Cybersecurity Final Year Project Proposal

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**Degree and Major:** Bachelors in Cybersecurity

**Project Advisor:** Professor Henderson

**Expected Graduation Date:** December 2025

**Problem Statement**

In an ideal scenario, network systems would be intuitive, allowing system administrators to understand their infrastructures and resolve issues with ease. However, network problems are often complex and elusive, making diagnosis and early detection challenging. This inability to effectively troubleshoot can lead to significant consequences, including production downtime, data loss, and compromised security. As organizations increasingly depend on reliable network performance, system administrators must have the tools to diagnose and comprehend their networks before something negatively affects production.

To address these challenges, I propose developing a network analysis tool for system administrators that simplifies diagnostics and troubleshooting. This tool will provide insight to detect potential issues early and improve network understanding, helping to prevent disruptions. Having all essential tools in one place will lead to more efficient management and reduce the risks of downtime, data loss, and security breaches. Ultimately, this tool will empower system administrators to manage their networks more effectively, ensuring smoother operations.

**Project Description**

This project is a network analysis tool designed to simplify network diagnostics and provide users with visual representations to enhance their understanding. It includes key features such as port scanning to identify open or closed ports, file transfer speed tests to analyze network throughput, and traceroute to display routing paths and potential bottlenecks. The tool will also include system uptime and resource monitoring, a ping sweep to find active devices, and latency monitoring. These features will be implemented using PowerShell scripts, providing an efficient solution to the challenges of network diagnostics. The tool is designed to save time for professional system administrators and help beginners improve their understanding of network structures. The expected outcome is a practical tool that improves the efficiency and accuracy of network diagnostics while furthering users' knowledge of their networks.

**Proposed Implementation Languages**

* **HTML/CSS:** Build the UI visual elements
* **JavaScript:** Handles the functionality and interactivity of the UI
* **PowerShell:** Executing the network diagnostic scripts

**Resources**

* **Electron:** A framework for building the desktop app using web technologies (HTML, CSS, JS)
* **Node.js:** Manages back-end processes, allowing integration with PowerShell to Javascript in the Electron framework
* **Visual Studio Code:** The primary IDE used for writing, debugging, and managing the project's code effectively
* **GitHub:** A platform for version control and collaboration used to manage the project's codebase and track changes throughout development

**Personal Motivation**

I aim to expand my knowledge in network diagnostics, troubleshooting, and PowerShell scripting, as these skills are valuable for system administrators and cybersecurity analysts, both of which are fields I am interested in pursuing. Additionally, this project will help me simplify complex network concepts, making them more accessible and easier to understand. I hope to provide a useful tool for beginners in networking by incorporating visual aids that enhance comprehension. Overall, this project will offer me practical, hands-on experience while contributing to a deeper understanding of key concepts in the field.

**Future Research Efforts**

The project will begin with developing the connection between HTML, JavaScript, and PowerShell. After this connection is established, scripts for the various features of the network analysis tool will be written to ensure functionality. Once the scripting is complete, the user interface will be implemented, focusing on usability and clarity to enhance the user experience.

Testing will start in my home network, where I have a solid understanding of expected results. I may also run it on a friend’s virtual network and possibly create my own. A significant focus will also be placed on learning PowerShell since I do not know much currently. To address this gap in knowledge, thorough research on PowerShell will be conducted to build confidence and competence. Overall, this tool serves as a collection of smaller tools, allowing for the easy addition of new features as skills develop and knowledge expands.

**Schedule**

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| |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | **Item** | **Description** | | | | **ECD** | **Status** | | **1** | **Plan** | | | | | | | 1.1 |  | Write Schedule | | | 10/10/2024 | Complete | | 1.2 |  | Complete Proposal | | | 10/24/2024 | Complete | | 1.3 |  | Complete Requirements Document | | | 10/31/2024 | Not Started | |  |  |  |  |  |  |  | | **2** | **Build** | | | | | | | **2.1** |  | **Back-End** | | |  |  | | 2.1.1 |  |  | Create Basic Prototype | | 11/02/2024 | In Progress | | 2.1.2 |  |  | Develop Scripts | |  |  | | 2.1.2.1 |  |  |  | Uptime & Resource Monitoring | 11/07/2024 | In Progress | | 2.1.2.2 |  |  |  | Port Scanning | 11/14/2024 | Not Started | | 2.1.2.3 |  |  |  | File Transfer Speed Test | 11/21/2024 | Not Started | | 2.1.2.4 |  |  |  | Ping Sweep | 11/28/2024 | Not Started | | 2.1.2.5 |  |  |  | Latency Monitor | 12/05/2024 | Not Started | | 2.1.3 |  |  | Implement Security / Error Handling | | 12/05/2024 | Not Started | |  |  |  |  |  |  |  | | **2.2** |  | **Front-End** | | |  |  | | 2.2.1 |  |  | Design UI | | 11/07/2024 | In Progress | | 2.2.2 |  |  | Implement UI | | 11/21/2024 | Not Started | | 2.2.3 |  |  | Test & Finalize | | 12/05/2024 | Not Started | |  |  |  |  |  |  |  | | **3** | **Testing and Development** | | | | | | | 3.1 |  | Create Testing Plan | | | 11/07/2024 | Not Started | | 3.2 |  | Test and Adjust | | | 12/19/2024 | Not Started | | 3.3 |  | Package and Deliver | | | 01/09/2024 | Not Started | |  |  |  |  |  |  |  | | **4** | **Documentation** | | | | | | | 4.1 |  | Write User Guide | | | 12/05/2024 | Not Started | | 4.2 |  | Write Technical Documentation | | | 12/19/2024 | Not Started | |