

“We may share the number of diaper changes”: A Privacy and Security Analysis of Mobile Child Care Applications

Moritz Gruber, Christian Höfig,
Maximilian Golla, Tobias Urban,
and Matteo Große-Kampmann

secunet

AWARE
full service awareness agency


if(is)
internet-sicherheit.



Childcare Apps

9:41 5

← PROFILE

 **James Davis**
Signed-In to Test Room

ADD ACTIVITY SIGN IN-OUT BILLING

All activities

Today, Nov 26

- NAP** 1:05 PM
Started nap at 1:05 PM
- BOTTLE** 11:55 AM
- BATHROOM** 10:30 AM
James's Wet diaper was changed
- SIGN-IN** 9:48 AM
By Jo Doe to Test Room
- MOOD** 8:07 AM
James was 😊 Cheerful

9:41 5

← Add Activity

PHOTO VIDEO LEARNING

MEAL NAP BATHROOM

BOTTLE MOOD MEDS

NOTE INCIDENT NAME TO FACE

OBSERVATION

VIEW TODAY'S LESSONS →


9:41 5

EXIT DEMO


Digital Day Care

Welcome! This is a fake class for you to explore - Look at posts, events, pictures - try posting yourself, all content in Demo Class is only for you, and will not show in your feed.

Feed Behavior Assignments Portfolios



UPDATES

 **Hana Lee**
Parent of Nora
Today 3 hrs ago - shared with Digital Day Ca...

With all of this rain we are having, the Lee family is dying to do something active. If anyone is around this weekend, we are headed to Skate King on Saturday. We will be there from 12:00-3:00 and we would love it if anyone w...

Read More Private Reply





Updates Messages Calendar Library Manage

9:41 5

← Messages

PARENTS STAFF

Search students...

-  **James Davis** 10:37 AM
Can you please arrive 10mins early, we need...
-  **Emily Miller** 10:36 AM
How is Emily doing today?
-  **Mason Williams** 10:34 AM
Don't forget to bring an extra box for the lunc...
-  **Emma Smith** 10:33 AM
Please remember the cooking lesson on We...

Childcare Apps

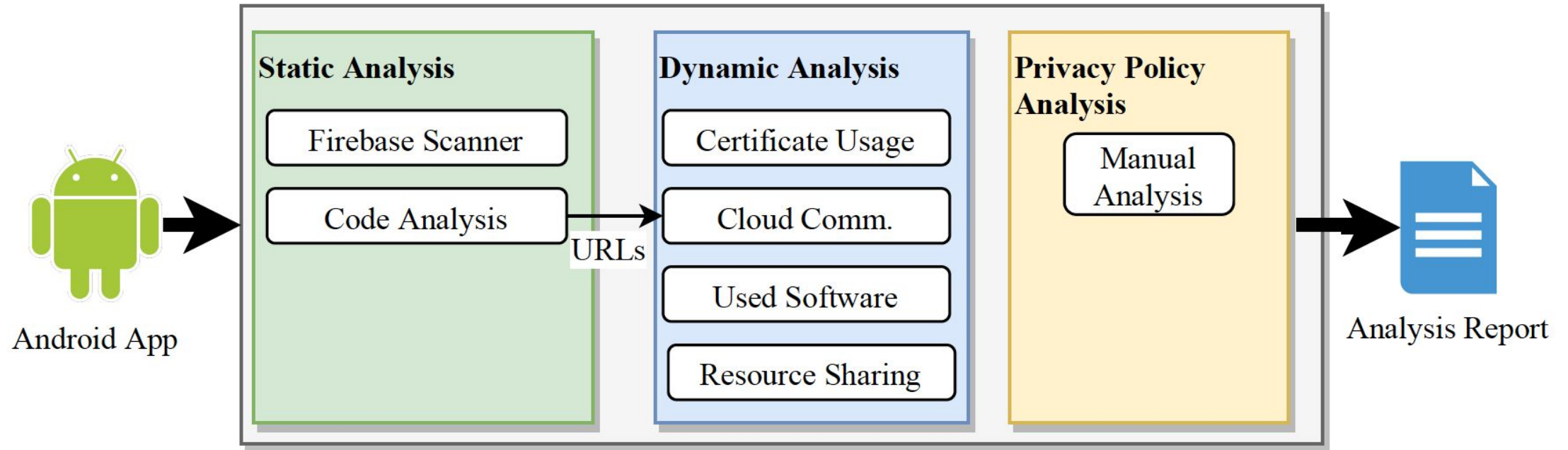
- We analyzed **42** child care Android apps
 - ❑ Apps identified through search queries
 - ❑ “Childcare app”
 - ❑ “Preschool management apps”
- Over **3 million** users of the analyzed apps

| App | Category | Installs |
|---------------|---------------|------------|
| 1Core Family | Production | 1,000+ |
| Bloomz | Education | 1,000,000+ |
| brightwheel | Education | 1,000,000+ |
| CARE Kita App | Parenting | 10,000+ |
| Cheqdin | Education | 1,000+ |
| Child Journal | Education | 5,000+ |
| Daily Connect | Education | 50,000+ |
| Educa Touch | Education | 50,000+ |
| Famly | Social | 100,000+ |
| HiMama | Education | 100,000+ |
| Hokita-Eltern | Communication | 500+ |

Children's Privacy

- Analyzed apps **process sensitive data**
 - ❑ PII (i.e., name, dob, address)
 - ❑ Behaviour (i.e., notes on development and activities)
 - ❑ Photos and videos
 - ❑ Current location
 - ❑ Health data
- **COPPA** and **GDPR** regulate the collection and processing of children's data

Analysis Framework



Privacy Policy Analysis

- We performed a **manual** analysis
 - ❑ Available tools fall short for **multi language** policies (~30% of all apps)
- Privacy policy analyzed from **Google PlayStore link**
- Privacy policy **mentions**
 - ❑ Processing of child data
 - ❑ Tracking
 - ❑ Data storing/sharing
 - ❑ Access to own data

Privacy Results

11 (26%) of the policies refer to the **website** or the **company**

14 (33%) do not **list the data stored** and **processed** by the app

Only 29 (69%) policies **mention** the processing of **minor's data**

Privacy Results

| App | Processing of Children Data | Tracking Mentioned | Data Sharing | Data Retention |
|--------------------|-----------------------------|--------------------|--------------|------------------|
| Hokita | ✗ | ✗ | no | no |
| KigaRoo | ✗ | ✓ | listed | listed |
| Parentzone | ✗ | ✗ | unspecified | yes without list |
| Daily Connect | ✓ | ✓ | listed | listed |
| Sandbox Parent App | ✗ | ✗ | listed | listed |
| Stramplerbande | ✗ | ✗ | unspecified | unspecified |
| LiveKid | ✓ | ✓ | listed | listed |
| Kaymbu | ✓ | ✓ | listed | no |
| HiMama | ✗ | ✓ | listed | no |
| Educa Touch | ✓ | ✓ | listed | no |

Client Security Related Findings

- **95%** of the apps did not use certificate pinning
- **98%** of the apps still support outdated Android versions
- **30%** of the used libraries are compiled in an insecure way
 - ❑ Missing Relocation-Flag (RELRO)
 - ❑ Missing Non-Executable Stack Flag (NX)
 - ❑ Missing Stack-Canary

Backend Security Related Findings

- 70% of backends use outdated software with known vulnerabilities (CVE)
- 10% of backends are vulnerable to critical vulnerabilities
 - ❑ SQL injection
 - ❑ GraphQL injection
 - ❑ Insecure Direct Object Referencing
- 12% of backends use insecure cloud storages
 - ❑ Photos and videos of children
 - ❑ Chat messages
 - ❑ User information

Takeaway and Recommendation



Most analyzed apps use some sort of vulnerable software and unclear privacy policies

Developers of child care applications need to be trained and made aware of their responsibilities



We need accessible guidelines and checklists that can be used by daycare facilities

Not using child care apps may ultimately lead to the use of unhealthy alternatives (i.e., WhatsApp)





Questions?

“We may share the number of diaper changes”: A Privacy and Security Analysis of Mobile Child Care Applications



There is a demand for instant communication



We need guidelines and checklists



Developers need to be trained and made aware

Moritz Gruber



@TobiunddasMoe

Christian Höfig



Maximilian Golla



@m33x

Tobias Urban



@_tobiasu

Matteo Große-Kampmann



@pizzahax