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Executive Summary

The US Cyber Range Website is an online cybersecurity education platform that offers interactive courses and activities to teach cybersecurity topics to high school and college students. The US Cyber Range team partnered with our client FourDesign, a graphic design team at Virginia Tech, to recreate and redesign the older existing online platform. Upon generating new graphic designs for the website, FourDesign requested the help and support of a team of students currently enrolled in CS 4624 to implement these designs into a website.

A Computer Science team enrolled in CS 4624 from the previous semester worked with the FourDesign team and US Cyber Range to help start the project. This CS team began by creating a website using WordPress and PHP widgets, while receiving and implementing the front-end graphics from FourDesign. Our team was tasked with completing the design of the previous team’s implementation, specifically focusing on making the website have responsive design for mobile and tablet devices.

During the first half of the semester, our team focused on research and setting up the WordPress environment from the previous team’s implementation. Many difficulties were encountered throughout this initial stage, and we discovered that the previous team’s implementation was lacking in many features and our starter code did not include everything that was needed. Therefore, our team in conjunction with FourDesign decided to restart the entire project from scratch, through WordPress, with emphasis on the Elementor Plugin.

Our implementation of the website removes many barriers to entry, allowing future additions and changes to happen with ease. This means our implementation of the website requires little to no background knowledge in programming. A very basic understanding of HTML/CSS is all that is needed to understand the Elementor Plugin provided by the WordPress Administrator Dashboard. Besides this foundational understanding, much of the leg work of the entire project was handled by our team.
Introduction

Ever since the blossom of the age of the Internet, the pesky threat of cybersecurity attacks has become a persistent fear. With almost all financial and personal transactions occurring virtually in the modern day, there are many reasons to be concerned about one’s online privacy and the security of the many services one relies on. To ensure the safety of one’s personal information, schools, companies, and the government have recently endorsed increased cybersecurity education. There is a strong need for students studying computer science to be well-informed in matters of cybersecurity so that they can develop systems which can withstand against a wave of newly evolving cyber threats, all to help promote the common good of society.

Terry McAuliffe, as Virginia governor, proposed the effort to speed up the education of cybersecurity which resulted in the need for the US Cyber Range team [1] located at Virginia Tech in Blacksburg, VA. Because many clients in the Commonwealth of Virginia expressed the need for the services of Cyber Range, US Cyber Range was officially established. US Cyber Range wanted to allow their platform to reach more students so they asked the FourDesign team to redesign their website to make it more attractive.

The FourDesign team [2] then asked a Computer Science team currently taking CS 4624 to implement the website that the US Cyber Range asked for, with their new custom designs. Our team, which consists of Zach Amados, Tengis Gantulga, Renzo Ramos, and Brian Duong, decided to pick up the project. We approached the project using a scrum-like approach. The workflow involved weekly Zoom/Discord meetings with the Computer Science team as well as scheduled meetings with the FourDesign client to inform the client of any substantial progress that was made by the team.

After initial meetings were held to have the Computer Science team possess a foundational understanding of the requirements and deliverables of the project, the Computer Science team deployed the website such that all users can see any and all progress made by the Computer Science team. The website was made through WordPress for the primary purpose of easy transfer to others that continue to develop on the website as a whole. Through the semester, the FourDesign team gave the Computer Science team informative notes towards ensuring the goal of an aesthetically pleasing website for US Cyber Range.
Requirements

Last semester, the US Cyber Range client requested a complete redesign of the initial website. Figure 1 shows one of the initial designs of the website before the complete redesign of the website. This initial design can surely be improved on. Compared to the new implementation of the website, the color scheme as well as user navigation throughout the website is inferior to the new website. The new redesign of the website consists of a variety of animations as well as a new website theme.

Besides the visual requirement, the client requests additional requirements of the new design. This new design should be responsive on a variety of different devices. These new devices include, but are not limited to, tablet and phone variations of where the website could potentially be viewed. The need for this requirement is built upon the fact that the FourDesign team believes that the popularity of the website can surely be increased on mobile devices.

Because this project was a continuation of progress that was made from the Computer Science team from last semester, the requirements that were imposed upon the team from the semester prior will still be imposed for the Computer Science team this semester. Other requirements of the new redesign of the website consists of an improvement upon the navigation aspect of the new website. The US Cyber Range client has recently stated that users were not able to find what they were looking for in the old website design. This improvement consists of changing page names, adding improved connections between pages, as well as rearranging the menu system.

It is also important to note other requirements that were not asked of us. These requirements consist of implementing features that handle user login functionality. The reason why this was not asked of the previous Computer Science team is because the US Cyber Range team has already made a formidable effort to implement this feature. With this feature implemented by the US Cyber Range team and with the website being completely redesigned by FourDesign, combining both of these aspects creates an overall complete website for all users to navigate through.
Methodology

We employed a series of methods to ensure sufficient progress is made throughout the semester. Initially, we broke down our primary goal of making a website into smaller tasks. These smaller tasks were further divided into smaller subtasks.

The initial task that the Computer Science team embarked upon was having a sufficient understanding of the WordPress framework. To accomplish this, the Computer Science team sought a variety of resources that either employed the use of the WordPress framework or concerned primal aspects of the WordPress framework that would theoretically be used throughout the implementation of the project.

The next task concerns creating the Website. This task was divided into the following three subtasks:

2. Adding necessary widgets using PHP
3. Creating necessary dynamic CSS Components

With the primary goal of a dynamic website, other subtasks include ensuring that the widgets are dynamic and functional as well as adding in dynamic images and files. Lastly, to ensure that this primary task has been satisfied, the Computer Science team sought to test the functionality of the website by demonstrating all functionalities of the website manually.

Each of the tasks that concern the aesthetics of the website are further broken down into smaller Services. All of these services concern a specific page of the website that needs to be implemented. All services take the provided Figma Design as input. Each service returns a WordPress Design. Each service is implemented through the WordPress Environment.

The following list consists of all pages that are required to be implemented:

1. Home
2. About
3. Services
4. CloudCTF
5. Teams
6. Pricing

For each of these pages, the Computer Science team uses the provided Figma Design as a template to make the corresponding page. Initially, the Computer Science team wishes to have each of these pages responsive on the desktop version of the website. Similarly, once all of these initial services have been successfully completed, the team now changes their focus such that all pages are responsive on mobile and tablet platforms of the website.

It is important to note that the final website need not demonstrate any functionality for its users. Rather the final website merely portrays the appropriate content for all its users in an aesthetically pleasing manner. Functionality such as login, logout, signup, enrolling in courses, and accessing courses, are beyond the scope of the project. The previously mentioned functionalities are implemented by US Cyber Range themselves.
Design

The Computer Science team worked with the FourDesign team in making a new website navigation design. The design follows best practices for specific widgets in specific pages as designed by the FourDesign team. Since the FourDesign team specializes in all sorts of design, the design and site map of the website was built based upon the knowledge of the FourDesign team. The site map for the complete design is seen in Figure 2. The design for each page was developed by the FourDesign team.

Figure 2: Design Map
Implementation

Implementing results of the design phase of the project was the primary responsibility of the Computer Science team. The FourDesign team strongly recommended that the Computer Science team implement the redesign of the website through WordPress. The final deliverable of the project is a WordPress website that looks synonymous with the initial designs. All of the fonts, line spacing, font sizes, font colors, and all other aspects of the provided Figma Designs [4] were used in the final designs of the website.

From a high-level perspective, the Computer Science team created the WordPress theme from scratch. Given an already provided template, the Computer Science team can alter the already implemented pages such that the implementation looks congruent to the designs provided by FourDesign. In addition, both the Computer Science team as well as the US Cyber Range team can add any additional pages to the website as requested by the US Cyber Range client. The implemented theme consists of a variety of page templates as well as stylesheets that correspond to each page template. More of the implementation is discussed in the Developer Manual section. Different from the implementation that was done by last semester’s Computer Science team, this new implementation did not consist of widgets that were made by the Computer Science team from scratch. Much of the widgets, aesthetics, and implementation of the design by this semester’s Computer Science team were made and applied through the Elementor Plugin provided by WordPress. Because of this, any additions to the website can be done through the WordPress dashboard without changing the given codebase.
Developer’s Manual

Environment Setup

Configuring the developer’s environment is independent of the Operating System on which the developer plans to edit the project. The only tool of software that the developer needs to download on their local computer is a web browser of their choice. The Computer Science team recommends that the developer downloads and installs Google Chrome to make any appropriate edits to the website. The following discussion concerning the configuration of the developer’s environment will be general to all Operating Systems, including Linux.

1. Install Google Chrome. Versions used by the Computer Science team include
   a. Google Chrome Version 100.0.4896.75 (Official Build) (64-bit)
2. Request administrator privileges from the current owner of the website.
   a. This step entails sending the current owner a series of credentials, which you will use to log into your administrator account.
3. Navigate to cscapstone.com/wp-admin
   a. Upon navigation to this website, the window that appears should look somewhat similar to what is illustrated in Figure 3, i.e., the login page provided by WordPress.

![Figure 3: WordPress Login](image)

4. Log in with your credentials
   a. After logging in, the window that appears should look something similar to the WordPress Dashboard as indicated in Figure 4.
5. To edit a page, hover the cursor over “Pages” in the side navigation pane and click on All Pages as indicated in Figure 5, i.e., the Side Toolbar.
6. Hover over any of the pages. To edit a page, click on “Edit with Elementor.” Clicking on this will take you to the Elementor Dashboard as indicated in Figure 6, i.e., a List of Pages.

<table>
<thead>
<tr>
<th>Title</th>
<th>Author</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>About — Elementor</td>
<td>zamados426@</td>
<td>Published 2018/11/27 at 9:17 am</td>
</tr>
<tr>
<td></td>
<td>gmail.com</td>
<td></td>
</tr>
<tr>
<td>Cloud CTF — Elementor</td>
<td>zamados426@</td>
<td>Published 2022/03/17 at 2:02 pm</td>
</tr>
<tr>
<td></td>
<td>gmail.com</td>
<td></td>
</tr>
<tr>
<td>Contact — Elementor</td>
<td>zamados426@</td>
<td>Published 2018/11/27 at 9:17 am</td>
</tr>
<tr>
<td></td>
<td>gmail.com</td>
<td></td>
</tr>
<tr>
<td>Home — Front Page, Elementor</td>
<td>zamados426@</td>
<td>Published 2018/11/27 at 9:16 am</td>
</tr>
<tr>
<td></td>
<td>gmail.com</td>
<td></td>
</tr>
<tr>
<td>Pricing — Elementor</td>
<td>zamados426@</td>
<td>Published 2022/03/19 at 12:05 am</td>
</tr>
<tr>
<td></td>
<td>gmail.com</td>
<td></td>
</tr>
<tr>
<td>Projects — Elementor</td>
<td>zamados426@</td>
<td>Published 2018/11/27 at 9:17 am</td>
</tr>
<tr>
<td></td>
<td>gmail.com</td>
<td></td>
</tr>
<tr>
<td>Services — Elementor</td>
<td>zamados426@</td>
<td>Published 2018/11/27 at 9:17 am</td>
</tr>
<tr>
<td></td>
<td>gmail.com</td>
<td></td>
</tr>
<tr>
<td>Teams — Elementor</td>
<td>zamados426@</td>
<td>Published 2022/03/17 at 2:56 pm</td>
</tr>
<tr>
<td></td>
<td>gmail.com</td>
<td></td>
</tr>
<tr>
<td>TeamsCourseware — Elementor</td>
<td>zamados426@</td>
<td>Published 2022/03/18 at 2:33 am</td>
</tr>
<tr>
<td></td>
<td>gmail.com</td>
<td></td>
</tr>
</tbody>
</table>

Figure 6: List of Pages

7. If you see the Elementor Dashboard, in Figure 7, then the developer has successfully configured their environment.

Figure 7: Elementor Plugin
Making Edits

Adding Content

1. To add a section, find the following “Edit Section” area at the bottom of the page as shown in Figure 8. The area that the developer should find is the “Drag Widget Here” to start adding content.

![Figure 8: Drag Widget](image)

2. Select the structure that the developer wishes to use, as shown in Figure 9.

![Figure 9: Select Layout](image)
3. Drag any of the widgets on the left to the added section.

![Figure 10: Drag Widgets](image)

The Computer Science Team has predominantly used the ability to add text. The following discussion concerns that functionality. The following instructions can be extended towards adding other widgets as well.
Adding and Styling Text

1. Upon clicking any widget, the left toolbar will change depending on the type of widget, as illustrated in Figure 11.

![Figure 11: Edit Text](image)

2. The “Content” tab of the side toolbar allows the developer to change the content of any text widget, as well as change the font or HTML tag of the text widget.
3. The “Style” tab of the side toolbar allows the developer to change the color, font size, font spacing, etc. of the specified text.
4. The “Advanced” tab allowed the developers to add any additional padding/spacing to any widgets.
Figure 14: Spacing
User’s Manual

The user need not configure their environment in a manner that is as extensive as that of the Developer. However, one similarity exists between both the configuration of the environment of the User and the Developer. This similarity is that both the User and the Developer need to download a web browser of their choice. Similar to that of the Developer, the Computer Science team recommends that the user download and install Google Chrome.

1. Install Google Chrome. The version used by the Computer Science team is
   a. Google Chrome Version 100.0.4896.75 (Official Build) (64-bit)
2. Request subscriber privileges from the current owner of the website.
   a. This step entails sending the current owner a series of credentials, which you will use to log into your subscriber account.
   b. This step is optional because the user can access content of the website regardless of their user status.
3. Navigate to escapstone.com
   a. The domain name of the website might change depending on the wishes of the current owner of the website.
4. At this point, the user can now navigate around the website.
Work Completed

Despite the setback that was discovered this past semester, the Computer Science team that was assigned to this project this semester managed to make progress beyond that of the Computer Science team that was assigned to this project last semester. To reiterate, the Computer Science team this semester restarted the project from scratch because of a major setback that was described earlier in this report. Despite this, the team managed to complete almost all of the deliverables that the client, Jeff Joiner and the FourDesign team, asked of us. The following pages are both complete and responsive on desktop, tablet, and mobile devices:

1. Cloud CTF
2. Contact
3. Home
4. Pricing
5. Projects
6. Services
7. Teams
8. TeamsCourseware
9. TeamsDevelopment
10. TeamsOperations

Throughout the semester, the FourDesign team has also given us a few notes and adjustments to improve the overall look of the website. Some of these improvements have been fixed in the final website. It is important to note that not all of these improvements have been fixed. These improvements, however, do not impact the overall functionality of the website as a whole. These improvements are discussed in more detail in the next section.
Lessons Learned

Difficulties

There existed a variety of difficulties throughout the semester concerning the project. The following discussion concerns two primary difficulties that were encountered. The first difficulty concerns the progress that was made in the semester prior. The team came into the project expecting to expand upon what was already completed by the prior team. Instead, the team came to realize that work from the prior team was not what was expected. The previous team’s work was incomplete and broken. After consulting the report made by the previous team and setting up a meeting with a member of the previous team, the team was still unable to get the previous team’s project up and running. Therefore, we encountered a problem of what to do next.

The second difficulty is related to communication. There were several instances in the timeline where meetings were delayed, canceled, or not scheduled. This occurred because of the structure of the project being: us, FourDesign, and the US Cyber Range. In order to communicate with the US Cyber Range, we had to first talk to the FourDesign team and then they would talk with the US Cyber Range. This led to moments in which we were just waiting for feedback before we could move on. Thus, as a result of these difficulties, as a team we decided to restart the project from scratch. We would then present the newly restarted project at the next meeting with FourDesign to show the progress we made.
Takeaways and Solutions

The team has taken away many points about how work is conducted in the real world. Specifically, we have learned that communication may not always be consistent. This can be a result of many different things such as other work, difficulties matching schedules, or waiting for others. This type of communication is complex and has many ways in which it can be delayed or halted. This is an important lesson to learn because we were not accustomed to communicating in a work environment. Thus, we will now be better prepared to confront communication in the future. Another lesson learned is that previous work will not always be up to par. We came in expecting code that was usable and readable but that was not what we received. Because of this, we encountered many setbacks and had to create new ideas to help support FourDesign and their needs. Some of the ideas we gave were restarting the project in WordPress, restarting the project in Angular, and continuing trying to recover the old code. Each of these had their pros and cons which considered elements such as time, effort, client’s needs, and compatibility. The Computer Science team initially ended up choosing to restart in Angular but this was not sufficient for the client’s needs so we quickly pivoted to restarting in WordPress. This lesson was important because we had to quickly think of new ideas and be able to pivot if an idea was not working properly.
Timeline

January
● Weeks 1-2
  ○ Find project to work on this semester
  ○ Contact with client and establish communication

February
● Weeks 1-2
  ○ Understand the requirements of the project
  ○ Presentation 1
  ○ Research the tools used for the project
  ○ Configure environment
● Weeks 3-4
  ○ Meet with the client to discuss difficulties
  ○ Wait upon feedback from the US Cyber Range client

March
● Weeks 1-2
  ○ Wait upon the feedback from the US Cyber Range client
  ○ Implement the main pages in Angular
● Weeks 3-4
  ○ Start the project in WordPress

April
● Weeks 1-2
  ○ Continue the project in WordPress
  ○ Show FourDesign the progress that was made
  ○ Presentation 2
● Weeks 3-4
  ○ Start the final report
  ○ Obtain feedback for the final report
  ○ Show the client the work of this past semester
The following discussion concerns some of the minor improvements that can still be made to the website. The About page of the website still needs to be responsive on both tablet and mobile devices. Other than the About page, all pages seem to be in an acceptable state. Tasks that need to be completed include ensuring a consistent footer exists across all pages of the website. What the footer consists of includes ensuring that the navigation bar not only exists on all pages, but is responsive on all devices. Similarly, the same can be said about the footer of each page. The footer still needs to be developed such that it looks synonymous to that of the given Figma designs, it exists on all pages, and it is responsive on all devices. In conjunction with the header and the footer, the header and the footer also need to provide appropriate linking across all pages of the website. Though much progress has been completed, there exists only a few tasks that need to be completed to ensure a complete website.
Acknowledgements

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References


