

# **Salesforce Solutions for Enterprise Client Management: A Practical Implementation**

by

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An internship report submitted to the Department of Computer Science and  
Engineering  
in partial fulfillment of the requirements for the degree of  
**B.Sc. in Computer Science**

**Department of Computer Science and Engineering  
Brac University  
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# Declaration

It is hereby declared that

1. This internship report is my own original work completed during the internship program at TwinForce Solutions Limited.
2. The report does not contain material previously published or written by a third party, except where this is appropriately cited through full and accurate referencing.
3. The report does not contain material which has been accepted, or submitted, for any other degree or diploma at a university or other institution.
4. I have acknowledged all main sources of help and guidance received during the internship.

**Student's Full Name & Signature:**

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# Approval

The thesis/project titled "Salesforce Solutions for Enterprise Client Management: A Practical Implementation" submitted by

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of Fall, 2024 has been accepted as satisfactory in partial fulfillment of the requirement for the degree of B.Sc. in Computer Science on Fall 2024.

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# Ethics Statement

This internship report and the work described herein have been conducted in accordance with ethical principles and guidelines. The following ethical considerations have been addressed:

1. **Data Privacy and Confidentiality:** All work conducted during the internship and subsequent employment respected client and company data privacy requirements. No sensitive or confidential information has been disclosed in this report.
2. **Intellectual Property:** All code, designs, and solutions developed during the internship and subsequent employment were created as part of the employment agreement with TwinForce Solutions Limited. The company retains appropriate intellectual property rights as per the employment agreement.
3. **Professional Conduct:** All work was conducted following professional software development standards and best practices. No unethical practices or shortcuts were employed in the development process.
4. **Academic Integrity:** This report represents original work completed during the period from May to December 2024. All sources of information, code references, and external resources have been properly cited and acknowledged.
5. **Client Confidentiality:** Any client-specific information or business processes mentioned in this report have been generalized to protect client confidentiality while maintaining the educational value of the work.

The work was conducted from May to December 2024, initially as an intern (May-July 2024) and subsequently as a full-time employee (August-December 2024), under the supervision of both academic and industry mentors, ensuring adherence to both academic and professional ethical standards.

# Abstract

This report documents my eight-month experience at TwinForce Solutions Limited, a Salesforce consulting firm, where I worked as a Software Development Intern from May to July 2024 and then transitioned to a full-time Software Developer role from August to December 2024. During this period, I contributed to two major projects: Travel Raro, a travel booking platform, and LIFE (Life for Relief and Development), a global non-governmental organization modernizing their operational systems.

For Travel Raro, I redesigned the booking system to accommodate up to four travelers instead of two, implemented a bounced booking tracking feature to capture abandoned bookings, and developed OTP verification for guest users. For LIFE, I migrated over 400,000 legacy records to Salesforce, integrated Stripe payment processing for both credit cards and ACH transfers, built custom donation dashboards with server-side pagination, and automated donor communication workflows.

The technical implementation involved extensive work with Lightning Web Components, Apex programming, Salesforce Flows, and third-party API integrations. Key challenges included optimizing code to comply with Salesforce governor limits, maintaining data integrity during large-scale migrations, and balancing stakeholder expectations with technical constraints.

This report examines my contributions across the full software development lifecycle—from requirement gathering and system design to implementation, testing, and deployment. It demonstrates how my Computer Science coursework in data structures, algorithms, database systems, and software engineering directly supported my work on enterprise-level applications.

## **Keywords**

Salesforce Development; Lightning Web Components; Apex Programming; CRM Implementation; Software Engineering Internship; Data Migration

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# Chapter 1

## Introduction

### 1.1 About the Internship

An internship bridges the gap between academic learning and professional practice, allowing students to apply theoretical knowledge to real-world problems. For me, this experience was crucial in launching my career as a Software Engineer, providing both technical skills and professional work habits that classroom education alone could not deliver.

As a Software Developer Intern, I successfully completed my internship at TwinForce Solutions Limited, which began in May 2024 and concluded in July 2024. Due to my outstanding performance throughout the internship, I was offered a permanent position with the company, which I gladly accepted. In August 2024, I transitioned into my role as a permanent employee at TwinForce.

The internship began with an intensive month-long training program where I developed a car rental management system. This dummy project covered Salesforce fundamentals—custom objects, Lightning Web Components, Apex triggers, and approval processes—giving me practical experience before joining live client projects. Following training, I was assigned to Travel Raro [8], a travel booking platform, and later to Life for Relief and Development (LIFE) [4], a global humanitarian organization. These projects exposed me to the full software development lifecycle and the challenges of enterprise-level implementations.

### 1.2 Objective and Motivation

This report documents my eight-month journey at TwinForce Solutions Limited, detailing my contributions to the Travel Raro and LIFE projects. It examines how my Computer Science coursework prepared me for professional software development and explores the challenges I encountered while working on production systems. The report also covers the technologies I used, the skills I developed, and the lessons learned from transitioning from intern to full-time Software Engineer.

This was a highly relevant internship as the demand for Salesforce professionals is increasing in the industry. The rapid digital transformation in the business world has led organizations to embrace CRM solutions to engage customers better and streamline operations, with Salesforce staying at the forefront with its scalable and

versatile ecosystem. The integration of artificial intelligence through Salesforce Einstein and Agent Creation, along with the extension of low-code/no-code tools, are just some of the innovative features that show the platform's innovation and future potential.

This internship was motivated by the opportunity to gain hands-on experience in a high-demand field, bridging the gap between academic knowledge and industry requirements. The chance to work on real-world projects, such as Travel Raro and Life for Relief and Development, provided invaluable exposure to the challenges and rewards of enterprise software development, positioning me to align with industry trends and equipping me with in-demand skills.

## **1.3 Problem Statement**

During my internship, the primary challenge was to modernize and automate business processes for clients using Salesforce. This included developing scalable booking systems, integrating secure payment gateways, and migrating large volumes of legacy data. The projects required balancing technical feasibility, user experience, and business objectives, all while adapting to rapidly changing requirements and tight deadlines.

## **1.4 Team Overview**

Although much of the technical work was performed individually, collaboration was essential for project success. I worked closely with my supervisor, Mr. Niloy Kanti Paul, and other team members for guidance, code reviews, and feedback. Regular meetings and brainstorming sessions fostered a collaborative environment, ensuring that project objectives were met efficiently.

## **1.5 Methodology**

The information presented in this report is based on my hands-on experiences working on various tasks related to the Travel Raro project during my internship, as well as my involvement in the Life For Relief And Development (LIFE) project following the completion of the internship. The report covers the entire internship process, including the initial training phase and my work on live projects. In addition to my personal experience, I supplemented my learning by utilizing external resources such as Salesforce documentation [6], and online platforms like Trailhead [7], Salesforce's official training tool. These resources provided me with in-depth knowledge of the tools, methodologies, and best practices used within the Salesforce ecosystem, further enhancing my technical abilities.

### **1.5.1 Primary Data**

The primary data for this report includes the following:

- Daily involvement in project work for Travel Raro, Life For Relief and Development, and other internal initiatives, as well as participation in training

sessions and team meetings.

- Feedback received from supervisors, colleagues, and stakeholders through discussions and performance evaluations.

### **1.5.2 Secondary Data**

- Salesforce documentation, including modules and resources from Trailhead, Salesforce's official learning platform, as well as information shared in Salesforce forums.
- Internal materials and resources from TwinForce, such as documentation created by senior developers, which were crucial for understanding internal workflows and processes.

### **1.5.3 Scope of the Report**

This report summarizes my experience as a Salesforce Developer at TwinForce from May 2024 to December 2024. It outlines my work on projects such as Travel Raro and Life for Relief and Development, focusing on SDLC phases, which include requirement analysis, design, development, testing, and deployment.

This report discusses tools and technologies such as Salesforce, Apex, LWC, Salesforce Flow, and Experience Builder used in the work. It provides challenges I faced and how I overcame those. It will also provide insight into how my studies in Computer Science helped me get introduced to the industry and to develop both technical and soft skills important for my future career.

# Chapter 2

## Company Overview and Background

### 2.1 Overview

Situated in Mirpur, Dhaka, Bangladesh, TwinForce Solutions Limited is a software company that specializes in Salesforce implementation and solutions along with consultancy. TwinForce started its journey from a single room apartment in 2022 by certified Salesforce Architect and Developer Saiful Islam, and it gradually became a reliable source for businesses to use Salesforce to streamline operations. Now it has its own office and plans to hire more developers to meet the growing demands.

The company has provided its services to multiple organizations across multiple fields like non-profit, education, robotics etc, to enhance their customer relationships and to improve their data management systems. TwinForce is also affiliated with BASIS (Bangladesh Association of Software and Information Services) [3], holding BASIS ID GE-24-06-100.

TwinForce has successfully worked with many Salesforce clients such as Flash Funding, JOCI, AgVantage, OCECD, Momentum, TSOGIANTS, BearRobotics, MTL Life among other notable clients. Beyond Salesforce, TwinForce has expertise in Node.js products, such as the website <https://www.bdword.com/>, demonstrating its versatility in technology solutions.

### 2.2 Organizational Structure

TwinForce has set up dedicated teams to achieve teamwork and maximize productivity. The company is managed and supported by Salesforce Certified Developers and run by dedicated departments. They are:

- **Sales and Marketing:** This department is responsible for client acquisition and all other office related work. After successfully getting a client, they then reach out to the interested clients and set up meetings with the development team specifically the PM. This department also manages client communica-

tion through the Salesforce AppExchange, which is the official platform for Salesforce apps and services.

- **Development Team:** This department consists of individuals who design, create, and maintain software solutions, such as Salesforce developers, Software engineers, Front-end Designers and SQA's. The team is further divided into small teams, each of which oversees a separate project independently. Each team is headed by a PM. I was part of the Team Raro under Mr. Niloy Kanti Paul and Team Life also under Mr. Niloy Kanti Paul and Ms. Dipanwita Saha.

The company has 25 employees, all of them divided into the above-mentioned departments. This organizational structure promotes effective communication and collaboration among teams, enabling TwinForce to respond quickly to the client's requirements and successfully deliver the end product. This also reduced clashes as in Salesforce, multiple people have to work on the same files at the same time.

## 2.3 Technologies and Tools

At TwinForce, we use a broad range of technologies and tools to implement effective and quality IT solutions. The main technologies and integrations include:

- **Salesforce:** This is the core tool for CRM and developing custom applications to let the company manage its customer relationship strategically. Outside of CRM applications, it may also be utilized due to its diverse array of built-in objects, such as Case, which law enforcement could use to manage cases. We use it to deliver custom and fast solutions.
- **Lightning Web Components (LWC) Development:** LWC's can be used for the construction of modern and sleek looking UI on Salesforce, enhancing user experience and interaction. Each LWC is accompanied by its separate HTML, CSS, JavaScript, and metadata files. Moreover, each LWC can be considered as a separate component and can be fine-tuned with modern framework like tailwind and bootstrap compared to older frame like aura or visual force. We use this to make visually appealing designs which we later use in the portal.
- **Apex Development:** This is the proprietary Salesforce programming language that is used to develop custom business logic and automate processes within the Salesforce platform. It is mainly used in the backend. It is very similar to Java in terms of syntax but has the additional benefits of SOQL and SOSL which makes DML easier to write and handle. This was much easier for me due to the training I received in BRAC.
- **Salesforce Flows Development:** Flows helps a user with basic coding skills to automate or accomplish complex business processes. Therefore, supporting the no-code/low-code paradigm. While they are powerful options in many scenarios, they cannot replace Apex. Very complex processes, especially those containing a diverse number of error cases, are better handled through Apex,

giving more control and finer error handling. Even though this comes at a cost of handling errors, we use flows frequently as it helps us deliver faster products.

- **Node.js Development:** We use this for our in-house projects like Bdword. We are also planning to use this in the future to migrate certain non-profits to Nodejs as salesforce license is expensive for certain non-profits or small businesses.
- **Amazon S3 Integration:** We have used S3 [2] on many projects for secure and scalable cloud storage, as it allows one to manage data with much more ease. It is, though, normally used in conjunction with Salesforce, since Salesforce only allows up to 5 MB for static resources. We save the files in S3 and just save the references in an object to reference it later.
- **MuleSoft Development:** Integrating various external systems and applications to share data with third party apps with Salesforce [5]. We have used this in AgVantage to save the files in ftp server.
- **Salesforce Experience Cloud:** Built-in site builder of salesforce to build secure scalable websites for business. For this more admin side skill is needed rather than developer skills.
- **Stripe Integration:** We used this in Travel Raro, Life and Flash Funding [1] to provide secure and dependable payment processing. We have used Stripe for both Credit Card payment and ACH payment.

## 2.4 Key Projects

At TwinForce, I contributed to projects across various industries, with my primary focus on two client implementations:

### 2.4.1 Travel Raro

A US-based travel agency specializing in group tours to the Philippines, Italy, and Greece. The company needed to scale their booking system beyond its two-traveler limitation and gain better insights into customer behavior.

### 2.4.2 LIFE (Life for Relief and Development)

A global humanitarian NGO operating for over 30 years with regional offices worldwide. They required migration from a legacy system to Salesforce to enable real-time data access across continents and automate donor management workflows.

Both projects demanded different technical approaches—Travel Raro focused on user experience optimization and behavioral tracking, while LIFE prioritized data integrity, global accessibility, and compliance with long-term retention requirements.

## 2.5 Building A Strong Theoretical Foundation

The structured curriculum of my Computer Science degree laid a robust theoretical groundwork that directly supported my transition into the software industry. Courses like CSE220 (Data Structures), CSE221 (Algorithms), CSE370 (Database Systems), and CSE470 (Software Engineering) equipped me with a strong command over key computer science principles, which I was able to apply effectively during my internship and full-time role at TwinForce Solutions Limited.

Courses such as CSE220 and CSE221 gave me a solid grasp of basic coding, data structures, and algorithmic thinking. These were especially useful when writing efficient and scalable Apex code and Lightning Web Components (LWC) in Salesforce. Salesforce imposes strict governor limits—such as a 50,000 record query limit per transaction—making it crucial to avoid SOQL queries inside loops. To handle this, I applied knowledge of lists, sets, and maps to bulkify code effectively. This ensured high performance and avoided hitting system limits. My exposure to asynchronous JavaScript also helped me write non-blocking LWC logic that was critical to user experience.

My understanding of CSE370 (Database Systems) enhanced my ability to model data efficiently in Salesforce using custom objects and relationships. This background made it easier to write optimized SOQL queries for data retrieval and manipulation, which is at the core of most Salesforce operations.

In CSE470 (Software Engineering), I learned the software development lifecycle in-depth, including stages such as requirement analysis, system design, testing, and maintenance. These lessons came in handy when contributing to real-world projects, allowing me to break down complex requirements into modular components and build reusable, testable code. I also became more disciplined in writing documentation and test classes, which are essential in enterprise software environments.

```

public with sharing class ProjectTriggerHandler {

    public static void CreateInvoice(List<Project__c> newProjects, Map<Id, Project__c> oldProjectsMap) {

        List<Invoice__c> invoicesToInsert = new List<Invoice__c>();

        Set<Id> contractIds = new Set<Id>();
        Set<Id> accountIds = new Set<Id>();
        Map<Id, Contract> contractMap = new Map<Id, Contract>();
        Map<Id, Account> accountMap = new Map<Id, Account>();
        Map<Id, Quote> quoteMap = new Map<Id, Quote>();

        for (Project__c newProject : newProjects) {
            if (newProject.Contract__c != null) {
                contractIds.add(newProject.Contract__c);
            }
            if (newProject.Account__c != null) {
                accountIds.add(newProject.Account__c);
            }
        }

        if (!accountIds.isEmpty()) {
            accountMap = new Map<Id, Account>([SELECT Id, Name FROM Account WHERE Id IN :accountIds]);
        }

        if (!contractIds.isEmpty()) {
            contractMap = new Map<Id, Contract>([SELECT Id, Quote__c FROM Contract WHERE Id IN :contractIds]);

            Set<Id> quoteIds = new Set<Id>();
            for (Contract contract : contractMap.values()) {
                if (contract.Quote__c != null) {
                    quoteIds.add(contract.Quote__c);
                }
            }

            if (!quoteIds.isEmpty()) {
                quoteMap = new Map<Id, Quote>([
                    SELECT Id, GrandTotal FROM Quote WHERE Id IN :quoteIds
                ]);
            }
        }

        for (Project__c newProject : newProjects) {
            Project__c oldProject = oldProjectsMap.get(newProject.Id);

            if (oldProject != null && newProject.Status__c == 'Completed' && oldProject.Status__c !=
'Completed') {
                Contract relatedContract = contractMap.get(newProject.Contract__c);
                Account relatedAccount = accountMap.get(newProject.Account__c);
                Quote relatedQuote = relatedContract != null ? quoteMap.get(relatedContract.Quote__c) :
null;

                Invoice__c newInvoice = new Invoice__c();
                newInvoice.Invoice_Status__c = 'Draft';
                newInvoice.Project__c = newProject.Id;
                newInvoice.Customer__c = relatedAccount != null ? relatedAccount.Id : null;
                newInvoice.Opportunity__c = newProject.Related_Opportunity__c;
                newInvoice.Invoice_Date__c = Date.today();

                if (relatedQuote != null) {
                    newInvoice.Total_Amount__c = relatedQuote.GrandTotal;
                }

                invoicesToInsert.add(newInvoice);
            }
        }

        if (!invoicesToInsert.isEmpty()) {
            try {
                insert invoicesToInsert;
            } catch (DmlException e) {
                System.debug('Error inserting invoices: ' + e.getMessage());
            }
        }
    }
}

```

Figure 2.1: Bulkified Code -1

In this Figure 2.1 we can see how code is bulkified. All the queries were done initially and outside loop, and the result was saved in respective lists. I used different kinds of list here depending on the needs. We have Set for saving distinct Id's, List for list of data and map for data where we need to map them or bind them to different kind of Id's or keys.

## **2.6 Exposure to Industry Tools and Practices**

The Computer Science program integrated industry-relevant tools and technologies, ensuring I was well-prepared for professional tasks.

### **2.6.1 Programming Skills**

Proficiency in Java gained through CSE110 (Programming Language I) and CSE111 (Programming Language II) eased my transition to Apex, Salesforce's primary programming language. Python exposure in CSE422 (Artificial Intelligence) broadened my technical versatility.

### **2.6.2 Version Control and Collaboration Tools**

Hands-on experience with Git and GitHub in CSE470 (Software Engineering) facilitated efficient repository management during team projects. Used Jira for project tracking and bug reporting, mirroring industry practices.

### **2.6.3 APIs and Integrations**

Gained theoretical knowledge of REST APIs in CSE470 (Software Engineering), which I later implemented in Salesforce integrations. This exposure allowed me to adapt quickly to Salesforce development tools like Lightning Web Components (LWC), Salesforce Flows, and Experience Builder.

## **2.7 Development of Teamwork and Communication Skills**

Team-based academic projects and communication-focused courses played a significant role in preparing me to collaborate effectively in a professional environment and communicate with diverse stakeholders.

### **2.7.1 Group Projects and Agile Methodologies**

- In CSE471 (System Analysis and Design), I participated in a final project that mimicked real-world software development. This required extensive teamwork, modular development, and version control management, preparing me for Agile methodologies used in my professional role. We also had to give a presentation on our work.

## 2.7.2 Presentation and Communication Skills

- ENG101 (Fundamentals of English) and ENG102 (English Composition I) taught me the foundations of formal communication and presentation skills. These courses emphasized the importance of clear and concise delivery of ideas, which helped me articulate technical concepts during team discussions and client meetings.
- CSE470 (Software Engineering) and CSE471 (System Analysis and Design) involved regular project presentations. These experiences prepared me to deliver effective technical demonstrations and progress updates, which proved invaluable when presenting Salesforce solutions to team members and clients over Zoom.

The focus on audience-specific communication in these courses helped me tailor my language and presentation style based on whether I was addressing technical colleagues or non-technical stakeholders.

## 2.7.3 Technical Writing and Documentation

Helped write detailed project reports, system requirement documents, and test plans as part of coursework in CSE470 (Software Engineering) and CSE471 (System Analysis and Design). This directly translated into professional skills like writing UAT scripts, bug reports, and functional documentation during my Salesforce projects. The combination of formal training in English courses and hands-on experience in group projects enabled me to confidently participate in team discussions, lead project demonstrations, and communicate effectively with clients on platforms like Zoom, Google Meet.

## 2.8 Review of Existing Research

The adoption of Salesforce and similar CRM platforms has been widely studied in both academic and industry literature. Research highlights the benefits of CRM systems in improving customer engagement, automating business processes, and enabling data-driven decision-making. Studies also emphasize the challenges of data migration, user adoption, and integration with legacy systems. The projects at TwinForce Solutions Limited reflect these trends, demonstrating the practical application of CRM best practices and the importance of continuous learning in a rapidly evolving field.

## 2.9 Summary of Key Findings

Through my internship, I observed that successful Salesforce implementations require a blend of technical expertise, effective project management, and strong communication skills. Key findings include the importance of:

- Customizing CRM solutions to meet specific business needs.
- Ensuring data integrity and security during migrations.

- Providing user training and support to maximize adoption.
- Leveraging automation and analytics to drive business value.

These insights will inform my future work in enterprise software development and contribute to ongoing improvements at TwinForce.

# Chapter 3

## Requirements, Impacts and Constraints

### 3.1 Requirement Analysis

The Requirement Analysis phase is crucial in setting a strong foundation for the project's success. It involves understanding the needs of the stakeholders and ensuring that these needs are translated into clear, actionable system requirements. During my internship, I was involved in gathering, analyzing requirements for two key projects: Travel Raro and Life for Relief & Development (LIFE). The process included the creation of the Statement of Work (SOW), Feasibility Analysis, and multiple rounds of discussions with stakeholders to ensure alignment on expectations.

#### 3.1.1 Requirement Gathering Process

The requirement gathering process was iterative and involved several rounds of collaboration with stakeholders to ensure that all needs were captured accurately. Key activities in this phase included:

##### Initial Meetings with Stakeholders

For both projects, initial meetings with key stakeholders were held to understand the high-level goals of the projects. These meetings helped understand the overall direction and major features and specifications that the system should support

- In the case of Travel Raro, this included defining user flows, understanding how the booking system should function, and identifying features like multi-person trip bookings, certain rules regarding promotions. The stakeholder was also clear about what his expectations were like how he wanted more people booking trips together to make a family holiday bundle, how he can give away certain promotion to selected persons only and how he should be notified if they were used.
- For LIFE, the discussions focused on understanding the donation system, existing challenges, and the need for automation and integration with payment gateways. As LIFE was already operating on another platform, we had a

reference structure to follow. The challenge was mapping their existing data model to Salesforce objects and convincing them that Salesforce was the better platform for their specific use case.

## **Collaborating with Stakeholders on Prototypes and Design**

After gathering initial requirements, we moved forward with designing prototypes and mock-ups to showcase our ideas. This was a collaborative effort with stakeholders, who provided feedback on the designs

- For Travel Raro, early prototypes of the booking system were presented, including videos for different booking types and user interfaces. The stakeholders were adamant about seeing a demo before we implement it on production. So we had multiple back and forth regarding design, labels statement and eventually came to a final version which was later implemented.
- For Life For Relief and Development, the stakeholders emphasized the need for a clean and user-friendly design, particularly for the payment page. Early prototypes of the payment interface were shared with the stakeholders, focusing on simplicity and accessibility. Multiple iterations were done based on their feedback to ensure an intuitive user experience. This involved simplifying the layout, minimizing distractions, and ensuring a seamless flow for both Stripe and ACH payment integrations. After finalizing the design, the agreed-upon version was implemented and tested thoroughly to meet the stakeholders' expectations.

## **Refining Requirements Through Feedback**

As the designs and prototypes were presented, feedback from stakeholders helped refine the requirements further. This led to several rounds of revisions and adjustments, ensuring the final system met all expectations.

- In the case of Travel Raro, stakeholder feedback led to the addition of features like an OTP system for anonymous users and a "bounced booking" feature.
- For LIFE, feedback was focused on integrating secure payment methods and the need for better reporting tools that led us to build reports for better statistics and analytics.

### **3.1.2 Feasibility Analysis**

The Feasibility Analysis was a critical step in both projects, helping ensure that the proposed system could be realistically built within the given constraints. This analysis evaluated the technical, financial, and operational feasibility of each project.

#### **For Travel Raro**

- **Technical Feasibility** : We evaluated whether Salesforce could meet Travel Raro's requirements without excessive external dependencies. Salesforce proved suitable because it offered native integrations with payment gateways like Stripe, built-in email automation, and robust reporting capabilities.

The platform's REST API allowed integration with external services when needed, while declarative tools like Flows reduced custom coding requirements. This meant faster development compared to building from scratch with traditional tech stacks.

For reporting requirements, Salesforce's standard reporting engine handled the needed analytics—booking patterns by state, agent performance metrics, and customer demographics. Travel Raro now uses these reports with Active Campaign for targeted marketing, which has proven effective.

Email automation through Salesforce workflows eliminated the need for third-party tools like Mailchimp. The system manages booking confirmations, reminders, and agent notifications through custom email templates, which also integrate with their existing PandaDoc setup.

The platform supported multiple user types—agents, anonymous users, and registered customers—with role-based permissions and different booking flows. The architecture could scale without major restructuring as the business grows.

- **Operational Feasibility:** Salesforce's user-friendly interface meant minimal training for Travel Raro's agents and administrators. Automated workflows handled repetitive tasks like booking confirmations and invoicing, reducing manual intervention.

The cloud-based system provided remote access, important for a distributed team. Centralized data management gave real-time visibility into bookings, customer information, and agent performance. The automation meant fewer staff were needed to maintain the system, making it cost-effective to operate.

## For LIFE

- **Technical Feasibility:** LIFE's primary requirement was data retention for 10+ years. Salesforce's cloud infrastructure met this need without requiring additional hardware or third-party storage solutions.

For a global NGO with regional offices across multiple continents, a cloud-based system was essential. Salesforce enabled regional offices to access, manage, and update their data in real-time, ensuring consistency across the organization.

The platform's native reporting and analytics capabilities allowed LIFE to track donor interactions, monitor project impacts, and generate insights from historical data. Payment processing through Stripe integration and email automation reduced reliance on external services like Mailchimp, lowering operational costs.

- **Operational Feasibility:** Salesforce required minimal on-premises infrastructure, reducing IT staff requirements. LIFE's existing IT team, developed over 30 years of operations, could easily be trained to handle platform maintenance and updates.

The user-friendly interface allowed regional office staff with limited technical expertise to enter and manage data independently. This was crucial since offline donations outnumbered online ones, requiring manual data entry by

customer representatives. Each regional office could operate autonomously while maintaining alignment with central organizational goals.

Role-based permissions and customizable workflows met the specific needs of each region without burdening central management. The mobile app enabled donors to contribute during emergencies, ensuring timely response. Automated payment tracking, email communications, and reporting reduced repetitive tasks, allowing staff to focus on strategic initiatives rather than administrative work.

## 3.2 Impacts

### 3.2.1 Impact on Travel Raro

The implementation of the Salesforce-based booking system had significant positive impacts on Travel Raro's operations:

- **Increased Booking Efficiency:** The redesigned booking system allowed customers to book trips more easily, resulting in improved user satisfaction and increased conversion rates.
- **Enhanced Customer Insights:** The bounced booking tracking system provided valuable data on customer behavior, enabling the business to target abandoned bookings with follow-up campaigns, leading to higher booking completions.
- **Improved Agent Productivity:** Automated email notifications to agents reduced manual communication efforts, allowing agents to focus on customer service rather than administrative tasks.
- **Scalable Growth:** The modular design and use of reusable Lightning Web Components made it easier to add new features and scale the system as the business grows.

### 3.2.2 Impact on LIFE

The migration to Salesforce and implementation of donation management features had substantial impacts on LIFE's operations:

- **Global Accessibility:** Regional offices worldwide could now access and manage data in real-time, improving coordination and operational efficiency across continents.
- **Enhanced Donor Engagement:** The integration of Stripe and ACH payment methods, combined with automated email communications, improved the donor experience and increased recurring donations.
- **Data-Driven Decision Making:** Custom reports and dashboards provided leadership with actionable insights into donation trends, campaign performance, and donor demographics, enabling better strategic planning.

- **Long-Term Data Security:** Salesforce’s cloud infrastructure ensured that 30+ years of legacy data, along with new data, would be securely stored and accessible for at least 10 years, meeting compliance and operational requirements.

## 3.3 Constraints

### 3.3.1 Technical Constraints

- **Salesforce Governor Limits:** Salesforce imposes strict governor limits on queries, DML operations, and CPU time. This required careful code optimization, including bulkifying Apex code to avoid hitting these limits during high-volume operations.
- **Static Resource Limitations:** Salesforce limits static resources to 5 MB per file, necessitating the use of external storage solutions like Amazon S3 for larger files.
- **Email Delivery in Sandbox:** Testing email functionality in sandbox environments was challenging as Salesforce sandboxes do not support actual email delivery, requiring all email testing to be done in production with careful validation.

### 3.3.2 Time Constraints

- **Tight Deadlines:** Both projects had strict timelines, requiring efficient time management and prioritization of critical features over nice-to-have enhancements.
- **Learning Curve:** As a new developer in the Salesforce ecosystem, there was an initial learning period that impacted development speed, though training and mentorship helped accelerate this process.

### 3.3.3 Resource Constraints

- **Limited Team Size:** Working with small, focused teams meant that each developer had to handle multiple aspects of development, from front-end LWC design to back-end Apex logic and testing.
- **Client Budget Considerations:** For LIFE, budget constraints required finding cost-effective solutions, such as using Salesforce’s built-in email automation instead of third-party tools like Mailchimp.

### 3.3.4 Operational Constraints

- **Stakeholder Availability:** Coordinating with stakeholders for requirements gathering, feedback sessions, and approvals sometimes caused delays due to their busy schedules.

- **Data Migration Complexity:** For LIFE, migrating 400,000+ records from a legacy system while maintaining data integrity and relationships was a complex, time-consuming process that required multiple validation cycles.
- **Compliance and Accessibility Requirements:** Ensuring WCAG compliance for accessibility meant additional design considerations and testing, particularly for users relying on screen readers and other assistive technologies.

# Chapter 4

## System Design and Implementation

### 4.1 Design

#### 4.1.1 High-Level Design (HLD) - Raro

The high-level design for the Travel Raro project outlines the interaction between various system components to ensure seamless user authentication, trip booking, payment processing, and data management. The design highlights the collaboration between external services, user interfaces, and Salesforce to achieve an automated, user-friendly, and efficient system.

## Some Components and Their Responsibilities

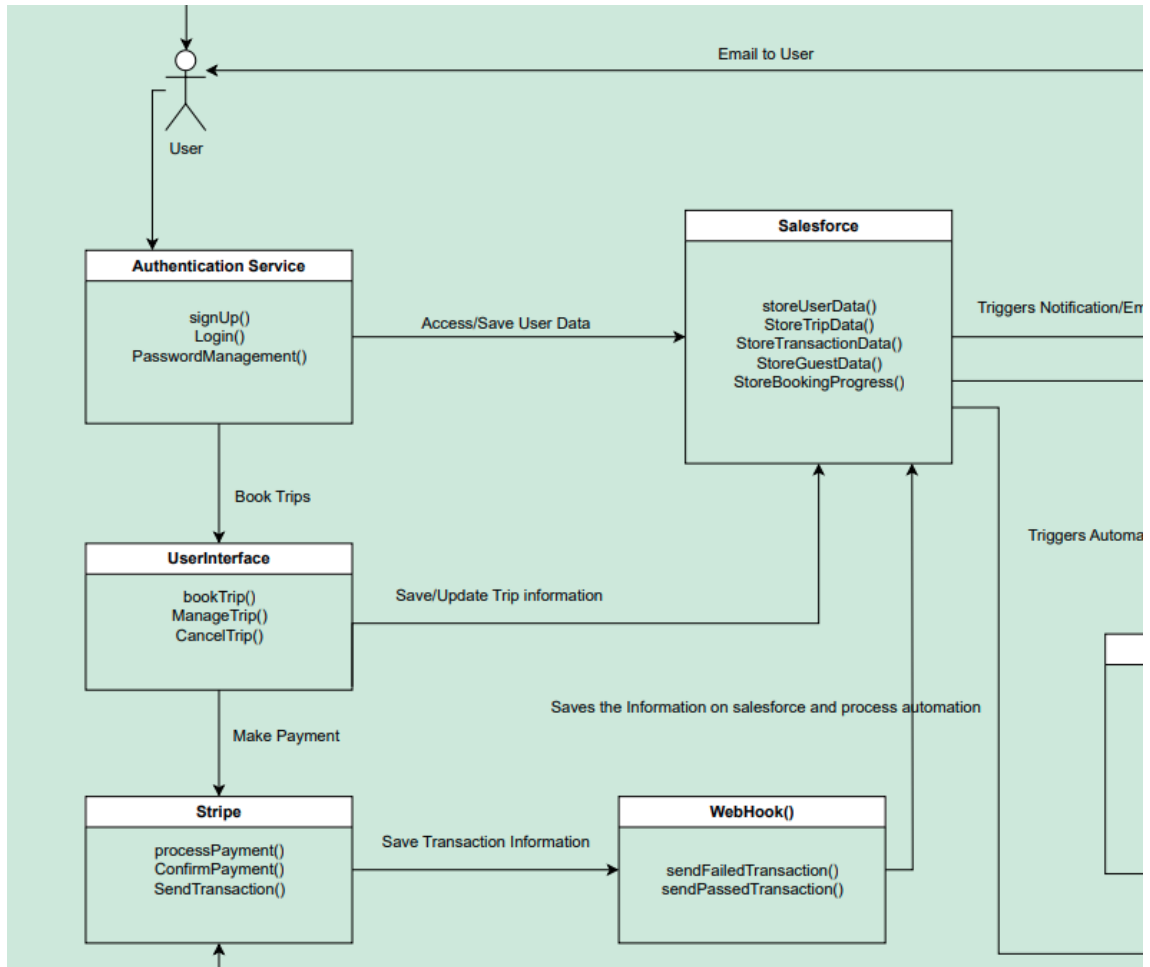


Figure 4.1: Part Of HLD of Raro

- **User** : The user is the primary actor interacting with the system to sign up, log in, book trips, manage bookings, cancel trips, and make payments.
- **User Interface** : The user interface provides a platform for users to interact with the system seamlessly. Through the bookTrip functionality, users can initiate and complete trip bookings with ease. This feature streamlines the process, ensuring a smooth booking experience for both new and returning users.
- **Salesforce** : Acts as the central hub for data storage and process automation.

### Key Features

- **Seamless Integration:** Authentication, trip management, and payment processing are seamlessly integrated, ensuring a smooth user experience.
- **Automation:** Automated notifications, emails and data updates reduce manual intervention.

- **Real-Time Updates:** Integration with webhooks and Salesforce ensures real-time data consistency across all components.

### 4.1.2 UI Design

#### Travel Raro

- Created reusable components for booking forms, OTP verifications, and navigation elements.
- Developed several LWCs for dynamic forms, shared across booking types (guest, agent, anonymous).
- Implemented a progress tracker for a seamless booking experience.

#### Life

- Built user-friendly forms for donation entry, payment selection, and payment gateway.
- Designed administrative components for viewing campaign metrics and funds reports.

## 4.2 Introduction to Salesforce Development

Salesforce development is an emerging field that deals with the customization and enhancement of the Salesforce platform for business needs. Among the top-tier CRM systems in the world, Salesforce provides a wide range of tools to help organizations manage customer interactions, optimize operations, and gain valuable insight from data analytics such as reports and dashboard. As time has passed, the pace of development has been accelerated rapidly due to the development of artificial intelligence. Salesforce continues to grow in popularity for its low-code/no-code platform. This enables the development and deployment of products much faster compared to working with conventional technology stacks. Also the new AI of salesforce, Einstein has revolutionized the creation of agents which analyzes the specific databases to answer questions to users. Many of the objects, such as Users, Account, Contact, and Opportunities, are ready out-of-the-box, so it would take a considerable amount of time to set up using other stacks like MERN or MEVN, or others based on Java. Subsequently, the intricate relationship with database systems and external integrations with other services is made significantly faster through the use of Salesforce. Within the Salesforce environment, there is no need for direct database connections or similar configurations like we do in MERN or others. Just making a project in Visual Studio Code and authorizing it facilitates seamless connectivity with the database. An additional critical factor contributing to the rising popularity of platforms such as Salesforce is their rapid product delivery capabilities. Specially in COVID which boosted their popularity when Salesforce was used to develop vaccine management solution overnight[3].

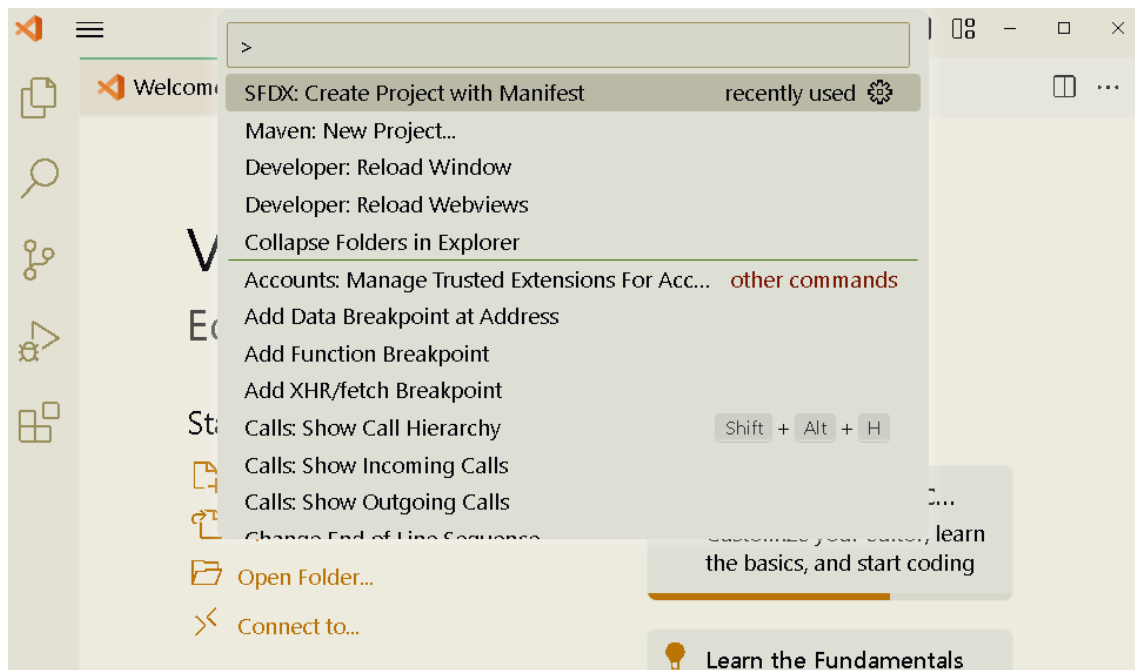


Figure 4.2: Create Project in VSCode

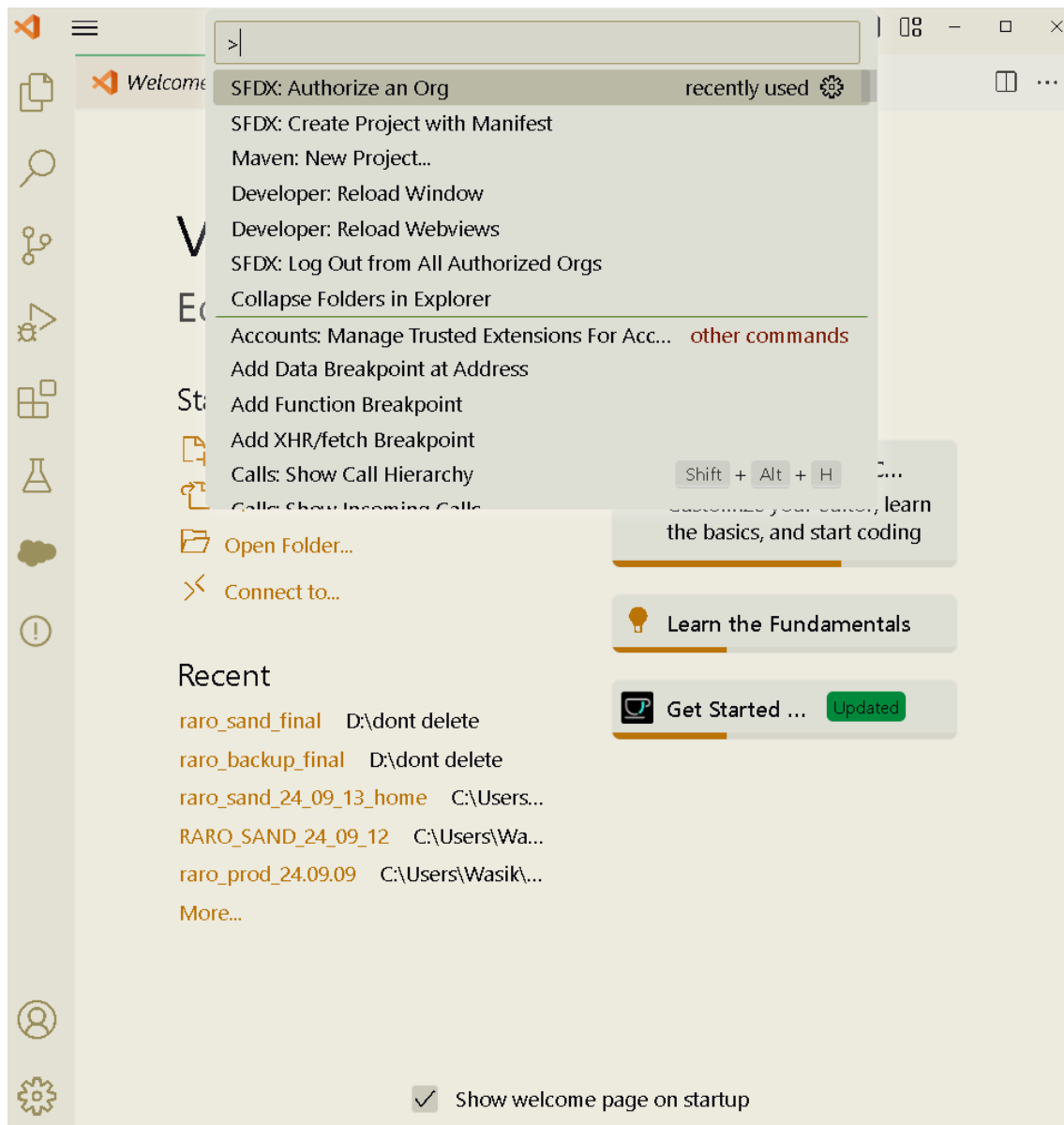


Figure 4.3: Authorizing An Org

During the period of my internship within TwinForce Solutions Limited, I was exposed to several aspects of Salesforce development, including Apex Development, development of Lightning Web Components, creation of Salesforce Flows as well as admin side skills. This experience significantly influenced me and enhanced my technical proficiency while enriching my understanding of business processes, thus enabling me to customize solutions that proficiently meet client requirements. This also provided insight into the broader picture of how front-end development and back-end development come together leading to a well-polished product. Being involved in projects directly helped me see how Salesforce can drive business success and speed up operations.

## 4.3 Travel Raro Project Implementation

During my internship, I had the opportunity to work on several projects, with the most notable being:

### 4.3.1 TFS Car Rental System (Training Project)

In the first month of my internship, I underwent extensive training on Salesforce, during which I was assigned a dummy project to develop a car rental system for TwinForce.

- Created custom objects and fields essential for managing car rentals, utilizing both standard objects such as Opportunities, User, Account, and Contact. This task helped me build up my admin skills which boosted my confidence further.
- Developed Lightning Web Components (LWC) to present car rental data and allow user interactions, enhancing my understanding of conditional tags and iterations, template within the HTML file which is managed by Salesforce's LWC framework.
- Built record types to use the same layout for different groups. I also created permission sets to regulate access to various data sets effectively. In one such case, an agent was not able to see his fellow agents' commission for completing a rent, but their manager was able to see all the agents' commission.
- Wrote Apex triggers to automate processes, including sending confirmation emails upon successful rental bookings, updating the account name on the account based on their last name.
- Created approval process where manager's approval was necessary if discounts were more than 15%. Any discount over the limit with bell notification on his dashboard. The rent's status will be pending until approved.

My exceptional performance in this training project demonstrated my capacity to apply theoretical knowledge in practical scenarios, ultimately leading to my assignment to the more complex and live Travel Raro project.

### 4.3.2 Travel Raro (Live Project)

Following my training, I transitioned to working on Travel Raro, an internal initiative focused on developing a trip booking system for customers. They mainly focus on the US market allowing guests to go to trips in Philippines, Italy and Greece. Initially, the system supported four types of bookings: from the internal system, agents, authenticated users, and anonymous users (without logging in). However, the maximum number of travelers permitted was limited to two (the primary user plus one additional person).

#### **Initial Assessment:**

- Initially I was given the task to understand the whole project by going through the existing flows and the org (we call salesforce platform org).

- Later I was given the task to test the guest booking and try to find any bug. One bug I found was the test mode stripe would allow guests to give more than trip amount money.

### Redesign of Guest Selection Process:

- The initial system only supported up to two travelers per booking, which limited the client's ability to accommodate families or larger groups.
- I redesigned the guest selection process to allow up to four travelers, enhancing the system's flexibility and scalability for future requirements.

Step 2

**Your Trip**



Test Philippines Trip  
Sep 30, 2025 - Feb 01, 2026

---

Have questions about reserving online?  
Contact us at  
[Reservations@travelraro.com](mailto:Reservations@travelraro.com)

Contact Information

FULL LEGAL NAME: (exactly as it appears on your passport)

First (Given) Name\*

Willia

Middle Name (s)

Tate Mcknight

Last (Surname) Name\*

Mejia

Email\*

dyzy@mailinator.com

(Country Code) + Mobile Number\*

Birthdate\*

mm/dd/yyyy

Passport Country of Origin\*

☒ Add Guest Information

FULL LEGAL NAME: (exactly as it appears on your passport)

First (Given) Name\*

Jane

Middle Name (s)

Figure 4.4: Old Booking Process with Only One Guest Allowed

Select Number Of Beds ▼

☒ Add Guest Information

Select The Number Of Guests\*

1  
--Select--  
1  
2  
3

Guest Number 1

FULL LEGAL NAME: (exactly as it appears on your passport)

First (Given) Name\*  
Enter First Name

Middle Name (s)  
Enter Middle Name

Last (Surname) Name\*  
Enter Last Name

Email\*  
Enter Email here

Unlock your account to view autofill suggestions  
Unlock account

Birthdate\*  
mm/dd/yyyy

Passport Country of Origin\* ▼

Figure 4.5: Old Booking Process With Multiple Guest Allowed

### Enhancement of Salesforce Flows:

- Optimized four distinct Salesforce Flows for new booking scenarios of adding additional guests.
- I had to modify three flows after being shown one by my team lead.
- I had to make necessary adjustments to the object related to trip booking including MyTrip object.

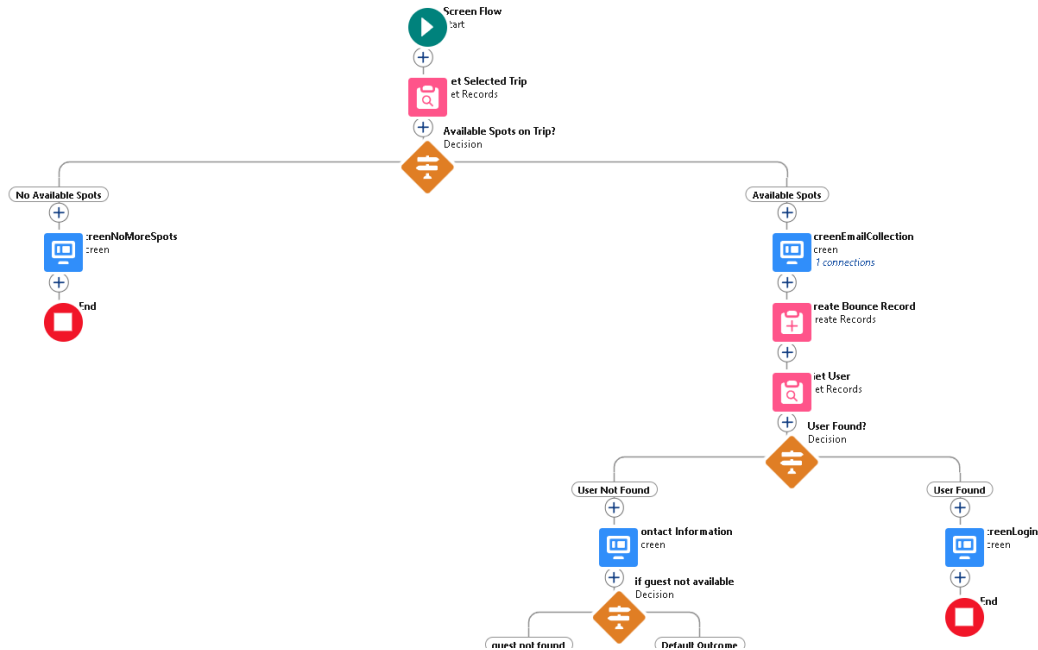


Figure 4.6: A portion From Flow Of Anonymous Guest BookingProcess

### Bounced Booking System:

- In response to the client’s request, I developed a feature to track users who abandoned the booking process. I created a new object within Salesforce to capture data on ”bounced” bookings.
- Adjusted the flow logic to capture and store information about users who exited the booking process prematurely, providing valuable insights into user behavior. This allowed the client to target these users with follow-up active campaigns with discounts, leading to an increase in completed bookings.

| FIELD LABEL        | FIELD NAME           | DATA TYPE             | CONTROLLING FIELD | INDEXED |
|--------------------|----------------------|-----------------------|-------------------|---------|
| Billing Apartment  | Billing_Apartment__c | Text(255)             |                   |         |
| Birthdate          | Birthdate__c         | Date                  |                   |         |
| Bounced Booking Id | Name                 | Auto Number           |                   | ✓       |
| City               | City__c              | Text(255)             |                   |         |
| Contact            | Contact__c           | Lookup(Contact)       |                   | ✓       |
| Country            | Country__c           | Text(255)             |                   |         |
| Coupon Code List   | Coupon_Code_List__c  | Long Text Area(32768) |                   |         |
| Created By         | CreatedById          | Lookup(User)          |                   |         |
| Customer Type      | Customer_Type__c     | Picklist              |                   |         |
| Date of Booking    | Date_of_Booking__c   | Formula (Date)        |                   |         |

Figure 4.7: Bounced Booking Object

## Redesign Whole Booking Process for New Sales:

- When the client launched a new winter sale, I was given a task to redesign the booking process to compete against major companies like Travelocity and Expedia. I redesigned the system to allow the new 10 LWCs to manage all four booking types (anonymous, returning user, agent, and internal).
- Previously all booking types had their own single LWC. So even for a small label change, we had to change 4 LWCs and then test four separate booking processes to make sure it worked. Now we can just change in one place and test it once.
- As the previous page is now divided into multiple LWCs we must create new Flows to accommodate the new changes. So, we created four new flows and used the new LWCs to finish the booking process.

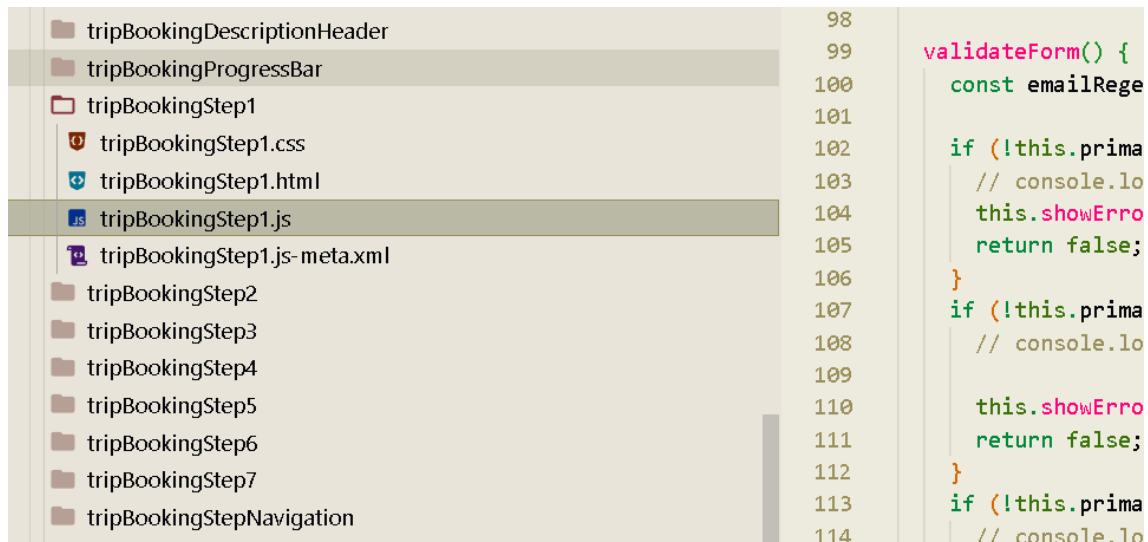


Figure 4.8: 10 new LWC's to make it more dynamic

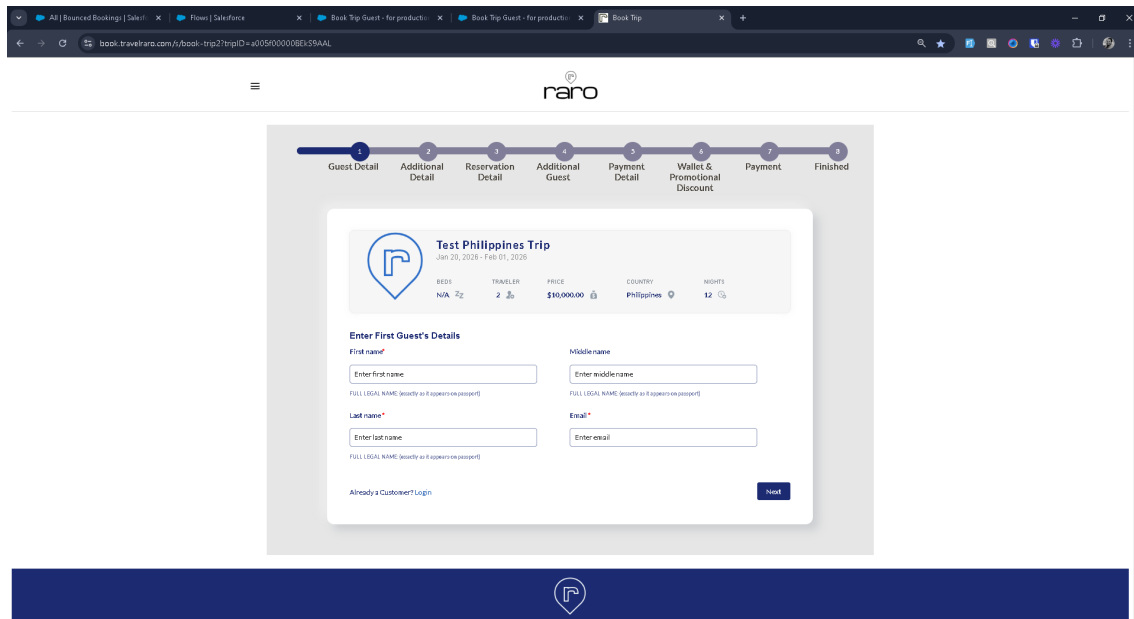


Figure 4.9: New Live Booking Design First Page

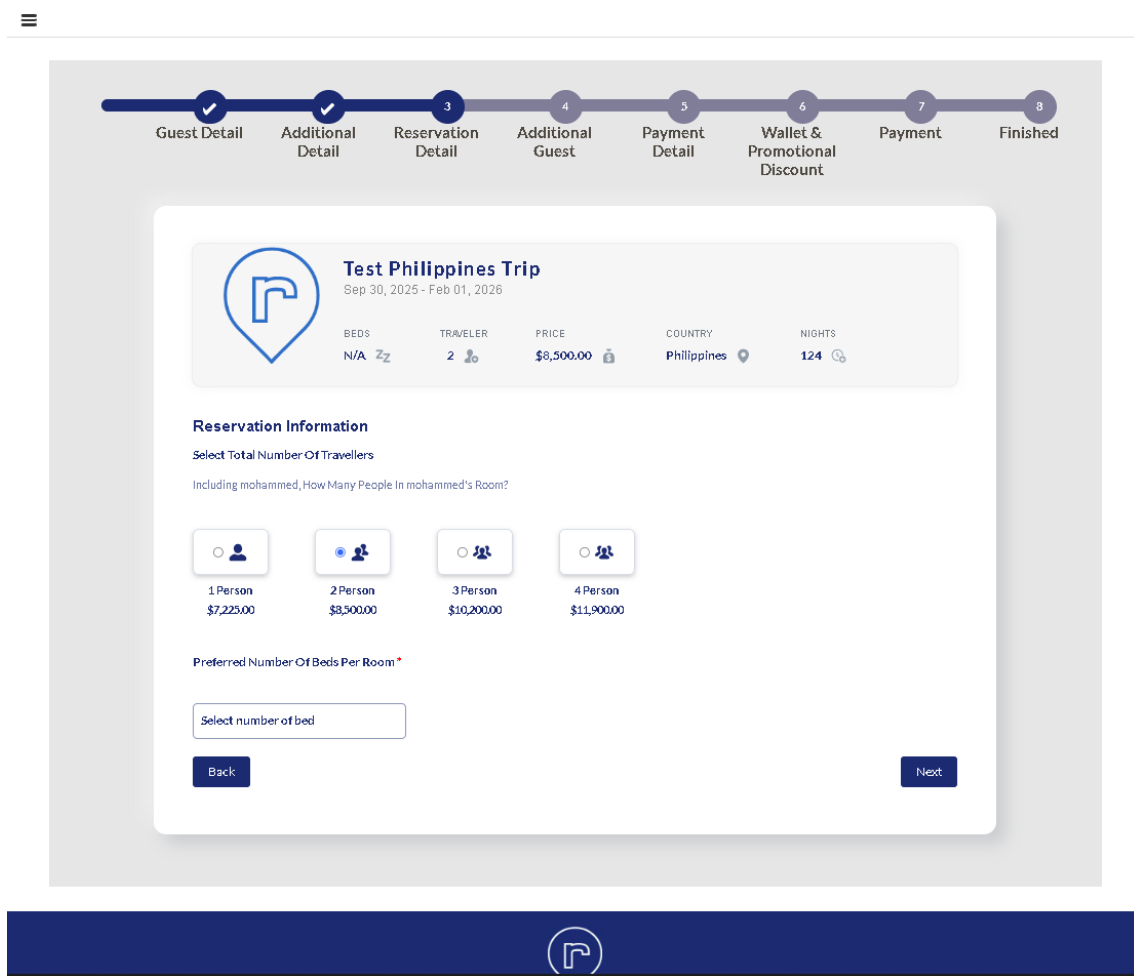


Figure 4.10: New Guest Selection Page

Additional Features:

- For guest user, I developed a one-time password (OTP) system for users to enhance the security of the reservation procedure and safeguard against spam threats.
- I created an automation that automatically sends emails to agents with the booking details when their guests' trips are successfully booked.

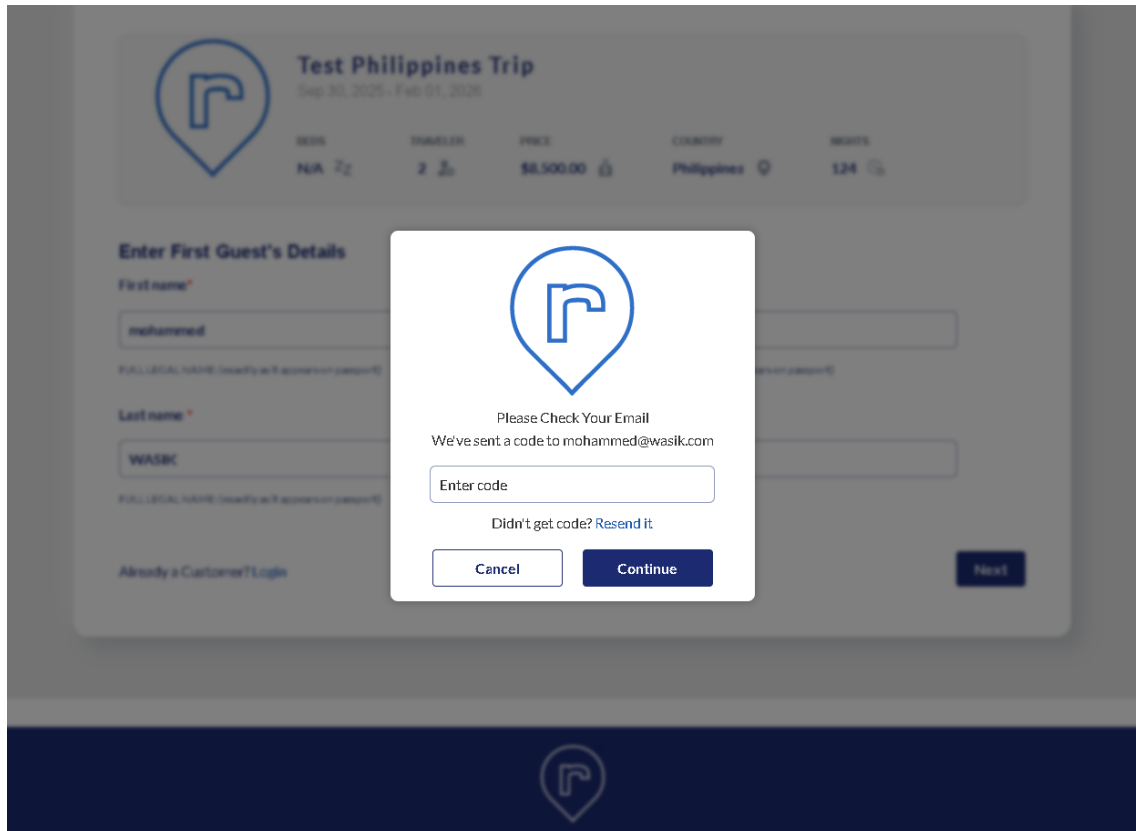


Figure 4.11: OTP Modal

```

public without sharing class OTPController {

@AuraEnabled
public static String sendOTPtoEmail(String useremail, String FirstName, String template, String
senderEmail)
{
    Integer otp = (Integer)(Math.random() * 1000000);
    String otpStr = String.valueOf(otp);
    System.debug('OTP: ' + otp);
    EmailTemplate et = [SELECT Id,Subject,HtmlValue,Body FROM EmailTemplate WHERE DeveloperName
=:template];

    List<OrgWideEmailAddress> oeList = [select Id from OrgWideEmailAddress where Address =:senderEmail];
    List<Messaging.SingleEmailMessage> emailListToBeSent = new List<Messaging.SingleEmailMessage>();

    String Mail_Subject = et.subject;
    String Mail_Body = et.htmlvalue;

    Messaging.SingleEmailMessage email = new Messaging.SingleEmailMessage();
    email.setTemplateId(et.Id);
    email.setOrgWideEmailAddressId(oeList[0].Id);

    email.setToAddresses(new String[] { useremail });

    email.setSubject(Mail_Subject);

    Mail_Body = Mail_Body.replace('{{OTP}}',otpStr);
    Mail_Body = Mail_Body.replace('{{FirstName}}',FirstName);

    email.setHtmlBody(Mail_Body);
    emailListToBeSent.add(email);
    if(!Test.isrunningTest())
    {
        try{
            Messaging.sendEmail(emailListToBeSent);
        }
        catch(Exception e){
            System.debug(e);
        }
    }

    System.debug('Email sent to: ' + useremail);

    return otpStr;
}
}

```

Figure 4.12: OTP Controller Class

### Change Sets:

- I executed changes in the sandbox environment. And then Deployed them to production through outbound change sets to live environment (Production).
- Managed inbound change sets in production (live environment) to deploy change to the portal after going through the necessary checks.

### Test Classes:

- For every apex class we wrote we had to write accompanying apex test classes which serves as unit tests. This makes sure the classes run smoothly before integrating it with production

## 4.4 Life For Relief & Development Project Implementation

Following my work at Raro, I was positioned to work on **Life** (Life for Relief and Development). The Life project was an initiative aimed at migrating the NGO's operations to the Salesforce platform while ensuring secure integration with payment systems and other organizational workflows. LIFE is a large non-profit organization with a focus on humanitarian aid, and the project required a robust system to streamline donation management, donor interactions, and reporting. Life has been operating for over 30 years. To date they have distributed over 620 million US dollars.

The development process began with understanding the existing system and identifying gaps in functionality. The legacy system had limitations in the handling of automation and lacked the ability to efficiently sync data between platforms. To address this, Salesforce was selected as the primary platform to host the organization's operations. The migration process included the transfer of large amounts of legacy data to Salesforce, ensuring accuracy and consistency.

### 4.4.1 Data Migration

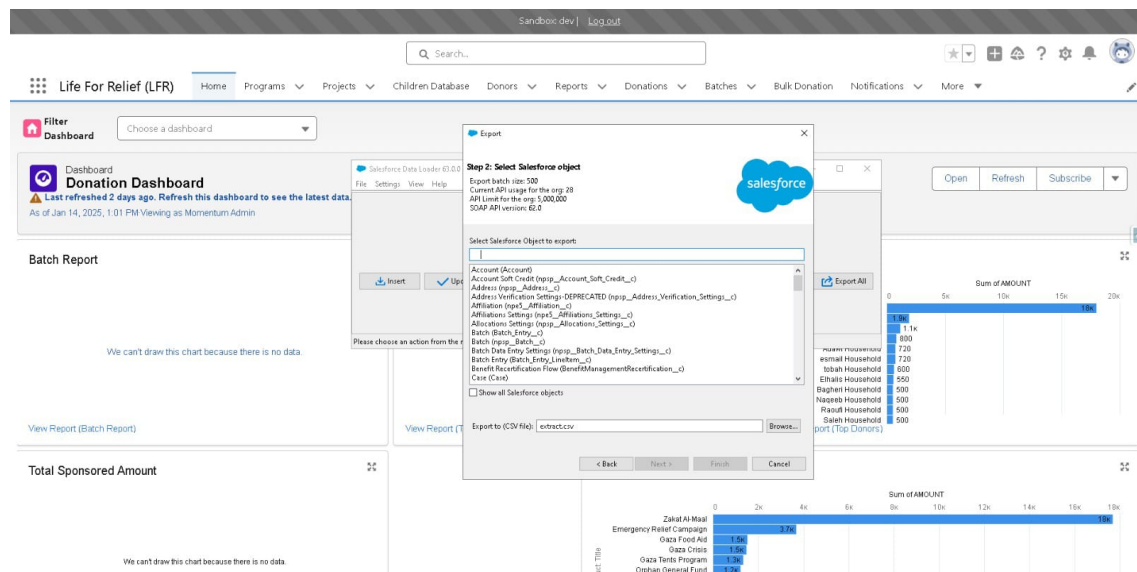


Figure 4.13: Data Migration With Data Loader

- I have helped move over 400,000 records from the legacy system into Salesforce, including donor profiles, donation transactions, campaign data, child sponsorship records, and various project details.
- Customized the database to match the existing database including creating new objects, fields, relationships, etc.
- Used Salesforce's Data Loader for bulk data imports, handling large data efficiently while maintaining existing structures and relationships.

# Dashboard Development

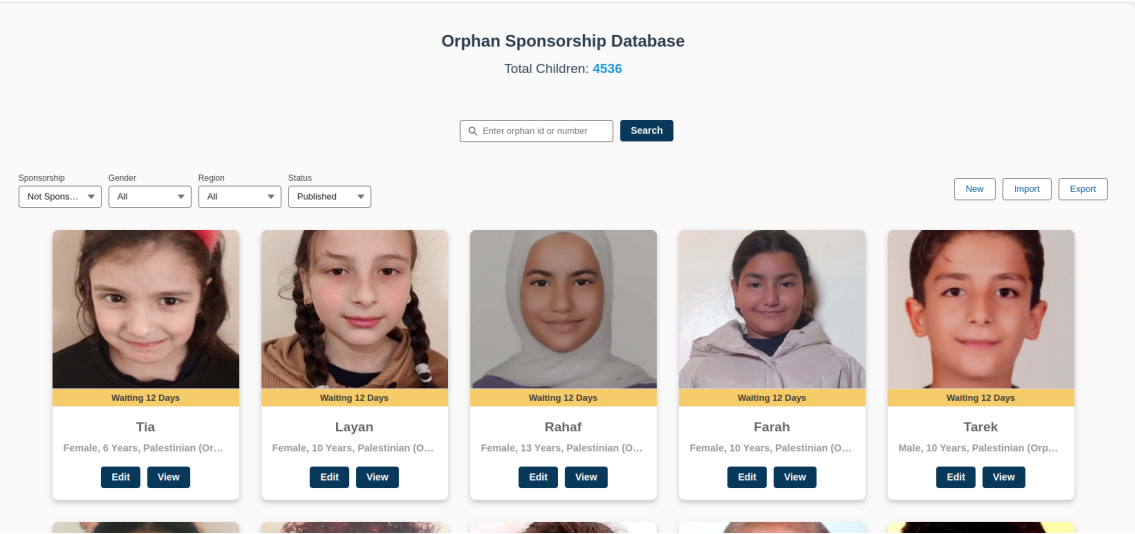


Figure 4.14: Orphan Dashboard

```

getOrphansDatabase({
  startAge: startAge,
  endAge: endAge,
  gender: gender,
  region: region,
  sponsorshipStatus: sponsorshipStatus,
  publishStatus: publishStatus,
  firstOrphanDate: this.firstOrphanName,
  firstOrphanId: this.firstOrphanId,
  lastOrphanDate: this.lastOrphanName,
  lastOrphanId: this.lastOrphanId,
  direction: this.direction
}))
.then((response) => {

  this.paginatedProducts = response.products.map(product => ({
    ...product,
    qty: 1,
    Price: 0,
    donationType: '',
    Age: product.Birth_Date__c ? this.calculateAge(product.Birth_Date__c) : '0',
    Date: this.formatDate(product.CreatedDate)
    // buttonText: product.IsSponsored__c ? 'Sponsored' : 'Sponsor Me',
    // isDisabled: product.IsSponsored__c
  }));

  console.log('paginatedProducts'+JSON.stringify(this.paginatedProducts));
  console.log('paginatedProducts Length '+this.paginatedProducts.length);

  this.totalPages = response.totalPages;
  if (this.totalPages == 0) {
    this.currentPage = 0;
  }
})
.catch((error) => {
  console.error('Error fetching products:', error);
});
}

```

Figure 4.15: Child Dashboard Controller JS

```

@AuraEnabled(cacheable=true)
public static Map<String, Object> getOrphansDatabase(
    Integer startAge,
    Integer endAge,
    String gender,
    String region,
    Boolean sponsorshipStatus,
    Boolean publishStatus,
    Date firstOrphanDate,
    String firstOrphanId,
    Date lastOrphanDate,
    String lastOrphanId,
    String direction
) {

    String query = 'SELECT Id, Name, CreatedDate,Orphan_No__c, Orphan_Id__c,Image_Url__c,
IsSponsored__c, Description, Family, Gender__c, Region__c, Birth_Date__c, On_Web__c,
Unsponsored_Day_Count__c ' +
        'FROM Product2 ' +
        'WHERE Parent_Product__c = null ' +
        'AND Family = \'Orphan Sponsorship\'';

    if (sponsorshipStatus != null) {
        query += 'AND IsSponsored__c = :sponsorshipStatus ';
    }
    if (gender != null) {
        query += 'AND Gender__c = :gender ';
    }
    if (region != null) {
        query += 'AND Region__c = :region ';
    }
    if (publishStatus != null) {
        query += 'AND On_Web__c = :publishStatus ';
    }

    if (endAge != null && startAge != null) {
        Date currentDate = Date.today();
        Date startDate = currentDate.addYears(-startAge);
        Date endDate = currentDate.addYears(-endAge);

        query += 'AND Birth_Date__c >= :endDate AND Birth_Date__c <= :startDate ';
    }

    if (direction == 'next' && lastOrphanDate != null && !String.isEmpty(lastOrphanId)) {
        query += 'AND (CreatedDate < :lastOrphanDate OR (CreatedDate = :lastOrphanDate AND Id >
:lastOrphanId))';
    } else if (direction == 'previous' && firstOrphanDate != null && !String.isEmpty(firstOrphanId)) {
        query += 'AND (CreatedDate > :firstOrphanDate OR (CreatedDate = :firstOrphanDate AND Id <
:firstOrphanId))';
        query += 'ORDER BY CreatedDate ASC, Id DESC LIMIT 48';
    }

    if (direction != 'previous') {
        query += 'ORDER BY CreatedDate DESC, Id ASC LIMIT 48';
    }

    List<Product2> products = Database.query(query);

    if (direction == 'previous') {
        List<Product2> reversedProducts = new List<Product2>();
        for (Integer i = products.size() - 1; i >= 0; i--) {
            reversedProducts.add(products[i]);
        }
        products = reversedProducts;
    }

    List<String> conditions = new List<String>();

    conditions.add('Parent_Product__c = null');
    conditions.add('Family = \'Orphan Sponsorship\''');

    if (sponsorshipStatus != null) {
        conditions.add('IsSponsored__c = :sponsorshipStatus');
    }

    if (gender != null) {
        conditions.add('Gender__c = :gender');
    }

    if (region != null) {
        conditions.add('Region__c = :region');
    }

    if (endAge != null && startAge != null) {
        Date currentDate = Date.today();
        Date startDate = currentDate.addYears(-startAge);
        Date endDate = currentDate.addYears(-endAge);

```

- I developed a donation dashboard to display donation details at multiple levels, such as donor, campaign, and regional contributions, allowing granular insights.
- The user can use this dashboard to donate to a particular child or multiple children together.
- Implemented server-side pagination and dynamic sorting to efficiently manage and display large datasets, improving load times and user experience.
- Ensured responsive design for the dashboard, making it accessible across different devices and usable by both internal users and external stakeholders through the Experience Builder portal and the system.

## 4.4.2 Payment Integration

Home Manage Payment Methods Projects User17146698184463863754

### Your Payment

**Details**

\*First Name \*Last Name

\*Email

\*Phone

**Billing Address >**

\*Address

Country  
Select Country

\*City \*Postal

**Payment Method**

**Credit / Debit Bank**

Card number MM / YY CVC

**Cart Summary**

Total No. of Donations: 0

Total Amount: \$0.00

Pay Now

**Life** | WHERE THERE IS LIFE...  
THERE IS HOPE...

Figure 4.17: Credit Card Payment

Your Payment

Details

\* First Name

\* Last Name

\* Email

\* Phone

Billing Address >

\* Address

Country

Select Country ▼

\* City

\* Postal

Payment Method

Credit / DebitBank

Account Holder Type

Select Type ▼

Account Type

Select Type ▼

Organization Name

Routing#

Account#

☐ By completing this purchase, you authorize us to charge the account above for the amount specified in the Total field.

Cart Summary

Total No. of Donations:

0

Total Amount:

\$0.00

Pay Now

Figure 4.18: ACH Payment

36

```

public with sharing class StripeBankPaymentController {
    public static String CUSTOMER_URL = 'https://api.stripe.com/v1/customers';
    public static String METHOD_URL = 'https://api.stripe.com/v1/payment_methods';
    public static String PAYMENT_URL = 'https://api.stripe.com/v1/payment_intents';
    public static String SETUP_INTENT_URL = 'https://api.stripe.com/v1/setup_intents';

    public static String SUBSCRIPTION_URL = 'https://api.stripe.com/v1/subscriptions';
    public static String PRODUCT_URL = 'https://api.stripe.com/v1/products';
    public static String PRICE_URL = 'https://api.stripe.com/v1/prices';

    public static String mockSecretKey;

    public static String getSecretKey() {
        if (mockSecretKey != null) {
            return mockSecretKey;
        }
        stripe_details__mdt stripedetails = [SELECT Stripe_secret_key__c
                                            FROM stripe_details__mdt
                                            WHERE developerName = 'stripe_details'
                                            LIMIT 1];
        return stripedetails != null ? stripedetails.Stripe_secret_key__c : null;
    }

    @AuraEnabled
    public static String createUsBankAccount(String bankAccountDataJSON) {
        String API_KEY = getSecretKey();

        // Deserialize input JSON into Map
        Map<String, Object> bankAccountData = (Map<String, Object>)
JSON.deserializeUntyped(bankAccountDataJSON);

        String Name = (String) bankAccountData.get('Name');
        String accountHolderType = ((String) bankAccountData.get('accountHolderType')).toLowerCase();
        String routingNumber = (String) bankAccountData.get('routingNumber');
        String accountNumber = (String) bankAccountData.get('accountNumber');

        String params = 'type=us_bank_account' +
            '&billing_details[name]=' + EncodingUtil.urlEncode(Name, 'UTF-8') +
            '&us_bank_account[routing_number]=' + EncodingUtil.urlEncode(routingNumber, 'UTF-
8') +
            '&us_bank_account[account_number]=' + EncodingUtil.urlEncode(accountNumber, 'UTF-
8') +
            '&us_bank_account[account_holder_type]=' +
            EncodingUtil.urlEncode(accountHolderType, 'UTF-8');
    }
}

```

Figure 4.19: Stripe ACH Controller

- Helped configure ACH payment functionality alongside credit card transactions, catering to the needs of donors and reducing transaction fees for high-value donations.
- Built the payment interface in a way which had minimal distraction resulting in a user-friendly checkout experience.
- Conducted end-to-end testing of the Stripe integration, verifying payment success, ACH transfers, and data accuracy in Salesforce dashboards using Stripe's Test mode.
- Set up the system in a way where toggling between the test and live mode can be done from within the system minimizing the operation cost.

## 4.4.3 Reporting and Dashboards

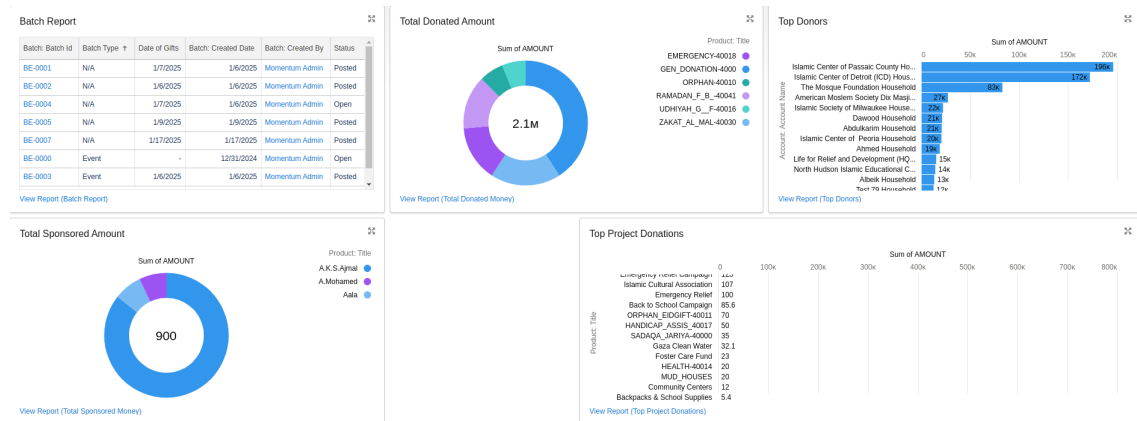


Figure 4.20: Report To Show Analytics

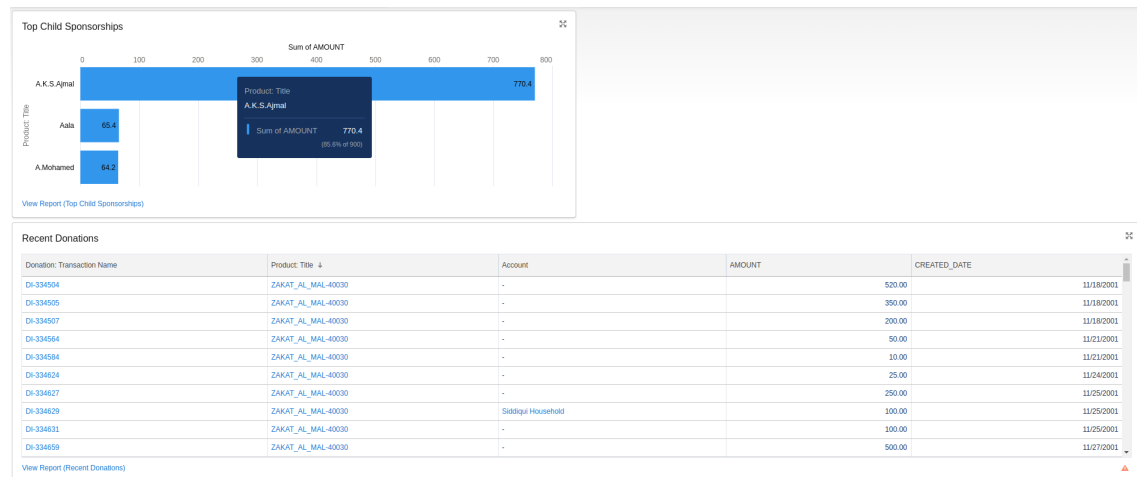


Figure 4.21: Report To Show Analytics -2

- **Top Donor Report:** Shows the donors who have contributed the highest total amounts to recognize and engage them effectively.
- **Top Donated Amount Report:** Displays the highest contributions, this is a sum made up of child sponsorships and project-specific donations (building schools, well etc).
- **Batch Report:** Identifies any pending transactions requiring administrative review or approval.
- **Total Sponsored Amount Report:** Shows the total amount contributed specifically toward child sponsorship programs. Both one-time and recurring are shown.
- **Total Project Donation Report:** Shows the total donations made for various project works.

- **Top Child Report:** Displays children who have received the highest levels of sponsorship.
- **Recent Donations Report:** Provides a list of the most recent contributions for real-time donor engagement.

#### 4.4.4 Automation - Email To Donor

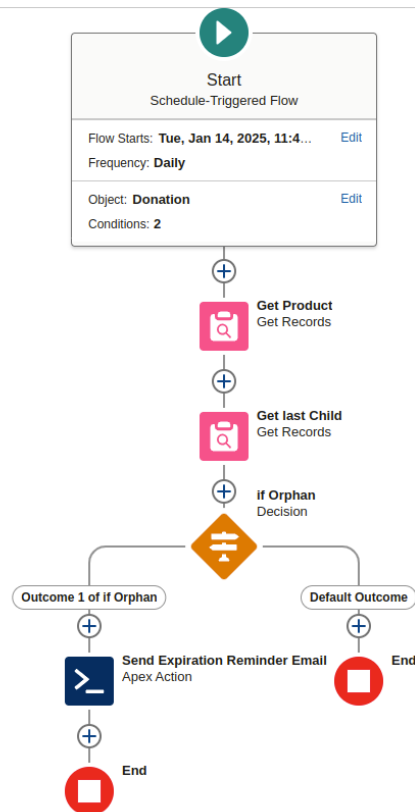
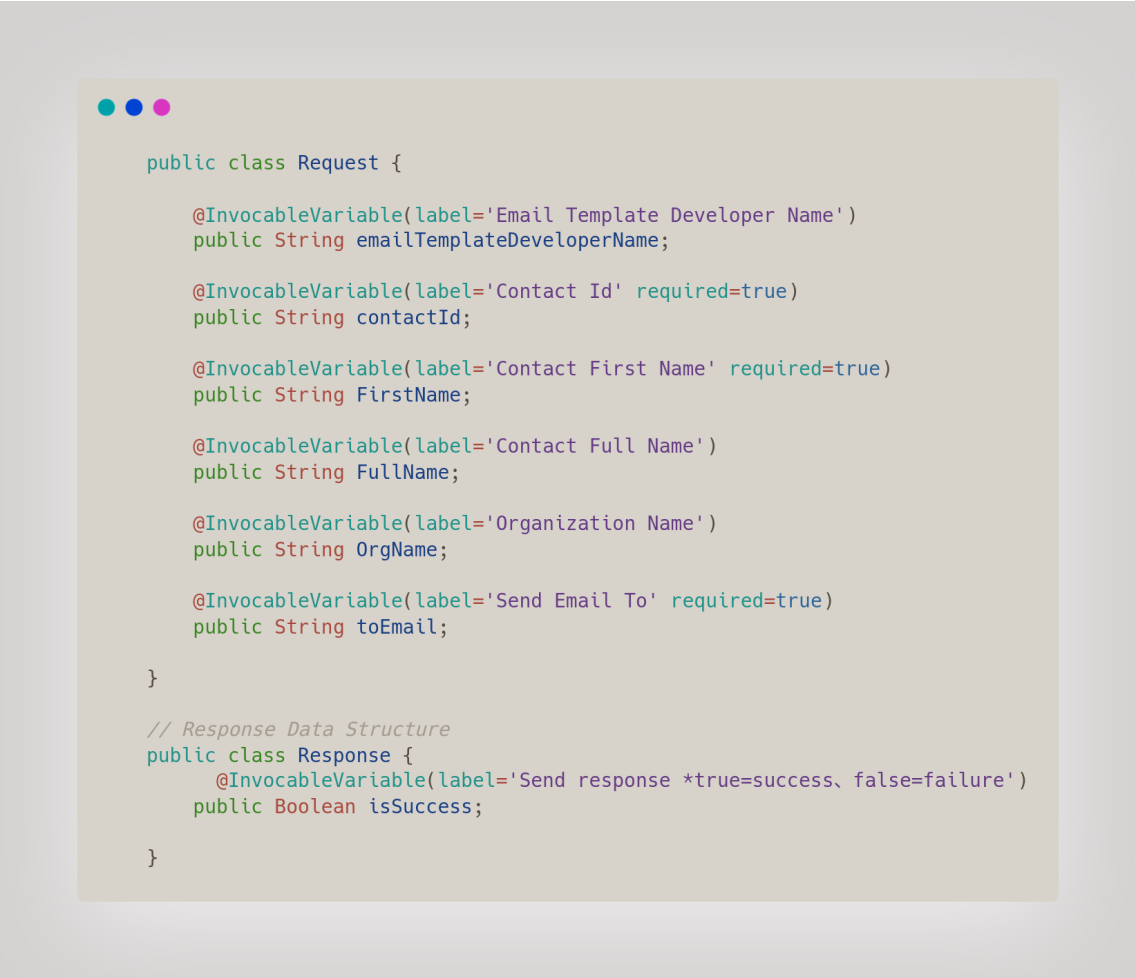


Figure 4.22: Email Automation -1



```

public class Request {

    @InvocableVariable(label='Email Template Developer Name')
    public String emailTemplateDeveloperName;

    @InvocableVariable(label='Contact Id' required=true)
    public String contactId;

    @InvocableVariable(label='Contact First Name' required=true)
    public String FirstName;

    @InvocableVariable(label='Contact Full Name')
    public String FullName;

    @InvocableVariable(label='Organization Name')
    public String OrgName;

    @InvocableVariable(label='Send Email To' required=true)
    public String toEmail;

}

// Response Data Structure
public class Response {
    @InvocableVariable(label='Send response *true=success, false=failure')
    public Boolean isSuccess;
}

```

Figure 4.23: Email Automation -2

- Configured Salesforce email templates to dynamically populate donor-specific details, such as name, donation amount, and project impact, ensuring personalized communication.
- Developed automation to send reminder emails when a donor's credit card is about to expire, particularly for recurring donations, including steps to update payment information seamlessly.
- Designed and implemented an automated email system in Salesforce to send personalized emails immediately after successful donations, enhancing donor engagement.

## 4.4.5 Site Development

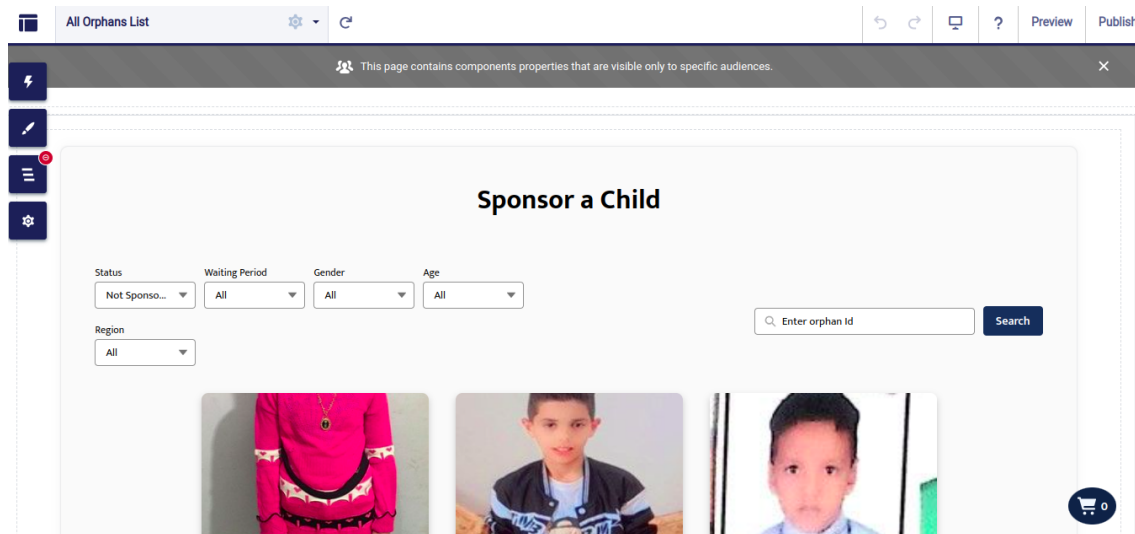


Figure 4.24: Website For LIFE

- Designed and developed a custom Experience Builder site in Salesforce to provide a user-friendly interface for donors, enabling them to view donation history, manage recurring donations, and update payment details. It also allowed them to see legacy data.
- Set up community sharing settings to ensure role-based access to donation data and sensitive donor information while maintaining compliance with privacy standards.
- Enhanced the site with Salesforce CMS integration to allow LIFE administrators to manage content dynamically, including updates about campaigns, events, and impact stories.

## 4.4.6 Tools and Technologies Used

### Salesforce Admin Skills

Since Salesforce comes with a lot of predefined settings and objects and permissions, to make it work according to our requirements, we need to make a lot of changes in the setup. Configuring all of this falls under the Salesforce admin skills. I have created multiple objects and created new fields in some existing fields. I created permission to limit access to certain objects for certain users.

### Lightning Web Components (LWC)

I have created multiple LWC's to facilitate the new design for raro. I also modified the existing lwc to meet new requirements. I also learned the usage of parent-child communication in LWC's.

## Apex Programming

Apex is a strongly typed, object-oriented programming language tailored specifically for the Salesforce platform. During my internship I wrote several classes including:

- **OTPController**: I created this class to send OTP code to guest users.
- **TripReminderEmailSender**: Class responsible for sending email to Agent. Also used html to make dynamic table in the email
- **TripReminderSchedulerEmail**: Class responsible for sending email to Agent email 15,7,3 days before the trip start date with guest details.
- **StripeBankPaymentController**: This class was responsible for setting up account and processing for ACH payment through stripe gateways.
- **ProjectTriggerHanlder**: This was responsible for creating invoice when the transaction was paid.

## Salesforce Flows

I used Flows to re-create the four booking types with the new LWCs. I also optimized and updated existing flows to accommodate new requirements.

## Experience Builder

I designed certain pages in the portal (site) to use the new LWCs. This allowed the users to have a better booking experience which was greatly appreciated by the client.

## Other Tools

In addition to the primary tools mentioned above, I also utilized several other technologies and tools during my internship, including:

- **Stripe**: We used this for secure payment processing, ensuring reliable financial transactions within various applications. Used it for testing that included changing between test and live mode for testing.
- **Visual Studio Code & Salesforce CLI**: I used these to deploy and retrieve code from vscode terminal. I have also used these to dry run certain sensitive apex classes before deploying to production.

# Chapter 5

## Testing, Deployment, and Learnings

### 5.1 Testing

#### 5.1.1 Travel Raro

| Project Name |  | Travel Raro      |  |  |  |  |
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| Reviewed By  |  | Niloy Kanti Paul |  |  |  |  |
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Figure 5.1: Test Cases for Raro

- Designed detailed test plans and cases to validate dynamic booking flows for anonymous users, authenticated users, and agents, ensuring smooth and error-free functionality.
- Created test cases to ensure proper testing for different promotion types.
- Created test scenarios for the Stripe payment integration to confirm secure transaction processing and accurate error handling.
- Developed test cases for the abandoned booking feature to ensure incomplete bookings were correctly tracked and logged.

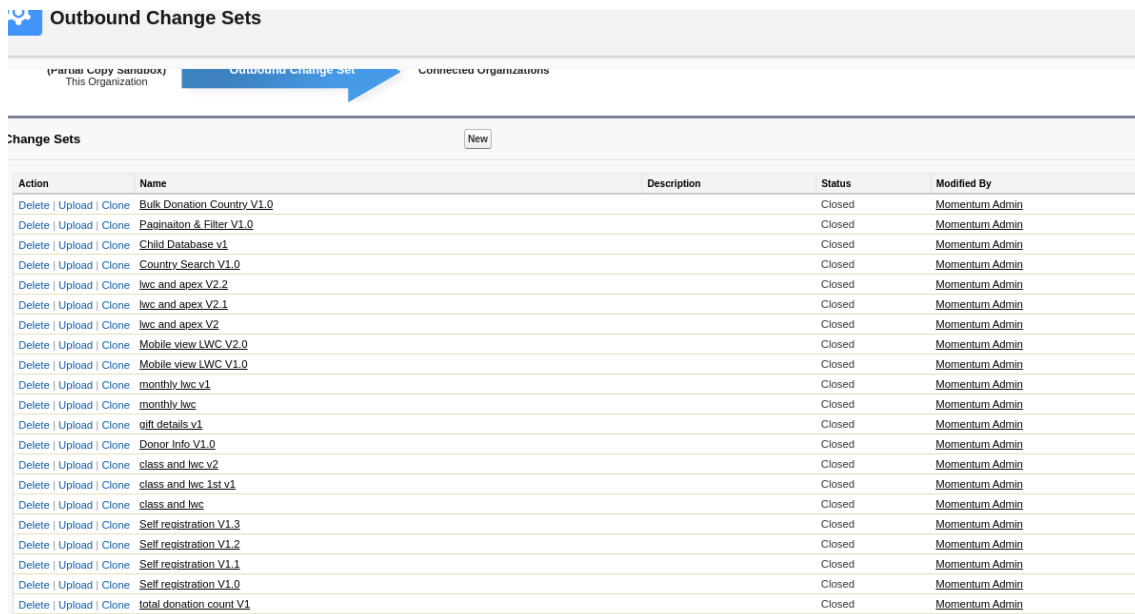
## 5.1.2 Life for Relief and Development (LIFE)

| Project Name | Life for Relief and Development                        |                                                     |                                                                                                                                                       |                                                         |                                                                                |        |
|--------------|--------------------------------------------------------|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|--------------------------------------------------------------------------------|--------|
| Created By   | Mohammed Wasik                                         |                                                     |                                                                                                                                                       |                                                         |                                                                                |        |
| Reviewed By  | Dipanwita Saha                                         |                                                     |                                                                                                                                                       |                                                         |                                                                                |        |
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|              |                                                        |                                                     |                                                                                                                                                       |                                                         |                                                                                |        |
| Test Case ID | Test Case Description                                  | Preconditions                                       | Test Steps                                                                                                                                            | Input Data                                              | Expected Output                                                                | Status |
| TC_001       | Test one-time donation to a child using credit card    | User has child donation information                 | 1. Open the donation page.<br>2. Select a child to sponsor.<br>3. Choose "One-Time Payment".<br>4. Enter credit card details.<br>5. Submit donation.  | Valid credit card details, child ID, amount             | Donation is successfully processed, and confirmation is sent via email.        | Passed |
| TC_002       | Test recurring donation to a child using credit card   | User has child donation information                 | 1. Open the donation page.<br>2. Select a child to sponsor.<br>3. Choose "Recurring Payment".<br>4. Enter credit card details.<br>5. Submit donation. | Valid credit card details, child ID, recurring amount   | Recurring donation is set up successfully, and confirmation is sent via email. | Passed |
| TC_003       | Test one-time donation to a project using credit card  | User selects a project to donate to                 | 1. Open the project donation page.<br>2. Select a project.<br>3. Choose "One-Time Payment".<br>4. Enter credit card details.<br>5. Submit donation.   | Valid credit card details, project ID, amount           | Donation is successfully processed, and confirmation is sent via email.        | Passed |
| TC_004       | Test recurring donation to a project using credit card | User selects a project to donate to                 | 1. Open the project donation page.<br>2. Select a project.<br>3. Choose "Recurring Payment".<br>4. Enter credit card details.<br>5. Submit donation.  | Valid credit card details, project ID, recurring amount | Recurring donation is set up successfully, and confirmation is sent via email. | Passed |
| TC_005       | Test one-time donation to a child using ACH            | User has child donation information                 | 1. Open the donation page.<br>2. Select a child to sponsor.<br>3. Choose "View New Payment".<br>4. Enter ACH details.<br>5. Submit donation.          | Valid ACH details, child ID, amount                     | Donation is successfully processed, and confirmation is sent via email.        | Passed |
| TC_006       | Test recurring donation to a child using ACH           | User has child donation information                 | 1. Open the donation page.<br>2. Select a child to sponsor.<br>3. Choose "Recurring Payment".<br>4. Enter ACH details.<br>5. Submit donation.         | Valid ACH details, child ID, recurring amount           | Recurring donation is set up successfully, and confirmation is sent via email. | Passed |
| TC_007       | Test one-time donation to a project using ACH          | User selects a project to donate to                 | 1. Open the project donation page.<br>2. Select a project.<br>3. Choose "View New Payment".<br>4. Enter ACH details.<br>5. Submit donation.           | Valid ACH details, project ID, amount                   | Donation is successfully processed, and confirmation is sent via email.        | Passed |
| TC_008       | Test recurring donation to a project using ACH         | User selects a project to donate to                 | 1. Open the project donation page.<br>2. Select a project.<br>3. Choose "Recurring Payment".<br>4. Enter ACH details.<br>5. Submit donation.          | Valid ACH details, project ID, recurring amount         | Recurring donation is set up successfully, and confirmation is sent via email. | Passed |
| TC_009       | Test invalid credit card during donation               | User attempts to donate with incorrect card details | 1. Open the donation page.<br>2. Select a donation type.<br>3. Enter invalid credit card details.<br>4. Submit donation.                              | Invalid credit card details                             | Error message is displayed for invalid payment details.                        | Passed |
| TC_010       | Test invalid ACH details during donation               | User attempts to donate with incorrect ACH details  | 1. Open the donation page.<br>2. Select a donation type.<br>3. Enter invalid ACH details.<br>4. Submit donation.                                      | Invalid ACH details                                     | Error message is displayed for invalid payment details.                        | Passed |
| TC_011       | Test cancellation of a recurring donation              | User has an active recurring donation               | 1. Go to the user dashboard.<br>2. Select the recurring donation to cancel.<br>3. Confirm cancellation.                                               | N/A                                                     | Recurring donation is cancelled, and confirmation email is sent to the user.   | Passed |
| TC_012       | Test viewing donation history                          | User has made previous donations                    | 1. Log in to the user account.<br>2. Go to the donation history page.<br>3. Verify the list of past donations.                                        | N/A                                                     | Donation history is displayed correctly with all details (amount, date, type). | Passed |
| TC_013       | Test donation receipt email                            | Donation is successfully processed                  | 1. Make a donation (one-time or recurring).<br>2. Check the email inbox for the receipt.                                                              | N/A                                                     | Receipt email is sent with accurate details of the donation.                   | Passed |

Figure 5.2: Test Cases for LIFE

- Prepared comprehensive test plans to verify all features of the Experience Builder site, ensuring an intuitive and functional user experience including one time sponsorships, recurring sponsorships.
- Wrote test cases to test Project Donation. This also included testing mix and match of different pre-set amount and dynamic amount. For dynamic value we used the BVA technique to test values close to the pre-set amount.
- Designed test cases for Stripe and ACH payment integrations to validate secure and reliable donation processing.
- Created test plans to ensure the accuracy of automated email notifications and data reports generated for donor insights.

## 5.2 Deployment and Maintenance



| Action                  | Name                       | Description | Status | Modified By    |
|-------------------------|----------------------------|-------------|--------|----------------|
| Delete   Upload   Clone | Bulk Donation Country V1.0 |             | Closed | Momentum Admin |
| Delete   Upload   Clone | Pagination & Filter V1.0   |             | Closed | Momentum Admin |
| Delete   Upload   Clone | Child Database v1          |             | Closed | Momentum Admin |
| Delete   Upload   Clone | Country Search V1.0        |             | Closed | Momentum Admin |
| Delete   Upload   Clone | lwc and apex V2.2          |             | Closed | Momentum Admin |
| Delete   Upload   Clone | lwc and apex V2.1          |             | Closed | Momentum Admin |
| Delete   Upload   Clone | lwc and apex V2            |             | Closed | Momentum Admin |
| Delete   Upload   Clone | Mobile view LWC V2.0       |             | Closed | Momentum Admin |
| Delete   Upload   Clone | Mobile view LWC V1.0       |             | Closed | Momentum Admin |
| Delete   Upload   Clone | monthly lwc v1             |             | Closed | Momentum Admin |
| Delete   Upload   Clone | monthly lwc                |             | Closed | Momentum Admin |
| Delete   Upload   Clone | gift details v1            |             | Closed | Momentum Admin |
| Delete   Upload   Clone | Donor Info V1.0            |             | Closed | Momentum Admin |
| Delete   Upload   Clone | class and lwc v2           |             | Closed | Momentum Admin |
| Delete   Upload   Clone | class and lwc 1st v1       |             | Closed | Momentum Admin |
| Delete   Upload   Clone | class and lwc              |             | Closed | Momentum Admin |
| Delete   Upload   Clone | Self registration V1.3     |             | Closed | Momentum Admin |
| Delete   Upload   Clone | Self registration V1.2     |             | Closed | Momentum Admin |
| Delete   Upload   Clone | Self registration V1.1     |             | Closed | Momentum Admin |
| Delete   Upload   Clone | Self registration V1.0     |             | Closed | Momentum Admin |
| Delete   Upload   Clone | total donation count V1    |             | Closed | Momentum Admin |

Figure 5.3: Outbound Change Set for LIFE

### Life for Relief and Development (LIFE)

- Executed the deployment of the Experience Builder site and payment integration features using a combination of Salesforce change sets and manual configurations.
- Executed the deployment of different sandbox elements like classes and lwc with Salesforce Cli using the meta files.
- Migrated data and implemented email automation scripts to ensure seamless functionality post-launch.
- Maintained the system by periodically updating configurations, generating new reports, and addressing feedback to enhance the platform's usability.

### Travel Raro

- Utilized outbound change sets for deploying new features and enhancements from the sandbox to the production environment. This included deploying Apex classes, Lightning Web Components (LWCs), and flows.
- Conducted pre-deployment testing in a staging environment to minimize potential issues during the production rollout.
- Provided post-deployment support by monitoring system performance, addressing bugs reported by users, and making necessary adjustments to improve functionality.

## 5.3 Challenges and Problem-Solving

### 5.3.1 Challenges Faced

Throughout my internship at TwinForce Solutions Limited, I encountered a variety of challenges that tested my technical expertise, adaptability, and problem-solving capabilities. These challenges spanned across projects like Travel Raro and Life for Relief and Development, each presenting unique hurdles that required innovative approaches to overcome. Below is a detailed account of the primary challenges I faced during my work.

#### **Complexity of Existing Systems**

The initial architecture of the Travel Raro booking system was highly complex. It relied on separate Lightning Web Components (LWCs) for different booking types, with all pages and components integrated into a single monolithic structure. This design resulted in significant inefficiencies, especially in areas like the payment and wallet pages.

Understanding the logic behind the system was a time-consuming process due to the numerous scenarios involved, such as handling six types of promotions. These promotions, when combined, generated a multitude of edge cases, adding to the complexity.

Client complaints about slow performance and poor user experience were common. To address these issues, a comprehensive redesign was implemented. This included modularizing the LWCs and streamlining the booking flow, which enhanced maintainability and performance. Tackling this challenge required in-depth debugging, understanding edge cases, and extensive testing.

#### **Limited Functionality in Booking System**

Initially, the Travel Raro system allowed bookings for only two travelers, which did not meet the client's long-term requirements. The design constraints posed a significant challenge as the system was not scalable to handle future features like larger groups or corporate tours.

Expanding the functionality to accommodate up to four travelers required a thorough redesign of the backend logic and UI. Extensive research was conducted to ensure the new design was future-proof, allowing for scalability with minimal effort in the future. This required collaboration with stakeholders to gather all potential use cases, followed by designing a flexible and modular architecture that could easily integrate additional features.

#### **Bounced Booking System**

The absence of a system to track abandoned bookings was a critical gap in the Travel Raro platform. Developing this feature was a significant challenge since it required accurate data capture and robust logic to ensure meaningful analytics.

I was solely responsible for implementing this feature, which involved creating a new object to store bounced booking data and developing a flow to track when users left the booking process without completing it. Accurate data collection was crucial as inaccurate metrics could lead to poor business decisions.

Through multiple iterations and feedback from my team lead, Mr. Niloy, and the client, I successfully implemented a reliable tracking system. This not only improved user insights but also provided the client with actionable data to address issues causing drop-offs. This also worked as a ledger in case of a failed transaction or error. The ledger in this case can help us figure out the part where the error occurred and if the error occurred after the transaction of Stripe was successful, we can manually add the trip.

### **Integration of New Features**

Implementing new features such as the OTP system for anonymous users and automated email notifications posed a dual challenge: technical complexity and limited prior experience. The OTP system required researching various authentication mechanisms and Salesforce's capabilities, while automated emails for agents and users demanded precise configurations and workflows.

Testing email functionality was particularly challenging as Salesforce sandboxes do not support email delivery. All testing had to be conducted in production, making accuracy and confidence in the implementation critical. With guidance from my team and thorough testing using tools like email logs and delivery reports, I successfully delivered these features.

### **Data Migration and Integration for LIFE**

The Life for Relief and Development project required migrating all operational data from legacy systems into Salesforce. LIFE, being a large NGO that has distributed over 620 million US dollars since its inception, had a massive volume of data to be transferred, spanning donor records, transaction history, and campaign details.

This was a particularly daunting task as I had to ensure data integrity while migrating historical data. Additionally, the need to deduplicate records and maintain consistency across thousands of entries added to the complexity. My solution involved using Salesforce's Data Loader tool for bulk data uploads, combined with custom scripts for deduplication and validation. This process not only streamlined data operations but also set a foundation for future scalability.

### **Dashboard Development for LIFE**

Building a custom child dashboard for LIFE posed challenges in both design and functionality. The dashboard needed to display complex donation metrics with features like server-side pagination and sorting, ensuring a seamless user experience even with large datasets.

The biggest challenge was optimizing performance as the dashboards would be accessed by multiple users simultaneously, querying large volumes of data. By implementing server-side logic, I ensured that only the required data was loaded at any given time, reducing load time and enhancing responsiveness.

### **Payment Integration for LIFE**

Integrating Stripe and ACH payment methods into LIFE's Salesforce system involved overcoming limitations in syncing payment data. Unlike simpler payment

gateways, ACH required additional security configurations, and integrating it with recurring donations required careful planning.

Testing the integration was a major hurdle due to the complexity of ACH workflows. However, by leveraging Stripe's APIs and Salesforce's capabilities, I created a seamless payment experience. This included configuring alerts for recurring donations, such as notifying users when their credit card was about to expire, ensuring uninterrupted payments.

## **Stakeholder Communication and Requirement Clarification**

In both projects of Travel Raro and LIFE, communication with stakeholders was the most important. It was highly vital that all needs were understood with clarity and, simultaneously, aligned toward the project requirements. Regular feedback sessions, stakeholder meetings, and review cycles were conducted for the purpose of gathering precise requirements and clearing ambiguity in needs.

Travel Raro was highly involved in the design, especially regarding the functionality and UI of the booking system. We debated many features and design elements back and forth until they were happy with the solution. Clear communication was crucial to make the final decision on the labeling, user experience, and functionality.

The stakeholders of the LIFE project emphasized that the UI should be handy, easy, especially on the payment page. We kept discussions and demos with constant feedback for alignment with their needs. Regular updates were also shared to ensure the system would meet the data retention requirement for a long time-up to 10 years-and scalability of the platform for global access at regional offices.

These interactions have aided in the building of trust and assurance that the systems we developed were functional and in line with what the stakeholders had envisioned, hence the success of the projects altogether.

These challenges not only pushed me to grow as a developer but also allowed me to develop a deeper understanding of Salesforce's capabilities and its potential to drive business transformation. The solutions I implemented addressed immediate needs while ensuring scalability and efficiency for the future.

## **5.4 Learning Outcomes**

### **5.4.1 Skills Gained**

Throughout my internship at TwinForce, I developed a range of valuable technical and soft skills. These skills have not only strengthened my capabilities as a developer but have also prepared me for future roles in the software development industry. My exposure to real-world projects, combined with structured learning, allowed me to grow in various areas such as system design, programming, testing, and collaborating within a team.

#### **Software Development Proficiency**

The internship helped me solidify my foundation in software development, enhancing my technical knowledge across various technologies and practices. I was introduced

to real-world systems that provided opportunities to apply development principles, including design patterns, optimization, and integration.

One key area I improved was my ability to develop and implement high-level designs (HLDs) and low-level designs (LLDs). These design documents were essential in breaking down complex systems, ensuring we had a clear roadmap for development. Writing these documents helped me understand how to create scalable and maintainable solutions from a top-level perspective, ensuring that the solution met both technical and business requirements.

I also learned to write clean, efficient, and maintainable code, following best practices for software development. In terms of tools, I gained experience working with various platforms and technologies, including APIs, third-party integrations, and different software development frameworks. The overall exposure broadened my perspective on how development works across different tech stacks.

## **Programming and Automation**

One of the biggest takeaways was learning to write clean, reusable, and efficient code. While I focused on Apex and Salesforce-specific technologies, the principles apply to any development environment. I now approach problems thinking about modularity and efficiency first, whether building APIs, data pipelines, or back-end logic.

Creating detailed test cases became routine. Writing unit tests, integration tests, and user acceptance tests (UAT) taught me that quality assurance is as important as the initial implementation. Testing revealed edge cases I hadn't considered and caught bugs before they reached production, reinforcing that the development lifecycle extends well beyond writing code.

## **System Design and Architecture**

Working on both high-level design (HLD) and low-level design (LLD) documents gave me a deeper understanding of how to structure complex systems. I was involved in feasibility analysis to evaluate the technical and operational aspects of a project. This process allowed me to gain insights into how developers and project managers approach system architecture and ensure the scalability and sustainability of their solutions.

By analyzing different systems, I also realized the importance of adhering to industry standards for design patterns, security measures, and code efficiency. This experience made me aware of how to balance performance, maintainability, and user needs while designing a system.

## **Lightning Web Components (LWC)**

I gained hands-on experience in developing LWCs, which enhanced my ability to create responsive and interactive user interfaces. This skill is essential for modern front end development, as it allows for the creation of user-friendly applications. Recently we are thinking of adding next.js to the front end to make it more responsive and user-friendly. This experience will help me tremendously in the future. And since Salesforce had recently added typescript support out of the box I will have a lot of opportunities in the tech field.

## **Workflow Automation**

Through the use of Salesforce Flows, I learned how to automate complex business processes, reducing manual intervention and streamlining operations. Although flows are not that common in other stacks but this helped me immensely understanding the whole process at once, how front end and backend works together. How backend can be used to do DML in multiple ways.

## **Testing and Debugging**

Testing and debugging are crucial in software development, and this internship gave me ample opportunities to hone these skills. I was involved in both manual and automated testing, ensuring the applications I worked on were fully functional and reliable. Debugging skills were sharpened through hands-on practice, especially in understanding how to trace and fix bugs in complex systems.

I also learned how to document test cases, track bugs effectively, and optimize code based on feedback from testing results. A key lesson here was the importance of negative testing—testing the edge cases and unexpected scenarios. I learned the hard way when a bug in email validation slipped through due to insufficient negative testing, but it was an invaluable lesson in testing rigor.

## **Compliance and Accessibility in Development**

Working with live systems taught me that accessibility is non-negotiable, not optional. I learned this the hard way when my initial solution using `display: none` for conditional rendering broke screen reader compatibility. Screen readers couldn't access hidden elements, making the interface unusable for visually impaired users. This mistake taught me that building features is only half the job—ensuring those features work for everyone is equally important. I started paying attention to WCAG guidelines and testing with assistive technologies, understanding that accessibility compliance is both an ethical responsibility and often a legal requirement.

## **Problem-Solving and Adaptability**

The ability to quickly adapt and solve problems is essential in any developer's career, and my internship helped me improve these skills significantly. Real-world projects often come with unforeseen challenges, which require flexibility and creative thinking. For example, during the Life for Relief and Development (LIFE) project, I was initially tasked with integrating Shopify into the system. However, I encountered limitations with product syncing and payment systems, so I recommended switching to Salesforce, which turned out to be a better solution.

Such instances taught me to always think critically, look for alternatives, and consider the bigger picture when making development decisions. Learning how to troubleshoot, iterate, and adapt to client feedback was crucial to my development as a problem solver.

## **5.4.2 Soft Skills Developed**

Beyond technical skills, this internship pushed me to develop professionally in ways I hadn't anticipated.

## **Team Collaboration and Communication**

As an introvert, joining team discussions was initially uncomfortable. I hesitated to speak up in meetings and preferred working independently. But code reviews and brainstorming sessions forced me out of that comfort zone. I had to explain my implementation choices, defend design decisions, and sometimes admit when I didn't understand something.

Over time, I learned that asking questions early saves hours of debugging later. I discovered that sharing half-formed ideas during discussions often led to better solutions than working alone. Software development, I realized, is fundamentally collaborative—no matter how independent the actual coding feels.

## **Time Management and Adaptability**

Juggling multiple features across two projects with overlapping deadlines was challenging. I had to learn to estimate task duration realistically—something I was terrible at initially. What I thought would take two hours often took a full day once I accounted for testing and edge cases.

My team lead's structured planning approach helped. Breaking large tasks into smaller chunks and tracking progress daily made deadlines less overwhelming. I learned that delivering working code incrementally is better than aiming for perfection and missing deadlines.

## **Industry Knowledge and Best Practices**

The biggest difference between personal projects and professional development? Accountability. In personal projects, I could skip documentation, ignore edge cases, and move on when something "mostly worked." In production systems, none of that was acceptable.

Working in an Agile environment introduced me to sprints, scrum meetings, and backlogs. I experienced the iterative process of delivering working software in increments, gathering feedback, and adapting. I learned that production code requires thinking beyond implementation—considering maintenance, security, compliance, and how other developers will interact with your code months later.

### **5.4.3 Real-World Application**

The skills and experiences I gained during my internship have equipped me to apply my knowledge in real-world development tasks. My confidence in problem-solving, designing systems, and delivering solutions has grown significantly.

## **Project Contributions**

### **Travel Raro Project**

Working on the Travel Raro project gave me practical experience in creating and implementing a booking system. This system was crucial in improving operational efficiency and providing a seamless user experience. I was involved in designing booking flows, implementing OTP validation for anonymous users, and integrating email notifications for user actions.

### **LIFE Project**

On the LIFE project, I worked on migrating data to Salesforce, integrating third-party payment systems, and building a user-friendly interface for non-profit stakeholders. This project was an excellent opportunity to apply my skills to a live environment, understand client needs, and create value-driven solutions.

### **Industry Knowledge**

Exposure to the IT industry, particularly in the context of Salesforce development, has deepened my understanding of the software development lifecycle, project management methodologies, and client interaction. Also working in a team in an agile environment helped me a lot to understand scrum, sprint, tickets, backlogs, peer review which will be very helpful to me in the future.

### **Guidance and Mentorship**

The mentorship during my internship at TwinForce was priceless. My team leader, Niloy, did a great job: he guided me in both technical skills, like Java, data structures, and problem-solving, and soft skills. Niloy motivated independent thinking while being available for anyone anytime and providing constructive feedback to enhance one's skills.

This learning was further enhanced within the collaborative environment of the team. Seniors shared their knowledge, and thus, there was a continuous culture of growth and openness. Such mentorship improves one's skill not only technically but also in problem-solving and communication; thus, it leaves an indelible mark on career development.

### **Personal Growth and Future Aspirations**

This internship was a journey of personal growth. I went from being reserved in team settings to confidently articulating ideas and presenting solutions to stakeholders. Regular meetings, brainstorming sessions, and constructive feedback from my mentors pushed this transformation.

Live projects exposed me to the realities of professional development—tight deadlines, changing requirements, and constant prioritization. These experiences reinforced my time management and problem-solving skills, preparing me for a career that demands adaptability and continuous learning.

Looking ahead, I want to deepen my expertise in software architecture and contribute to large-scale, impactful solutions. The foundation built during this internship positions me well for my long-term goal of becoming a solution architect.

# Chapter 6

## Conclusion

This internship at TwinForce Solutions Limited has been transformative for my career trajectory. What began as a three-month internship evolved into a full-time position—a testament to the growth I experienced during those initial months. Working on Travel Raro taught me the importance of user-centric design and the value of tracking user behavior to drive business decisions. The LIFE project exposed me to the complexities of enterprise-scale data migration and the critical role of stakeholder communication in technical projects.

Beyond technical skills, this experience fundamentally changed how I approach problems. I learned that the best solution is not always the most technically sophisticated one, but rather the one that best meets client needs within given constraints. The bounced booking feature for Travel Raro, for instance, was technically simple—just a new object and flow adjustments—but it provided immense business value by enabling targeted marketing campaigns.

Looking ahead, I aim to deepen my expertise in system architecture and eventually take on leadership roles. The mentorship I received from Mr. Niloy Kanti Paul showed me that effective leadership means empowering team members to explore solutions independently while providing guidance when needed. I want to replicate that approach with future colleagues, creating environments where asking questions is encouraged and knowledge sharing is the norm.

I am currently pursuing Salesforce Administrator and Platform Developer I certifications to formalize my skills. However, the real value of this internship extends beyond any specific platform or technology. I learned how to gather requirements from stakeholders who may not be technical, translate those requirements into system designs, implement solutions that balance ideal functionality with practical constraints, and support deployed systems based on user feedback.

The transition from intern to full-time Software Engineer at TwinForce validates the practical skills I developed. As I continue in this field, I carry forward not just technical knowledge, but an understanding of the complete development lifecycle and the collaborative nature of professional software development. The foundation built during these eight months will positively impact every project I undertake, every team I join, and every challenge I face in my career ahead.

# Bibliography

- [1] *Ach direct debit*, Available at: <https://docs.stripe.com/payments/ach-direct-debit>, Stripe. [Online]. Available: <https://docs.stripe.com/payments/ach-direct-debit>.
- [2] *Amazon web services s3 documentation*, Available at: <https://aws.amazon.com/s3/>, Amazon Web Services. [Online]. Available: <https://aws.amazon.com/s3/>.
- [3] *Basis: Bangladesh association of software and information services*, Available at: <https://basis.org.bd/>, BASIS. [Online]. Available: <https://basis.org.bd/>.
- [4] *Charity and humanitarian aid — life for relief and development*, Available at: <https://www.lifeusa.org/>, Life USA. [Online]. Available: <https://www.lifeusa.org/>.
- [5] *Mulesoft api integration platform*, Available at: <https://www.mulesoft.com/platform/api-management>, MuleSoft. [Online]. Available: <https://www.mulesoft.com/platform/api-management>.
- [6] *Salesforce developer documentation*, Available at: <https://developer.salesforce.com/docs>, Salesforce. [Online]. Available: <https://developer.salesforce.com/docs>.
- [7] *Salesforce trailhead: The fun way to learn*, Available at: <https://trailhead.salesforce.com>, Salesforce. [Online]. Available: <https://trailhead.salesforce.com>.
- [8] *Travel raro*, Available at: <https://travelraro.com/>. [Online]. Available: <https://travelraro.com/>.