PHISECURE

PHISHING EDUCATION: TO BE AWARE, DON'T BITE THAT HOOK

CS411W Demo 1 Presentation

By: Team Orange (2024)

9/24/24

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Team Members

Team Leader

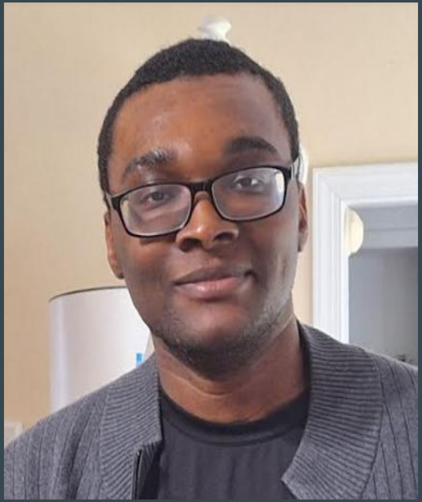
Hunter Pollock is a Senior at ODU currently studying and majoring in Computer Science, with the goal of getting a Master's degree in the graduate program. He enjoys playing video games, good food, listening to music, and learning about programming.

PHISECURE

Frontend Lead

Ethan Barnes is another Senior at ODU, studying Computer Science. He is currently working at a flour mill as a Second Miller. He enjoys reading, the outdoors, and discovering new things. He has three children.

Team Members

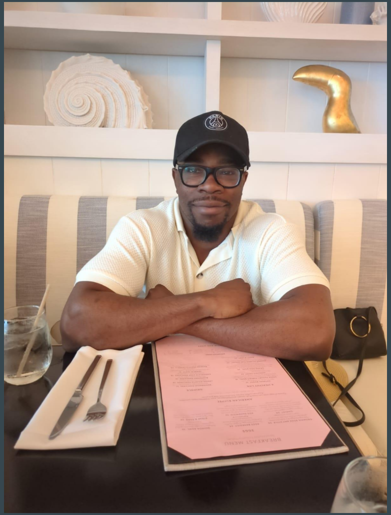


Webmaster

Joshua Freeman is a senior at ODU and is majoring in Computer Science. He like to read and play video games.

Backend Lead

Dylan Via is an undergraduate student at ODU going for his bachelors in Computer Science. He plans on pursuing a career in Software Engineering after he graduates. Most of his training in coding has been in C++, but he does have experience in Java and Python.



Database Lead

Ralph Mpanu is a senior at ODU and is majoring in Computer Science. After graduating he plans on working as a software engineer. He enjoys fitness and practicing brazilian jiu-jitsu.

Mentor

Mustafa Ibrahim is a PhD student at ODU, specializing in Computer Science with a focus on Cybersecurity, particularly in Networking Security. He also enjoys playing soccer.

Phishing - A Growing Threat

- Phishing is becoming more and more common in the modern world
  - Over **3.4 billion** phishing emails are sent a day, and email phishing accounts for **1.2%** of all email traffic globally![16]
  - **84%** of organizations [of all kinds] were the target of at least one phishing attack.
  - Education industries (such as universities) make up **9.3%** of these attacks.
    - That might not sound like much at first, but that's **316,200,000 emails per DAY** targeted at educational institutions!
  - To demonstrate this problem, let's look at a recent attack from an educational institution to demonstrate why this is a problem...

A Case Study in Phishing Vulnerability

- Students at California State University were getting emails about their Office 365 accounts being terminated if they didn't cancel the request
- Except they *weren't* being terminated to begin with. It was a scam by a phisher to grab student info and hack into other student emails to extort them for money.[17]
- Stories such as this are occurring more frequently throughout the world at universities. Phishers are always changing tactics and getting smarter in how to perpetrate these crimes.

A Case Study in Phishing Vulnerability (cont.)

- 82 student accounts of theirs were compromised in Q2 of 2023, up from almost zero at the beginning of 2021.[17]
- These attacks pose as either threatening to shut down access to important services like email accounts or offering students jobs with very enticing pay.
  - The second one especially is tempting, as many newer students need the money to support themselves, especially those who moved to live near the university (especially those from out of town and/or state).
- This proves to be a massive challenge for universities to mitigate and prevent attacks like this. Why?

Phishing: A Growing Threat

Universities need innovative educational tools for teaching cybersecurity to their faculty, staff, and students so they can better identify and avoid phishing attacks.

Phishing Education

It's becoming more and more clear students and faculties at these universities do not have the proper training required to discern phishing scams from legitimate emails

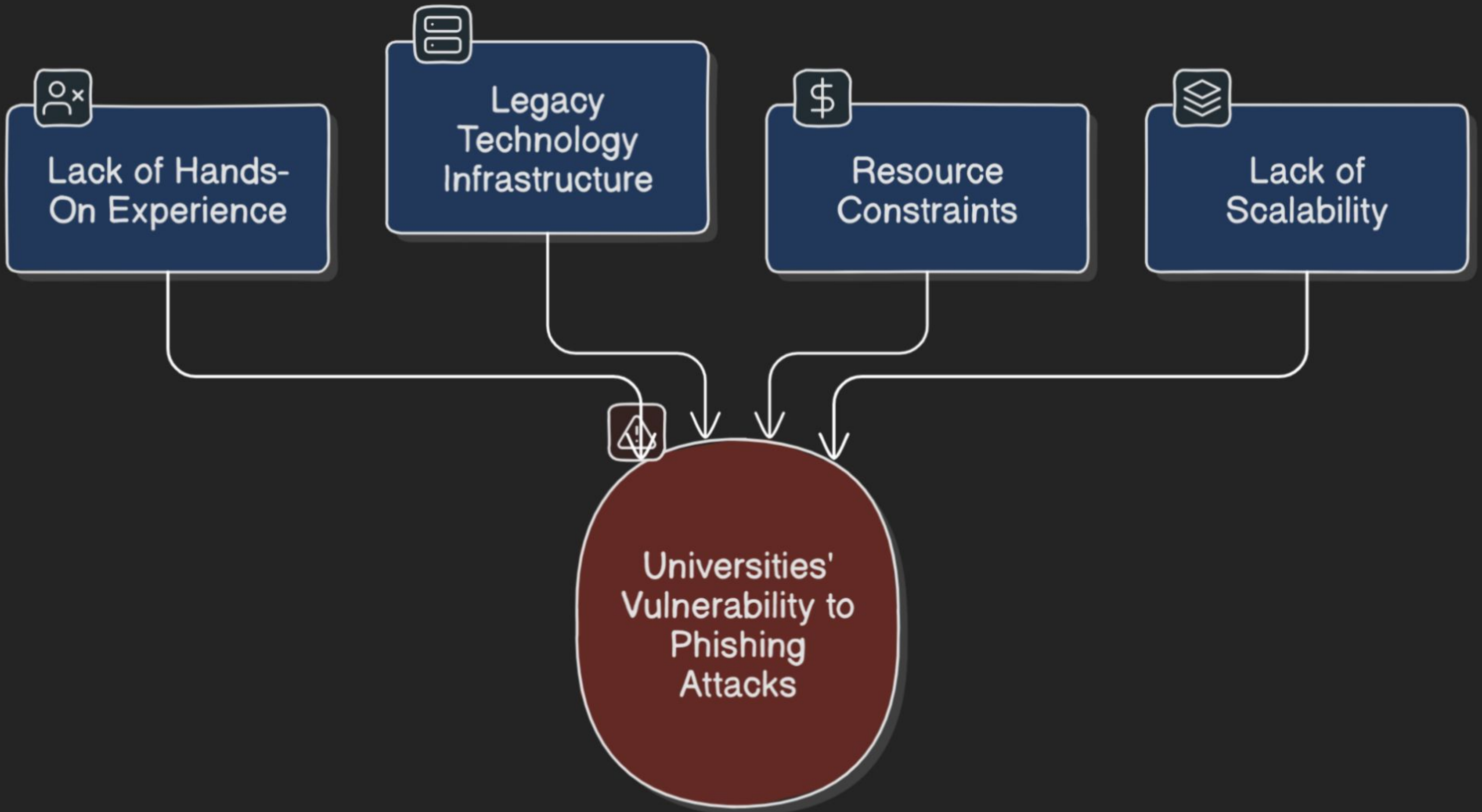
- The average click rate for a phishing attack is **17.8%** , going to to **53.2%** for more targeted spear phishing attacks![16]
- As well as all this, educational facilities have been reported to be some of the most likely to fall for phishing attacks, opening the emails **27.8%** of the time! It's becoming more and more of an issue, and educational institutions like universities are some of the most vulnerable entities out there.

Universities need a proper way to train their students so that they don't bite the hook.

Problem Characteristics

- **Lack of Hands-On Experience:** Students and non-technical university personnel may lack the practical experience in identifying and avoiding phishing attacks.
- **Legacy Technology Infrastructure:** Due to resource constraints universities may rely on inadequate technology infrastructure which can impact students' learning experiences.
- **Resource Constraints:** Universities face resource constraints which can hinder implementing comprehensive phishing training programs.
- **Lack of Scalability:** Universities may encounter challenges in scaling their training initiatives to accommodate a growing student population.

Universities' Vulnerability to Phishing Attacks



Lack of Hands-On Experience

Legacy Technology Infrastructure

Resource Constraints

Lack of Scalability

Universities' Vulnerability to Phishing Attacks

Solution Statement

Phisecure provides a customized training software solution, developing phishing simulations that are tailored to the user. The methods used during the simulation will be reported and explained in detail to the user. Creating a thorough teaching & grading process to help them identify phishing threats.

Solution Characteristics

Hands-On Experience: Phisecure offers personalized phishing simulations, giving users a firsthand experience with realistic phishing scenarios and insightful feedback related to the interaction via the Dashboard Module

Modern Technology: Using the User Personalization Component, users will experience modern day phishing methods referencing popular services that they use.

Resource Management: Automates the process with minimal setup using the User Management Module and automates the performance feedback that is displayed in the Dashboard Module.

Scalability: Phisecure ensures scalability through the Peer Phishing Component, allowing users to help with creation of new and unique phishing templates. Combined with the User Management Module, it simplifies onboarding and role-based access, making it easy to scale for larger groups

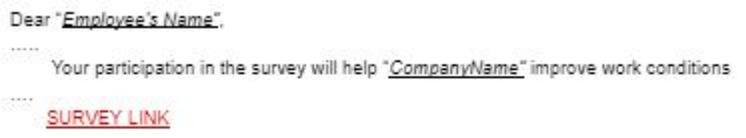
University Collaboration

Phisecure’s goal is to collaborate with universities to offer a unique educational experience.

With the Phisecure tool, Universities can provide a unique solution to teaching students how to identify and avoid phishing scams.

Simulation

- Personalized templates will be selected that relate to the user



Dear "Employee's Name",

.....

Your participation in the survey will help "CompanyName" improve work conditions

....

SURVEY LINK

- User Personalization Component ensures the contents of the messages will relate to the user as well
- The time of the attacks will be random
- The goal of these attacks will be to get interaction from the user in these forms
    - A reply back to the message, exposing personal information(information will be deleted)
    - Clicking a link that will imitate Malware. (it will not be Malware) The link will just report back that it was clicked.
    - If user detects that this is a malicious message, they are incentivised to report the message.

Dashboard Module

- The Phisecure Performance Dashboard provides users with personalized feedback following simulation.
- The user will be shown how well they performed
  - Did they spot the message and report it
  - Did they expose sensitive information
  - Did they click a link sent to them
- Phisecure will use the Red Flag Recognition Feature to show the user what red flags they could have spotted
  - Were they asked to provide sensitive information
  - Was there unwarranted urgency or threat
  - Suspicious attachments sent
- All performance data is recorded and visualized in the Dashboard for overall progress tracking

Peer Phishing Component

- Students will select another student for a simulated attack

- Students will create a template for phisecure to use

- Success of their attack will be recorded and reported to them (no sensitive information will be shared)

Purpose of Feature

- This can promote more interaction and a different perspective
- Successful templates can be adapted into Phisecure's template database for future use

Customers, End-Users, Stakeholders

Customers:

- Universities

End-Users:

- Students
- Instructor
- Simulator Administrators

Stakeholders:

- University Leadership/Administrators (Deans, University Presidents)
- Employers

MFCD Breakdown

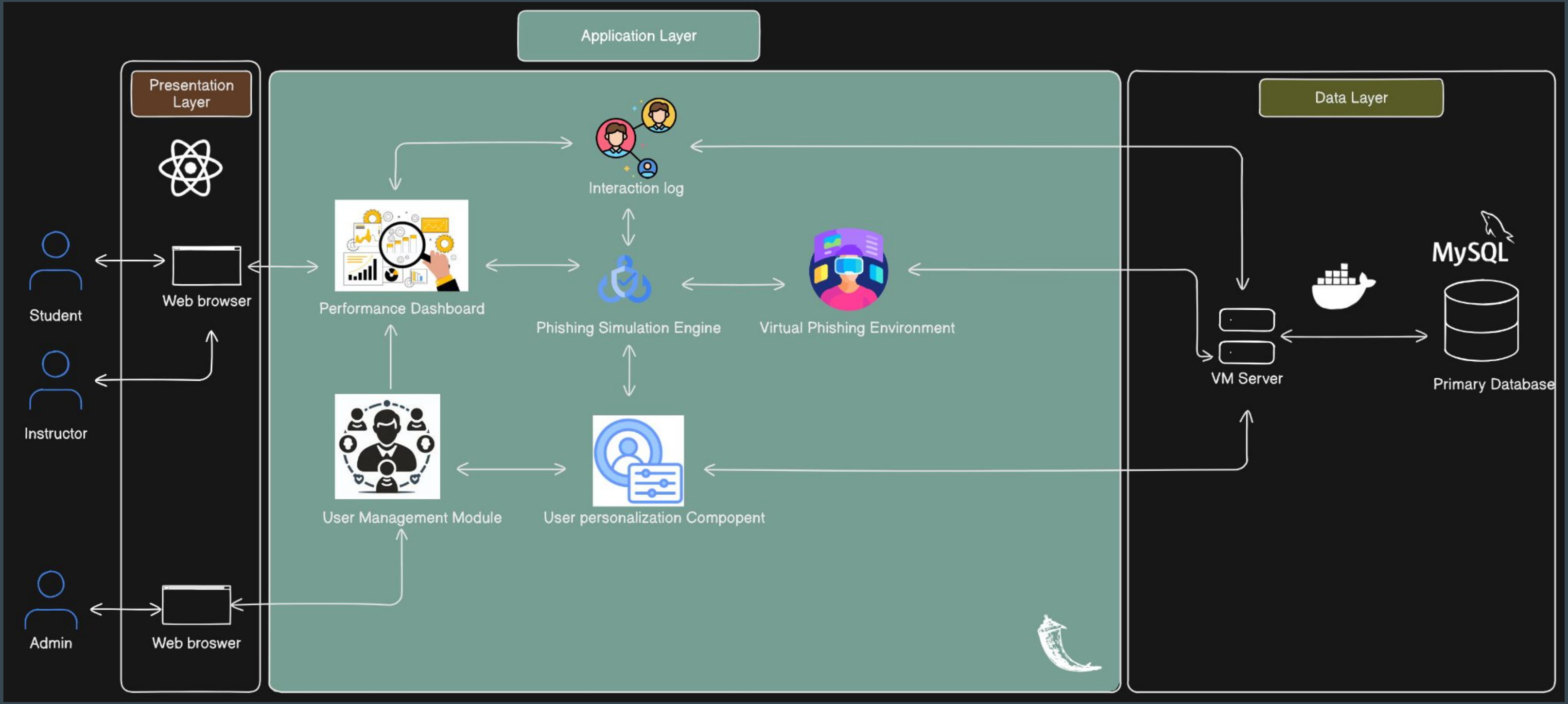
Components/Modules:

- Phisecure Performance Dashboard: Provides users with personalized feedback based on interactions with phishing templates.
- Peer Phishing Compopent: Allows students to create phishing emails to target peers.
- User Personalization Component: Tailors phishing email templates based on user questionnaire and previous simulation encounters
  - Adjusts the difficulty of phishing emails based on user performance.
- Virtual phishing environment: Simulates regular email inbox where students interact with phishing emails.
- User management Module: Handles user creation and role-based access control.

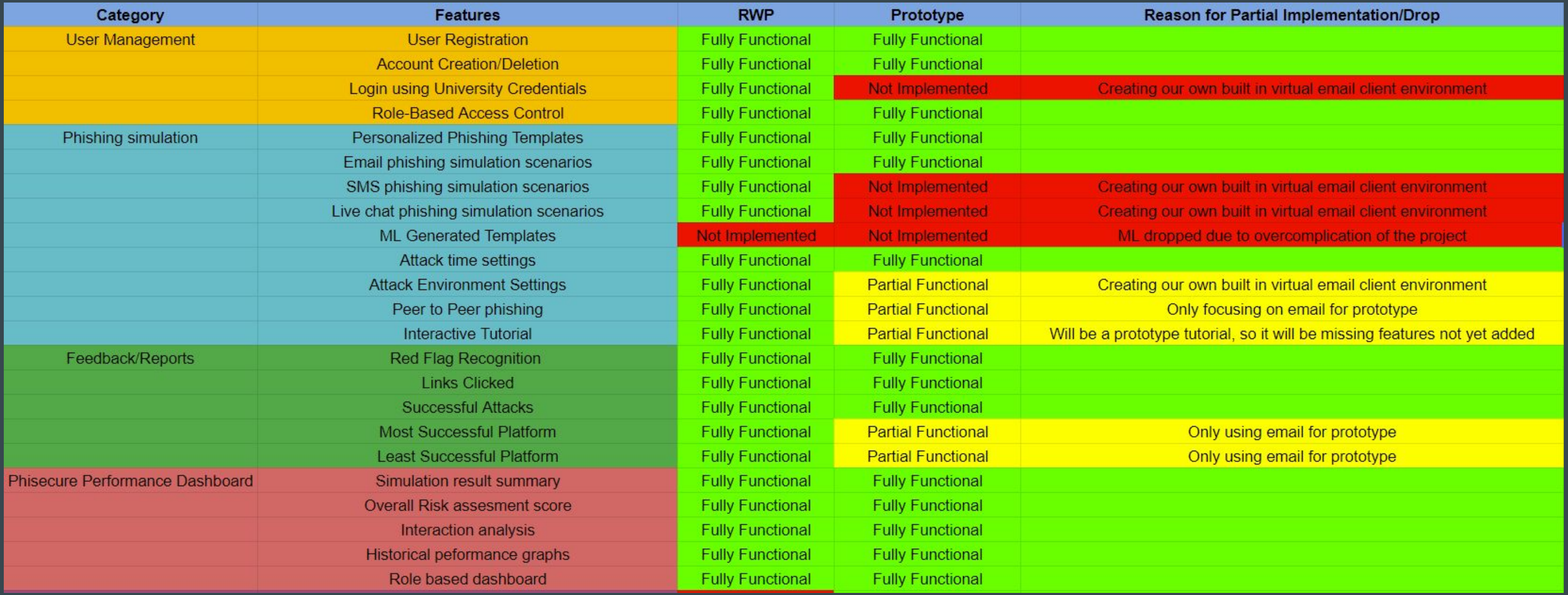
Infrastructure:

Hosting Environment: ODU provided VM using docker to containerize the frontend, backend, and database.

Prototype Major Functional Component Design

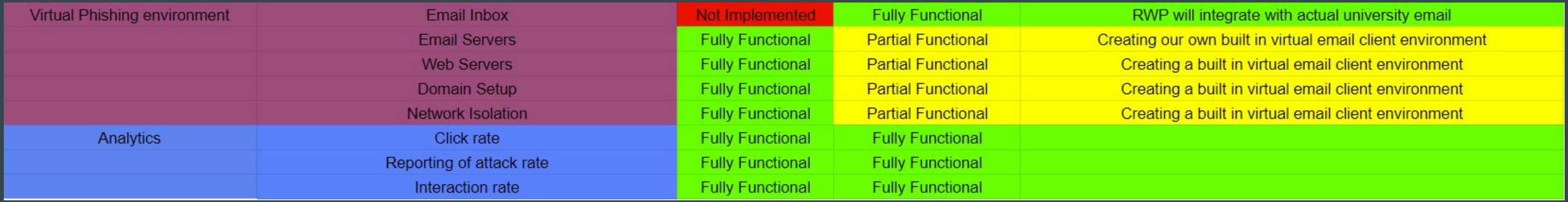


RWP Vs Prototype



Category	Features	RWP	Prototype	Reason for Partial Implementation/Drop
User Management	User Registration	Fully Functional	Fully Functional	
	Account Creation/Deletion	Fully Functional	Fully Functional	
	Login using University Credentials	Fully Functional	Not Implemented	Creating our own built in virtual email client environment
	Role-Based Access Control	Fully Functional	Fully Functional	
Phishing simulation	Personalized Phishing Templates	Fully Functional	Fully Functional	
	Email phishing simulation scenarios	Fully Functional	Fully Functional	
	SMS phishing simulation scenarios	Fully Functional	Not Implemented	Creating our own built in virtual email client environment
	Live chat phishing simulation scenarios	Fully Functional	Not Implemented	Creating our own built in virtual email client environment
	ML Generated Templates	Not Implemented	Not Implemented	ML dropped due to overcomplication of the project
	Attack time settings	Fully Functional	Fully Functional	
	Attack Environment Settings	Fully Functional	Partial Functional	Creating our own built in virtual email client environment
	Peer to Peer phishing	Fully Functional	Partial Functional	Only focusing on email for prototype
	Interactive Tutorial	Fully Functional	Partial Functional	Will be a prototype tutorial, so it will be missing features not yet added
Feedback/Reports	Red Flag Recognition	Fully Functional	Fully Functional	
	Links Clicked	Fully Functional	Fully Functional	
	Successful Attacks	Fully Functional	Fully Functional	
	Most Successful Platform	Fully Functional	Partial Functional	Only using email for prototype
	Least Successful Platform	Fully Functional	Partial Functional	Only using email for prototype
Phisecure Performance Dashboard	Simulation result summary	Fully Functional	Fully Functional	
	Overall Risk assesment score	Fully Functional	Fully Functional	
	Interaction analysis	Fully Functional	Fully Functional	
	Historical peformance graphs	Fully Functional	Fully Functional	
	Role based dashboard	Fully Functional	Fully Functional	

RWP Vs Prototype



Virtual Phishing environment	Email Inbox	Not Implemented	Fully Functional	RWP will integrate with actual university email
	Email Servers	Fully Functional	Partial Functional	Creating our own built in virtual email client environment
	Web Servers	Fully Functional	Partial Functional	Creating a built in virtual email client environment
	Domain Setup	Fully Functional	Partial Functional	Creating a built in virtual email client environment
	Network Isolation	Fully Functional	Partial Functional	Creating a built in virtual email client environment
Analytics	Click rate	Fully Functional	Fully Functional	
	Reporting of attack rate	Fully Functional	Fully Functional	
	Interaction rate	Fully Functional	Fully Functional	

Software/Hardware Tools

- Frontend
  - Framework: React
  - Languages: Javascript, HTML, CSS
  - IDE: VS Code
- Backend
  - Framework: Flask
  - Languages: Python
  - IDE: VS Code
- Database
  - MySQL
- Repository/Version Control Tools
  - Git and GitHub

User Story: Student

- As a Student, I need the ability to perform my own phishing attacks against my peers.
- As a Student, I need to acquire feedback about phishing attacks I fell for so that I may better understand where I could learn to avoid said attack in the future.
- As a Student, I need to be graded on the success of my created attacks
- As a Student, I need to be graded on my ability to recognize an attack created by other students
- As a Student, I need to be shown the red flags I could have spotted
- As a Student, I want the UI to be easy to navigate

User Management	Phishing Simulation	Feedback/Reports	User Interface	Virtual Phishing Environment	Analytics	Other
🟨	🟦	🟩	🟥	🟪	🟦	🟪

User Story: Admin

- As an administrator, I need to manage user accounts, which include registration, authentication, and permissions management.
- As a simulator admin, I want to have access to user management configuration where I can assign roles and permissions to individual users, including the ability to launch simulated phishing attacks.
- As an administrator, I need to be able to see an assessment on how effective a phishing attack was.
- As a simulator admin, I want to have access to a dashboard or interface where I can view aggregated data and analytics on user interactions with simulated phishing attacks .
- As an administrator, I need the student information given to Phisecure to be protected from outside agents.
- As an Administrator, I need to monitor system usage and performance to ensure optimal functionality.

User Management	Phishing Simulation	Feedback/Reports	User Interface	Virtual Phishing Environment	Analytics	Other
🟨	🟦	🟩	🟥	🟪	🟦	🟪

User Story: Instructor

- As an Instructor, I need to have the ability to add, remove, and modify student data for my class through Phisecure
- As an Instructor, I need the phishing attacks to be personalized to promote interaction from the students
- As an Instructor, I need to know if the student successfully avoided a phishing attack or if they never saw it
- As an Instructor, I need to monitor my students through Phisecure
- As an Instructor, I need to see links that my students clicked
- As an Instructor, I need to see the student's Phisecure grade
- As an Instructor, I want to be able to control when the attacks will occur

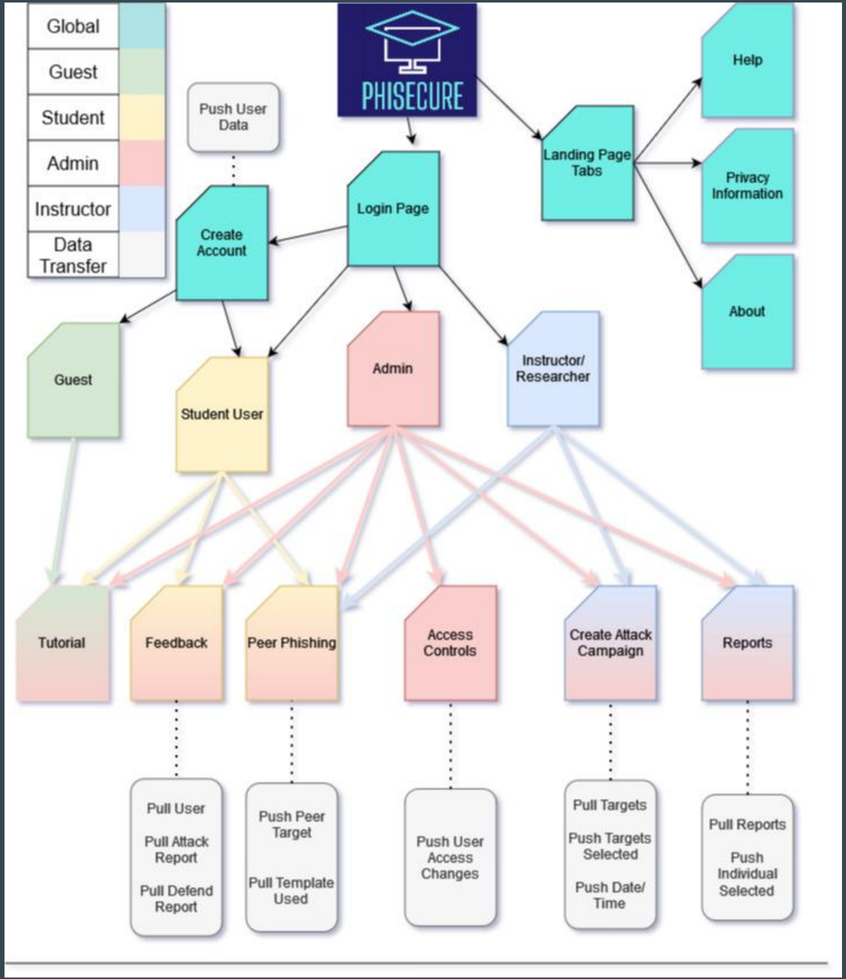
User Management	Phishing Simulation	Feedback/Reports	User Interface	Virtual Phishing Environment	Analytics	Other
🟨	🟦	🟩	🟥	🟪	🟦	🟪

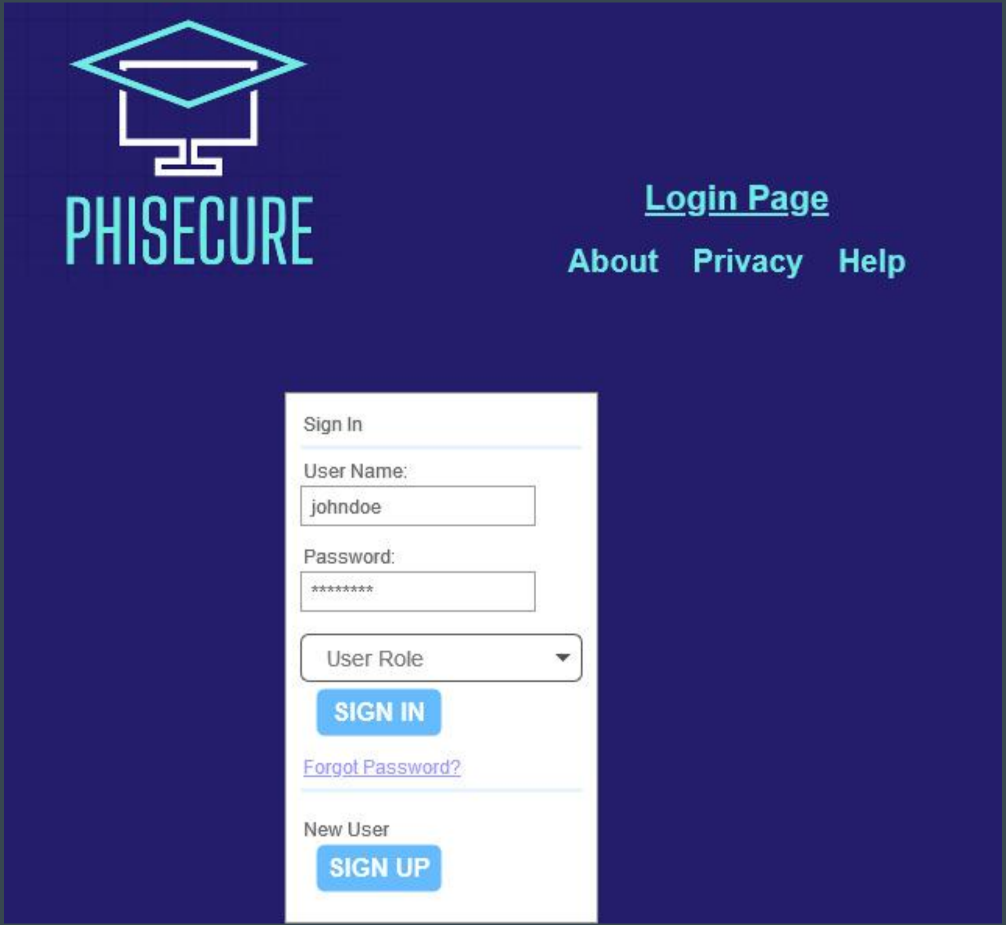
User Story: Tester

- As a tester, I want to be able to create and manage student accounts to simulate classes for testing purposes
- As a tester, I need to be able to access admin rights
- As a tester, I want to be able to create/delete an account
- As a tester, I want to be able to create a simulation against myself to verify functionality
- As a tester, I would like to send myself feedback based on my selected role to verify functionality
- As a tester, I want to validate user interface elements for consistency, usability, and accessibility.
- As a tester, I want to be able to run unit, integration, and system tests
- As a tester, I want to be performing incremental testing each sprint.
- As a tester, I need a webpage to analyze links clicked.

User Management	Phishing Simulation	Feedback/Reports	User Interface	Virtual Phishing Environment	Analytics	Other
🟨	🟦	🟩	🟥	🟪	🟦	🟪

User Interface Sitemap

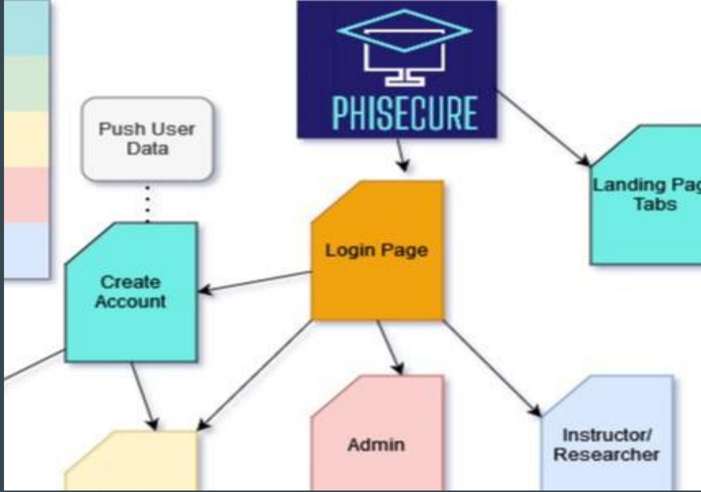




Sign In

User Name: johndoe

Password: *********



Color Scheme:

Background

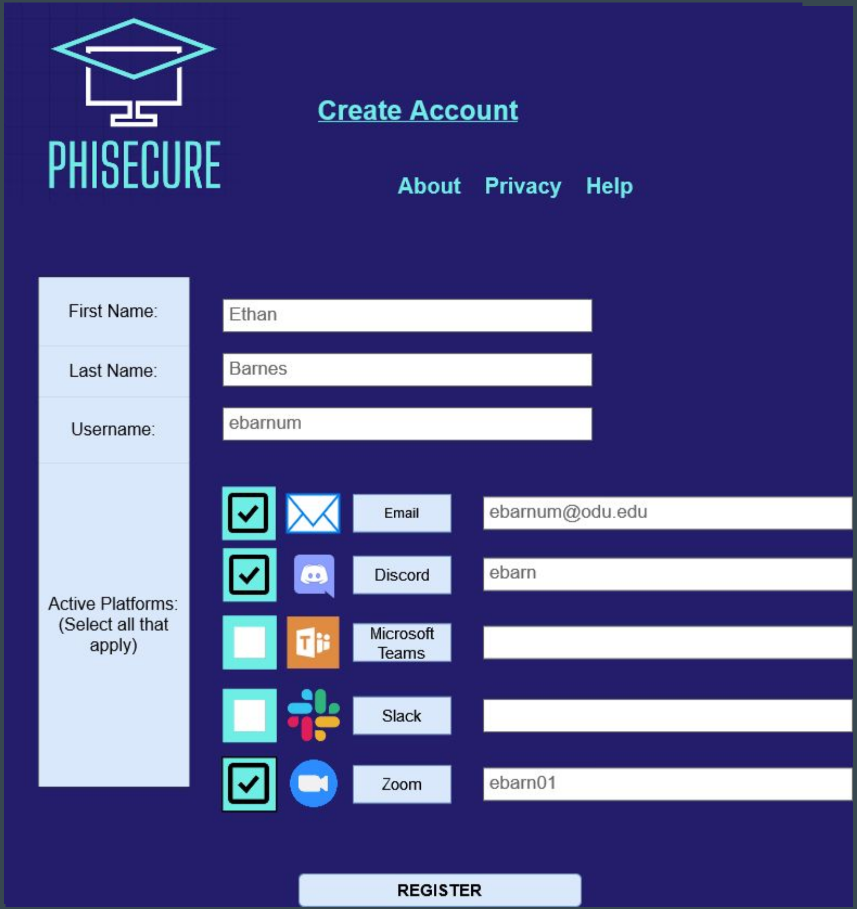
#231D6C

Title Text

#6FEDE5

Charts/Graphs Library:

React Google Charts



PHISECURE

Create Account

About Privacy Help

First Name: Ethan

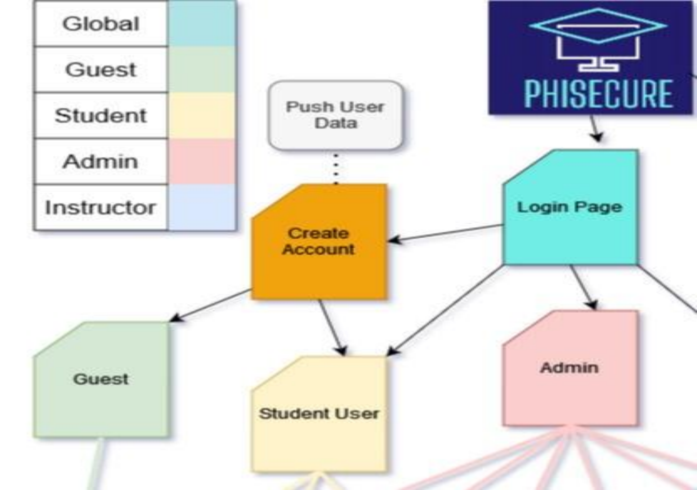
Last Name: Barnes

Username: ebarnum

Active Platforms: (Select all that apply)

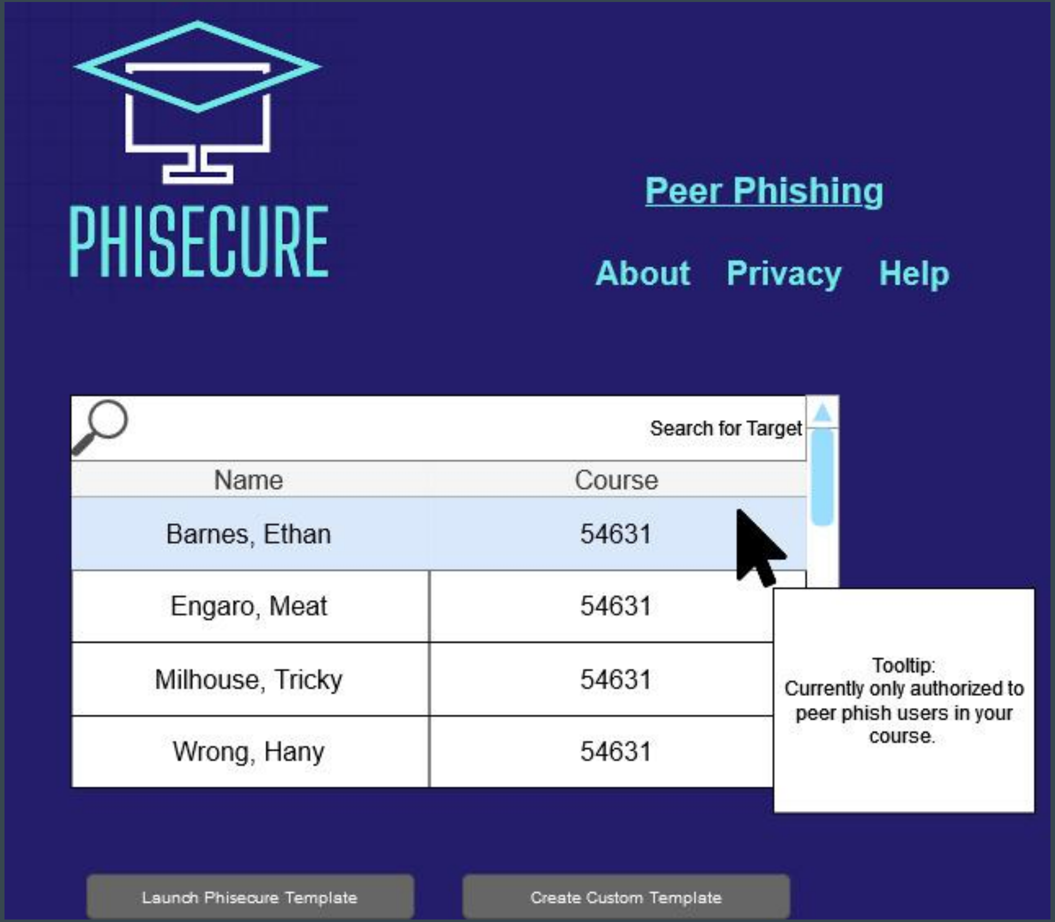
☑	Email	ebarnum@odu.edu
☑	Discord	ebarn
□	Microsoft Teams	
□	Slack	
☑	Zoom	ebarn01

REGISTER



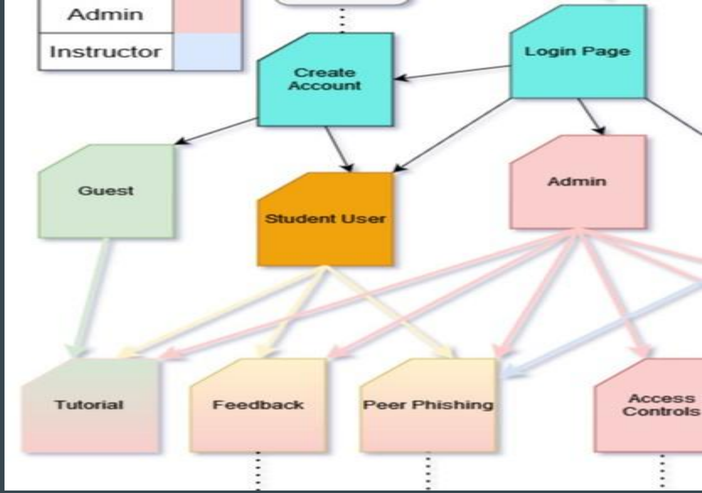
Only “First Name,” “Last Name,” “Email,” And “Username” POST to database

Only email functional for prototype

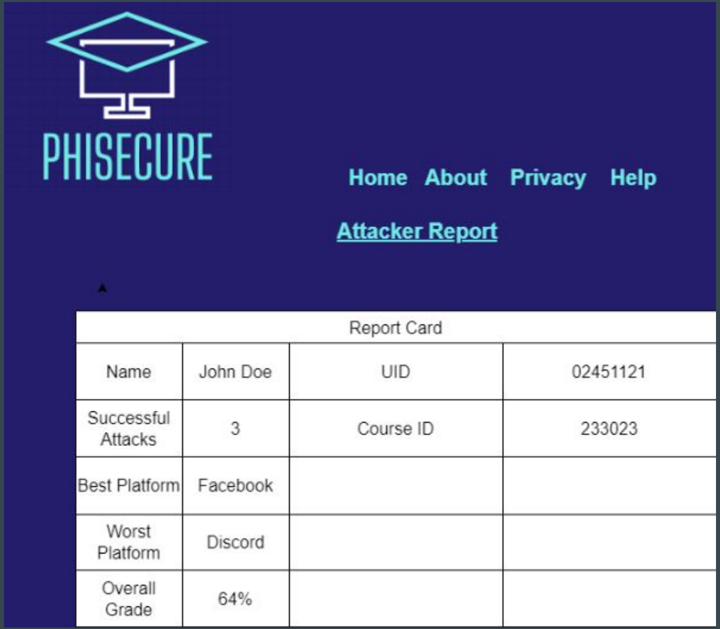


Name	Course
Barnes, Ethan	54631
Engaro, Meat	54631
Milhouse, Tricky	54631
Wrong, Hany	54631

Tooltip:
Currently only authorized to peer phish users in your course.

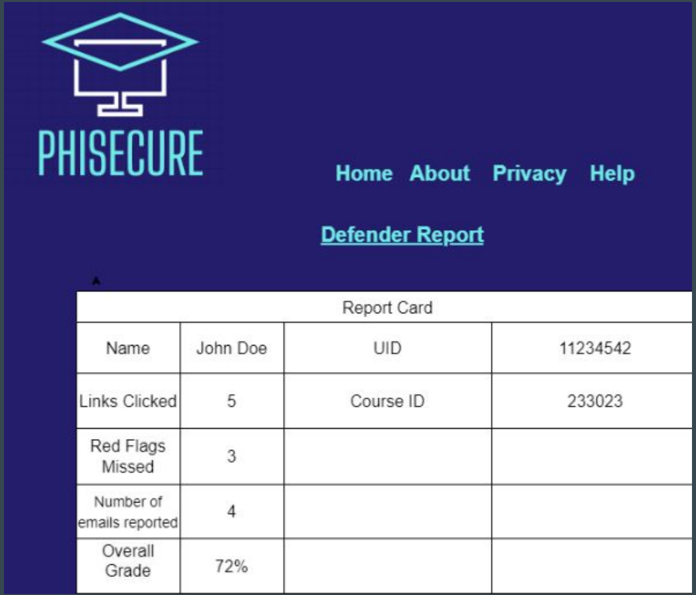


- Reached from the Student Dashboard
- “Create Custom Template” not functional
- Add attack time settings
- Fetches all users with a student ID for the prototype?



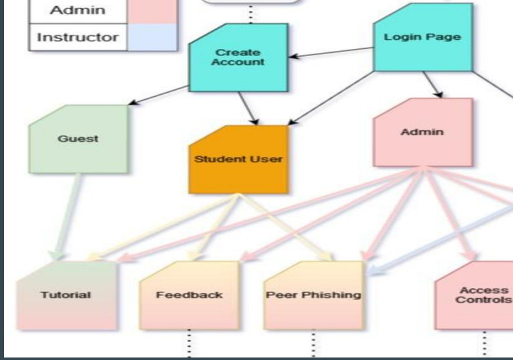
Attacker Report

Report Card			
Name	John Doe	UID	02451121
Successful Attacks	3	Course ID	233023
Best Platform	Facebook		
Worst Platform	Discord		
Overall Grade	64%		

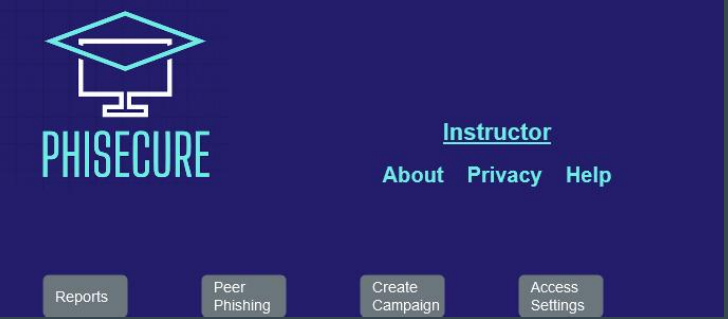


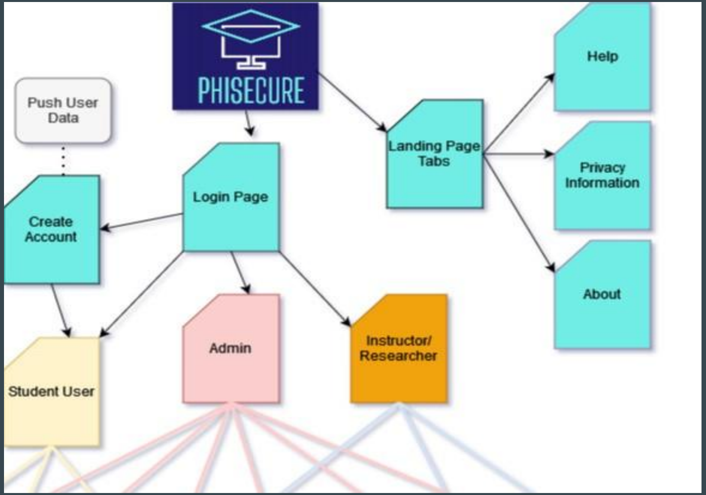
Defender Report

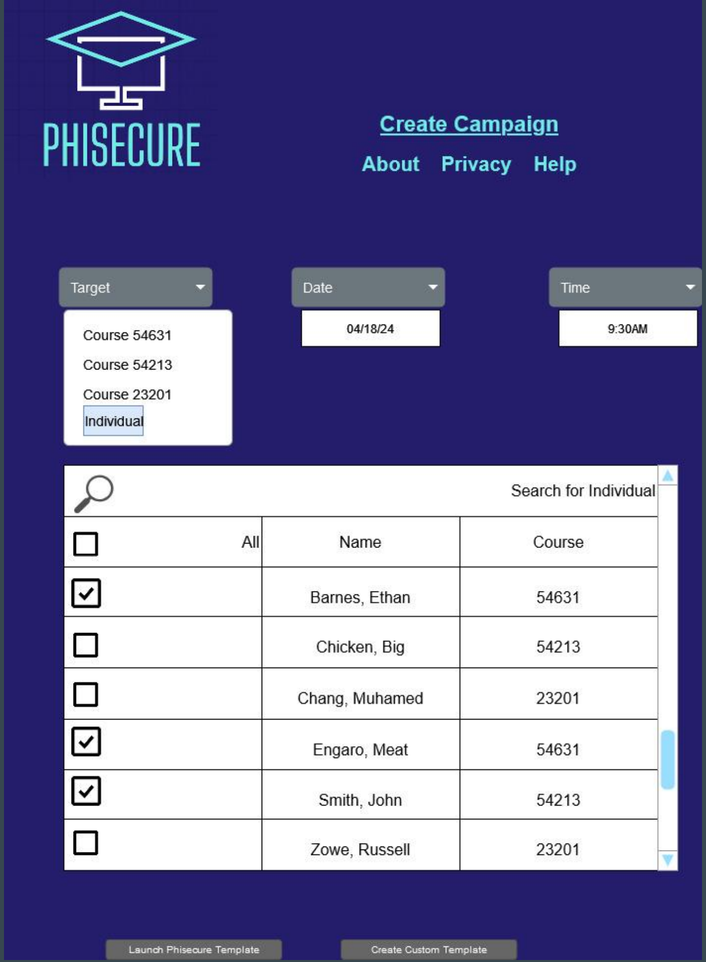
Report Card			
Name	John Doe	UID	11234542
Links Clicked	5	Course ID	233023
Red Flags Missed	3		
Number of emails reported	4		
Overall Grade	72%		



The rest of the mock-ups display functions that plan to be in the prototype





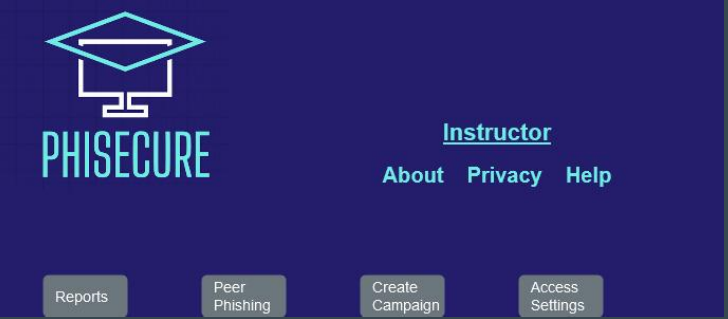


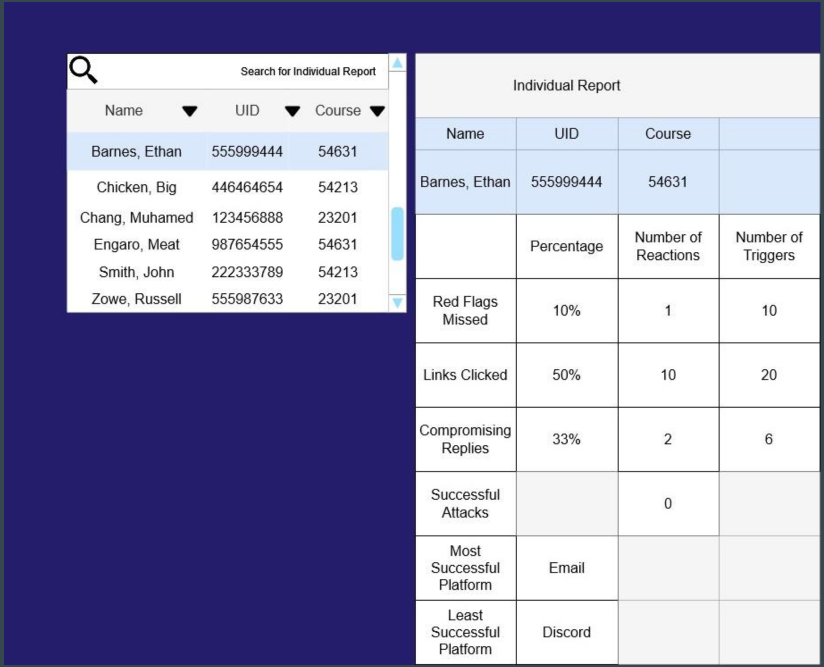
Date: 04/18/24

Time: 9:30AM

Search for Individual

□ All	Name	Course
☑	Barnes, Ethan	54631
□	Chicken, Big	54213
□	Chang, Muhamed	23201
☑	Engaro, Meat	54631
☑	Smith, John	54213
□	Zowe, Russell	23201



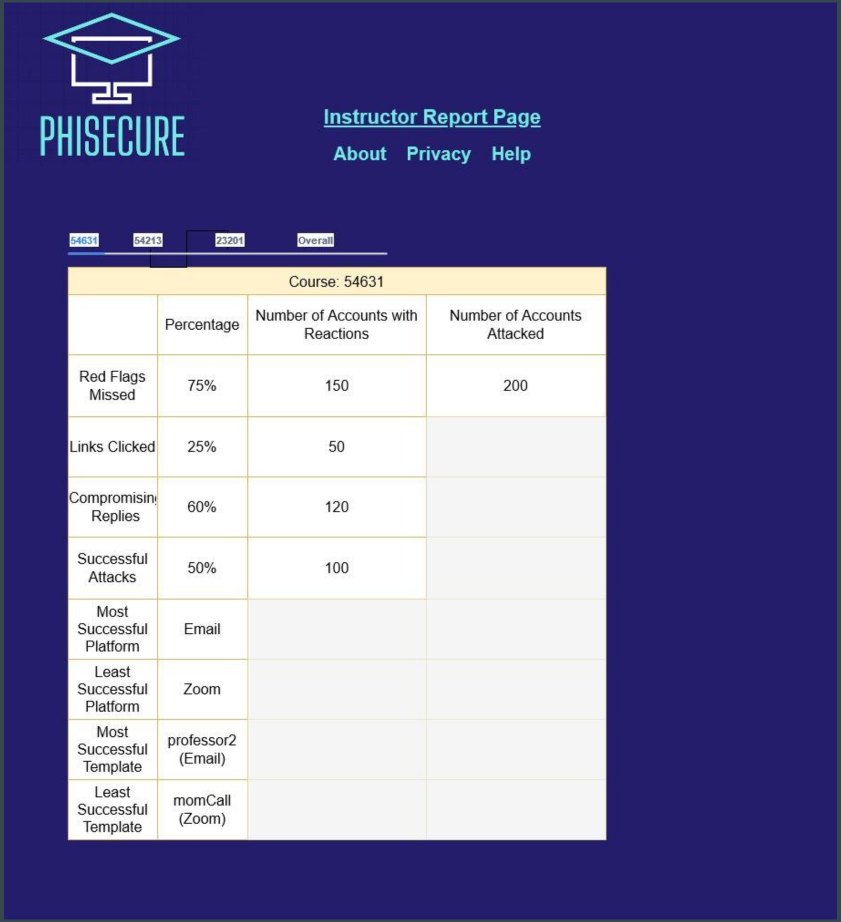


Name	UID	Course
Barnes, Ethan	555999444	54631
Chicken, Big	446464654	54213
Chang, Muhamed	123456888	23201
Engaro, Meat	987654555	54631
Smith, John	222333789	54213
Zowe, Russell	555987633	23201

Individual Report

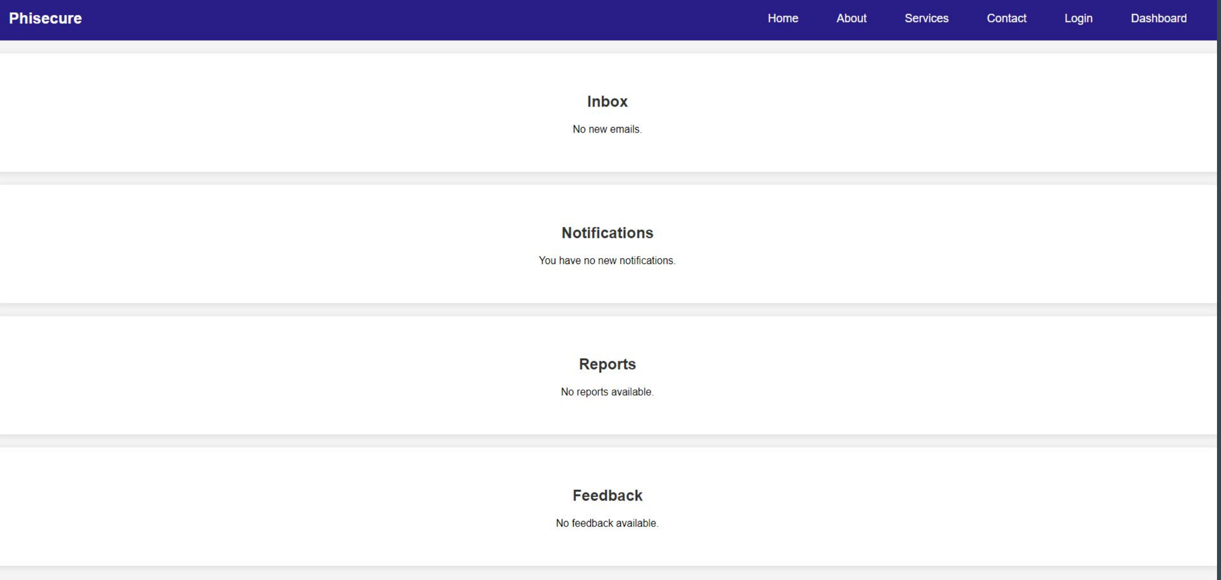
Name	UID	Course	
Barnes, Ethan	555999444	54631	

	Percentage	Number of Reactions	Number of Triggers
Red Flags Missed	10%	1	10
Links Clicked	50%	10	20
Compromising Replies	33%	2	6
Successful Attacks		0	
Most Successful Platform	Email		
Least Successful Platform	Discord		



Course: 54631

	Percentage	Number of Accounts with Reactions	Number of Accounts Attacked
Red Flags Missed	75%	150	200
Links Clicked	25%	50	
Compromisin Replies	60%	120	
Successful Attacks	50%	100	
Most Successful Platform	Email		
Least Successful Platform	Zoom		
Most Successful Template	professor2 (Email)		
Least Successful Template	momCall (Zoom)		



Inbox

No new emails.

Notifications

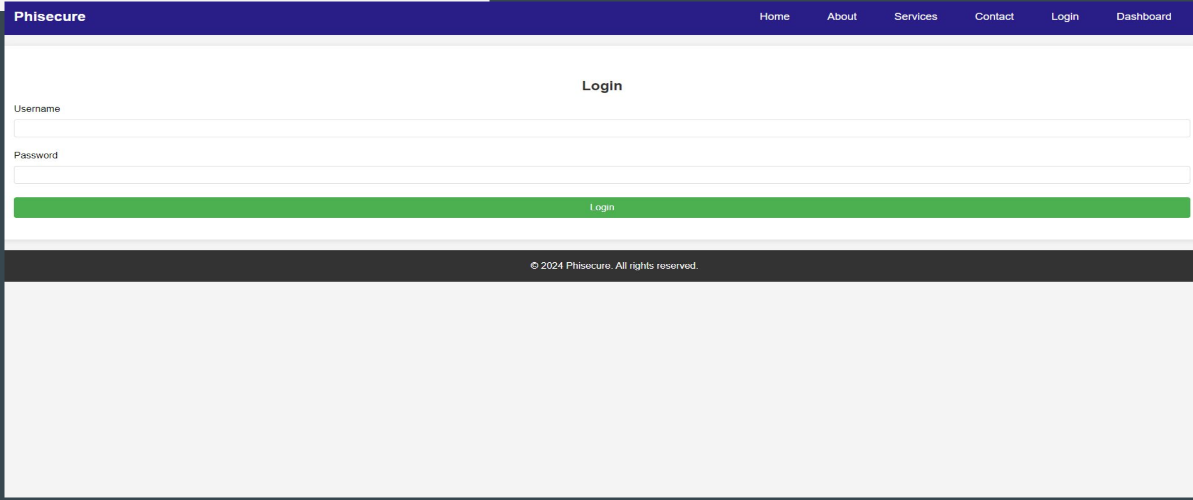
You have no new notifications.

Reports

No reports available.

Feedback

No feedback available.



Login

Username

Password

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Sprint Breakdown

Sprint 1 (Weeks 4-7)

- Refine database models
- Implement basic admin and teacher dashboard
- Implement homepage layout
- Establish virtual email environment
- Update and implement new Unit, System, and Integration tests
- Implement regression testing procedures

Sprint 2 (Weeks 8-11)

- Implement phishing campaign features
- Implement dashboard statistics/performance metrics
- Implement Feedback/Report compopent.
- Update and implement new Unit, System, and Integration tests

Sprint 3 (Weeks 12-14)

- Implement role-based access control
- Fine tune phishing campaign features
- Implement click rate tracking for phishing links
- Refine UI
- Update and implement new Unit, System, and Integration tests
- Implement regression testing procedures
- Implement performance testing procedures

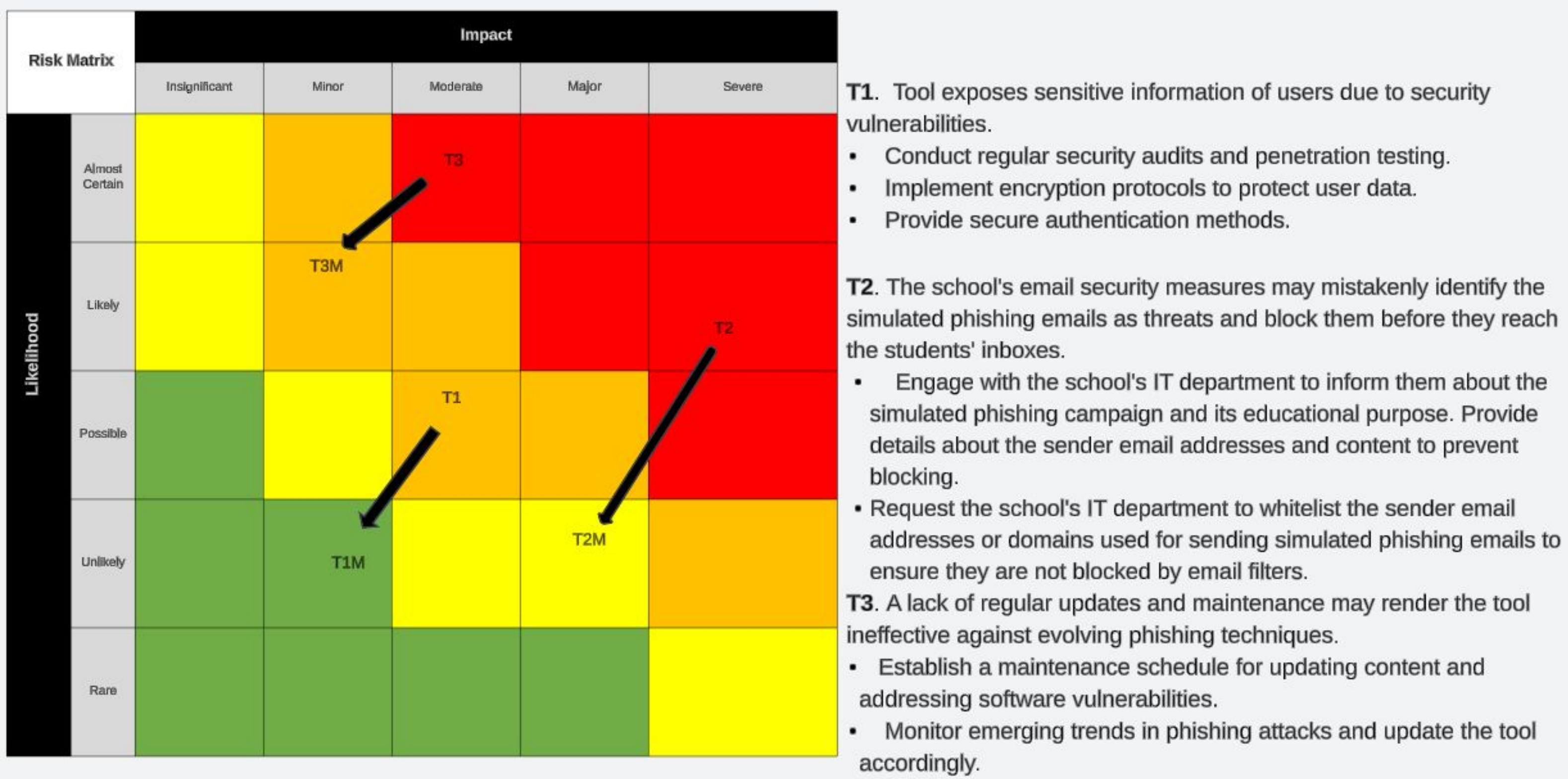
Sprint 4 (Weeks 15-16)

- Add features for managing user accounts, permissions and campaigns
- Implement advanced analytics and reporting functionality
- Ensure readiness for production deployment
- Setup deployment configurations
- Update and implement new Unit, System, and Integration tests

Issues/Concerns/Challenges/Risks

- Learning all the proper languages and frameworks that will go into the project (MySQL, Flask, etc.)
- Integrating the frontend, backend, and database.

Technical Risk Matrix



Risk Matrix		Impact				
		Insignificant	Minor	Moderate	Major	Severe
Likelihood	Almost Certain	🟨	🟧	🟥 T3	🟥	🟥
	Likely	🟨	🟧 T3M	🟧	🟥	🟥 T2
	Possible	🟩	🟨	🟧 T1	🟧	🟥
	Unlikely	🟩	🟩 T1M	🟨	🟨 T2M	🟧
	Rare	🟩	🟩	🟩	🟩	🟨

T1. Tool exposes sensitive information of users due to security vulnerabilities.

- Conduct regular security audits and penetration testing.
- Implement encryption protocols to protect user data.
- Provide secure authentication methods.

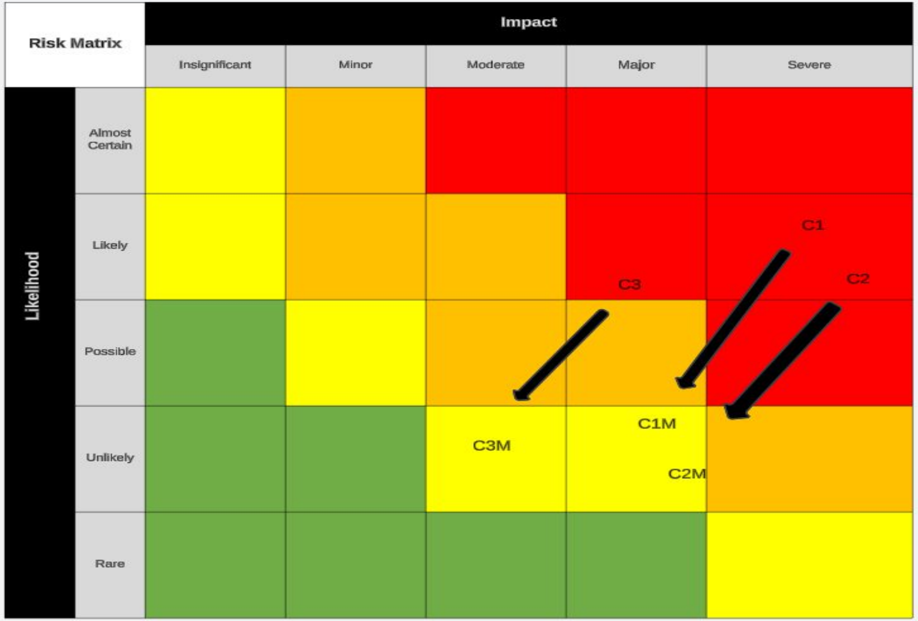
T2. The school's email security measures may mistakenly identify the simulated phishing emails as threats and block them before they reach the students' inboxes.

- Engage with the school's IT department to inform them about the simulated phishing campaign and its educational purpose. Provide details about the sender email addresses and content to prevent blocking.
- Request the school's IT department to whitelist the sender email addresses or domains used for sending simulated phishing emails to ensure they are not blocked by email filters.

T3. A lack of regular updates and maintenance may render the tool ineffective against evolving phishing techniques.

- Establish a maintenance schedule for updating content and addressing software vulnerabilities.
- Monitor emerging trends in phishing attacks and update the tool accordingly.

Customer Risk Matrix



Risk Matrix		Impact				
		Insignificant	Minor	Moderate	Major	Severe
Likelihood	Almost Certain	🟨	🟧	🟥	🟥	🟥
	Likely	🟨	🟧	🟧	🟥 C3	🟥 C1 C2
	Possible	🟩	🟨	🟧	🟧	🟥
	Unlikely	🟩	🟩	🟨 C3M	🟨 C1M C2M	🟧
	Rare	🟩	🟩	🟩	🟩	🟨

C1. Simulations within the education tool may not accurately reflect real-world phishing scenarios, leading to a disconnect between learning outcomes and practical application.

- Conduct thorough research to ensure simulations reflect current phishing techniques and trends accurately.
- Regularly update simulations to incorporate new phishing methods and tactics as they emerge.
- Solicit feedback from users to identify areas where simulations may be lacking or could be improved.
- Provide supplementary resources or exercises to reinforce learning and bridge any gaps between simulation and real-world scenarios.

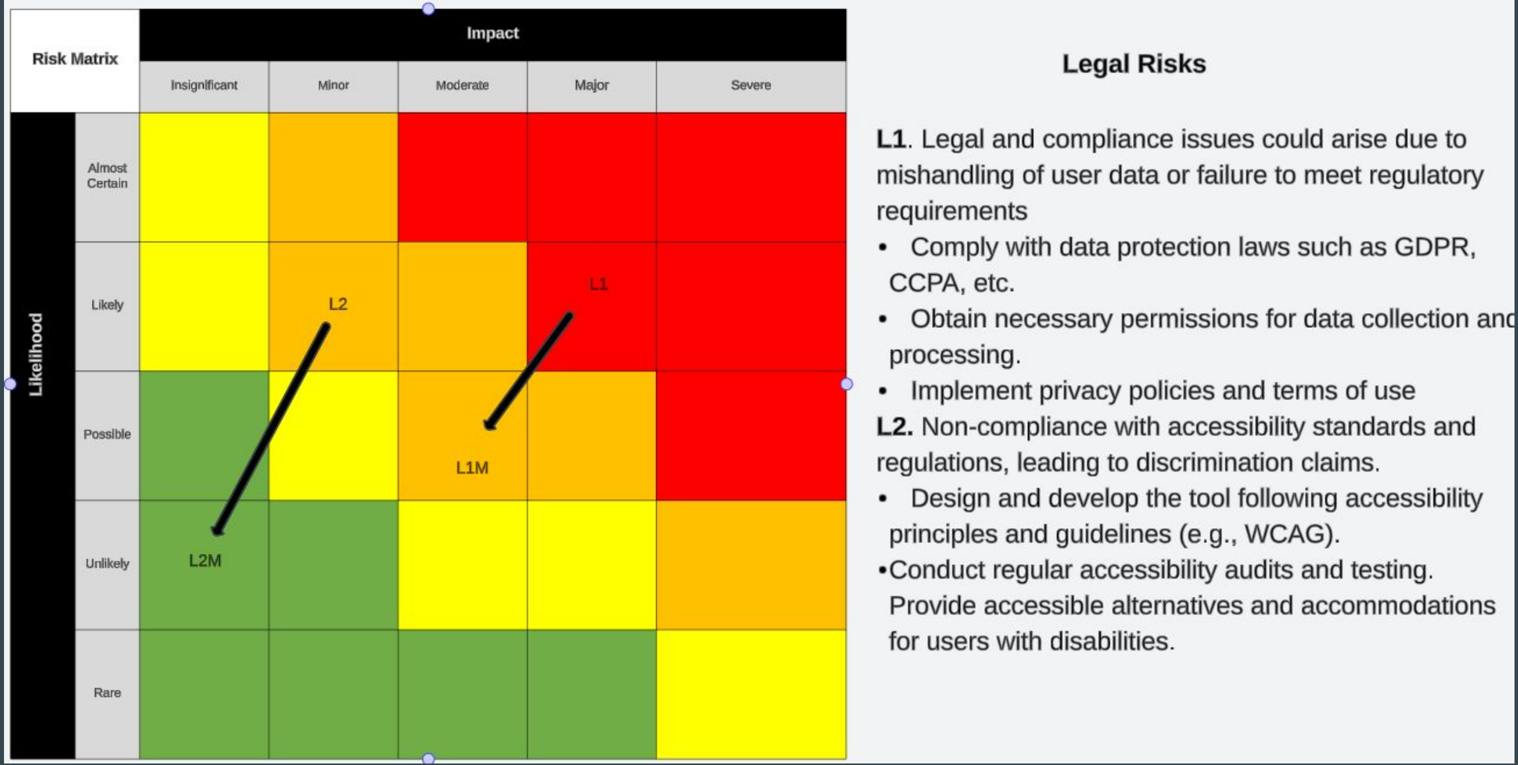
C2. Frequent exposure to simulated phishing attacks within the education tool may desensitize users to real-world threats.

- Implement varied and realistic phishing simulations to maintain user engagement and prevent desensitization.
- Provide ongoing education and reinforcement of phishing awareness best practices to remind users of the importance of remaining vigilant.
- Monitor user feedback and engagement metrics to identify signs of desensitization and adjust simulation frequency or intensity accordingly.
- Emphasize the dynamic and evolving nature of phishing threats to reinforce the need for continued vigilance and awareness.

C3 Some students may misuse the phishing simulation platform to launch real phishing attacks against their peers instead of participating in the educational exercise as intended.

- Establish clear guidelines and policies outlining acceptable use of the phishing simulation platform. Clearly communicate the consequences of engaging in malicious activities
- Monitor user activity on the platform to detect any suspicious behavior or unauthorized actions, such as unusual patterns of email sending or targeting specific individuals
- Educate students about the ethical and legal implications of engaging in malicious activities, emphasizing the importance of responsible behavior in cybersecurity practices
- Immediately suspend or revoke access privileges for any student found engaging in malicious activities, and notify appropriate authorities or school administration if necessary. Provide support and guidance to affected students and take corrective actions to mitigate any damage caused.

Legal Risk Matrix



Risk Matrix		Impact				
		Insignificant	Minor	Moderate	Major	Severe
Likelihood	Almost Certain	🟨	🟧	🟥	🟥	🟥
	Likely	🟨	🟧 L2	🟧	🟥 L1	🟥
	Possible	🟩	🟨	🟧 L1M	🟧	🟥
	Unlikely	🟩 L2M	🟩	🟨	🟨	🟧
	Rare	🟩	🟩	🟩	🟩	🟨

Legal Risks

L1. Legal and compliance issues could arise due to mishandling of user data or failure to meet regulatory requirements

- Comply with data protection laws such as GDPR, CCPA, etc.
- Obtain necessary permissions for data collection and processing.
- Implement privacy policies and terms of use

L2. Non-compliance with accessibility standards and regulations, leading to discrimination claims.

- Design and develop the tool following accessibility principles and guidelines (e.g., WCAG).
- Conduct regular accessibility audits and testing. Provide accessible alternatives and accommodations for users with disabilities.

Conclusion

- Phishing is a widespread issue that presents a significant challenge for universities.
- Phisecure offers a tailored solution, which provides customizable phishing simulations.
- Through collaboration with universities, Phisecure enhances its reach, offering innovative cybersecurity education.

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Glossary and Appendices

Phishing- The fraudulent practice of sending emails or other messages purporting to be from reputable companies to induce individuals to reveal personal information, such as passwords and credit card numbers.

Spear Phishing - A type of phishing involving personalization and targeting a specific individual.

Malware- Software that compromises the operation of a system by performing an unauthorized function or process.

Ransomware- A malware designed to deny a user or organization access to files on their computer.

Attack- An attempt to gain unauthorized access to system services, resources, or information, or an attempt to compromise system integrity.

Next Steps Towards Demo 2

Backend : develop the messaging and inbox logic required for a simulated email environment, along with handling recipient interaction with emails (e.g., opening, replying, or clicking a link).

Frontend : continue to implement CSS to produce a more professional appearing site, in addition to adding an email page.

Database : work on refining the database models, ensuring it supports the email messaging and inbox logic for the simulated email environment. In addition storing interaction data like email opens, replies, or clicking links.

Hunter

-Continue to delegate and monitor activity between team members

-Ensure Quality Control of code and teamwork

-Assist Dylan with **backend development** and Ralph with Database design and management

-Assist Joshua with the creation of an admin page for the UI of the website

Dylan

- Add functionality to message students for the email environment
- Add logic to check students interaction with the email
  - Did the student open the message?
  - Did the student reply to the message?
  - Did the message have a link? If so did they click it?
- Add functions for creation and deletion of these student accounts
- Add logic for personalization questionnaire, adding tags to students based on responses
- Add functionality to match students with templates
- Add testing for these new functions

Ethan

- Design and implement Professor’s dashboard and related pages.
- Pull individual reports based on student’s name and class identification.
  - Including Red Flags Missed, Links Clicked, and Compromising Replies, as well as if they performed any successful peer phishing and their most/least successful platforms.
- Pull course reports based on class identification with the same information
- Create phishing campaigns that can be set for a certain datetime, and target individuals or whole classes.
- Continue improving API calls for the Frontend
- Learn more React, CSS, and HTML
- Implement Google React Charts

Joshua

-Design the homepage according to the mockups, ensuring a responsive layout and intuitive navigation that directly supports the flow of the phishing simulation. This will grant the user easy access to simulation features, data analytics, and the dashboard.

-Integrate front-end frameworks

-Create dashboard for student role. The student role will be able to see their reports, send phishing attacks, and check their inbox.

-Keep website up to date.

Ralph

- Ensure that database schema supports the requirements of the dashboard features for each role (Student, Professor, Administrator)
- Collaborate with backend on the performance analytics feature and phishing templates based on personalization component.
- Learn how to run integration tests.
- Work on unit tests for backend endpoints for templates feature and also start testing for performance analytics for students i.e (successfully phished (clicked on a link), email reported (successfully defended)

Breaking down the high level functionalities into more concrete tasks

1. **Dashboard Module (frontend)**

- **Visualization and Insights Development**:
  - Develop front-end components to show user interaction statistics (e.g., click rate, response rate).
  - Use React Charts or similar libraries to visualize phishing attack success and other metrics.
  - Aggregate data from the feedback/analytics module to display real-time reports.
- **Role-Based Dashboard Pages**:
  - **Student Dashboard**: Display individual performance (phishing attacks missed, analytics of responses).
  - **Professor Dashboard**: Show group performance and insights (e.g., how many students fell for the phishing attack).
  - **Admin Dashboard**: Access and control over user roles and simulation management (I don’t think you should implement this – I think you have it as Fully?)

Backend Database Operations:

- Store analytics results and ensure they are accessible for report generation and dashboard visualization.
- **Tasks**:
  - Design database tables for storing user analytics, such as interactions, performance summaries, and red flags identified.
  - Create efficient data retrieval queries to support real-time or near-real-time dashboards.

Data Aggregation for Dashboard

- *Task*: Develop backend to aggregate data from the phishing simulation engine and personalization module.

3. Personalization Module (backend)

- **User Profiling Development**:
  - Create backend logic to collect and store user behavior (e.g., frequency of falling for phishing attacks).
  - Develop logic to tag users and customize phishing templates accordingly.
  - Use database tables to create profiles based on initial questionnaires and interaction history. (Will template differ based on initial user profile and then after many attempts or performance?)

4. User Management Module (Not implemented)

- **Account Creation and Deletion**:
  - Implement user registration, deletion, and account management functions.
  - Develop role-based access logic for different user types (student, professor, admin).
- **Login and Authentication**:
  - Integrate university credentials for login.
  - Implement a secure authentication mechanism, such as OAuth or SSO, to validate users.

5. Feedback/Analytics Component (backend)

Red Flags Analysis:

- **Create an analysis engine that identifies where users went wrong (e.g., missed red flags)**: (backend)
- **Identify which red flags were ignored, where urgency/threat was misinterpreted**: (backend)

Performance Summary:

- **Develop summary reports for each user—number of successful attacks, potential areas of improvement**: (backend)
- **Create an aggregation function for professors to view class-wide data**: (backend)
- **Create front-end components to visualize individual and group feedback**: (frontend)

Data Aggregation for Dashboard:

- **Aggregate data across different users and send it to the dashboard for visualization**: (backend)

Virtual Phishing Environment (UI of Simulation Core)

- **Email Inbox Creation**:
  - **Develop a simulated inbox for students to receive and interact with phishing emails**: (frontend)
  - **Integrate with the Simulation Engine to send emails**: (backend)
- **Messaging Interaction Logic**:
  - **Add logic to capture interactions with emails (open, reply, link clicks)**: (backend)
  - **Create various attack vectors—links, attachments, sensitive data requests**: (backend)
  -
  -

API Development for Frontend Integration:

- Develop backend APIs to provide analytics data to the front end.
- **Tasks**:
  - Create RESTful APIs to serve the feedback and performance data to users.
  - Ensure APIs are secure, taking care of user data privacy.
  - Test APIs with the frontend to ensure smooth integration of performance data and visual insights.
  - define the expected structure of data to ensure proper visualization in the **Dashboard Module**.