Eco Clean – Scheduling Solution

Course: CSIS 4495	Section: 002
Full Name	**Student Number**
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1. Introduction

Nettoyage Eco Vert is a cleaning services company delivering toxin-free eco-friendly services. The delivery of services requires effective and efficient coordination and scheduling of staff team to client's location. Currently, this process is done manually the proposed EcoClean Scheduling Solution project aims for digital transformation enhancing the company's operational efficiency. The project requires design, develop, and implement an integrated digital platform comprising a web-based scheduling portal and a companion mobile application to resolve the critical operational inefficiencies caused by a manual scheduling system of the company. A successful project delivery improves the internal resource management, team motivation, client satisfaction and future business growth.

2. Background & Context

Nettoyage Eco Vert is a values-driven eco-friendly cleaning company offering both residential and commercial services. The company currently operates in Quebec in, and specific geographic service zones, which add complexity to scheduling. Currently, appointment booking, staff allocation and communication (client confirmations, delay updates, internal notes), payroll management are managed manually via traditional methods such as email, and spreadsheets. This process is a time-consuming, high administrative overhead activity, which lacks real-time visibility for all parties involved. Furthermore, the company's growth scaling may not be able to handle by this existing manual system without adding significant administrative staff, thereby presenting a significant bottleneck.

3. Research Project

3.1. Project Design and Objectives

The project will design, build a digital solution to automate the scheduling operations of Nettoyage Eco Vert. The core objectives are:

To develop a comprehensive web-based scheduling platform that serves as the central operational hub for better operational management with administrative staff interface for optimized resource allocation, real-time monitoring, and management of all scheduling activities. Furthermore, a real-time mobile application will be designed for iOS and Android that connects clients and cleaning staff, facilitating direct updates and notifications.

3.2. Scope of Work and Deliverables

Web-Based Scheduling Platform

- User-Friendly Interface to accommodate the needs of client, front line worker and administrative staff
- Scheduling management system for booking, rescheduling, and cancelling appointments.
- Admin & Staff Dashboard for monitoring and managing schedules and assigning resources
- Google Maps integration for service area validation and route planning.

- Calendar Integration for both client and staff regarding the appointments
- Notifications and Reminders on bookings and updates

Mobile Application (iOS & Android)

- Client interface to view, book, and manage appointments and receive real-time updates
- Staff interface to access daily schedules, view client addresses and notes, and navigate via integrated maps. Additionally, if the frontline staff is delayed, they can update the client on the delay.

4. Justification

The project is aimed at delivering an end-to-end solution for an industry partner. A successful solution would lead to the replacement of the manual system by digitizing core workflows. Learning from this project can be also applied for similar business operations expanding the potential to scale other service-based businesses with a reusable, efficient digital framework.

Beyond the business rationale, this applied research project broadens our technical and design understanding in several key areas, which were not explored in the academic program earlier., including:

1. Analysing the current manual scheduling decisions and designing a practical, digitized scheduling algorithm. It may require balancing of several dynamic constraints such as staff availability, geographic service zones, job duration estimates, and client priority etc.
2. Developing cross-platform mobile applications is required to seamlessly operate on both Android and iOS. This involves managing device-specific integrations, native module usage for features like maps and notifications, and ensuring a consistent user experience across platforms.
3. Integrating real-time services such as Firebase to manage live notifications, schedule updates, and instant status changes between the web platform, mobile apps, and users.

5. Potential Benefits

This could improve the company operations in the following areas:

- Replace manual scheduling, minimizing the time spent on coordination and route management
- Better transparency for resource allocation and payroll management
- Provide a client interface for booking, rescheduling, and managing appointments
- Improve internal communication and monitoring of staff utilization
- Improve client communication
- Scale the business with minimum administrative resources (Hire more frontline employees with lower management overhead)

6. Hypothesis & Assumptions

It is believed that digitization of existing scheduling and introducing client and front-line interfaces will have the following impacts:

- Drastically cut down on time spent managing appointments
- Nearly eliminate booking mistakes and double-booking
- Help cleaning teams work smarter with better routes, checklist for better preparation and information
- Make clients happier through easy booking and real-time updates

However, the following assumptions have to be made:

- Clients and cleaners will effectively adopt the mobile app and utilize it.
- The company is ready to train front-line staff about the app and the administrative staff for the web-based scheduling platform.
- The business policies and plans (such as the service area map and travel fees) can be clearly set up inside the software.
- The company will invest the required amount if the initial MVP meets the requirement.

7. Research Procedures

1. **Stakeholder Input:** Conduct interviews and process walkthroughs with the administrative staff.
2. **Process Analysis:** Review existing scheduling solutions used by the business as well as previously proposed solutions.
3. **Market Analysis:** Research on similar service delivery companies and the solutions used by them.
4. **Persona & Journey Mapping:** Develop detailed profiles for client, front-line staff, and administrative staff.
5. **Requirement Prioritization:** Collaborate with the client to categorize features into MVP
6. **Technical Specification:** Document detailed system requirements, architecture, and integration points (e.g., Google Maps API, notification services).
7. **Prototyping:** Create workable prototypes for key use cases (client booking, staff check-in, admin dashboard).
8. **Usability Testing:** Testing the prototypes with representative users, gather feedback and improving the solution.

8. Technologies

This project involves the design and development of a cross-platform scheduling system accessible via both web and mobile applications. The system must support appointment creation, real-time availability management, automated reminders, and secure user authentication. To meet these objectives efficiently and scalable, a modern full-stack technology approach is required.

The selected technologies emphasize cross-platform compatibility, scalability, maintainability, and reliability, which are critical for time-sensitive systems such as schedulers.

8.1. Functional Requirements (Technical)

- Allowing users to create, view, update, and cancel appointments
- Sending automated reminders at configurable intervals (e.g., 5 days, 1 day, 1 hour before an appointment)
- Delivering notifications via multiple channels (email, push notifications)
- Navigation functionality to assist users in reaching appointment locations efficiently

8.2. Non-Functional Requirements (Technical)

- Scalability – ability to support increasing numbers of users and appointments
- Reliability – scheduled reminders must be delivered even after server restarts
- Security – protection of user data and secure authentication
- Performance – fast response times for booking and calendar views
- Maintainability – clean architecture and modular codebase
- Cross-platform support – consistent behavior across web and mobile devices

To satisfy the above requirements, the following technological capabilities are required.

8.3. Frontend Technologies

- Cross-platform user interface development
- Responsive design for a variety of devices
- Efficient state management for real-time updates
- Calendar and date-time visualization components
- Handling of location-based services, maps, geolocation

8.4. Backend Technologies

- RESTful APIs for communication with clients
- Business logic to manage scheduling rules and availability
- Secure authentication and authorization mechanisms

- Background task execution for reminders and notifications

8.5. Database Technologies

- Reliable storage of appointment and user data
- Strong support for date and time operations
- Data consistency and integrity

8.6. Proposed Platforms

8.6.1. Frontend

The system employs **React** for web application development and **React Native** for mobile application development. These frameworks support a modern, component-based architecture and enable:

Code reuse across iOS and Android platforms

Faster development cycles through shared logic and components

A consistent and unified user experience across devices

For the web application, **Next.js** is used as a React framework to enhance performance and scalability. It enables features such as server-side rendering and optimized asset loading, which improve initial load times and overall application responsiveness.

Expo

Expo is a development platform and toolchain built on top of React Native that simplifies the creation of cross-platform mobile applications. It provides a unified environment for building, testing, and deploying applications for both Android and iOS using a single codebase.

In this project, Expo plays a key role in streamlining mobile development by abstracting complex native configurations and providing access to commonly required device features.

Expo contributes to the system in the following ways:

- Cross-Platform Mobile Development: enables a single mobile codebase to run consistently on both Android and iOS
- Push-notifications supports the delivery of automated appointment reminders to mobile users
- Location and Map Support: provides access to device GPS and location permissions, enabling navigation and direction features
- Development and Deployment Tools: live reloading, simplified build processes, and over-the-air updates

8.6.2. Backend

The backend is implemented using **Node.js** with **TypeScript**, providing:

- Strong typing for reduced runtime errors
- Asynchronous processing for handling concurrent users

A structured backend framework (such as **Express**) is suitable for organizing complex scheduling logic and enforcing clean architectural boundaries.

8.6.3. Database

PostgreSQL is selected as the primary database due to:

- Advanced date and time handling
- Support for transactional operations
- High reliability and scalability

Redis is used for fast, temporary, and time-sensitive operations.

- Storing background jobs and reminder schedules
- Acting as a message broker for job queues
- Handling delayed execution (timers)
- Supporting real-time or short-lived data

Why two database technologies?

- Constant polling of PostgreSQL is inefficient
- Redis excels at fast reads/writes and time-based operations

8.6.4. Utilities

Scheduling and Reminders

Automated reminders are implemented using a background job queue system. Technologies such as Redis-based job queues such as **BullMQ** to allow the system to:

- Schedule delayed reminder tasks
- Persist scheduled jobs even if the application restarts
- Execute reminders at precise times

This approach ensures reliability and accuracy, which are critical for scheduling systems.

Notification Services

To notify users effectively:

- Email services are used for formal reminders
- Push notification services are used for mobile alerts

This multi-channel approach increases the likelihood that reminders reach users on time.

9. External Partners & Affiliates

This project was sourced through the Riipen platform.

Project Link:	https://douglascollege.riipen.com/projects/rVnMYjLj
Company:	Nettoyage Eco Vert
Company Contact:	Stephanie Riddell, Founder
Riipen Platform Contact:	Morgan Brown

10. Project Planning & Timeline

Phase / Task	Leading Person(s)*	15-Jan-26	22-Jan-26	29-Jan-26	05-Feb-26	12-Feb-26	19-Feb-26	26-Feb-26	05-Mar-26	12-Mar-26	19-Mar-26	26-Mar-26	02-Apr-26	09-Apr-26
1. DISCOVERY & ANALYSIS														
Understanding the Riipen project and its scope	Upul & Vidarshan													
Market research on existing solutions for scheduling	Upul													
Current Process Analysis	Upul & Vidarshan													
Stakeholder Interviews	Upul & Vidarshan													
2. SYSTEM DESIGN														
User Interface Design	Upul													
Database Schema Design	Upul													
3. WEB PLATFORM DEVELOPMENT														
Backend Development	Vidarshan													
Frontend Development	Vidarshan													
4. MOBILE APP DEVELOPMENT														
React Native/Expo Setup	Vidarshan													
Client App Features	Vidarshan													
Staff App Features	Vidarshan													
5. INTEGRATION & TESTING														
API Integration	Vidarshan													
System Testing (Whole system)	Upul & Vidarshan													
User Acceptance Testing	Upul													
6. DOCUMENTATION														
User Manual Creation	Upul													
Final Presentation Prep	Upul & Vidarshan													

*Please note that both members will collaborate across all phases, with leadership roles assigned according to individual strengths and technical expertise.

11. Project Contract

Course	CSIS 4495
Instructor	Padmapriya Arasanipalai Kandhadai
Project Title	Eco Clean – Scheduling System
Team Members	Atapattu, Upul M - 300392188 Arachchi Mudiyanselage, Vidarshan - 300392818

1. Purpose

We agree to work together respectfully, communicate clearly, and share responsibilities to complete this Riipen project successfully.

2. Communication & Meetings

Platform	Calls, Whatsapp and Email	
Response Time	Within 24 hours.	
Meetings Medium	Can be Online or In-person.	
Meeting Dates	Monday	3:30 PM to 8:00 PM
	Tuesday	1:30 PM to 8:00 PM
	Wednesday	8:00 AM to 12:00 PM
	Friday	3:30 PM to 8:00 PM
	Thursday, Saturday, and Sunday Urgent Meetings only.	

3. Responsibilities

Tasks will be divided fairly and adjusted as needed. Everyone is responsible for meeting deadlines and contributing to discussions.

4. Decision-Making & Conflict

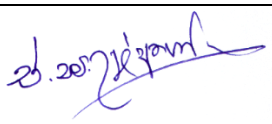
We aim for consensus decisions and disagreements will be discussed respectfully; unresolved issues may be raised with the instructor.

5. Accountability

Members will complete work on time or notify the group if delays arise. If there is a possibility of missing the deadlines due to medical or family matter, the said member must contact the instructor and ask for guidance how to handle the situation.

Signatures

We agree to the above terms:

	(Upul Atapattu, 26th January 2026)
	(Vidarshan Rathnayake, 26h January 2026)

12. AI Usage

AI Tool Name	Version, Account Type	Purpose	Value Addition
ChatGPT	5.2, Plus	Research on scheduling related frameworks and utilities for Node JS	Improved scheduling system over a traditional cron job system.
ChatGPT	Free version	What are the items that should be included in a one-page project brief for the "Cleaning Service Scheduling Solution," to build a web and mobile app for a cleaning company.	Once I got the structure, based on the nettoyageecovert.ca and Riipen project platform, I have done the brief. Added the business rationale based on operational planning experience.

13. Work Logs

Member: Vidarshan

Date	Hours	Description
20th January 2026 1:30pm-2:00pm	0.5 hours	Had the initial meeting with Stephanie Riddel to understand the scope of the Riipen project.
22nd January 2026 9:30pm-11:30pm	2 hours	Started research on technical feasibility upon discussing the requirements on a Teams meeting on 20th Tuesday.
23rd January 2026 5:30pm – 7:00pm	1.5 hours	Setup the template for the word document (Proposal)
24th January 2026 6:30pm – 8:30pm, 9:30pm – 10:30pm	3 hours	Research + setup development tools needed for the mobile app including finding resources to learn technologies if there is a skill gap. These findings will be communicated to Upul as the development commences.
25th January 2026 12:00am – 1:30am	1.5 hours	Compile and insert the information gained from the research of technologies.

Member: Upul

Date	Hours	Description
15th January 2026 2:30am-3:30am	1.5 hour	Prepare the project brief after studying the company website and the project scope.
20th January 2026 1:30pm-2:00pm	0.5 hours	Had the initial meeting with Stephanie Riddel to understand the scope of the Riipen project.
24th January 2026 4:00pm - 5:00pm	1 hour	Researched on existing scheduling solutions (ADP) and what it currently serves, what are their capabilities to understand the current market.
25th January 2026 3:00pm – 4.30pm	1.5 hour	Studied and reviewed the section that Vidarshan has done on the technologies and the development tools.
25th January 2026 8:00pm – 8.30pm	0.5 hours	Prepared the project timelines and deliverables
26th January 2026 5:00pm – 8:30pm	3.5 hours	Worked on the project proposal to match the project brief, giving background, project scope, benefits and justification and finalized.

14. References

Expo. (n.d.). Expo. Expo. https://expo.dev/

Redis. (n.d.). Redis. Redis.io. https://redis.io/

BullMQ - Background Jobs processing and message queue for NodeJS. (2018). Bullmq.io. https://bullmq.io/

Home - Nettoyage Eco Vert. (2026, January 3). Nettoyage Eco Vert. https://nettoyageecovert.ca/