black hat EUROPE 2019

DECEMBER 2-5, 2019

EXCEL LONDON, UK

Simple Spyware

Androids Invisible Foreground Services and How to (Ab)use Them

December 2019

Who am I

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Let’s start with the latest privacy changes

Background Limitations

2017

Android Oreo

Background Sensor Access

2018

Android Pie

Background Location Access

2019

Android10

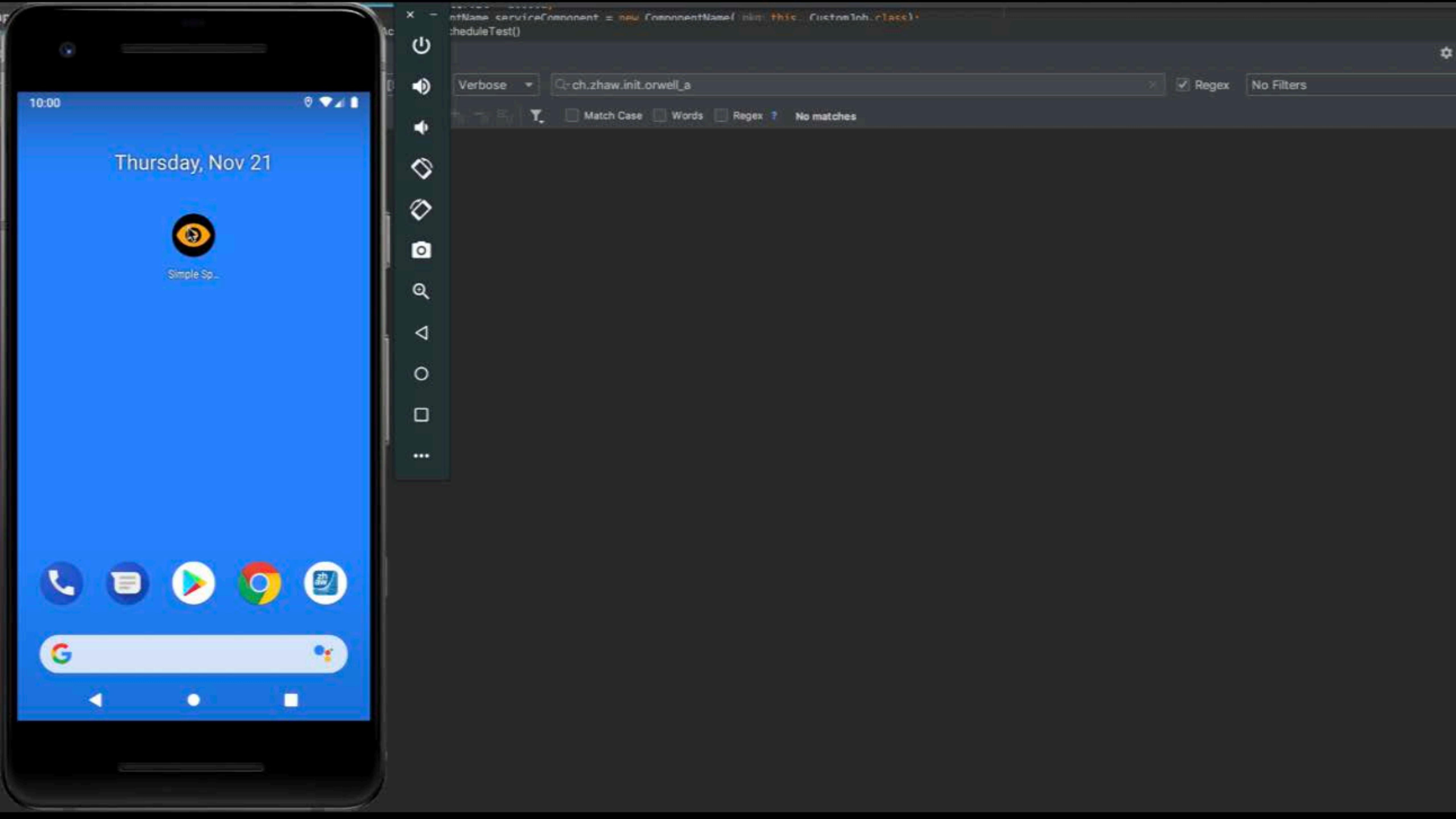
2020

...

LIVE DEMO

But that’s nothing new!

So what’s new?



```
ntName serviceComponent = new ComponentName( pkg: this, CustomJob.class);
:heduleTest()
```

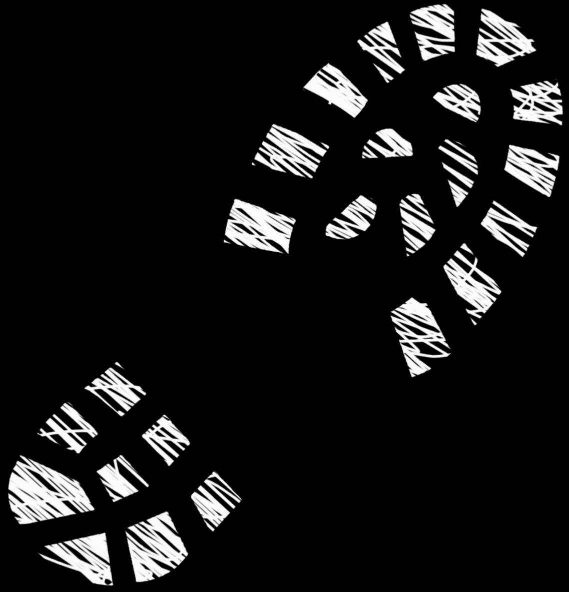
Verbose | ch.zhaw.init.orwell_a | ☑ Regex | No Filters

□ Match Case □ Words □ Regex ? No matches

First step

How to run stuff in Background?

Schedulers



Alarm Manager

Job Scheduler

Started by an app, but lives **outside** the **app lifecycle**.

Code – Job Scheduler

```
public void scheduleJob(){
    long interval = 1000 * 60L;
    ComponentName serviceComponent = new ComponentName(this, JobScheduler.class);
    JobInfo.Builder builder = new JobInfo.Builder( JOB_ID, serviceComponent);
→ builder.setPeriodic(interval)                     // Minimum is 15 minutes
→ builder.setOverrideDeadline(interval * 2);   // Sets the maximum scheduling latency
→ builder.setMinimumLatency(interval);         // Run after delay
   JobScheduler jobScheduler = this.getSystemService(JobScheduler.class);
   jobScheduler.schedule(builder.build());        // Schedule the job
}
```

JobInfo.builder

- → setPersisted(true);
- → setRequiredNetwork(NetworkRequest networkRequest)
- → setRequiredNetworkType(int networkType)
- → setRequiresBatteryNotLow(boolean batteryNotLow)
- → setRequiresCharging(boolean requiresCharging)

Second step

How to access the data?

Foreground Service

Forground Services

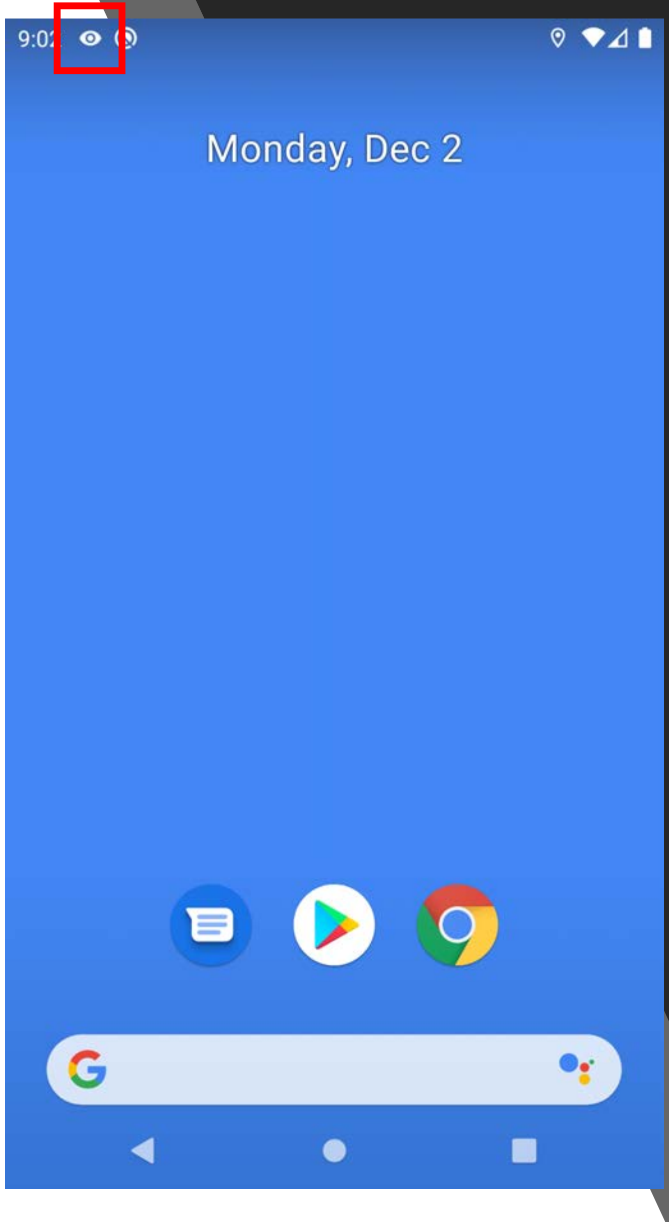
→ Needs to show a sticky **notification**

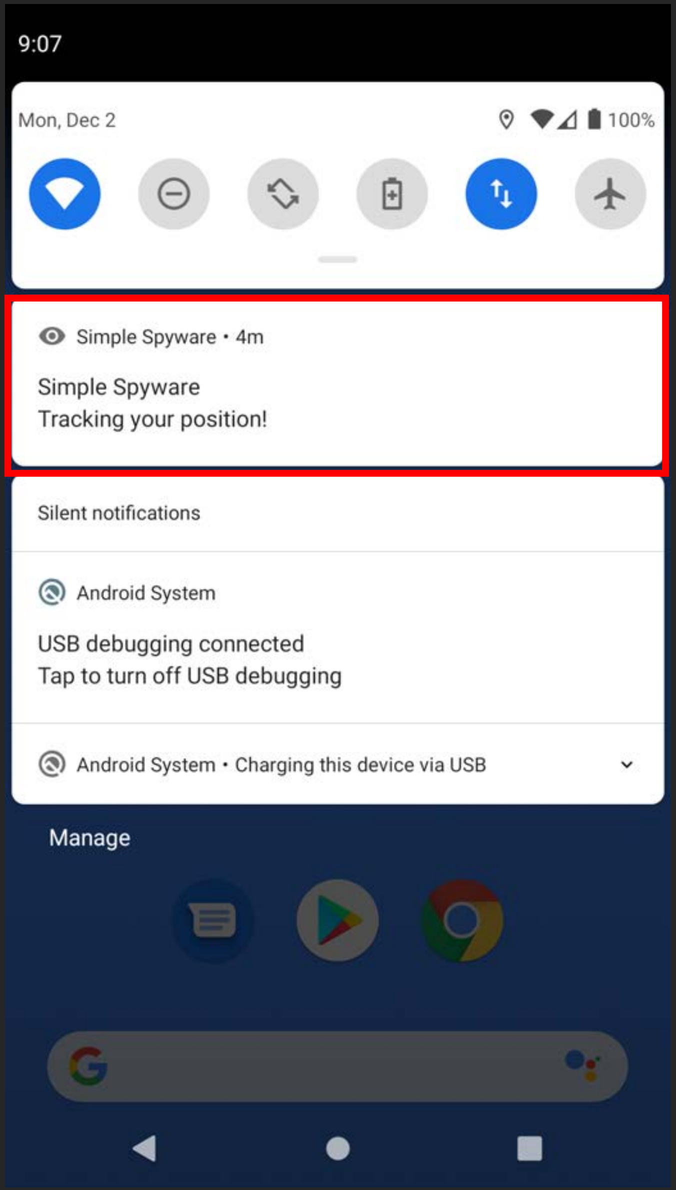
→ **Notification design is set by the app**

→ Can be started from **background** job

→ Do **not** have sensor limitations

→ Has to be started within a **5 seconds**





Simple Spyware • 4m

Simple Spyware
Tracking your position!

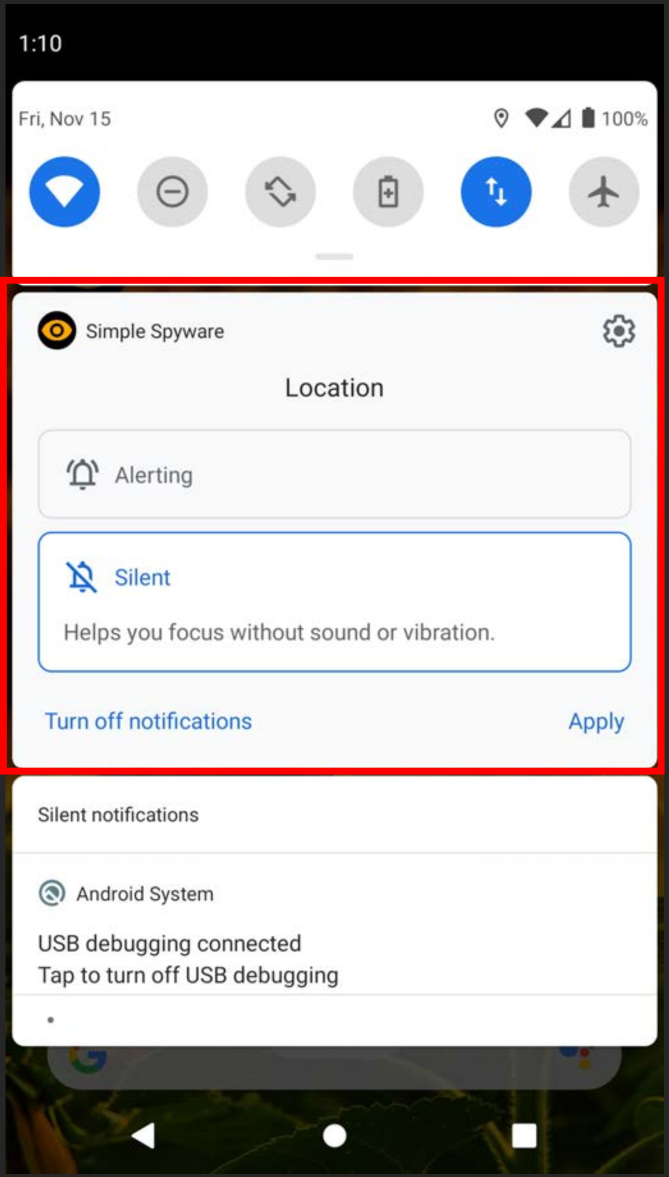
Silent notifications

Android System

USB debugging connected
Tap to turn off USB debugging

Android System • Charging this device via USB

Manage



Simple Spyware

Location

Alerting

Silent
Helps you focus without sound or vibration.

Turn off notifications   Apply

Silent notifications

Android System

USB debugging connected
Tap to turn off USB debugging

How to get rid of the notification?

We just **don’t…**

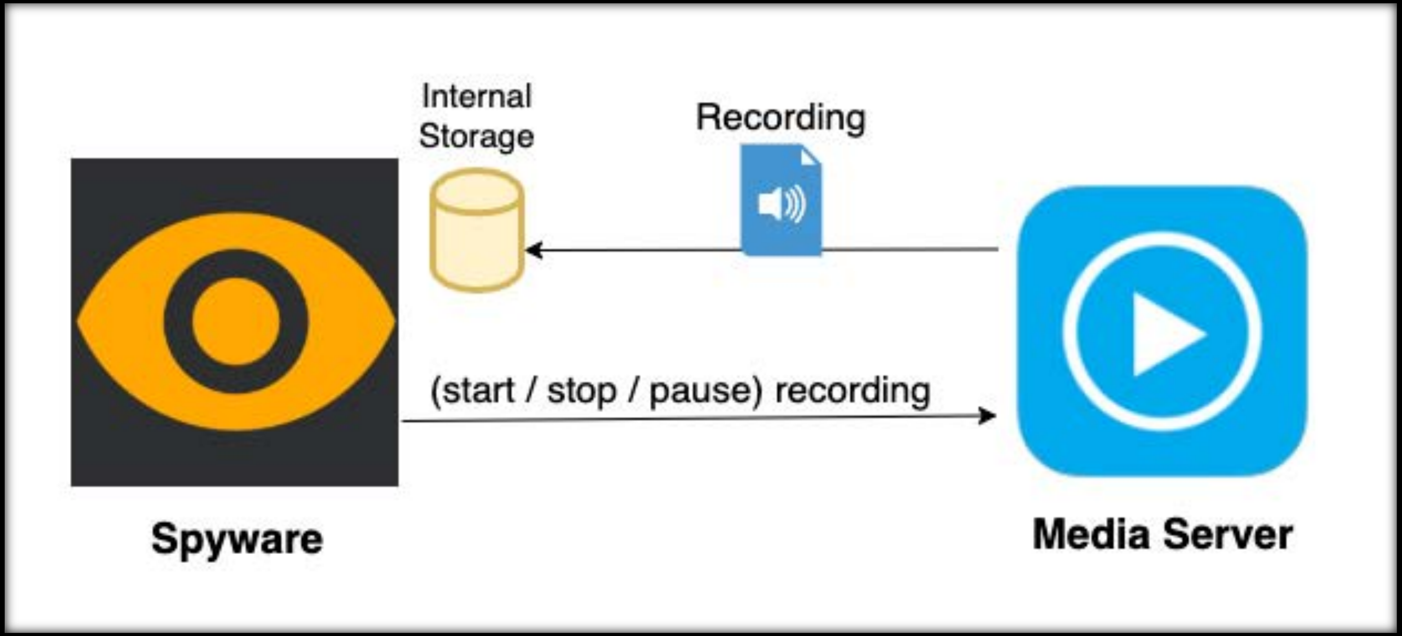
Code – Foreground Service:

```
@Override
public int onStartCommand(Intent intent, int flags, int startId)
{
     // ~4.9999.. seconds to call startForeground(...)
    Notification notification = createCustomNotification();
 → this.startForeground(1, notification) // Sensor access not restricted anymore.
    accessCamera();
    accessMicrophone();
    // … some malicious code
 → stopForeground(true); //Stop the service before notification is loaded
  return START_STICKY;
}
```

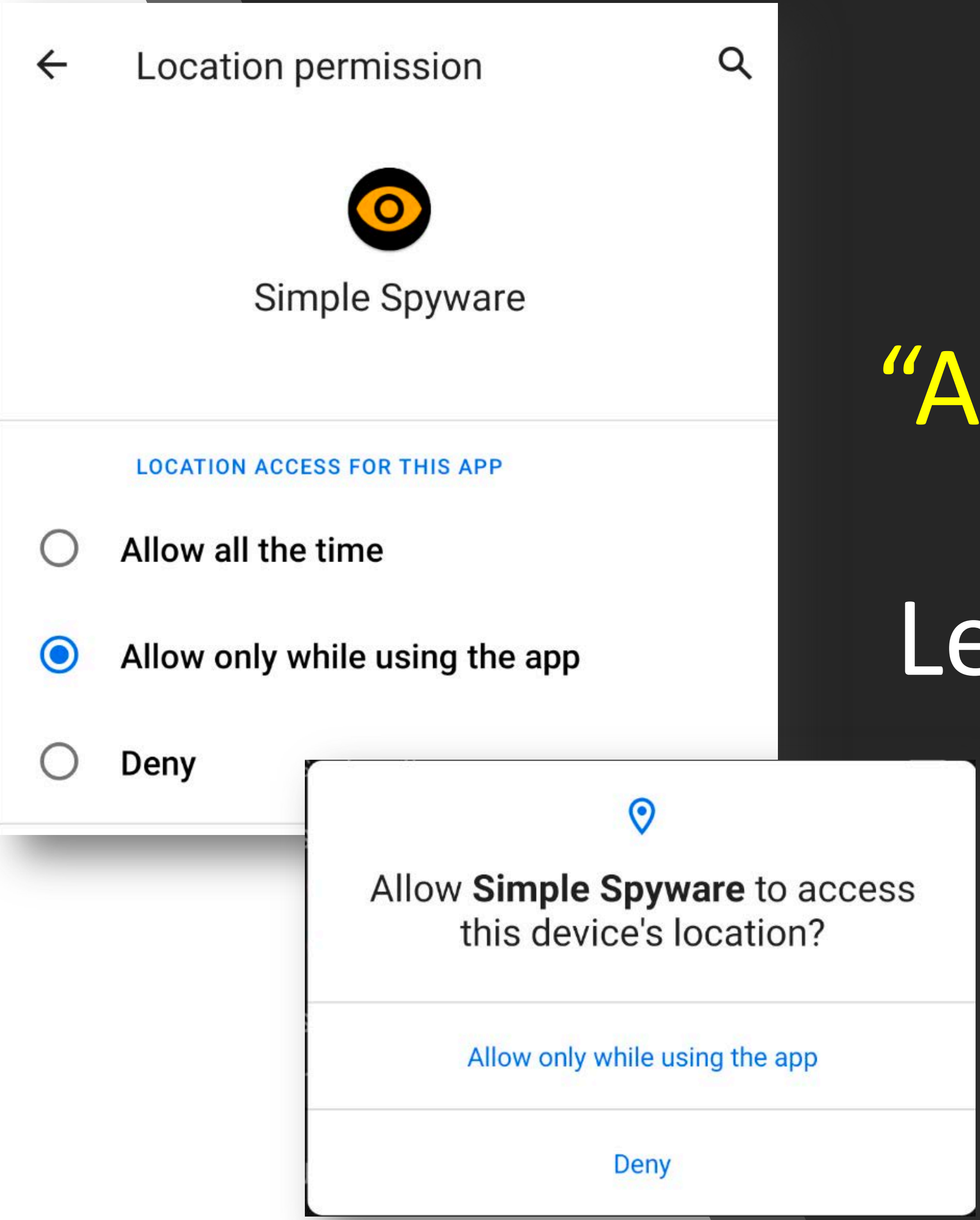
Long Running Tasks

→ MediaPlayer API

→ Apps do not run recording in their own lifecycle context.



Does this work on Android10 (Q)?



Location permission

Simple Spyware

LOCATION ACCESS FOR THIS APP

○ Allow all the time

● Allow only while using the app

○ Deny

Allow **Simple Spyware** to access this device's location?

Allow only while using the app

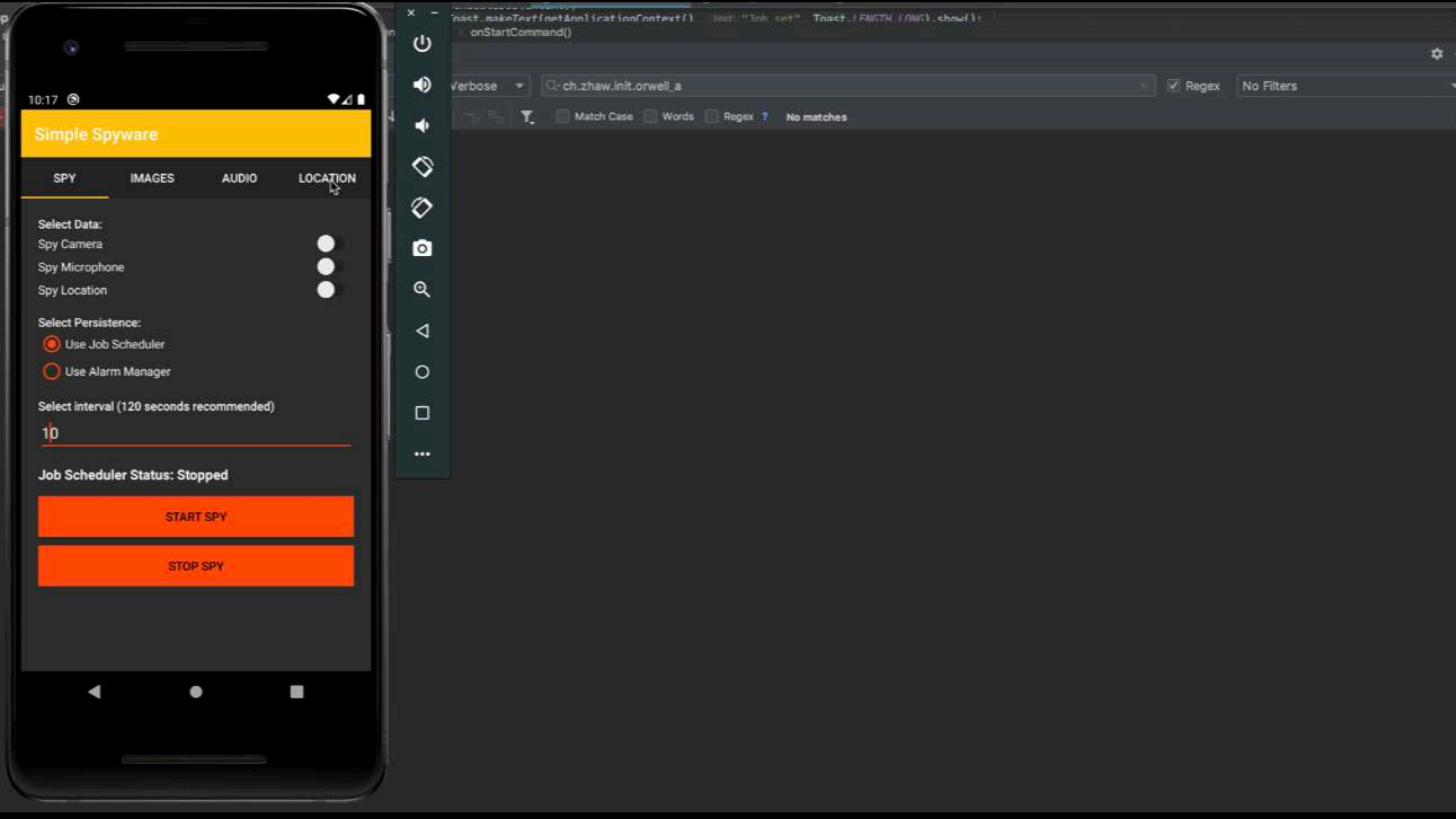
Deny

New permission level:

“Allow only while using the app”

Let’s track from “background*”

*sorry, I meant foreground



```
oast.makeText(getApplicationContext()  text: "Job set", Toast.LENGTH_LONG).show();
onStartCommand()
```

Select Data:
Spy Camera
Spy Microphone
Spy Location

Select Persistence:
● Use Job Scheduler
○ Use Alarm Manager

Select interval (120 seconds recommended)
10

Job Scheduler Status: Stopped

Conclusion

It’s a bug… no, it’s a feature!

Limitations

Timing

Access

Visibility

Permissions

Mitigation

→ CVE-2019-2219 – Patch is coming soon

→ Probably hard to **patch**, since as you have seen it’s a kind of a design problem as well.

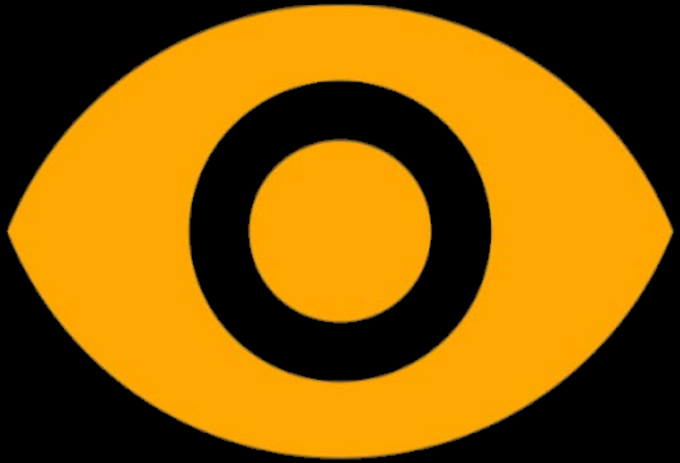
→ Security by visibility is a good idea, when it’s really visible

→ Some vendors have permission usage monitors

Takeaways

Stop Apps

Revoke Access



Demo

→ **Test:** Test yourself! Don’t worry, it’s safe :-D

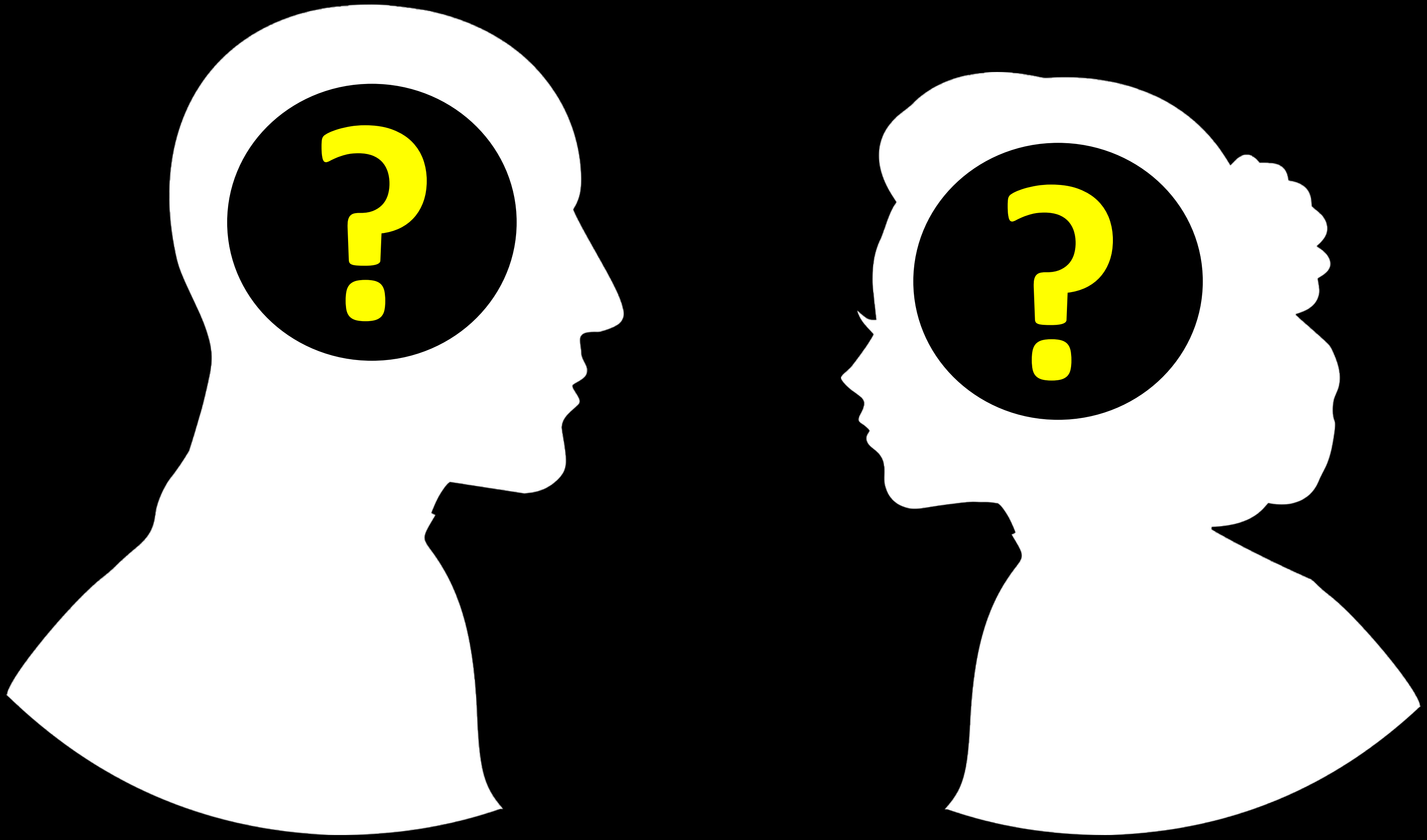
→ **Code:** https://github.com/7homasSutter/SimpleSpyware

→ **APK:** https://github.com/7homasSutter/SimpleSpyware/releases

I hope you enjoyed this short talk…

Thank you!

there is some more info in the appendix
and the whitepaper



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