Keep.id: A Secure Identification Storage System for those Experiencing Homelessness (Team 23)

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Abstract

One of the most pressing issues facing the homeless population is lack of access and security relating to government issued identification. Government identification remains crucial in rebuilding and maintaining political, economic, and social ties between this disadvantaged population and society, and we want to contribute towards ending the cycle of homelessness. This is the vision behind Keep.id, a secure document storage application that allows the homeless to easily store a copy of their identification online for easy access. With copies of identification stored online, this would facilitate processes such as filling out job applications, completing government aid forms, and even help them participate in the democratic process.

As of now, Keep.id has the functionality to upload/download PDFs and to sign up homeless clients and nonprofit workers. However, it cannot auto fill PDFs and send documents, which we hope to build. We evaluated the product through small scale user testing, security through advisor feedback, and the business through customer interviews with I-CORP. We used these evaluations to refine our target customer needs and product focus.

If successful, homeless clients would use the product to access their IDs or submit government applications. Long-term we hope the project even the previously homeless will use our product to receive aid from government programs, and apply for jobs and housing. We want to create a cloud storage app that's built for the homeless population and truly caters to their unique needs.

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1 Motivation and Business Analysis

1.1 Problem Statement

Despite being a rich polity, the United States of America has immense societal inequality and homelessness problems. These problems are rooted in marginalization of those incarcerated, historical discrimination, and drug abuse. Homelessness is pervasive and many are often moved to help the homeless, but it is difficult because one-time charity cannot solve the systemic problems keeping the homeless from housing. One of the biggest issues facing the homeless is lack of access to government-issued identification. On the streets, government ID's are often stolen along with personal bags while someone is sleeping, and so many homeless individuals do not have ID because it was stolen within the first few months of being homeless, and if they got it again they would lose it soon. Often, those that do have ID carry it in their backpack 24/7, which is a suboptimal place to keep one's ID. If they store their ID somewhere secure but remote, such as a file cabinet of an organization, they will not have access to it and hence it will be useless in many cases that ID is required. Our goal is to empower the homeless to reintegrate into society, which requires an ID for housing applications, job applications, aid applications, voting, and even entry into certain buildings.

For example, the I9 is a form the United States of America government requires to prove legality to work, so that noncitizens cannot obtain work without permission. However, the I9 requires per-

sonal ID to prove identity and eligibility to work, and this requires sensitive documents such as a birth certificate or passport. If the homeless do not have these documents, their only option is informal, illegal work. This makes employment for the homeless hard without ID. We want to aid the homeless in getting back on their feet, but they need a secure ID first, because government aid programs in the city cannot help the homeless if they require ID and the homeless have none.

Our goal is to empower the homeless with Keep.id, a web application which allows the homeless to easily store a copy of their ID online for easy access. The web application will have a few main features including upload/download of ID, filing of government aid forms using ID copies (where legally accepted), and sending secure emails to agencies with the possibility of including ID. The homeless client would go to an agency for homeless services (Broad Street Ministries, etc.) to first begin the process of acquiring a new physical ID if they had lost it. Once they acquire a physical ID, they would upload scans of it with the help of the homeless service agency to their own Keep.id account. The physical copy would then be stored with the homeless service agency or the government. The online copy through Keep.id could then be sent securely to organizations, accessed at the library, or printed out. We also hope to autofill aid applications with the information from the ID's (with client permission of course). Because many homeless do not have phones, current two-step verification methods would need to be substituted with more relationally-oriented methods through homeless service agencies.

1.2 Value Proposition

Keep.id is document storage built for those experiencing homelessness. Secure information storage, access to government assistance, and legal ownership of data is made available through the help of partner organizations on the ground.

We offer a dual value proposition, because we create value for both the homeless clients and the nonprofits/local governments serving the homeless. Keep.id primarily serves the homeless, because it is focused on creating immediate value and security for their situation. Keep.id helps those experiencing homelessness who want to access available aid by securely storing ID, automatically applying to benefits, and providing connections to homelessness services. We hope to make the lives of the homeless easier through this product, and we hope to help decrease barriers to reentry through government and private aid.
We also serve the nonprofits, because through this product we will help them achieve their goals of mitigating the effects of homelessness. Because these participating nonprofits will be locations where accounts can be created and accessed, then many homeless will be drawn to more frequently visit these nonprofits and build relationships with the people there, in turn increasing their ability to be free from homelessness. Keep.id also helps homelessness-focused nonprofits and local governments by reducing the time employees spend completing aid applications, reducing barriers in the process of helping clients apply for aid through online ID management, and growing the base served of agencies.

1.3 Stakeholder Analysis

In our Keep.id ecosystem, we recognize the presence of a variety of stakeholders, including those experiencing homeless (we call them guests), aid organization such as Broad Street Ministries, government assistance contacts, and medical providers. We will use a PESTLE framework to analyze the space we are entering. PESTLE stands for Political, Economic, Social/Cultural, Technological, Legal, and Ecological.

1. Political: We will be communicating with government officials that deal with governmental assistance programs such as SNAP (Pennsylvania Supplemental Nutrition Assistance Program), Medicare/Medicaid, Social Security and other welfare programs. As requirements for enrollment in these programs changes over time due to government policies, Keep.id needs to notify users and continue to stay in line with these policies.

2. Economic: We are currently in an economic bull market, which means unemployment is low. As a result, the homeless population should be below its average currently. However, if another financial collapse begins, many more individuals will lose their homes unfortunately. We hope to be ready to provide the needed service in this case.

3. Social/Cultural: It is important to understand the marginalized status of many of these homeless populations, which have frequently been the targets of unfair policing strategies, assault, and gang violence. These homeless populations are also frequently swept under the rug and receive no political inclusion, which often leaves them underrepresented and misunderstood. When building Keep.id, understanding the perceptions and lifestyle of the populations experiencing homelessness is critical. There also might be issues with trust of technology and outsiders in storing sensitive documents, because these individuals have often experienced the worst of people and society, and so they might only trust on a relational level but not on a corporate level. They also might be unsure of whether the technology will work or safely store their documents, and they might be confused as to how it works.

4. Technological: With the rise government supplied phones, dubbed "Obamaphones", to homeless populations, access to Keep.id is growing. We also hope to provide cheap but powerful computers such as Chromebooks to the agencies we partner with, which has been possible through decreasing computer costs.

5. Legal: Because Keep.id does handle medical data, we must ensure that we are HIPAA compliant. This means external audits and dedicated legal advisors to help ensure compliance.

6. Environmental Factors: Not much in this category. In Philly winters, there is usually an increase in the homeless population that stays in shelters, which might increase strain.

1.4 Market Opportunity

The homeless are a notoriously underserved market because they have little to no resources of their own to spend on products aside from bare needs, so it is difficult to build sustainable products to serve them. We are capitalizing on the existence of numerous nonprofits that support this cause. Since Broad Street Ministries, the premier homeless service agency in Philadelphia, was the developer of the idea, we believe that other nonprofits would be eager to try the product to help their homeless clients.

The two major paying market segments are the nonprofits supporting the homeless and the local government, because both have an interest in the product. We interviewed nonprofits through I-CORP, and we were able to assess what needs they faced with regards to ID storage and application filling.

We discovered that ID is needed for other uses that we did not think of as Penn students, such as proving the custody of children or accessing a methadone clinic (for previous opiate users). Also, we learned that small organizations send their clients to Social Services Agency (a government agency) in order for them to fill out their forms. This is because people are comfortable with this government agency. As a result, we realized that providing Keep.id for local governments is important, because they also fill out aid forms for people to apply for benefits.

We also validated the need to store medical documents, but not for the same reason that we thought initially. We learned that medical documents are important for proving disability for application to SSI, and the homeless disproportionately struggle with disabilities and have SSI. As a result, HIPAA compliance is important for our product to help with application to SSI, and we are building our product to be compliant, in addition to the original reasons of having our product be of the highest security standards.

We learned about the need for organization of the various documents needed for an application, and not only the application itself. We interview Christian Churches of Harrisburg and found that coordinating the documents needed is a major barrier, because this can be confusing to the homeless. We need to build functionality to make this digital and automatically check if the documents needed have been uploaded in order to make this process easier. We also heard from them that, "Paperwork is something that keeps homeless people from accessing services that they could be accessing otherwise", validating the need for our product.

We also gained information on the relative percentages of the homeless with ID. We learned that roughly 15 percent of the homeless have no ID (from one agency) and that 65 percent of the homeless lack some form of ID (from another agency). We also learned that for most of the homeless, agencies know who they are, and they can help them gain ID and apply for benefits

through informal methods, because they have a relationship with the client. However, a small percentage of the homeless are unknown to nonprofits and have no ID, so helping them begin the process of acquiring ID and apply for benefits is very hard. We found out that ID can be used to acquire other ID, and some forms of ID are free in Pennsylvania for the homeless, like birth certificates. A digital copy of ID can be used to get a new copy of another ID or the same ID, so we validated the use of ID images in getting new ID. Also, we asked some agencies whether a digital copy of ID would be allowed in many cases when applying, and they said that it depends on the relationship between the aid agency and the nonprofit, and that many times a digital copy will be accepted if the nonprofit is trusted to have the original ID. This is because the aid agency will make a copy of the ID anyway, so if they can trust the nonprofit then they will accept a PDF copy. We also learned that many employers will accept a PDF copy of ID when filling the I9, even though they technically are supposed to see the original. We learned a lot about the need for ID storage and the use of digital ID copies, and we believe that digital ID copies will be useful for this population given the current legal environment.

We also learned that there is a need for sharing information among various nonprofits in a city. Many current solutions do not allow data sharing among nonprofits (even if allowed by clients) of information such as drug usage and veteran status, so whenever a homeless person visits a new nonprofit, they have to answer these questions again. One nonprofit mentioned that if this information could be shared with the client's permission, it would decrease barriers to clients accessing the services they needed and would streamline the process, which is something we are planning for Keep.id to do.

1.5 Customer Hypothesis

We also discovered that nonprofits would not be the best customers, but rather local government agencies. This is because the nonprofits we interviewed said that they had very low budgets for "innovative" activities, because most of the funds they received were from the federal government, which required them to spend the money on basic projects like food and shelter. However, they suggested partnering with private agencies to fund the project, because they said whenever they tried to fund a new project, they often partnered with a private organization. Rather, they said that the local government would be a better customer, because they are often the ones filling out many applications, and they would also control whether digital ID would be accepted or not. However, we were discouraged by this because we believe that local governments would be more difficult to acquire as customers because they would require our product to be more stable and would be more risk-averse. We decided that we would need to have a base of nonprofit users, which could be using for free, before we ask a local government to fund our product, because we need to show the local government that the product works. One benefit of local governments as customers is that the revenue is more stable, because government contracts are more stable than private contracts, since government usually have a more constant spending budget than private organizations.

We realized that Continuums of Care would be the best customer for our product after interviewing many nonprofits. We interviewed a continuum of care, and they described themselves as the coordinators for all the homeless services within a city. They can be nonprofits or government agencies, but they are not for-profit. They decide which HMIS (Homeless Management Information Service) a county (or area of counties) will use, and so we believe that entering counties through Continuums of Care would be the most effective way to spread Keep.id, because they might be able to help secure government funding from HUD or DHHS, and they would be able to help coordinate the use of Keep.id among various nonprofits in the county.

It is important to understand the homeless population too, which is the target user for Keep.id. The two major groups of the homeless are the street homeless and the sheltered homeless. The street homeless are the individuals living on the street at night, and they are at the highest risk for disease and hypothermia. They tend to be less trusting because they are not using shelters, and they might have trust issues with our product. The sheltered homeless live in shelters or temporary housing, and this population is actually much larger in a city like Philadelphia. They would likely be more trusting of a product endorsed by organizations, because they are already using other services.

After we interviewed the nonprofits, we described Keep.id to them, and many offered to help

us Beta test, so we believe that even though funding for Keep.id could be difficult, a dedicated user base exists for this product and there is demonstrated need for a service storing the ID of the homeless digitally.

1.6 Market Size Segment

In 2018, there were an estimated 5,788 homeless in Philadelphia by the government, and 1,083 of them were street homeless (Mitchell, 2018). This was an increase of 1.7% from the previous year (Mitchell, 2018). Due to the opioid crisis, we expect this number to continue increasing until the crisis is reverted. In 2018, 553,000 individuals were homeless, and 194,000 were unsheltered (Council, 2019). As we expand from BSM to other local aid organizations around Philadelphia, we expand our reach, and moving to nearby clusters of homelessness such as in New York, Baltimore, and Washington DC allow our user base to grow.

It is almost impossible to exactly understand the market size of the homelessness nonprofits, because some organizations are part of churches and serve other functions, and some nonprofits serve 10s of homeless persons, while others serve 1000s of homeless persons, so there is no way to directly know how many organizations serve the homeless based on the population in a city without individually counting them, and some organizations overlap multiple jurisdictions. However, we assume that the growth of homeless nonprofits will be roughly proportional to the size of the homeless population, and as revenues are dependent on the number of homeless served (since our business model is a subscription per person), it does not matter how many homeless nonprofits there are. Each county has a continuum of care, our main customer, and we do not have reason to expect the number of these to grow or shrink.

1.7 Cost

The costs associated with running the website total around 500 dollars a year currently (although they will need to be scaled, but with marginal costs for storage, since PDF files are not too large). The major cost is supporting developers full time to work on the project and maintain it. We hope to support two developers, one focused on front end and one on back end, and each will receive a 35,000 dollar compensation package. We believe we can hire people for this amount if they are passionate about the social cause, because nonprofits often pay similar amounts. We also plan to hire one individual at 35,000 dollar for interfacing with the homeless and testing the product with them constantly. thousand clients (for the workstation).

1.8 Revenue

Our revenue model is a monthly subscription for the nonprofits, which is signed in three month long contracts. We hope to charge each nonprofit 10/year per person on the service, with a 15 person minimum. We require 15 persons minimum in order to ensure the nonprofit is large enough, because we will provide them with laptops, so they need to serve a large population to make this investment worth it. The nonprofit pays 10 a year per individual, which is easily how much the nonprofit could spend in two days on food for the individual. Given that the product has the ability to help with long-term homelessness, we believe that many nonprofits will be willing to purchase.
There are many cities nearby such as New York, Baltimore, and Washington, D.C., which we can expand to quickly and which combined have a homeless population of around 105,000 (Council, 2019). Hence, since the Washington, D.C. to New York stretch has around 110,000 homeless (including Philadelphia), if we are able to capture 15 percent of this market (around 15,000 homeless and 150,000 dollars annually), we can sustain the project. Reaching 1/5 of these nonprofit organizations would be our target, which would allow Keep.id to be fully self-sustaining.

2 Related Work

There are currently cloud-based document storage systems such as Google Drive (http://drive.google.com) and OneDrive (https://onedrive.live.com) for the general population. There are also Homeless Management Information Systems, such as Philadephia's Office of Homeless Services (http://philadelphiaofficeofhomelessservices.org/about-us/hmis/) that are designed to collect information about those who are experiencing homelessness or are at risk of homelessness. However, there seem to be no public personal document storage services currently available specifically tailored for those who are experiencing homelessness.

Each area has a Continuum of Care, mentioned in section 1.5, which decides which HMIS will

be used. HMIS systems are mandated by HUD for all agencies receiving federal money, and so all the homeless nonprofits in an area will use the same HMIS in order to receive this money. We will be targeting these Continuums of Care to provide Keep.id, but we do not hope to replace HMIS systems, because they also track data for the purpose of the federal government. This includes data such as the number of homeless persons and other personal data, which is used in understanding the problem of homelessness by the federal government. We do not intend to provide this information now to the federal government, because it would require us to follow their regulations and be approved by the federal government, which is hard. The current HMIS market is monopolized, with 85 percent of the market controlled by WellSky (according to an interview we did through nonprofit OneRoof), and we do not hope to compete in this market, even though many current HMIS systems have the ability to upload documents. We are building a product to complement HMIS systems because ID storage can be seen by clients (whereas only nonprofits access HMIS systems and documents) and aid applications can be filed, so our product focuses more on applying for benefits rather than reporting data to the federal government.

Because we are storing health data, we will be in the health record industry, which is rapidly growing with many different standards. This industry is very competitive, but we have a unique distribution channel and an underserved market, which puts us at an advantage. We plan our innovation to be a disruptive innovation because it will be less functional than most current health care storage websites, but it will also cost much less for the nonprofits. In addition, we are utilizing homeless agencies to connect with customers that are likely not being marketed to by large health care data firms. We also provide more than just health care data storage, because we can store all types of identification. We also hope we will build a feature to allow for automatic form filling for government and NGO aid applications using the data we have.

For example, on health care data organization is EPIC https://www.epic.com/, which helps with health care files. However, they focus on analyzing these files and providing information regarding the data, which makes their product more expensive. We, on a different side are providing just storage for these files and simple scraping of descriptive data with no analyzing. This can also help with our trust, because homeless individuals might not want their health data to be analyzed for insights, which EPIC seems to do.

The solution is new because there exists no dedicated ID platforms for homeless ID storage that we know of. The current best solution would be to use Google Drive or OneDrive, but there are many problems with these solutions. First, these solutions are not designed to be used by the homeless population, which sometimes do not have things most people have, such as phones for two-step verification. Second, these applications do not allow for integration with aid agencies and for filling government aid forms using ID. Third, these applications do not have the account management our platform does through nonprofits, for on our platform an authorized nonprofit can perform actions on behalf of a homeless member if the homeless client requests.

Broad Street Ministries (BSM) exemplifies the third-party through whom Keep.id may be used. BSM offers support that the homeless can use to get the services they should have for the basic physical life necessities. There, they can receive mail for food stamps and social security, because they have their "residency" set to there. They can also apply for government services through the help of Broad Street Ministries, and they also can receive free services such as medical service and legal aid and free daily meals. The workers help the homeless get new ID through the government and advocate on their behalf, one example being how they have helped waive ID fees for the homeless.

3 Technical Approach

A comprehensive implementation overview can be found in Appendices A through D. Through each of these diagrams, we highlight key aspects of the system: we provide an architectural overview, an API diagram to highlight the extensive nature of our API, a class diagram to understand logic flow, a process view diagram to help understand the workflow of our development process, and a deployment view to see the underlying platforms.

3.1 Overview and Explanation of Technologies Used

As seen in Appendix A, the Keep.id Application Overview, our product consists of three parts a client, server, and Database, with an additional part being physically physical document storage at non profits, which is part of the overall proposed system but not something we are in charge of creating or managing.

As shown in Appendix A we hosted both our client and server on Heroku, a platform-as-a-service provider. We chose to use Heroku because it allowed for continuous integration where we could seamlessly implement and view our work online by Heroku hosting whatever was pushed to our GitHub. To ensure the viability of code pushed to master we also attached a Travis CI (continuous integration) test suite to make sure our code could carry out basic tasks without breaking. Travis allows for tested automated deployments with both integration and unit test, which sped up the development process greatly. As seen in Appendix D, our entire integration pipeline goes through multiple build and test phases, from style checking, to code coverage, to even package vulnerability management. If you follow the step numbers 1 through 7, you can get a better sense of our entire deployment and workflow.

For the frontend, as seen in Appendix A, we decided to use a CDN (content delovery network) and DNS (domain name service) provider called Cloudflare. Through using Cloudflare we helped limited some of the potential attacks and harmful activity that could be used against our website through the front end. The front end application was build in React.js and TypeScript, with strong security guarantees through environment variable protections.

Both our frontend and back end were run in linux containers. These containers can run in parallel and would allow our product to easily scale if demand increases. More detail can be found in Appendix E, which describes the physical architecture of the system.

Four our backend, our code was written in Java. When we started this project we had to decide the language in which we would write our backend. Though node.js may have allowed someone equally skilled in both JavaScript and java to build the backend with less difficulty, due to our previous experiences and classes, most of the team had much more experience with java. To set up the java server to communicate with the internet, we used the javalin framework since it is relatively simple and lightweight, only consisting of a few thousand lines of code.

For our database we chose to use MongoDB, a database-as-a-service. Many of our team members were more familiar and comfortable with it as opposed to SQL, and therefore by using it we believed we would speed our development time. To manage our database we used a cloud instance of MongoDB, which allowed us to have strict access control, and provided redundancies to our database spread throughout the world through geographic replication, allowing for quicker access and drastically reduced data loss potential. This enhanced the reliability and the security of Keep.id.

3.2 Our API Layer and Logic

An overview of our API layer can be found in Appendix B, which describes the various subsections of our server API. This allows us to send and receive data from the server in a scalable manner using REST practices, which are considered industry standard. Building upon that our logic relationships, which allow for easy code reuse and security protocols. This can be found in Appendix C, the Class Diagram.

4 Evaluation

To evaluate Keep.id, the team issued survey to Penn students and to security experts to gauge the effectiveness of the application on two different fronts. Though a third survey would have been ideal to issue to a more representative sample of users, such as Broad Street Ministry's guests, this was not achievable due to the current environment. The implementations and findings of the other surveys are as follows.

4.1 User Evaluation

In order to test that our product works seamlessly and intuitively to our user base, we sent out a questionnaire to a random sampling of testers that were given instructions to navigate through the application and use its features. This questionnaire contained a series of instructions that were purposely vague enough so that the users could give feedback on how difficult it was to find features within the application. For example,

instead of directing the tester to press the ”Start 3-Month Free Trial” button and fill out the form for a new organization, the instruction simply said ”Create a new organization.” This way, the tester could reveal to the team if the application has a natural and intuitively useful user interface. The instruction set that each user followed guided them through most of the main features of the application, including enrolling an organization, enrolling a worker, enrolling a client, uploading a few documents as the client, and viewing those documents. Then, the tester had the opportunity to freely roam around the website on their own to leave any additional feedback. Following the instruction set was a list of questions, which intended to to gauge how easily it was for the tester to understand how to access certain functionality within the application, as well as to provide feedback on any part of the application that could be improved. Here is the content of the questionnaire:

Please follow the instructions below and then write your responses. Please read the questions before.

1. Sign up as a director of your organization.
2. Log in as the director of your organization.
3. Create a new worker for the organization.
4. Log out as the director.
5. Log in as the new worker created in Step 3.
6. Create a new client for the organization.
7. Log in as the new client.
8. Upload a document.
9. Upload a second document.
10. View your documents.
11. Play around with the site.

Note: The instructions are purposely simplified to see if performing this set of actions is intuitive on our site.

Questions:

1. Were any of the instructions unintuitive to find on the website?
2. Were any of the instructions difficult to complete?
3. Overall, describe how intuitive or not intuitive Keep.id is?
4. Open-ended question: Do you believe that Keep.id would be useful for its target user?
5. If you played around with the site in Step 11, were there any features that either broke, were unintuitive, or could use improvement?

4.2 User Evaluation Results

From sending the user testing questionnaire to 10 people, the team was able to compile a list of the most common areas of feedback:

1. Many testers found the organization account creation process to be unintuitive. We received feedback that there should be an explicit button on the front page of the application that has a clear label that tells users how to enroll a new organization.

2. A few testers actually pointed out a bug in our backend code, which should have been caught during integration testing, but it is good that it was caught during this stage as a backup. Some users were unable to register clients and workers due to a session token failure.

Using this feedback, the team plans to add a more intuitive way to enroll an organization, and put in some more integration tests that solve the client- and worker- enrollment issues that some of the testers faced.

4.3 Security Evaluation

In addition to using the OWASP security guidelines to manually evaluate the security measures we implemented in our application, we also sent a detailed specification of our application to a number of security experts to get a sense of the ways in which we could improve our application’s security. The specification contained details on password storage, retrieval, reset, and session generation.

4.4 Security Evaluation Results

The feedback we received from our security experts was largely positive, as we had already been following most of their recommended security protocols. In particular, our security experts stressed that our application should be encrypting passwords before storing them in our database, and this is precisely what we had already implemented.

5 Societal Impact

Keep.id is primarily a social impact venture, as our application works with disadvantaged populations as well as helps existing nonprofits function more efficiently. Keep.id seeks to alleviate key pain points in the homeless population in their path towards societal integration centered around identification, which enables jobs, a social security net, and access to healthcare and mental illness treatment.

There are a couple possible concerns in dealing with a disadvantaged population, which include access, a reliance on nonprofits, and security. The first concern, access, deals with exactly how we can translate technological innovation into real world impact without excluding segments of the homeless population. While our initial focus is in Philadelphia, a very segregated city, we aim to create an inclusive application that does not favor certain demographics. One way to mitigate this is to partner with several different homeless organizations, as each homeless organization usually has a certain target demographic and territory, allowing Keep.id to diversify its access base. The second concern, reliance on nonprofits, deals with the instability and cash-strapped nature of nonprofits. Keep.id's business model uses nonprofit support in order to fund operations, which can be volatile as nonprofits frequently lack consistent sources of funding themselves. One way to mitigate this is to allow for Keep.id to be agile as a business and to never remove support for users, as removing access to identification would be devastating for many homeless. Lastly, security is one of Keep.id's top priorities in preserving the security and integrity of user data. Our application stores sensitive information, such as government identification and medical data, and we must protect that data from people seeking to further take advantage of those in need. Strong security evaluations, code style and quality, code testing, security audits, and using state-of-the-art cryptography are just a few of the many security protocols that we are pursuing.

6 Discussion and Lessons Learned

Overall, the team did not adhere very well to our initial timeline, which aimed to have a minimum-viable-product (MVP) finished and tested by the end of December. In reality, our MVP was finished closer to late February, which happened as a result of both an overly ambitious schedule, as well as some client feedback. We had consistent weekly meetings with our clients where we addressed their feedback on our weekly builds, which, in some ways, made it more difficult to adapt to the initial timeline that we had created for ourselves.

We definitely did not hold ourselves accountable to the missed milestones in our timeline, and we often did not communicate well enough things did not get done. This is a lesson that we should take with us when we continue to work on this project in the future. In reality, much of the team had very busy schedules and were not able to put in a large enough weekly commitment, so it is exciting to see the type of progress that will happen on the application when all of us are more free during the summer.

However, in the end we were able to complete the MVP and a few additional features and were set for user testing before Coronavirus, and I think that is something we can be proud of. As the semesters progressed we were able to improve our production rate by switching our weekly meetings to coding instead of meeting to discuss progress and pushing the progress meeting to once every few weeks so as to continue receiving feedback and to keep us accountable. Furthermore, I think as we continued to work on the project all of us improved and were able to fulfill our various roles better. I think we also learned that even though it may be slower to start, the initial investments of spending time to better understand the technologies, languages, and techniques that need to be used leads to a better and more quickly implemented product.

For the future, we foresee progress being made on Keep.id in the near future. We hope to continue working this summer on Keep.id. Some team members hope to continue Keep.id as a nonprofit and want to see the product be used in the hands of the intended clients. We hope to continue meeting nonprofits and we hope to get some to beta test with us soon, in addition to Broad Street Ministry. The next features we hope to create are autofilling aid applications and management of client documents by employees.

We have plans to continue Keep.id as a non-profit that would earn revenue, and we have goals to expand Keep.id to other cities in the United States besides from Philadelphia. Our goals are as follows:
Summer 2020: Finish new features and Beta test with three nonprofits
December 2020: One paying nonprofit, which is serving 20 percent of homeless population in Philadelphia. We hope to be earning 10,000/yr in revenue.
March 2021: Apply for Philadelphia City grant money, and be earning 10,000/yr Revenue along with the Grant.
Summer 2021: Serve ten paying Nonprofits in Mid Atlantic and 10 percent of Homeless Population of Mid-Atlantic, and earning 170,000/yr in revenue. Our hope is to apply for the President's Engagement Prize for 2021 to fund three persons and 100,000 to fund existing team members.

We have really enjoyed working on Keep.id and believe it can really help the homeless, and we want to give thanks to all those involved in the project and who donated their time to help make this project live.

7 References

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Mitchell, John N. "Service Pays Respect to 270 Homeless Who Died." The Philadelphia Tribune, 21 Dec. 2018.

8 Appendices

Figure 1: Appendix A: Architecture Overview of the Application

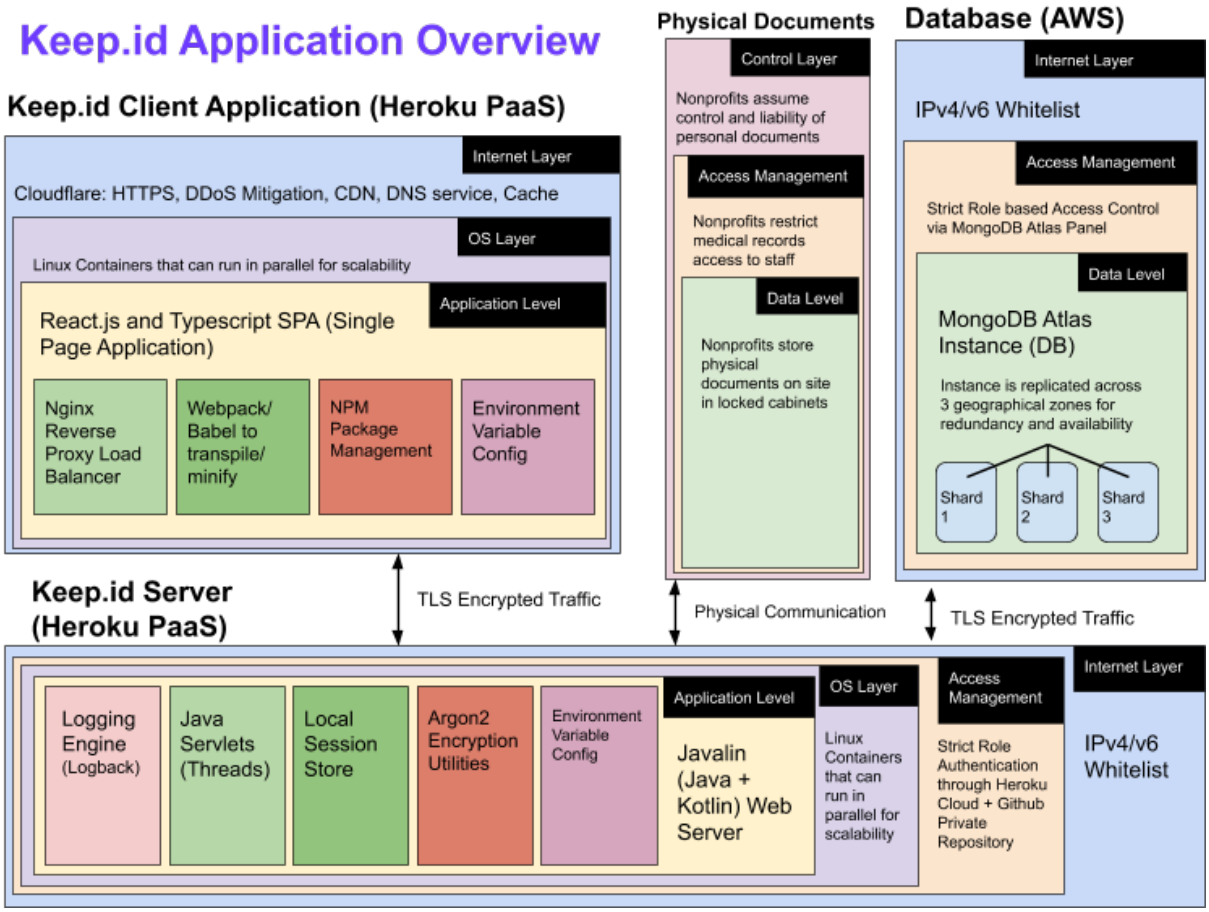

Figure 2: Appendix B: API Diagram of the Application

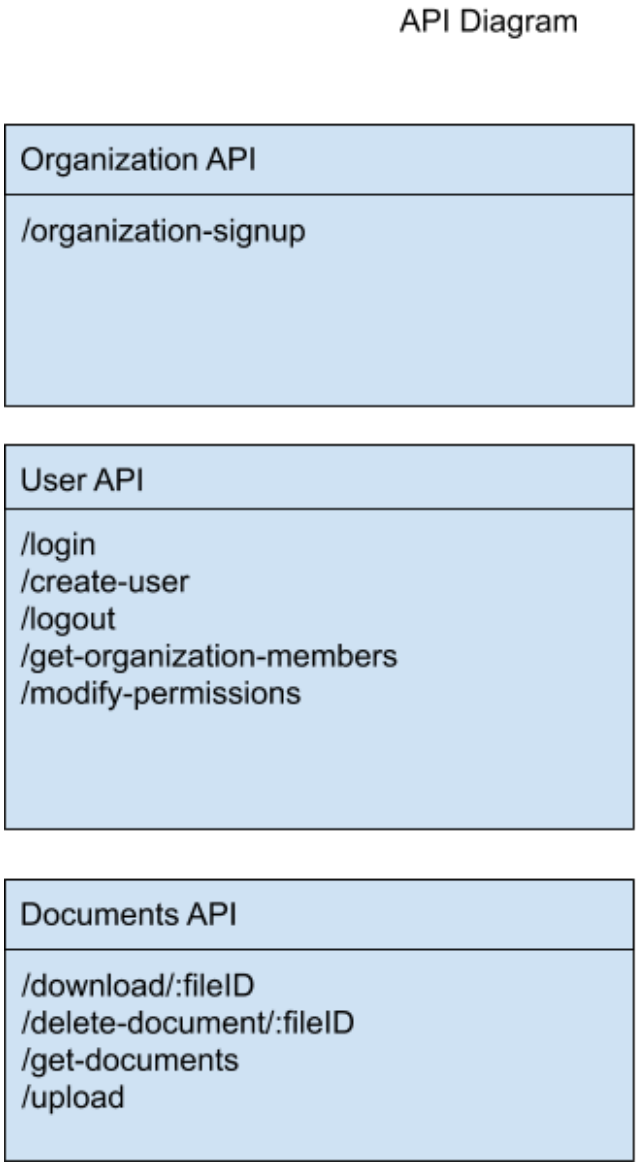

Figure 3: Appendix C: Class Diagram of the Application

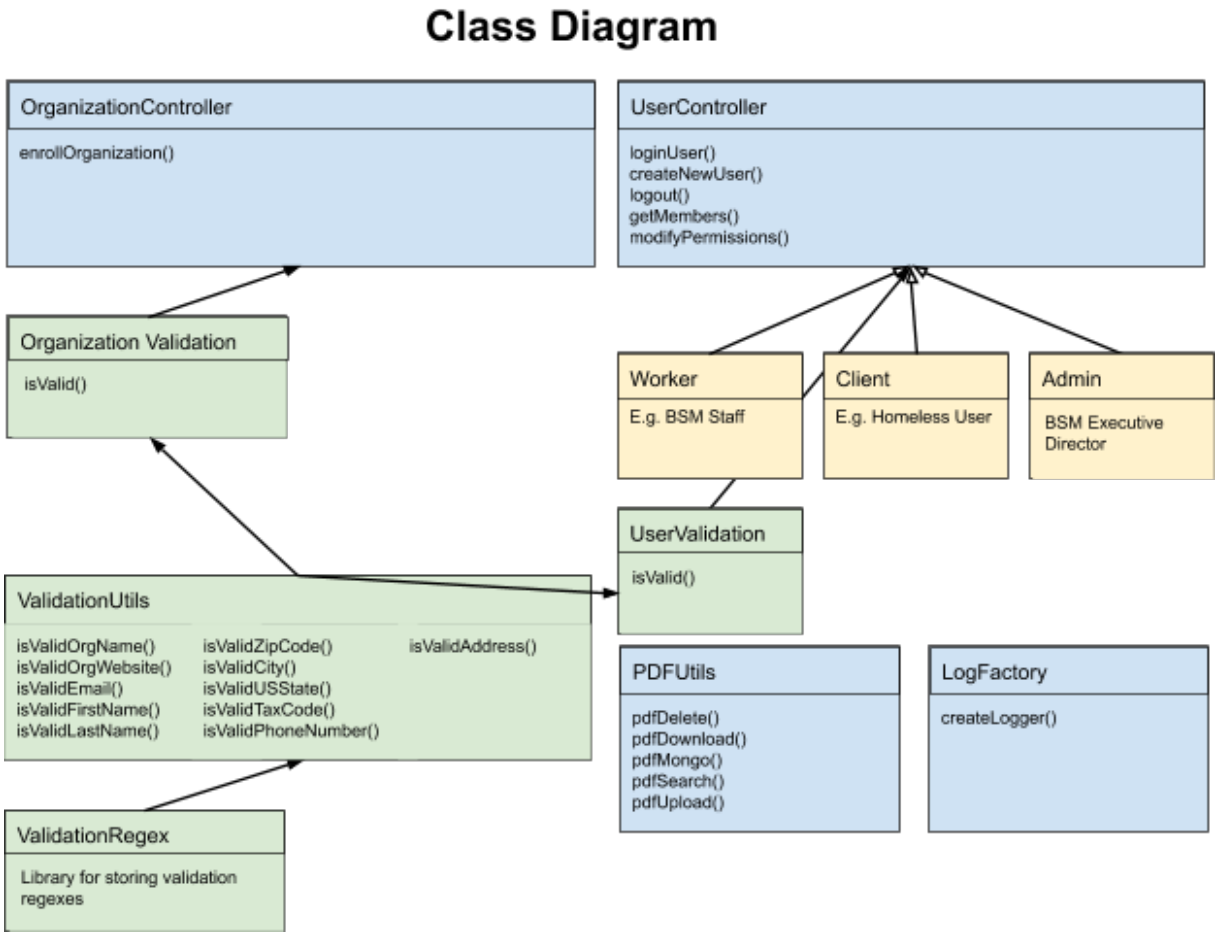

Figure 4: Appendix D: Process View of the Application

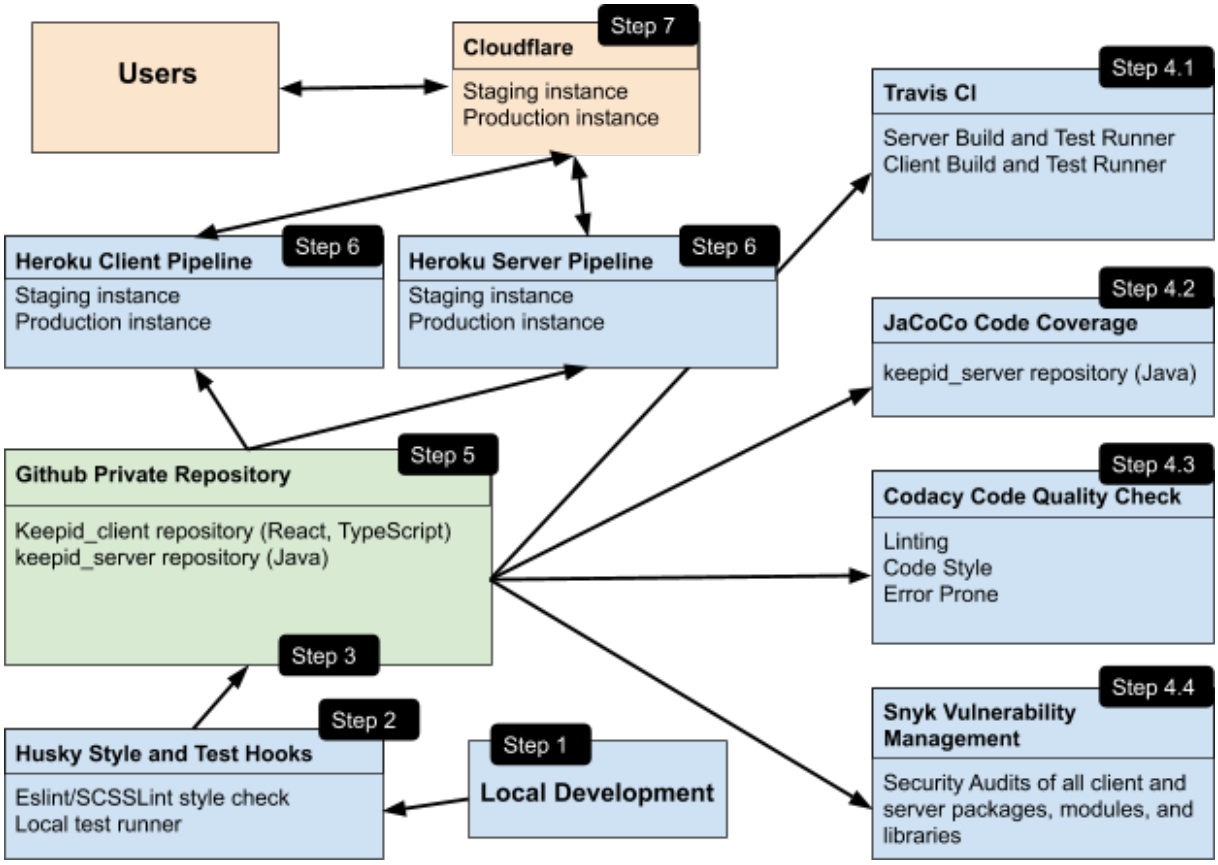

Figure 5: Appendix E: Deployment View of the Application

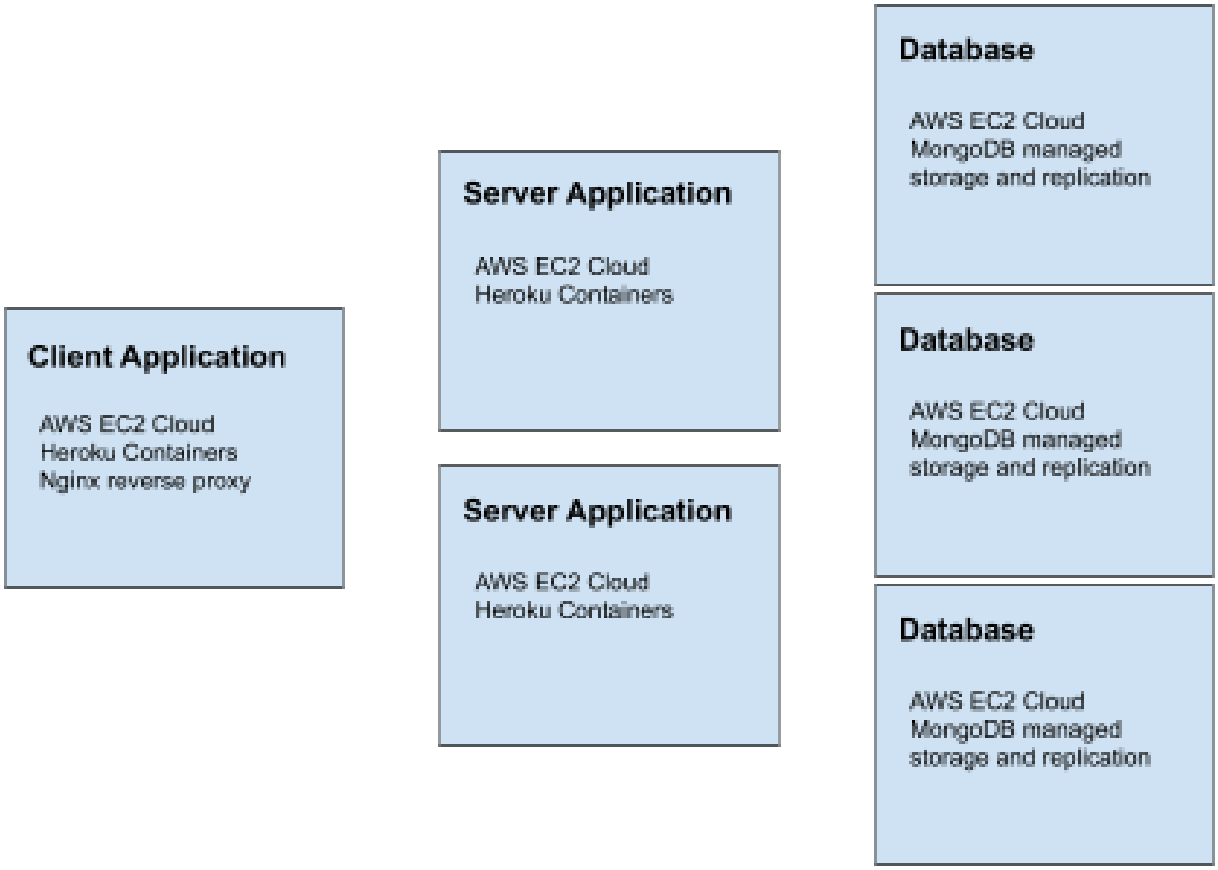

Figure 6: Appendix F: Home Page

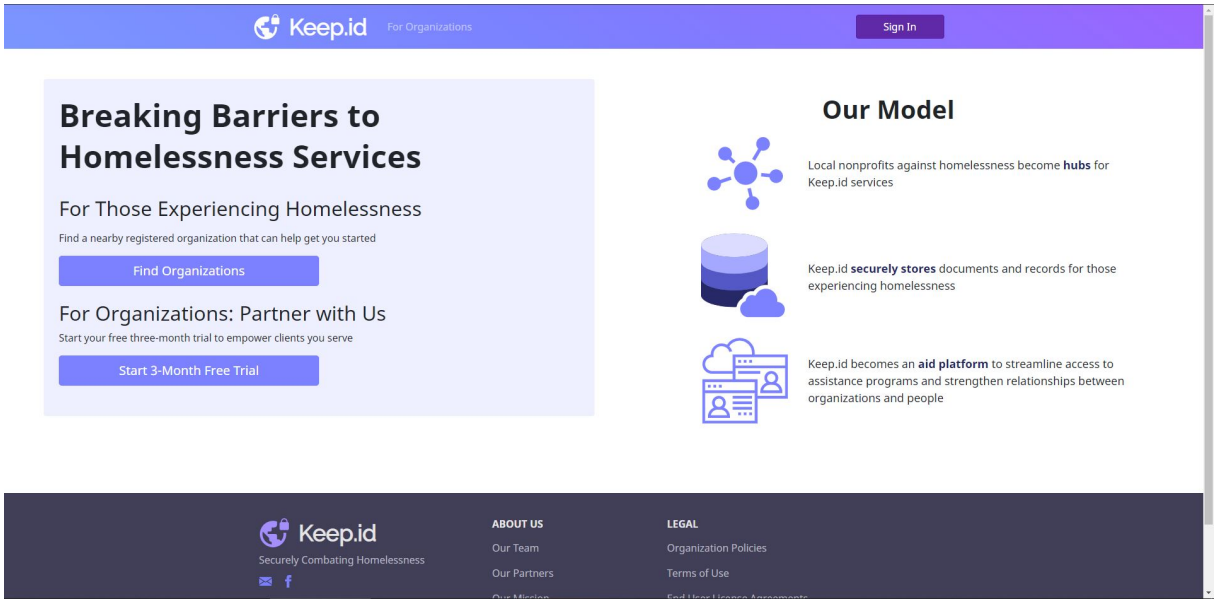

Figure 7: Appendix G: Login Page

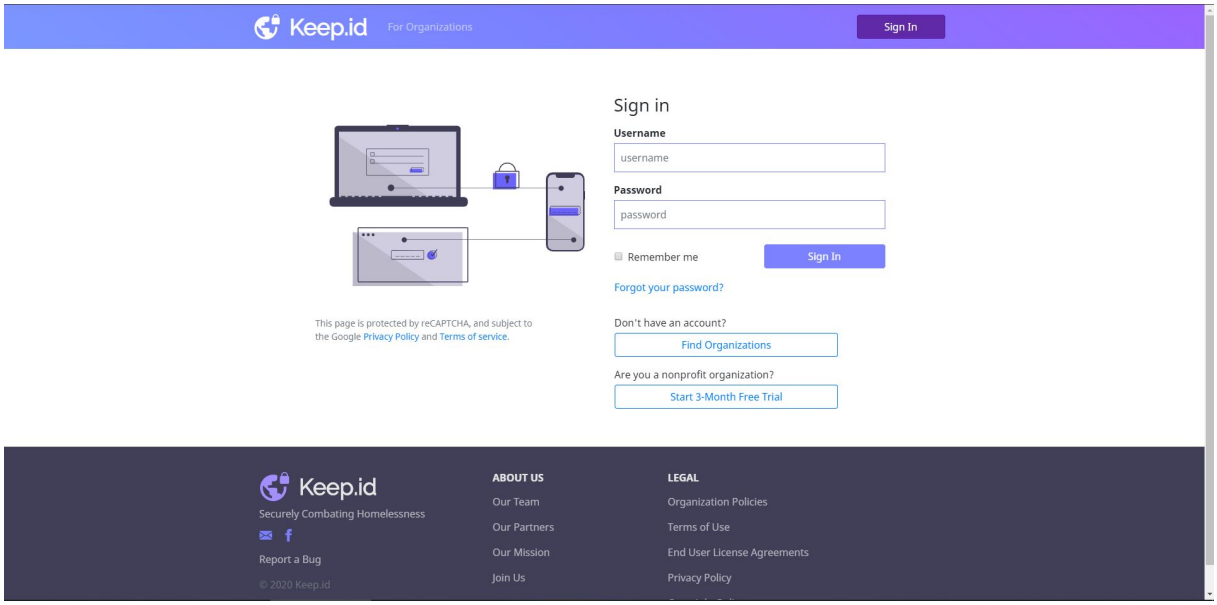

Figure 8: Appendix H: Landing Page

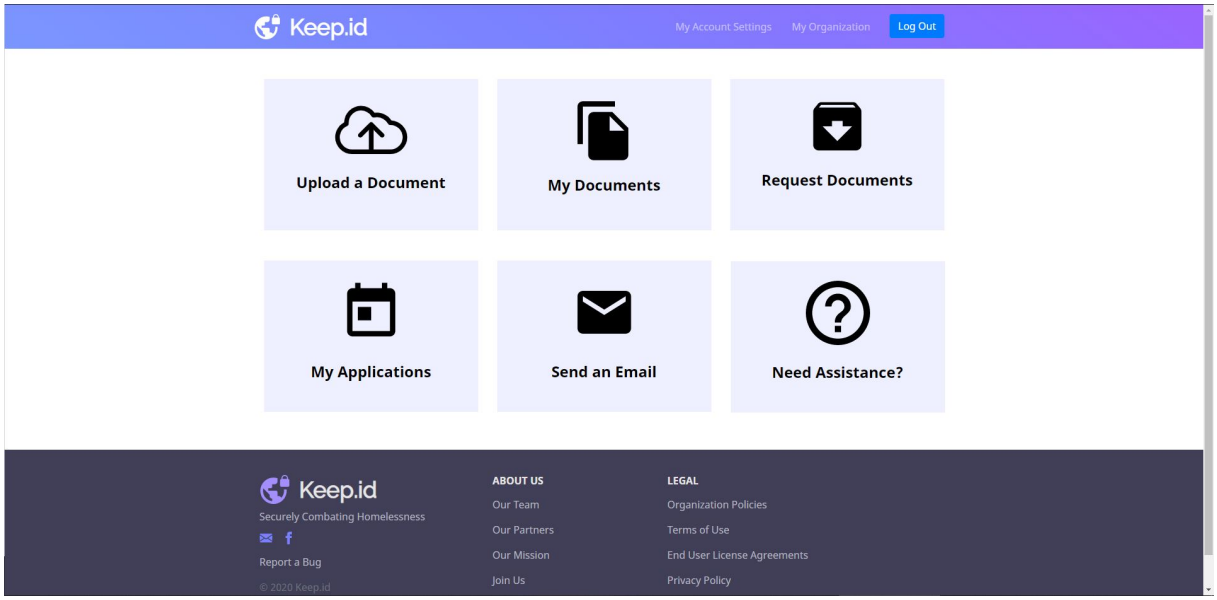

Figure 9: Appendix I: Upload Document Page

Figure 10: Appendix J: My Documents Page

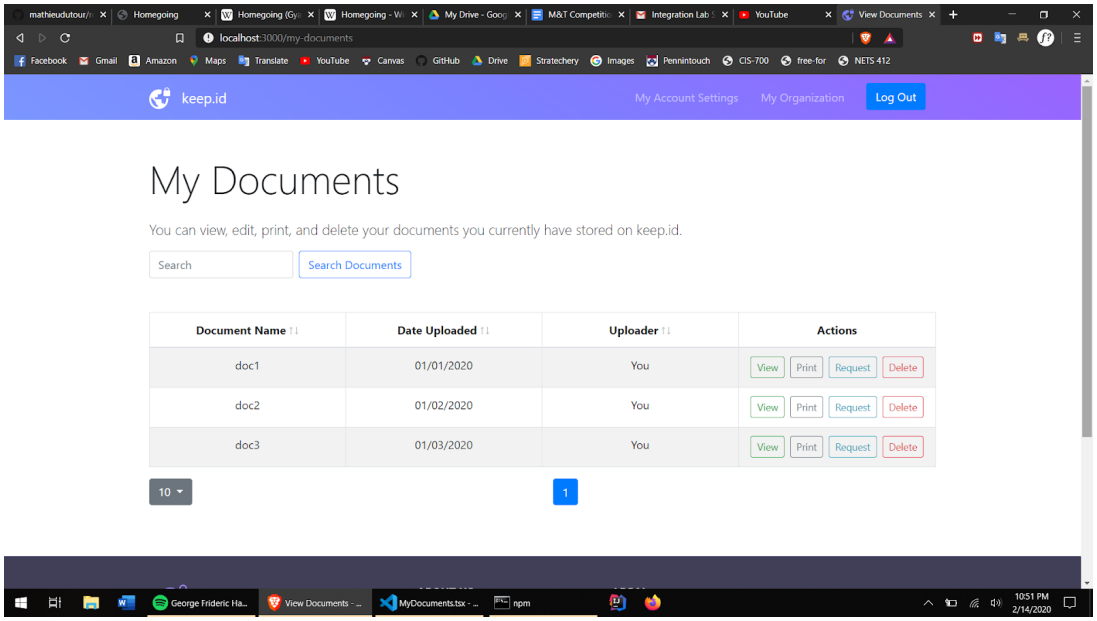

Figure 11: Appendix K: Admin Panel Page