



## Announcements

Project 3a paper due today

Submit up front on table



## Next week, Encryption...

A method to securely send messages between 2 parties

- \* Meant to ensure privacy, integrity and security

But what happens if the party you send the information to reveals it to others?

- \* Intentionally or unintentionally

You want information kept private, others feel they have a right to know-either to protect or to do business

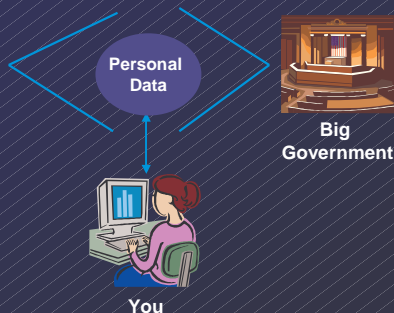


## Who's Tracking Whom?



Big Business

Others?



## What is Privacy?

Privacy is difficult to pin down and define.

- \* Roots of privacy are deep in history
- \* Hebrew culture, Classical Greece, Ancient China all reference it

Different ideas about privacy internationally

- \* UN sees privacy as a fundamental human right
- \* Different countries, different protections

Privacy is not mentioned in our Constitution

- \* But it was a problem in need of a solution, identified by two men who would eventually become Supreme Court Justices



## What Is Privacy in the U.S.?

Brandeis & Warren wrote ...

*The narrower doctrine (of privacy) may have satisfied the demands of society at a time when the abuse to be guarded against could barely have arisen without violating a contract or a special confidence; but*

→ **modern devices** afford abundant opportunities for the perpetration of wrongs without the participation of the injured party

Modern devices mean we need a new definition of privacy



## A Definition

What does "privacy" mean in the modern world?

*Privacy, the right of people to choose freely under what circumstances and to what extent they will reveal themselves, their attitude, and their behavior to others*

- \* Privacy is a right
- \* You control when & how much is revealed



## What does Privacy mean in a networked world?

Many people think they move across the Internet anonymously?

> **WRONG!**

Do you expect that your interactions online should have some measure of privacy?

Should transactions be tracked?

\* If yes, what limitations are there?

How about just browsing?



## Digital Privacy

How private is your information online?

- Reputable online businesses post Privacy Stmt
- The statement should understandable to you and say what info they collect, what they will do with it, how to "opt-out", etc.
- But, there is little policing & few penalties

Real Networks in 1999 secretly gathered data on people's personal music tastes, encrypted the info so no one would know, didn't mention it in their privacy statement, and used TRUSTe auditor -- the day after getting caught, they improved their privacy statement ...

should we ever trust them???



## Challenges to Privacy from IT

Privacy Protections for information in the public domain that are based on the difficulty and expense of collecting and manipulating information are diminished

Data collected for one purpose is readily available and can be used for other purposes

\* Student computer use to "identify" student effort

Data collection can occur "invisibly", without the person's knowledge

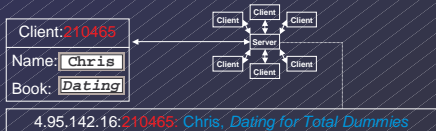
\* Cookies, video cameras, web logs of pages visited, etc.



## Cookies

Cookie: a record stored by a Web server on a client (your computer)

- The cookie is usually a unique ID that allows the server to remember who you are
- Well known CS idea that improves Web use



## Cookies: Good

Cookies are used by many sites and they make Web usage much better

- Many sites, e.g. Amazon.com use cookies
- Banking and credit card applications cannot be secure enough without cookies
- If the privacy laws met OECD standards, cookies would be all good and no one but computer scientists would know about them

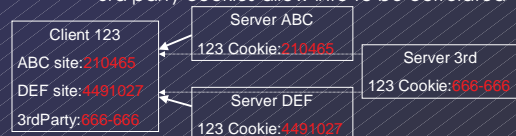
But there is a problem



## Cookies: Bad

Cookies can be stored in your computer by sites you have not visited: 3rd party

- 3rd Party Cookies come from a site in business with the site you visit, e.g. for ads
- 3rd party cookies allow info to be correlated





## Correlating Cookies

The 3rd party cookie becomes the key (literally, in DB sense) to join (in DB sense) the info held by separate co.s

Company ABC Database				
Customer	Cookie	Ad Agcy	Data1	Data 2 ...
123	210465	666-666	val 1	val 2

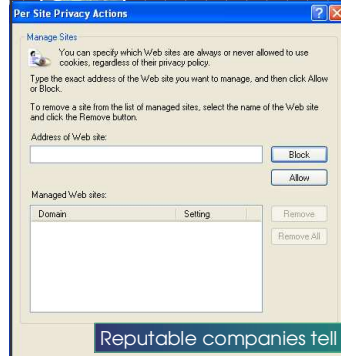
  

Company DEF Database				
Customer	Cookie	Ad Agcy	Data1	Data 2 ...
123	4491027	666-666	val 1	val 2

The result? A complex database identifying you and your habits!



## Managing Cookies



Most browsers give you a way to say "no thanks"

- to accept no cookies at all

- or to accept them selectively

Reputable companies tell you their cookie policy



## Beyond Cookies

But Web sites can collect information on you even without the use of cookies  
How can they do that?

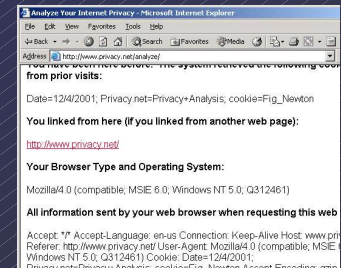
Web sites store information about the requests they receive in log files. These files contain detailed information about every single request the site receives, including where the request came from, what time the visitor showed up, and what pages he or she looked at.



## What can a Web server learn about you?

How much information is available about you when you use a Web browser?

Have a look at [www.privacy.net](http://www.privacy.net)



## General Privacy Protection

Takes work on your part:

- \* Question why personal info needed
- \* Give only minimum required
- \* Ask what 3<sup>rd</sup> parties have access
- \* Check off opt-out option on forms or create your own
- \* Pay cash
- \* Periodically check the info companies do have for accuracy



## Protect Online Privacy

Takes work on your part:

- \* Look for privacy policies
- \* Use separate email for online transactions
- \* Clear out your web cache after use
- \* Only use online forms in secure mode
- \* Reject unnecessary cookies
- \* Use anonymizers while browsing
- \* Encrypt email