Medical Dispenser @ Trine University

Matthew Bounds, Keegan Canny
Advisor: Dr. Mahesh Khadka, Ph.D
Trine University, One University Avenue, Angola IN 46703
In association with the AWS Foundation, Benchmark Human Services, and Innovation One

Introduction

In health and medicine, having the most up-to-date information is vital for the safety and well-being of clients. In assisted living homes, however, physically visiting every location to confirm patients have taken their medication isn't always practical--or possible. As such, Benchmark Human Services reached out to the University to develop a solution that would allow the company's direct support professionals (DSPs) to check customers' medication records remotely. Since 2018, the University has facilitated this partnership through Innovation One; our phase of the project involves designing a software component to interface with the company's Livi dispenser units.

Figure 1: Container cabinet for Livi unit. Developed by Nicholaus Giese, Houston Lehman, Nikola Medich, and Austin Nault (Senior Design 2018-19.)

Requirements

Benchmark's requirements for the system are as follows:
- The software shall provide Benchmark employees access to customers' medical records and schedules through their personal Livi units.
- The software will authenticate users with an external API, and should not store any user information locally.
- The software must comply with the Health Insurance Portability and Accountability Act (HIPAA); i.e. all communication the software sends must be reasonably encrypted.
- The software must be device-agnostic and accessible from any location with an Internet connection.

Methods and Modules

The first step in designing the software solution was crafting an SRS document to summarize Benchmark's requirements and outline how their needs should be met. This SRS was completed in October and approved by the company in November, allowing us to begin development proper the following semester.

In order to adhere to Benchmark's requirements, we developed the software solution as a web page. The majority of the web infrastructure was programmed in PHP and Javascript, utilizing the JQuery library to communicate with Benchmark's server-side API.

Due to our inability to access Benchmark's servers directly, we focused on replicating their databases' expected behavior on local machines using SQL.

Figure 2: Login page and welcome page.
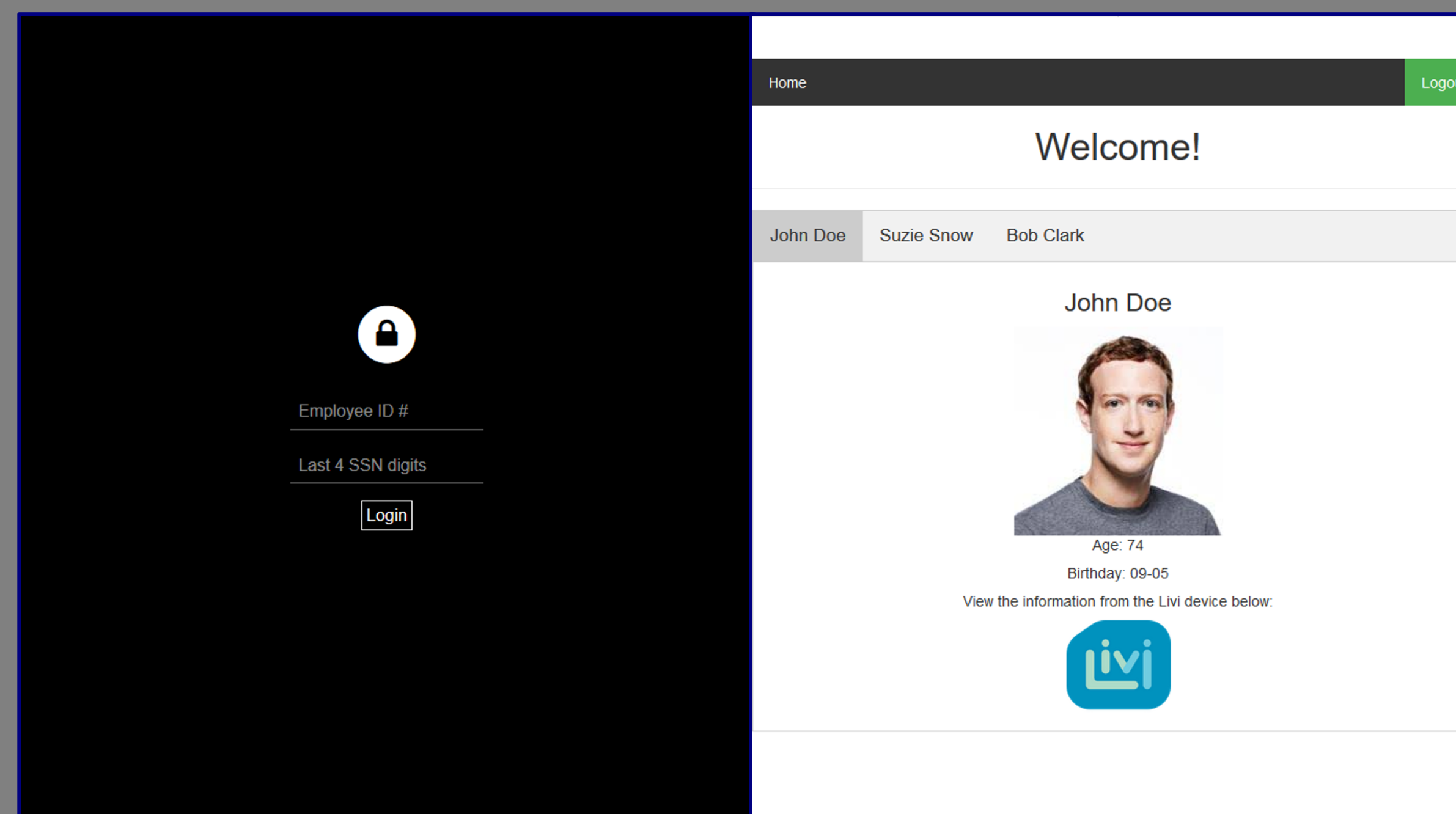
Integration Testing

Due to communication difficulties and workplace disruptions as a result of the ongoing COVID-19 pandemic, several functionalities have yet to be implemented on Benchmark's server. Because of this, the software is not yet able to communicate and exchange data with the API, nor with the company's databases.

Progress

Though some features remain unimplemented due to unforeseen delays, we have completed our design document and made significant progress in constructing the software. Of the 15 requirements outlined in the SRS, 11 of them have been completed; the remaining 4 are unimplemented due to the aforementioned server issues. Though we are unable to communicate with Benchmark's server, we have fully emulated their requested features on our local SQL infrastructure. Benchmark has also rescinded their requirements for certain features related to Medical Administration Records (MARs), which has required us to change the software accordingly.

Future Roadmap

Our work is one part of a larger whole; our role was to complete the specifications for the software component, and lay the groundwork for its construction. Though we were unable to complete the software outright, we implemented many of its required functionalities and set a good foundation upon which future teams can build. Once Benchmark (and the world) return to normalcy, we expect swift progress on this partnership.

Acknowledgements

We would like to thank the following for their guidance and support throughout this project:
- Trine University and the Allen School of Engineering
- Dr. Mahesh Khadka, Ph.D
- Jason Blume and Innovation One
- The AWS Foundation
- and Benchmark Human Services.