

Despite America being one of the richest countries in the world, an estimated eight million of its aging citizens face the threat of hunger (World Bank, 2019; NCOA, 2015). Meals on Wheels is America's oldest and largest organization dedicated to mitigating this issue through community chapters (MOWA, 2019). The non-profit's local chapter delivers meals to disabled or elderly people in the Charlottesville-Albemarle area who cannot cook or buy food themselves. With the help of volunteers, the organization packs, labels, and distributes meals to customers via various delivery routes. In addition, volunteers drive a few shuttle routes to deliver meals to locations outside of the Charlottesville-Albemarle area (A. Dudley, personal communication, September 27, 2019).

A small team of paid staff administers Charlottesville's Meals on Wheels chapter by managing delivery routes, maintaining current and prospective customer information, and ensuring that all daily jobs are filled by at least one volunteer (S. Bayker, personal communication, September 13, 2019). These administrative tasks can get rather complex due to a combination of daily, weekly, biweekly, monthly, and one-time volunteer shifts and customer needs. Also, most of the meals delivered are sourced via donation, which makes predicting supply difficult.

The greater U.S. Meals on Wheels organization sells professional software to help staff manage the complexity of their tasks; however, the Charlottesville office cannot afford it (A. Dudley, personal communication, October 11, 2019). Thus, staff managed volunteers, customers, and routes by hand until approximately three years ago, when a University of Virginia computer science capstone team created a web portal for them. Adopting this web portal gave Meals on

Wheels' staff more time to focus on essential tasks by automating physical reports and tedious manual tasks.

A subsequent capstone team updated the web portal to its current state, but Meals on Wheels' staff still desires improvements. First, staff complained that the web application has become increasingly slow over time. After examining the current codebase, we believe this slowness is likely due to its cluttered, unclear data storage and the use of an inexpensive hosting solution. Second, staff identified several organizational oddities within the app layout, making some tasks take longer than necessary. Finally, staff requested the addition of new features, including historical report generation and general search functionality.

It is clear that the system needs an update; however, the technical debt¹ accumulated by the separate capstone teams developing features over a two-year period necessitates a rewrite. Our capstone team's goal, therefore, is to write a new application that satisfies Meals on Wheels' needs and has a more reasonable and maintainable backend for long-term deployment, including state-of-the-art modularity via Docker, normalized database models², and cost-effective cloud deployment via Amazon Web Services. By redesigning and modernizing from the ground up, our project should enable Meals on Wheels to operate at lower costs and function more quickly; the organization should have more time and money to help customers in need. We aim to provide a minimum viable product including features such as account creation, assigning volunteers to routes, and volunteer substitution by the end of the current year. We plan on releasing the complete, working product by May 2020.

¹ According to Allman (2012), technical debt is "when engineers take shortcuts that fall short of best practice."

² Normalization is the process of organizing a database to eliminate redundancy and inconsistent dependency. (Microsoft, 2017)

Requirements for a Minimum Viable Product

- All Users
 - As a user, I should be able to create my own account (including custom username), so I can log in and see personalized information.
 - As a user, I should be able to request to change my password in case I forget it.
- Volunteers
 - As a volunteer, I should be able to release my route on a day, so someone else can substitute for that job.
 - As a volunteer, I should be able to pick up a released route on a particular day, so no routes go without a volunteer.
 - As a volunteer, I should be able to pick up a new route that has not been assigned to any volunteer, so I can plan my hours in advance.
- Staff
 - As staff, I should be able to create clients, so I can accommodate a growing client base.
 - As staff, I should be able to generate reports, so I can prepare daily operations.
 - As staff, I should be able to manually create delivery routes, so I can customize the volunteer's tasks.
 - As staff, I should be able to manually delete delivery routes, so I can avoid cluttering the portal with unused routes.
 - As staff, I should be able to assign volunteers to recurring routes, so I can plan delivery.
 - As staff, I should be able to substitute one-time volunteers for jobs, so I can ensure that all necessary jobs are filled.
 - As staff, I should be able to release volunteers from their recurring routes, so I can assign another volunteer to the recurring route.
 - As staff, I should be able to one-time release volunteers from their routes, so I can allow other volunteers to substitute.
 - As staff, I should be able to print reports that have been generated by any staff, so can have physical report copies.
 - As staff, I should be able to see who is volunteering on a particular day, so I can stay organized and communicate as necessary.

References

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