Website for Sharing Knowledge

Design Document

Team 16
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Revised: 3/9/2021 v1

Executive Summary

Development Standards & Practices Used

Our engineering standards are as follows:

- Split production in development
    - Prevents developer from accidentally deleting production data
    - Better test environment
    - Good control of the software version
- Developing in the same environment
    - Helps mitigate cross environment confusion
    - Allows team members to collaborate more effectively
- Document before execution
    - Our project use cases will be identified and documented on a discovery basis
    - This prevents development from moving faster than user acceptance
- Iterative approach requires modifiability and modularity
    - Components should be easily modifiable and loosely coupled

Summary of Requirements

Functional requirements:

- Ability for security experts to create blog posts
- Ability to search blog posts
- Ability to see a breakdown of different threat models based on the blog posts

Environmental requirements:

- An authentication system which prevents unauthorized personnel from submitting blog posts, to protect the dataset from being 'poisoned' by bad data
- Design a browser-friendly interface for users that can be accessed anywhere

Economic requirements:

- Uses university resources to circumvent costs associated with hosting and processing

Applicable Courses from Iowa State University Curriculum

- SE 329 - Software Project Management
- SE 339 - Software Architecture & Design
- COMS 352 - Intro to Operating Systems
- SE 319 - Constructing User Interfaces
- ENGL 314 - Technical Communication
- COMS 363 - Intro to Database Management Systems

New Skills/Knowledge acquired that was not taught in courses

- All knowledge relating to using and implementing Wordpress
- Text mining algorithms
- Most cybersecurity and threat modeling knowledge

Table of Contents

List of figures/tables/symbols/definitions (This should be the similar to the project plan)

1 Introduction

1.1 Acknowledgement

We would like to acknowledge Lotfi Ben Othmane for being not only the middle-man between our clients of cyber security experts, but also for being our adviser and giving us weekly advice and direction.

1.2 Problem and Project Statement

Problem

There is currently no centralized database that efficiently documents and organizes threat modelling patterns. A system such as this is necessary in the fight to ensure the safety and security of software systems around the world. The ability to easily gain the knowledge required to effectively mitigate current threats is something that many organizations and specialists wish they had, as such a database has the ability to adapt and change as new threats and vulnerabilities are discovered.

Solution

Our team has devised a web application that includes a database of documentation regarding various threat modelling patterns. This web application will allow users to submit knowledge regarding threat modelling patterns in the form of blogs, where these blogs will be data mined to be more efficiently organized so that a third party could more easily access the information they would need. Our application will also allow for modification of these blog posts, as it is understood that just as technologies are always evolving, so are the threats facing them.

1.3 Operational Environment

Due to our project being software-based, any environmental hazards are limited to the server. The server is hosted at Iowa State during development, and a copy of all of the files needed to run the website are saved on GitLab. The website itself from a user perspective will be able to run on any modern web browser.

1.4 Requirements

Functional requirements:

- Ability for security experts to create blog posts
- Ability to search blog posts
- Ability to see a breakdown of different threat models based on the blog posts

Environmental requirements:

- An authentication system which prevents unauthorized personnel from submitting blog posts, to protect the dataset from being 'poisoned' by bad data
- Design a browser-friendly interface for users that can be accessed anywhere

Economic requirements:

- Uses university resources to circumvent costs associated with hosting and processing

1.5 Intended Users and Uses

Our intended users are cybersecurity professionals. Only approved cybersecurity experts can make blog posts, while anyone will be able to view the posts and the information provided by the text-mining algorithm.

1.6 Assumptions and Limitations

Assumptions:

- All users with login credentials will be verified cyber security experts
- Concurrent user count doesn't exceed 10,000.
- Text Mining Algorithm will be provided

Limitations:

- Text mining is limited by the training data set
- Application cannot function without users inputting thread modelling data

1.7 Expected End Product and Deliverables

The end product that will be delivered to the client is all of the source code for the website and any related code and documentation needed to run the project.

Expected deliverables:

- Web application for submitting threat modeling patterns in the form of blogs
    - The web application will be the primary product. The system for submitting blogs is based on Wordpress.
- Use text-mining system to extract threat modeling information from each of the blogs
    - The text-mining algorithm will save information such as the user, context, problem, solution, and alternative solution derived from the blog posts to a database.
- Visualize the threat modeling knowledge to experts

- Using the information saved to our database, we will then have a different page that allows the user to easily view statistics and graphics related to threat modeling patterns.

2 Project Plan

2.1 Task Decomposition

Deliverable 1: Web application for submitting threat modeling patterns in the form of blogs

- User creation and blog posting handled by Wordpress
- Wordpress blog posts are saved to local database

Deliverable 2: Text-mining algorithm derives threat-modeling information from blog posts and saves it to a database

- Text-mining system will scan over all blog posts and retrieve the user, context, problem, solution, and alternative solution.
- It will then save these fields to a database

Deliverable 3: Polished web interface that allows for easy searching of blog posts and threat modeling patterns, in addition to visualizations such as graphs and charts generated from the database.

- Web interface will be polished for general release
- Website will include a search feature which can search for blog posts and/or threat modeling patterns
- A separate webpage will show statistics and visualizations such as graphs and charts to provide an overview of all of the threat patterns

2.2 Risks And Risk Management/Mitigation

Task	Risk Probability	Mitigation
• User creation and blog posting handled by Wordpress	.2	N/A
• Wordpress blog posts are saved to local database	.1	N/A

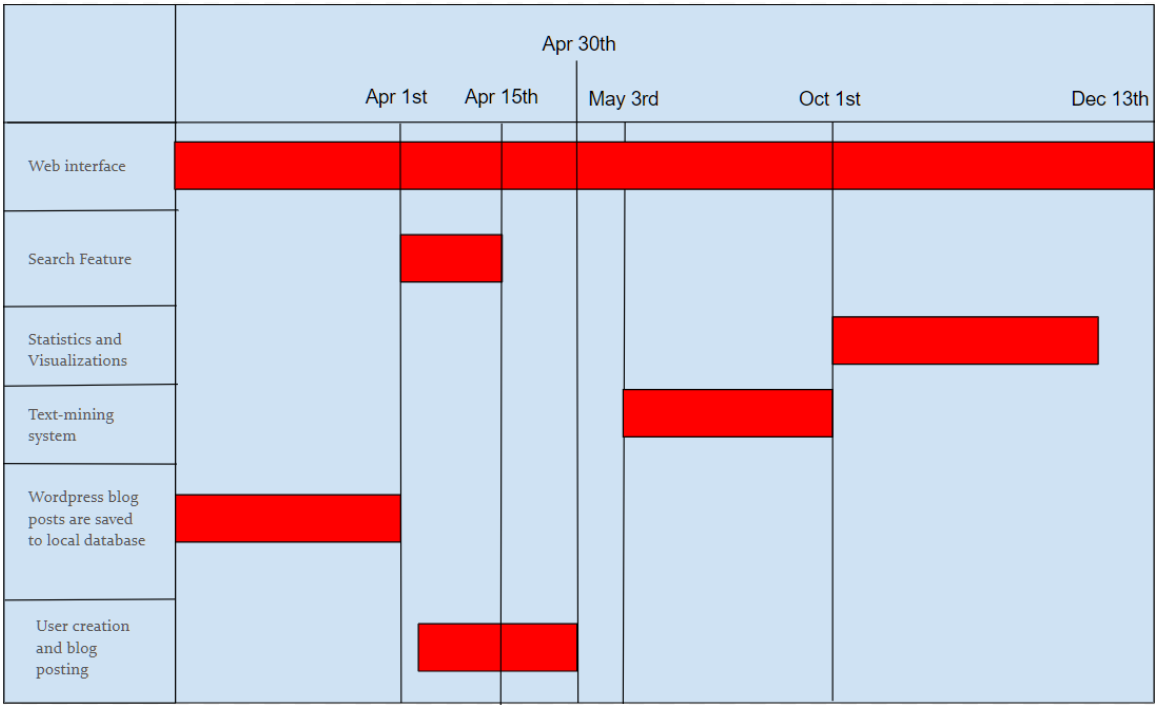
• Text-mining system will scan over all blog posts and retrieve the user, context, problem, solution, and alternative solution.	.6	Develop a system to regularly sanitize inputs/flag potential data poisoning attempts. Not possible to eliminate due to the uniqueness of the project.
• Web interface will be polished for general release	.2	N/A
• Website will include a search feature which can search for blog posts and/or threat modeling patterns	.5	Developing this feature ourselves would be very costly and potentially dangerous for SQL injections and other forms of mishandled edge cases. This feature should not be developed by the team, we will use a predeveloped library or built in functionality of wordpress.
• A separate webpage will show statistics and visualizations such as graphs and charts to provide an overview of all of the threat patterns	.3	N/A

2.3 Project Proposed Milestones, Metrics, and Evaluation Criteria

Our milestones will be tied with our deliverables and subtasks.

- Working Wordpress blog posting and user creation/permissions.
- Text-mining algorithm will extract all necessary fields from the blog posts with 80% accuracy
- Working search functionality that allows searching of all text blog posts
- Visualizations will be continuously updated with the addition of every new blog post

2.4 Project Timeline/Schedule



Our team schedule is based off of the expectations from deliverables 1-3. The goal by the end of the semester is to have finished deliverable 1 and started deliverable 2. The requirements are that we have deliverable 1 done with plenty of time to spare, as to give the client time to hand the project off to experts. This requirement is what will keep our group on schedule. While the web interface will always be changing and new features being added, this makes the task ongoing.

2.5 Project Tracking Procedures

- GitLab - Version control
- Trello - Issue tracking
- Discord - Team Instant Messaging
- WebEx - Team meetings
- Google Drive - Shared file storage
- Google Docs - Collaborative documentation

2.6 Personnel Effort Requirements

Task	Description	Projected hours required
Web interface	HTML/CSS design	200
Search feature	Searching of blog posts	35
Statistics and visualization	Uses information extracted from text-mining algorithm to	100
Text-mining system	Extracts information from blog posts to database	85
Wordpress blog posts	Blog posts are done through Wordpress	70
User creation	User creation is handled through Wordpress	40

2.7 Other Resource Requirements

- Server

2.8 Financial Requirements

- The financial need for server deployment outside of iastate network

3 Design

3.1 Previous Work And Literature

As Professor Lotfi Ben Othmane said himself, what we're doing in this project has no direct precedent. In regards to research, our group is not aware of any research that may or may not have led to the inception of this project.

3.2 Design Thinking

The defining process is focused on a specificity target to identify user needs and core issues, then reframe them to reflect new knowledge. Ideate is dedicated to dive in problems with teams and generate new ideas.

3.3 Proposed Design

As of 3/9/2021, we have an Ubuntu virtual machine hosted at Iowa State's Electrical and Computer Engineering department that is running an Apache web server combined with Wordpress. We only have the basic implementation of Wordpress without any added functionality or customization, but we plan to customize it to the point where it fits our deliverables. This will satisfy the functional requirements of having a blog-posting system, and also provides a basis for user creation and permissions.

Beyond Wordpress, we will need to implement a text-mining feature that runs with the addition of every new blog post. In addition, we will need another library to visualize the data retrieved by the text-mining algorithm. All of these services will be hosted on the same server.

3.4 Technology Considerations

At this time, WordPress is the software we have chosen to use to manage our website. Whilst this has greatly simplified setup and improved the potential stability of our site versus a custom-written approach, it's also reduced our total level of control and understanding of the site's internals versus if we had written our website from the ground up.

If WordPress turns out to be too restrictive for our goals to tolerate, we have an alternative idea in mind to utilize SpringBoot for web page and site service management.

3.5 Design Analysis

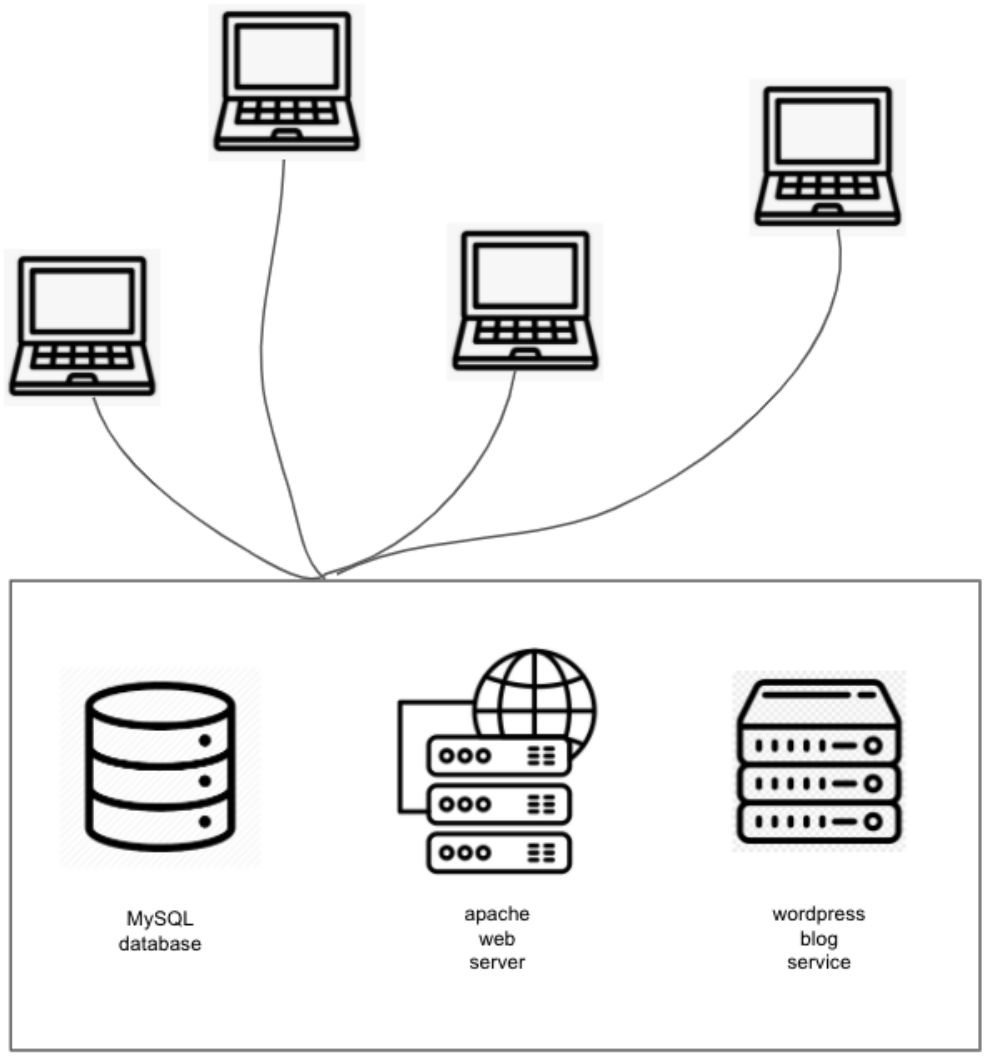
As of 3/9/2021, it is too early to tell if our proposed design will be all that we need. It will be very difficult to change from Wordpress, so I expect Wordpress to stay with us the entire project. We will need to iterate the design with how we plan to implement the text-mining and visualization programs.

3.6 Development Process

We will implement an iterative development process on a weekly basis. Every Tuesday we have a group meeting where we discuss what needs to be done for the week. Every Thursday we have a meeting with our client/adviser to discuss further requirements that are expected from our clients, as well as ask any questions related to the tasks for that week.

3.7 Design Plan

In the current phase of the project, which is to make a web application for submitting threat modeling patterns in the form of blogs. We have designed the architecture of our server.



4 Testing

4.1 Unit Testing

At this time, we have no method for unit testing in place.

4.2 Interface Testing

We don't have an interface testing plan in place at this time, but it will likely become more necessary as our website acquires additional components.

4.3 Acceptance Testing

We intend to communicate back-and-forth with the security experts collaborating with us on the project in order to achieve their desired functionality and look-and-feel.

4.4 Results

Insofar, that has not been any testing phrase to describe.

5 Implementation

Due to the nature of our project and after talking to Lotfi, our project will not follow the typical senior design workflow of designing first and then creating the project. Instead, we will design and create parts in an iterative development style. Due to this, we will have some deliverables done before the start of the second semester. Anything that we don't get done during the first semester will be done in the second semester.

6 Closing Material

6.1 Conclusion

So far we have created the first iteration of our web application which includes very basic forms of functionality regarding the implementation of our web server and database, along with a first implementation of WordPress. Continuing forward, we aim to implement further functionality where users will be able to create accounts and submit first iteration threat modelling patterns in the form of blog posts. This is naturally the next step in the process of completing this web application, as it is the main purpose of this application.

6.2 References

"Support – Official WordPress.com Customer Support," *Support - WordPress.com*. [Online]. Available: https://wordpress.com/support/. [Accessed: 09-Mar-2021].

6.3 Appendices

N/A