

A Web Portal for the Greater Charlottesville Area Development Corporation

Albert Borges
University of Virginia
aeb3bs@virginia.edu

Austin Farquhar
University of Virginia
alf2fr@virginia.edu

Tyler Crawford
University of Virginia
tjc4jc@virginia.edu

Evaristo Koyama
University of Virginia
ek4ks@virginia.edu

Nathan Thillairajah
University of Virginia
nkt7hr@virginia.edu

Mamadou Diallo
University of Virginia
mdd4vn@virginia.edu

Scott Mallory
University of Virginia
sam4ku@virginia.edu

ABSTRACT

In Charlottesville and Albemarle County, 18 percent of families do not make enough money to pay for the essentials of life such as food, shelter, clothing and utilities, as well as the added costs associated with working, including child-care and transportation [6]. In order to secure and retain a quality job, low-income individuals often need support from multiple sources, including skills training, childcare, transportation, health care, and stable affordable shelter. The Greater Charlottesville Area Development Corporation (GCADC) works to "reduce unemployment and underemployment, and eliminate poverty [in Charlottesville, Virginia]" [6]. In order for a given person to obtain a job, they may need a number of resources: transportation to and from work, child care while they are working, appropriate clothing to wear while working, and training to perform their job. GCADC evaluates the needs of such individuals and, by coordinating with existing nonprofits, ensures that the individuals have what they need to obtain and retain employment. With the partnership of GCADC and the Service Learning Practicum at the University of Virginia, our technical team developed a Django-based web portal to allow multiple non-profit organizations to coordinate assistance to individuals who are seeking employment. Our web portal has greatly improved the operating efficiency of GCADC and provided these non-profit organizations with more streamlined information about the job seekers they are assisting.

1. INTRODUCTION

The Greater Charlottesville Area Development Corporation (GCADC) is a non-profit organization that helps locally unemployed individuals find jobs, and additionally helps employed individuals find better jobs than they currently have. GCADC evaluates the needs of these individuals and coordinates with existing non-profit organizations to meet these needs. Individuals have a wide range of needs including transportation, child care, training, and even finding appropriate work attire [1]. To provide assistance, GCADC partners with local "peers" who fill out a survey on behalf of the job seekers in order to determine these areas of need. The actual job seekers themselves are prevented from directly filling out the form in the interest of accuracy - they will

often under-exaggerate their level of need to avoid shame or embarrassment [6]. These assisting peers are often members of the local community, most commonly church volunteers or educators. Once these peers have identified areas of need for the job seeker by reading from a script and filling out the survey, each individual non-profit organization can assist the seeker with one of these areas of need. In the Charlottesville Albemarle area, over five thousand families, or 18 percent of all families, cannot afford to pay for the combination of the basics of life and working costs - so the GCADC plays an important role in the local community [1].

Before the deployment of our web portal, the GCADC allowed peers to conduct candidate surveys through a Google Drive Form in order to assess the needs of each individual. However, the results from these surveys were sent to a complicated spreadsheet, making it difficult for each assisting non-profit organization to gather relevant information. Each of these assisting organizations needs to be able to view all of the job seekers they are currently assisting, as well as a list of job seekers needing assistance with matching needs. In addition, it is difficult for GCADC staff members to keep track of all current job openings and assisting organizations. [1]. Communication amongst peers and providers also required significant effort - peers used to have to constantly check to see if a given provider had met with a job seeker yet to provide assistance. There was also no notification system in place, meaning that staff must watch the spreadsheet in order to provide updates to providers and peers. As previously described, this system was not ideal due to the inefficiency of manual data input and lookup, in addition to a lack of customizability for providers. Furthermore, there was a lack of privacy, as all providers could see confidential information of all job seekers in the spreadsheet.

In order to address these deficiencies, our technical team developed a web portal to allow providing non-profit organizations to coordinate assistance to job seekers. This project is one of many under the University of Virginia Computer Science Service Learning Practicum (SLP), which allows students to develop software for local non-profit organizations. Service Learning Practicum - beyond filling a senior thesis requirement for Computer Science majors - offers many educational and social benefits. With only five percent of computer science students joining non-profit organizations after

graduation, SLP allows students to see firsthand that the nonprofit sector offers significant and rewarding opportunities [5]. In 2012, after conducting the quasi-experimental evaluation study on 214 college engineering students, Sevier and coauthors concluded that a service learning approach to education was "significantly more effective than the NSL [non-service-learning] method in terms of positively influencing students' interest, recognition of relevance, and satisfaction in learning" [2].

2. BACKGROUND

In order to ensure the most optimal product was developed for GCADC, we utilized a combination of agile development with the Django framework. An agile approach, which is a software development methodology where emphasis is placed on collaboration and continuous planning, testing and integration was employed to best accommodate our seven person team. The agile development methodology, unlike the traditional "waterfall" method of software development, focuses on continuous development and having a viable product at the end of each development cycle.

Specifically, we incorporated the major practices of agile development which included using version control, setting coding standards, and giving weekly demos to our stakeholders. The web portal backend was developed with Django, a high-level Python Web framework that encourages rapid development and clean, pragmatic design [4]. Django is the framework of choice since it was created with the intentions of solving the software issues that the original assessment tool struggled with: usability, security, and scalability. Since a relational database suited our storage needs, we used MySQL due to developer familiarity and widespread support. For frontend development, Twitter Bootstrap was used to create a responsive, mobile-optimized experience. jQuery was used for much of our JavaScript code, and it was supplemented by a number of third party libraries. Finally, we deployed our application on Amazon Web Services and used GCADC's existing domain name (cvilleworks.org).

3. RELATED WORK

GCADC currently uses a Google Form to input all the information for seekers. They then take these results and pipe them into an Excel spreadsheet and use that to coordinate all of their relationships between providers, seekers, and peers. This currently works for them since they are currently running a relatively small operation. However, this solution is not scalable because it requires some overhead work from their employees. Our system organizes all of their information and relationships (e.g. non-profit Provider to Job Seeker) in a much more structured fashion. This removes the need for overhead and the complexity of managing their work with Excel. The features provided by our application also reduce the mentioned complexity. Additionally, the Google Form/Excel method lacks security and privacy, which is solved by our project with different user types, data security, and password management.

LinkedIn is a social network that allows professionals to connect to their co-workers and view open positions that suit their skillset. Individuals create profiles that can be seen by companies and recruiters [3]. However, LinkedIn may not be a viable option for many of the job seekers that GCADC assists due to potentially limited skillsets and lack of access

to education about how to construct a robust profile.

4. SYSTEM DESIGN

We will describe the way in which our web portal was designed, by examining the two most important components - the Seeker Form and Roster - and then discussing user management.

4.1 Seeker Form

The Seeker Form is filled out by peers on behalf of the job seekers themselves, consisting of three sections. The first section includes basic information about the seeker. This presented more of a challenge than simply creating a static form, because the form may need to be modified after deployment. For example, an administrator may need to add a new question to the basic information part of the form. As a result, we created a Django model named Question that handled the dynamic capability needed to add questions to the Seeker Form. The second section of the form allows the peer to choose an open job position that the seeker may be interested in. Lastly, the third part consists of a list of different services and the respective providers for each service that the job seeker may be in need of, allowing peers to choose which services need to be focused on. In order to accomplish this, a dictionary was mapping services to arrays of providers, making it trivial to generate the dropdowns (i.e. the select html elements) that contained the respective providers for each service. The way that the peer navigated through the Seeker Form among all three parts was using three separate HTML <div> tags and altering their hidden attribute. Peers are prevented from navigating to the next div if they have not filled out all the required fields using JavaScript.

Our system affords some configuration options for Administrators relating to the Seeker Form. The first is allowing them to add and remove questions from the form, through the Add Question and the Edit Questions/Options features. Different types of questions may be added, including text, integer, dropdown, checkbox, radio, and date fields. When a dropdown, checkbox, or radio question is added, the Administrator is redirected to a form where they may add options to choose from. They may later add and remove options by selecting a question on the Edit Questions and Options page. In addition to adding a question to the Seeker Form, Administrators may also add global position attributes, meaning more fields that must be filled out when adding a Position. This gives our system more flexibility, making it more likely to see continued use in the future when requirements may change for the organization. Position Attributes function similarly to Seeker Form questions, as they may be of different types, some of which requiring the attachment of options.

4.2 Roster

The Roster page was designed to allow users to view data in the system in a seamless manner. Additionally, it consolidates many of the features that began to clutter the sidebar during the development process. In the end, we decided upon a Bootstrap table that would display all users and data in the system. Moreover, there is a dropdown menu that allows the user to switch among the various data types. For example, if the user is currently viewing all the administrators in the system, he/she can use the dropdown to switch to

view all of the peers in the system without leaving the Roster page. When a different data type is selected, the roster console allows the user to edit, delete, or add new instances of that data type. This allowed for a more streamlined and intuitive experience compared to only providing this functionality via the sidebar.

The default setting for the Roster is to display all of the active job seekers in the system. Each seeker may be viewed, edited, and deleted from their associated row in the roster table. Clicking on the row will bring up the profile of the seeker, which displays all of their information from the Seeker Form, in addition to the photo that was uploaded for them. On the right side of the row, there are buttons to edit and delete the seeker. Providers and positions function similarly in the roster, each allowing view, edit and delete operations. The other dropdown options for data types - peers, services, administrators, and staff - all offer add and delete functionality from the roster. Besides the basic operations, the roster offers a few accessibility features to enhance usability. The first of these is ability to sort columns, making it easy for administrators and staff to quickly scan through data. Next, we included a robust search feature that allows users to filter each data type by a keyword. Finally, administrators may configure which columns are displayed for seekers and positions through the Configure Roster page. Here, each Seeker Form question and position attribute can be turned "on" or "off," configuring whether it is displayed as a column in the roster table for that object type. This will prevent clutter and too many columns being displayed as questions and position attributes are added later on.

Figure 1: Providers view on Roster

Name	Email	Service	Edit	Delete
Pepsi Cola	ridge.schuyler@gmail.com	Beverage Distribution	Edit	Delete
Region Ten	benith@regionten.org	Mental Health	Edit	Delete
Region Eleven	so@regionten.org	Substance Abuse Treatment	Edit	Delete
Pathways Fund	woodworth@pathwaysfund.org	Financial Buffer	Edit	Delete
Test Provider	nmhdy23@gmail.com	Transportation	Edit	Delete
Wheels to Work	ridge.schuyler@gmail.com	Transportation	Edit	Delete
Charlotteville Free Clinic	smth@freec clinic.org	Physical Health	Edit	Delete
Jori's Legal Services	sam4du@virginia.edu	Legal Assistance	Edit	Delete
Sentara Clinic (Jefferson School)	jruise@gmail.com	Physical Health	Edit	Delete
Charlotteville Area Transit	ridge.schuyler@gmail.com	Transportation	Edit	Delete

4.3 User Management

User management is relatively simple in our system. We decided upon four different types of users, where each had different levels of access to the system. In order to keep information secure in the system, each type of user only had access to objects that pertained to them. For example, peers may only see seekers in the roster that they are responsible for. Furthermore, providers may only view information about seekers that were referred to their service. The four types of users are administrators, peers, providers, and staff. Administrators are the only user type that may create new users of any of the four types. They use the Register New User page to create new administrators, peers and staff, providing an email to send the new account information to. The new user will receive an email with a temporary password and their respective username to login to the system.

Adding a provider works similarly, with the administrator selecting a service, name, point of contact, and email - an email will then be sent to the provider with their new login credentials.

5. PROCEDURE

As mentioned, there are four types of users who actually use the system: administrators, peers, providers, and staff. Peer users are selected and trained by administrators to use the system. These individuals identify potential job seekers in the community and enter them into the system through the Seeker Form. Once the job seeker's information is in the system, the peer continues to work with them as a liaison as they work their way through the pipeline to obtaining the needed services and a job. Providers offer a specific category of service to job seekers. After job seekers have been inputted into the system, providers will be able to see all relevant information in the Roster for those who were referred for their service. They will denote in the system when they have started and completed administering their service to inform the associated peer. Staff are employees of the Office of Economic Development who use the system to input, update, and close jobs that are available for job seekers. Administrators have access to all parts of the system, but specifically they add new users of all types to the system and monitor its performance. Job seekers are in the system though they do not personally interact with it.

6. RESULTS

At the start of this project, GCADC was using an inefficient, insecure, and confusing system to keep track of their data. The system that we created has simplified and organized GCADC's processing system, and increased security and confidentiality. Below are some specific examples of improvements that GCADC and its different users will experience.

6.1 Peers

Peers will see a vast improvement in their ability to track information about their seekers and new job opportunities. Using the past system, once a peer entered a seeker into the system using the Seeker Form, they had no access to that seeker's information. If they needed to change or update information for the seeker, they would have to contact an admin of the system. They also had to keep track of the seekers they had entered by themselves - they had no access to a list of seekers they were responsible for. With the system that we designed, a peer will have an account that will allow them to see all of the seekers that they have entered as well as update information for seekers that have already been entered into the system. When the peer is viewing information for seekers, they can also see what phase of the process the provider is at in helping the seeker. This is a vast improvement over the old system, in which the peer would constantly call the provider in order to get updates on the status. In addition, peers can receive either text or email notifications every time a new job is added to the system, increasing the likelihood of them identifying a seeker to bring into the GCADC program. All of these improvements allow peers to be more organized, stay updated on job opportunities, and edit information about seekers much more efficiently.

6.2 Providers

Providers will experience a much more organized and user friendly interface. Using the old system, all information about every seeker was stored in one central Excel spreadsheet. This meant that any time a provider wanted to access information about a seeker, they had to search through information from every single seeker in the system. Not only is this incredibly inefficient, but it is also very insecure and nonconfidential. The new system addresses these issues by limiting content based on which user is logged in - a provider now only sees seekers that they are providing services for in their Roster. Additionally, there is a search bar that can be used to search for specific seekers. This increases efficiency for the provider, seeing as how they do not have to sift through data for the entire system. In addition, Providers may now access seeker information in a format that easily allows printing. In the past the provider would record the seeker's information upon meeting them, which was redundant because the peer had already entered the seeker's information into the Google Form. Using the new system, providers can simply search for the seeker on the website, and then view or print their information. These upgrades provided by the new website will increase efficiency of the providers through more personalized data and less redundancy, as well as improve confidentiality through limited access to data.

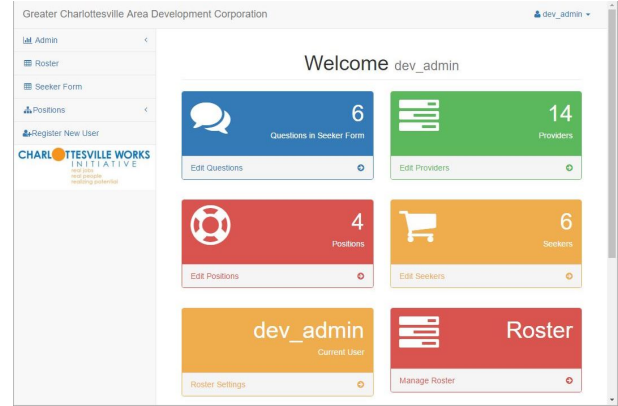
6.3 Administrators

Administrators will experience great improvements in organization and efficiency of managing the different users and components of GCADC. Much like providers and peers, administrators will have a user friendly console with which they can view and edit all users of the system. Having a central, organized console for user management will significantly cut down time for administrators. Registering new users will also be much simpler for administrators. Instead of having to personally email the new user, grant them access to the spreadsheet, and store their information somewhere, administrators may now simply register a new user on the website. When the new user is registered, an email is automatically sent to them with a link to login and password information. At this point, the new user can update their password, update their notification preferences, and use the system, all without requiring action by the administrator. In addition, the new system provides administrators with a simple, intuitive way to update forms for inputting seekers and positions. Administrators can add or delete questions and specify options for dropdowns in a manner similar to the Google Form of the old system. Administrators are also able to select what information they want to show up on the main console for different types of data, allowing them to create a personalized interface that was never possible with the old system. All of these features create a simpler and more streamlined experience for the administrator that will significantly increase the efficiency of GCADC's administrative functions.

6.4 Overall Benefits

All user types of GCADC will benefit from the improvements of our new system. The main benefits will be more organized data storage and access, increased efficiency, and a more user-friendly interface. All users will have an easier time carrying out their responsibilities, and inefficiencies

Figure 2: Main Administrator Menu



through communication and data organization will be significantly reduced. Even though many of these improvements in efficiency may seem minor right now, they will be instrumental to the success of GCADC as the organization scales up its operation by adding more job seekers. Privacy and confidentiality will also be increased by the new authentication system that has different levels of authentication. Overall, our system will provide GCADC with a more user-friendly interface, more efficient operations on almost every level, and more organized data entry and storage.

7. CONCLUSIONS

We designed a system to meet the need of the GCADC to help facilitate job seekers getting the services needed in order to obtain and maintain employment. This system was a vast improvement from the previously used Google Form and spreadsheet system that was in place. The system now has a single web interface. Each type of user is able to log into the same web portal and will be given access to the appropriate functionalities and services for their role. The system is also secure. Different parts of the system are restricted to users of specific authorizations and the information of job seekers is no longer visible to anyone with the link to the data but only to the relevant providers. The system has a variety of security measures in place to keep personal information confidential. The system has the ability to share notifications with users. Peers are shown a notification whenever new job positions are added so that they can be up to date on available openings to identify possible job seekers, and they also can use this portal to see whether the job seekers have met with and are being helped by each associated service. Finally, the system is dynamic. Relevant users can add new questions and attributes and alter most parts of the system without taking it offline. The system updates as deadlines pass and makes appropriate changes as they are made. With these functionalities implemented in the new web system, the GCADC can better assist members of the community in their effort to obtain needed services and jobs. Most importantly, the system will become more useful as the GCADC begins to serve more local job seekers, because it will increase efficiency for administrators, providers, and peers.

8. FUTURE WORK

Although our system has strong core functionality, there is a lot of work that can be done to significantly improve the system. The one big project that we would want to undertake is the creation of a mobile app for this system. For desktop users, it is intuitive to use our web application. Our customer indicated that many of the peers using the form would do so on tablets. The interface was designed to work well with different screen sizes, including mobile, but an app that could be installed on tablets could make it easier for some users rather than opening it in a mobile browser.

Secondly, the Seeker Form could be improved to dynamically filter jobs and providers based on seekers inputs in the form. Some providers only service certain individuals based on specific criteria, for instance one only servicing a specific city of residence or area code. Based on input into the form, a filtering algorithm or decision tree could help the peer in guiding the seeker when filling out the form. Furthermore, we could add the ability for administrators to view metrics about providers and seekers in the system, including visualizations such as graphs and charts.

Another helpful feature that we could add to the system is the tracking of individuals that are involved with GCADC. Details that could be tracked include wage amount, employment status, and hours worked. The Virginia Employment Commission already has a significant amount of data of this nature, so we would need to figure out how to import that as well. Ideally, tracking these statistics would lead to the creation of graphs and reports that could display the information in an interesting way. Tracking different seekers and their individual progress is an obvious use of this feature. Another benefit is seeing how seekers trend under different providers, seekers, or peers. The tracking and graphing of this information could be used by GCADC to help make any changes to their business plan or execution to better accomplish their goals.

9. ACKNOWLEDGMENTS

We would like to thank Ridge Schuyler for his enthusiasm, input, support and devotion to this project. We also want to congratulate him as he was recently named the new Dean of Self-Sufficiency Programs at Piedmont Valley Community College. Additionally, we thank Aaron Bloomfield for providing us with this opportunity and giving us guidance during the development process. Finally, we would like to thank Start Bootstrap for providing the theme that was used in the final web portal.

10. REFERENCES

- [1] A. Bloomfield. SLP Requirements Document: Greater Charlottesville Area Development Corporation (GCADC). *University of Virginia Service Learning Practicum Requirements Documents*, 2015.
- [2] C. Servier, S.Y. Chung, J. Callahan and C.B. Schrader. What value does service learning have on introductory engineering students' motivation and ABET program outcomes? *Journal of STEM Education: Innovations and Research*, 13(4):55–70, 2012.
- [3] J. Chiang and H. Suen. Self-presentation and hiring recommendations in online communities: Lessons from LinkedIn. *Computers in Human Behavior*, 48:516–524, 2015.

- [4] D. S. Foundation. Django: The web framework for perfectionists with deadlines, 2015.
- [5] B. Fung. Mozilla: Just 5 percent of computer science kids go into nonprofits: We're going to change that., September 2014.
- [6] R. Schuyler. Realizing the dream: Family self-sufficiency in Albermarle County and Charlottesville, Virginia. September 2015.