Privacy of Social Media

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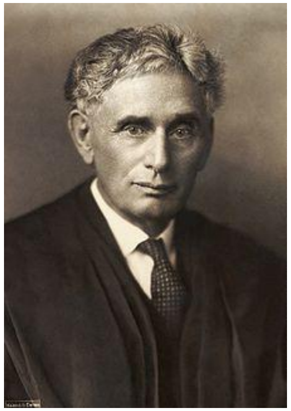
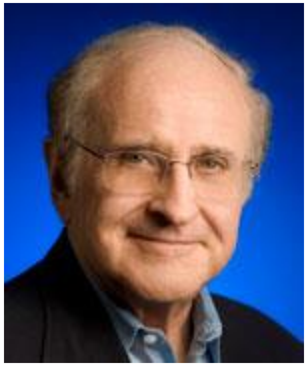
Slides are modified from Privacy and Networks CPS 96 and Social Networking Security and Privacy

What do we mean by privacy?

- Louis Brandeis (1890)
  - "right to be left alone"
  - protection from institutional threat: government, press

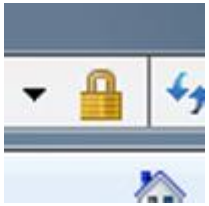




- Alan Westin (1967)
  - "right to control, edit, manage, and delete information about themselves and decide when, how, and to what extent information is communicated to others"

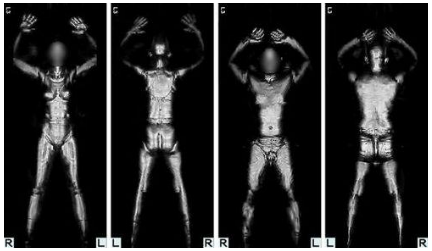
Privacy vs. security

Privacy: what information goes where?



Security: protection against unauthorized access

- *Security helps* enforce privacy policies
- Can be *at odds with each other*
  - e.g., invasive screening to make us more “secure” against terrorism



Types of social media services

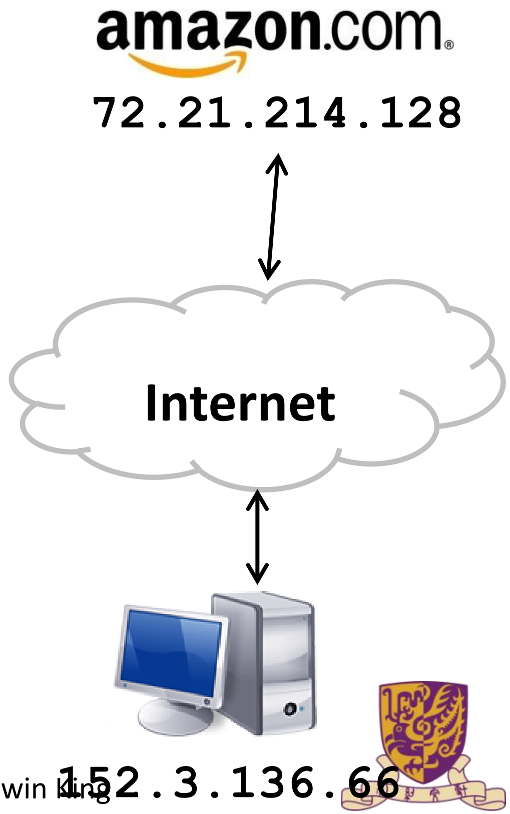
- Networking
  - Facebook, Google+, Linkedin, Twitter
- Content Sharing
  - Pinterest, Facebook, Dropbox, Google Drive
- Location-based Services
  - foursquare, Google Latitude, Facebook, Gowalla

Privacy-sensitive information

- Identity
  - name, address, SSN
- Location
- Activity
  - web history, contact history, online purchases
- Health records
- …and more

Tracking on the web

- IP address
  - Number identifying your computer on the Internet
  - Visible to site you are visiting
  - Not always permanent
- Cookies
  - Text stored on your computer by site
  - Sent back to site by your browser
  - Used to save prefs, shopping cart, etc.
  - Can track you even if IP changes



Types of Protection

- Security
  - Prevention of malicious action to systems, info
- Safety
  - Prevention from physical or mental harm
- Privacy
  - Prevention of exposing sensitive or private info

Default Privacy Modes

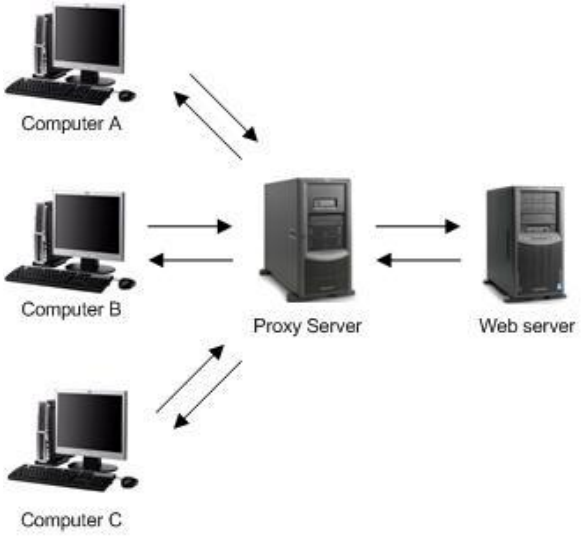
- "Mostly open"
  - The default sharing mode is **public**
  - You must choose to keep content private
- "Mostly closed"
  - The default sharing mode is **private**
  - You must choose to share content

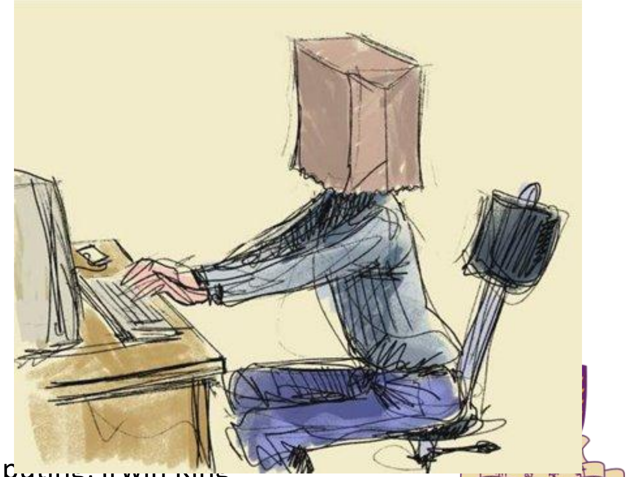
Alternatives?

- Anonymization
  - Do not use real names
- Encryption
  - NOYB, flyByNight
- Decentralization
  - Tighter control over data

Anonymization

- Hide identity, remove identifying info
- Proxy server: connect through a third party to hide IP
- Health data released for research purposes: remove name, address, etc





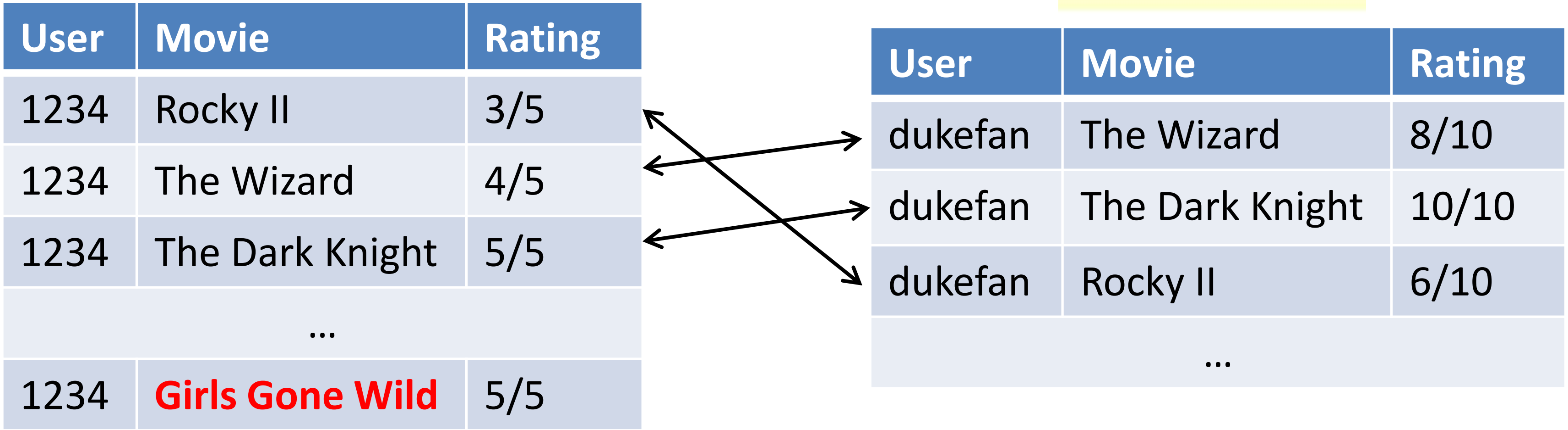
Threat: deanonymization

- Netflix Prize dataset, released 2006
- 100,000,000 (private) ratings from 500,000 users
- Competition to improve recommendations
  - i.e., if user X likes movies A,B,C, will also like D
- Anonymized: user name replaced by a number

Threat: deanonymization

- Problem: can combine “private” ratings from Netflix with public reviews from IMDB to identify users in dataset
- May expose embarrassing info about members…

Threat: deanonymization



User	Movie	Rating
1234	Rocky II	3/5
1234	The Wizard	4/5
1234	The Dark Knight	5/5
…		
1234	Girls Gone Wild	5/5

User	Movie	Rating
dukefan	The Wizard	8/10
dukefan	The Dark Knight	10/10
dukefan	Rocky II	6/10
…		

User 1234 is dukefan!

Threat: deanonymization

- Lesson: cannot always anonymize data simply by removing identifiers
- Vulnerable to aggregating data from multiple sources/networks
- Humans are predictable
  - E.g., try Rock-paper-scissors vs AI

Location privacy

- Mobile phones:
  - – Always in your pocket
  - – Always connected
  - – Always knows where it is: GPS
- Location-based services
- Location-based ads
- What are we giving up?

Why, when and what to disclose?

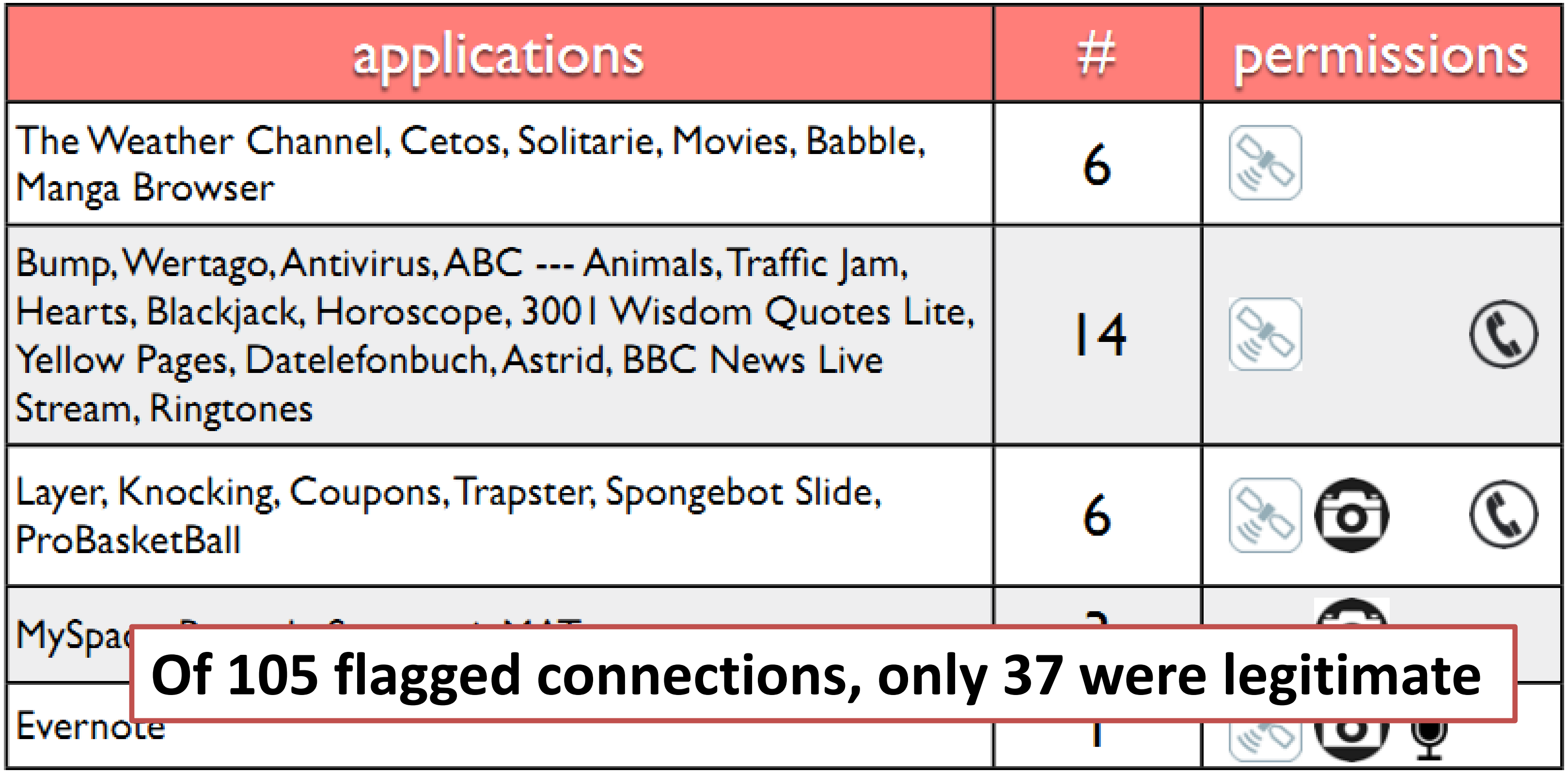
- It is not a simple question!
- Tradeoff between functionality
- Also important whom to disclose it to?
  - Relatives
  - Co-workers
  - Friends
- There have been studies about this
  - Not easy to classify
  - People want to disclose only what is useful

How is your data used by apps?

- Many “free” apps supported by ads
- Analytics: profiling users
- Our research: found it common for popular free apps to send location+device ID to advertising and analytics servers
- What can we do?
  - – More visibility into what app does with data once it reads it

Application Study

- 30 popular Android applications that access Internet, camera, location or microphone



applications	#	permissions
The Weather Channel, Cetos, Solitarie, Movies, Babble, Manga Browser	6	🛰
Bump, Wertago, Antivirus, ABC --- Animals, Traffic Jam, Hearts, Blackjack, Horoscope, 3001 Wisdom Quotes Lite, Yellow Pages, Datelefonbuch, Astrid, BBC News Live Stream, Ringtones	14	🛰 ☎
Layer, Knocking, Coupons, Trapster, Spongebot Slide, ProBasketBall	6	🛰 📷 ☎
MySpa	3	📷
Evernote	1	🛰 📷 🎤

Of 105 flagged connections, only 37 were legitimate

Findings - Location

- 15 of the 30 applications shared physical location with an ad server
- Most of this information was sent in the clear
- In no case was sharing obvious to user
    - Or written in the EULA
    - In some cases it occurred without app use!

Findings – Phone identifiers

- 7 applications sent device unique identifiers (IMEI) and 2 apps sent phone info (e.g. phone number) to a remote location without warning
  - One app’s EULA indicated the IMEI was sent
- Appeared to be sent to app developers

“There has been cases in the past on other mobile platforms where well-intentioned developers are simply over-zealous in their data gathering, without having malicious intent.” -- Lookout

What are the risks?

- Privacy
- Reputation
- Data
- Access
- Control
- Employment
- Legal Proceedings