

Seneca APPLIED RESEARCH

College and Community Social Innovation Fund Project (CCSIF)

Principal Investigators: Varinder Gill, Xiaoli(Lisa) Li

Research Assistants: Hien Nguyen, Alvia Siraj, Yi Zhou, Jaspar Aga Camana, Monica Hong, Justin Bonsu



Table of Contents

Acknowledgement.....3
Executive Summary 4
Introduction 5
Literature Review 6
Phase I – Data Collection and Analysis..... 8
Phase II – Development of Paper Prototype 14
Phase III – Development of the Booking System..... 17
Phase IV - Pilot with the Nonprofit Organization and Further Improvement in the Tool22
Conclusion25
Works Cited..... 26
Phase V – User Menu/Instructions on How to Use the Tool.....27

Acknowledgement

The completion of this research project would not have been possible without continuous support from various stakeholders of the study. First of all, we would like to express our gratitude to Prosper Canada for giving this opportunity to conduct the research. We are especially grateful to Marlene Chiarotto, Ana Fremont, Galen MacLusky and David Ike for their continuous support, feedback, and guidance during all phases of the project. We were able to complete this study on time due to their sincere efforts to assist us with data collection and provide us with other necessary documents required for the project. Due to timely efforts by Prosper, we were able to connect with organizations and conduct interviews with them to collect primary data. We express our sincere gratitude to Disability Alliance British Columbia for collaborating on testing of our online platform and providing their input about its various features. We appreciate all the participants who shared their experiences and opinions for this study. We express our gratitude to Namrata Barai, Director, Applied Research, Seneca Innovation, Shahrzad Farzinpak, Chair of School of Human Resources and Global Business and Suzanne Abraham, Chair of School of Information Technology Administration and Security for their continuous support throughout the study. We are extremely thankful to our Research Manager Andrew Paton and our Project Coordinator, Idiris Kabel, for their sincere efforts to coordinate this entire project.

Decreasing Barriers Faces by Low Income Communities through the Development of Innovative Online Assistance System for Tax Filing

Executive Summary

The overall purpose of the collaborative project between Seneca College and Prosper Canada was to build a supportive booking system for tax clinics serving low-income communities. Due to various barriers to tax filing, not all people file taxes in Canada. As this booking system will be free and accessible to low-income communities, it will eliminate some of the barriers by making the process of remote tax filing easier. Moreover, the virtual tool will help the tax clinics to serve their clients more efficiently. This project was divided into five main phases. Phase I revolved around data collection and analysis through semi-structured interviews, conducted virtually using the Zoom platform. These interactions aimed to gather perspectives on a range of barriers, including insufficient funding, limited volunteer support, and inadequate resources for tax filing assistance. The analysis of data collected helped to understand the common barriers faced by the organizations and tax filers. During the analysis of primary data, we found out that the participants from nonprofit organizations were seeking a client driven and streamlined centralized booking system. During Phase II, the focus was the creation of digital prototypes for four key portals decided during phase I: Administration, Clinic, Volunteer, and Client portals. These prototypes were created based on the data collected from the survey respondents and customized to address their specific needs. Phase III entailed the development of a comprehensive booking system, integrating all four portals to streamline and enhance the tax appointment booking process for both tax filers and clinics. This step aimed to optimize efficiency and effectiveness in facilitating appointments and ensuring a better experience for all stakeholders involved. During phase IV, a pilot phase was initiated, during which the developed tool was tested with partner organizations. Valuable feedback and observations were collected, which served as a foundation for necessary adjustments and refinements. By subjecting the tool to real-world usage and user input, it was refined iteratively to better meet the needs and expectations of its intended users. Finally, phase V was dedicated to the creation of a comprehensive user guide. This guide aimed to provide clear and detailed instructions for users in each role, facilitating their navigation and utilization of the tool's functionalities.

Introduction

In Canada due to the process for filing taxes being quite complicated and other existing barriers, not all people from low-income file taxes which is mandatory to claim benefits. This widens the wage disparity between lower income communities and middle-to-high income communities. An important step toward

increasing access to tax preparation services for low-income households was the introduction of the Community Volunteer Income Tax Program (CVITP) by Canada Revenue Agency (CRA) in 1971, which supports collaboration with community organizations to provide free tax preparation services. The CVITP is a collaboration between CRA and community organizations that host tax preparation clinics and arrange for volunteers to prepare income tax and benefit returns for eligible individuals. [1], [2] This free service is not available to all the people who need assistance and therefore is not an effective solution for everyone. This project, a collaboration between Seneca research team and Prosper Canada aimed at developing a service and accompanying on-line tool to improve the efficiency of tax clinics and the ability of low-income tax-filers to file taxes by booking online appointments.

Prosper Canada is a national charity that works with partners to promote policies and resources that help Canadians prosper. Financial empowerment. This project has been divided into various phases. For the first stage of the project, we focused on examining the common pre and post COVID -19 barriers faced by low-income communities. Our main concern is studying the various challenges and barriers faced by low-income communities when they file their taxes that leads to their failure to access benefits. We conducted virtual interviews with management and staff working at different community organizations involved in providing free tax filing services to understand their perspective on barriers faced by tax. Some pre-COVID barriers that can complicate the tax filing process includes, large amount of documentation, limited awareness regarding benefits of filing taxes, mistrust in CVITP volunteers, lack of training of the CVITP volunteers, lack of awareness regarding these clinics, and literacy & language barriers (Taxpayers' Ombudsman, 2020; Prosper Canada, 2020; Varatharasan et al., 2019). Some post-COVID barriers include lack of communication on remote services, limited access to technology and tax preparation software, CRA's digital authentication and authorization processes, and connectivity and affordability barriers (Taxpayers' Ombudsman, 2020; Prosper Canada, 2020; Prosper Canada&Bridgeable,2020). We will discuss each factor in detail by dividing it into two categories: pre-COVID and post-COVID.

Literature Review

Pre-COVID Barriers

The tax and benefit system in Canada are quite complex, and there were some major barriers faced by low-income communities such as complicated tax filing process, lack of awareness regarding the CVITP clinics, mistrust, and lack of training of the CVITP volunteers. As Taxpayers' Ombudsman [7], Prosper Canada [6], and Varatharasan [4] have stated that the most common barrier is the difficult process of filing taxes including many documents required to file taxes. When low-income communities rely on tax services for gathering the appropriate documentations for filing taxes, often the tax service providers make a mistake,

leaving these communities with a poor tax filing experience of having to pay for the mistake. According to Taxpayers' Ombudsman (2020), these communities are usually not publicly aware of the Canada Revenue Agency's Community Volunteer Income Tax Program (CVITP) which, "provides low income people, including vulnerable persons who may otherwise have difficulty accessing income tax and benefit return filing services, with an opportunity to meet their tax obligations, and to gain access to, or continue to receive, the government credits and benefits designed to support them" [5]. CVITPs are organized in collaboration with financial community organizations (as tax clinics) to assist people with filing their taxes free of cost. However, people do not use the CVITP clinics in fear and doubt of owing money to the government if they use the service and depend on friends or relatives to seek assistance to file their taxes [5]. According to these communities, they cannot trust or rely on the CVITP volunteers because of their lack of training on filing complex tax returns [8], [5], [4]. For example, CVITP volunteers are unsure of how to file taxes for clients who are self-employed, for single family households who need child benefits, and for the people who are deceased [8], [4], which often results in low-income communities receiving smaller amount of returns, thus, low-income communities often self-learn about how to file complex tax returns [4]. Other barriers include CRA's authentication and authorization process, literacy and language barriers, and inaccessible telephone lines [5], [4]. Most low-income communities tend to be the vulnerable population such as individuals with insecure housing who have short term and temporary home addresses, or individuals with cognitive or physical disabilities, and new immigrants to Canada [5], [4]. The CRA's authentication and authorization process is usually done by telephone, and has too many identity verification steps, such as providing name, personal identification number, home address. Sometimes, low-income communities get denied access to CRA through telephone, in case of difficulty proving their identity through a temporary or short-term address or communicating due to cognitive or physical disabilities. Sometimes the tax filers struggle to communicate in English or French due to language barriers [5], [4]. CRA telephone lines are hardly reachable, and people never get a call back from the CRA agents despite leaving a voicemail, hence, often leaving low-income communities more helpless and clueless on understanding Canada's tax and returns system and causing them to seek assistance from family or acquaintance when it comes to filing taxes in Canada [5], [4].

COVID-19 Barriers

During the global pandemic, many of these barriers are still prevalent and new barriers have occurred due to the COVID-19 outbreak. The outbreak has exacerbated many of the pre-existing barriers of the Community Volunteer Income Tax Program (CVITP) that have prevented low-income families to file their taxes. One of those pre-existing barriers is the mistrust regarding CVITP Volunteers. Since the COVID-19 outbreak, the CVITP has moved their services to a virtual setting creating many obstacles for the

volunteers as they adjust to new ways of tax filing. During the week of June 15th, 2020, Prosper Canada surveyed their Financial Empowerment Champions to get an update regarding the successes and challenges since their transition of service from in-person to remote/virtual service [9]. According to the report that was released on July 6th, 2020, many of the volunteers of these Financial Empowerment Champions (FECs) partners had challenges adjusting to the new virtual service format [9]. Moreover, because of the new virtual environment, volunteers cannot take in as many clients as before due to their spending more time now to complete their tax filing virtually [9]. The report also mentions that volunteers are more reluctant to take on added responsibilities necessary in virtual clinics such as booking appointments and tax preparation [9]. For many of the FEC Partners, the training of volunteers has also posed an obstacle. During the pandemic, partners have voiced their disappointment regarding the lack of support and accommodation by the CVITP Coordinators as these partners transitioned from in-person meetings to virtual meetings. There has been no accommodation by the CVTIP as to setting up virtual clinic model and the technology, security, and delivery of the services to smoothly transition from an in-person meeting [9].

According to a report from Prosper Canada, “Tax Filing Support during COVID-19 pandemic”, clients have stated the CRA frontline staff way of communication is, “technical and intimidating” [6]. The potential impact of the pandemic for clients is their fear regarding the possibility of losing their benefits due to the closure of CVITP and missing the due date to file their taxes [6]. In fact, Prosper Canada’s report on the challenges and success states that the CRA CVTIP Volunteer helpline is “near impossible to access” [6]. Moreover, when clients do call, they would receive an automated message saying to call back due to their busy phone lines. Due to the pandemic, this occurrence has happened more than previous years for these partners [6]. Limited access to technology or tax preparation software is another issue during the pandemic that prevents low-income communities from filing their taxes. Sherra Profit’s, Taxpayers Ombudsman report, “Taxpayer Rights in the Digital Age” states that, “The primary risk of a push to a digital information and services due to the pandemic is that people will not file a return due to issues such as lack of digital literacy while file a return with incorrect information” [7]. Prosper Canada’s Report, “Tax Filing Support during COVID-19 pandemic” mentions that due to closures of CVITP clinics, these barriers will be exacerbated “without the navigation and explanatory assistance that volunteers and staff at CVITP clinics provide to their clients” [6]. Moving on, the lack of awareness for many clients is the barrier that has been evident during the COVID-19 outbreak. Prior to the outbreak, Prosper Canada noted that many of their partners allowed for the CRA to advertise their services on their website [6]. The outbreak has made it difficult for the CRA for them to communicate to the public about tax filing options available and the duration of their availability in [6]. In conjunction, one of the barriers that low-income communities face is the lack of communication between the clinics and tax filers since it has moved to telephones,

emails/online assistance systems. This would lead to an increased lack of awareness of CVITP services available with their partners and a lack of notification to changes in deadlines in clients filing their taxes.

Improvement Needed for Pre-COVID Barriers

Office of the Taxpayers' Ombudsman (2019-2020) and Canada Revenue Agency and Taxpayers' Ombudsman (2020) claim that they are raising awareness regarding the CVITP by utilizing social media platforms and by placing posters in public places. Since the messages on the promoting campaigns and the advertisements posted on social media platforms are often wordy and difficult to understand, these should be clear and concise highlighting the advantages of using the services of CVITP program. Also, for low-income communities to be able to rely on and trust on the CVITP volunteers, they should be properly trained about how to file various types of taxes to eliminate the trust issue among tax filers [4], [5]. The steps of the CRA's authentication and authorization process should be simpler, for example, it should require a current postal code instead of vocalizing the home address when identifying identity through telephone call. The unattainable telephone lines as well as the literacy and language barriers can be decreased if the CRA and the main stakeholders or partners hire more customer service representatives or agents to help low-income communities via telephone. Also, due to increased number of landed immigrants the other language support should be made mandatory (not optional). There is a need for diverse customer service representatives who can speak other languages besides English and French, the two official languages in Canada.

From the complicated tax filing process, lack of awareness about CVITP clinics, mistrust, and lack of training of the CVITP volunteers, and the lack of communication via telephone and emails/online assistance systems have all posed as barriers prior to the outbreak. However, since the coronavirus outbreak, many of these barriers have worsened due to the CVITP transitioning their services from in-person meetings to virtual and remote clinic models. This exacerbates the existing obstacles, especially for vulnerable communities such as those with little to no access to technology and newcomers. Therefore, certain measures must take place for these barriers to be decreased to give low-income communities better access to services to file their taxes.

Phase I – Data Collection and Analysis

For data collection during phase 1 of the project, we conducted 8 semi structured interviews using virtual platform Zoom during December 2020 and January 2021. Semi structured interviews are interviews that have an interview guide, but not limited to its structure [3]. Yet, having an interview guide is beneficial during the semi-structured interview because the questions are thought out in advance, to help the

interviewers to be more prepared. The interviewer can also ask follow-up questions that are not on the interview guide during the interview [3]. We used this method because we only had one opportunity to interview the participants. According to Cohen D and Crabtree B [3], semi-structured interviews are the best choice when there is only one attempt to interview the informants, and when there are only few interviewers to collect the necessary data. The respondents mentioned three big barriers including lack of funding, lack of volunteers and less equipment such as computers available to help the tax filing process.

Data Analysis

During the interviews, participants were asked about their input about the barriers that low-income people face, while filing the taxes. We found out that some groups such as seniors or people with disabilities may experience high anxiety because of the overwhelming amount of documents required for tax filing. One barrier was no guarantee of access to the internet, or a cell phone to file taxes online. Another barrier is misinformation on social assistance, for example, some people assume that there is no need to file taxes when they receive social assistance such as trillium benefits. The participants emphasized that due to the high influx of calls received during tax season, there is a strong need to produce a secure tool that efficiently distributes information to the organization. Using thematic analysis to analyze the interview data, we applied coding for the most frequent themes occurring during the interviews to organize the data. Our coded section was then analyzed to see if we needed to combine any codes to discover major themes. We started with listening to the interview recordings and making notes on many of the topics covered throughout the interview. We also made side notes on their concerns and opinions that may not directly answer the interview question itself.

Tax clinics have used different tools to file taxes so far. One such tool, Profile, is quite efficient and has more options than Turbo Tax (a tax filing software). However, the free version of Profile does not have all the options available. This serves as a barrier for already resource deficient tax clinics. Another tool used by clinics U File eliminates the language barrier. However, its main limitation is automatic removal of clients' information (personal/financial) once the tax is filed. Hence the clinics are required to collect and feed this information every year. Share Point, another tool used by the organizations, can share additional resources among community partners to offer a broader range of services but this tool is not accessible to clients. A common barrier amongst all participants was the lack and illiteracy of technological devices and the language barrier.

Barriers to Tax Filing

Client Barriers

One of the biggest barriers clients faced was communication; due to the difficulty for clients to communicate with community organizations during the pandemic. In case of a missed document(s), clients were not able to connect with the tax clinics to send the missed document virtually due to technology barriers. Low-income communities typically involve newcomers to Canada, people who have physical or intellectual disabilities, seniors, and the homeless. Many of these groups have difficulty understanding English or French and may lack the mobility needed to visit the community centers in person. Individuals who are part of low-income communities often work for gig economy such as Uber, Skip the Dishes, and Instacart these days. According to the CRA guidelines, community organizations or volunteers at tax clinics are not eligible to help them file the income taxes for self-employed individuals. Many people from low-income communities do not have enough knowledge about taxes and the tax system in Canada. They do not understand why taxes exist, the purpose of taxes and the benefits of filing taxes. Technology as a significant barrier was also highlighted by most of the respondents. People may not have access to the internet or a computer, such as seniors, may have never been exposed to certain technology, or despite knowing how to use technology or having access to technology, some people may not trust it because of their concerns around the individual privacy. Respondents also shared that people often prefer to file their taxes through a phone call. However, it is particularly challenging to go over the documents with the clients remotely over the phone because the clients often do not know how to read aloud the information needed to file a tax return.

Organization Barriers

Interview participants also mentioned the barriers faced by the service providers. The first biggest challenge is lack of funding and less space available to run the free tax clinics. With a limited budget it is difficult to fulfill certain tasks to file taxes for free such as administrative duties, booking appointments, appointing supervising staff and volunteers. There may also be a lack of office equipment and supplies such as laptops, phones, printers, ink, and paper, as well as difficulty accessing the internet. Another main challenge is recruiting volunteers and supervisory staff who are committed to organizing and running the tax clinics as well as who are strongly knowledgeable about the tax system and certain tax software. They must be proficient in technology but are expected to be quick learners who can file taxes for multicultural groups with diverse needs. Overall, since most of them are volunteers, it is difficult to recruit them during the operational hours of the free tax clinics. Respondents often mentioned the barrier around dropping off the documents. It is exceedingly difficult to process the documents because in case of some missing information, the tax filers have to contact the individuals and some clients may not have access to phones

or the internet. Some organizations use cloud storage systems such as OneDrive or SharePoint for the clients to securely upload or drop off documents, but the limitations include whether the clients are efficiently uploading the correct documents. Although the organizations may either receive documents through a drop off or a cloud storage system, verifying clients' identities, and crosschecking with the documents poses a barrier.

Virtual Clinic Barriers

According to the participants nonprofit organizations find it difficult to persuade clients to share personal information over the phone due to telephone scams. Most people from low-income communities are accustomed to using paid tax preparation services, or in person tax clinics, they feel uncomfortable supplying the necessary information verbally over the phone. Tax filing over the phone is not time efficient for the tax filers too. Tax filers normally take a longer time to gather all the necessary documents and have difficulty reading the information over the phone. Another major barrier is lack of funding for virtual tools or tax software tools, as both the federal and provincial government do not fund tax delivery services. Therefore, nonprofit organizations often have the challenge of paying for the costly software tools within the organization or through indirect funding they receive from their partnered organizations. There is also a lack of funding for the new equipment at the office, such as computers. Many organizations make volunteers use computers that are at least 8 to 10 years old, and volunteers face difficulty when filing taxes for clients. Respondents also mentioned that volunteers are unwilling to prepare tax returns for clients remotely. Many volunteers do not feel comfortable asking extra security questions to verify clients' identities. Furthermore, they may not be able to solve the technical errors if they file tax returns remotely from their homes. Also, if the organization uses many online tools, including tax filling software and online messenger platforms, the volunteers have to multitask to flip with multiple tabs. This leads to distractions and impedes their ability to file the taxes properly. Some organizations have volunteers work on their personal devices, and have the volunteers save clients' information on a drive before uploading it onto a secure file storage system that protects clients' privacy. Lastly, supervisory staff members within the organizations may feel more stress about supervising and troubleshooting technical issues because often they may have multiple people including volunteers asking questions remotely during the hours of operation of the virtual clinics.

Input Regarding Online Tool Development

The respondents commonly had a few common suggestions for the online tool. These include case management software, integration of multiple applications and a centralized booking system.

Case Management Software

It is a data management system where the organization will be able to retrieve clients' confidential information such as phone number or email address in an organized way by accessing the clients' social insurance numbers. Salesforce [10] and Sumac [11] are the existing tools that are the most representative case management software tools but are driven by revenue and are private companies. Salesforce is quite complicated for nonprofit organizations to use, yet Sumac and Techsoup [12] are popular and user friendly for nonprofit organizations to use. However, the limitations are that Sumac and Techsoup do not reflect the situation, for example, the software does not have a feature to integrate with the phone system, email, and it does not have storage room for clients' private files.

Integrating Multiple Applications

The integration of multiple applications such as Microsoft Office applications will allow users to access their Microsoft Account and use other applications such as Microsoft Teams, Microsoft Bookings (some organizations use this system), Outlook, Excel, and many other Microsoft platforms. The respondents also suggested a strong and secure data transfer system. For example, after using a computer at a public place, when an individual signs off, the data should automatically be erased from the computer. Overall, the respondents recommended a tool that will not expose or reveal any personal information or identification to other individuals besides the client.

Centralized Booking System

One of the challenges with the centralized booking system is that the volunteers at free tax clinics have distinct levels of understanding about the digital world and technology, and each organization has a unique way of dealing with clients and has different expectations for filing taxes for clients. There are also gaps in training, and a need for a clear user manual as well as a support team that needs to be developed and trained in a centralized manner. This will help to have easier implementation of the booking system in each community organization. A few respondents mentioned that Turbo Tax can be one of the representative examples of a centralized booking system which is driven by volunteers and that the system is used through Microsoft Teams, yet the biggest challenge is the practice, because often people do not show up when the volunteers are waiting for people to login onto the Microsoft Teams to help them file their taxes. The biggest challenge for the centralized booking system is ensuring that the appointments are being followed through and have people prepared for the appointment, Due to approximately 50% efficiency rate of centralized booking system; it's difficult to recruit the volunteers, and people either did not show up for their appointments on the virtual platforms, or often faced technical problems. Moreover, there were people

who showed up to the appointment but did not have their documentation ready and were not prepared fully to file a tax return. The second challenge about the centralized booking system was funding, many organizations have tried to implement it as a pilot project but had to stop it due to lack of funding. The third and last challenge for implementing the centralized booking system was finding the right person to run the centralized booking system, because it is extremely hard to recruit a person or volunteer who speaks both English and French as well as the efficiency to collect correct personal data from clients such as names and location. The names of clients were often misspelled, and it is difficult to track the locations of clients because there were no separate centralized numbers assigned to the clients.

The participants suggested a few features about the tool that included the tool to be communicative, inclusive, informative, as well as simple and intuitive for the nonprofit organizations to use during the tax period. Furthermore, the online tool needs to be a more comprehensive and very communicative online platform for agencies, more clients driven rather than volunteer driven, while protecting the confidentiality and privacy of the clients. In addition, it would be useful for the clients to receive a summary of the benefits they will receive to help them understand the importance of filing their taxes and the benefits they might be eligible for. Lastly, the online tool should be simple, have a small number of windows or tabs, with an easy-to-understand language. It would be beneficial if the tool can be translatable and workable in different languages other than the two major languages used in Canada.

Advantages and Limitation of the Tools

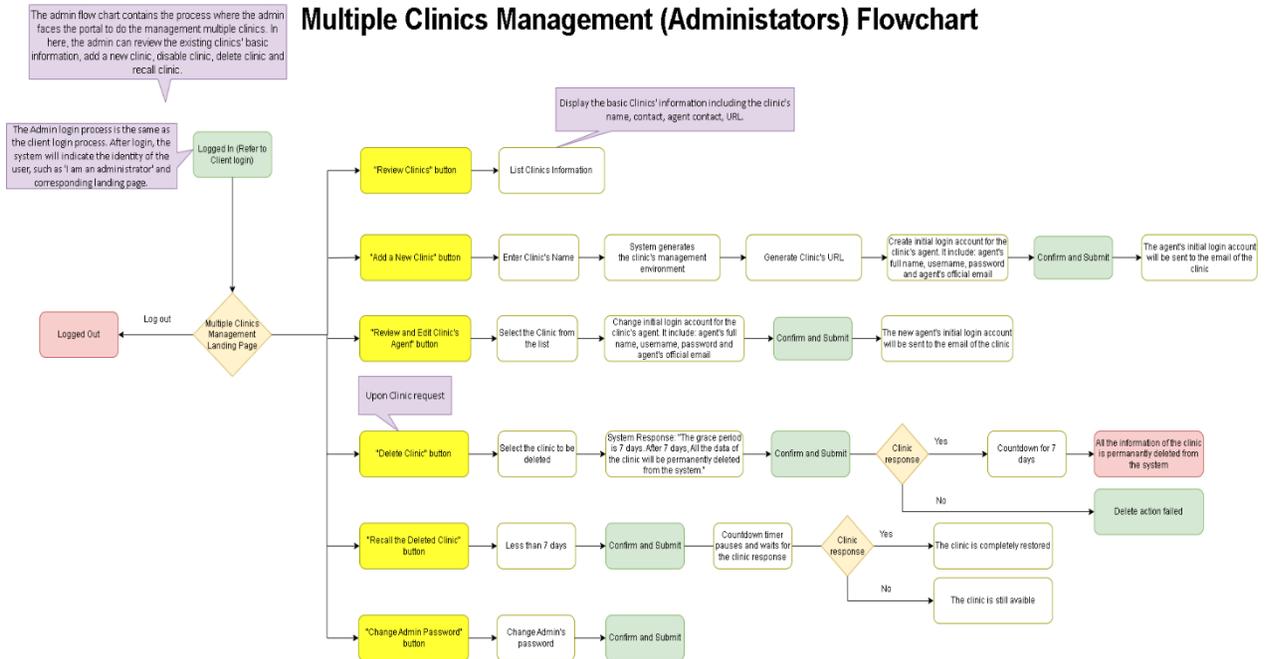
Some nonprofit organizations have used Profile, which is more intuitive than Ufile tax software, a tool that the CRA uses for filing taxes. This software is expensive, however beneficial for the volunteers to use because the tool can automatically maximize the benefits and credits from the software, is able to capture the mistakes, and has more options than Turbo Tax. Profile is mostly used by professional accountants and the free version will not have all the options available. A few organizations have used Ufile software that has both English to French embedded in it. However, the limitation of Ufile is automatic removal of the clients' personal and financial information. Every year, clients' information must be entered into the system; hence it is not time efficient for both volunteers and clients. SharePoint, another software used by organizations, can supply, and share additional resources among community partners to offer broader sources of services for clients to have easier access to CVITP clinics' services, yet the biggest limitation of SharePoint is that its access to clinics and volunteers only, whereas clients cannot use or access the software at all. Some organizations have also used other online tools that were beneficial when running the virtual clinics, and the most used online platform was the WhatsApp, its video calling or messaging with clients to book appointments efficiently. Through another online tool E-courier [14] used to securely transfer files such as tax documents through email, the clients were able to easily send the documents

through a link with no additional instructions. Adobe Reader was used to either fill in the intake form or access the documents that were sent by clients. Lastly, Google calendar was used as a centralized appointment calendar that was accessible to all members within the tax clinics. A few organizations have used the Microsoft OneDrive system and integrated Microsoft Teams to conduct virtual tax delivery appointments. The Microsoft OneDrive system is a secure cloud-based system, so it can securely store documents. Microsoft OneDrive system is driven by an organization, so it is difficult to integrate into other organizations' systems and to check if the clients are uploading the correct documents into the system. Microsoft Teams is a useful virtual platform to directly connect and interact with clients while the volunteers file the tax returns on the clients' behalf, but some low-income clients have difficulty accessing the virtual' hence it complicates the process of verifying one's identity. Some of the community organizations also used a centralized list of email addresses or phone numbers for clients who have difficulty communicating due to no access to technology. Based on the feedback gathered from the primary data and available resources with the research team, the team members decided to finalize the development of a centralized booking system and started working on the paper prototype of the system.

Phase II – Development of the Paper Prototype

In the developmental stage of the tool, the research team conducted regular meetings with the partner organizations to get feedback on each component of the developmental stage of the tool. They also collaborated with stakeholders to get further input on the development of the tool. This next phase of the project involves creating an electronic prototype that outlines the important functions and features needed by the clients for the application. Following the client's input, the research team utilized the software 'Draw.io' to generate various diagrams depicting distinct user flows. The initial diagram presented below (Figure 1) illustrates the administrator flow, which was discussed with Prosper Canada. In this flow, the administrator has the authority to manage, create, and delete clinics and clinic agent accounts, as well as oversee their own account.

Figure 1: - Multiple Clinics Management (Administrators) Flowchart



The next diagram (Figure 2) depicted below represents the Clinic agent portal, where the clinic agent possesses the capability to manage, add, and remove volunteers, modify clinic information, and create and supervise appointments for clients. This diagram showcases several concepts discussed with the clients that were ultimately excluded from the final version of the project due to their classification as unnecessary features. For instance, the “biweekly assignment distribution” was a feature discussed to automatically allocate a client to a volunteer; however, it was determined that volunteers should create their own schedules to prevent potential complications. Figure 3 represents the client user flow, where clients can book appointments with clinics and manage their existing appointments. Every step required for clients to successfully book or manage their appointments is depicted in detail to optimize user experience.

Figure 2: - Single Clinic Management (Agent) Flowchart

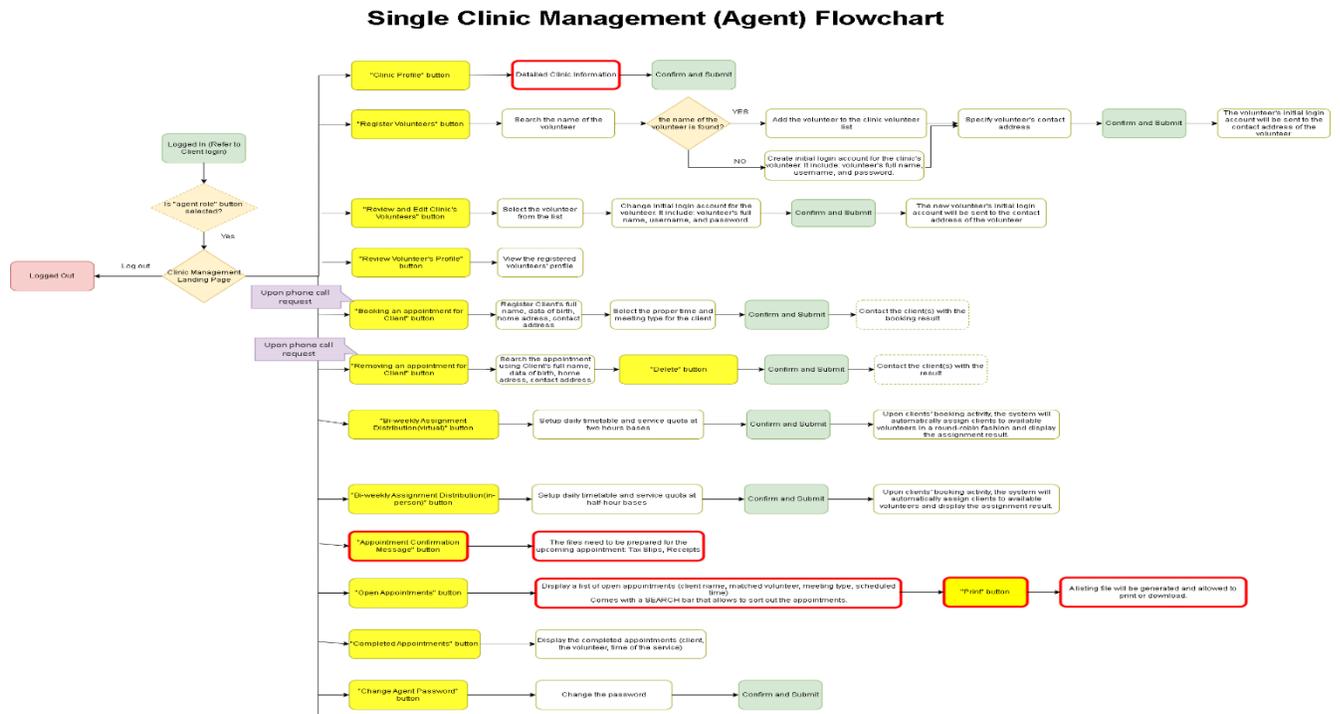
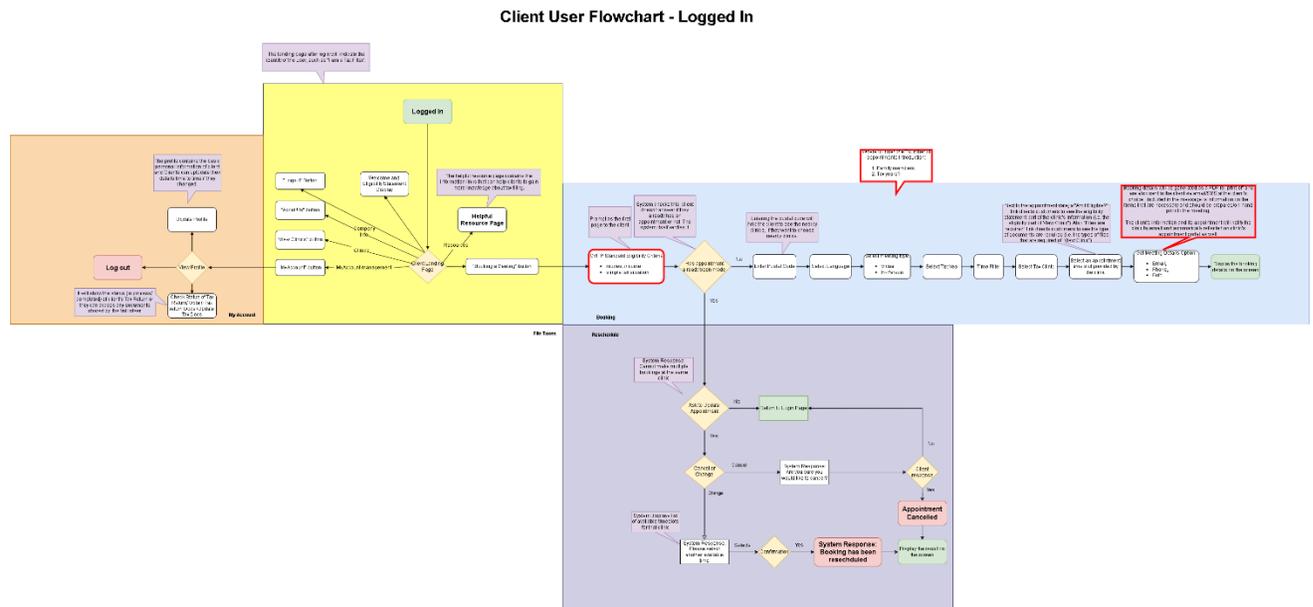


Figure 3: - Client User Flowchart (Logged in)

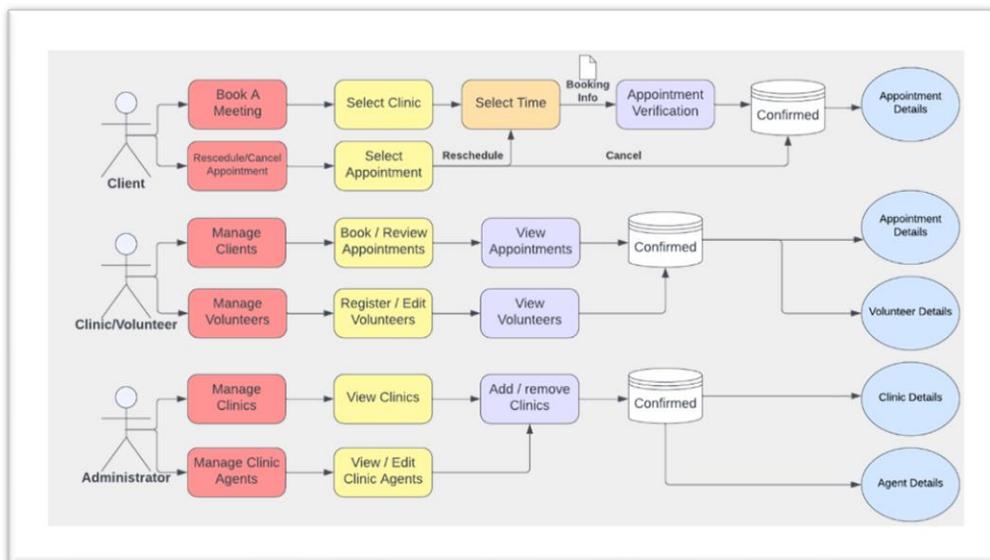


These prototypes were developed based on the Prosper Canada's suggestions and requirements and were condensed into diagrams that best represent the features and demonstrate the most efficient way for users to achieve their designated goals.

Phase III – Development of the Booking System

After finalizing the paper prototype, the team started the development of the booking system named ‘Prosper Tax’. Prosper Tax, an application to help individuals and families with tax support, makes it easier for everyone to connect with tax clinics in their area, view their availability and select the appointment date and time that works best for them. The users receive confirmation about their upcoming appointment via email or mobile phone after they schedule their appointment. The clinics then may contact the users through the application, making it more convenient for users who may not have the time or resources to visit the clinic in person. In addition, the application helps the tax clinics keep track of their client information and the upcoming appointments booked by users in one centralized location. The tool allows the tax clinics to assign a volunteer to assist the users with tax filing. Connecting volunteers with filers supports the organizations with limited resources since it allows them to leverage the expertise of volunteers to provide additional support for users in need. The volunteer can assist the tax filers with various tasks such as preparing the tax return, answering tax-related questions, and helping clients navigate through complex tax laws and regulations. Overall, the application provides a more effective and efficient way to support the users. Tax clinics and their volunteers can work together to connect with individuals and families that need help with taxes and provide them with critical assistance that can further help them to achieve better financial stability by claiming the benefits they are eligible for.

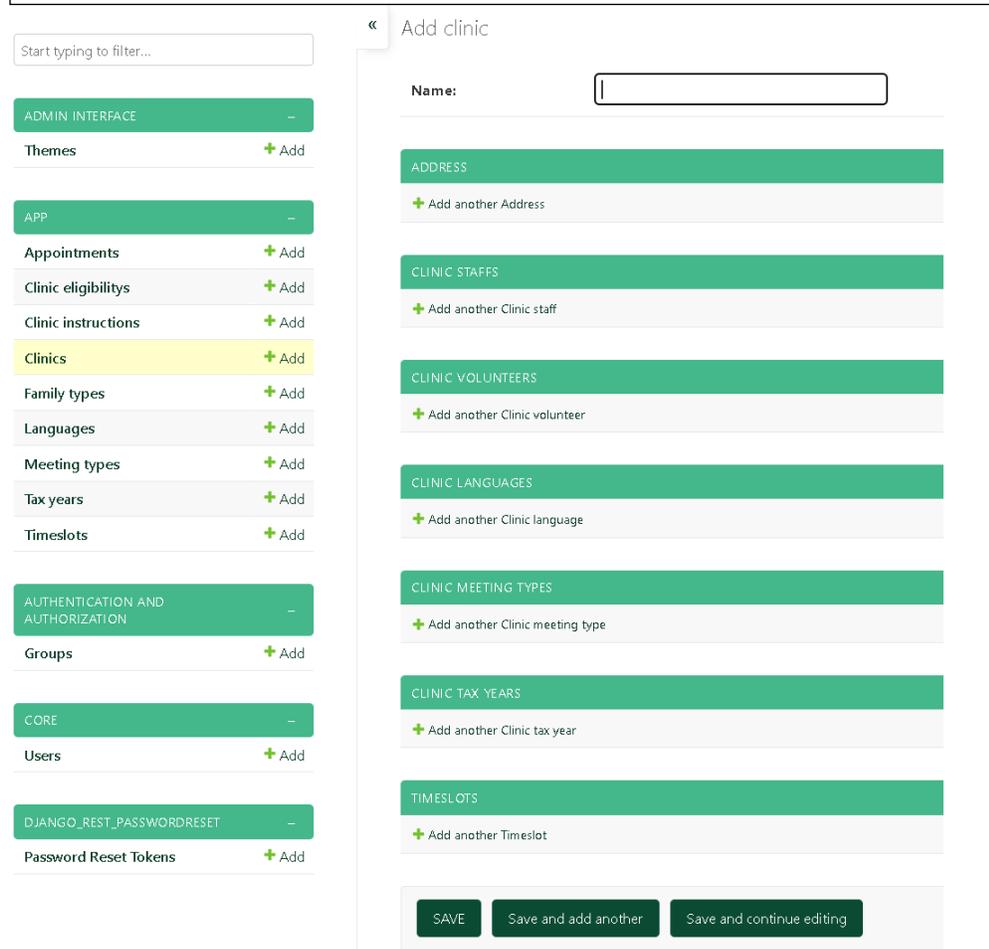
Figure 4: - Various Portals of the Booking System



This application consists of 4 main portals: Administrator (admin) portal, Clinic portal, Client portal, and Volunteer portal. Each portal assists in making booking tax appointments easier and efficient for tax filers and clinics. Figure 4 illustrates simplified version of each portal and their functions.

The Administrator portal allows for the creation and management of all accounts and features in this application. One of the roles of Administrator is to create and manage clinics, clinic agent accounts and volunteer accounts. They can also add default values to certain categories in this application such as family type, language, tax year and meeting types that can be accessible to the clinics after these changes are made. This portal is the main portal for all overhead functions of the application.

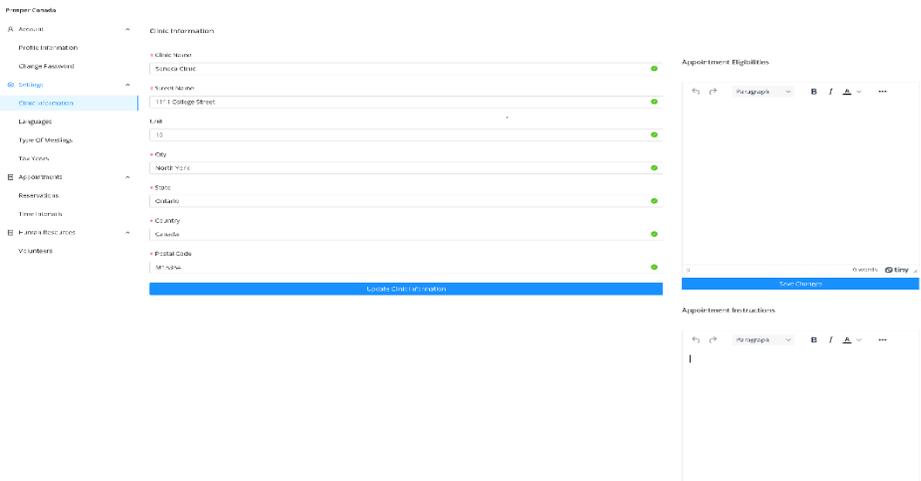
Figure 5: - Administrator Portal



The Clinic Agent portal allows individuals to manage their settings and information for their clinic. The user can manage their personal account settings such as their username, email, and password, as well as manage the public clinic settings that will be available to the client users as seen in the figure below. Along with the address and eligibility updates, the clinic agent can also update and change their language, tax year, meeting type, and timeslot settings from the default if needed. Lastly, they can also manage and create

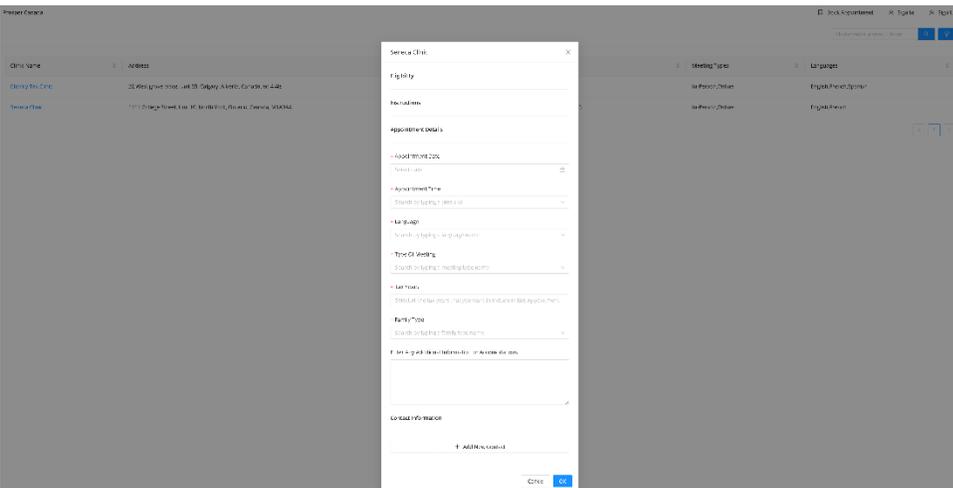
appointments on behalf of a client and manage/add volunteers. On this portal, clinics have editable fields to describe their profile, such as their specialty, the population/communities they serve, and define eligibility for tax filing services, the documents clients should prepare before joining an appointment, and provide a channel for clients to submit documents.

Figure 6: - Clinic Agent Portal



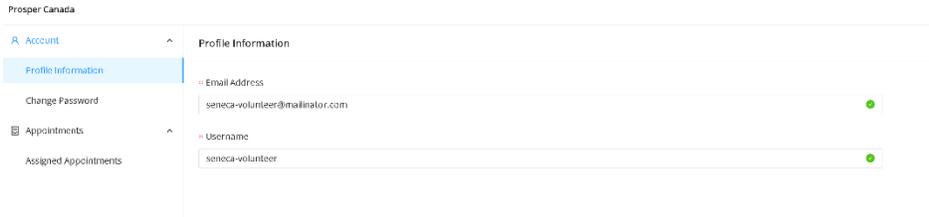
The Client portal is simpler and user efficient as the picture below presents. This portal displays a list of clinics available to book with, accompanied by a search bar to search for a specific clinic and a filter feature to filter the clinics based on date, time, language, meeting type, and tax year. Once the user selects a clinic, they can now fill in a simple form that allows them to select the date and time of appointment and add any other necessary details. Once the user clicks the submit button, the appointment will be created.

Figure 7: - Client Portal



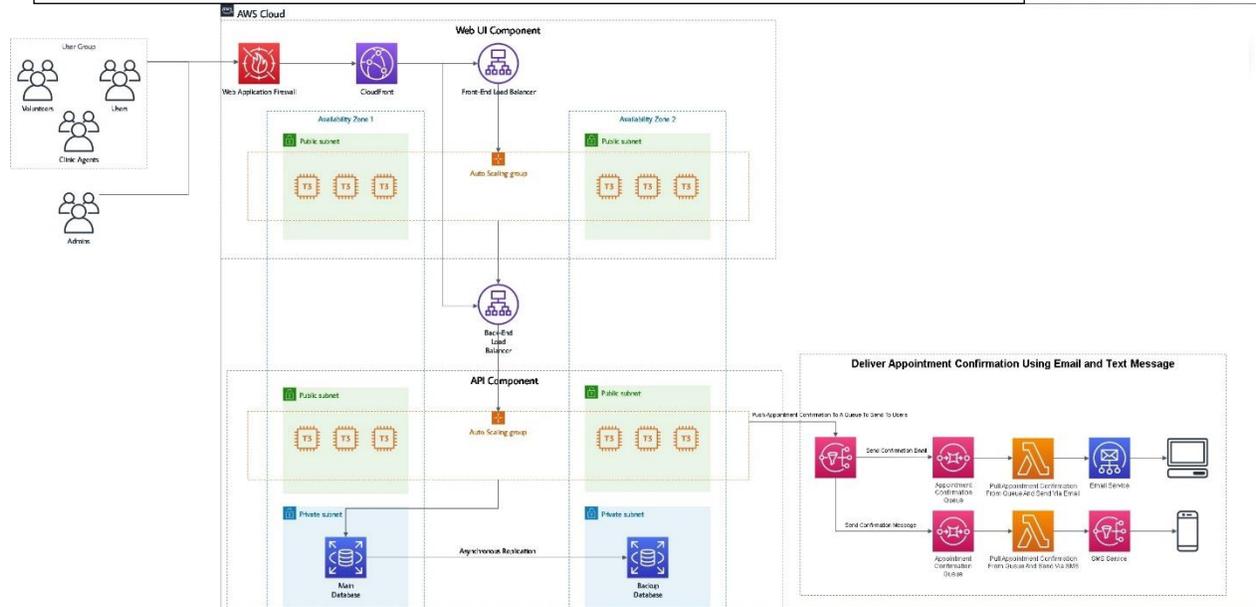
Lastly the volunteer portal is a simplified version of the clinic agent profile, where they can change their account details and passwords and can view the appointments they are assigned to.

Figure 8: - Volunteer Portal



The diagram below aims to provide a visual of our system and how it uses AWS to provide a scalable, secure, and high-availability application to serve all the above listed users. The network application structure consists of multiple layers and components that will be explained below, each performing a specific task to achieve the overall objective of the application.

Figure 9: - Visual Representation of the Booking System



User Authentication and Security: Users enter the application through the AWS Web Application Firewall, which provides an additional layer of security to the application. After passing through the firewall, users can access the front-end page hosted on CloudFront. The front-end technology includes Front-End Load Balance, which distributes traffic to an Auto Scaling group. The Auto Scaling group covers two public subnets, ensuring high availability and scalability.

Using a combination of private and public subnets in AWS can provide an additional server security layer and enhance overall network security.

1. **Segmentation:** By dividing the network into private and public subnets, we create a logical separation between resources that are accessible from the internet (public subnet) and those that are not (private subnet). This segmentation reduces the attack surface and limits the exposure of servers to potential threats.
2. **Controlled Access:** Public subnets connect to the internet and allow inbound and outbound traffic, making them suitable for resources that need to be publicly accessible, such as web servers. However, private subnets are isolated from the internet and restrict direct access, providing a secure environment for sensitive resources like database servers.
3. **Network Access Control Lists (ACLs):** Network ACLs act as a virtual firewall at the subnet level and allow or deny inbound/outbound traffic based on rules. By configuring appropriate ACLs, we control the flow of traffic to servers. Public subnets may have more permissive rules to allow public access, while private subnets can have stricter rules to limit access only to trusted sources.
4. **Security Groups:** Security groups function as virtual firewalls at the instance level, controlling inbound and outbound traffic. By associating security groups with server instances, we define granular rules to allow specific protocols, ports, and IP ranges. This adds a layer of security by controlling server access based on individual instances.
5. **NAT Gateway or Bastion Host:** We utilized Bastion Host to access the production database servers. Since private subnets are isolated from the internet, we need to establish outbound internet connectivity for servers in the private subnet. A NAT gateway or bastion host can be deployed in a public subnet to act as a bridge, allowing private instances to access the internet securely without exposing them directly. This setup ensures that sensitive servers remain protected while still being able to interact with necessary external resources.
6. **Enhanced Data Protection:** Placing sensitive servers in a private subnet adds an extra layer of defense against potential attacks. By keeping these servers, databases or backend servers inaccessible from the public internet, we reduce the risk of unauthorized access, data breaches, and exploitation of vulnerabilities.

Backend Load Balancing: The frontend sends requests to the backend, which consists of a Backend-End Load Balance that controls the APIs. The backend also has an Auto Scaling group that covers two subnets to ensure high availability and scalability. The Backend-End Load Balance distributes requests to the

appropriate components based on the request type. For example, if the frontend request is Appointment, then the backend will send the request to the Appointment component.

Appointment Component: The Appointment component includes Queue for confirming Appointment, email, and SMS for sending appointment confirmation to clients. This component performs the necessary actions to confirm and communicate appointment details to users.

Database: The application has two databases, one being the main database used for storage and scheduling. If the main database is lost, the backup database can be applied and enabled. Asynchronous replication between the two databases ensures that the application runs without interruption. The database is not open to the outside world and uses a private subnet, ensuring data security.

Phase IV - Pilot with the Nonprofit Organization and Further Improvements in the Tool

After developing the tool, our research team started a pilot testing with one of the organizations – Disability alliance, a nonprofit organization located in British Columbia (DABC). The booking system was tested by their staff and the clients from March 2023 to May 2023. We received continuous feedback from them to modify the application and worked on these modifications. Our client, DABC, had concerns regarding the confidentiality of client and appointment records accessible to administrators. Our developers proposed a solution by creating customized APIs for administrative tasks and replacing the current Django administration module. We should design a new interface that consolidates all relevant clinic information, such as name, address, and settings, onto one page. Additionally, we recommended switching the database system from relational to non-relational to improve retrieval and modification times. Lastly, we should automate the appointment slot population by introducing a volunteer portal through which volunteers can provide their availability to create appointment slots, allowing agents to focus on other critical tasks. The current platform allows customers to open the website from a PC or mobile device using a browser. If necessary, it may be needed to design an APP for this platform in the future. We proposed improving authentication and access control to prevent unauthorized access and brute-force attacks. For a user-friendly interface that can be extended to third-party authentication services, we suggest using AWS Cognito. It provides a pre-built defense against attacks, is cost-effective, and integrates well with existing authentication systems. To reduce hosting costs and avoid paying for idle time, we recommend redesigning the backend using serverless architecture on AWS.

Furthermore, they were requested to collect feedback from the volunteers who serve the clients for tax filing. Though the sample size was quite small, the feedback provided by them was useful to evaluate the usability of the tool. Clients found this tool to be great and user friendly. Some participants expressed their interest in the tool and would like to use it in future. The tool enables them to communicate with the right

person and file their taxes virtually. However, some participants found the whole process of booking a little longer as compared to other means of booking an appointment such as via phone. We believe that once the clients start using it more often, it will be faster to book appointments for them. This will further save the time and resources of tax clinics, used for booking time slots for their clients.

In addition to the above points, other implementations need to be improved in the future for the benefit of clinics and users. First, on the clinic portal, each timeslot scheduling should add a “Language” option that can be specified according to the volunteer’s ability. Second, DABC recommends the timeslots that is available within certain number of hours of the same day should not be visible to the client. That is, restrict the same day booking by the client. Third, clinics can define their geographic service area, a parameter that can be used as a filter when customers search for clinics. Fourth, it is best to allow one appointment per person in the system. That is, each customer should not book multiple appointments with the same email or phone number. Fifth, if the tax years are not created sequentially, they should be automatically sorted sequentially by the system, which is not currently the case. Sixth, this is not for future improvement, but a friendly reminder. If a client books a virtual appointment, the clinic should be aware of this and generate an online meeting link for this appointment via Microsoft Teams, Zoom, or similar tools and promptly send the link to the client's phone or email.

Benefits of the Web Application

This section describes the main benefits of the tools for the administrator, clinics, and clients.

Administrator Side

Under the admin portal of the web application, admin will have access to a range of powerful tools and capabilities to help them manage and optimize the functionality of their online platform. With a high level of authority, admin will have control over its performance and user experience and will be able to perform global operations on the entire web application. One of the key benefits of the admin functions is the ability to generate, modify, and delete tax clinics, clinic agents, and clinic volunteers. Hence admin will be able to easily manage and update the information associated with these entities, ensuring that the web application is always up-to-date and accurate. In addition, abilities under the admin portal will enable them to customize the experience of their web application for different users tailoring it to their unique needs and preferences. If the administrator adds the tax years, meeting types and support languages to the database of clinics, only clinic agents will be able to activate or deactivate these features within the clinic portal. This provides a layer of control on the admin portal to pre-define the uniformity of information in terms of taxable years, meeting types and supported languages, clients will be able to experience similar options no

matter which clinic they choose. Overall, the admin function of the web application provides a high level of control and customization over the online platform.

Clinic Side

As tax season approaches, it's important for tax filing agencies to have access to the tools and resources to ensure they can effectively serve their clients. Prosper Tax provides a range of functions and features to help streamline and optimize their operations. One of the key benefits of our web application is its ability to support tax clinic management through the admin portal. The admin uses the admin portal and can easily create a new portal for the newly joined clinic, along with one or more clinic agents who can manage the clinic. Conversely, the leaving clinic can request the admin to remove their clinic portal from the system. Clinic agents have access to a range of tools within the clinic portal. They can customize the clinic profile, define the eligibility criteria of the tax-filing clients, and update the appointment introduction that clients will see when making an appointment. This helps ensure that all relevant information is up-to-date and accurate, making it easier for clients to find and schedule appointments with the right clinic. Furthermore, our web application also allows admins to specify the tax year of each clinic and the method of appointment. For example, a clinic may be able to do tax returns for the current year or for the previous 5 years and may offer online or in-person appointments. Clinic agents can then specify the type of appointments to accept in the current period within the clinic portal, further optimizing the scheduling process. Language support is also a key feature of our web application. Admins can add languages such as English, French, or other languages to a specific clinic through the admin portal, and clinic agents can select the appointment language currently supported by the clinic on their portal based on their staff's language proficiency. This helps ensure that all clients can communicate effectively with the clinic, regardless of language barriers.

Our web application also offers two powerful functions that are specifically designed to optimize appointment scheduling and management for tax clinics.

The first function is the ability for clinic agents to set time slots based on the number of clinic's staff members. This feature allows clinic agents to specify a time and set the maximum number of appointments that can be booked during that time. Once the time period is exceeded or the maximum number of appointments has been reached, no further appointments will be allowed on the client side. This helps ensure that clinics can manage their schedules effectively and avoid overbooking or under booking. The second function is the ability for clinic agents to manage appointments directly within the clinic portal. This includes adding a new appointment on behalf of the client, updating the status of appointments, making changes to appointment settings, or manually canceling appointments. By offering this level of

control and flexibility, our web application empowers clinic agents to better manage their appointments and ensure that their clients are receiving the best service. By utilizing the web application, tax filing agencies can benefit from a range of powerful functions and features that are specifically designed to optimize their operations and streamline appointment scheduling and management. With the ability to set time slots based on the number of clinic employees, and manage appointments directly within the clinic portal, clinics can improve efficiency, reduce errors, and ultimately provide better service to their clients.

Client Portal

An appointment application designed to provide tax support can offer various advantages to low-income families. These benefits can be summarized as follows:

Convenience: The appointment application enables low-income families to schedule tax support appointments at their convenience. This feature is particularly useful for families with busy schedules or limited access to transportation.

Expertise: Tax clinic scan provides valuable guidance and expertise to low-income families. They can assist these families in navigating complex tax laws and regulations, thus maximizing their tax refunds, and minimizing costly errors.

Accessibility: The appointment application can make tax support more accessible to low-income families who may have limited access to paid tax professionals or may not know where to seek assistance.

Cost savings: Several tax support programs may charge fees for their services. The appointment application can help low-income families locate free or low-cost tax support options, saving them money and reducing financial stress.

In conclusion, the appointment application for tax support can be a powerful tool for low-income families. By providing access to expert advice, cost savings, and greater financial stability, this application can significantly benefit low-income families.

Conclusion

This project was structured into five distinct phases to achieve its objective of constructing a supportive booking system effectively and efficiently for tax clinics serving low-income communities. The implementation of these phases has provided a systematic framework, allowing for an organized progression and a clear understanding of each task at hand. Overall, the project has progressed systematically through various phases, starting from data collection and analysis, moving to prototype development, booking system implementation, pilot testing, and ultimately, the creation of a user guide.

This comprehensive approach ensures that the resulting tool addresses the identified barriers and meets the needs of both the community organizations and low-income individuals seeking tax filing assistance.

Work Cited

- [1] Canada Revenue Agency (CRA) and Corporate Research Associates Inc. (CRAI). “Barriers Associated with Tax Filing in Vulnerable Populations.” Government of Canada. 2017. <https://www.canada.ca/en/revenue-agency/services/about-canada-revenue-agency-cra/publicopinion-research-executive-summaries/barriers-tax-filing-vulnerable-populations.html>. Accessed 26 October 2019
- [2] Canada Revenue Agency (CRA). “Community Volunteer Income Tax Program: A Guide for Community Organizations”. Government of Canada. 2018. https://www.cchwebsites.com/content/pdf/tax_forms/ca/en/rc266.pdf. Accessed 29 October 2019
- [3] Cohen D, Crabtree B. “Qualitative Research Guidelines Project.” July 2006. <http://www.qualres.org/HomeSemi-3629.html>. Accessed on 5 November 2020.
- [4] Nirupa Varatharasan, Philippe Raphael, and Ayesha Umme-Jihad, “*Tax Time Insights: Experiences of people living on low income in Canada.*” Toronto: Prosper Canada. 2019.
- [5] *Reaching Out Report 2020: Improving the Canada Revenue Agency’s Community Volunteer Income Tax Program.* Minister of Public Services and Procurement Canada 2020, Office of the Taxpayers’ Ombudsman,2020.
- [6] *Tax Filing Support during COVID-19 pandemic.* Prosper Canada.2020.
- [7] *Taxpayer Rights in the Digital Age: The benefits and risks of digitalization for vulnerable populations in the Canadian income tax context.* Minister of Public Services and Procurement Canada 2020, Office of the Taxpayers’ Ombudsman, May 2020.
- [8] *Transformation through Disruption: Annual Report 2019-2020.* Minister of Public Services and Procurement Canada 2020, Office of the Taxpayers’ Ombudsman, 2020.
- [9] *Virtual CVITP Clinic Delivery: Updates from Financial Empowerment Champion partners.* Prosper Canada. July 2020.
- [10] <https://www.salesforce.com/ca/>
- [10a] <https://www.bdc.ca/en/articles-tools/technology/free-low-cost-applications/crm-solutions-free-low-cost-options>
- [10b] <https://www.wesuggestsoftware.com/top-10-crm-software-mostly-used-in-canada/>
- [11] <https://www.sumac.com/take-a-tour/>
- [12] <https://www.techsoup.ca/>^[i]
- [13] <https://diacc.ca/2020/05/13/self-assessment-verified-me-by-securekey-technologies-inc/>

[14] <https://corporate.e-courier.ca/>

[15] <https://www.techsoup.ca/taxonomy/term/909/rules>

Phase V – Preparing the User Guide

How to use the platform

We've been creating video clips on YouTube as a user guide to demonstrate how to use the platform. Here is the YouTube link: https://www.youtube.com/playlist?list=PL_EWWJJDZrUMAP8S8FzxHjCgiHmzz1HDW.

Instruction to use SQS to send email when appointments are created.

Here are the steps to follow to use AWS SQS (Simple Queue Service) queues and Lambda functions to send emails:

1. *Create an AWS SQS queue:* - Go to the Amazon SQS service in the AWS Management Console. - Click "Create New Queue" and give your queue a name. - Configure the settings you want for the queue, such as visibility timeout and message retention period. - Click "Create Queue" to create the SQS queue.
2. *Set up an IAM role for your Lambda function:* - Open the AWS Identity and Access Management (IAM) console. - Create a new IAM role or use an existing role that has permission to send emails through your email service (e.g., Amazon SES). - Make sure the IAM role has the necessary permissions to access the SQS queue you created in step 1.
3. *Create an AWS Lambda function:* - Open the AWS Lambda service in the AWS Management Console. - Click "Create function" and choose the authoring option that suits your needs (e.g., "Author from scratch"). - Give your Lambda function a name and choose the runtime environment (e.g., Node.js, Python). - Configure the settings you want for the function, such as memory allocation and timeout duration. - Under "Permissions," select the IAM role you created or updated in step 2. - Write or upload the code for your Lambda function that sends emails. Be sure to include the necessary code to connect to your email service and process messages from the SQS queue. - Save and deploy the Lambda function.
4. *Configure the SQS trigger for the Lambda function:* - In the AWS Lambda console, open the function you created in step 3. - Click "Add trigger" and select "SQS" from the trigger options. - Choose the SQS queue you created in step 1 from the "Queue" dropdown. - Configure any additional settings, such as batch size and polling interval. - Save the trigger configuration.
5. *Test the setup:* - Send a test message to the SQS queue using the AWS SDK or the AWS Management Console. - Monitor the execution logs of your Lambda function to ensure that it receives the message and

sends the email successfully. By following these instructions, you will have set up an AWS SQS queue to receive email-related messages and a Lambda function that processes these messages and sends emails using your email service. Don't forget to adjust the code in the Lambda function to match your specific requirements.

Instructions to use SQS to send SMS when appointments are created.

To use AWS SQS (Simple Queue Service) queues and Lambda functions for sending SMS messages, follow these steps:

1. Choose an SMS service provider that integrates with AWS, such as Amazon SNS (Simple Notification Service) or Twilio. Sign up for an account and follow their documentation to configure the SMS service with AWS integration.
2. Create an AWS SQS queue by going to the Amazon SQS service in the AWS Management Console. Provide a name for the queue and configure the desired settings. Click on "Create Queue" to create the SQS queue.
3. Set up an IAM role for your Lambda function by opening the AWS Identity and Access Management (IAM) console. Create a new IAM role or use an existing role that has permissions to send SMS messages through the chosen SMS service provider. Ensure that the IAM role has the necessary permissions to access the SQS queue created in step 2.
4. Create an AWS Lambda function by opening the AWS Lambda service in the AWS Management Console. Provide a name for your Lambda function and select the runtime environment. Configure the desired settings for the function. Under "Permissions," select the IAM role created or updated in step 3. Write or upload the code for your Lambda function that sends SMS messages. Make sure to include the necessary code to connect to the chosen SMS service provider and process the messages from the SQS queue. Save and deploy the Lambda function.
5. Configure the SQS trigger for the Lambda function by opening the function created in step 4 in the AWS Lambda console. Click on "Add trigger" and select "SQS" from the trigger options. Choose the SQS queue created in step 2 from the "Queue" dropdown. Configure any additional settings. Save the trigger configuration.
6. Test the setup by sending a test message to the SQS queue using the AWS SDK or the AWS Management Console. Monitor the execution logs of your Lambda function to ensure that it receives the

message and sends the SMS successfully. By following these steps, you can set up an AWS SQS queue to receive SMS-related messages and a Lambda function that processes these messages and sends SMS messages using the configured SMS service provider. Adjust the code in the Lambda function to match your specific SMS service provider and requirements.

Set up database using MySQL engine and set up security group, so the traffic only allowed from backend tier.

To set up RDS MySQL on AWS and allow traffic from the backend tier, follow these steps:

1. Log in to the AWS Management Console and open the Amazon RDS service.
2. Click on "Create database" to set up a new RDS MySQL instance.
3. Choose the MySQL engine and select the desired version for your database.
4. Under "Templates," choose the appropriate template based on your workload requirements (e.g., Free tier, Production).
5. In the "Settings" section: - Provide a unique name for your database instance. - Set the master username and password for accessing the database. - Configure the size, storage, and allocated resources based on your needs.
6. In the "Connectivity" section: - Choose the desired VPC for your RDS instance or create a new one. - Select the appropriate subnet group within the chosen VPC. - Specify the database port (default is 3306) for inbound connections.
7. In the "Security" section: - Choose the option "Create new" for the security group. - Provide a name for the security group. - Click on "Add rule" to configure inbound rules for the security group. - Select "MySQL/Aurora" as the type. - Specify the source IP or IP range of your backend tier to allow traffic from the backend. - Add any additional inbound rules as needed.
8. Review the configuration details and click on "Create database" to create your RDS MySQL instance.
9. Wait for the instance creation to complete.
10. Once available, note down the endpoint URL, which will be used to connect to the MySQL database from your backend tier.
11. Update the configuration of your backend tier to use the RDS MySQL endpoint URL, along with the provided master username and password, for database connections.
12. Test the connectivity from your backend tier to the RDS MySQL instance using the configured endpoint URL, username, and password.

By following these steps, you can successfully set up an RDS MySQL instance on AWS and configure a security group to allow traffic from your backend tier. Make sure to adjust the settings and parameters based on your requirements and VPC configuration.

Installation Instructions

Install pip

Windows

Step 1: Download the get-pip.py Script.

Open a web browser and go to the following link to download the get-pip.py script:
<https://bootstrap.pypa.io/get-pip.py>

Right-click on the page and select "Save As" or "Save Page As" to download the script to your computer.

Step 2: Open a Command Prompt

Press the Win + R keys on your keyboard to open the "Run" dialog box.

Type cmd and press Enter to open a Command Prompt.

Step 3: Navigate to the Directory

Use the cd command to navigate to the directory where you saved the get-pip.py script. For example: cd C:\path\to\directory

Step 4: Install pip

Run the following command to install pip: python get-pip.py

Step 5: Verify the Installation

To verify that pip is installed correctly, run the following command: pip --version.

MacOS and Linux

Step 1: Open a Terminal

Launch the Terminal application on your macOS or Linux system.

Step 2: Install pip

Run the following command to install pip:

```
curl https://bootstrap.pypa.io/get-pip.py -o get-pip.py  
sudo python get-pip.py
```

Step 3: Verify the Installation

To verify that pip is installed correctly, run the following command:

```
pip --version
```

Setup Backend Environment

Step 1: Install Django

Ensure you have Python installed on your system. You can download the latest version of Python from the official Python website.

Open a terminal or command prompt and run the following command to install Django using pip (Python package manager): `pip install django`

Step 2: Create a Django Project

Open a terminal or command prompt and navigate to the directory where you want to create your Django project.

Run the following command to create a new Django project: `django-admin startproject project_name`

Replace the project name with the desired name for your project. This command will create a new directory with the project structure and necessary files.

Step 3: Navigate to the Project Directory

Change into the project directory by running the following command: `cd project name`.

Replace the project name with the name of your project.

Step 4: Create a Django App

Django projects are made up of multiple apps. Each app represents a specific functionality of the project.

Run the following command to create a new Django app: `python manage.py start app name`

Replace app name with the desired name for your app. This command will create a new directory with the app structure and necessary files.

Step 5: Configure the Database

By default, Django uses SQLite as the database. If you want to use a different database, you'll need to update the project's settings. Open the `settings.py` file located in the project directory and modify the `DATABASES` section accordingly.

Step 6: Run Migrations

Migrations are used to create database tables based on your app's models. Run the following command to apply migrations to the database: `python manage.py migrate`.

Step 7: Start the Development Server

You can now start the Django development server to see your project in action. Run the following command: `python manage.py run server`. This command will start the server, and you can access your project by visiting `http://localhost:8000` in your web browser.