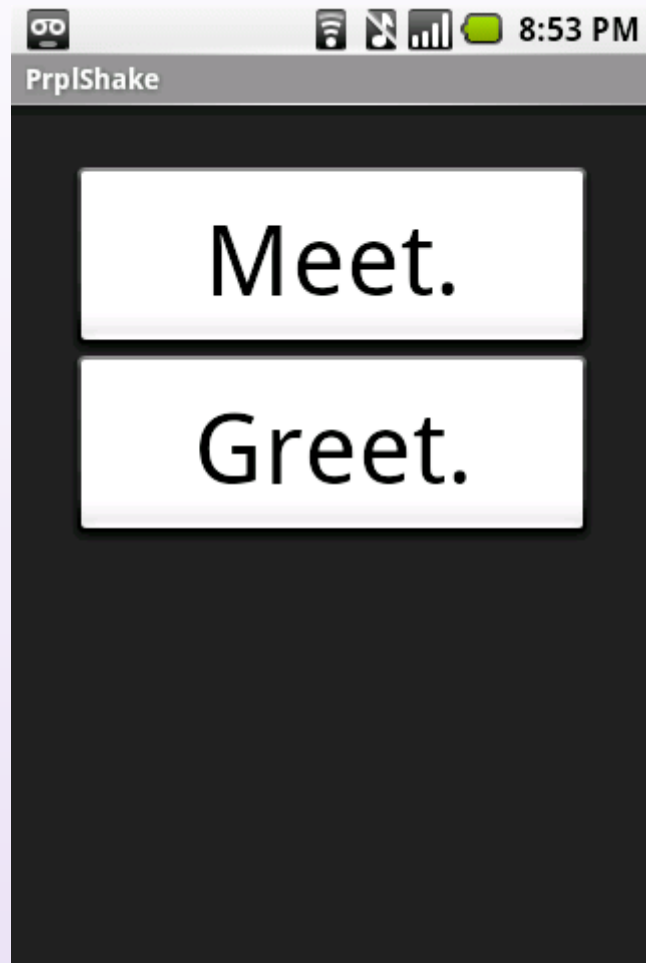
# Adoption Challenge

**Make Sharing with Privacy Easy.**

**Make Privacy Fun.**

**Make Privacy Pay.**

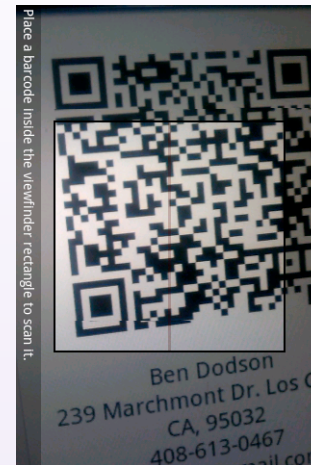
# Making Friends in a Snap





# In Situ Linked-In

No Big Brother



4. Make a new friend with a snap

Connect cyberspace with physical space

5. Auto upload photos to butler

6. Distributed Datalog query to see friends' photos

1. Auto weighted social graph

Privacy is key

In-situ social networking

2. Butler has my contacts, photos, music

3. Access hosted as a Facebook app

Separate access and ownership

App development platform focus

# Themes

# Apps

# Infrastructure

In-situ social networking

Privacy is key

No Big Brother

Connect cyberspace with  
physical space

Viral

**E-Mail Mining**  
In Situ Linked-In

**Digital Handshake**  
Digital Payment

**Social App**  
Music Jukebox

**HCI**  
Semantic Web Display  
Interactive Front Page

**Representation**  
Caching  
Semantic Web Web

**Development Platform**  
Distributed Datalog  
Info Flow Control  
Privacy Preservation

**Compute Utility**  
Tian Di Ren 3-Tier Arch