Home security with Raspberry PI

Idea

This project realizes a home security application with a Raspberry Pi. The Raspberry Pi hosts a Spring Boot application *(microservice)* which represents the core software part of this project. The Raspberry Pi is connected to a camera and a movement sensor and acts on a detected movements. The Raspberry Pi itself will host the microservice represented by a Spring Boot application which provides a REST-API for configuration purpose and push notifications to the connected clients. Also the microservice manages the connected sensors.

An android admin app allows the owner of the security domain to configure the system and to register users, who get notified if a security issue occurs. The by the owner of the security domain registered users will have the client app installed on their android devices which are capable of receiving push notifications sent by the microservice in case of an security issue.

The clients are registered on the *Firebase Cloud Messaging (FCM)* service provided by Google and will get the notifications pushed to them via this service. The microservice acts as the app server which manages the client apps which are part of the security domain. The microservice will register and unregister clients and pushes notifications to them.

Hardware

The main hardware is a Raspberry Pi 3 Model B which hosts the microservice and has a movements sensor and a camera connected to it. The hardware for the internet connection is already provided by the Raspberry Pi. No further hardware is needed.

Software

The main part of the software is the microservice implemented as a Spring Boot application which hosts the REST-API for the administrative tasks, pushes notifications to the clients and interacts with the connected sensors. The library *PI4J* For is used for interacting with the connected hardware. As a database a *MongoDB* server is used which holds the registered users, client applications and the recorded occurred security issues. A *Nginx* service is used as a reverse proxy to provide a secure SSL connection where the certificate is provided by *Letsencrypt-CA*. Docker is used to isolate the service from each other and to provide the possibility to deploy updates and upgrades for the database and spring boot application without the need to modify anything on the host.

The *Firebase Cloud Messaging (FCW)* service is used to push notifications to the registered clients of the users.

System infrastructure

The following images shows the main infrastructure of this application.