| Internship Project Title | TCS iON RIO- 45: Create a CAPTCHA Service to Secure a Simple Web-based Application |
| --- | --- |
| Name of the Company | TCS iON |
| Name of the Industry Mentor | Niteen Gokhale |
| Name of the Institute | MIT ADT University |

| Start Date | End Date | | Total Effort (hrs.) | | Project Environment | Tools used |
| --- | --- | --- | --- | --- | --- | --- |
| 19/06/2023 | 30/06/2023 | | 45 | | Eclipse IDE, windows | Java, HTML, CSS, JavaScript |
| Milestone # |  | Milestone: | |  | | |

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**Acknowledgements :**

I owe a huge debt of gratitude to TCS iON for all of their help with the project, including their direction, continual oversight, and provision of the necessary information. I want to show my gratitude to my parents and my academic mentor for their great support and encouragement in getting this assignment done. I want to express my sincere appreciation and thanks to my industry mentor for taking the time to pay me such close attention.

**Objective :**

To create a safe online application CAPTCHA service.

The program will be protected from automated bots by the CAPTCHA system, which also makes sure that only human users can access its features and capabilities.

**Introduction / Description of Internship :**

The development and deployment of a CAPTCHA system to increase the security of a web-based application is the main emphasis of this internship opportunity.

I have gained useful knowledge in web application security throughout the internship and have learned about the difficulties in preventing automated assaults. I have the chance to use my programming and problem-solving abilities to create novel CAPTCHA methods that can successfully distinguish between humans and bots.

**Internship Activities :**

Understanding the CAPTCHA's goal and creating a CAPTCHA service to deliver a CAPTCHA image and check user-entered CAPTCHA text are the major activities.

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1. Research: In order to comprehend the fundamental ideas and investigate

current CAPTCHA approaches, algorithms, and best practices, solutions.

2. Design and development: I created the architecture and put the CAPTCHA

service into place using the research findings. This required creating the user

interface for showing challenges, establishing the verification process, and

writing code to produce CAPTCHA difficulties.

3. Integration: To effortlessly integrate the CAPTCHA service, I collaborated

closely with the web-based application development team. This required

updating the application's code base and making sure it worked on various

browsers and gadgets.

4. Testing and Debugging: To assure the dependability and efficiency of the

CAPTCHA service, I carried out extensive testing. I also conducted systematic

debugging to address any problems or faults that surfaced during testing.

5. Documentation: Throughout the internship, I kept thorough records of the

project requirements, design specifications, implementation information, and

user manuals.

**Approach / Methodology**

I used a methodical process to develop the CAPTCHA service, which included the following steps:

1. Requirement Analysis: I carefully examined the web-based application's requirements and determined which particular CAPTCHA difficulties would be appropriate for its function.

2. Algorithm Selection: I chose a CAPTCHA algorithm that would be effective at telling humans from bots based on the requirements that were established.

3. Design and Implementation: Using the right programming language and framework, I developed the CAPTCHA generating and verification methods.

4. User UI Design: To present the CAPTCHA challenges to users and collect their responses, I designed a simple and user-friendly UI.

5. Integration: To ensure compatibility and functionality across all platforms, I worked with the development team to easily integrate the CAPTCHA service into the web-based application.

6. Testing and Improvement: I performed in-depth testing to assess the functionality, dependability, and performance of the CAPTCHA service. I made the necessary adjustments and upgrades based on the test findings to increase its efficacy.

**Assumptions:**

The following presumptions were made during the CAPTCHA service's

development:

1. Users are able to comprehend and respond to the CAPTCHA challenges

given and have a basic experience with web-based apps.

2. Users have access to contemporary web browsers and gadgets that work

with the technologies required for CAPTCHA functionality.

3. The CAPTCHA service will be included into the current web-based

application without major dependencies or conflicts.

**Exceptions / Exclusions:**

While creating the CAPTCHA service, the following exceptions and exclusions

were considered:

1. The CAPTCHA service does not address advanced security measures beyond

user verification. It focuses primarily on distinguishing between humans and

bots.

2. The CAPTCHA service does not provide protection against targeted attacks

or sophisticated bots that may employ advanced techniques to bypass

CAPTCHA.

3. The CAPTCHA service does not guarantee absolute security but significantly

reduces the risk of automated malicious activities.

**Charts,Tables**

Diagram illustrating the process of creating captcha to secure a web-based application:

**User Interface**

**|**

**V**

**Web Server**

**|**

**V**

**CAPTCHA Generation**

**|**

**V**

**CAPTCHA Image**

**|**

**V**

**Web Page**

**|**

**V**

**User Interaction**

**|**

**V**

**Validation**

**|**

**V**

**Access Granted**

**Algorithms:**

The CAPTCHA service incorporates the following algorithms:

1. CAPTCHA Generation Algorithm: This algorithm generates CAPTCHA

challenges, which can be in the form of distorted characters, puzzles, or other

visually-based tests.

2. CAPTCHA Verification Algorithm: This algorithm verifies the user's response

to the CAPTCHA challenge and determines whether it matches the expected

solution.

**Challenges & Opportunities:**

Throughout the internship, several challenges and opportunities were

encountered, including:

1. Designing CAPTCHA challenges that are both difficult for bots to solve but

easily recognizable and solvable by humans.

2. Ensuring the CAPTCHA service's compatibility with different browsers,

devices, and screen sizes to provide a seamless user experience.

3. Addressing potential accessibility issues for users with visual impairments or

other disabilities.

4. Balancing the level of difficulty of CAPTCHA challenges to minimize user

frustration while maintaining security.

5. Investigating potential vulnerabilities and finding ways to enhance the

CAPTCHA service's robustness against automated attacks.

**Reflections on the Internship:**

During this internship, I gained valuable insights into web application security and the practical implementation of CAPTCHA techniques. I learned to balance security measures with usability considerations to create an effective and user-friendly CAPTCHA service. This experience enhanced my programming skills, problem-solving abilities, and project management capabilities. I also developed a deeper understanding of the challenges associated with web-based security and the importance of continuous testing and refinement.

**Recommendations:**

Based on my experience and observations during the internship, I would like to make the following recommendations:

1. Implement additional security measures, such as rate limiting and IP blocking, to further mitigate the risks posed by bots.

2. Continuously monitor and update the CAPTCHA service to stay ahead of emerging bot technologies and techniques.

**Outcome / Conclusion**

In conclusion, the internship's goal of developing a CAPTCHA system to increase the security of the web-based application was effectively attained. The project's results not only enhanced the application's security posture but also gave the intern invaluable experience in web application security, algorithm design, user interface integration, and testing procedures. The findings of the internship make a contribution to the field of online application security and emphasize the importance of putting in place effective CAPTCHA systems to prevent automated bot attacks.

**Enhancement Scope**

A variety of colors can be used to create the CAPTCHA image.The characters in the input text box may be concealed or displayed as special characters while accepting input.

* **code and executable file**

