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Subject Area	Software Engineering - Core Systems
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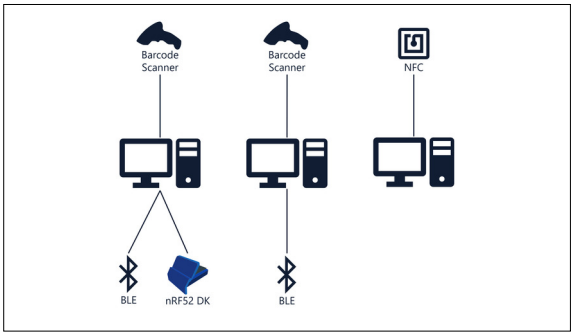
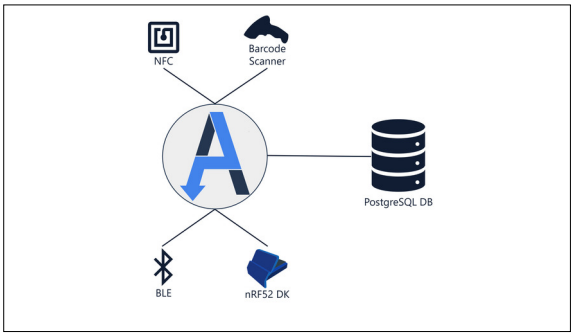
Airflash – Firmware Management for Temperature Loggers



Previous firmware update arrangement
Own presentment

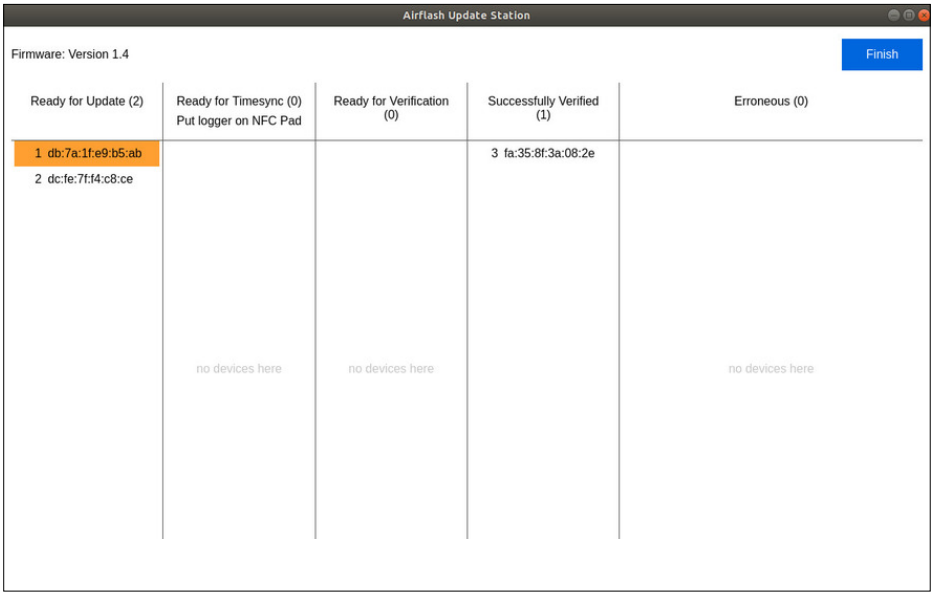


New firmware update arrangement
Own presentment

Initial Situation: MODsense is an IoT temperature logger manufactured by Modum.io AG to monitor the temperature of pharmaceutical shipments. To fix potential bugs or to add new features to the logger, the firmware can be updated using Bluetooth Low Energy (BLE). The firmware update currently involves three dedicated machines, each requiring human interaction. This leads to an error-prone and time-consuming process. Furthermore, the establishment of the loggers' traceability is laborious, making it difficult to check a logger's current firmware as well as its latest updates. The goal of this bachelor thesis is to re-engineer the whole update process and deliver a possibility to track the update history of all loggers in circulation.

Approach: The firmware update involved multiple technologies such as BLE and Near-field communication (NFC), so it was important to carefully gather requirements to get a big picture of the process. Moreover, the architecture was designed with many independent components, so individual hardware-dependent parts could be easily exchanged. This required an evaluation of different programming technologies to find the one that is best suited for the implementation.

Result: The results are two independent applications. The first application (Airflash Update Station) updates the loggers. It uses NFC for the user interaction and BLE to deploy the new firmware onto the logger. The second application (Airflash History Management) stores the history of the loggers and is used by the Airflash Update Station in the update procedure to constantly update the state of the logger. This provides traceability for Modum, fault tolerance in the case of an Airflash Update Station crash or process interruption and scalability.



Logger update interface
Own presentment