

CS217 Project Proposal: NDN Open mHealth Pilot Applications

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1 Introduction

Mobile health has emerged as both an important commercial market and a key area of Health IT, a national priority [1]. The Open mHealth team envisions that the Internet will interconnect data capture, secure storage, modeling and analytics, and user interface components to create a modular, layered framework. In [3], the Open mHealth architecture uses a data-centric hour-glass model, with the “thin waist” representing the storage unit and standardized data exchange. The focus on data exchange as the backbone of the application ecosystem makes Open mHealth an excellent network environment to both drive and evaluate NDN [2].

The NDN Open mHealth (omh) work started in Feb 2015, and is an ongoing collaboration between multiple NDN campuses [1]. The development of its driving application, NDNFit, is led by Haitao Zhang.

2 Plans and issues

The goal of this project is to provide a working set of application components for the NDN omh ecosystem, and in doing so, identify requirements for the architecture, and put new library features to test. For example, NDNFit application would be a customer for schematized trust [6], name based access control [5], link objects, and NFD-Android.

The following sections discuss the current progress, and the plans and a rough timeline for the next quarter.

2.1 NDNFit components

The major components and dataflow of NDN omh are shown in Figure 1. We expect there to be multiple instances of each component in the network.

Since last October, the authors have already implemented a prototype capture application NDNFit, an Android identity manager [4], and data storage unit (DSU)

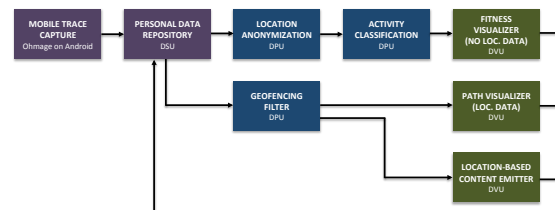


Figure 1: NDN omh components and dataflow [1]

using repo-ng. The work in this quarter was focused on access control design, and integration with data processing unit (DPU). Remaining key issues in both design and implementation are described in section 2.2.

2.2 Key issues and timeline

- Access control and user authorization implementation (Early Spring 2016)

Security's a primary concern for this application: user data should be available only to identities his authorized. The initial design uses name-based access control (NAC): for a user's data, the capture device functions as a producer (and group manager), the authorized DPUs function as both producers and consumers, and authorized data visualization units (DVU) as consumer.

The initial security design's already nailed down in the March 10 call, and our goal is to demo an initial implementation during the retreat. Functions outside of NAC library, such as DVU authorization (being able to read data in user namespace) and DPU authorization (being able to read and produce data in user namespace), would also need to be provided, which could happen at the start of Spring 2016.

- DPU and NFN integration (Early Spring 2016)

We intend to use NFN as one of the DPUs. On-

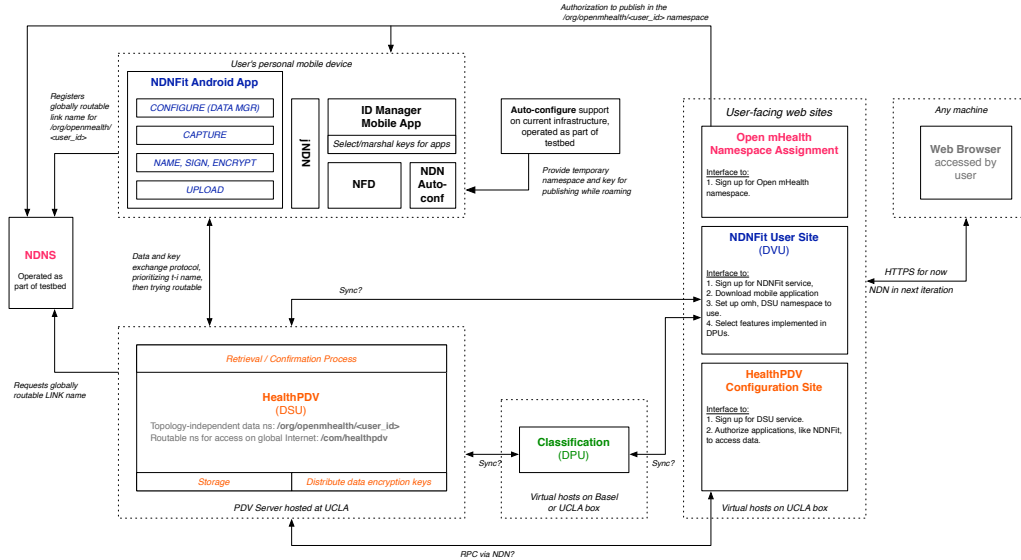


Figure 2: NDN Open mHealth application architecture

going discussion hasn't resolved the design issue of handling versioned data catalog in NFN, and potential name rewriting for NFN as DPU: essentially, the names used to trigger NFN function calls, and how much of NFN is exposed to the network are still being designed.

This is proposed as a Hackathon project. We hope to nail down the design at the retreat, and provide an implementation in early Spring 2016. While these issues are discussed, we are also planning to implement a simple DPU without NFN for the retreat to demonstrate NAC in action.

- DVU implementation (Early Spring 2016)

For now the visualization unit's viewed as a simple consumer. We already have prototypes, and a full implementation would happen in early Spring 2016. For demonstration purposes, a namespace visualization tool's also proposed in the milestone schedule document.

- Packaging and deployment (Late Spring 2016)

With the components (roughly described in Figure 2) functioning, we hope to make the system constantly available on the testbed, and package the tools (for example, the *Authorization Manager* application and website) for easy access of other participants wishing to join the ecosystem. Remaining design issues regarding link and NFN integration should be resolved before this stage. We would

expect to reinspect the assumptions we made, and go through further iterations at this stage.

- System evaluation (Late Spring 2016)

With more participants in the system, we hope to evaluate the system's availability and robustness, update the write-up, and get ready for NP projects' public demonstration. Further design iterations would happen at this stage, and depending on the progress, other topics such as namespace privacy could be explored.

References

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- [5] YINGDI YU, ALEXANDER AFANASYEV, L. Z. Name-based access control. Tech. rep.
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