GONZAGA UNIVERSITY
School of Engineering and Applied Science
Center for Engineering Design and Entrepreneurship

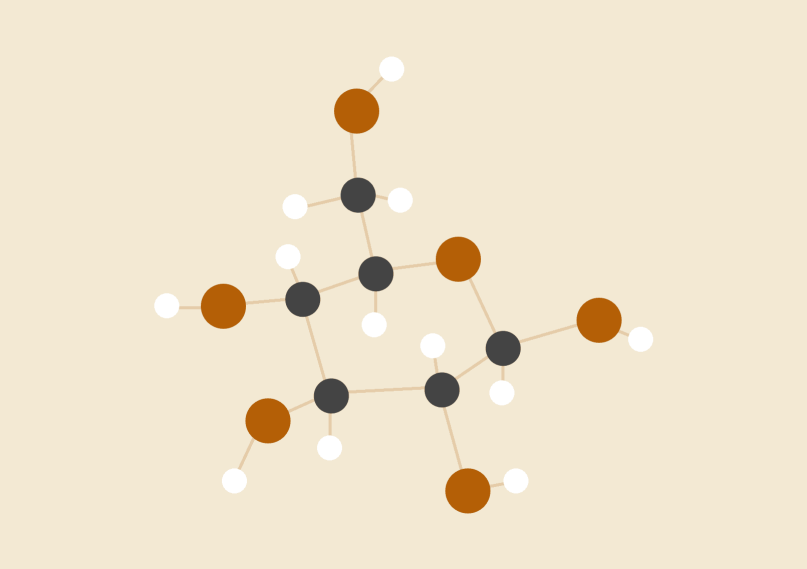
Medcurity Network Inventory

Full Plan Draft Release

Release:
Draft v0.9

PROJECT PLAN DRAFT STAGE DOCUMENT
October 9, 2023

Medcurity Network Inventory Team



Brandon Huyck
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1 Project Overview

1.1 Project Summary

Provide a clear and concise two-paragraph summary of your project. The first paragraph of the summary must provide a high level description of your project's "why" (i.e., the problem the project is trying to address) and the second paragraph your project's "what" (i.e., how your project is going to address the problem). The summary should be written for someone who is unfamiliar with the project domain (including jargon used within the domain).

Online scammers and hackers are capable of causing serious damages. Whether motivated by ransom money, identity theft, or power and status, attackers are able to leverage their unauthorized access to systems, placing individuals and companies at high risk for digital security breaches and malicious attacks. Notably, these targeted attacks are strategic, and mainly aim to exploit large amounts of sensitive and private data. Thus, to be proactive, professionals in a data-driven field must allocate and invest in resources to engineer layers of security. For instance, implementing these security precautions will allow professionals in the medical industry to ensure private medical records are kept confidential and to protect client safety and data. Adhering to medical record compliance protects sensitive patient health information from being disclosed without patient consent or knowledge and thus follows our Sponsor's mission of helping clients meet their federal digital security standards, known as *HIPAA* standards.

Our software inventory tool implements security precautions with an authentication process, requiring that an administrator or client enter correct credentials to access the tool. Next, the tool will send out a special agent that scans the client's network and adds the information discovered to our database. The agent is looking for server identification addresses, information about devices on the network, location of the server, and encryption methods, among other attributes. After data has been loaded into the database, we give the user access to an exportable customized spreadsheet report that details the information discovered. Identifying devices and software within the network domain will demystify connections that may be unsafe to allow into the network. To ensure clients will only be able to access their own information, the tool will link client information to only their accounts, reinforcing authentication and checking the user has access to their information and no one else's.

1.2 Project Objectives

Provide a description of the major project business objectives (i.e., business goals/desired outcomes of the project). Be sure each objective is concrete, specific, measurable, and has been vetted with your project sponsor/liaison.

The main desired outcome of the Medcurity Network Inventory Team is to develop a new tool that complies to HIPAA standards and can be used by the sponsor to help in their goal of organizing, managing, and controlling the numerous tasks healthcare organizations are responsible for. The tool must be able to scan a client's network for devices that are currently connected to it and identify the client's needs and diagnose issues. While the solution is a standalone product, it should work seamlessly with the sponsor's current environment and should be easy to understand, access, and deploy. The resulting product should be able to output customized reports, either through a CSV file or Microsoft Excel

spreadsheet, that have filtering capabilities and be easy to read. Documentation is necessary in order to allow future developers to understand the code and sufficient testing is necessary to ensure the project works as expected.

1.3 Project Stakeholders

Provide a brief description of the main stakeholders of the project. This should include yourselves as developers, your project sponsor and liaison, your faculty advisor, your design advisory board members, and the target user communities you are building your product for (note that there may be multiple potential user communities being targeted). For each concrete project stakeholder, be sure to include their affiliation (organization) and their role in the project. Describe your target user communities in enough detail to give the reader confidence you understand the needs of these groups relevant for your project.

The main stakeholders of the project include our Liaisons, Rachel Kunkel and Amanda Hepper, who are both directly affiliated with Medcurity. They are responsible for communicating with the Medcurity Network Inventory Team, relaying specifications for the project, and addressing any overall questions the team may have.

The design advisory board (DAB) member, Richard Weeks, who works at F5 as a version control specialist, is responsible for giving advice and guidance. Since the DAB members have had experiences in past projects and qualifications, they are able to provide a different perspective to the rest of the team and are able to help solve specific technical issues the team may run into.

Similar to the DAB member, the advisor, Mike Mudge, who is a senior manager at Avista, provides guidance to the team. Unlike the DAB member, the advisor is responsible for guidance relating to the high-level aspects of the project. They are also responsible for evaluating the team's progress, routinely checking up with them to ensure they are on pace to complete their project.

The main developers are the students at Gonzaga University, Brandon, Colleen, Artis, and Jack. They are responsible for the majority of the project work and are expected to collaborate through good communication, organization, and providing unique perspectives to any given scenario. Their work and their process aligns with what their future career will potentially look like.

Along with the DAB member, the Medcurity IT department members are the ones likely to provide the team specific information regarding the content of the project. Since they are responsible for upholding the current software systems at Medcurity, they will be able to give tips and warnings on how the team will integrate the new software tool that will become a part of their current system.

The network management departments are a part of the general industry. The team's work is going to contribute to Medcurity's systems, which are involved in the network management systems. This means it is important to consider the general industry standards relating to this subject when the team is assembling their software solution as it may lead to unforeseen circumstances. Medcurity also has a lot of clients so they must be accounted for when developing the project.

1.4 Project Deliverables

Provide a brief description of each project deliverable. The main deliverable will be the software product you are developing. Other deliverables may include software documentation (e.g., a users or developers

manual), a software installer, performance evaluation results, maintenance plans, etc. For each deliverable give a description of what it will generally include and how it will be delivered and/or deployed.

The main deliverable will be the software tool as described in 1.2 and 1.5. This includes a network crawler agent, a database, an Excel spreadsheet, and a UI. The network crawler agent and the UI will be packaged to be executed as a bash command. When the command is executed, the UI will pop up, triggering the network crawler agent; when the agent is complete, it will export its findings to the Excel spreadsheet. The database will be hosted in the cloud on AWS. In addition, documentation for users and future developers, testing methods and results, and a report describing the future work that could be added will be provided. All of this will be submitted via a Git repository with a README.md file.

1.5 Project Scope

Provide a brief description of the project scope that states what aspects of the project already exist (out of scope) versus what aspects you will be developing from scratch (in scope). Your description must be accompanied by a high-level context diagram, highlighting the components that are outside of the scope of your project and how they will generally interact with your system.

This project is a stand-alone tool, and as such there are minimal out-of-scope aspects to consider. It has four in-scope features: the agent that scrapes the network for devices and software, the database that stores the devices and software that the agent finds, the UI that displays status and results and offers minor user interaction functionality, and the Excel spreadsheet that will be generated from the database. There is not any existing software that our tool will need to be integrated into. Perhaps noteworthy, our database will be MariaDB using MySQL hosted on AWS, all of which could be considered out-of-scope.

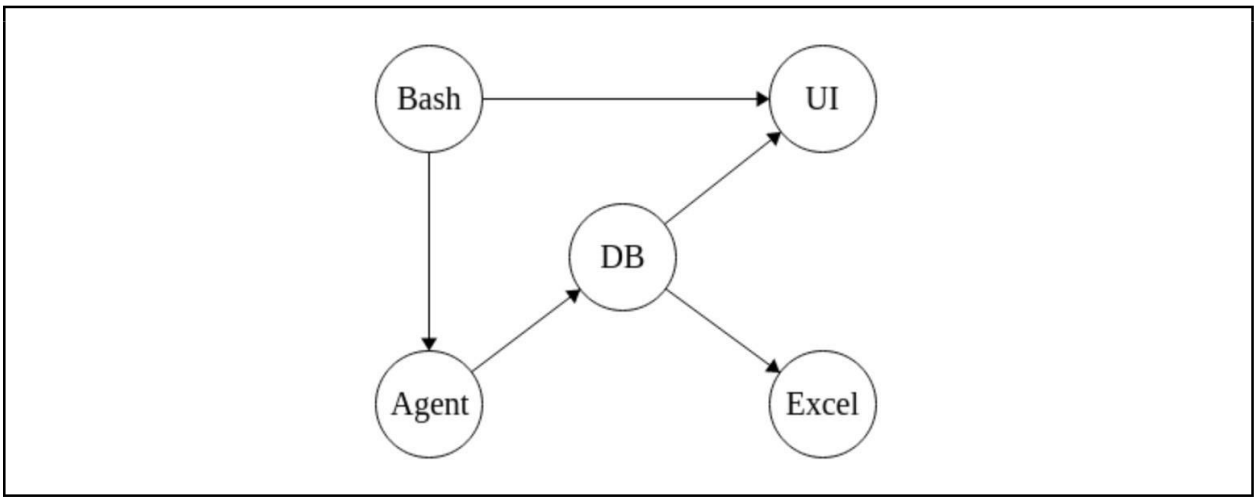


Figure 1

1.6 Related Work

Provide a description of existing systems and/or approaches that try to solve a similar problem as yours. Identify and describe the system most-closely related to the one you are planning on building, discussing

both the similarities and the differences between this system and yours. Additionally, summarize the major similarities and differences of those less related, but still similar to your project. The goal of this section is to show that you have examined and understand the product landscape and have a clear idea of the needs of your project and how they are similar and different to the current systems/approaches available. Provide a link or reference (as a footnote) to each system you describe.

As a main component of our project, working with security and IT management, there are many software development companies that invest in and offer network scanning and device-tracking applications along with supporting management software.

Auvik[1] —

The network management system offered by Auvik Networks provides real-time network discovery and mapping by collecting data from various sources allowing users to visualize their network's structure and understand how devices are connected, mirroring our project plans. Additionally, Auvik automates inventory and documentation, capturing information including the device's make, model, serial number, IP address, and switchport connections. These additional features lie outside of our current project plans but could potentially be implemented after initial designs with sponsor's permission. Lastly, the Auvik program assists in hardware lifecycle management by identifying devices that may need upgrades or replacements. It retrieves data about support contracts, available software updates, security patch eligibility, and device availability for purchase. This feature will also not be included in our project plans.

Famatech[2] —

Provided by the Famatech corporation, the "Advanced IP Scanner" shows all the connected network devices and provides remote control of computers via RDP and Radmin. Additionally, the program also gives the user access to shared folders. Comparing this software to our project, the only major difference is that the Advanced IP Scanner uses Radmin, a third-party company, for remote connection.

SolarWinds[3] —-

The "User Device Tracker" offered by SolarWinds shares some close similarities with the plans we have for our project and has some shared functionality. Altogether, shared functionalities include the ability for the client to identify users and devices on their network with a comprehensive network topology and store that in a database for further analysis. Additionally, the SolarWinds program offers an active directory integration with an interactable interface allowing the user to whitelist hosts, track sensitive or suspicious devices and remotely turn switch ports on and off. As for current plans, this additional functionality offered by the SolarWinds

[1] Auvik Network Management - https://www.auvik.com/features/
[2] Famatech Advanced IP Scanner - https://www.advanced-ip-scanner.com/
[3] SolarWinds User Device Tracker - https://www.solarwinds.com/user-device-tracker

program is not planned for our project, however, can be added as potential features to be added after initial development.

2 Project Requirements

2.1 Major Features

Provide a description of the major features that must be implemented for a viable and useful product. Major features include broad feature areas, constraints that must be met, and other major items that must be completed for the project to be considered successful. The major features should be identified in consultation with your project sponsor and target user communities. The major features described here should also be listed in the major features checklist, which must be approved by your sponsor and faculty advisor. Each major feature should also have rationale for inclusion. This subsection should also discuss major features that were considered nice to have but were not included as targets for your project and a discussion of why they were not included. Describe the process your team used to determine the major features, which should be determined through discussions and feedback from your target users as well as your project sponsors. Provide a summary of the major features in a table as follows (again, the table should match the items given in the major features checklist).

Table 1: Major Features

Feature	*Description* *Brief summary describing the feature and significance (as appropriate)*
DatabaseSystem	The database management system will be secure, easily queryable, and organized into tables for efficient medical record retrieval and filtering by professionals. Rows and columns of a table are defined by the relationship between the client's network and the software and device information connected to it. Sponsor is hopeful for columns to detail Software System/Medical Devices, Server Info, Electronic Patient Health Information (ePHI), Authentication Methods, Location, Purchase, Quantity/Value, and Asset Information.
AdminPrivilege	Administrator account(s) owned by authorized personnel will be given access to records in the database. Together with the UI, a secure login page will prompt the admin for their credentials to proceed. Client records must be accessed by licensed professionals to properly access client needs. Thus, these privileged accounts will be able to add, update, and remove client information to best fit the situation at hand.
SoftwareTesting	The software inventory tool will be tested thoroughly to assert functionality and reliability. Furthermore, fully integrating the tool with the Sponsor's software calls for extensive testing of compatible software, usability, security, and accuracy. This integration testing will utilize the Crawler Agent to transfer data to the database and confirm every component functions as engineered and intended.
CrawlerAgentTraversal	A crawler agent that will traverse the network it is connected to, searching for devices and software that are also connected to the network. Traversing the network in this way is required to build up the inventory database. This is in response to the business objectives to provide the client with an inventory of software and devices to assist with HIPAA regulations.
CrawlerAgentDatabase	The crawler agent will need to integrate with the database. While traversing the network, the crawler agent will find software and devices that are also connected to the network. To report the software and devices found, it will store them as it finds them

	into a database, building it up as it traverses. This is in response to the business objectives to provide the client with an inventory of software and devices to assist with HIPAA regulations.
Report(CSV)	A report CSV file will be one of the main sources of output that the user will receive. With a CSV file, data can easily be imported into a spreadsheet or a different means of data visualization. It could also be implemented as part of the UI, allowing the user to access the data and view it in a filtered and hassle-free way.
ManualInput	Manual input is important because it is one of the main ways the user will interact with the software. The user should be able to interact with the interface, logging in with their credentials, add, update, and remove client information, choose when to export the data into a csv file, and more.
User Interface (UI)	As a primary component of the program's front end, users will interact with an intuitive and visually appealing user interface for the means to view, analyze and control the program's behavior. The goal is to create a seamless and user-friendly interface that enhances the overall functionality and accessibility of our inventory tool. This feature directly impacts the usability of the program and the overall user experience, so it is important to collaborate with our project stakeholders in order to produce a high-quality, easily accessible and comprehensive inventory tool.
Documentation	Project documentation is essential to the project lifecycle from planning and development to deployment and maintenance. The scope encompasses a comprehensive report of all aspects of the project ensuring transparency. Key components include the project guidelines, requirements, design and architecture, guides, logs, API usage, version history, and user guides that will aid in current and future development especially concerning maintenance. Proper documentation that is clear and concise will aid in our initial development as well as anyone else maintaining or building upon this software inventory tool.

2.2 Initial Product Backlog

Provide a description of the essential project requirements (features, characteristics, constraints of the system) that must be developed for project success. Your requirements must have unique names/titles; have priorities and estimates; be clear, concise, free of jargon, and consistently worded; be specific (each requirement should capture one aspect of the system); and be measurable (i.e., clearly state what "done/completed" looks like). Include a brief description of your priority and estimate scheme.

Note that high priority requirements (typically requirements you will start on right away or soon after) should be well defined and more precise but lower priority items can be fuzzier and less precise at this point. You can state your requirements as user stories, however, you should also include requirements for non-functional aspects of the system as well (as needed). Note that the requirements in this subsection should elaborate upon the major features listed in the previous subsection. Summarize your requirements in a table as follows or use your Kanban board (Trello or GitHub) to gather a series of screenshots that summarize your backlog items.

Table 2: Initial Product Backlog

Requirement	*Description* *Brief summary describing requirement including acceptance criteria.*	*Major Feature* *From Table 1*	*Priority*	*Estimate*

DatabaseType	Use a relational database with querying abilities and enough capacity for millions of entries, such as SQLite (140 TB) or MySQL.	DatabaseSystem	High	Low
DatabaseCapacity	Document the maximum needed size of the database to account for all client information and software associated.	DatabaseSystem	Medium	Low
DataStorage: Name of Software/Device	Dedicate column to the name of the specific software or device being recorded in the database.	DatabaseSystem	High	Low
DataStorage: Type of Software/Device	Dedicate column to the type of specific software or device being recorded in the database.	DatabaseSystem	High	Low
DataStorage: AppVersion	Dedicate column to the application version in place at the time of data retrieval.	DatabaseSystem	High	Low
DataStorage: Operating System & Version	Dedicate column to the type of operating system and version of software or device being recorded in the database.	DatabaseSystem	High	Low
DataStorage: ServerName	Dedicate column to the server name of the specific software or device being recorded in the database.	DatabaseSystem	High	Low
DataStorage: ServerIP	Dedicate column to the server IP address of the specific software or device being recorded in the database.	DatabaseSystem	High	Medium
DataStorage: Server On Cloud or Premise?	Dedicate column to storing if the specific software or device is on the Cloud or on premise.	DatabaseSystem	High	Medium
DataStorage: ServerLocation	Dedicate column to storing the server's accurate location in the database.	DatabaseSystem	High	Medium
DataStorage: EncryptionApplied	Dedicate column to storing if the server is encrypted or	DatabaseSystem	High	Medium

	not. This will be stored as a YES/NO			
DataStorage: EncryptionMethod	Dedicate column to storing the server's encryption method if encryption applies to the software or device.	DatabaseSystem	High	Medium
AdminList	Create a list of authorized personnel to access the database and resources.	AdminPrivilege	Medium	Low
AdminUsernames	Establish test cases of admin accounts and assign unique usernames to each.	AdminPrivilege	Medium	Low
AdminPasswords	Craft secure passwords for test cases of associated admin accounts.	AdminPrivilege	Medium	Low
AdminAbilities	Document the privileges and software admin users will be able to update and access.	AdminPrivilege	Medium	Low
AdminUserManagement	Ensure and determine how administrators are able to create, update, and delete user accounts and permissions within the tool.	AdminPrivilege	Medium	Low
AdminDataMaintence	Ensure and determine how administrators are able to monitor and maintain stored data.	AdminPrivilege	Medium	Low
AdminBackup	Ensure and determine how administrators are able to backup and recover data in the case of system failure.	AdminPrivilege	Medium	Low
AdminReports	Ensure and determine how administrators are able to generate reports on software inventory in the database.	AdminPrivilege	Medium	Low
TestingEnvironment	Determine ideal environment to host extensive testing on software, and if this will be on a VM or local computer.	SoftwareTesting	Medium	Low

TestingAccuracy	Create methods or scripts to confirm entries are as expected to prevent tampered data or inaccurate information.	SoftwareTesting	Medium	Medium
TestingCrawlerAgent	Verify and test the datasets used by the crawler agent to ensure correct investigation and reports.	SoftwareTesting	Medium	Medium
TestingDefects	Establish a process to report and manage errors or issues that arise with various inputs to the database, crawler agent, and UI among other major features.	SoftwareTesting	Medium	Low
TestingSecurityCompliance	Adhere and ensure compliance with HIPAA standards in all areas of the inventory tool.	SoftwareTesting	Medium	Low
TestingSecureLogin	Ensure UI and login system is free from cyberattacks like SQL injection and unauthorized access.	SoftwareTesting	Medium	Medium
TestingManualInput	Proactively check for invalid input to prevent attacks or inaccuracies.	SoftwareTesting	Medium	Low
TestingIntegration	Confirm and document seamless integration abilities between Sponsor software, CSV reports, UI, database, and crawler agent.	SoftwareTesting	Medium	Low
CrawlerAgentStyleInvestigation	Investigate various crawler agents, seeing how they work to assist in designing our own	CrawlerAgentTraversal	High	Low
CrawlerAgentUsableInvestigation	Investigate various crawler agents, seeing if there is an existing one that we could use	CrawlerAgentTraversal	High	Low
CrawlerAgentMultipleNetworks	Figure out if the crawler agent needs to crawl multiple networks sequentially, and if so how	CrawlerAgentTraversal	Medium	Low
CrawlerAgentTargetRecognition	The crawler agent needs to recognize the software and	CrawlerAgentTraversal	High	Medium

	devices we want to add to the database			
CrawlerAgentSearchAlgorithm	Determine the best algorithm for the crawler agent to follow when traversing the tree (e.g. depth vs breadth)	CrawlerAgentTraversal	Medium	High
CrawlerAgentSearchExtent	Determine how deep and wide the crawler agent needs to search the network for target software and devices	CrawlerAgentTraversal	Low	Medium
CrawlerAgentRoot	Determine where the crawler agent will begin its traversal	CrawlerAgentTraversal	High	Medium
CrawlerAgentTargetIdentification	Determine what software and devices the crawler agent needs to recognize and how it will be able to do that	CrawlerAgentTraversal	High	High
CrawlerAgentProgress	Determine how to report current progress status of crawler agent to the UI, informing the user	CrawlerAgentTraversal	Medium	Low
CrawlerAgentLaunch	Determine how to launch the crawler agent, through bash or the UI	CrawlerAgentTraversal	High	Low
CrawlerAgentParsing	Determine what information the crawler agent needs to parse from a target	CrawlerAgentDatabase	High	High
CrawlerAgentScrubbing	Determine how the crawler agent will scrub the data it needs to collect from the target, including the best data format	CrawlerAgentDatabase	High	High
CrawlerAgentDatabaseLink	Determine how the crawler agent will be linked to the database	CrawlerAgentDatabase	High	High
CrawlerAgentDataTransfer	Determine how the crawler agent will transfer the information it scrubbed from a target to the database	CrawlerAgentDatabase	High	Medium

CrawlerAgentTransfterFail	Determine how to handle when the crawler agent attempts to perform a data transfer but it fails	CrawlerAgentDatabase	Low	Medium
CrawlerAgentDuplicateData	Determine how to handle when the crawler agent attempts to catalog a duplicate target (potentially out of scope for this major feature)	CrawlerAgentDatabase	Low	Medium
ReportFileSizeCheck	Ensure that CSV imports work by ensuring that the file is not too large due to too many fields or rows.	Report(CSV)	High	Low
ReportEncodingCheck	Verify that the CSV file is UTF-8 encoded otherwise data may appear nonsensical when imported.	Report(CSV)	High	Low
ReportMissingData	Check if any data fields are incomplete and must be filled out.	Report(CSV)	High	Medium
ReportFileTypeCheck	Files may be saved with the wrong extension and cause issues. Ensure they are saved with the csv extension.	Report(CSV)	High	Low
ReportHeaderCheck	Check if the header columns are not missing and formatted correctly.	Report(CSV)	Medium	Medium
ManualInputLogin	Users must know how to login with their credentials properly in order to gain access to the software.	*ManualInput*	High	Medium
ManualInputEdit	Verified users must be able to manually edit data from new and existing data from patients and organizations.	*ManualInput*	High	High
ManualInputInvadidCheck	Ensure that data that is manually inputted follows the same format and syntax so the database can function properly.	*ManualInput*	High	High
ManualInputReports	Allow users to be able to export data into a report when they choose to.	*ManualInput*	High	Medium

ProgressBar	User will see a progress bar accompanied by a status message	*UI*	Low	Low
DesignCSVDownload	Main user program interaction will be with a downloaded CSV file opened in Excel	*UI*	Medium	Low
Documentation - Gonzaga CPSC491 class requirements	Gonzaga 491 assignment check-ins with team document submissions for: Sec02 - Requirements Section - Draft v0.1 • Sep 17 Sec03 - System Design Section - Draft v0.1 • Sep 24 Sec01 - Overview Section - Draft v0.2 • Sep 27 Sec02 - Requirements Section - Draft v0.2 • Oct 1 Sec04-07 - Risks, Release, Management, and Maintenance Sections - Draft v0.1 • Oct 8 Full Plan Draft release v0.9 - For adviser review • Oct 9 Project Plan Presentation - SEAS CEDE Event • Oct 18 Project Plan Document - v1.0 • Oct 19	*Documentation*	High	High
Documentation - Backlog	Each backlog item should be accompanied by clear and concise descriptions, priority levels, and estimates, allowing the current and future development team to understand the scope and importance of each item. This documentation helps facilitate effective communication within the team, ensuring everyone is aligned on project goals and tasks.	*Documentation*	High	High

2.3 Additional Features

Provide a description of non-essential, but nice to have product features, characteristics, and constraints (i.e., "stretch goals"). As with your project requirements (major needs), be sure to organize, name, prioritize, and clearly articulate each additional project feature, characteristic, and constraint. Each additional feature should be specific and measurable.

Table 3: Additional Features

Requirement	*Description*	*Priority*	*Estimate*
PerformanceTesting	Performance testing results showing if, how, and where the system is optimized for performance, where system performance could be improved, and an accompanying report	High	Medium
Style	Maintaining consistent style in coding and the way the user interface will look is something that must be considered in the design. The team will have to agree on a certain style to follow in order to make the code and interface as clear as possible.	Medium	Low
Login	Initial Development plans do not include interaction with confidential information that could pose potential legal action. Administrative accounts with differentiated permissions should be determined close to v1.0 release and should reflect current software abilities.	Low	Low
UIWebInterface	As a stretch goal, the user will be able to utilize a web interface to manage their network inventory.	Low	Low

3 Design Considerations

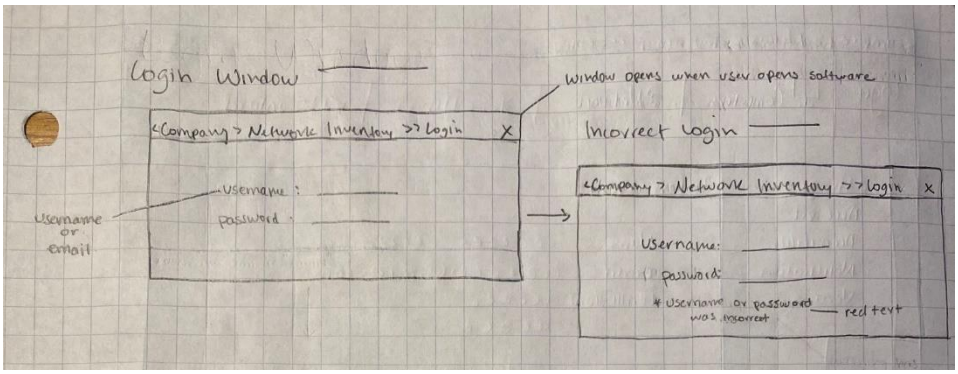
3.1 Initial User Interface Design

Provide a description of the general user interface layout, including a set of initial user interface design mock-ups. Your text should provide a general description of how each mock-up will function. Each mock-up should be put into a separate figure (with a caption). Your mock-ups can be hand-drawn or digitally formatted, but must be clear and easy to follow. Your mock-ups must also be vetted with your project sponsor/liaison. Relate your interface designs to your project's major features (e.g., state what features each mock-up will accommodate and how). State the process you used to arrive at the mock-ups, focusing on how the mock-ups have been vetted by your target users, your sponsor, and other project stakeholders, and the feedback you have received.

Version 1 Sketch and Storyboard —-

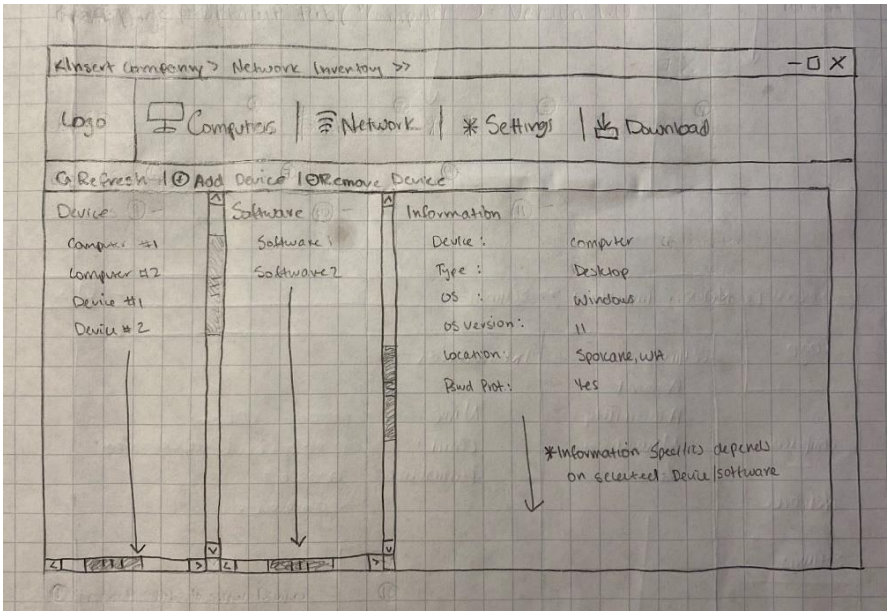
The login window will appear when the program starts up.

Login Window



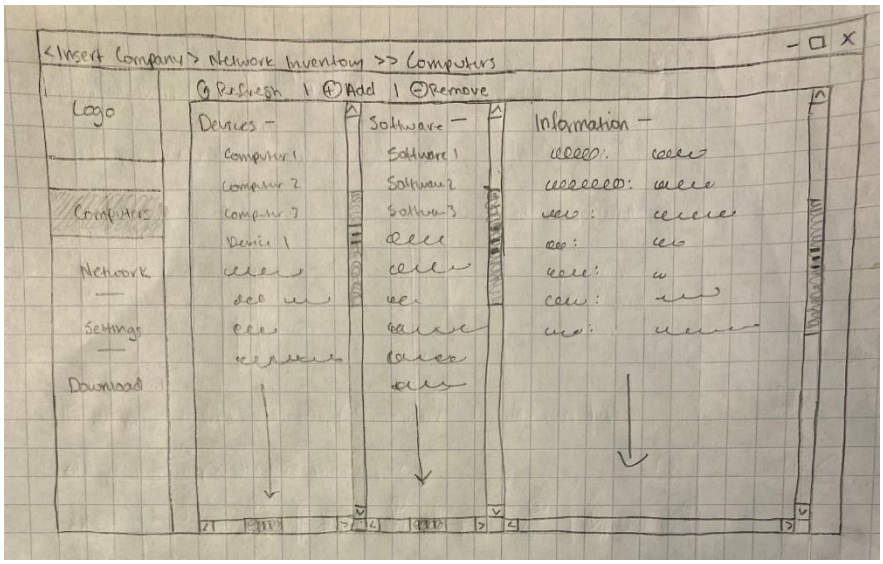
Homepage Version 1

Version 1 of the main homepage which will appear after the user correctly enters their username and password in the login window. This homepage is the same as the "computers" tab in the sketch.



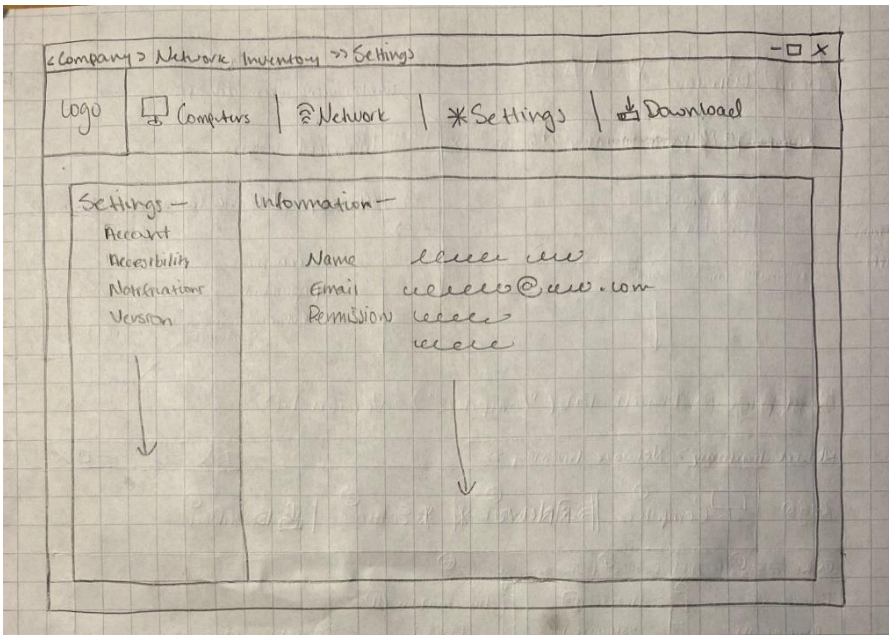
Homepage Version 2

Version 2 of the main homepage which will appear after the user correctly enters their username and password in the login window. This homepage is the same as the "computers" tab in the sketch.



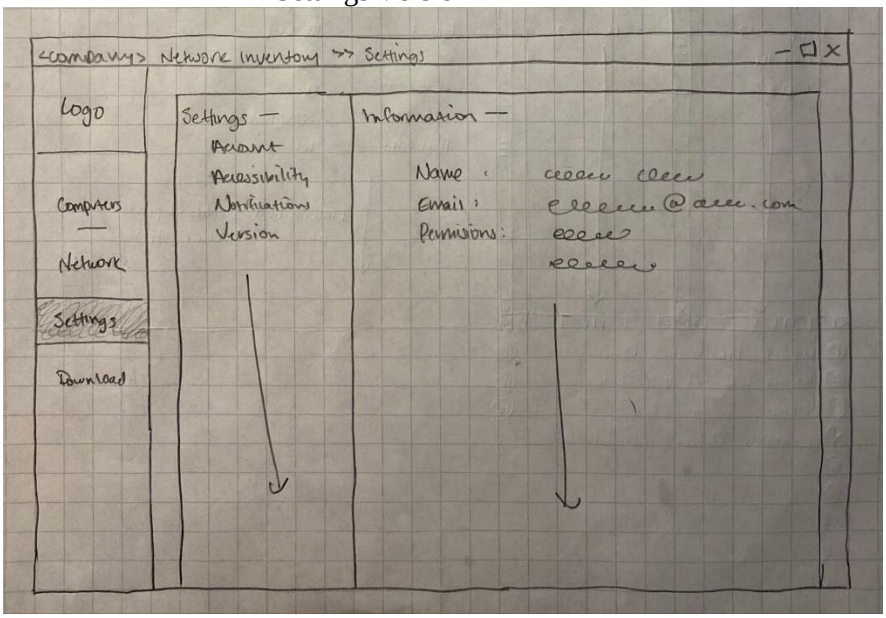
Settings Version 1

The settings versions 1 tab will show account Information, accessibility options, the software version and other miscellaneous settings.



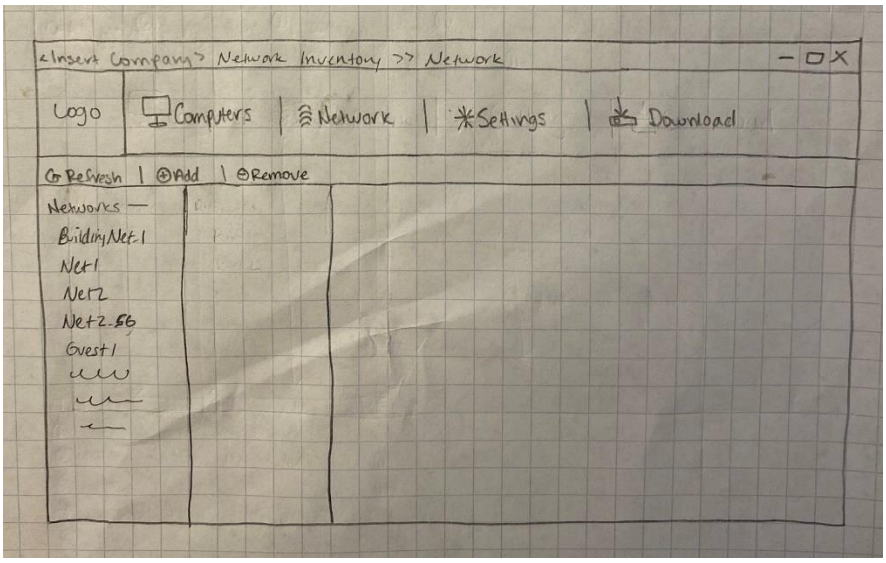
Settings Version 2

The settings versions 2 tab will show account Information, accessibility options, the software version and other miscellaneous settings.



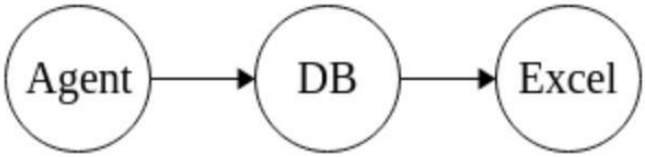
The network version 1 tab Will show the setwork Configurations and other Information regarding the Network and network Technologies themselves

Network Version 1



3.2 Initial Software Architecture

Our system consists of two main components: the network crawler agent and the database. The crawler agent will be launched from the terminal. As it crawls the network and finds target devices and software, it will insert them into the database, updating it. When the network crawl is complete, the database will be exported to an Excel spreadsheet, following the format of the example spreadsheet.

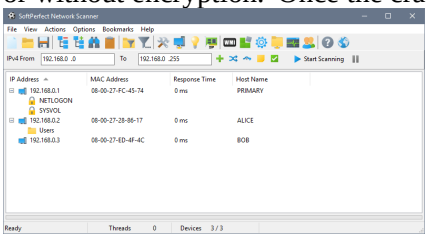


3.3 Development Environment, Tools, Languages, and Libraries

List off the various categories of required development tools and dependencies the project design is expected to have. What languages will the various components be done in? What libraries or frameworks do you expect to need? What IDEs, testing harnesses, or other parts will be needed. Are you relying on any Internet APIs for data, cloud platforms, or computing engines? List off the expected components of your initial design.

We expect our major features to require development tools and dependencies. Beginning with the retrieval of data, the crawler agent will utilize the terminal to launch its search for networks and devices connected to it; this requires a well-built network scanner for detecting devices which can be used from an existing program such as SoftPerfect Network Scanner. This software scans TCP ports for internal and external IP addresses, and provides an exportable CSV (among other) formatted reports which is ideal for our Sponsor. The tool uses nmap and ssh commands, provides data on operating system discovery, and conducts vulnerability tests (https://www.softperfect.com/products/networkscanner/). This specific software will cover most of the crawler-needed elements of Software System/Medical Devices, but the crawler agent will also need to

scrape information about server location and if it is located in the Cloud or on the premise, and ePHI with or without encryption. Once the crawler gets this information, it will be stored into the database.



Our database will use either MariaDB or SQLite based on Sponsor's capacity needs and which will be easiest to implement into the company's existing software/systems. The DB must store server information and device information noted above in addition to user authentication methods and credentials to login securely. *The DB will also hold information about Location: department/space location/date of last order, Purchase: vendor, purchase price per item/warranty expiry date, and Quantity/Value: condition, quality, asset value/total value, and Asset Information: model, vendor NO./remarks/photo or link. These attributes will likely be provided without having to use the crawler agent.* Database IDE could be dbForge which is compatible with a non-local stored MariaDB or MySQL DB. To validate credentials, the DB will use either a query that matches login information or it utilizes libraries like https://mariadb.com/resources/blog/how-to-connect-python-programs-to-mariadb/.

If UI is necessary, it will likely use HTML/CSS to create the interface and connections to DB and agent.

3.4 Initial Software Test Plan

Provide a description of your plans for testing your software product for quality assurance and overall usefulness for your target user groups. Your plan must include details concerning the tests you plan to do, the significance and purpose of the tests, and when during your project you plan to perform them. Note that you must leave enough time to address issues that arise from testing. Be sure to include and explain any additional types of tests that are meaningful or necessary for your project, such as testing performance, security, deployment, and so on.

Our software test plan will have to validate our user interface (UI), our output file, our network crawler agent, our database, security, and all business requirements. For our UI, we will test if the login menu functions correctly and that users will only be able to access the software if they successfully put in their credentials. For the output file we will need to test that the data is displayed properly (in correct columns, no missing data, etc) in the Excel spreadsheet. For the network crawler agent we will need to test if the crawler agent grabs all the target devices in a given network. The most important part of the software that must be tested in the database, since it has the majority of the important data we want to output. We must ensure that all data in the database is valid (correct data types) and are under the correct columns. We must verify that the database is properly storing all the devices and software into the database, ensuring that they are all accounted for. The naming conventions for the columns must make sense to the user. The primary and foreign keys must also be valid in order for the querying to work correctly. Just as important for our project are tests that address performance, security, and deployment are working for our project. The software must be secured and that only verified users have access to it. While we are unsure of the magnitude of data we are handling, the software should be able to perform at a reasonable level. We must also ensure that the software that we develop ends up working as expected and is natural to the users.

4 Project Risks

Provide a list of the major risks that are associated with your project. For each risk, you must clearly and concisely describe: (1) why it is a risk to the project (e.g., what will the potential impact be to the project); (2) what actions you will take to prevent the risk from happening; (3) how you will monitor the risk; (4) what events/situations will trigger the need to mitigate the risk (i.e., when will you know to switch to "plan B"); and (5) what you will do if the risk does becomes a reality (i.e., what is your "plan B", "plan C", etc.). It is not enough to just list your risks; you must also have a plan to prevent, monitor, and mitigate each risk.

1. Data corruption
    1. Impact: System data may become corrupted, resulting in inaccurate or unreliable records; functionality and performance may also be negatively affected.
    2. Prevention: Ensure backup procedures are in place, perform regular database maintenance, and implement secure authentication upon tool execution.
    3. Monitoring: Frequently check the database and its entries for potential inaccuracies, data loss, and unexpected program crashes.
    4. Event Trigger: Any type of suspicious activity or database error messages must be mitigated.
    5. Mitigation: Recover data lost from backups and analyze the source of corruption. Next, document proactive steps to prevent future loss.
2. Declining database performance
    1. Impact: When filtering and storing large sets of inventory data, database performance may decline over time.
    2. Prevention: Update selected database to the most recent version of its releases, and install the latest version of the host operating system to avoid preventable technical issues.
    3. Monitoring: Evaluate performance statistics, record query response time, and monitor for potential overuse of capacity.
    4. Event Trigger: Observable slow performance when retrieving information or lengthy freezing during requests would require mitigation.
    5. Mitigation: Ensure queries are optimized when sent to the database and remove any entries that are not needed.
3. Data security breach
    1. Impact: Malicious actors may gain unauthorized access to sensitive data, causing data loss and extensive privacy breaches.
    2. Prevention: Verify authentication is secure and usable, with a focus on what the visible scope is for each user.
    3. Monitoring: Communicate any irregularities, suspicious login attempts, unexpected situations, or security alerts.
    4. Event Trigger: Be aware of any security alerts or unusual activity on local host machines or git repository files.
    5. Mitigation: Notify stakeholders of issues and contain systems that interact with the tool inventory system.
4. Software compatibility
    1. Impact: Performing scans of networks may not return all software devices due to compatibility issues, leading to inaccurate data or uncapturable data.
    2. Prevention: Install the most recent software for the database and ensure software between user interface, database, and authentication is compatible with various tests to verify proper connectivity.
    3. Monitoring: Especially in developmental stages, monitor inventory data for inconsistent entries or inaccurate records.

4. Event Trigger: If inaccurate .csv reports are commonly generated, issues likely involve software compatibility.
5. Mitigation: Test libraries and any potential crawler agent 3rd party tools early and often to verify accuracy and usability within project scope.

5 Initial Product Release Plan

5.1 Major Milestones

Table 3: Major Milestones

Milestone	*Description*	*Target Completion Date*
DatabaseDesign	The database design should be complete, so we can start coding it for itself and the connecting parts. This needs to be available for review before the end of the first semester to provide time for revisions.	First week of December
CrawlerAgentOutline	Specifics of the crawler agent's implementation (e.g. build from scratch or wrap open-source, how it will interact with the user and network, what information it will collect, how it will connect with the database, etc.) should be mapped out to facilitate success in the second semester	First week of December
TestingPlan	Decisions on how the various pieces of the software will be tested should be decided. This should include what parts need unit testing, how to go about user-acceptance testing, etc.	First week of December
UserInterfaceLayout	The user interface should be fully sketched out, allowing for approval before starting to implement it in the second semester.	First week of December
DatabaseVersionZero	Database will be built siloed. It will be hosted on a test AWS server and filled with test data emulating real-world conditions	First week of March
CrawlerAgentVersionZero	Crawler agent will be built siloed. It will be functional on a test network, traversing it, seeing all targets, and collecting appropriate data	First week of March
TestingUnderway	Testing will be complete to various extents, with multiple unit tests written for each component, and user-acceptance testing and integration tests planned out with extensive details	First week of March
UserInterfaceVersionZero	Each component of the user interface will be built siloed, without necessarily being connected together. It will not be connected to the database or other components of the project. Feedback from stakeholders will be requested and inform the final stage of its development	First week of March
TestingComplete	All testing will be in place, completed, and passing	Second week of April

ComponentIntegration	The database, crawler agent, and user interface will be connected, communicating with each other, and are functional in a development environment emulating production.	Second week of April
DocumentationComplete	Documentation on each individual component, testing results, future directions, the software as a package, and end-user instruction will be written and saved in the repository	Third week of April

5.2 Initial Sprint Releases

Provide an initial plan for the work you will complete and demo at the end of each sprint for the entire year. Your initial sprint plan should connect the major milestones with your project backlog and major features. Thus, e.g., your release plan should coincide with your project milestone schedule above.

For each sprint, state what requirements will be worked on and concretely what you will demo for your target users and sponsor at the end of the sprint. Note that you will need time in your release plan for system and usability testing as well as system deployment and documentation. Be sure to clearly state when usability testing, deployment, and documentation will be performed.

Summarize your sprint plan in a table as follows. Note that it is expected that the sprints for the rest of this semester are more precise than those towards the end of the year and that your plan may change. However, you must demonstrate that you have spent time thinking about the high-level release plan for your project.

Table 4: Sprint Release Plan

No	***Sprint Date***	***Sprint Length***	***Sprint Goal***	***Backlog***	***What we will demo***
1	***10/24-11/6***	**14**	**Evaluate how we handle the first sprint and to get initial designs done.** **Complete ~1/3 total development on Database design, Crawler Agent Outline, Testing Plan, User Interface layout**		
2	***11/7-11/20***	**14**	**Complete ~3/4 total development on Database design, Crawler Agent Outline, Testing Plan, User Interface layout**		

3	***11/27-12/4***	**8**	**Database design, Crawler Agent Outline, Testing Plan, User Interface layout Due, Create second presentation**		
4	***12/5-12/18***	**14**	**Dead week + finals, presentation on 12/6, final project plan due 10/19**		
5	***12/19-1/1***	**14**	**Winter Break sprint 1**	**Depending on schedules, work will vary**	**Depending on schedules, work will vary**
6	***1/2-1/15***	**14**	**Winter Break sprint 2**	**Depending on schedules, work will vary**	**Depending on schedules, work will vary**
7	***1/16-1/29***	**14**	**Complete ~1/4 total development on Database Version Zero,** **Crawler Agent Version Zero,** **Testing Underway,** **User Interface Version Zero**		**Current Software Versions**
8	***1/30-2/12***	**14**	**Complete ~2/4 total development on Database Version Zero,** **Crawler Agent Version Zero,** **Testing Underway,** **User Interface Version Zero**		**Current Software Versions**

9	***2/13-2/26***	**14**	**Complete ~3/4 total development on Database Version Zero,** **Crawler Agent Version Zero,** **Testing Underway,** **User Interface Version Zero**		**Current Software Versions**
10	***2/27-3/10***	**13**	**Database Version Zero,** **Crawler Agent Version Zero,** **Testing Underway,** **User Interface Version Zero Due**		**Current Software Versions**
11	***3/18-3/25***	**8**	**Sprint after spring break to get back into the project. Start documenting version 0 bugs and where the software is lacking.**	**Will vary on what isn't working.**	**Documentation on what needs to be fixed.**
12	***3/26-4/8***	**14**	**Refine and optimize version zero software**	**Will vary on what isn't working.**	**Optimized software components.**
13	***4/9-4/22***	**14**	**Final sprint before delivery week. Finalize database, crawler agent, testing, and UI**	**Will vary on what isn't working.**	**Refined and optimized versions of project component**
14	***4/23-5/3***	**11**	**Design Expo, Presentation #4 and Senior Celebration Events all on 5/1, final report due 5/3**	**Presentation and FINAL tweaks to software**	**Deliver the project**

6 Maintenance Considerations

Provide a brief description of maintenance issues regarding the system you develop. In particular, discuss whether there is an identified group that will provide maintenance of the system (and what their level of expertise is), what parts of the system may require maintenance, how you plan to develop the system to

support future maintenance, what level of expertise will be required to perform maintenance on the system, and any other issues concerning maintenance of the system you develop.

Some aspects of our project that should be monitored throughout the product's lifespan are the database and its performance, security issues, and compatibility with future software. We expect that the IT department of Medcurity, the most likely to be experienced with this line of work, will be able to, with the use of our thorough documentation, be able to understand and maintain all aspects of the product in the future.

While the database should be fairly simple and straightforward, there is a chance that issues may arise if invalid entries for the database appear or improperly formatted data. Tests will be developed to account for these issues. Should Medcurity seek to change fundamental aspects of the database, such as what users are allowed to enter or how the data should be formatted, the IT department should be able to clearly find where they should be able to do that. If the performance of the database dips, there should be systems in place for the IT department to evaluate performance statistics and pinpoint where the issue may be.

Security issues should be accounted for with a verification system for the product and should remain the same throughout the product's lifespan. If Medcurity wants to create additional fields in authentication to ensure user-sensitive data is secure, the documentation should allow the IT department to seemingly add more forms of security for the system.

Software updates could potentially render our system incompatible or outdated as time goes on. In order to prevent this, all sections of the code should be clearly and thoroughly documented. The IT department should be able to understand every section's logic and code through documentation, allowing them to modify it should the time come.

7 Project Management Considerations

Provide a brief description of how you plan to organize yourself as a team to complete the project deliverables. Minimally, this should include where and when your weekly team meetings will be, when/where you will meet with your project sponsor (for standing meetings), and how you will update your sponsor, primary DAB member, faculty advisor, and other stakeholders of your progress. Also include a description of how you are planning on breaking up the work for your project among team members. Each team member must be responsible for some concrete aspect of the system. Finally, list any additional tools you plan to use to communicate your progress and/or elicit feedback from your sponsor, liaison, and end users.

Our team plans to meet every Tuesday at 4:30 p.m. at PACCAR 203. Our faculty advisor will accompany the team in most meetings, and our primary DAB member and sponsors will attend whenever they must be present for discussion or updates. We have been using email as our primary form of communication, but everyone has joined a Discord server where brief communication can be made. We will plan to give our sponsor, DAB member, faculty advisor, and relevant stakeholders frequent updates of our progress, potentially weekly or bi-weekly, allowing them to be informed about details of the project. This is how we plan to break up the project, but it is not set in stone yet:

Brandon Huyck: Network Crawler Agents
Colleen Lemak: Database
Jack Nealon: User Interface
Artis Nateephaisan: Testing

We plan to use email to give progress reports, schedule meetings, ask questions, and receive feedback from liaisons and end users. If email is unnecessary for things such as quick questions, people may also send messages through Discord as an easy and informal way of communication.