TRIBHUVAN UNIVERSITY

FACULTY OF HUMANITIES AND SOCIAL SCIENCES

INTERNSHIP REPORT

ON

.NET Development

AT

AMNIL Technologies PVT.LTD.

Submitted to

Department of Computer Application

Asian College of Higher Studies

In partial fulfillment of the requirements for the Bachelor's in Computer Application

Submitted by

Name: Bijay Khadka

TU Reg. No: 6-2-1177-11-2020

Under the Supervision of
Govinda Gautam

TRIBHUVAN UNIVERSITY

FACULTY OF HUMANITIES AND SOCIAL SCIENCES

Asian College of Higher Studies

MENTOR'S RECOMMENDATION

I hereby recommend that this internship report prepared under my supervision by **Bijay Khadka** (**6-2-1177-11-2020**) entitled "**Intern AT AMNIL Technologies PVT.LTD.**" in partial fulfillment of the requirements for the degree of Bachelor of Computer Application be processed for the evaluation.

……

Bikram Duwal

Desktop Team Lead

AMNIL Technologies Pvt. Ltd.

Jhamsikhel, Lalitpur

TRIBHUVAN UNIVERSITY

FACULTY OF HUMANITIES AND SOCIAL SCIENCES

ASIAN COLLEGE OF HIGHER STUDIES

SUPERVISOR'S RECOMMENDATION

I hereby recommend that this internship report prepared under my supervision by **BIJAY KHADKA (6-2-1177-11-2020)** entitled "**INTERN AT AMNIL TECHNOLOGIES PVT.LTD.**" in partial fulfillment of the requirements for the degree of Bachelor of Computer Application is recommended for the final evaluation.

……..

Govinda Gautam

Supervisor

Department Bachelor of Computer Application

Asian College of Higher Studies

Ekantakuna, Lalitpur

LETTER OF APPROVAL

This is to certify that this internship report prepared by Bijay Khadka entitled "Dotnet Development" has been submitted to the Department of Computer Application for acceptance in partial fulfillment of the requirements for the degree of Bachelor in Computer Application. In our opinion, it is satisfactory in the scope and quality as a project for the required degree.

Signature of Supervisor …….. **Mr. Govinda Gautam** Asian College Of Higher Studies	**Signature of Mentor** …….. **Mr. Bikram Duwal** AMNIL Technologies Pvt. Ltd.
Signature of Head of Department …….. **Mr. Pranaya Nakarmi** Asian College Of Higher Studies	**Signature of External Examiner** …….. **Mr. Basanta Chapagain** Tribhuvan University

ACKNOWLEDGEMENT

I would like to express my sincere gratitude to Amnil Technology Pvt. Ltd. for providing me with the opportunity to complete my internship in Backend Development (.NET). This experience has been invaluable in enhancing my technical skills and understanding of the field.

I extend my heartfelt appreciation to my mentor Bikram Duwal for his continuous guidance, insightful feedback, and unwavering support throughout my internship journey. His expertise and encouragement have been instrumental in shaping my learning experience.

Additionally, I would like to thank the entire team at Amnil Technology Pvt. Ltd. for their cooperation and for fostering a professional and collaborative environment. Their willingness to share knowledge and provide constructive feedback has significantly contributed to my growth.

Lastly, I am grateful to my academic institution, Asian College of Higher Studies, and faculty members for their guidance and support throughout this internship. Their academic insights and encouragement have played a crucial role in the successful completion of this report.

ABSTRACT

This report outlines the internship experience at Amnil Technology Pvt. Ltd., undertaken to fulfill the requirements of the 7th semester of the Bachelor of Computer Application (BCA) program at Asian College of Higher Studies. It provides a brief introduction to the internship program as a .NET Developer, along with an overview of the organization, the tools and methodologies applied, the tasks performed, and the experience gained during the internship. The internship mainly focused on desktop and web-based backend development using the Microsoft .NET technology stack. Over the three-month period, I worked on various development tasks using technologies such as C# .NET, WinForms, Blazor, and ASP.NET. I was responsible for writing and maintaining backend logic, creating user interfaces, integrating databases, and enhancing the performance and functionality of applications. I utilized ADO.NET and Entity Framework for efficient data access and management, working with both SQLite and MySQL databases. The internship also involved using Git for version control and collaboration, participating in code reviews, and understanding agile development practices. This internship provided valuable hands-on experience in real-world software development. It helped strengthen my skills in backend programming, data-driven application design, and team collaboration, while giving me exposure to professional workflows and development standards in the IT industry.

***Keywords**: .NET Development, C#, WinForms, Blazor, ASP.NET, SQLite, MySQL, Backend Development, Entity Framework*

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LIST OF ABBREVIATIONS

ADO	ActiveX Data Object
ASP	Active Server Page
IT:	Information Technology
JS:	JavaScript
MIS:	Management Information System
MVC:	Model View Controller
MySQL:	My Structured Query Language
.NET	Network Enable Technology
UI:	User Interface

CHAPTER 1: INTRODUCTION

1.1. INTRODUCTION:

This report outlines the experiences and progress achieved during an internship at Amnil Technologies Pvt. Ltd., a software development company established in 2009 and based in Nepal. The internship role was that of a Backend developer where the focuses on PHP and Laravel framework. An internship is a temporary work placement that allows students or beginners to gain real-world experience in their chosen field. It bridges the gap between classroom learning and professional work by providing hands-on training in a real business environment. Internships are necessary because they help develop practical skills, build professional networks, and improve job readiness.

The internship was completed at Amnil Technology, a software development company specializing in delivering technology-driven solutions. The company is known for its focus on quality service delivery, innovative development methodologies, and fostering a learning environment. Amnil Technology works with a range of clients across various industries and provides services such as web and desktop application development, database integration, and IT consulting. The experienced team and structured internship program made it an ideal organization for gaining industry-level experience. Amnil Technology was chosen for the internship because of its active involvement in enterprise-level software projects and its commitment to guiding and mentoring emerging professionals. The organization uses modern tools and frameworks in real development scenarios, ensuring a productive and learning-centered atmosphere. Backend development using .NET was selected as the focus area due to its robustness and wide usage in enterprise applications. During the internship, various aspects of .NET development were explored, including ADO.NET, Entity Framework, LINQ, and MySQL integration. WinForms was used to develop a desktop-based Non-Linear Equation Solver, combining UI design with mathematical logic. Additionally, Blazor was introduced as a modern framework for building interactive web applications with C#, offering a deeper understanding of client-side rendering and component-based architecture.

Projects completed during the internship reinforced understanding of software design, backend integration, and full-stack interactions. Tasks included building CRUD operations, managing database connections, and developing algorithm visualization tools in Blazor. Emphasis was also placed on version control using Git and GitHub, which enhanced

collaboration and project management skills. Overall, the internship experience played a crucial role in strengthening technical abilities, understanding real-world development practices, and preparing for a career in software engineering.

1.2. Problem statement:

Understanding complex algorithms and solving non-linear equations can be challenging without visual support and interactive tools. To address this, the internship project focused on developing a Non-Linear Equation Solver using WinForms and an Algorithm Visualization Tool using Blazor. The solver implements numerical methods like Bisection and Newton-Raphson to provide accurate solutions through a user-friendly desktop interface. Meanwhile, the Blazor-based visualization tool helps users grasp algorithm logic through interactive, real-time visual representation. Together, these tools aim to enhance learning and practical application in computational mathematics and algorithm design.

1.3. Objective:

- To fulfill the academic requirements of the BCA program.
- To apply the knowledge learned during the course in real world applications and to learn the company cultures.
- To improve backend development skills using ASP.NET, ADO.NET, and Entity Framework.
- To strengthen coding, debugging, and testing skills relevant to .NET applications.

1.4. Scope and Limitation:

Scope:

- ASP.NET, WinForms, Blazor, and MySQL solutions can be used across various sectors such as entertainment, healthcare, and finance, ensuring efficient access to critical applications.
- Organizations can leverage the power of .NET technologies to streamline operations, automate manual tasks, and improve communication through interactive user interfaces.
- The technology suite supports a variety of services, including web and desktop applications, data management, and process automation, enhancing operational efficiency and user engagement.

- Clients benefit from advanced features like real-time data processing, interactive UIs, and cross-platform support, which allow for better decision-making and competitive advantage.
- Solutions are built to integrate smoothly with existing systems, providing flexibility and scalability to cater to specific business needs.

Limitation:

- Limited exposure to advanced features and full-stack application development due to the project's scope.
- Restricted access to some production systems and sensitive project data due to confidentiality agreements.
- Time constraints may limit the ability to explore certain .NET technologies in depth.
- Focused mainly on backend and frontend tasks, reducing involvement in other areas of the development cycle such as DevOps and cloud infrastructure.

1.5. Report Organization:

The report is organized into five chapters.

Chapter 1: The introduction to the project assigned during the internship and the work done is briefly introduced. The problem statement defines the problem that was being targeted by the project. It also mentions the different objectives of the project/work. The scope and limitations describe the targeted audience and goals for the project but also the goals that the project fails to meet.

Chapter 2: It starts off with the introduction to the organization and carries on to describe the organization's hierarchy. It also describes the different domains that the organization is working in. Then it goes on to the details about the department or unit that the intern worked in. Finally, the section has a literature review/ related study that evaluates findings of different papers that has been relevant for research during this internship project work.

Chapter 3: The section consists of the Background study and literature review. This section deals with the background study and literature review. This chapter provides a comprehensive understanding of the theoretical and technological background related to

the internship project. It includes a study of the tools, frameworks, and programming paradigms used, along with a review of existing literature and related work in the field of web development.

Chapter 4: This section consists of Internship activities. It includes the Roles and responsibilities, weekly log, Description of the project involved and the task/ Activities Performed. This chapter outlines the core activities undertaken during the internship period at Amnil Techologies. It details the roles and responsibilities assigned, the tasks performed on a weekly basis, the projects involved, and the overall contributions made to the organization. The section is divided into four main parts for better clarity and structure.

Chapter 5: The final chapter is the conclusion section and learning outcomes. This is the last section deals with the conclusion of the report and the learning outcomes. This provides the conclusion of the report. This final chapter summarizes the overall internship experience and highlights the key takeaways gained throughout the training period at Amnil Technologies. It reflects on the objectives achieved, the knowledge acquired, and the professional development that took place over the course of the internship.

CHAPTER 2: INTRODUCTION TO ORGANIZATION

2.1. Organization Details:

Amnil Technologies Pvt. Ltd., founded in 2009, specializes in delivering tailored Technology solutions to help businesses achieve their unique objectives and enhance their operations. With expertise across several domains including business process digitization and automation, data analysis and visualization, enterprise application development, data-driven applications, mobile app development, robotic process automation (RPA), omni-channel chatbot development, and resource augmentation, we serve a wide range of industries globally.

Our approach is guided by strategy, creativity, and the latest technologies. We utilize advanced tools and frameworks such as .NET Core, Node.js, PHP Laravel, Python, and cloud-based solutions to deliver outstanding results. Our commitment to building long-term relationships with clients is built on transparency, quality, and dedication.

As an ISO 27001:2013 certified company, we prioritize delivering secure and scalable solutions. At Amnil Technologies, we focus on building better, growing together, and creating lasting impact for our client.

Figure 2. 1: organizational Logo

Table 2. 1 Organization Details

Name	Amnil Technologies Pvt. Ltd
Location	Jhamsikhel, Lalitpur, Nepal
Website	https://www.amniltech.com
Email	info@amniltech.com

2.2. Organizational Hierarchy:

The organizational hierarchy at Amnil Technologies Pvt. Ltd. would typically follow a structured chain of command to ensure smooth operations and effective communication. Here's a possible hierarchy:

- CEO/Operation Manager: Oversees the overall operations and strategic direction of the company.
- Project Managers: Responsible for managing and coordinating projects, ensuring timely delivery, and maintaining client relations.
- Team Leads/Senior Developers: Supervise specialized teams in areas such as software development, ensuring that tasks are completed as per project requirements.
- Interns/Trainees: Contribute to various tasks under the guidance of senior team members and project managers, providing support.

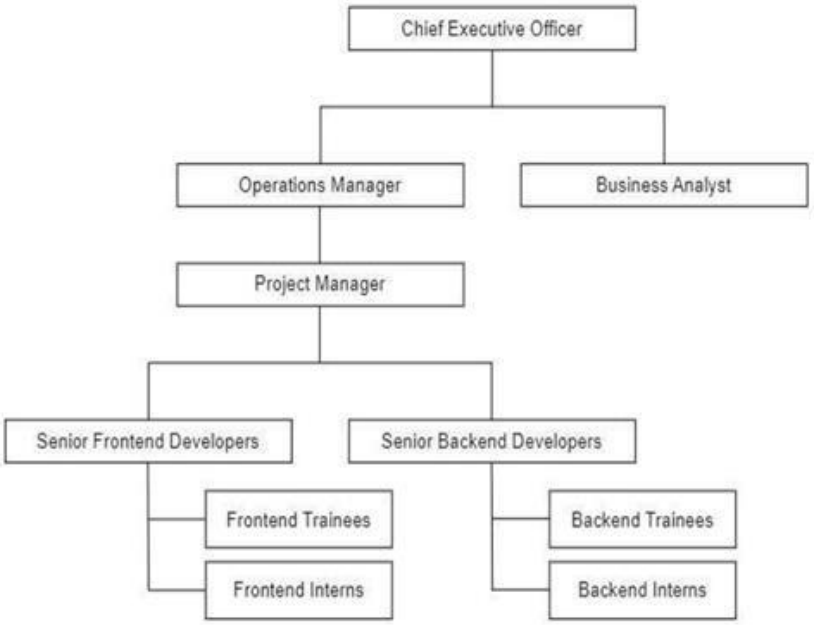


Figure 2. 2 Organization hierarchy

2.3. Working Domains of Organization:

Amnil Technologies operates in several key domains, focusing on business process digitization, enterprise applications, mobile app development, and robotic process automation. Their expertise extends to data analysis and omnichannel chatbot development, enabling them to provide innovative solutions to industries such as pharmaceuticals, banking, and media. They help businesses enhance their operational efficiency and customer engagement through cutting-edge technologies.

2.4. Description of Intern Department/Unit:

Amnil Technologies offers internship opportunities across various departments, such as Business Process Digitization, Data Analysis, Enterprise Applications, Mobile App Development, and Robotic Process Automation. Interested candidates can apply by sending their CVs to careers@amniltech.com.

The company typically looks for interns with experience in languages like .NET, PHP, Java, ReactJS, JavaScript, Python, and other programming languages. Interns have the chance to gain hands-on experience by working closely with industry professionals, contributing to real-world projects, and enhancing their technical skills in a supportive learning environment.

Table 2. 2: Internship Details

Intern's Name	Bijay Khadka
Project Name	Algorithm Visualization
Department Name	Development Team
Start Date	20th December,2024
End Date	20th March,2025
Working days	Monday-Friday
Office Hours	9 am -6:00 pm
Mentor's Name	Bikram Duwal

CHAPTER 3: BACKGROUND STUDY AND LITERATURE REVIEW

3.1 Background Study:

The background study reflects a review of the internship activities and the technologies implemented during the projects. Modern software development requires the integration of robust, secure, and scalable technologies. Among these, the .NET framework developed by Microsoft remains a powerful platform for building a wide range of applications, from web to desktop.ASP.NET, part of the .NET ecosystem, supports the development of dynamic web applications with a structured approach using the Model-View-Controller (MVC) architecture. It simplifies common development tasks such as routing, data binding, session management, and authentication. ADO.NET and Entity Framework were used to manage data operations efficiently, providing direct and object-relational access to the database, respectively. Blazor, a modern web UI framework in the .NET family, was another essential tool during the internship. It allows developers to build interactive, client-side web applications using C# instead of JavaScript. Blazor offers two hosting models—Blazor Server and Blazor WebAssembly and supports component-based development, real-time UI updates, and seamless API integration. Through the creation of an algorithm visualization project in Blazor, understanding of front-end interactivity and rendering performance was significantly deepened. WinForms was utilized for building desktop-based applications, specifically a Non-Linear Equation Solver using numerical methods. It provided a hands-on understanding of GUI design, event-driven programming, and desktop software logic, reinforcing the versatility of the .NET framework.Tools such as Git and GitHub were employed for version control and collaborative development. SQL Server and MySQL were used as the backend databases, enabling effective data handling and storage for both desktop and web-based applications.

Overall, this background study provided the technical foundation needed to contribute meaningfully to real-world software projects and enhanced both theoretical and practical understanding of application development using .NET technologies. (Moravcik, 2012)

3.2 Literature Review

The algorithm visualizer project is a tool designed to help users understand and visualize the workings of various algorithms in a visual and interactive manner. (Kulkarni, 2023) It allows users to input different algorithms and see how they perform step by step, helping

to improve their
understanding of complex algorithms and their efficiency. This project aims to make learning and teaching algorithms more engaging and accessible for users of all levels. (Debabi, 2016)The visualizer enhances algorithmic understanding, promotes critical thinking, and contributes to the overall advancement of computer science education. The problem definition of an algorithm visualizer project involves clearly specifying the goals and objectives of the

The problem is to develop a web-based algorithm visualizer application that enables users to interactively understand, learn, and analyze various algorithms and data structures. The visualizer should provide a user-friendly interface for visualizing the step-by-step execution of algorithms and the changes they make to data structures, allowing users to gain a deeper understanding of algorithmic concepts. (Shaher, 2023) Visualization is proposed as one of the effective ways to support student learning. For example, during the second semester of the Computer Science degree, understanding sorting algorithms was challenging due to the complex recursion involved. Watching it explained on the board or reading about it was not effective. As visual learners, the idea of seeing data move to its position during execution helped grasp the concept more clearly. This inspired the project idea, as it caters to learners who benefit more from visual input rather than traditional verbal explanations. (Raiyan, 2016)

For years, many educators have relied on lecturing, storytelling, and blackboard teaching to deliver information. Standardized exams in written formats emphasize verbal learning. However, in a world filled with laptops, smartphones, tablets, and VR machines, it has become essential to teach students how to read and produce visual content effectively. Without adapting to this change, there is a risk of falling behind. Many professors lack the resources to equip 21st-century students with the visual skills they need. The integration of visualization in teaching presents both opportunities and challenges. It is important to clarify these aspects to enable effective implementation. As a result, more teaching staff are showing interest in incorporating visual representation into their teaching strategies, aiming to create engaging and stimulating learning experiences for students across face-to-face, blended, and online environments.

Every software engineer should have a good understanding of Data Structures and Algorithms (DSA) to develop efficient software. Algorithm visualizers have historically played a vital role in enhancing user understanding by providing effective and interactive ways to learn complex concepts. Over the years, many algorithm visualizers have been

developed for educational purposes. For instance, in 2008, the paper titled *"AlCoLab: Architecture of Algorithm Visualization System"* focused on script-supported algorithm visualization systems aimed at improving the teaching process of conceptual subjects like algorithms. Similarly, in 2019, the paper *"Towards Developing an Effective Algorithm Visualization Tool for Online Learning"* presented a work-in-progress research project at Athabasca University, aiming to create an effective visualization tool for online learning environments. That same year, the paper *"Open Interactive Algorithm Visualization"* introduced an ongoing project for developing an open, interactive visualization website. Moving forward to 2021, *"AlgoAssist: Algorithm Visualizer and Coding Platform for Remote Classroom Learning"* emphasized the integration of various educational elements—such as pre-assessment, algorithm explanation, visualization, coding, and post-assessment—into a single application. Also in 2021, the paper *"Algorithm Visualizer"* aimed to simplify and deepen the understanding of algorithm operations by exploring the potential of enhancing traditional teaching methods with visual aids. These studies collectively demonstrate the growing interest and continued progress in using visualization tools to improve algorithm education. (Romanowska, 2018)

CHAPTER 4: INTERNSHIP ACTIVITIES

4.1 Roles and Responsibilities

As a .NET Intern, I contributed to the development and enhancement of enterprise applications by:

- Developing a non-linear equation solver using the Bisection and Newton-Raphson methods.
- Integrating MySQL databases with ADO.NET and Entity Framework (EF).
- Creating algorithm visualizations for Bubble Sort, Merge Sort, DFS, and BFS.
- Designing WinForms and Blazor user interfaces for desktop and web platforms.
- Implementing error handling and input validation to improve application stability.
- Debugging and optimizing features for better performance and reliability.

Through these responsibilities, I gained practical experience in .NET development, database management, and software optimization, strengthening my technical skills in real-world applications.

4.2. Weekly Log

Table 4. 1 Weekly Log

Week	Activities
Week 1 (23th Jan-29th Jan)	The first week of the internship focused on understanding the Visual Studio environment and the basic structure of a .NET project. I learned how solutions, projects, files, and references are organized and managed within Visual Studio. To build a strong programming foundation, Object-Oriented Programming (OOP) concepts such as classes, objects, inheritance, polymorphism, and encapsulation using C# Console Applications were prcatice. This helped me understand how real-world logic is implemented in .NET applications.
Week 2 (30th Jan – 6th Feb)	This week focused on learning LINQ in C# for efficient data querying and manipulation. Methods like Select, Where, and OrderBy were practiced on collections, which helped in writing

	cleaner, more readable code and strengthened the understanding of data handling in .NET.
Week 3 (7th Feb – 13th Feb	This week was dedicated to learning Entity Framework (EF) for database operations in .NET. EF's ability to simplify data access using models and LINQ queries, instead of raw SQL, was explored. Creating Code First models, performing CRUD operations, and managing database migrations were practiced. This helped in understanding how to connect applications with databases in a more efficient and structured way.
Week 4 (14th – 20th)	This week focused on learning ADO.NET for performing low-level database operations in .NET using MySQL. The usage of MySqlConnection, MySqlCommand, MySqlDataReader, and DataTable was practiced to connect with MySQL databases, run queries, and retrieve data manually. This approach helped in understanding how data flows between an application and a database at a deeper level, providing better control over database interactions.
Week 5 (21th Feb – 27th Feb)	This week, work began with Windows Forms (WinForms) to build desktop applications. A Non-Linear Equation Solver was developed using the Bisection Method and Newton-Raphson Method. The user interface for input/output was designed, events were handled, and the logic for solving equations was integrated. This project provided an opportunity to apply both mathematical logic and UI design in a real-world desktop application.
Week 6 (28th Feb – 4th Mar)	This week, Git and GitHub were explored for version control and collaboration. Repositories were initialized, changes were committed, branching was practiced, and code was pushed to GitHub. Collaboration through pull requests and resolving merge conflicts was also explored. This enhanced the ability to manage code changes and work efficiently in a team environment.
Week 7 (5th Mar – 11th Mar)	In Week 7, I explored the ASP.NET MVC folder structure and its components. I learned how folders like Models, Views, and Controllers work together to handle data, user interface, and logic.

	Understanding this structure helped me grasp the flow of web applications and how to organize code in a clean and maintainable way.
Week 8 (12th Mar – 18th Mar)	This week, CRUD (Create, Read, Update, Delete) operations were implemented in an ASP.NET MVC application using ADO.NET. The application was connected to a MySQL Server database, allowing seamless data management and interaction.
Week 9 (19th Mar-25th Mar)	This week, an algorithm visualization project was created using Blazor to better understand UI updates and interactivity. Visualizations for sorting algorithms like Bubble Sort and Merge Sort, as well as traversal algorithms like BFS and DFS, were implemented. This project helped grasp the logic behind the algorithms and how Blazor dynamically renders changes in real-time.
Week 10(26th Mar-2nd Apr)	Bug Fixing of above modules with the help of seniors

4.3 Description of the Project Involved During Internship

The implementation strategy for the non-linear equation solver project included development, testing, and deployment phases based on project planning activities and deliverables. The system development process involved creating the system design and establishing a plan for how each system component would be implemented. As an intern, I worked on building the application using C# .NET WinForms, ADO.NET, Entity Framework (EF), and SQLite for database management. Testing was performed to ensure the product was functional, efficient, and ready for deployment.

Frontend (Development tools and programming language):

The frontend of the non-linear equation solver application was designed using:

- C# WinForms: Used for creating the graphical user interface (GUI), developing forms, buttons, and displaying results.
- Blazor: Used for building interactive web-based UIs, integrating C# for both client and server-side logic.
- ASP.NET: Used for building the web backend, providing API endpoints for interaction

with the frontend and data management.

Backend:

The backend of the application was designed using:

- C# .NET: For handling core business logic and computational functions, such as solving equations using the Bisection Method and Newton-Raphson Method.
- ASP.NET: Used for building the web server and APIs, connecting frontend elements to backend services and databases.
- ADO.NET and Entity Framework (EF): For database access and management, enabling seamless interaction with the MySQL databases for data storage.
- MySQL: Used for handling larger datasets and multi-user access in a server-based environment, providing robust data storage and scalability options.

Key Technologies:

- C# .NET: For handling core business logic and computational functions, such as solving equations using the Bisection Method and Newton-Raphson Method.
- ASP.NET: Used for building the web server and APIs, connecting frontend elements to backend services and databases.
- ADO.NET and Entity Framework (EF): For database access and management, enabling seamless interaction with the SQLite and MySQL databases for data storage.
- MySQL: Used for handling larger datasets and multi-user access in a server-based environment, providing robust data storage and scalability options.

Development Tools:

- Visual Studio: Used for coding, debugging, and compiling the application.
- Git: For version control and collaboration with the development team.

4.4 Tasks/Activities Performed

As part of the .NET Internship, I worked on several tasks and activities related to the development and enhancement of the non-linear equation solver project. These tasks included:

- Developed a Non-Linear Equation Solver using Bisection and Newton-Raphson methods.
- Integrated MYSQL using ADO.NET and Entity Framework for storing inputs and solutions.
- Designed clean, responsive UI using WinForms and Blazor for desktop and web

access.

- Performed thorough testing and debugging to ensure accurate results and stable functionality.
- Collaborated with the team to align development tasks with project requirements.
- Created algorithm visualizations for Merge Sort, Bubble Sort, DFS, and BFS using Blazor and WinForms for educational and interactive purposes.

This combination of front-end and back-end development, along with database integration, contributed to the completion of the non-linear equation solver project successfully.

CHAPTER 5: CONCLUSION AND LEARNING OUTCOMES

5.1 Conclusions:

The development of a backend application using .NET technologies, including C#, WinForms, ADO.NET, Entity Framework, and MySQL, provided invaluable insights into creating dynamic and scalable enterprise solutions. This internship experience highlighted the importance of .NET technologies in building efficient, maintainable, and secure web applications and desktop solutions.

The project involved designing a Non-Linear Equation Solver using WinForms, where mathematical computations were integrated with a user-friendly graphical interface. Additionally, backend logic implementation using ADO.NET, database management with Entity Framework, and CRUD operations using MySQL strengthened the understanding of database interactions and optimization techniques.

The hands-on experience with WinForms for developing desktop applications, coupled with the use of Blazor for frontend development, allowed for a deeper understanding of full-stack application development. The practical exposure to database operations and error handling improved problem-solving abilities, and the ability to create both desktop and web applications in a .NET environment.

This internship experience significantly enhanced understanding of both desktop and web application development, improved skills in backend technologies, and contributed to professional growth in .NET development. The knowledge gained from using these technologies has provided a solid foundation for future work in both backend and full-stack development.

5.2 Learning Outcomes:

The internship provided valuable hands-on experience in backend development, focusing on .NET technologies and WinForms. A key project, the development of a Non-Linear Equation Solver, allowed for practical application of mathematical logic integrated with a user-friendly desktop interface. This experience deepened understanding of software development processes, from UI design using WinForms to backend functionality using C# and ADO.NET for database operations.

Proficiency in database management was achieved through the use of ADO.NET and Entity Framework, which simplified data access and manipulation within a MySQL environment.

Practical experience was gained in implementing CRUD operations, which further enhanced the understanding of how data interacts with applications and the importance of efficient data management.

In addition to the technical skills gained, the internship improved problem-solving capabilities through troubleshooting, debugging, and performance optimization. Collaboration with the development team emphasized effective communication and project management, fostering a productive work environment.

The internship also introduced the integration of Blazor for web application development, where a key project involved creating an algorithm visualization tool. This allowed for a better understanding of how Blazor handles UI updates and interactivity, specifically through the visualization of sorting and traversal algorithms like Bubble Sort, Merge Sort, BFS, and DFS. The project provided valuable insights into dynamic rendering and real-time UI updates in Blazor, which enhanced the ability to work on modern, client-side web applications.

This comprehensive experience in both desktop and web development, alongside hands-on exposure to full-stack concepts, provided a strong foundation for future work in .NET development. Overall, the internship contributed significantly to technical and professional growth, equipping with the necessary skills for creating scalable, efficient, and user-friendly applications. It was a transformative experience in backend and full-stack development that enhanced both coding and collaborative abilities, paving the way for future career advancements.

REFERENCES

Debabi, W. (2016). Using serious game to enhance algorithmic learning and teaching. *ResearchGate*.

Kulkarni, A. (2023). Algorithm Visualizer. *ResearchGate*.

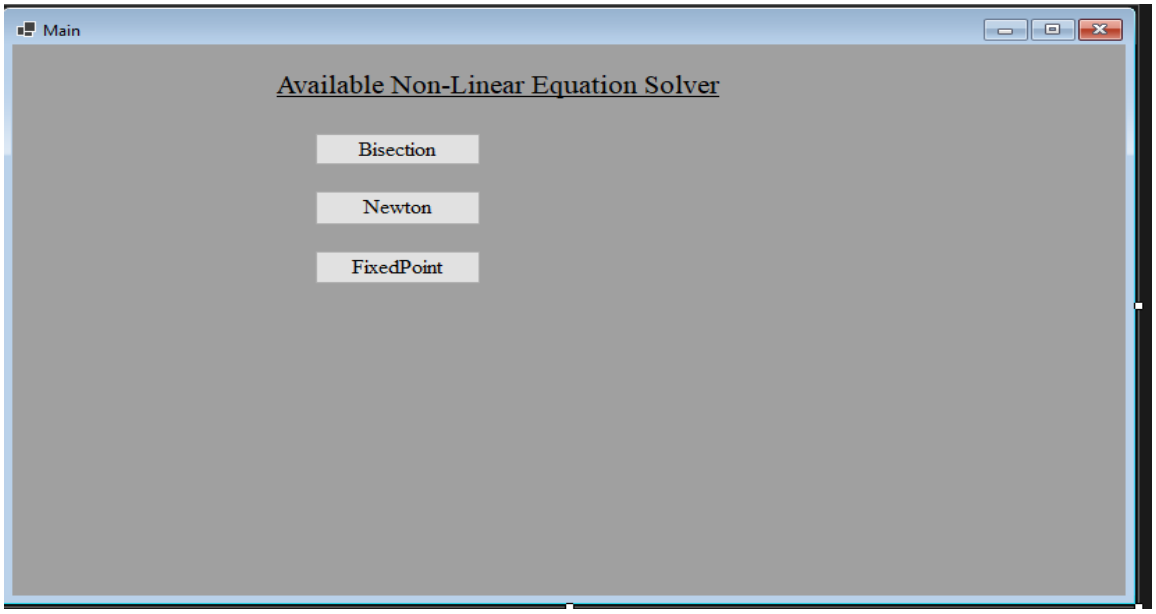
Moravcik, O. (2012). Elements of the Modern Application Software Development. *ReasearchGate*.

Raiyan, J. (2016). The Role of Visual Learning in Improving Students' High-Order Thinking Skills. *ResearchGate*.

Romanowska, K. (2018). Towards Developing an Effective Algorithm Visualization Tool for Online Learning. *ResearchGate*.

Shaher, P. (2023). Algorithm Visulaizer Helpere. *ResearchGate*.

APPENDICES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Available Non-Linear Equation Solver
Bisection
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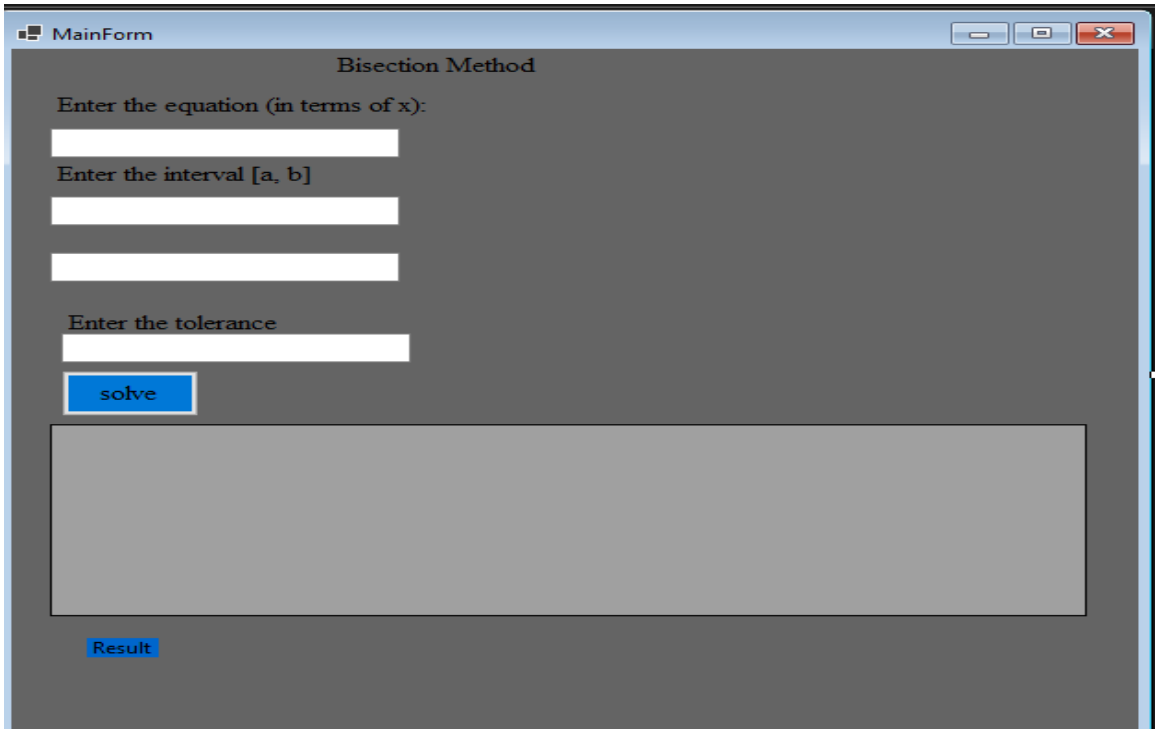
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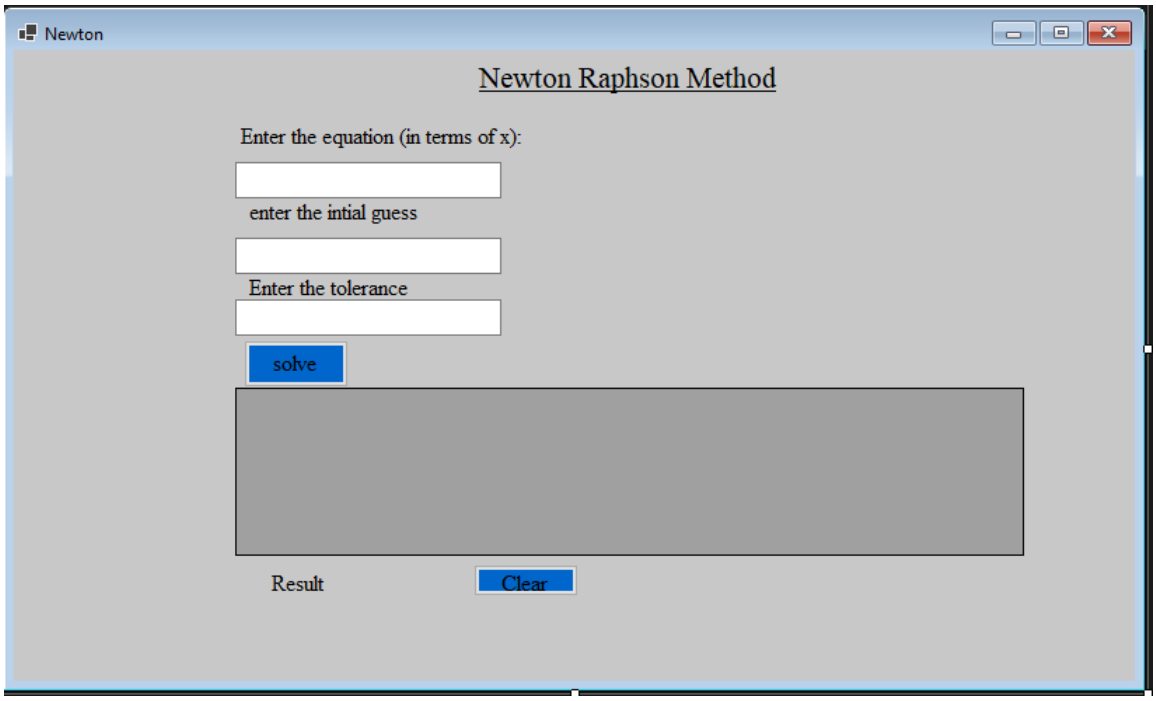
Bisection Method
Enter the equation (in terms of x):
Enter the interval [a, b]
Enter the tolerance
solve
Result


Newton
Newton Raphson Method
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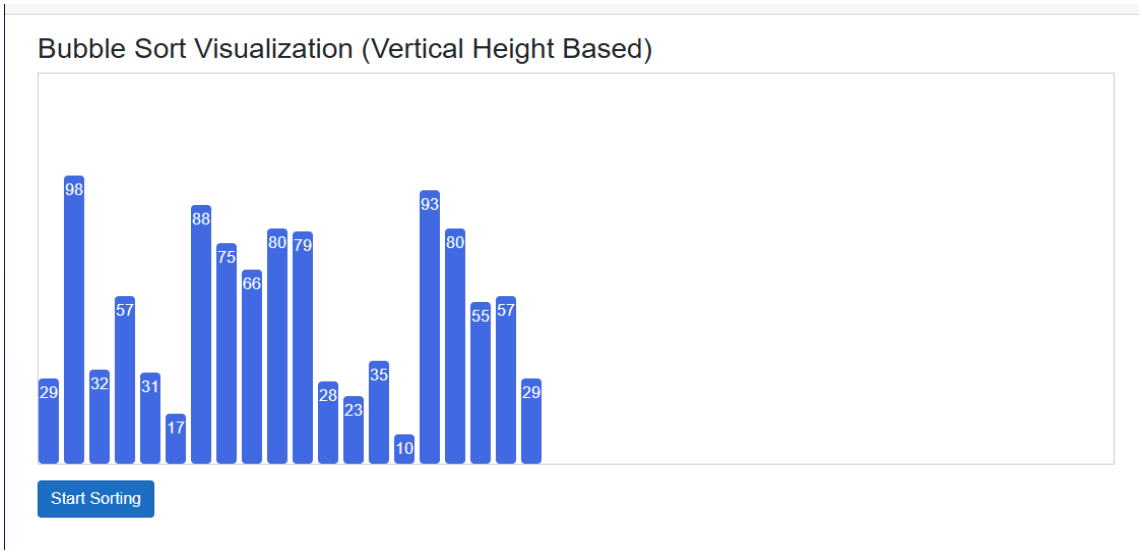
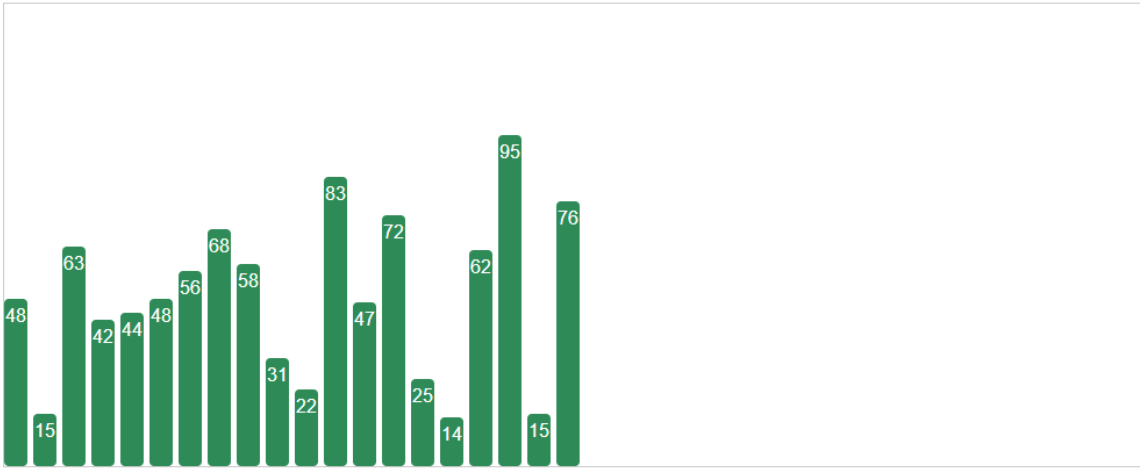
enter the intial guess
Enter the tolerance
solve
Result
Clear


Bubble Sort Visualization (Vertical Height Based)
29
98
32
57
31
17
88
75
66
80
79
28
23
35
10
93
80
55
57
29
Start Sorting

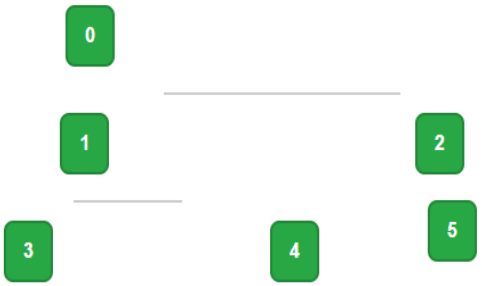
Merge Sort Visualization (Vertical)



Start Merge Sort Reset Array

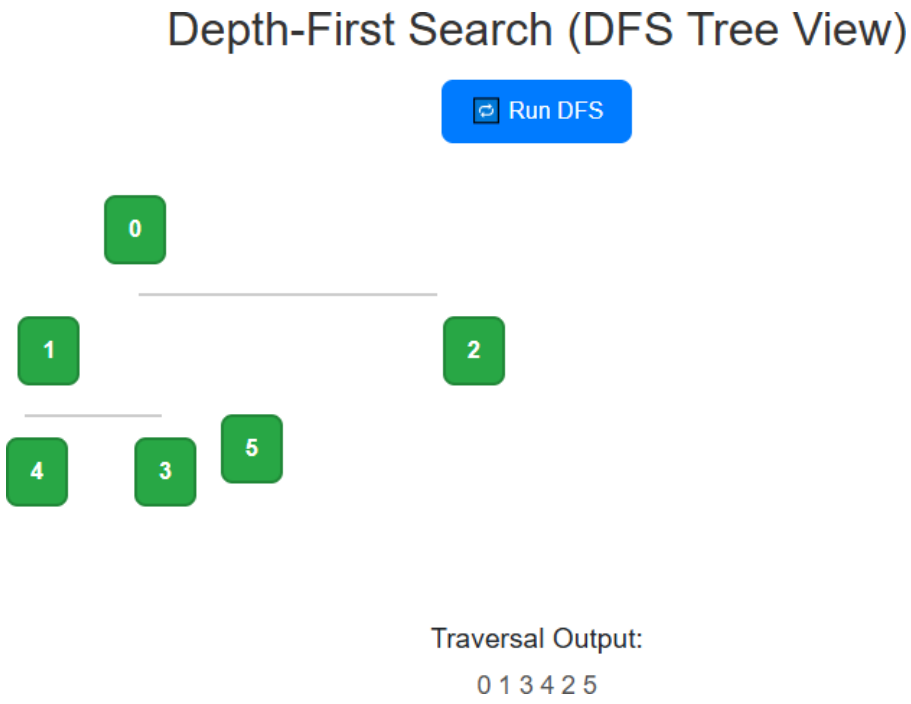
Breadth-First Search (BFS Tree View)

Run BFS



Traversal Output:

0 1 2 3 4 5


Depth-First Search (DFS Tree View)
Run DFS
0
1
2
4
3
5
Traversal Output:
0 1 3 4 2 5