



In a nutshell



Olivier Le Goaër



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Who I am?

Associate Professor in Computer Science (France)

➡ STEE College (Sciences & Technologies for Energy and Environment)



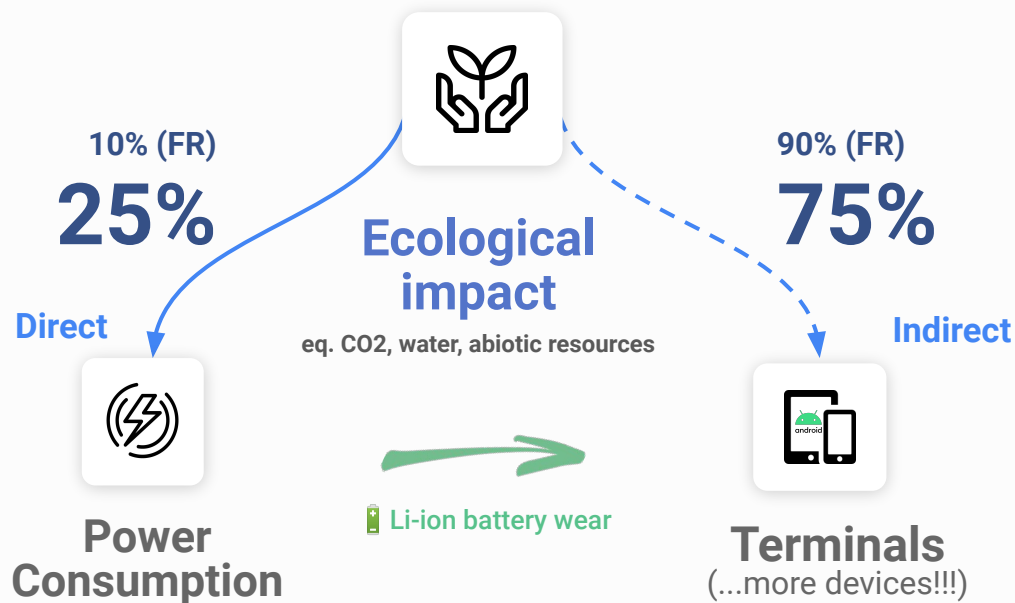
Research in the field of Software Engineering

➡ How to build “greener” software?

Teaching Android programming

➡ Online course (+130k views)

Context



Insights

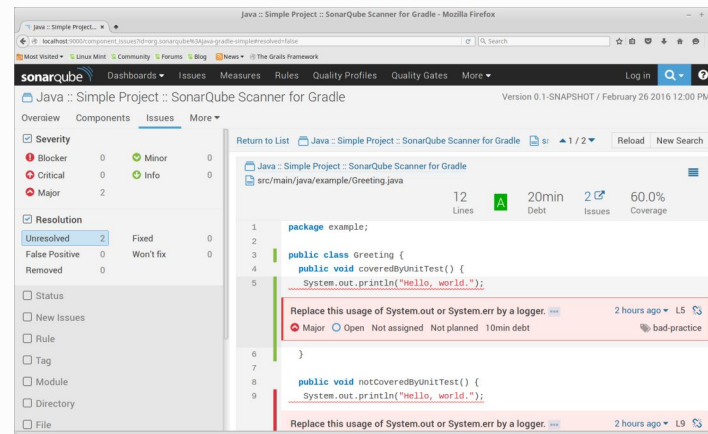
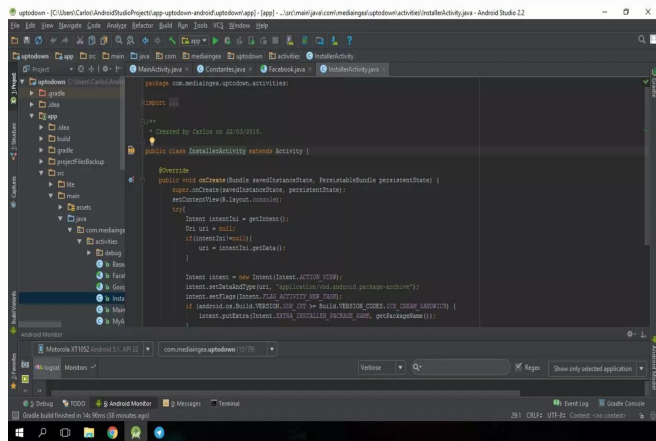
“Green code extends clean code with ecological concerns”

“Carbon debt adds to the technical debt”

“Mobile apps should have an eco-score (A to E)”



Motivation



android
studio



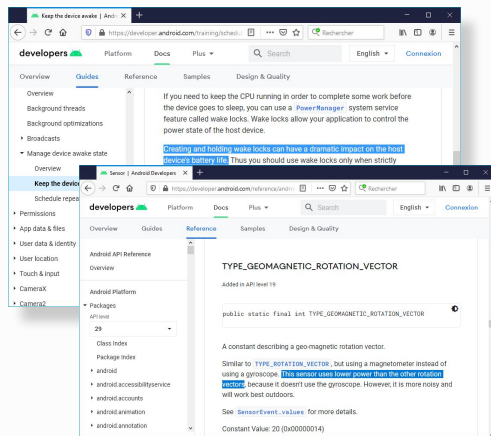
No guidelines on how to
write eco-friendly apps

sonarqube



World-class solution to
improve code quality

Energy code smells for Android



API Reference Documentation



Research Papers



Dev Interviews

Catalog of energy code smells

<http://olegoaer.perso.univ-pau.fr/android-energy-smells/>

OPTIMIZED API (2)

Fused Location, Bluetooth Low-Energy

LEAKAGE (3)

Media Leak, Sensor Leak, Everlasting Service

BOTTLENECK (4)

Internet In The Loop, Wifi Multicast Lock, Uncompressed Data Transmission, Uncached Data Reception

SOBRIETY (10)

Dark UI, Day Night Mode, Brightness Override, Thrifty Geoloc, Thrifty BLE, Thrifty Motion Sensor, Thrifty Notification, Vibration-free, Torch-free, High Frame Rate

IDLENESS (6)

Keep Screen On, Keep CPU On, Durable Wake Lock, Rigid Alarm, Continuous Rendering, Keep Voice Awake

POWER (4)

Ignore Battery Optimizations, Companion in background, Charge Awareness, Save Mode Awareness

BATCH (3)

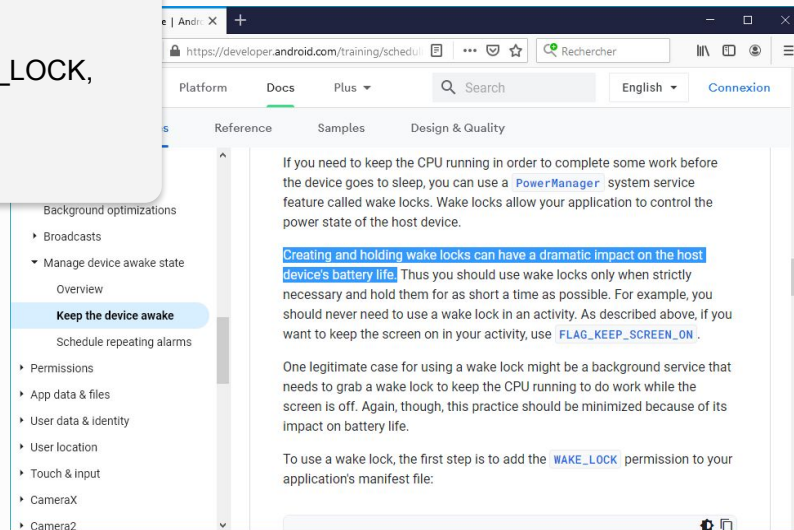
Service@Boot-time, Sensor Coalesce, Job Coalesce

RELEASE (8)

Supported Version Range, Same dependencies, Duplicate dependencies, Fat app, Clear Cache, Disable Obfuscation, Shrink Resources, Convert to WebP

Focus on *Keep CPU On*

```
PowerManager powerManager = (PowerManager)
getSystemService(PowerManager.SERVICE);
WakeLock wakeLock =
powerManager.newWakeLock(PowerManager.PARTIAL_WAKE_LOCK,
    "MyApp::MyWakelockTag");
wakeLock.acquire();
```



Highlights

- **Statically detectable**
 - Few green best practices resist to this “**great filter**”
- **Extended detection scope**
 - A native android project mixes **Java, XML, File System, Gradle***
- **Good and bad smells**
 - Albeit code quality tools are only focused on **bad smells**
- **Revamped User Interface**
 - Green code merits its own **user experience**

*Groovy script

Open Source Software

➡ Commitment to **digital commons**

- **Released as OSS** in January 2022 (formerly hosted by Green IT assoc.)
- <https://github.com/green-code-initiative/ecoCode-android>

➡ Attract **early-adopters**

- **Hackathon in Paris in June 2022** (60+ attendees)
- **Hackathon in Paris in April 2023** (100+ attendees)

Technical guidelines

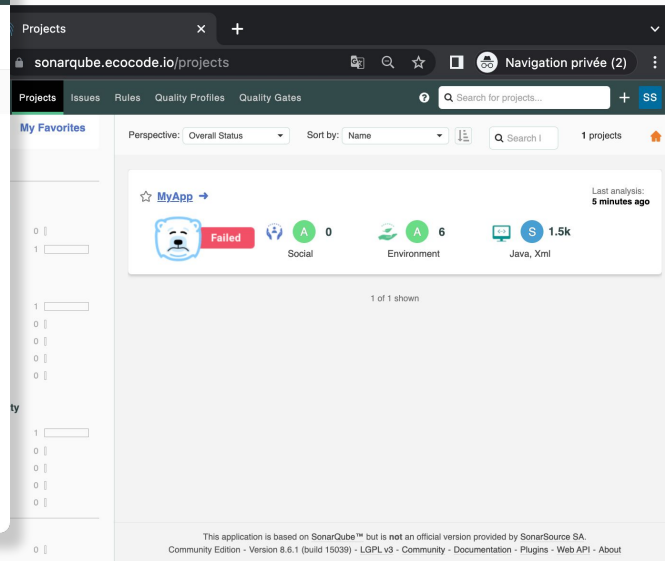
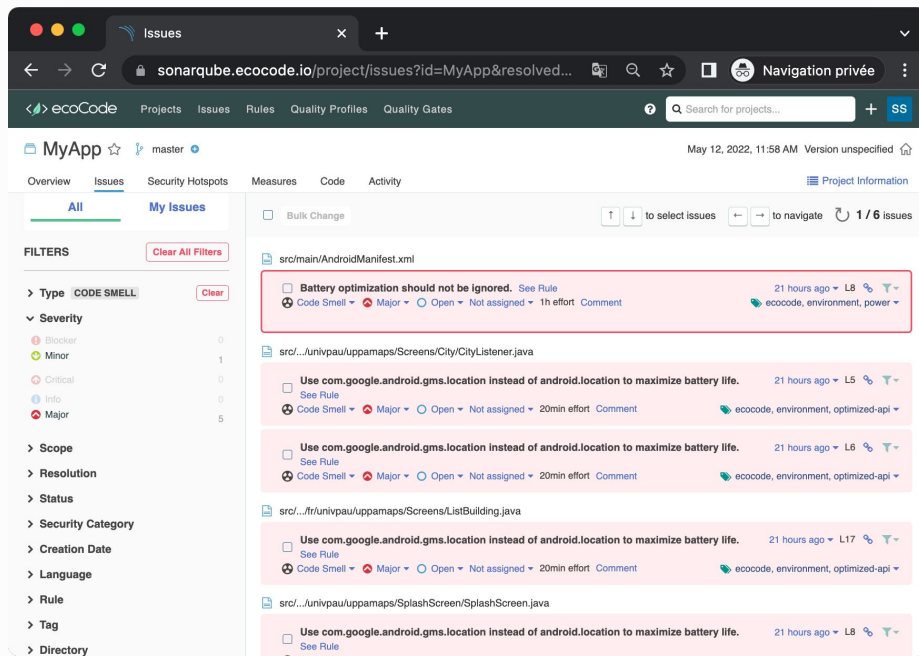
Currently



Soon



Screenshots



Related works



From **academic**



EcoAndroid [Ribeiro *et al.*, 2021]



E-Debitum [Maia *et al.*, 2020]



xAL [Fatimaa *et al.*, 2020]



aDoctor [Iannone *et al.*, 2020]



Green Android Lint [Le Goaer, 2019]



From **industry**



Green Software Insights [CAST, 2023]

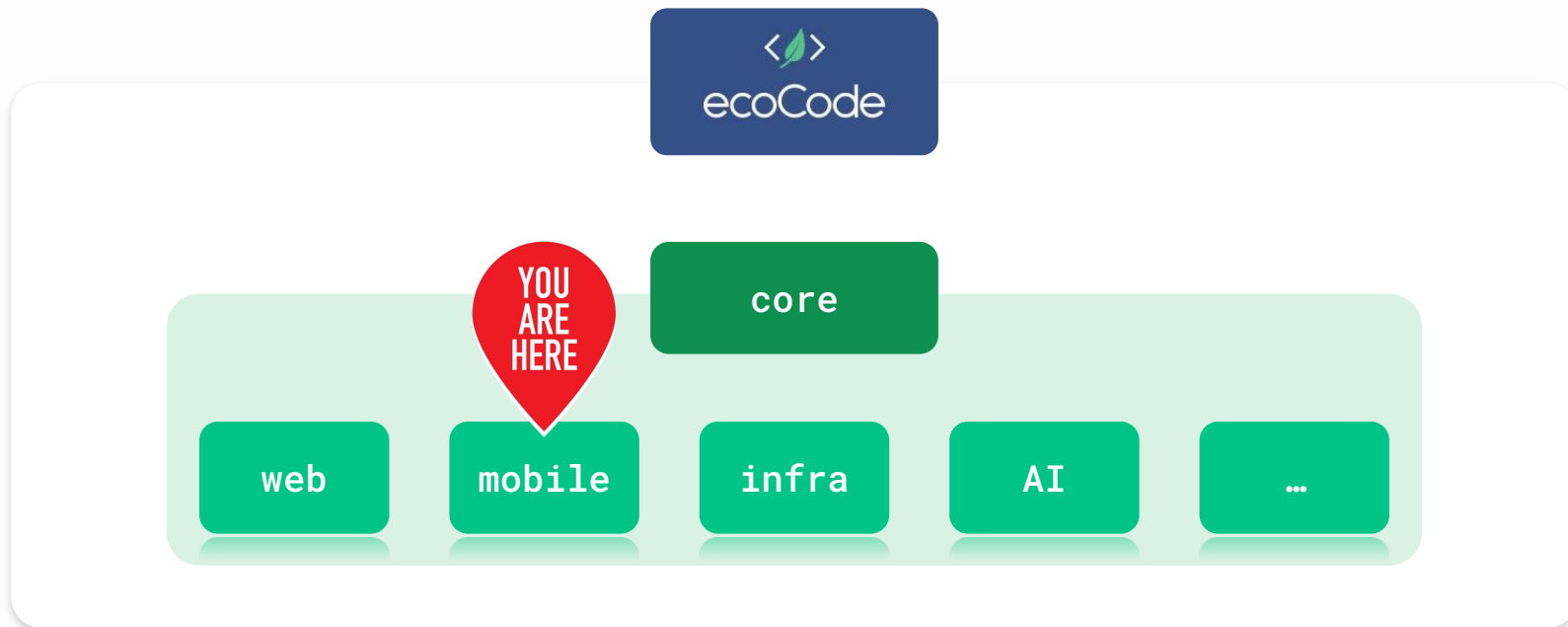


EcoSonar [Accenture, 2022]



Greensight Sonar [Capgemini, 2022]

Roadmap



Extended talk

DevFest Perros-Guirec (oct. 2022)



Questions?



rate this presentation



ekko, our mascotte



free demo tutorial