

Internet Privacy

Dr. Norrathep Rattanaivanon

Final Exam

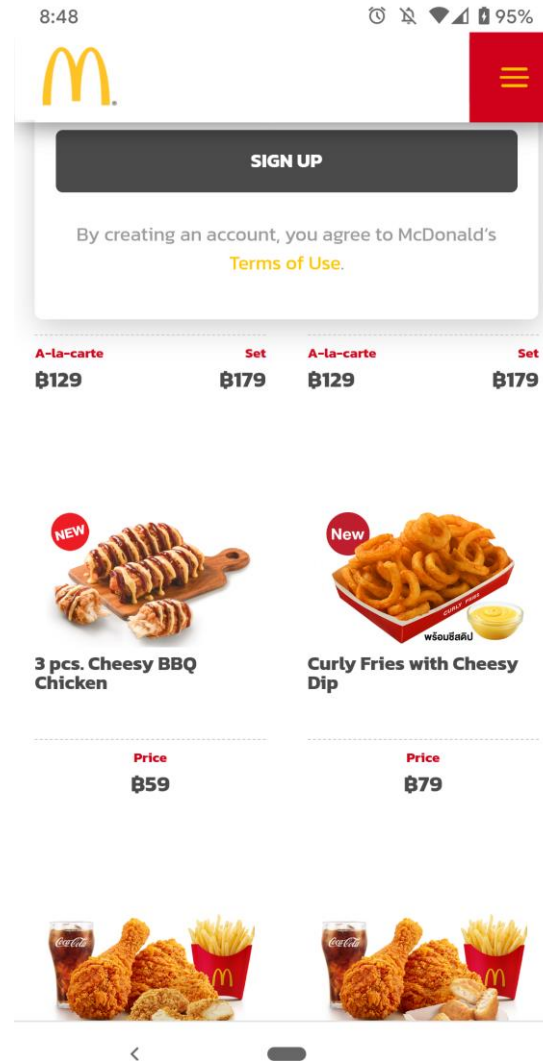
- I'll allow final exam to be taken *online* if some of you cannot come back to the school by the final week



Why is data privacy important?

- Right now, in the era of big data and machine learning
 - Every company wants YOUR data to make profits
 - Data privacy – how a piece of data should be handled, for example:
 - Sharing your personal health data to a hospital but not to the public
 - Sharing your credit card information to an online shopping website but not to a video streaming website
 - Importance: when private data gets in the wrong hands, bad things can happen
 - Bad person can blackmail you using your personal health data
 - Hacker can spend your money if he has your credit card information
-

Has this ever
occurred to
you?

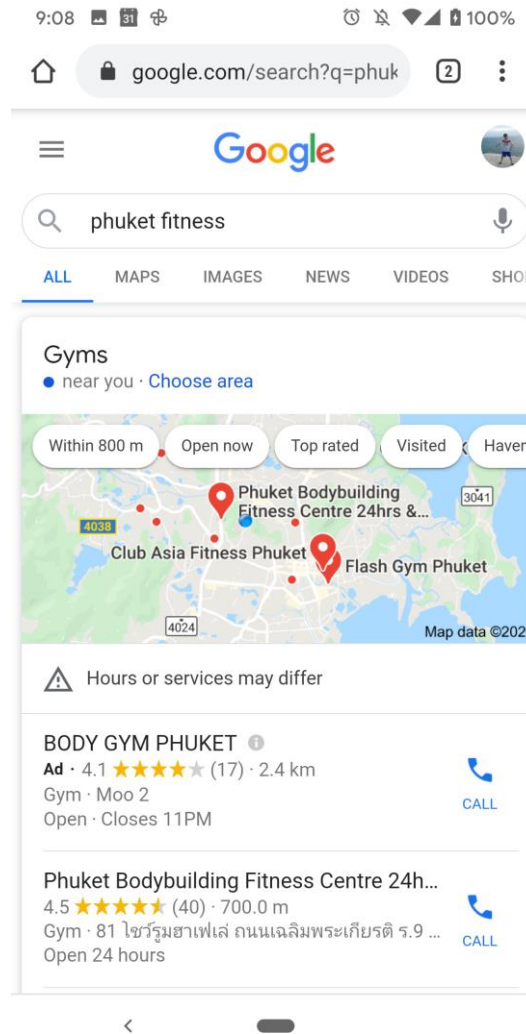


I was hungry, so I wanted
to order food from
McDonald's but I changed
my mind.



Right after, a McDonald's
advertisement is shown on
my Facebook's account.
Coincidence?

Or this?



I was looking for a fitness gym in Phuket on my phone.



Right after, a certain fitness' advertisement is shown on my Facebook's account. Can't be a coincidence!

Or:

- Watch a video of your favorite Youtube channel
- A similar type of videos is shown as an ad on your social media
- Reading on a news website
- The same website is shown as a recommended website on your search engine
- Physically visiting a shopping mall
- The same shopping mall is shown on your social media



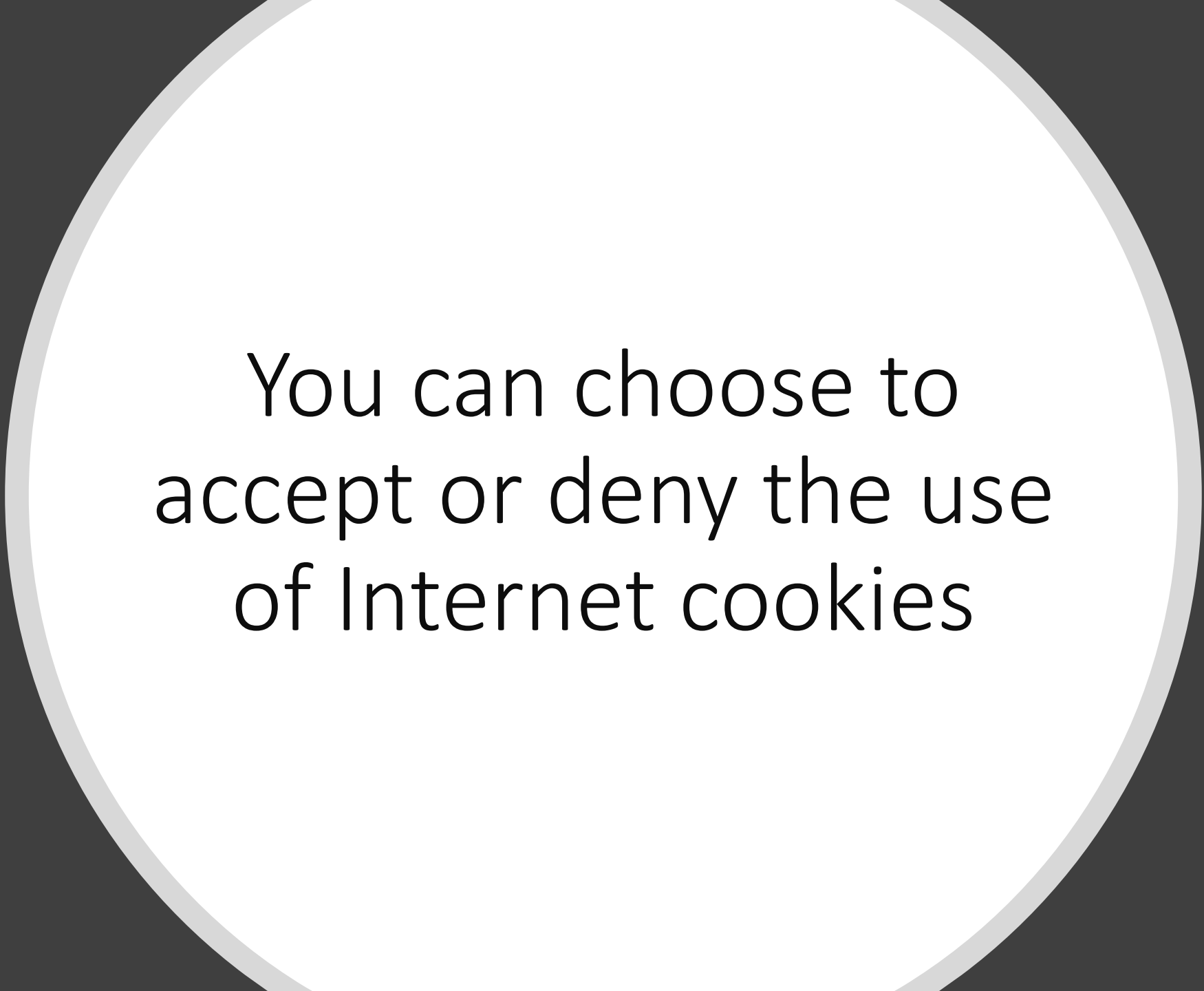
A stylized sun graphic on the left side of the slide. It features a solid yellow circle at the bottom left, with several short, curved yellow lines above it, suggesting rays. The background is split into an orange upper half and a white lower half by a curved line.

How do websites know
our behaviors?

Web Tracking



- Your behaviors are shared across websites via *cookies*
 - Browsing activities, mouse clicking, keypress, GPS data etc.
- They could also share or sell your behaviors to other parties, such as government or other websites
- Not safe for your secret behaviors
 - E.g., having two Twitter accounts: one for personal account, the other anonymous account used for criticizing your company/government.
- Possible to reveal your anonymous account



You can choose to
accept or deny the use
of Internet cookies

Fundamentals

What is Malware? How Malware Works & How to Remove It

by **Joseph Regan** on July 11, 2019



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What kind of cookies do you use and what do they do?

The following table lists the cookies used on our sites and describes their purpose:

| Cookie Group | Purpose |
|-------------------------------|--|
| Technical cookies | These cookies are necessary for proper functionality in certain areas of our sites, such as enabling the e-commerce part of our sites, offering you product and pricing combinations relevant for your region, allowing us to balance the load on our servers, recording user preference for cookies usage, etc. Cookies in this category comprise both session as well as persistent cookies. Our sites may not work well or at all without these cookies; therefore these cookies are always used, regardless of user preferences. Cookies in this category are always set by our sites and not third-party domains. |
| Analytics cookies | These cookies are used to collect information about how you use our sites. We use the information to compile reports and to help us improve our sites, make it more user-friendly and monitor that it is performing correctly. The cookies collect information in an anonymous form about your activity on our sites including the pages you visit and the webpage that referred you to our sites. Cookies in this category may be set by our sites or third-party domains. More information about certain of these cookies is available below in the anonymous identifier section. |
| 3rd-party tracking cookies | These cookies are used to collect information about how you use our sites and what keywords you used to arrive at our sites, which websites you have visited, as well as the way you reached our sites. We use this information to compile reports, to help us improve our sites, and generally to tailor product and service offerings to you. These cookies may be set either by our sites or third-party domains. |
| 3rd-party integration cookies | These cookies are used to integrate third-party functionality in our sites, such as YouTube™ videos, feedback forms or social media icons that allow you to share our content. Cookies in this category may be set by third parties and include, without limitation, cookies set by the following domains: YouTube.com, Twitter.com, LinkedIn.com and Facebook.com. |



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[Cookie Settings](#)[I Agree](#)[Show Vendors](#)

Cookie in Search Engine

Share your search behaviors to third-party websites for advertising

TYPES OF COOKIES USED BY GOOGLE

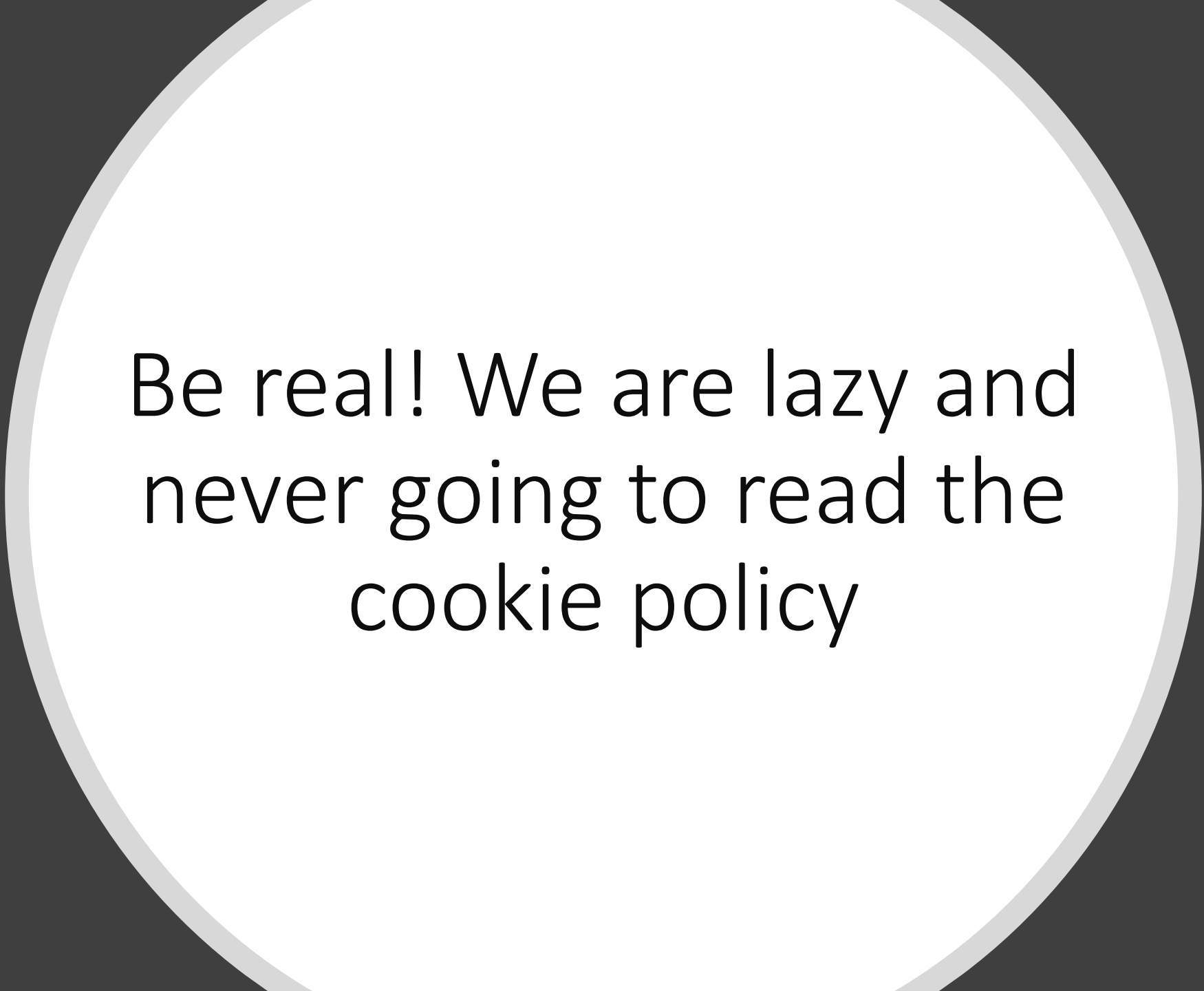
We use different types of cookies to run Google websites and ads-related products. Some or all of the cookies identified below may be stored in your browser. You can view and [manage cookies in your browser](#) (though browsers for mobile devices may not offer this visibility).

| Category of use | Example |
|-----------------|---|
| Preferences | These cookies allow our websites to remember information that changes the way the site behaves or looks, such as your preferred language or the region you are in. For instance, by remembering your region, a website may be able to provide you with local weather reports or traffic news. These cookies can also assist you in changing text size, font, and other parts of web pages that you can personalize. |

Advertising

We use cookies to make advertising more engaging to users and more valuable to publishers and advertisers. Some common applications of cookies are to select advertising based on what’s relevant to a user; to improve reporting on campaign performance; and to avoid showing ads the user has already seen.

Google uses cookies like NID and SID to help customize ads on Google properties, like Google Search. For example, we use such cookies to remember your most recent searches, your previous interactions with an advertiser’s ads or search results, and your visits to an advertiser’s website. This helps us to show you customized ads on Google.



Be real! We are lazy and
never going to read the
cookie policy

Prevent Web Tracking



Never accept cookies?



Private search engine



Tracker blocker

Tracker Blocker



Block cookies that track users' behaviors



Example: [Privacy Badger](#),
[Ghostery](#)

Task: 10-minute

Find some
examples of
private search
engines

How can you clear
all cookies stored
on your browser?

What about
incognito/private
browsing modes?

Difference

| | Current Incognito/Private Browsing Mode | Tracker Blocker |
|--|--|------------------------|
| Prevent storing browsing history on computer | Yes | No |
| Prevent website tracking | Depends (usually No) | Yes |



Incognito/private browsing modes

- Useful when accessing a public computer
- People accessing the same computer after me will not know what websites I accessed

Recommendation:



Start with
incognito/private
browsing



Whenever logging in is
necessary, use tracker
blocker + incognito



VPN (Make sure who you
are trying to hide cannot
control VPN providers)

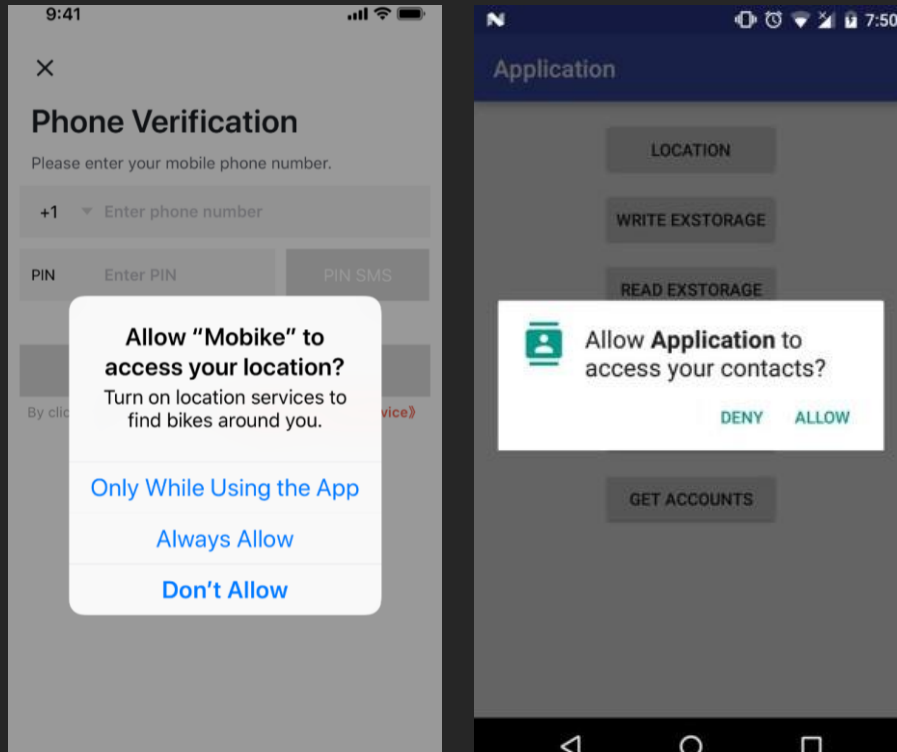


The Onion Routing

Mobile Privacy



Mobile Environments



- Application-based rather than website-based
-
- When installing or first launching a mobile app, it asks for permission.
- **Do you just always allow those permissions?**

Personally Identifiable Information (PII)

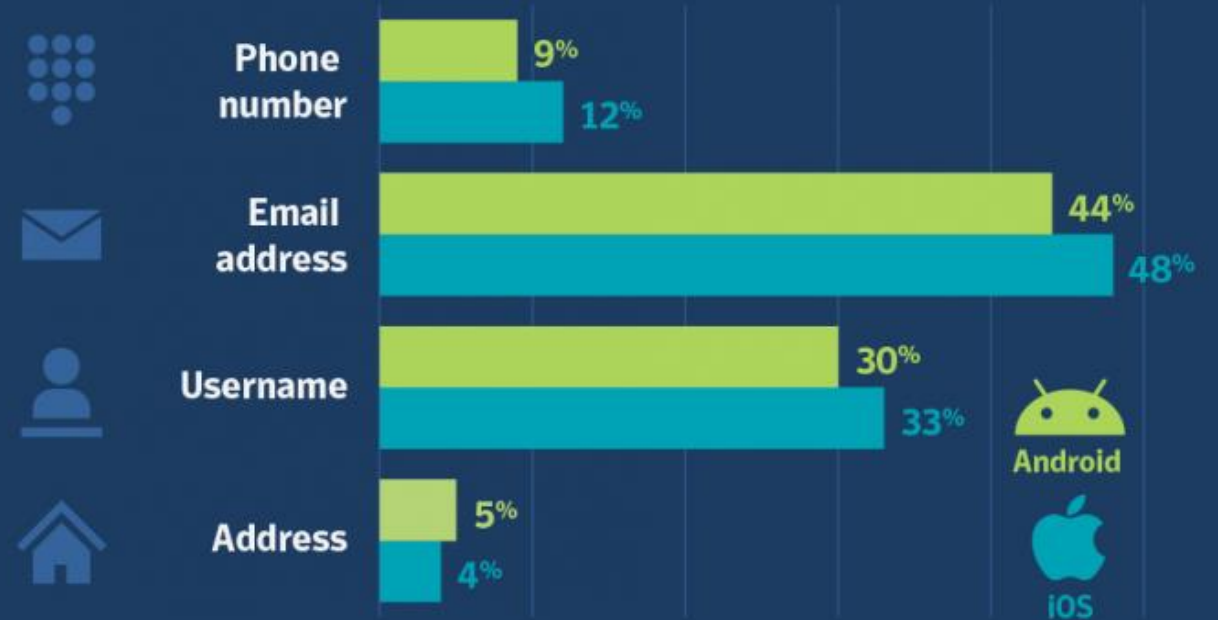
(Credit: Symantic)

MOBILE PRIVACY

How much personal information are your apps gathering?

Analysis of top 100 apps on Google Play and iTunes*

Personally identifiable information (PII) shared with apps



Why do we need to protect PII?

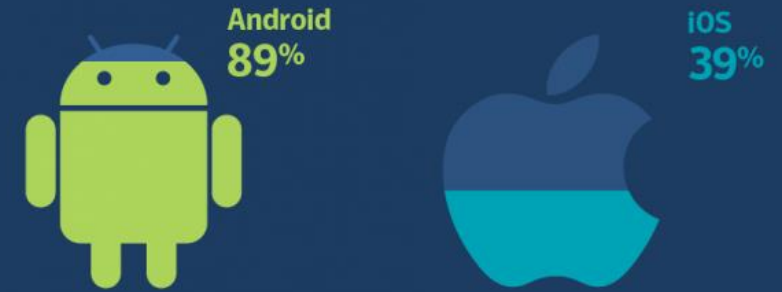
- Prevent *identity theft*
- Pretend to be you and can cause damage, e.g.,
 - Withdraw money from your bank account
 - Ask for money from your friends on social media

Risky Permissions

- Permissions where the app requests data or resources that involve the user's private information

Risky permissions

Percentage of apps that request risky permissions by operating system



Q: What are “risky permissions?”

A: Permissions where the app requests data or resources that involve the user's private information, or could potentially affect the user's stored data or the operation of other apps

Risky permissions breakdown



What to do for apps asking risky permissions?

- Apps asking for risk permissions != malicious apps
- Ask the following questions:

01 Do I know what information and permissions an app is requesting?

02 Am I comfortable sharing personal information with this app developer?

03 Does the app really need the device permissions it is requesting?

Kahoot.it

Privacy in IoT & Big Data

Current & Future Technology

<https://abovethelaw.com/2019/11/why-iot-big-data-is-a-bigger-deal-for-privacy-than-you-think/>

You may have the following now or soon:

- Smart doorbell: track not only visitors but your comings and goings
- Smart fridge: have cameras inside that can take pictures of the inside
- Fitness watch: track your location, steps, heartbeat, sleep patterns and even diet

These devices collect and SHARE YOUR DATA with third-party applications

Potentially, I (or someone else) can pay to learn all your personal/habit information

OR

What happens if this data is leaked?

Protection: Law Side

- [EU GDPR](#) (2018): new set of rules designed to give EU citizens more control over their personal data
 - Company collecting data must protect it from misuse and exploitation
- [California's CCPA](#) (expected 2020)

Protection: Technology Side

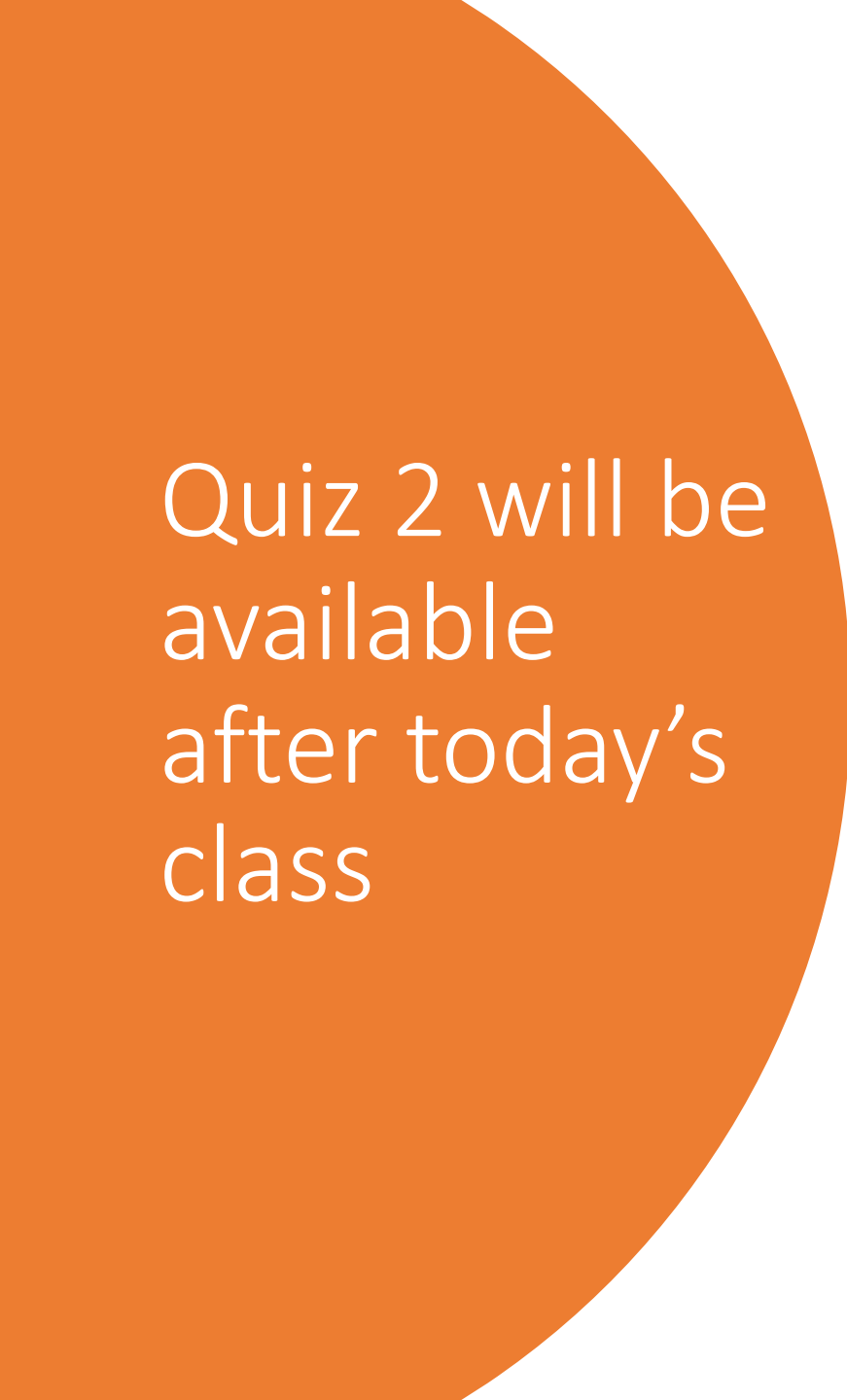
- Very hard (they don't use cookies)
- Companies should ensure that when they collect data, the collection process must be *privacy-preserving*
 - Collect data without learning user's PII

Food for thoughts


- IoT + Big Data
- How do you know that these devices (or even your smartphone) do not spy on you?
- How can you really be sure about that?



Q/A

A large orange circle is positioned on the left side of the slide, partially cut off by the edge. It contains the text 'Quiz 2 will be available after today's class' in white.

Quiz 2 will be
available
after today's
class

- On LMS: <https://lms2.psu.ac.th/>
 - Due September 16th 9am Thailand time
 - 5 questions; 5% of your overall grade
- 
- A yellow dashed line is located in the bottom right corner of the slide, consisting of several short, curved segments.

Final Project Presentation

- Last week of class: 12 mins + 3 (Q&A) mins
 - 10 points total
 - Understanding: 5pts
 - Presentation skills: 2pts
 - Questions and Answers: 3pts
-
- 4 teams will present on Tuesday, September 22nd
 - The rest will present on Thursday in the same week

Team Slot Presentation (based on # of people in each team)

Tuesday 22nd

- ZBC
- Information Age
- Flowers
- Hope Star

Thursday 24th

- Boom
- Storm
- Return of the king
- ABC

Group Presentation

- Online research a real-life case study of security or privacy issues on the internet
- Make PPT presentation with the following topics:
 - Detailed story: what happened in that case study?
 - Problem: What is a source of the problem?
 - Solution: How would it have been mitigated?