



PHOTO LIFE

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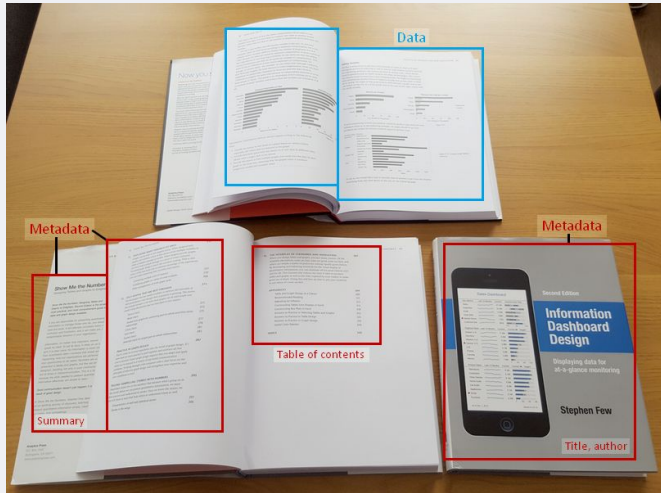


01

INTRODUCTION

METADATA

- ★ “Data about data. Metadata is data that provides information about a file’s contents.”
[National Institute of Standards and Technology]



Name	Date	Type	Size	Date created	Dimensions
data.png	11/28/2016 10:03 PM	PNG File	97 KB	2/5/2017 1:35 AM	600 x 320
data_dictionary.png	11/28/2016 11:47 PM	PNG File	49 KB	2/5/2017 1:35 AM	600 x 320
diagram.png	1/14/2017 1:10 AM	PNG File	25 KB	2/5/2017 1:35 AM	600 x 320
document.png	11/28/2016 11:16 PM	PNG File	32 KB	2/5/2017 1:35 AM	600 x 320
folder.png	11/28/2016 10:03 PM	PNG File	97 KB	2/5/2017 1:35 AM	600 x 320
mysql.png	11/30/2016 11:22 AM	PNG File	25 KB	2017 1:35 AM	600 x 320
oracle.png	11/30/2016 11:22 AM	PNG File	25 KB	2017 1:35 AM	600 x 320
schema.png	11/29/2016 12:33 PM	PNG File	25 KB	2017 1:35 AM	1200 x 800
search.png	11/29/2016 12:44 PM	PNG File	25 KB	2017 1:35 AM	600 x 320
toolbox.png	11/28/2016 11:47 PM	PNG File	49 KB	2017 1:35 AM	600 x 320

The diagram shows a workflow: 1. 'Your Database' sends a 'Schema & descriptions report' to 'Dataedo Repository'. 2. 'Dataedo Repository' sends 'Documentation, descriptions, diagrams, metadata' to 'Developers'. 3. 'Developers' send 'Generate script' to 'SQL Script'. 4. 'SQL Script' sends 'Run script that saves descriptions in your database' back to 'Your Database'.

Credits: Dataedo



PHOTO METADATA: EXIF FORMAT

- ★ Exchangeable Image File Format
- ★ Standard format for images
- ★ Information about the context of the photos we take, such as:
 - Camera Settings
 - Date and Time
 - Geolocation: X coordinates, Y coordinates
 - *Who* is in the photo (including pets!)

General	Exif	GPS	TIFF
Aperture Value	2.526		
Brightness Value	1.671		
Color Space	sRGB		
Components Configuration	1, 2, 3, 0		
Date Time Digitized	Dec 31, 2015, 3:10:13 PM		
Date Time Original	Dec 31, 2015, 3:10:13 PM		
Exif Version	2.2.1		
Exposure Bias Value	0		
Exposure Mode	Auto exposure		
Exposure Program	Normal program		
Exposure Time	1/30		
Flash	No flash function		
FlashPix Version	1.0		
FNumber	2.4		
Focal Length	1.85		
Focal Length In 35mm Film	35		
ISO Speed Ratings	250		
Lens Make	Apple		
Lens Model	iPhone 4S front camera 1.85mm f/2.4		

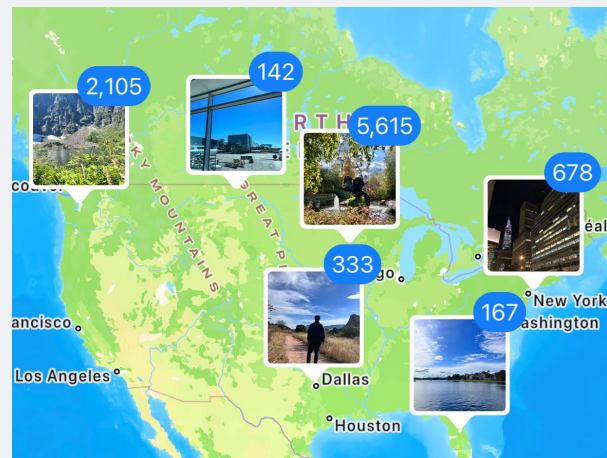


WHY IT MATTERS

- ★ Can be helpful, but can also be used for **malicious purposes**
- ★ Can also contain private, personal info about the photo taker



Credits: Apple Machine Learning Research



WHY IT MATTERS

- ★ Many services that allow for photo uploading do not restrict access to the metadata
- ★ Privacy has and continues to be a major issue within the tech industry
- ★ Information can be shared and downloaded w/o the photo taker's permission
- ★ There is a *ton* more metadata that is taken and stored than the ones that the device displays

This scary AI breakthrough means you can run but not hide – how AI can guess your location from a single image

News

By Alex Blake published December 20, 2023

AI knows where you've been

Credits: TechRadar

Tech > Mobile

You Might Be Giving Up Your Location When You Share Photos on Your iPhone

Location metadata is embedded in your iPhone photos and videos by default. Here's how to disable this feature.

Credits: CNet





02

OUR APPROACH

PROJECT PLAN

We want to demonstrate how image metadata could be extracted, stored and analyzed after uploading to a platform that does **not** restrict the data.

Album Generator

Generate Photo Albums based on criteria the user chooses

Profile Maker

Generate User Profile based on the photos the user uploads



TECH STACK



C#

- More efficient than Python
- Good for project development
- Runs in .NET
- We didn't know it yet!



TECH STACK



NuGet Packages:

- .NET libraries
- JSON management, metadata extraction, database management

Blazor

- Web design based on HTML, CSS and C#

Visual Studio:

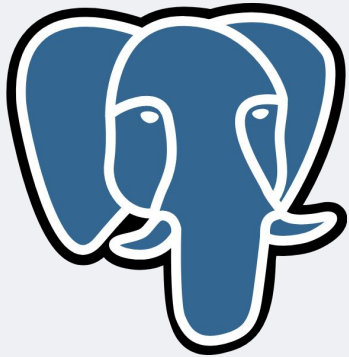
- Hosts all of our tools



TECH STACK



Google Cloud



Google Cloud:

- Offers Services to store pictures with no metadata restrictions.

PostgreSQL:

- Database management



03

SYSTEM DESIGN

THE EXTRACTOR

Camera:	Canon EOS 400D Digital
Exposure:	0.005 sec (1/200)
Aperture:	f/11
Focal Length:	100 mm
ISO Speed:	100
Exposure Bias:	0/3 EV
Flash:	Flash fired
Orientation:	Horizontal (normal)
X-Resolution:	72 dpi
Y-Resolution:	72 dpi
Software:	Adobe Photoshop CS2 Windows
Date and Time:	2008:01:06 20:59:54
YCbCr Positioning:	Co-Sited
Exposure Program:	Manual
Date and Time (Original):	2008:01:06 14:47:06
Date and Time (Digitized):	2008:01:06 14:47:06
Shutter Speed:	500948/65536
Metering Mode:	Pattern
Color Space:	sRGB
Focal Plane X-Resolution:	4433.295 dpi
Focal Plane Y-Resolution:	4453.608 dpi
Exposure Mode:	Manual
Compression:	JPEG

Keep



Discard

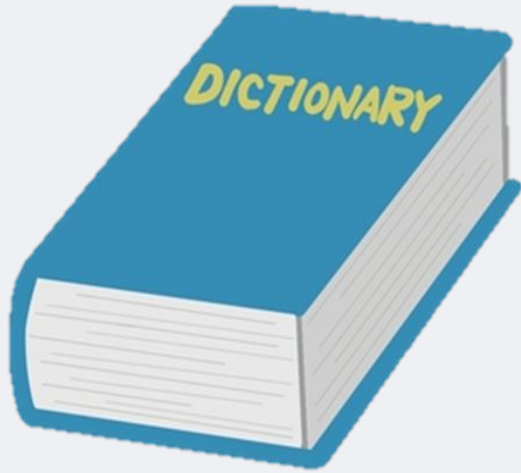


THE EXTRACTOR



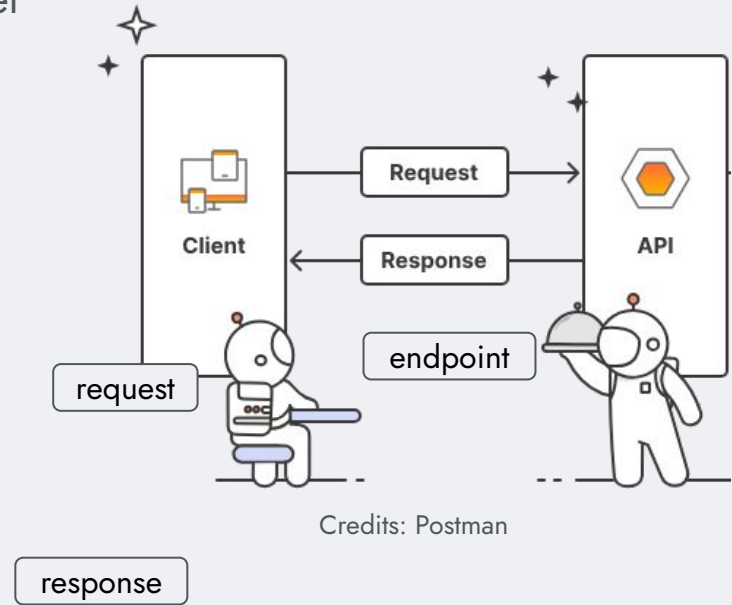
- Everything is a string
- Units are included
- EXIF Format does not match SQL format for decimals and time stamps.

THE EXTRACTOR

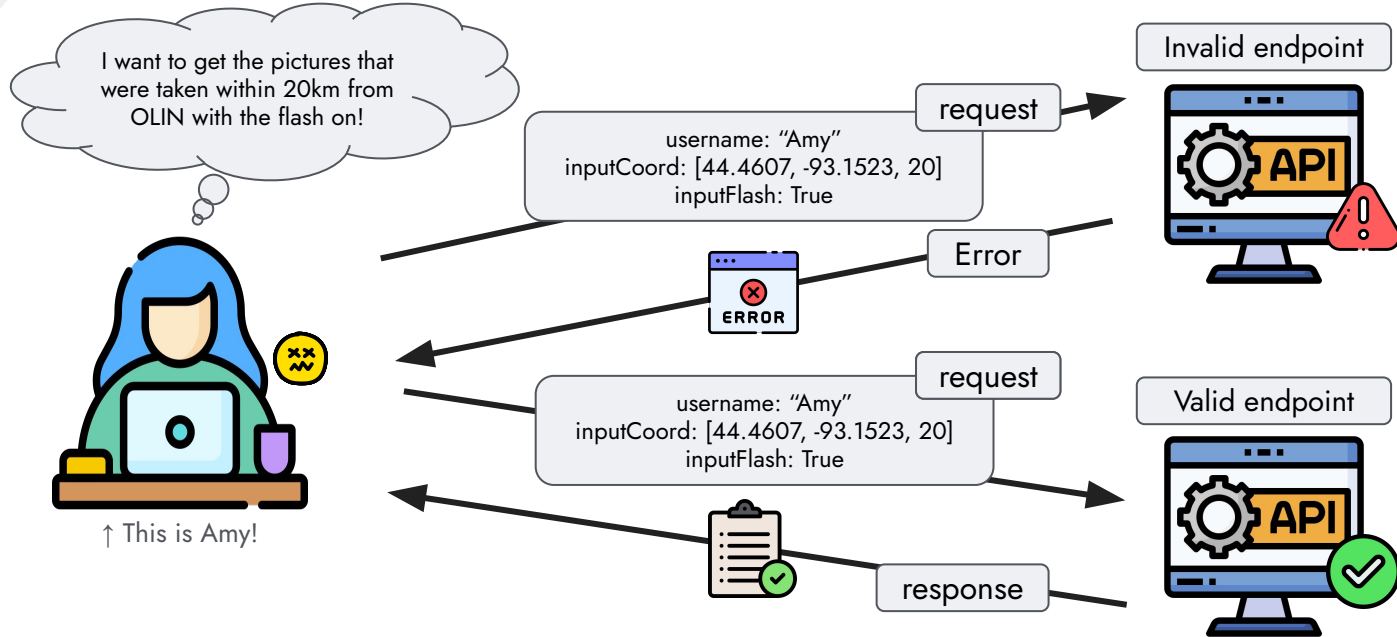


METADATA EXTRACTOR API

- ★ How can we send the extracted data for other services to use?
 - Console Application → Web Application (API)
- ★ What is an **API**?
 - Application Programming Interface
 - “A software intermediary that allows two applications to talk to each other”
[MuleSoft]



METADATA EXTRACTOR API

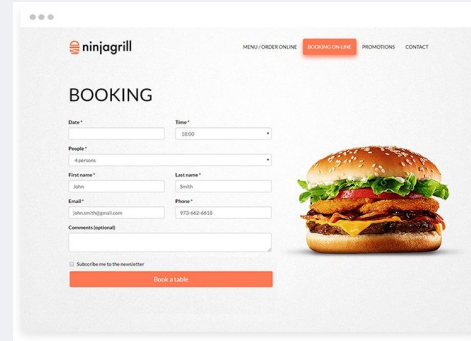


METADATA EXTRACTOR API



PROFILE MAKER SERVICE

- ★ A console application rather than a web application
- ★ Is “injected” into web pages; pages must already have access to the service to use it



GOOGLE API INTEGRATION




Authentication Request
API Requests




Authentication Tokens
Photo Ids
Photos



 Sign in with Google



CloudSponge wants to access your Google Account

 contactstransmuteperformance@gmail.com

This will allow **CloudSponge** to:



See and download your contacts



Make sure you trust CloudSponge

You may be sharing sensitive info with this site or app. Learn about how CloudSponge will handle your data by reviewing its [terms of service](#) and [privacy policies](#). You can always see or remove access in your [Google Account](#).

[Learn about the risks](#)

Cancel

Allow

GOOGLE API INTEGRATION



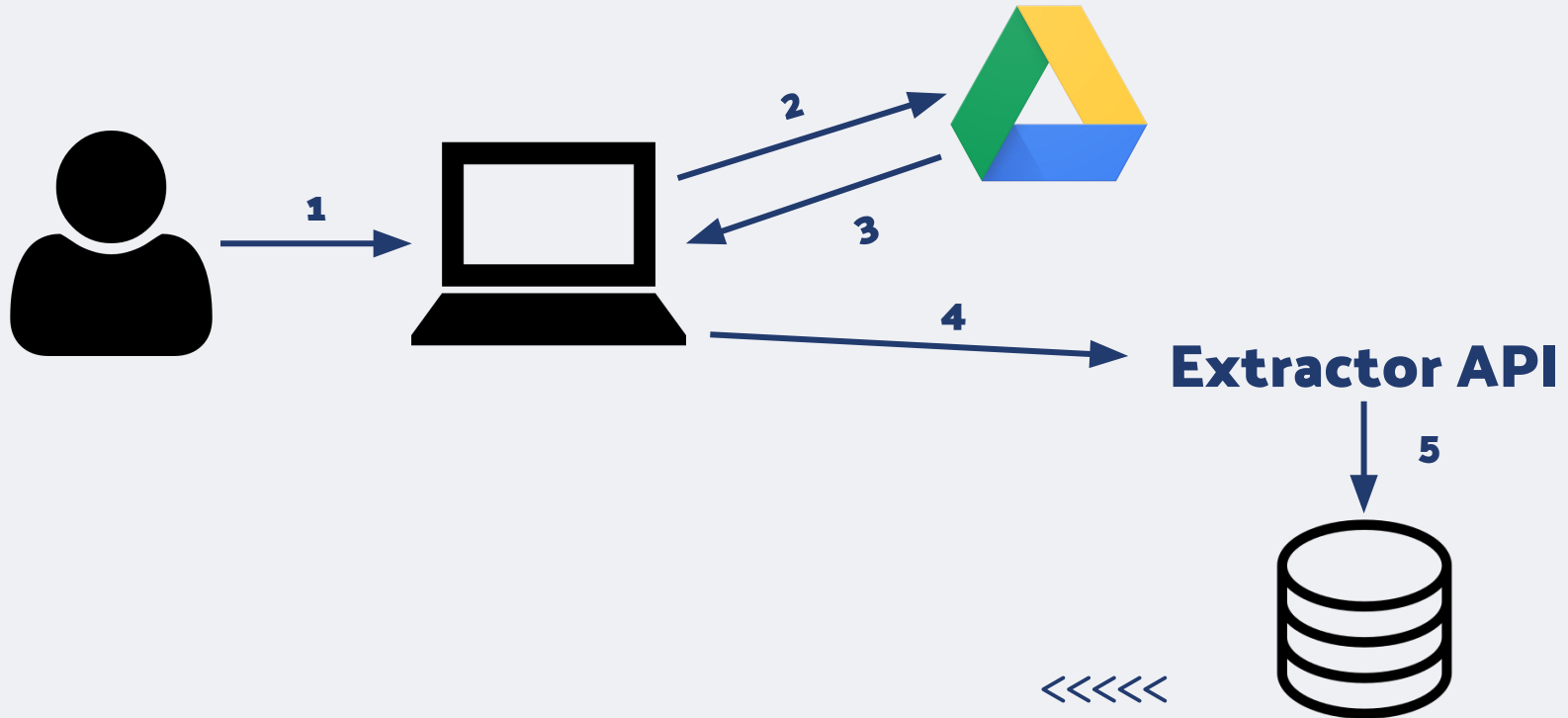
Authentication Request
API Requests



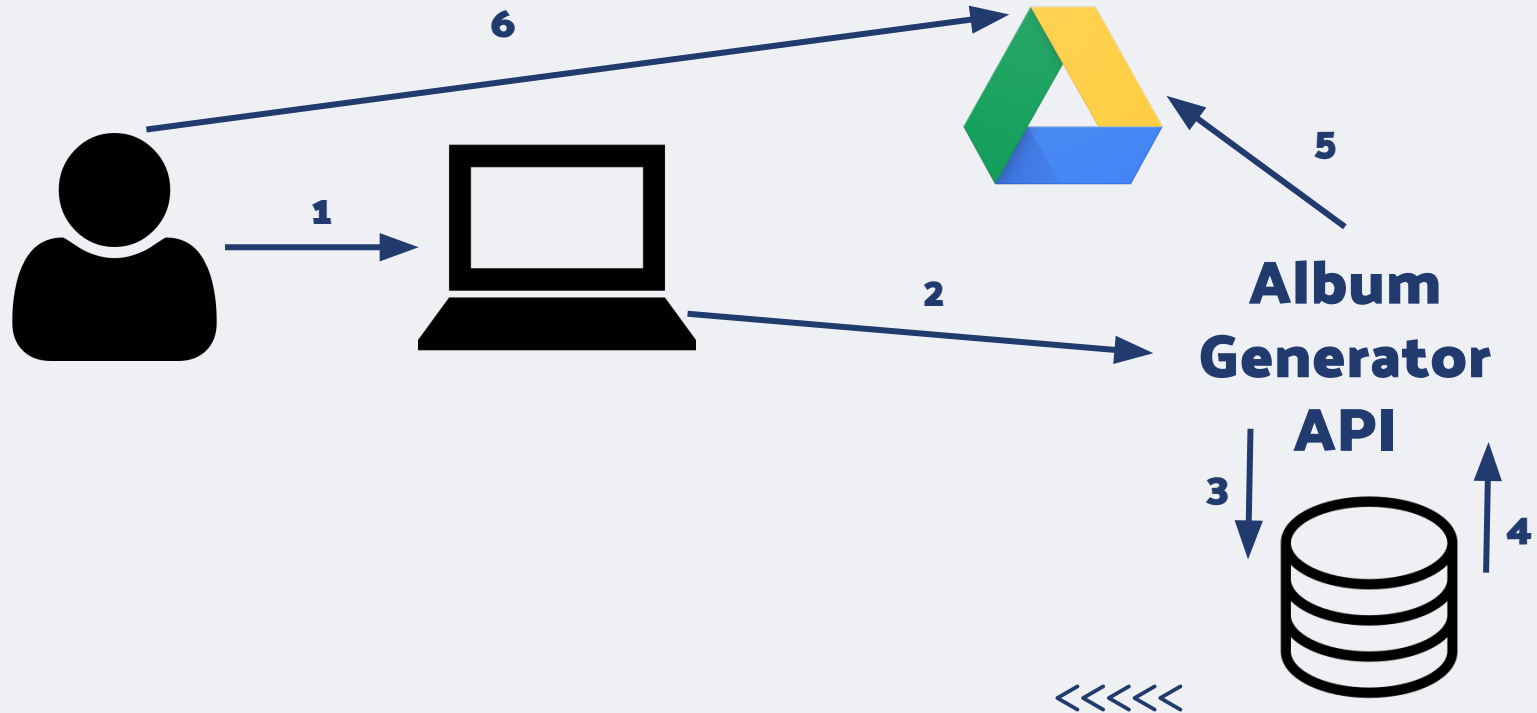
Authentication Tokens
Photo Ids
Photos



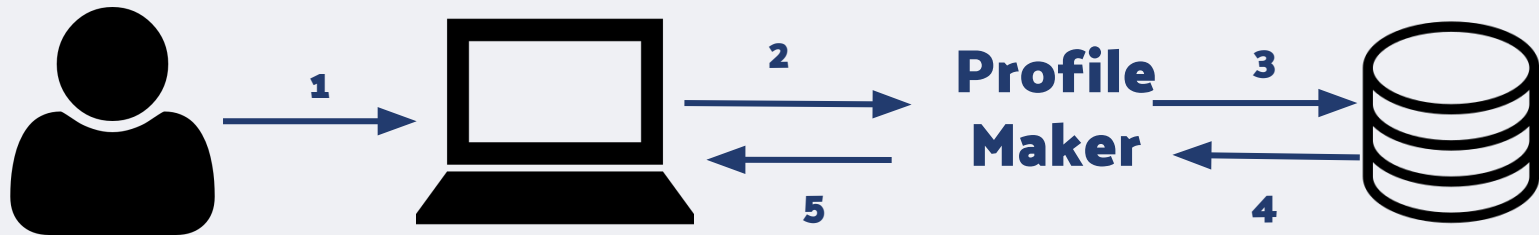
WORKFLOW: THE EXTRACTOR



WORKFLOW: ALBUM GENERATOR

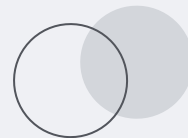


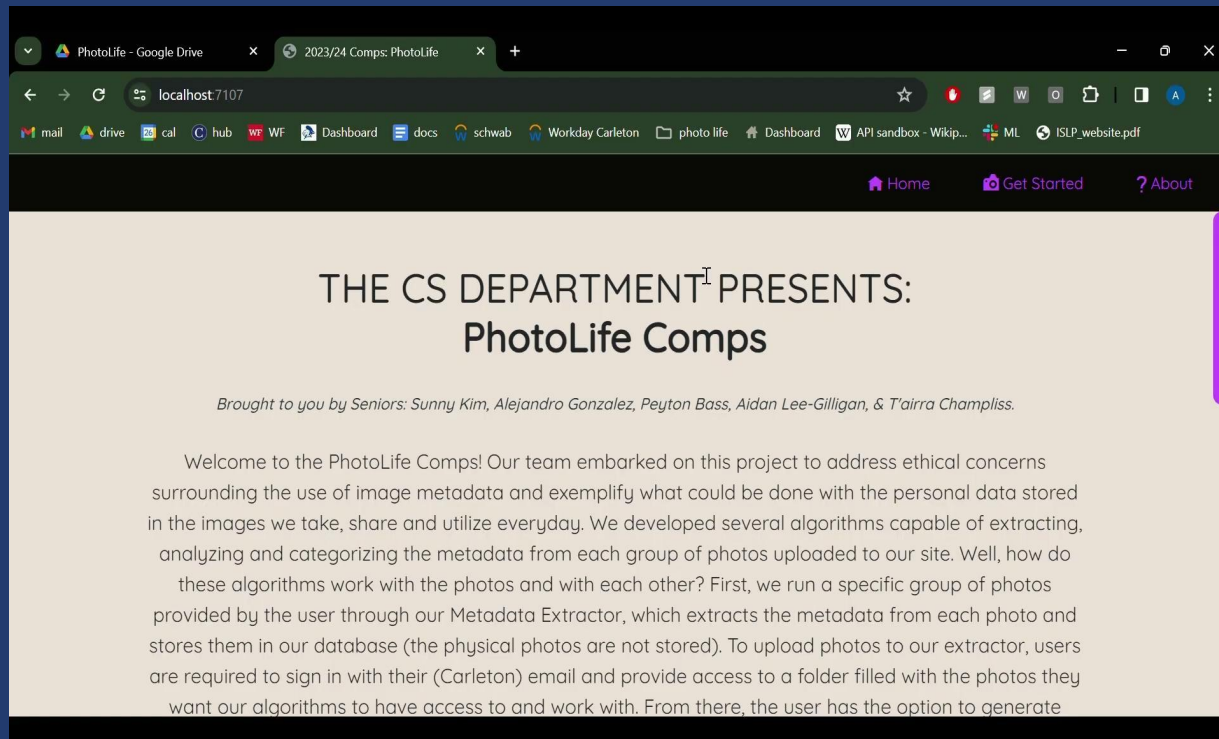
WORKFLOW: PROFILE MAKER





04
DEMO







05

ETHICS

ETHICAL GUIDELINES

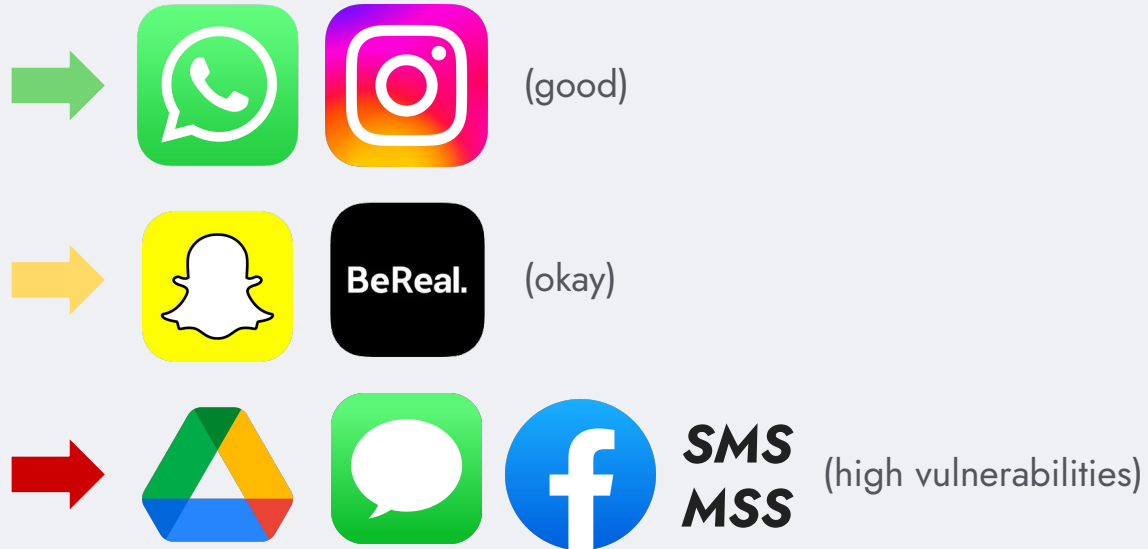
compiled from:atlan.com; Association for Computing Machinery; Santa Clara University; etc.

- ★ Prioritize user privacy and data protection
- ★ Only download what we need (the metadata, and not the photos themselves)
- ★ Delete data after use
- ★ Transparency w/ clear and concise information



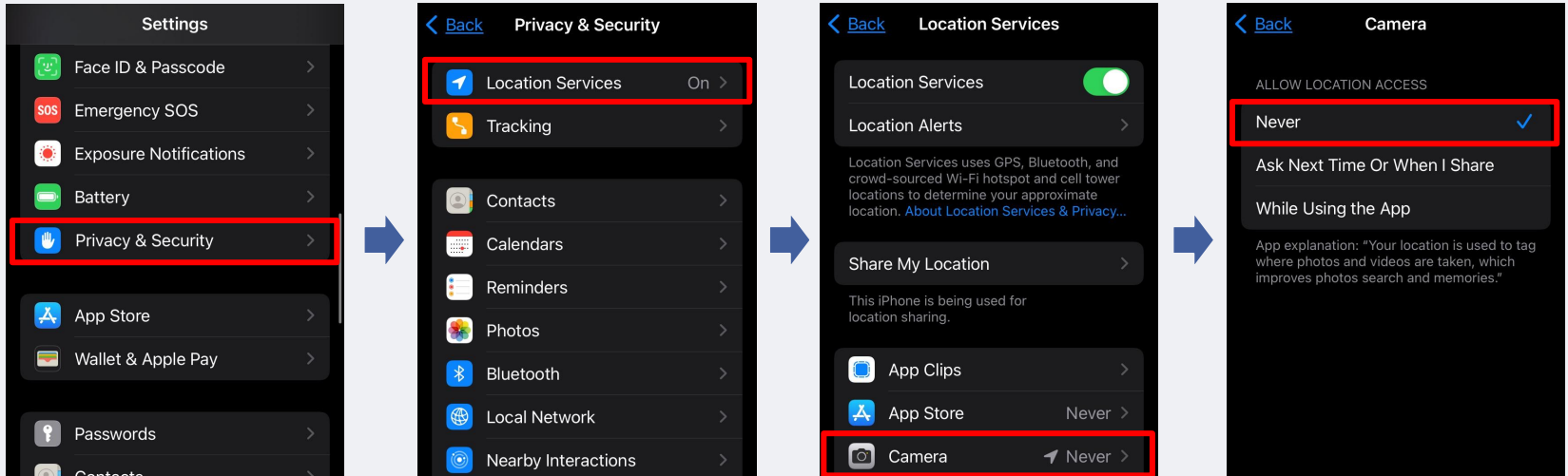
OUR RECOMMENDATIONS

- 1) Understand how the platforms you use store metadata on upload



OUR RECOMMENDATIONS

2) Turn off certain data settings that you **don't** want stored



For Location Geotagging on iPhones



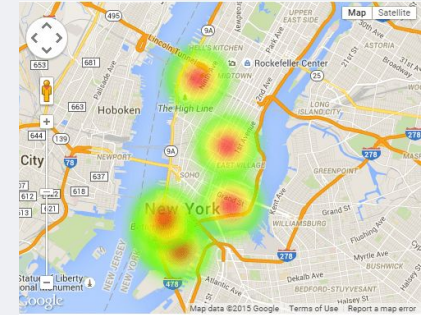


06

FUTURE DIRECTIONS

WHAT COULD COME NEXT?

- ★ Face Recognition
 - Who is in a photo?
- ★ Coordinates to Visual Map
- ★ Heat Map of Visited Locations
 - Behavior/Routines
- ★ Integrating Tags
 - Online Presence
- ★ Photo Libraries
 - What metadata is saved?
 - Policies/guidelines





THANK YOU

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