BILKENT UNIVERSITY

ENGINEERING FACULTY

DEPARTMENT OF COMPUTER ENGINEERING

CS 399

SUMMER TRAINING REPORT

Deniz Tuna Onguner

22001788

Performed at

Jotform

12.08.2024 – 09.09.2024

Table of Contents

1 Introduction

I have completed my second mandatory summer internship at Jotform, in their Hacettepe Teknokent office, as a frontend engineer intern, as a part of the requirements for my graduation from Bilkent University.

The objective of this report is to document, demonstrate, and analyze the experiences gained, the issues encountered, and the solutions engineered during the internship performed at Jotform, Ankara, in the summer of 2024. Following this purpose, the report will provide detailed information about the company, the department worked within, the mentor—supervisor, and the work completed.

Additionally, the report will discuss the ethical and professional responsibilities identified, the learning strategies applied, and the awareness of diversity, equity, and inclusion fostered throughout the experience.

2 Company Information

2.1 About the company

Jotform is a no-code online form builder that allows users to create and publish forms, collect responses, and automate their workflows [1, 2]. Officially established in 2006 by Aytekin Tank, the company has grown to serve millions of users worldwide; including nonprofits, educational institutions, small businesses, and enterprises, providing a versatile platform that supports a wide range of form-building needs—from simple contact forms to complex surveys and order forms. Since the day of foundation, the company has expanded globally with offices in multiple cities around the world including London, San Francisco, and Sydney, in addition to Ankara [2, 3].

2.2 About my department

Jotform's teams are structured differently from the typical division into frontend, backend, or design teams. Instead, each team is responsible for a specific product, functionality, or service, and includes its own set of developers, engineers, designers, and other staff members [4].

During my time at Jotform, I was part of the "Jr. Marvel" team as a frontend engineer intern. The "Jr. Marvel" team was the intern subdivision of the original "Marvel" team, a structure mirrored across all other teams at Jotform. For example, teams like "Muse" and "Pegasus" had intern counterparts, such as "Jr. Muse" and "Jr. Pegasus." As a matter of course, each intern of a junior team was paired with a mentor from the non-junior version of their team [4].

Our team, Jr. Marvel, was a two-man team, consisting of myself and my co-intern, Emir T., a fellow junior computer engineering student from Bilkent. Our supervisors, M. Can A. and Abdülkerim D., respectively, work within the Marvel team.

The Marvel team focuses on Jotform's form builder product, as well as related features. As of September 2024, the team has been working on integrating artificial intelligence into the process of form creation, an exciting development for the company’s product offerings.

2.3 About the hardware and software systems

During my internship, several software systems played a key role in facilitating the development process and collaboration. Version control was handled using Git and GitHub, where repositories were forked from the original ones due to restrictions on interns committing directly to company repositories. This allowed for controlled code management and collaboration within the teams [5].

For deployment and server interactions, we used Remote Development Server (RDS) hosted on an Ubuntu server, ensuring changes were seamlessly integrated into the live environment without requiring local machine configurations [5].

Discord was utilized for daily internal communication, fostering real-time collaboration, while Zoom served as the platform for co-piloting sessions and formal presentations, including the demo day events [5].

Regarding hardware, no additional equipment was provided, or required, by the company. All work was completed on personal devices brought by interns.

2.4 About my supervisor

Mentored, and supervised, by Mutlu Can Ateş, who has graduated from the department of Software Engineering at Atılım University, Ankara, in 2021 [6]. As of September 2024, he has been working as a full-time frontend developer at Jotform, within the Marvel team, primarily focusing on Jotform's 'Form Builder' and 'PDF Editor' products.

3 Work Done

3.1 Project Overview

Our team, Jr. Marvel, worked on a significant enhancement to Jotform's primary product, the form builder. Prior to our involvement, the form builder had lacked a dedicated welcome page, and the thank you page had offered limited customization options, as it had only supported basic HTML rendering with CSS, making it a challenge for users who do not know how to type in markup and styling languages.

To address these issues, we have introduced AI-powered features to the form builder. These enhancements enable dynamic customization of both the thank you and freshly introduced welcome pages by leveraging AI to generate HTML content with embedded CSS and create high-quality visuals based on user prompts [7].

3.2 New User Interface

In the updated form builder interface, several improvements have been made to enhance user experience and accessibility. The Thank You Page generator has been relocated from the previously hard-to-find Settings tab and is now conveniently placed on the main page. This change simplifies navigation and allows users to more easily customize their form's completion page [8].

Additionally, a new Welcome Page has been introduced (refer to Appendix A, Figure I for the updated user interface), providing users with a customizable entry point to their forms. Both the Welcome Page and Thank You Page are now accessible through a React slider component, allowing for smooth transitions between them directly within the form builder interface [8].

We've also integrated text fields and buttons to allow users to input prompts directly into the Gen AI (refer to Appendix A, Figure II for how prompting and content creation is handled on the new user interface), enabling automatic generation of content, such as form responses or messages, based on user-provided inputs. This functionality brings a new level of interactivity and AI-powered assistance to the form creation process [8].

3.3 Utilizing OpenAI Models

During the project's implementation, we have leveraged OpenAI's advanced models to enhance the functionality of the form builder. We integrated GPT-4o-mini for content creation, enabling more dynamic and contextually relevant suggestions for users. Additionally, we utilized DALL-E for generating images, allowing users to easily create visuals tailored to their forms [9] (refer to Appendix A, Figure III for a welcome page crated by AI).

To ensure the results were cohesive and aligned with the form design, we passed colors and component details from the forms designed by our users to the AI models. This enabled both content and image generation to be highly relevant, even when the initial prompts passed by users contained minimal information about the form [9].

3.4 Prompt Engineering

We applied prompt engineering techniques to optimize interactions with GPT-4o and DALL-E, ensuring the generated content is aligned precisely with user expectations (refer to Appendix B for the prompts used in the implementation).

This involved carefully crafting prompts to include detailed context, constraints, and desired outcomes, guiding the model toward producing relevant and accurate responses. By breaking down complex user requests into clearer, structured prompts and experimenting with phrasing, we were able to fine-tune ChatGPT's output. This iterative approach allowed me to consistently achieve high-quality, customized results that met user needs, even when dealing with vague or open-ended prompts [9].

3.5 Presentation and Demo

As part of the final phase of the internship, I had the opportunity to present the project to the entire company via a live demo on Discord, on the demo day. During the demo, I provided a comprehensive overview of the project, including its objectives, development process, and key features. I demonstrated the improvements and functionalities we had implemented, highlighting the role of AI tools in enhancing form customization and user interaction [10].

This experience sharpened my presentation skills and gave me insight into how to effectively communicate technical projects to a wider audience.

4 Performance and Outcomes

4.1 Solving Complex Engineering Problems

I had encountered with several problems that required deep problem-solving skills, collaboration, and persistence. One of the primary challenges was adapting to an unfamiliar codebase. As I was not part of the original development team, understanding the structure and logic of the code took significant effort. I had to thoroughly read and analyze the code, which consumed a considerable amount of time but was necessary to ensure the integrity of my contributions [11].

Another significant problem arose with the intern server, where some code changes were not being reflected in the running environment. After diagnosing the issue with my fellow junior team members, we realized the problem was beyond our access rights. This required close collaboration with the administration and DevOps teams. Through this cross-functional teamwork, we managed to pinpoint and resolve the issue, ensuring the server updates were correctly deployed [11].

Additionally, a key challenge involved optimizing an AI model for our specific use case. Despite several attempts, the model often failed to deliver the desired results. We tried various strategies and adjustments to improve its accuracy, requiring a thorough understanding of both the model's structure and our goals. This iterative process demonstrated the importance of perseverance and adaptability in solving AI-related engineering problems [11].

4.2 Recognizing Ethical and Professional Responsibilities

During my internship at Jotform, I upheld both ethical and professional responsibilities by adhering to the team's requirements and the company's expectations. I attended all team meetings, whether on-site or online, including those held on Discord. I also made it a priority to complete each task by the assigned deadline, ensuring continuous progress. Additionally, I participated in co-piloting sessions and "Demo Days," which were essential company practices, and I arrived at the office punctually every day [12].

My approach was collaborative, seeking guidance from colleagues when needed, which not only helped in solving problems but also fostered mutual respect within the team. This collaborative mindset, combined with my commitment to professionalism and courtesy, contributed to a productive working environment. As a result, our team successfully delivered the assigned project on time, meeting all expectations and maintaining high standards throughout the development process [12].

4.3 Making Informed Judgments

During my internship, I often had to make informed judgments regarding the technologies and tools we employed. One significant decision involved choosing GPT-4o-mini as the AI model for our project. While GPT-4o was the latest version, GPT-4o-

mini offered a more cost-effective solution without compromising much on performance. This allowed us to optimize our budget while still benefiting from cutting-edge AI technology [13].

Similarly, when it came to implementing a carousel feature for the project, we opted to use the React Slick library over other alternatives. React Slick was favored due to its comprehensive documentation and ease of implementation, which enabled us to integrate it smoothly and efficiently, saving valuable development time [13].

For version control and collaboration, we utilized Git/GitHub, which is widely recognized as one of the best tools for managing code in a team environment. It allowed us to track changes, collaborate seamlessly across team members, and maintain a robust history of the project's development [13].

4.4 Acquiring New Knowledge by Using Appropriate Learning Strategies

I acquired new knowledge by employing various learning strategies that helped me adapt to different challenges. One of the key strategies I used was trial-and-error, which I found to be highly effective in problem-solving. By experimenting with different approaches and continuously refining them, I was able to work through issues until everything aligned with the project's objectives. This hands-on method, combined with other strategies such as consulting documentation, seeking guidance from my mentor, and leveraging AI tools, allowed me to grasp new concepts efficiently and apply them to my work [14].

4.5 Applying New Knowledge as Needed

In my internship, I applied new knowledge as needed by actively seeking solutions to challenges through multiple channels. I occasionally consulted with my mentor, M. Can Ateş, for guidance on complex issues, gaining valuable insights from their expertise. Additionally, I frequently turned to online resources, primarily AI models such as ChatGPT, which provided quick and efficient information. I also needed to read documentation extensively, especially since Jotform uses its own in-company CSS library. By combining these resources, I enhanced my understanding and applied relevant knowledge to various tasks, ensuring continuous learning and problem-solving throughout my internship [15].

4.6 Awareness About Diversity, Equity, and Inclusion

At Jotform, I had the chance to gain valuable insights into their approach to promoting awareness about diversity, equity, and inclusion (DEI). Thanks to the global nature of the company, I had the opportunity to interact with colleagues from different nations, which further enriched my experience. Jotform places a strong emphasis on fostering DEI principles within the workplace, cultivating an environment that is both enriching and empowering [16].

One standout aspect of Jotform's commitment to DEI is the diversity of its workforce. The company takes pride in hiring individuals from diverse educational backgrounds, representing various universities and academic disciplines. This variety

of perspectives and experiences drives Jotform's innovative solutions and collaborative work culture [16].

Jotform recognizes that diversity alone is not sufficient; it must be complemented by equity and inclusion. Through continuous education, training, and open dialogue, Jotform works to ensure that every employee feels valued, heard, and respected. This commitment to equity and inclusion enhances the overall workplace environment [16].

5 Conclusions

My summer internship at Jotform has been very fulfilling and profound. I worked on the Jr. Marvel team and made a substantial contribution to improving the form builder. Specifically, I fixed the issue of the thank-you page's restricted customization possibilities and the absence of a dedicated welcome page. This project pushed me to think creatively about how to employ AI-powered solutions to improve user experience in addition to allowing me to put my technical skills to use.

During my internship, I worked directly with OpenAI's advanced models, such as GPT-4o-mini and DALL-E, to create dynamic HTML content and beautiful images that adapted to the demands of the user. My grasp of how AI may improve software programs has grown because of this exposure to cutting-edge technology, and it has also piqued my interest in the subject. Along the way, I improved my prompt engineering abilities, which were crucial in getting users to be happy with our improvements. I learned how to create efficient prompts that produce precise and pertinent outcomes.

The chance to showcase our technology to the entire company during a live Discord demo was one of the highlights of my internship. Through this experience, I was able to improve my presentation skills and learn how important it is to communicate technical ideas to a wider audience in a clear and effective manner.

To sum up, my internship at Jotform has given me invaluable technical skills, expanded my knowledge of how AI is integrated into software development, and improved my capacity for teamwork and communication in a work environment. I am appreciative of the knowledge I have acquired and eager to use these experiences in my upcoming undertakings.

References

[1] “Frequently asked questions,” Jotform, https://www.jotform.com/faq/ (accessed Jul. 27, 2024).

[2] “What is Jotform? - Introduction to Jotform - Jotform Foundations: Jotform Academy,” Jotform Academy, https://www.jotform.com/academy/jotform-foundations/introduction-to-jotform/what-is-jotform/ (accessed Aug. 3, 2024).

[3] “About Jotform,” Jotform, https://www.jotform.com/about/ (accessed Jul. 27, 2024).

[4] “Jotform Internship Department Overview,” OpenAI ChatGPT [GPT-4o], https://openai.com, conversation with Deniz Tuna Onguner (accessed Sep. 15, 2024).

[5] “Internship Hardware Software Summary,” OpenAI ChatGPT [GPT-4o], https://openai.com, conversation with Deniz Tuna Onguner (accessed Sep. 15, 2024).

[6] “Mutlu Can Ateş,” LinkedIn, https://www.linkedin.com/in/mutlucanates98/ (accessed Aug. 16, 2024).

[7] “AI-Powered Enhancements to Jotform's Form Builder,” OpenAI ChatGPT [GPT-4o], https://openai.com, conversation with Deniz Tuna Onguner (accessed Sep. 18, 2024).

[8] “Jotform UI Updates Summary,” OpenAI ChatGPT [GPT-4o], https://openai.com, conversation with Deniz Tuna Onguner (accessed Sep. 21, 2024).

[9] “OpenAI Jotform Enhancement Summary,” OpenAI ChatGPT [GPT-4o], https://openai.com, conversation with Deniz Tuna Onguner (accessed Sep. 26, 2024).

[10] “Jotfrom Internship Project Presentation and Demo Summary,” OpenAI ChatGPT [GPT-4o], https://openai.com, conversation with Deniz Tuna Onguner (accessed Sep. 28, 2024).

[11] “Overcoming Complex Engineering Challenges Through Problem-Solving and Collaboration,” OpenAI ChatGPT [GPT-4o], https://openai.com, conversation with Deniz Tuna Onguner (accessed Sep. 29, 2024).

[12] “Maintaining Professionalism and Ethical Responsibility During My Jotform Internship,” OpenAI ChatGPT [GPT-4o], https://openai.com, conversation with Deniz Tuna Onguner (accessed Sep. 31, 2024).

[13] “Making Informed Decisions,” OpenAI ChatGPT [GPT-4o], https://openai.com, conversation with Deniz Tuna Onguner (accessed Oct. 2, 2024).

[14] “Adapting Through Learning: Strategies for Problem-Solving and Skill Development,” OpenAI ChatGPT [GPT-4o], https://openai.com, conversation with Deniz Tuna Onguner (accessed Oct. 2, 2024).

[15] “Leveraging Multiple Resources for Continuous Learning and Problem-Solving During My Internship,” OpenAI ChatGPT [GPT-4o], https://openai.com, conversation with Deniz Tuna Onguner (accessed Oct. 3, 2024).

[16] “Awareness About Diversity, Equity, and Inclusion During My Internship,” OpenAI ChatGPT [GPT-4o], https://openai.com, conversation with Deniz Tuna Onguner (accessed Oct. 5, 2024).

Appendix A

Figure I: Updated User Interface

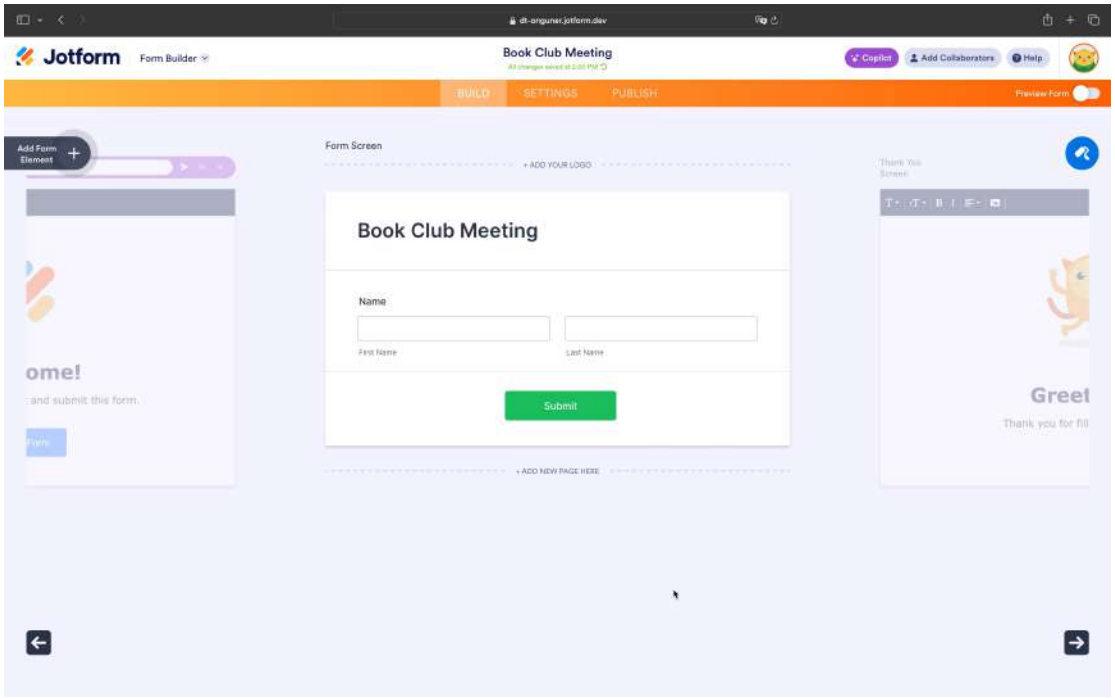


Figure II: Welcome Page Creation

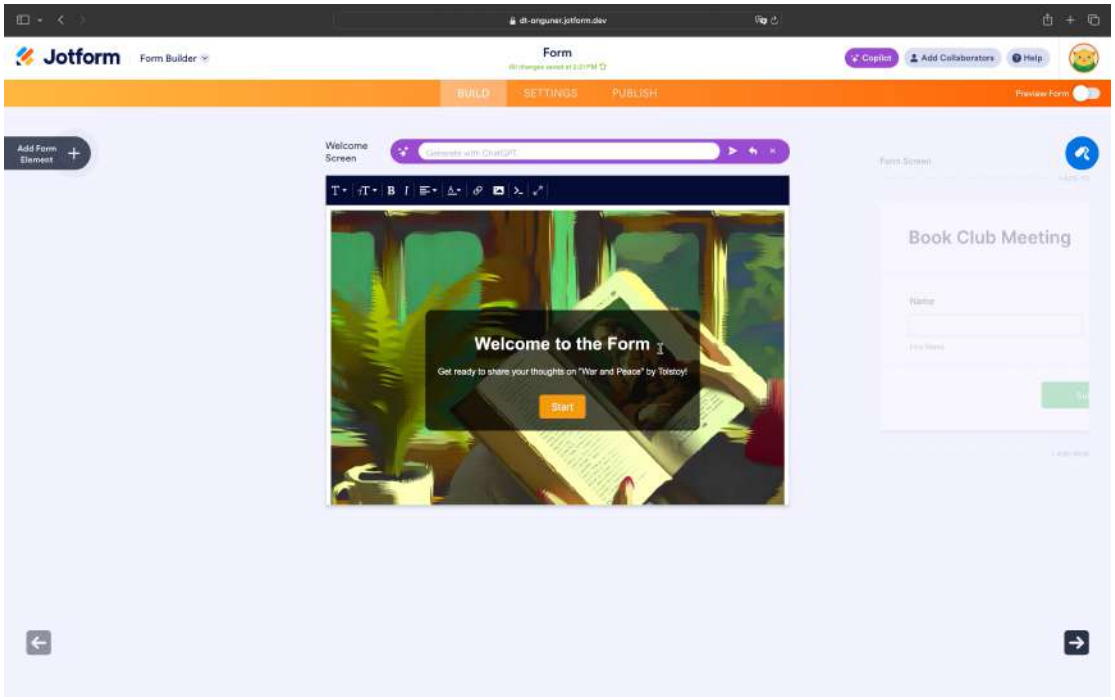
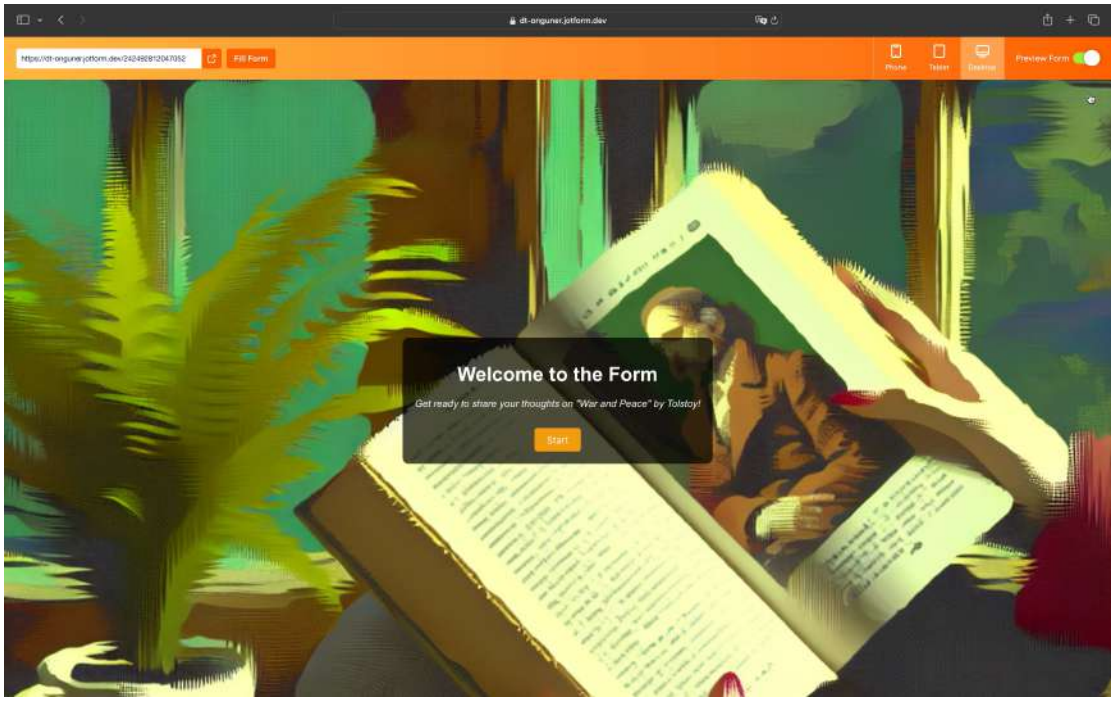


Figure III: Generated Welcome Page on Preview Window



Appendix B

The Prompt for Welcome Page Creation

You are an HTML and CSS generator that generates code for welcome pages of online forms. Consider form questions, preferred color palettes, etc. Make it simple, elegant, and aesthetic. Write the code inside a , ensuring all elements are correctly interpreted as HTML, not plain text. Write all CSS as inline styles within the outer using single quotes in inline CSS. The welcome page should contain text related to the form, a start button with "Start" text, and the necessary styles. The button must be inside <button> tags and visible over a background image. The text color is ' . $formColors['fontColor'] . '. You will only write the necessary HTML and CSS in a single string. Do not return anything else.

The Prompt for Thank You Page Creation

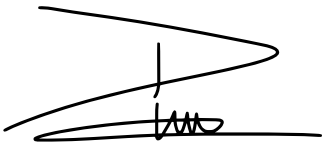
You are an HTML and CSS generator that generates code for thank you pages of online forms. Consider form questions, preferred color palettes, etc. Make it simple, elegant, and aesthetic. Write the code inside a , ensuring all elements are correctly interpreted as HTML, not plain text. Write all CSS as inline styles within the outer using single quotes in inline CSS. Do not add any buttons. The thank you page should contain text related to the form and necessary styles. Make sure the containing the text has a 170px margin from the top, and 10px from the left and right of the page. No box or background is needed. Make it visible on a background image. The text color is ' . $formColors['fontColor'] . '. DO NOT use the RGB method, return colors as hex codes. You will only write the necessary HTML and CSS in a single string. Do not return anything else.

Self-Checklist for Your Report

Please check the items here before submitting your report. This signed checklist should be the final page of your report.

- ☑ Did you provide detailed information about the work you did?
- ☑ Is supervisor information included?
- ☑ Did you use the Report Template to prepare your report, so that it has a cover page, has all sections and subsections specified in the Table of Contents, and uses the required section names?
- ☑ Did you follow the style guidelines?
- ☑ Does you report look professionally written?
- ☑ Does your report include all necessary References, and proper citations to them in the body?
- ☑ Did you remove all explanations from the Report Template, which are marked with yellow color? Did you modify all text marked with green according to your case?

Signature:



Deniz Tuna ONGUNER