# Hackerville

**Design Document**

**Team Number:**
**sdmay22-07**

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**Team Members:**
**Andrew Groebe - Software Tester & Developer**
**Brady Heath - Client Communicator & Developer**
**Emily Hohneke - Team Organizer & Developer**
**Adam LaRocque - Client Communication Lead & Developer**
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# Executive Summary

## Development Standards & Practices Used

Development standards that will be used for Hackerville:

- OWASP (Application Security Verification Standard) - Ensure that Hackerville is a secure application and follows good security practices
- NIST (National Institute of Science and Technology) - Ensure that Hackerville secure application and follows good security practices
- Learning modules need to be made with the standard to teaching cyber security as according to cyber.org - Ensure that we are teaching cybersecurity to a specific standard recognized nationally
- GDPR (General Data Protection Regulation) compliance - Ensure that Hackerville uses ethical data collection and storage of user data
- ADA and 508 compliance - Ensure that hackerville is as accessible as possible to all users
- FERPA compliance if this is an international project - Make sure that we follow any legal standards that exist internationally
- Follow Web application standards - Use HTTPS for information security

Development practices used include Agile methodologies and version control (GitLab), which is explained further below.

## Summary of Requirements

Implementation of Hackerville in accordance with our client's expectations includes the following requirements:

- Implementation of backend LDAP server
- Completion of WordPress frontend
- Infrastructure for hosting LDAP server, WordPress, and custom pages that may be loaded from backend
- Completion of at least three learning-based cyber security training activities
    - Coffee Shop - learn lessons about connecting to public WiFis
    - TMI social media site - learn about being safe on social media
    - City bank - distinguish between fake and real online banking experiences
- Enablement of cookies on frontend for basic tracking of user activities
- Strive towards ADA AND 508 Compliance

## Applicable Courses from Iowa State University Curriculum

The following courses have been found to be applicable to Hackerville implementation:

- SE 319 - Software Construction
- SE 309 - Software Development

- COM 363 - Database Management Systems
- SE 317 - Introduction to Software Testing
- SE 421 - Software Security
- CYB E 230 - Cyber Security Fundamentals
- CYB E 231 - Cyber Security Concepts and Tools
- CYB E 234 - Legal, Professional, and Ethical Issues in Cyber Systems

## New Skills/Knowledge acquired that was not taught in courses

Beyond the skills and knowledge gained from the coursework above, our team gained skills in LDAP, WordPress, and Selenium through research during the design phase.

## List of figures/tables/symbols/definitions

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# 1 Team

## 1.1 Team Members

Andrew Groebe - Software Tester & Developer
Brady Heath - Client Communicator & Developer
Emily Hohneke - Team Organizer & Developer
Adam LaRocque - Client Communication Lead & Developer
Isabel Maymir - Client Communicator & Developer
Liz Memmini - Team Organizer & Developer
Andrew Sandor - Software Tester & Developer

## 1.2 Required Skill Sets for Your Project

Following list given to us by client:
1. Networking
2. Security
3. Web-servers
4. Web Development

## 1.3 Skill Sets Covered by the Team:

1. Networking - Elizabeth and Brady
2. Security - Emily, Andrew S, Isabel, and Brady
3. Web-servers: Andrew G, Adam
4. Web-development: All team members

## 1.4 Project Management Style Adopted by the Team:

Our team is going to use a waterfall project management style. This will allow us to effectively develop individual parts of the project, while working towards the finished product.

## 1.5 Initial Project Management Roles:

Andrew Groebe - Software Tester & Developer
Brady Heath - Client Communicator & Developer
Emily Hohneke - Team Organizer & Developer
Adam LaRocque - Client Communication Lead & Developer
Isabel Maymir - Client Communicator & Developer
Liz Memmini - Team Organizer & Developer
Andrew Sandor - Software Tester & Developer

# 2 Introduction

## 2.1 Problem Statement

Our project's intent is to fill the knowledge gap that exists within cybersecurity, specifically targeting the younger generations so we can protect our information from attacks in the future. Cybersecurity is an important concept within the world today, especially because most information is stored virtually. This is convenient, however, there are many attacks that threaten our security every day. In addition, users are the main targets to get into a system. Users click on phishing email links, give away confidential information over the phone, and allow easy access to their accounts through weak passwords. It is essential that people understand concepts within cybersecurity in order to keep our virtual environments safe from attackers. Therefore, providing an opportunity for students in grades 6-12 to learn about cybersecurity is a great way to make them more aware of how to navigate the internet safely. Overall, this will bring awareness to cybersecurity and potentially expose them to a field they may later be interested in pursuing a career in.

## 2.2 Requirements & Constraints

Hackerville Requirements Given by Client:
- Need server side infrastructure to store and process data
- User interaction is going to be completely web-based, no downloadable clients
- Enable cookies so administrators can see anything the users do
- Create a user management system, infrastructure, web-pages, apartments/village, and exercises
- Build a virtual bank, TMI (social media platform), email, and shopping sites that users can interact with - these will be used to teach Cyber Security lessons

Constraints That Our Design Will Consider:
- Privacy for users - users should only have access to their own data
- Separate users by their individual classes and schools that they are associated with
- Make it easy for teachers to add and manage their classes
- Prevent users from posting things they shouldn't to the TMI site
- Must assume limited knowledge of cyber security concepts
- Need to adhere to all legal requirements

## 2.3 Engineering Standards

Engineering Standards for Hackerville:
- OWASP (Application Security Verification Standard) - Ensure that Hackerville is a secure application and follows good security practices
- NIST (National Institute of Science and Technology) - Ensure that Hackerville secure application and follows good security practices

- Learning modules need to be made with the standard to teaching cyber security as according to cyber.org - Ensure that we are teaching cybersecurity to a specific standard recognized nationally
- GDPR (General Data Protection Regulation) compliance - Ensure that Hackerville uses ethical data collection and storage of user data
- ADA and 508 compliance - Ensure that hackerville is as accessible as possible to all users
- FERPA compliance if this is an international project - Make sure that we follow any legal standards that exist internationally
- Follow Web application standards - Use HTTPS for information security

## 2.4 Intended Users and Uses

There will be various people who benefit from the results of Hackerville. The intended audience is students in grades 6 through 12, though college students, and the general public could benefit from the Hackerville platform as well. Since cybersecurity is a continuous threat to our personal information, it is essential that people learn the tactics that attackers use to attack networks, and have basic security knowledge in order to better protect them. Most people do not know that they are a victim of a security attack or breach, therefore, informing the younger generations will ensure that they understand good security practices in order to protect their information that is stored virtually now and in the future.

Since cybersecurity is such an important concept, everyone should care that Hackerville exists. People should want to inform themselves about cybersecurity, and teachers should want to inform their students on best security practices. If we don't, we will see an increase in cyber crime, which also means that our sensitive information could become public. In addition, this will also help people to be aware of what information they are giving out and becoming stored on the internet. Sometimes emails or websites may look legitimate, however, they could be a phishing attack behind the scenes. Therefore, teaching students to examine sites or how to properly determine a safe site is an essential piece to security, especially as the world is increasing the use of virtual information storage. This is where Hackerville will become important because the web platform will be educational, but also fun and interactive.

The Hackerville web platform will contain a virtual village where students can learn more about cybersecurity through activities in different "locations". For example, a student may get a phone call from their "teacher" asking them to run a specific command or log into a specific website. Since the student thinks that it's their teacher, they log into the website, and their credentials are revealed to an attacker. Once this happens, the student is alerted of the security issue and is educated on the importance of preventing phishing attacks by asking identifying questions so they know who they are talking to and what they are trying to do. Therefore, Hackerville will be a fun and interactive web platform that will allow students to interact with each other, while learning about cyber security.

# 3   Project Plan

## 3.1  Project Management/Tracking Procedures

Which of agile, waterfall or waterfall+agile project management style are you adopting. Justify it with respect to the project goals.

**As a whole, our group will use waterfall and agile management style. To start we will use agile as we all work together on these deliverables. Overall we will use a waterfall management style, but once we have concrete work done for some aspects of the project, our group will break up to work on individual pieces simultaneously which is how the agile management style will be used in addition to the waterfall style. We will do this because with seven people being in one group it will allow us to get more done if we break up into teams. For example we will have people work on the web-servers, the interactive labs, and the user environment. We will have separate teams that will all work on their own things at the same time and then we will bring these together to solidify the Hackerville website.**

What will your group use to track progress throughout the course of this and the next semester. This could include Git, Github, Trello, Slack or any other tools helpful in project management.

**Since this project is not code-development heavy, we will begin by using Trello to track our progress. Trello does not have any code associated with it's story cards, so this will lend itself easily to WordPress development.**

## 3.2 Task Decomposition

In order to solve the problem at hand, it helps to decompose it into multiple tasks and subtasks and to understand interdependence among tasks. This step might be useful even if you adopt agile methodology. If you are agile, you can also provide a linear progression of completed requirements aligned with your sprints for the entire project.

**The main task is to update the current website Hackerville.org with all of the below tasks:**

**Build outline for the entire Hackerville website**

- **Create a sketches of screens for the website, this will be done with the client**
- **Determine connection between screens**
- **Determine the user connections i.e. the connection between teachers and students**
- **Determine how to make website ADA and 508 compliant**
- **Determine if we need to be FERPA complaint**
- **Privacy - how to implement privacy of users within Hackerville**
- **Determine separation of schools and classes, example, students can't talk with students across the country**

**Create backend for various aspects of Hackerville**

- **Enable cookies so superusers (us) can see everything that users do**
- **Rough outline/sketch of how backend connects to web-based client**

**Determine how students create their profiles and how they will interact in the village**

- **Need to have a hackerville email to interact with other students in Hackerville**
- **Figure out a registration process with user school/class**

**Determine interactive activities that will be used to teach cyber security**

- **Pull important cyber security teaching standards from cyber.org**
- **Create multiple levels of difficulty per interactive activity**
- **Figure out which locations house which interactive activities i.e. coffee shop should have an activity about not trusting free public wifi**

## 3.3 Project Proposed Milestones, Metrics, and Evaluation Criteria

What are some key milestones in your proposed project? It may be helpful to develop these milestones for each task and subtask from 2.2. How do you measure progress on a given task? These metrics, preferably quantifiable, should be developed for each task. The milestones should be stated in terms of these metrics: Machine learning algorithm XYZ will classify with 80% accuracy; the pattern recognition logic on FPGA will recognize a pattern every 1 ms (at 1K patterns/sec throughput). ML accuracy target might go up to 90% from 80%.

1. **The core website (hackerville.org) will be implemented and ready for use as a proof-of-concept deliverable.**
2. **User management will be provisioned and implemented on UNIX servers for authentication of users on Hackerville.**
3. **At least 3 service-based websites (branching off of the apartment main website) will be implemented**
   - **TMI (*"Too Much Information") -* The social media platform analogous to Facebook in the Hacerville virtual world (tmi.com.hackerville.org).**
   - **CityBank - The bank of Hackerville, where users will manage their own money and bank accounts.**
   - **Coffee Shop - The coffee shop of Hackerville, where users will learn lessons on connecting to public WiFi.**
4. **The website frontend and backend will be ADA and Section 508 compliant, ensuring that 100% of users can easily use the website.**
5. **The backend data storage will be GDPR compliant. (international, TBD)**
6. **75% of the use-cases our software is written for should include unit and integration tests - this is a rough percentage estimate, may move the mark as we progress and if time permits.**
7. **75% of software written for Hackerville should include corresponding documentation - once again, rough percentage estimate.**

8. **In addition to automatic tests, 100% of the web pages must be tested manually (accessibility, edge cases, etc.)**

## 3.4 Project Timeline/Schedule

• A realistic, well-planned schedule is an essential component of every well-planned project

• Most scheduling errors occur as the result of either not properly identifying all of the necessary activities (tasks and/or subtasks) or not properly estimating the amount of effort required to correctly complete the activity

• A detailed schedule is needed as a part of the plan:

– Start with a Gantt chart showing the tasks (that you developed in 2.2) and associated subtasks versus the proposed project calendar. The Gantt chart shall be referenced and summarized in the text.

– Annotate the Gantt chart with when each project deliverable will be delivered

• Project schedule/Gantt chart can be adapted to Agile or Waterfall development model. For agile, a sprint schedule with specific technical milestones/requirements/targets will work.
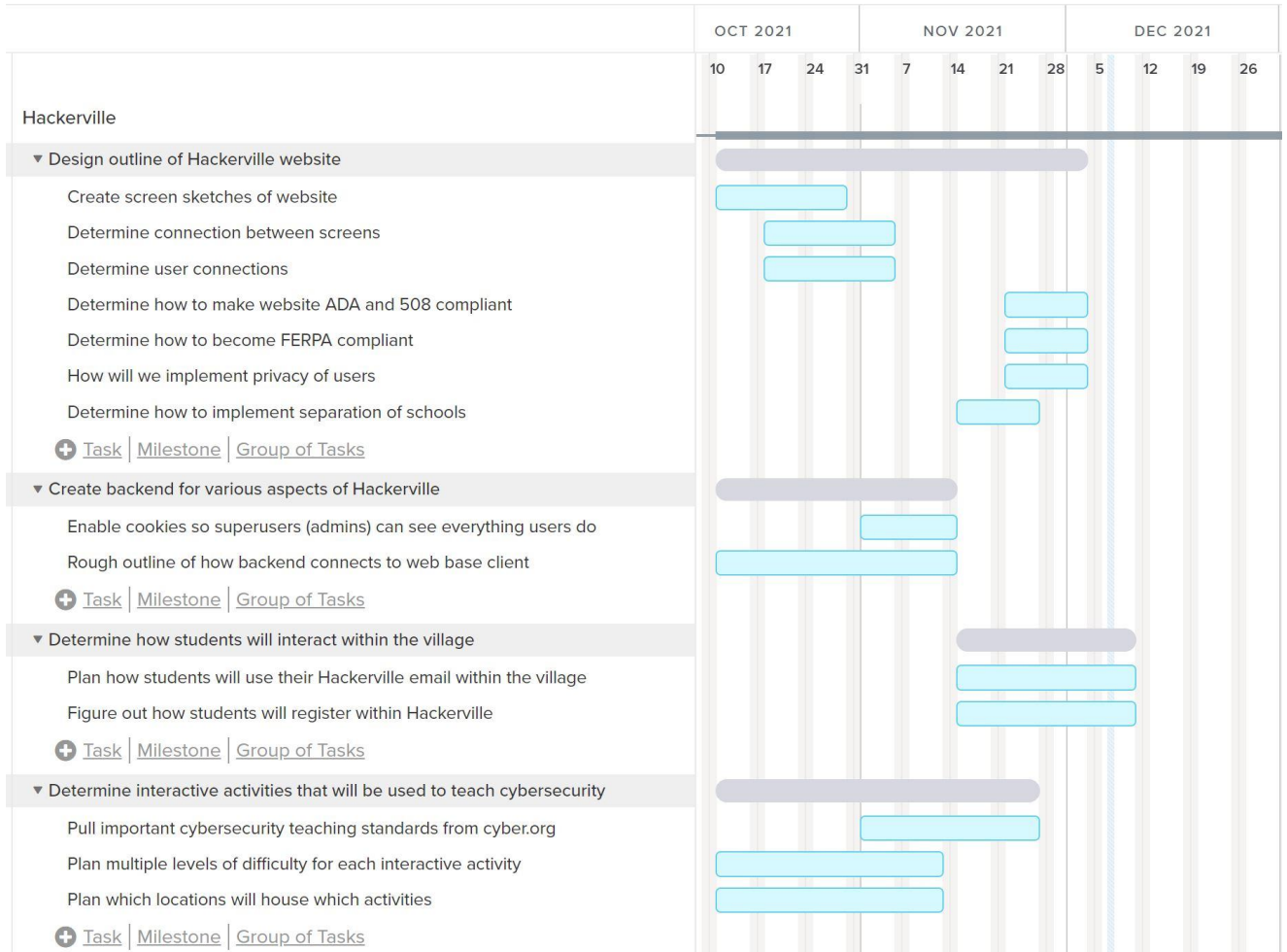
**Figure 3.4.1** The Gantt chart above shows a timeline of the fall semester, with which we are exactly on track.
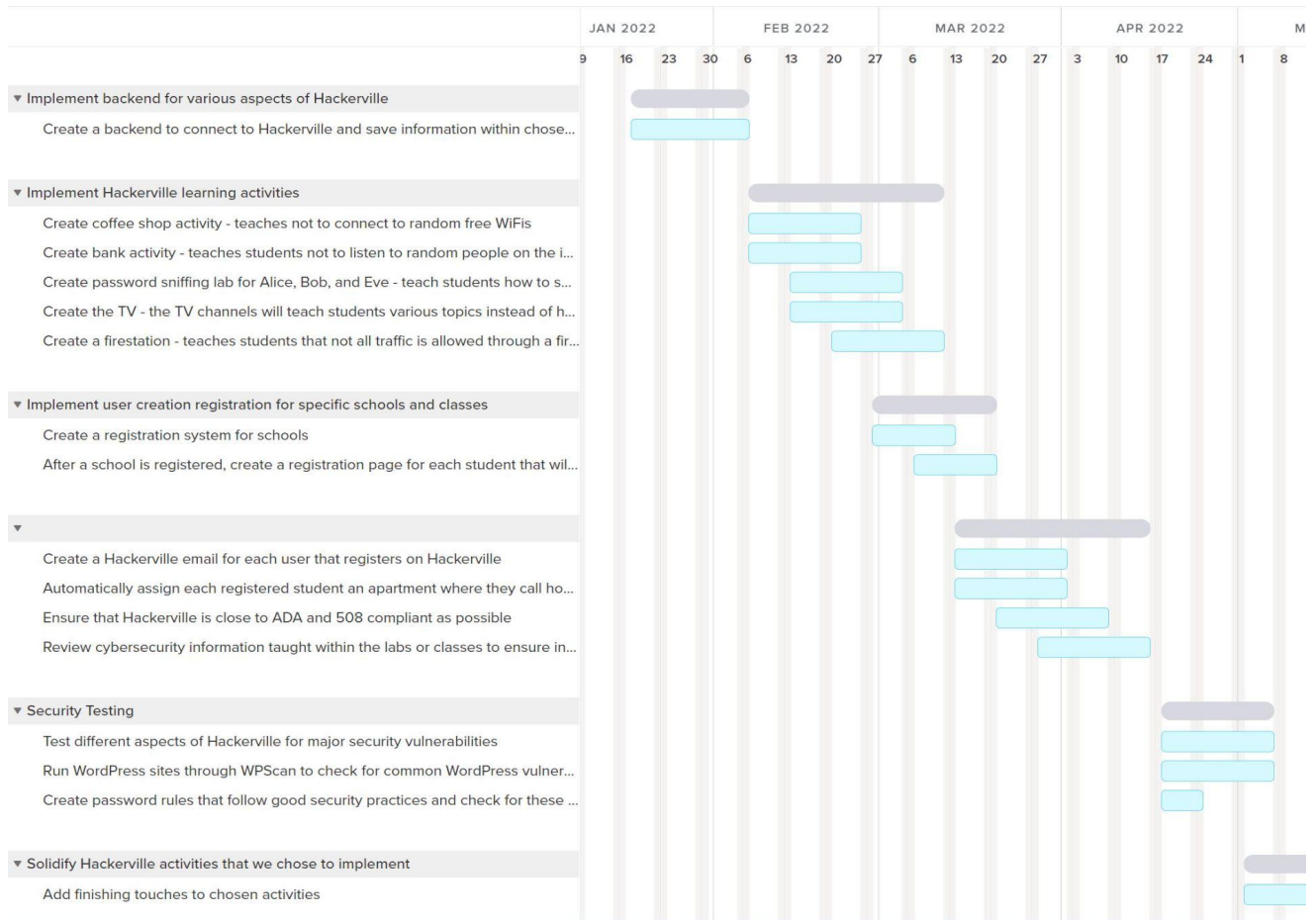
**Figure 3.4.2** The Gantt chart above shows a timeline of the spring semester, which will include the vast majority of our implementation. As seen, we will start the semester with implementing our backend LDAP server.

## 3.5 Risks And Risk Management/Mitigation

Consider for each task what risks exist (certain performance targets may not be met; certain tools may not work as expected) and assign an educated guess of probability for that risk. For any risk factor with a probability exceeding 0.5, develop a risk mitigation plan. Can you eliminate that task and add another task or set of tasks that might cost more? Can you buy something off-the-shelf from the market to achieve that functionality? Can you try an alternative tool, technology, algorithm, or board?

| Risk | Risk factor | Mitigation plan |
|---|---|---|
| The team may not adhere to our restraints, constraints, and engineering standards. | 0.51 | A solution would be to check that we are adhering to these guidelines before making any changes or developing anything new. It may also be beneficial to meet with the client and ensure that the product meets expectations. |
| The site we create could be vulnerable to cyber attacks. | 0.51 | While the full Hackerville site is not likely to be completed this year, we can test the components we create and leave notes for future teams/developers detailing any known vulnerabilities so they may be patched in the future. |
| Wordpress may not be able to handle the integration of security tools, or cannot provide all of the functionality required for the building, maintaining, and use of the website. | 0.75 | An alternative hosting service may be used to mitigate this, though that could come at the cost of convenience and require more development/money. |
| Not fully developing goals for the system to accomplish before starting work on the system. | 0.55 | A solution would be to have constant communication with the client in the early stages of building the system to ensure all the tasks of the system are accounted for during development. |

**Table 3.5** The table above enumerates Hackerville's Risks and Mitigation Plans

## 3.6 Personnel Effort Requirements

Include a detailed estimate in the form of a table accompanied by a textual reference and explanation. This estimate shall be done on a task-by-task basis and should be the projected effort in total number of person-hours required to perform the task.

| *Task* | *Number of In-Person Hours* |
|---|---|
| **Build outline for the entire Hackerville website** | |
| Create a sketches of screens for the website | 2 |
| Determine connection between screens | 1 |
| Determine the user connections | 2 |
| Determine how to make website ADA and 508 compliant | 3 |
| Determine if we need to be FERPA complaint | 1 |
| Privacy - how to implement privacy of users | 3 |
| Determine how to implement separation of schools and classes | 4 |
| | |
| **Create backend for various aspects of Hackerville** | |
| Enable cookies so superusers (us) can see everything that users do | 2 |
| Rough outline/sketch of how backend connects to web-based client | 2 |
| | |
| **Determine how students create their profiles and how they will interact in the village** | |
| Need to have a hackerville email to interact with other students in Hackerville | 1 |
| Figure out a registration process with user school/class | 1 |
| | |
| **Determine interactive activities that will be used to teach cyber security** | |
| Pull important cyber security teaching standards | 2 |

| | |
|---|---|
| from cyber.org | |
| Determine activities that could provide different levels of difficulty for students | 2 |
| Figure out which locations house which interactive activities | 2 |

**Table 3.6** The table above enumerates estimated personal effort for various tasks.

## 3.7 Other Resource Requirements

Identify the other resources aside from financial (such as parts and materials) required to complete the project.

- Domain name - https://hackerville.org
  - This will already be provided by our client.
- HTTPS Certificate - https://letsencrypt.org/ (or another provider)
- Servers
  - Windows - Active Directory requires Windows servers (client specifically requested usage of Active Directory for user authentication).
  - Linux - Although not specifically mentioned by client, we may choose non-Windows servers for our other infrastructure (that do not require Active Directory).
- Development Team requirements:
  - Git CLI
  - GitHub accounts
  - WordPress accounts

# 4  Design

## 4.1 Design Context

### 4.1.1 Broader Context

Describe the broader context in which your design problem is situated. What communities are you designing for? What communities are affected by your design? What societal needs does your project address?

**The broader context in which our design problem is situated is education. This is directly related to schools(elementary through high school), but this could also fit into workplace training. Hackerville will address the societal need of navigating the web safely, and protecting your sensitive data.**

List relevant considerations related to your project in each of the following areas:

| Area | Description | Examples |
|---|---|---|
| Public health, safety, and welfare | How does your project affect the general well-being of various stakeholder groups? These groups may be direct users or may be indirectly affected (e.g., solution is implemented in their communities)<br><br>**Our project will educate our users on how to navigate the web safely, and how to protect their sensitive data.** | Increasing/reducing exposure to pollutants and other harmful substances, increasing/reducing safety risks, increasing/reducing job opportunities<br><br>**We will educate our users through simulated cyber attacks and exercises.** |
| Global, cultural, and social | How well does your project reflect the values, practices, and aims of the cultural groups it affects? Groups may include but are not limited to specific communities, nations, professions, workplaces, and ethnic cultures.<br><br>**Navigating the web safely and protecting sensitive data is a world-wide issue, and everyone needs to stay up to date with how to defend current cyber attacks.** | Development or operation of the solution would violate a profession's code of ethics, implementation of the solution would require an undesired change in community practices<br><br>**Cyber attacks happen across the world, and anyone with a computer needs to be knowledgeable.** |
| Environmental | What environmental impact might your project have? This can include indirect effects, such as deforestation or unsustainable practices related to materials manufacture or procurement.<br><br>**Hackerville is a completely online project, so there are no direct environmental costs.** | Increasing/decreasing energy usage from nonrenewable sources, increasing/decreasing usage/production of non-recyclable materials<br><br>**The servers need to be powered and our users need to have computers, which indirectly affects the environment.** |

| Economic | What economic impact might your project have? This can include the financial viability of your product within your team or company, cost to consumers, or broader economic effects on communities, markets, nations, and other groups.<br><br>**There will be the initial cost of production, which will mostly be development man-hours. After creating the system, we can sell the license to schools and companies across the US.**<br><br>**Users who are not educated are more likely to fall for a cyber attack** | Product needs to remain affordable for target users, product creates or diminishes opportunities for economic advancement, high development cost creates risk for organization<br><br>**Development will cost nothing, as this is a school project. We can choose to have Hackerville be open source, or sell licenses to school districts. We can either profit off of this or just charge users the cost of keeping the servers running.** |
| --- | --- | --- |

**Table 4.1.1** The table above includes our design context

## 4.1.2 User Needs

List each of your user groups. For each user group, list a needs statement in the form of:

User group needs (a way t0) do something (i.e., a task to accomplish, a practice to implement, a way to be) because of some insight or detail about the user group.

**Students need a way to effectively learn the basics of cyber security in order to start their career in keeping the online world safe.**

**A company's workforce needs a way to learn about various cyber attacks in order to keep their company's information safe.**

**Teachers use this tool to meet cs standards**

## 4.1.3 Prior Work/Solutions

Include relevant background/literature review for the project

– If similar products exist in the market, describe what has already been done

    **KnowBe4 is a cyber security educator for the workplace. KnowBe4 simulates phishing attacks sent via email. An employee can choose to report the email, or if they click on a "malicious"**

**link, their supervisor is notified and will have a conversation with them. KnowBe4 also has many mandatory videos that teach the basics of how to identify cyber attacks and how to deal with them effectively.**

– If you are following previous work, cite that and discuss the **advantages/shortcomings**

– Note that while you are not expected to "compete" with other existing products / research groups, you should be able to differentiate your project from what is available. Thus, provide a list of pros and cons of your target solution compared to all other related products/systems.

Detail any similar products or research done on this topic previously. Please cite your sources and include them in your references. All figures must be captioned and referenced in your text.

https://www.knowbe4.com/

**KnowBe4's simulated phishing attacks are fairly easy to detect. The emails come from suspicious addresses, and the content is meant to be noticed as fake. This is in part due to its target audience, but these emails could be more misleading than they currently are.**

**KnowBe4's informational videos are comprehensive and up to date with current cyber attacks. There are required quizzes that you must receive at least an 80% on, enforcing the user to actually learn the material.**

## 4.1.4 Technical Complexity

Provide evidence that your project is of sufficient technical complexity. Use the following metric or argue for one of your own. Justify your statements (e.g., list the components/subsystems and describe the applicable scientific, mathematical, or engineering principles)

1. The design consists of multiple components/subsystems that each utilize distinct scientific, mathematical, or engineering principles

**Hackerville is a system made up of multiple different internet facing servers, including hackerville.org, neighborhood.hackerville.org, servers.hackerville.org, and tools.hackerville.org. These front facing applications have multiple screens associated with them, and need to be connected accordingly so the user can have a seamless experience.**

**The backend for Hackerville is also made up of multiple different servers, including authentication, assessment, management, and a private email server. The backend will need to be created to house the user directory information, and the actual code of the activities demonstrated on the front-end.**

2. The problem scope contains multiple challenging requirements that match or exceed current solutions or industry standards.

Hackerville allows students to experience falling into cyber security traps in a real world scenario, but with none of the real consequences. It is much more than simulated phishing attempts, and our users will become educated in how these attacks actually work. They will learn why people use cyber security attacks, how these attacks are performed, how to identify and stop these attacks, and how to handle a successful attack.

# 4.2 Design Exploration

## 4.2.1 Design Decisions

List key design decisions (at least three) that you have made or will need to make in relation to your proposed solution. These can include, but are not limited to, materials, subsystems, physical components, sensors/chips/devices, physical layout, features, etc.

1.  **LDAP (Linux-based service) will be used to store users and perform authentication and authorization.**
2.  **Service-based websites will be implemented on subdomains instead of a branch of the top-level domain (i.e. city-bank.hackerville.org, NOT hackerville.org/city-bank).**
3.  **For simple, static pages that do not require any overhead, we will use WordPress.**
4.  **For complex pages with overhead we will host our web files (HTML, CSS, JavaScript) on a machine and serve them with Apache.**
5.  **The cyber security lessons taught on the service-based websites will each have multiple levels of difficulty.**

## 4.2.2 Ideation

For one design decision, describe how you ideated or identified potential options (e.g., lotus blossom technique). List at least five options that you considered.

**(1) - LDAP (Linux-based service) will be used to store users and perform authentication and authorization**

**We came to this decision primarily because it was suggested by our client, who is very technical and thinks it will be best for our use case. The ideation process consisted of a few meetings with our primary client (Doug), where we asked for his preferences on technology and followed up with him on our decision.**

**Some other options that were considered/may be considered are the following:**

1. **LDAP - likely decision**
2. **Windows Active Directory - based on LDAP, but this is the Windows Server offering.**
3. **OAuth - allowing users to log in with external services (i.e. Google, Facebook, Apple, etc.).**
4. **Hackerville REST API - we may also consider building out a REST API that our frontend can talk to for storing users and performing authentication and authorization, although this is not likely a decision that we will make.**
5. **Managed Cloud solution - we could also consider using a managed cloud offering (AWS, GCP, Azure) to store and authenticate our users (one example is AWS Cognito) - this is also not a likely decision**

## 4.2.3 Decision-Making and Trade-Off

Demonstrate the process you used to identify the pros and cons or trade-offs between each of your ideated options. You may wish to include a weighted decision matrix or other relevant tool. Describe the option you chose and why you chose it.

**The tradeoffs apply mostly to the platform that we will be using as a backend. If the server that is available to us is running a unix system, we will most likely use openLDAP. If it is running Windows server, we'll be using Active Directory. Right now it seems much more likely that we will be using a server running unix. There are drawbacks to using any of these options, since most of the group does not have experience working with them. Some group members have some knowledge of openLDAP, as it was used in a class they have taken. Note - We need one email identity with multiple passwords or authenticators based on what they are trying to login to, TMI, bank, etc.**

# 4.3  Proposed Design

Discuss what you have done so far – what have you tried/implemented/tested?

**We have been working closely with our clients to make sure the ideas that they have are being implemented. As a team we have been researching ways to implement a website and learning how to use LDAP. We will also be in the process of researching how to work on the back end of a website so late this semester or early second semester we can start the process of designing and implementing it.**

## 4.3.1 Design Visual and Description

Include a visual depiction of your current design. Different visual types may be relevant to different types of projects. You may include: a block diagram of individual components or subsystems and their interconnections, a circuit diagram, a sketch of physical components and their operation, etc.
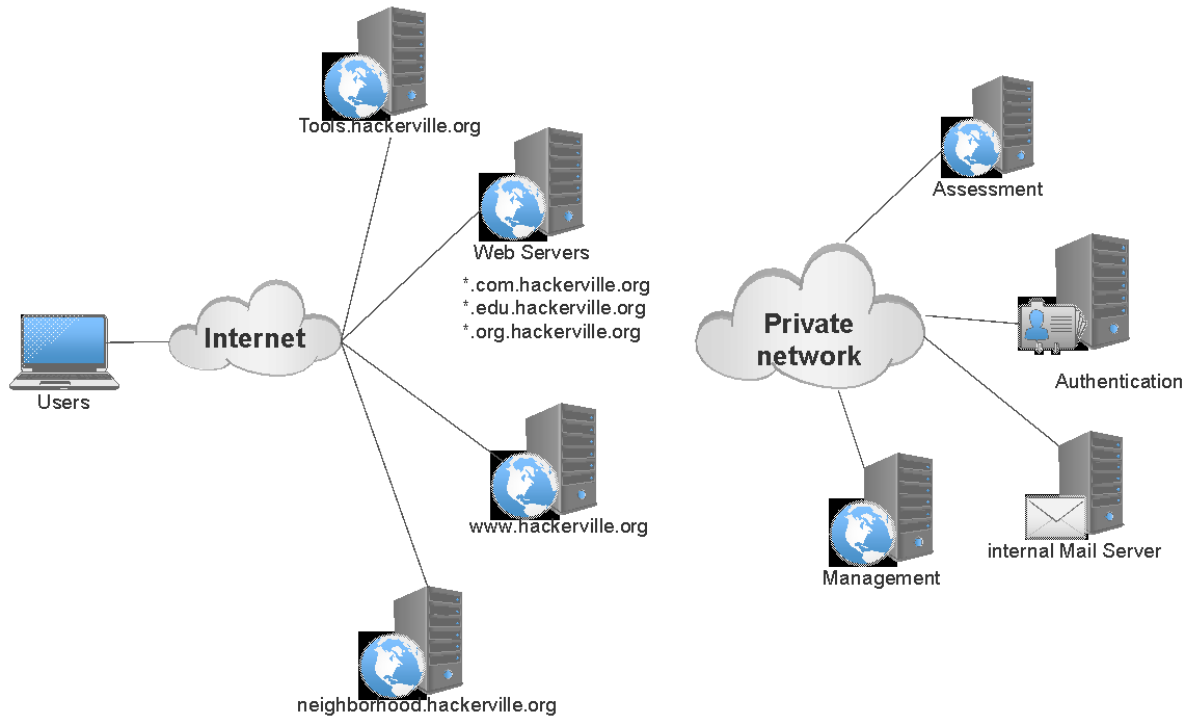
**Figure 4.3.1** Network Diagram of Hackerville

Describe your current design, referencing the visual. This design description should be in sufficient detail that another team of engineers can look through it and implement it.

**Internet facing Servers:**

- **www.hackerville.org:**  This is the primary website and will be the portal where students and teachers login to gain access to their neighborhood. This is where teachers and other users can register to become part of Hackerville. The site also contains all of the public information about Hackerville. This will also contain links to teacher materials and resources.   The site has four portals:
    - o **Visitor Center**:  This portal contains public information about Hackerville and also allows limited access to a public neighborhood.
    - o **Current Residents**:  This portal is used by students and teachers to gain access to the Hackerville site and their neighborhood / apartment.
    - o **Moving to Hackerville**:  This portal is used by teachers to create their apartment complex and to obtain leases for their students to access their apartment.
    - o **Public Library**:  This portal will provide access to all of the learning materials to support Hackerville.

- **neighborhood.hackerville.org:**  This site provides the neighborhood view of Hackerville to provide students a context for their interaction with Hackerville.  For example, the site will be where the students can interact with their apartment.
- **servers.hackerville.org:**  These are multiple web sites running on one or more servers.  These web sites include a bank, a social media platform, email server, shopping site, etc.
- **Tools.hackerville.org:**  This site is used for more in depth activities support by Hackerville.   For example, the site will contain access to a Unix shell, Kali Linux, and other tools.

**Back-end servers:**

- **Authentication:**  This is the primary system for user authentication and user directory information.
- **Assessment:**  This server will be used to collect data from Hackerville and provide teachers and the investigators data about the usage of the Hackerville learning environment.
- **Private email server:**  This is the internal email server for all of the users.
- **Management:**  This will be used to manage the overall Hackerville environment

## 4.3.2 Functionality

Describe how your design is intended to operate in its user and/or real-world context. This description can be supplemented by a visual, such as a timeline, storyboard, or sketch.

**Our design will be usable by middle and high school students, as well as their teachers. It will involve each student being able to interact with various locations in "Hackerville" such as a coffee shop and a bank. In these locations there will be opportunities for students to learn some basic cyber security skills and lessons with different difficulty levels. Students will also have a Hackerville email associated with their account, and be able to post things on the "social media" portion of the site, TMI.**

How well does the current design satisfy functional and non-functional requirements?

**The current design adequately satisfied both the functional and non-functional requirements. However, this may change and require further changes depending on resources available and any obstacles we encounter while developing the project.**

## 4.3.3 Areas of Concern and Development

Based on your current design, what are your primary concerns for delivering a product/system that addresses requirements and meets user and client needs?

**Our primary concerns are that the tools we will be using will not have the functionality we require, and that we do not have access to the resources needed. If we discover that WordPress is not able to support the functionality that Hackerville demands, we will need to create our own website based on HTML.**

What are your immediate plans for developing the solution to address those concerns? What questions do you have for clients, TAs, and faculty advisers?

**We will have to begin development in order to address these concerns.**

## 4.4 Technology Considerations

Highlight the strengths, weaknesses, and trade‑offs made in technology available.

Discuss possible solutions and design alternatives

**Some strengths of the technology available is the simplicity of making web pages in Wordpress and that there is already a template website made with the format completed. A possible weakness is that there is less room for creative freedom when using a website that is already set up.**

**More specifically, WordPress leaves little room for advanced customization, only allowing us to make simple edits to HTML, CSS, and JavaScript. This will work very well for some of our expected features, and very poorly for others. For example, creating our cyber security learning activities will likely require a lot of custom code, so we will serve these files over Apache instead of WordPress.**

## 4.5 Design Analysis

– Did your proposed design from 3.3 work? Why or why not?

**While it is not fully implemented, the design of this project is solid. We have gone over our design with our client and the implementation we chose is feasible, and we will be able to create our project successfully.**

– What are your observations, thoughts, and ideas to modify or iterate over the design?

**The design is fairly straightforward. The entire project will be server side, as most websites are. The only remaining question is how we will be able to make 1 user have unique login credentials for each of the respective sub-websites(TMI, Bank, etc.). While this functionality is definitely possible, how we will exactly implement it is still unknown.**

## 4.6 Design Plan

Describe a design plan with respect to use-cases within the context of requirements, modules in your design (dependency/concurrency of modules through a module diagram, interfaces, architectural overview), module constraints tied to requirements.

**Our plan is to implement the existing design plan that we described in Section 3.3 above. We will begin the implementation of this design immediately next semester.**

# 5  Testing

Testing is an **extremely** important component of most projects, whether it involves a circuit, a process, power system, or software.

The testing plan should connect the requirements and the design to the adopting test strategy and instruments. In this overarching introduction, given an overview of the testing strategy. Emphasize any unique challenges to testing for your system/design.

## 5.1    Unit Testing

What units are being tested? How? Tools?

**We need to test the functionality of our users creating accounts. We will test this by creating accounts and comparing their unique values, as well as ensuring their credentials are accurate to how they were entered during registration.**

**A subset of the individual units being tested are the following (just some examples):**

1. **Users**
2. **Apartments**
3. **Villages**
4. **Activities**

## 5.2   Interface Testing

What are the interfaces in your design? Discuss how the composition of two or more units (interfaces) are being tested. Tools?

**Our interfaces are going to be the WordPress hosted web pages that our users will interact with. These pages compose the hackerville environment, and need to be interconnected seamlessly. We plan on using Selenium, an automated web browser testing service, to test this functionality. We can write automated scripts that use Selenium to test site functionality across different browsers (Chrome, Edge, Firefox).**

## 5.3   Integration Testing

What are the critical integration paths in your design? Justification for criticality may come from your requirements. How will they be tested? Tools?

**An important integration to test is ensuring our frontend pages for user authentication are properly integrated to our backend LDAP user service. To do this, we can write automated scripts that communicate with our LDAP service in the same way the frontend does to ensure proper implementation.**

## 5.4   System Testing

Describe system level testing strategy. What set of unit tests, interface tests, and integration tests suffice for system level testing? This should be closely tied to the requirements. Tools?

**In order to test the whole system, we will use the debugging feature of our favorite IDE, use Selenium to create automated tests for the web page interfaces, and register test users to test for edge cases in production.**

## 5.5   Regression Testing

How are you ensuring that any new additions do not break the old functionality? What implemented critical features do you need to ensure do not break? Is it driven by requirements? Tools?

**Tests will be executed to ensure correctness after any changes are made to the system. This includes manual testing (user interface), automated interface testing (perhaps through Selenium), and automated unit tests (for testing changes made to codebase). For pages on our website implemented in WordPress, strict unit testing may not be required. However, we still want full coverage automated testing (once again, maybe with Selenium) for all pages on the website.**

## 5.6   Acceptance Testing

How will you demonstrate that the design requirements, both functional and non-functional are being met? How would you involve your client in the acceptance testing?

**To demonstrate that all design requirements are met, we will register a test user to the site. We will then sit down with our client and go through the functionality of the project from the test user's perspective. We will demonstrate each aspect of our project, and our client will be able to agree with the functionality, tell us what should not be intended, and give us new ideas.**

## 5.7   Security Testing (if applicable)
**We will test the security of our website with various tools that find vulnerabilities within websites. One tool that will be useful for us is wpscan. WPScan checks for vulnerabilities within WordPress sites which is what Hackerville will be hosted on. Additionally, we could "conduct" security tests against our website. We could try and detect if there is any information exposed that shouldn't be, or if an attacker would be able to gain access to our website as an administrator. This way we can see if there is a significant security issue that we will need to fix, or if there is any information that we need to take down. Overall, we will just try and conduct simulated security tests against our website to ensure that we are implementing good security practices.**

## 5.8   Results

What are the results of your testing? How do they ensure compliance with the requirements? Include figures and tables to explain your testing process better. A summary narrative concluding that your design is as intended is useful.

The results of our testing will determine if our implementation is successful. This is because we are covering all implementation aspects of our system, including units, user interfaces, integrations, and security testing. Our testing (both manual and automatic) ensures compliance with the requirements mostly because our tests will be written according to the requirements. For example, our automated user interface testing (likely through Selenium) will be written according to what our users will be doing on the website. In turn, our user's expected behavior comes from requirements given to us by the client.

The diagram below outlines Selenium's testing process. This will be an important component of our testing because it ensures that our user experience is strong.
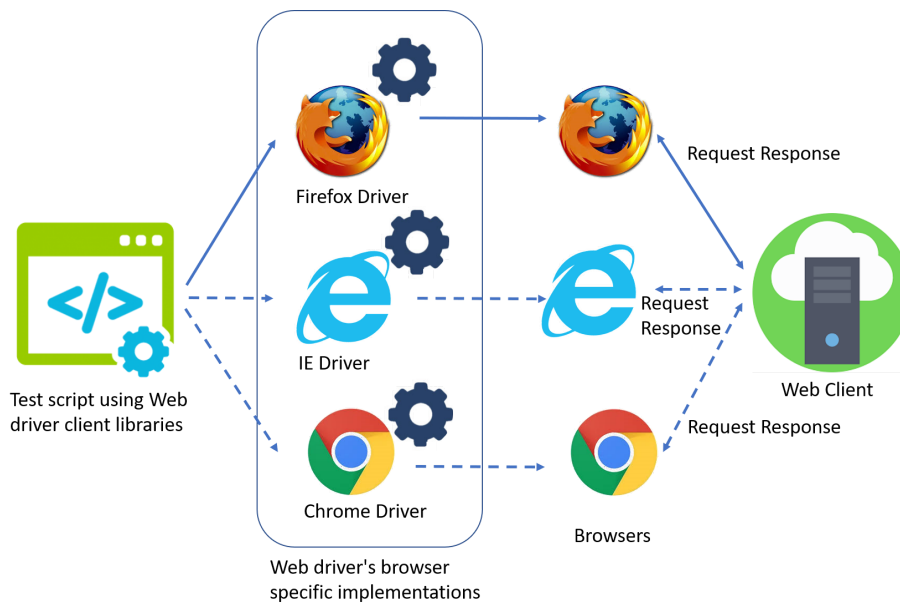


**Figure 5.8** Hackerville User Interface Testing Diagram

# 6 Implementation

*Describe any (preliminary) implementation plan for the next semester for your proposed design in 3.3. If your project has inseparable activities between design and implementation, you can list them either in the Design section or this section.*

A preliminary prototype of Hackerville has been completed by our clients and is currently being hosted on [https://hackerville.org](https://hackerville.org) powered by WordPress. This prototype will be expanded on as explained in the sections in this document.

A very specific implementation plan for next semester can be found in section 3.4, which includes two Gantt charts that enumerate the tasks we plan on completing next semester. The first task involved in the implementation next semester will be implementing the backend LDAP server.

# 7 Professionalism

## 7.1 Areas of Responsibility

| Area of responsibility | In our own words | IEEE Code of Ethics | How it differs from the NSPE Canon |
|---|---|---|---|
| Work Competence | Complete tasks related to the project in such a way as to demonstrate masterful understanding of the topic(s), as well as professionalism. | To maintain and improve our technical competence and to undertake technological tasks for others only if qualified by training or experience, or after full disclosure of pertinent limitations;<br><br>To seek, accept, and offer honest criticism of technical work, to acknowledge and correct errors, and to credit properly the contributions of others;<br><br>to improve the understanding of technology; its appropriate application, and potential consequences; | Very similar, the only difference is IEEE emphasises being able to apply constructive criticism. |
| Financial Responsibility | The overall value of the deliverables is equitable to the overall value of the work done and the materials used. | To be honest and realistic in stating claims or estimates based on available data;<br><br>To reject bribery in all its forms; | Both specify being honest in the evaluation of cost, IEEE specifies there should be no bribery. |
| Communication Honesty | Being 100% honest and forthcoming with the project's stakeholder, advisors, and anyone else involved. | To be honest and realistic in stating claims or estimates based on available data;<br><br>To seek, accept, and offer honest criticism of technical work, to acknowledge and | Both emphasize complete honesty between all parties involved, and the IEEE standards go into further detail of |

| | | correct errors, and to credit properly the contributions of others;<br><br>To assist colleagues and co-workers in their professional development and to support them in following this code of ethics | how this communication should be held and accepted. |
|---|---|---|---|
| Health, Safety, Well-Being | Keeping in mind what possible consequences to health, safety, and general well-being of ourselves, our clients, and anyone affected by our work may arise. | To accept responsibility in making decisions consistent with the safety, health, and welfare of the public, and to disclose promptly factors that might endanger the public or the environment;<br><br>to avoid real or perceived conflicts of interest whenever possible, and to disclose them to affected parties when they do exist;<br><br>To avoid injuring others, their property, reputation, or employment by false or malicious action; | Both have the same basic meaning, though the IEEE code of ethics goes into more detail about what might constitute harm to health, safety, and well-being. |
| Sustainability | Ensure that the work we do does not have a negative effect on the environment, and be mindful of any possible effects and minimize any that are negative. | To avoid injuring others, their property, reputation, or employment by false or malicious action; | This is not an aspect of the NSPE cannon. |
| Social Responsibility | Create projects that help society grow or become better. | To accept responsibility in making decisions consistent with the welfare of the public;<br><br>To treat fairly all persons and to not engage in acts of discrimination based on race, religion, gender, disability, age, national origin, sexual orientation, gender identity, or gender expression; | Essentially the same, but NSPE puts more emphasis on the honor and reputation of the project |

**Table 7.1** Areas of Responsibility

## 7.2 Project Specific Professional Responsibility Areas

**For each of the professional responsibility areas in Table 1, discuss whether it applies in your project's professional context. Why yes or why not? How well is your team performing (High, Medium, Low, N/A) in each of the seven areas of professional responsibility, again in the context of your project. Justify.**

**Work Competence:** Work competence applies directly to our project because in our project, the quality of work needs to be near perfect. This is because we are attempting to educate people, and we need to teach them information that is 100% correct and relevant within the security field. As you can imagine, if our team provided incorrect information to the students we are teaching, it could cause severe consequences if they were to apply the information that they learned within Hackerville to the real-world. Therefore, we know that our project must be high quality and the information shared needs to be correct and current.

Our team is performing in the high range for this professional context, as we are very knowledgeable within the field of cyber security.

**Financial Responsibility:** Financial Responsibility will not be a direct concern for Hackerville. There is not much cost involved with the creation of Hackerville since a rough prototype currently exists. Therefore, there are not many extra costs to complete the website, since domains are already in-use and it is already on the internet. The only cost that could be considered is work-hours or any extra domains that Hackerville would need to purchase.

**Communication Honesty:** Communication Honesty directly applies to our project. This means we need to be honest with our faculty advisor regarding our progress and any obstacles we encounter. Our team is performing in the high range for this as we have asked for feedback throughout the design phase of this project. In addition, we have had excellent communication with our faculty advisor and he can visibly see the progress we make, so there is no point in lying.

**Health, Safety, Well-Being:** This directly relates to our project. We are teaching people how to surf the web safely. We need to teach good practices that we are confident our users will be safe if they apply them. If we are teaching out-dated or incorrect material, we could be liable. Our team is performing in the high range for this, as we are very knowledgeable in cyber security.

**Property Ownership:** Property Ownership directly relates to our project. We will be having students interacting within the Hackerville environment who also have other properties that must be protected. We will not be connecting any social media accounts within Hackerville as this is an educational tool, rather than a social media platform. Therefore, we need to keep each student's property in mind and make sure we are continuing to provide them the privacy they need with that.

Our team has been performing in the high range for this, as we are all aware of the importance of TMI within an educational website.

**Sustainability:** Our project has very little to do with sustainability. Our website only requires computing power, and with the current state of the power grid and world wide web, our project will not make any meaningful impact on the environment.

**Social Responsibility:** Social Responsibility directly relates to our project. We are producing a product that will benefit society by educating people on how to keep their sensitive information safe. Our team is performing in the high range for this, as we are very knowledgeable in cyber security.

## 7.3 Most Applicable Professional Responsibility Area

**Identify one area of professional responsibility that is both important to your project, and for which your team has demonstrated a moderate or high level of proficiency in the context of your project. Briefly describe what this responsibility means to your project, the ways in which your team has demonstrated the responsibility in the project, and specific impacts to the project that you have observed.**

**The most applicable professional responsibility area for our project would be work competence. Our group has a great understanding of both cyber security and website building principles. Both of which are necessary for this system to work properly. The lessons need to be made in a website that is easy to understand and use by all ages. As well as usability, the lessons must be accurate and true to the cyber security standards they are trying to convey**

# 8 Closing Material

## 8.1 Discussion

**The result of this initial phase of the project (only this semester) includes a comprehensive design document, plan, and understanding of what our team will be implementing. Our client has been happy with our design and has encouraged us to begin implementation next semester.**

## 8.2 Conclusion

**As mentioned above, the primary result of this semester has been the design of the Hackerville environment, including the core website frontend, openLDAP backend, and important learning activities for cyber security concepts.**

**To reiterate, our goals are as follows:**
- **Implement LDAP backend**
  - **Decided to use an openLDAP server hosted on Linux due to being open source with a lot of documentation available.**
- **Implement at least the following 3 cyber security learning activities:**
  - **Coffee Shop - learn lessons about connecting to public WiFis**
  - **TMI social media site - learn about being safe on social media**
  - **City bank - distinguish between fake and real online banking experiences**
- **Complete WordPress implementation for any pages needed on the frontend**
  - **WordPress will be used for simple static websites**

- ○ **Apache web server will serve more complex pages that need custom HTML, JavaScript, or CSS.**
- **Thoroughly test our work with unit, integration, and regression testing**
  - ○ **Selenium will be used to test our user interfaces**

## 8.3 References

## 8.4 Appendices
N/A

## 8.4.1 Team Contract

**Team Members:**

1) Emily Hohneke                           2) Brady Heath

3) Elizabeth Memmini                       4) Isabel Maymir

5) Andrew Groebe                           6) Adam LaRocque

7) Andrew Sandor

**Team Procedures**

1.  Day, time, and location (face-to-face or virtual) for regular team meetings:

Wednesdays at 3pm in the Hackerville Discord

2.  Preferred method of communication updates, reminders, issues, and scheduling (e.g., e-mail, phone, app, face-to-face):

Our team has decided to use GroupMe and Discord as the main form of communication for updates, issues, and scheduling of meetings. This is just a simple way for us to communicate anywhere when we may not be physically with each other at a certain moment. In addition, our team has decided to utilize Slack to communicate with our faculty advisor and client. For our specific project, these two people happen to be the same person and since they are familiar with Slack, we decided to go that route in order to communicate with them. This is just a better

way to communicate with them so our emails don't get lost in the hundreds of other emails they receive, and we can get better and faster answers to our questions.

3.  Decision-making policy (e.g., consensus, majority vote):

As a team, we decided that our decision making policy would be through polls and a majority vote. This way we feel that the decisions are made fairly and the decision would satisfy a majority of the team members. We know that it is almost impossible to ensure that everyone is satisfied and we believe that this is the best way to make decisions within a team this large.

4.  Procedures for record keeping (i.e., who will keep meeting minutes, how will minutes be shared/archived):

As a team, we understand the importance of record keeping and we decided to create a Google drive where we will house meeting minutes for our project. We decided to keep a record of our meetings because we know that many issues will come up throughout the year where someone may not be able to make it to our meeting. When this happens, we do not want to back track, and we want the member that missed the meeting to still be informed with what was discussed at that specific meeting. Liz has been taking the meeting minutes and will continue to post them to the Google drive so everyone has access to them following the meetings.

**Participation Expectations**

1.  Expected individual attendance, punctuality, and participation at all team meetings:

Participation is a huge factor in creating a successful project, therefore, we expect each member to be present at every meeting, either in-person or virtually unless they have an excuse that is acceptable. This is simply because we hope that everyone will follow along with the project throughout the year, and it ensures that everyone has received the same information. In addition to attendance, we expect every team member to contribute during meetings in a meaningful way. This way we know that each team member is working on their specific role and contributing to the project in a meaningful way. In addition, this shows our TA, faculty advisor, client, and the other team members that we care about creating a successful project.

2.  Expected level of responsibility for fulfilling team assignments, timelines, and deadlines:

Throughout the time on our project, we expect every team member to fulfill their assigned role. This will ensure that everyone is held responsible for a specific section of the project, and no

one feels like they have to do the entire project. In addition, we expect everyone to complete their assigned role by the time stated in our weekly meetings. This is because we have a very difficult end product and the only way to achieve that goal is to discuss team member assignments at our meetings and hold everyone responsible for completing their assigned task on time.

3.  Expected level of communication with other team members:

As a team, we expect everyone to communicate with the other team members if they run into difficulty or finish a function of our end product. This is because everyone needs to know the status of the project at all times since we are all responsible for work done within the project. Therefore, if someone is having troubles with a specific section, then they need to communicate that in order to receive help from another teammate or our faculty advisor. In addition, every team member is expected to communicate with the team about other issues that may arise preventing them on working on a specific task. Again, this is because we need to know the status of the project at all times and may need to substitute other teammates in depending on life situations.

4.  Expected level of commitment to team decisions and tasks:

Since this is a fairly large project, our team expects a high level of commitment to this project. We need everyone to take the project seriously, otherwise, our project will not be as successful as it could have been. Therefore, every member is expected to be committed to the project regardless of any decisions that are made. We know that someone may not be happy with a decision, however, they are still expected to be committed to their role and deliver progress that is exceptional.

**Leadership**

1.  Leadership roles for each team member (e.g., team organization, client interaction, individual component design, testing, etc.):

Our leadership roles for each team member are assigned as follows:

Team organization: Emily & Liz

Client Interaction: Isabel, Adam, Brady

Individual Component Design: Emily, Liz, Brady, Andrew S, Andrew G, Isabel, Adam

Testing: Andrew S and Andrew G

2. Strategies for supporting and guiding the work of all team members:

One strategy for supporting and guiding the work of all team members would be holding the team organizers accountable for checking up on anyone and helping them when needed. The biggest role for the team organizers is ensuring that our team is making progress. Therefore, the team organizers should continuously offer support or guidance for anyone who may be focusing on an individual component design.

3. Strategies for recognizing the contributions of all team members:

One strategy for recognizing the contribution of all team members would be to have frequent demos and updates of everyone's progress. This will ensure that everyone is recognized for the contributions that they are making to the team and project as a whole. In addition, this will alert our team if someone is not making very many contributions. This is also just as important because if we continuously have a team member not making contributions, then we will know that we need to change team assignments in order to ensure everyone is contributing.

**Collaboration and Inclusion**

1. Describe the skills, expertise, and unique perspectives each team member brings to the team.

*Emily* – I am a cybersecurity engineer and have worked with many of the topics that we are trying to teach within our Hackerville environment. I have done real-world phishing, password spraying, password cracking, and pen-testing in general. This is typically considered the "fun stuff" of cybersecurity that most people think of when they think of hacking. I typically focus more of the offensive side of security and therefore, really want to add topics like this to our Hackerville environment. In addition, I am fairly organized and try to keep things on track when it comes to projects.

*Elizabeth* – I am also a cybersecurity engineer focusing mainly on defensive tactics for cyber security. I have done real-world access management, vulnerability assessment and designing solutions for vulnerabilities, and firewall configuration. These things are not what is typically thought of when thinking of cyber security but it is just as important as hacking. I would like for our Hackerville environment to have the offensive and defensive sides of cyber security as well as the intersection between the two sides. For the standpoint of how I work in a team, I am very confident in being the person checking on the status of the project and making sure things get done and offering help when needed.

***Andrew G*** – I am a Software Engineering student and tech enthusiast interested in programming, cyber security, and full-stack web development. In my free time, I enjoy learning new engineering skills and constantly working on side projects. Professionally, I have completed three Software Engineering Internships with UnitedHealth Group in Minnesota. All three of my summers were great experiences, but I particularly enjoyed my most recent internship, which involved contributing to a web-based tool for Cyber Security Analysts. This experience led me to select Hackerville as my first project preference, as I think I can make the most use of my skill set on this project. I am particularly excited to bring my skills of web development, security, and networking to the team.

***Andrew S*** – I am a Software Engineering student with most of my experience being in frontend development and a little bit of full stack. In industry I have experience with one previous internship in developing API's using JSF and Maven database frameworks. Also, during my internship I learned a little bit about cybersecurity. I enjoyed what I learned and it helped peak my interest in Hackerville to try and learn a bit more about security. In terms of working on projects I'm most efficient when I'm able to work for long periods of time at once on development. This should hopefully work well once we get the project started and are done with planning.

***Isabel*** – I am a Cyber Security engineer with experience in various aspects of the fiend including development of security solutions and penetration testing. Additionally, I have worked as a teaching assistant for introductory-level classes in cyber security engineering. This has given me experience teaching cyber security fundamentals through labs similar to what will be done on this project. Working as a teaching assistant has also given me experience working in teams to find solutions to problems that those learning the basics of cyber security may face, and explaining how and why things work.

***Adam*** –  I am a software engineer with little experience in cyber security. I am currently taking 421, a cyber security course. My experience in actual coding is limited to my course work. I am confident I can solve most problems with a couple key google searches. My biggest weakness is setting up environments, but once I figure out where/how to code I can hit the ground running. I am a pretty social and organized person, so I would be more than comfortable talking to our client and coordinating with group members.

***Brady*** – I am a cyber security engineering student with a lot of coding experience. I have experience with password cracking, penetration testing, and phishing. I am also very organized and like to ask questions until I know what is expected of my work. I have helped with making websites as well. I would like to see this Hackerville website be a learning tool used in schools and to teach people how to protect themselves on the internet. I am very optimistic on others opinions and work very well in groups and teams.

2.   Strategies for encouraging and support contributions and ideas from all team members:

The main strategy for encouraging and supporting contributions from all team members is acknowledging that they put in effort and thought to better our project. We do not want to discourage any of our team members or make them think that they didn't contribute when they took time to work on the project. Even though we may now use a function or contribution from a team member, we will still support their idea and thank them for taking the time to work on the project. This is because sometimes without someone's idea, we might not have shifted our perspective and gone another direction. Therefore, even if we don't use a team member's idea, that idea will have helped us in some way, even if we don't realize it instantly.

3.  Procedures for identifying and resolving collaboration or inclusion issues (e.g., how will a team member inform the team that the team environment is obstructing their opportunity or ability to contribute?)

The environment our team envisions will be collaborative and open ended. Our team has identified that the procedure for identifying collaboration issues is just going to be to bring up the issue in our group chat or at a team meeting. Most people are not good at recognizing cryptic messages or hints, and so the team member that has an issue needs to communicate their issue in order for it to be solved. After the person brings up the issue, the team will go through our decision making process to figure out next steps to improve the team. If the issue is still not solved, we could bring it up with our faculty advisor or TA and try to offer a solution that way.

**Goal-Setting, Planning, and Execution**

1.  Team goals for this semester:

    ●  Create a prototype of the Hackerville environment
    ●  Work successfully as a team
    ●  Learn everyone's strengths and weaknesses so we can divide roles up efficiently
    ●  Meet most or all of the clients' needs
    ●  Learn how to communicate effectively with our faculty advisor or manager like personnel
    ●  Learn how to gain skills from other team members to become a more well rounded engineer

2.  Strategies for planning and assigning individual and teamwork:

Our team decided that we will talk about each other's strengths and weaknesses and divide up tasks accordingly. If there are multiple people interested in the same role, we may have to do a team vote to decide who works on what in a specific week. For planning, we will try and use our faculty advisor's goals for us to get done each week. This way we know that we are planning the

correct functions to meet the next milestone. In addition, our team organizers will make sure that we have a plan solidified each week to ensure that we are making progress on the project.

3.  Strategies for keeping on task:

Our team's main strategy for keeping on task is going to be holding everyone accountable for assigned work and checking on completion at team meetings. This is the main way to ensure that we stay on task and don't navigate away from our end goal. In addition, the team organizers will check up on the team frequently to ensure that even the small milestones and goals are being met. Sometimes people are more productive when they know someone is going to check-in on them, and therefore, adding this, may help our team stay on task more often.

**Consequences for Not Adhering to Team Contract**

1.  How will you handle infractions of any of the obligations of this team contract?

Our team will handle infractions by communicating the infraction with the specific team member that is violating the contract. If an argument is happening between two people, then those people can try and work through the conflict themselves. If that doesn't solve the issue, then the team members can bring the conflict up in a meeting with the entire team. We will then go through our decision making process to solve the issue and find a resolution.

2.  What will your team do if the infractions continue?

If our team cannot solve infractions of the team contract ourselves, then we will schedule a meeting with our TA or our faculty advisor in order to solve the issue. At this point our team's decision making process will be unnecessary as we will use the solution and recommendation of the TA or faculty advisor as an executive decision.

*************************************************************************

a) *I participated in formulating the standards, roles, and procedures as stated in this contract.*

b) *I understand that I am obligated to abide by these terms and conditions.*

c) *I understand that if I do not abide by these terms and conditions, I will suffer the*

*consequences as stated in this contract.*

1) Emily Hohneke                                      DATE    9/16/2021

2) Elizabeth Memmini                                  DATE    9/16/2021

3) Adam LaRocque                                      DATE    9/15/2021

4) Andrew Groebe                                      DATE    9/15/2021

5) Brady Heath                                        DATE    9/15/2021

6) Isabel Maymir                                      DATE    9/16/2021

7) Andrew Sandor                                      DATE    9/19/2021