Project Context Overview

Ryan Wright, the owner of Lawn Care Specialists (LCS), has a second child on the way and one of his biggest competitors has decided to retire. Ryan has taken this opportunity to expand his business with the incorporation of a new information system. Although Ryan has limited knowledge on the subject, having only taken one INFO123 class in his freshman year at the University of Canterbury. Lawn Care Specialists services include: moving, edge trimming, fertilising, dethatching and lawn treatment e.g, treatment for fungi, and Ryan would like his Information system too: (schedule optimized routes for him and his employees, work as a customer relationship management (CRM) tool keeping track of all his customers, their information and offering them specialized offers and advertisement, keep track and manage his inventory and the resources used for business e.g, petrol, and have an automated accounting system which keeps track of who has paid their bill, who still owes him and sending out invoices.)

Problems

Ryan has some loyal clients but these clients are still small, which means he hasn't captured the majority of market share in his area which can be taken by competitors. His clients also need emergency services sometimes which could cause some trouble with scheduling later if he were to expand his business. He is also about to extend his family and will need the extra income and as a father, he will want to spend more time with his family. If Ryan were to use Information Systems, this could help solve most of his problems but he has a little knowledge about computers and how to use them. By learning and integrating the system into his business, Ryan's business will become more efficient and help him grow.

Opportunities

The opportunities that arise from buying this new business are that the customers, tools and supplies, truck, and employee will be carried over to the next owner. This means that Ryan would be able to save a significant amount of money from buying inventory and could immediately begin working with his expanded customer base. With Ryan expecting a second child, having an employee who had already worked with the previous owner eases the difficulty of learning how the business normally functions and allows him to delegate some of the jobs he would usually take himself; therefore, allowing him to spend more time with his family. This growth of his business would incentivise Ryan to invest in IS, which could improve the efficiency of his business and would make it easier for him to expand it in the future.

Benefits

The GARDEN_CARE system will be a benefit for Ryan's business as the customers will be able to see the services he has to offer and book even after hours of business being closed. It will provide ease of functioning and Ryan will be able to spend more time with his family. The system will be more secure than a manual write-down method. The real-time collection of data would help in further introducing add ons to the business and tracking the new or old customer traffic. The system will increase consistency, accessibility to employees and clients. It will result in reducing manual operational costs and increasing efficiency. The new system will make it simple to store operational data, history of visitations, and communication records. It simplifies the process of supplying the essential information and hence supports in making better decisions instantaneously.

System Scope

Narrative

Ryan is intending to expand his business and buy a small residential lawn care and garden service. With this, he will have more than double the number of residential pools that will require services which leads to about 170 customers. On that account, Ryan wants to implement a GARDEN_CARE system that would assist his business growth. The system should brush up on various aspects of his business including route scheduling, customer and inventory management, and accounting.

System Requirements

Route Scheduling

Since Ryan has decided to buy the business, he will have another 170 customers that need to be taken care of which can be troubling if he doesn't have a system in place. With this expansion, he needs to coordinate his driver better so they can do their work efficiently and this is where the system will come in handy. The system should be able to produce a daily schedule by looking at the customer database and prioritise based on the location, time, and work type. The schedule should include the customer's name, address & GPS route, contact number, and work type which the driver could see through their vehicle display. After the job has been completed, the driver could mark it as finished and it'll be sent to the main computer via the internet so Ryan could review it or follow up if there is an issue. The system will continuously update the schedule each day according to the customer database in case there's a new customer or an emergency is needed.

System Priorities:

Create a daily schedule: **High**

Creating daily schedule for the employee so that they know the order and details of the jobs they

have to do for the day is the main objective of the system. We're trying to make this function the

highest priority compared to other functions because this is the critical function that is needed for

the business to operate and by doing so could prevent error when other functions are not functioning

correctly.

Sync up with customer database: High

This is the second highest priority for the system because it works together with the daily scheduler

to update the data from new customer and new job requests so that the scheduler can show the

correct data for employees.

Transfer data to vehicle and back: Medium

Allow employees to easily see the schedule from their vehicle's screen which is embedded and they

can interact with it to let Ryan knows that the job is complete or if there's an issue. It is not as

important because it can easily be communicated through phone or other means.

Create efficient route with GPS: Low

Help employees navigate to the destination efficiently. The reason it's a low priority is the same as

the previous function.

Customer Management

Ryan only served the customers he knew personally and residential areas but with the acquisition of

new business he has 170 more customers and handling all the records without a computer system

would be exhaustive. The current records are all either stored in writing or as he knows people

personally he remembers when which place needs his services. This poses a threat to data loss,

prone to human errors, inconsistencies, and lack of backups with a higher number of people to cater

to. Ryan intends to record critical customer information such as the company's name, customer's

contact name, address, phone, email, and fax. This can be achieved with a basic database

management system not making it unaffordable for him. He also wants to be able to adjust the

frequency of his visits so that it is all systematic. A workflow automation system will help in

achieving this by sending up follow up emails about visitations and invoice reminders. Furthermore,

the system should be able to pass information to other systems like accounting, forecasting or route

scheduling. It should be able to integrate well with other systems.

Ryan has seen other garden care services using marketing to capture clientele but he is not sure if he

needs it yet for his business as he is buying another lawn service. An analytical system which sends

out personalised offers for customer retention would also be beneficial. He has expressed interest in

building up a website so that customers can book him and see if his services are available in their

side of the city as he only wants to service his side of customers first. He wants the potential

customers to be notified when he starts expanding towards their area if they opt to be notified. This

could be done by using a contact management system and mass email sending system which will

save time and be more efficient. The customers in booking could be shown the sample services and

their prices.

System priorities:

Database system: **High**

Storing the exhaustive customer data is essential for Ryan because of the acquisition of another

business and increase in the number of customers. Therefore, database system has a high priority.

Competent with other systems: High

Customers are the main element for the business hence the customer management system should be

designed in a way that highly integrates with other systems.

Analytics and personalised offers system: **High**

The best way to retain customers is to cater to their individual needs and by analysing the past

services and providing them with the offers they would willing to use in future. There are multiple

lawn services avai; able in the market and to have a loyal customer base an analytical system poses a

high priority.

Website: **Medium**

A website will lead to future expansion for Ryan's business hence at the moment it do not hold

much priority as the business can still go ahead without a website. It has medium priority as it is

important but not a necessity.

Marketing: **Low**

It has low priority because Ryan is already acquiring a new business and has good number of new

customers.

Workflow automation system: **Low**

Contact management system: Low

After having a database system the workflow automation system and contact management system

can wait until more customers are added or Ryan decides to expand his services to another part of

the city so that he can get more budget for developing another two systems. Database management

system can store the data but the employees will have to manually do the contact and workflow

system works.

Inventory

Ryan realises that by buying this new business he will have more inventory that he will need to

organise. A software that could keep track of his tools, supplies, fertilisers and chemicals would be

necessary to support his growing consumer base. Some of the information about Ryan's inventory

the system may contain could include product code, product name, and quantity. Ryan also believes

that he would need software that could manage his fleet of trucks that would keep track of petrol

and oil purchases, registration and warrant of fitness (WOF), insurance, mileage, repairs, and

maintenance. Building this system would help streamline the management of his business and could

make it easier to introduce more trucks in the future if his business were to expand. Inventory

management should have a high priority as it is essential that Ryan always has the product and

equipment available to complete his jobs. This would also allow his employees to assist in

managing the inventory. Truck management has a medium priority because the number of trucks

Ryan has available is only between 1-2. This function would be more useful for when he has a

larger fleet of trucks; however, it may be more efficient for him to include this feature now to save

time building this system in the future and to prevent future difficulties of learning how it works.

System priorities:

Inventory management: High

Truck management: Medium

Accounting

Before decided to expand his business he would individually write and mail each of his invoices,

this was because he had a smaller customer base and he knew each individually. This is not viable

anymore with Ryan expanding his business so will his customer base making his process of

invoicing way too time-consuming and a lot more prone to human error.

Ryan's new IS will automatically on a monthly basis send out an invoice to each of his customers

for their monthly fee and any other non regular fees that have occurred in that given month such as

a dethatching service.

The new IS will also have to track which customers have still yet to pay and the amount they owe,

this function of the IS could be integrated with the customer system by having an amount owed

section, this way you will not have to load in all the customers' details twice.

With Ryan's new expansion there will be new employees who will need to be put on the payroll,

when Ryan was working alone he would have his accountant do all his taxes and theoretically he

could do the payroll, this makes this feature not as high priority as the rest although having an

automated payroll and tax feature would save Ryan a lot of expenses especially in the long-run.

Lastly, Ryan would want a forecasting feature that will give him an estimate of how well his

business will do and if it will cover his expenses, with increased labour cost, material costs, rent,

and a need for inventory, now he can not store his supplies in his truck having a forecasting feature

would allow Ryan to adjust the number of expenses he can afford.

System Priorities:

Automated invoice/billing system: **High**

Due to Ryan's increased customer base, handwriting invoices is too time consuming and

prone to human errors.

Automated payroll & tax system: **Medium/High**

Much like the invoice, Ryan's increased customer base leads to Ryan becoming more busy

and having less time to hand file his taxes and do his payroll. Although time taken is not as

long as invoicing and his accountant could file his taxes for him, so it is not as high of a

priority as invoice/billing.

Tracking customer's bill: **High**

This is because of the large number of new customers, it would be impossible for Ryan to

keep track. If Ryan forgot who has yet to pay there could be a chance they do not get

notified and Ryan loses out on revenue. If Ryan forgets who has already paid he could lose a

potential customer and it could damage LawnCares reputation.

Forecasting tool: High

This allows Ryan to make strategic decisions helping LawnCare in the long term. This tool

would also help Ryan purchase supplies and have minimal inventory to reduce inventory

costs.

LaMotte

Ryan also considers a range of organic lawn care products and is contemplating whether it is

plausible to expand his business into organic gardening. Moreover, an Auckland-based company,

The Supreme Lawns, is planning to expand its business into Christchurch which in turn, would

intensify the competition. Nevertheless, Ryan believes he should focus on the basics for now

instead of thinking too far ahead. Hence, having his own lawn care products and expanding

business would be low priorities for now.

System priorities:

Having lawn care products: Low

Expanding business: Low

System Functions Prioritising

Ryan wishes for four main functions to be in his GARDEN CARE system which are route

scheduling, customer management, inventory management, and accounting.

The highest priority would be accounting as he tremendously needs good software to keep tabs on

customers' invoices and bills. Having the system to automatically issue invoices to customers is

highly significant in dealing with a large number of customers. As he will have an employee, an

accounting system that will handle the payroll issues would be much easier and cheaper. Not only that, his inventories would increase too which requires bigger storeroom and hence, more expenses. Therefore, having an accounting system that works together with his customer and inventory management would be the top priority.

The next priority would be the customer management function. Ryan requires a database system to store his customers' records as he cannot afford data loss with the increased number of customers. The system should be able to integrate with accounting and route scheduling functions for optimal use. He also considers marketing his business to capture clientele but it is trivial for now. However, a website might help him manage his services with booking options and potential customers will get notified once he expanded his business.

Inventory management and route scheduling would be the next priorities with his growing consumer base. A software to organise his inventory but also keep track of his trucks' information such as maintenance and petrol use would be beneficial especially if the business were to expand further. Ryan also requested a route scheduler that would increase efficiency between jobs. This feature should be able to coordinate with the customer management function so he can prioritise customers based on location, time, and work type.

Ryan's plan to expand his business into organic gardening would be a low priority at the moment. Although a rival company would cause stiffer competition, it is best if he focuses on the basics for the time being and carries on upgrading his business.

Assumptions:

Customers will be charged once the job has been finished Inventory are updated by every employees based on their usage that day

Project Schedule



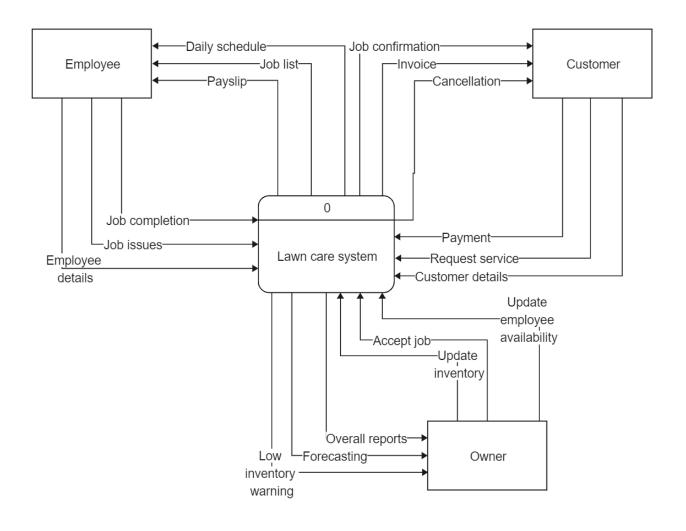
ID.	Milestone 1	Start	Finish	Duration	Aug 2021	
L					8/0	25/8
1	Introduction	9/08/2021	12/08/2021	4d		
2	Business Problems	9/08/2021	12/08/2021	4d		
3	Opportunities	9/08/2021	12/08/2021	4d		
4	Benefits	9/08/2021	12/08/2021	4d		
5	System Scope and Narrative	12/08/2021	16/08/2021	3d		
6	Route Sche duling	12/08/2021	16/08/2021	3d		
7	Customers Management	12/08/2021	16/08/2021	3d		
8	Inventory Management	12/08/2021	16/08/2021	3d		
9	Accounting	12/08/2021	16/08/2021	3d		
10	La Motte	12/08/2021	16/08/2021	3d		
11	System Function Prioritising	12/08/2021	16/08/2021	3d		

ΙD	Milestone 2	Start	Finish	Duration	Sep 2021	
					19/9 26/9	
1	Context Diagram and Level-0 Diagram with Narrative	17/09/2021	1/10/2021	11d	William,Sahaj	
2	Use Case Diagram and Written Use Case	17/09/2021	1/10/2021	11d	Aaron, Jae	
3	Entity Relationship Diagram	17/09/2021	1/10/2021	11d		

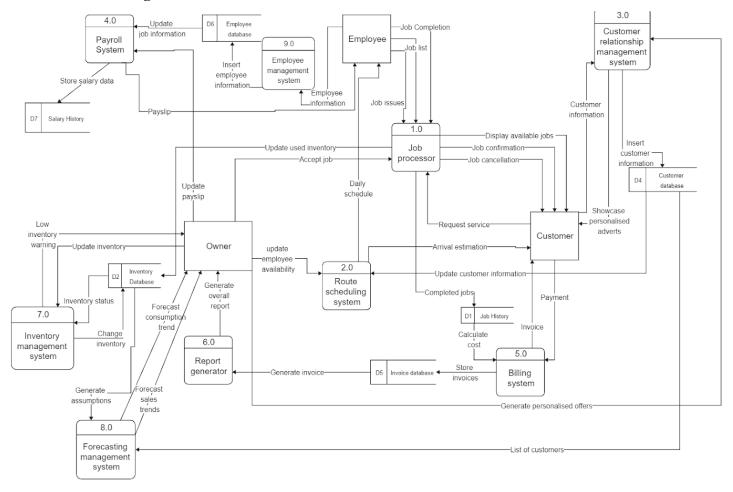
םו	Milestone 3	Start	Finish	Duration	Oct 2021
1	Home Page for Owner, Customer and Employee's sides	8/10/2021	20/10/2021	9d	
2	Login and Create Account Page	8/10/2021	20/10/2021	9d	
3	Customer Booking and Payment Page	8/10/2021	20/10/2021	9d	
4	Customer Details and Payroll Form	8/10/2021	20/10/2021	9d	
5	Inventory Management and Sales (Forecasting) Page	8/10/2021	20/10/2021	9d	
6	Jobs Page for Completed, Current and Upcoming	8/10/2021	20/10/2021	9d	
7	Gantt Chart	20/10/2021	26/10/2021	5d	
8	Describe how the prototype reflects the system functions and solves the business problems	20/10/2021	22/10/2021	3d	-
9	Provide Assumptions for the System	20/10/2021	22/10/2021	3d	
10	Summary of what functionality should be included	25/10/2021	26/10/2021	2d	
11	Acquisition Approach	25/10/2021	26/10/2021	2d	
12	Provide estimated cost of system	25/10/2021	26/10/2021	2d	
13	Outline feasibility assessments of the system	25/10/2021	26/10/2021	2d	
14	Edit presentation video	25/10/2021	26/10/2021	2d	

Logical Design Description

1. Context diagram (with narrative description)



2. Level-0 Diagram



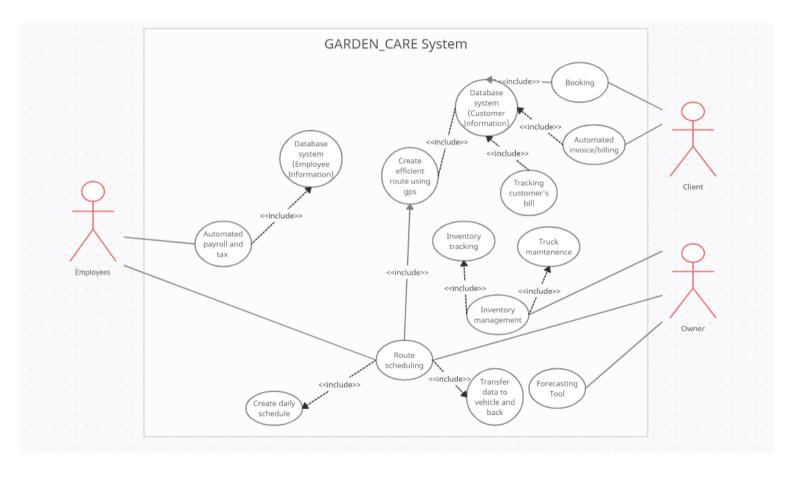
Narrative Description

The focus of our system is the convenience for the owner of the business. It is designed to simplify all the processes. We have a job processor that will autonomously do most of the main tasks, guided by some secondary processes to help. The job processor will gather all the requested jobs from customers and send them out accordingly to the owner and employees. The request must go to the owner for approval and then employees can continue on with the tasks. Once the job has been sent, it'll automatically access the inventory database and update it based on how much inventory has been used. This inventory database will be used by the inventory management system to give the owner a warning when their inventory is low, and the owner can also update how many inventories they have through this system. Not only that, but the inventory database can be used by the forecasting management system along with the customer database to make a forecast about the consumption and sales trend for the owner. This will provide economic benefit to the owner. With our system, employee wages can also be done automatically. Employees will have to fill out their details which then will be processed by the system and then stored inside the employee database

before the system could send the payslip to them. Owner can easily update the payslip details from the system and the system will save the payment history inside the database for future reference. The next system route scheduling uses a customer database to process all the customer information and the employee availability updated by the owner to generate a daily schedule for employees. It sends an estimation of arrival for providing services to the customers. Customer relationship system stores this customer database and enables them to be forecasted to show personalised advertisements. It helps us to better understand customers and provide them with quality services. Furthermore, our automated billing system processes the cost of all completed jobs from the database of job history and generates an invoice to be sent to the customer. This billing system flags the customers who have not paid their amounts for longer than fifteen days. All of this data is stored in an invoice database to be able to generate reports through a report generator and provide overall reports to the owner.

3. Use case diagram and written use case

Use case diagram:



Written use case:

Use Case Title: Booking

Primary Actor: Client

Level: Blue

Stakeholders: Client, LawnCare Specialist

Precondition: Client has access to LawnCare Specialist website

Minimal Guarantee: Client fails to book

Success Guarantee: Client successfully creates a booking

Trigger: Client accesses LawnCare's website

Main Success Scenario:

1. Client logs in.

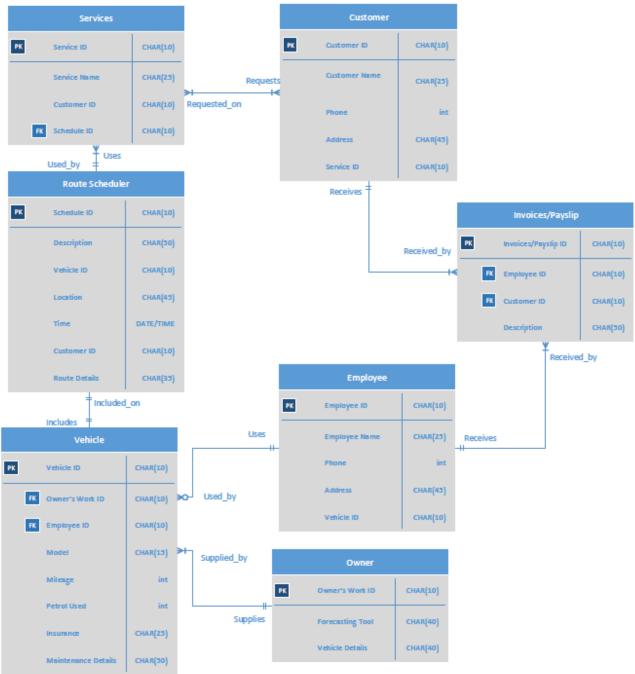
- 2. Client goes into the booking section of the website.
- 3. Client places a booking.
- 4. LawnCare sends confirmation of booking and notifies related parties.
- 5. Client receives confirmation

Extensions:

- 1a. Client does not have an account:
 - 1a1. Client registers for an account.
 - 1a2. Client leaves the website.
 - 1a3. Client proceeds to book anyways. When the customer lands on the booking section they are prompted for their location
- 2a. Client's location is not in business range:
 - 2a1. Client leaves the website
- 3a. No available bookings:
 - 3a1. Client tries to book a different day. Client cancels current booking
 - 3a2. Client books with another service. Client leaves website

- 5a. Confirmation fails to send:
 - 5a2. LawnCare booking system failure. Client contacts LawnCare about the problem.
- 5b. Incorrect booking details:
 - 5b1. Client puts in wrong details. Client contacts LawnCare to fix order details.

4. Entity-Relationship Diagram:



Narrative Description

The owner supplies vehicles which will be used by employees to provide services for customers. Each vehicle includes a route scheduler which specifies the service requested by customers and their locations. Invoices will be provided to customers whilst employees will receive their payslips.

Recommendation of a solution

Acquisition approach

The final outcome of our system is to use an integrated approach of outsourcing and building several systems. This will be described individually according to each system.

Customer management system

Even Though there are multiple CRM softwares available off the shelf we have decided to build a new system so that it caters to individual needs for Ryan's business and in the future he doesn't have to worry about more investment into an important system such as Customer relationship management system. Building a system will also help to form a strategy for the business to meet the customer expectations. The CRM system will store all customer details and integrate with route scheduling, billing, report generating and forecasting systems. Additionally it will send personalised offers and adverts to the customers.

Accounting system: billing and payroll system

We decided to divide the accounting system into two subsystems of billing and payroll management. Billing system will take care of all customer side invoices while payroll system will manage all employee salaries. Both the systems will use the approach of in house building in order to achieve the functionality what Ryan is looking forward to.

Route scheduling system

This system will use an outsourced software from OptimoRoute. This software will be bought off the shelf and will be improved for Lawn Care system. At the moment Ryan only serves customers in his side of the city which means he doesnt need to spend money on getting a fully optimised system. OptimoRoute optimizes schedules and addresses so one can focus on improving clients' experiences and developing business.

Inventory management system

This system will be available to Ryan to see online and to track the inventory. We have decided to build this system because currently Ryan doesn't have an extensive amount of inventory and it will be cost efficient to build an in house system rather than purchasing off the shelf. The system will track all the used inventory and send out an alert when the stock falls below a certain limit. It will showcase petrol cost for trucks, their wof dates, maintenance needed and product quantities.

Forecasting system

This system will use the data from inventory and customer details database to formulate assumptions for consumption and sales trends. Forecasting system will be built in house so that sensitive business details are not shared with the third party softwares. Furthermore, It will be more efficient and productive if it is not outsourced.

Cost Assessment

For Ryan's information system, we recommend buying an off the shelf software, then building upon the existing software with the various functions Ryan needs. This will help to cut costs and make adding the new features less demanding. We recommend that the customer database, inventory management, and accounting software be built manually. The route scheduling software will be outsourced due to the difficulty of creating an efficient routing system. Due to Ryan's business being relatively small, we expect the overall development cost of the information system to be between \$50,000 and \$75,000. For a general one-time purchase off the shelf management software, we estimate the price to be around \$3,000. The customer database, inventory management, and account system will all have a similar level of complexity in design; therefore, the price for each component should be approximately the same. We expect the price to be roughly around \$15,000 for each part. As the route scheduling system will only be a section of the entire system, it should not require a significant amount of workers for completion. We recommend allocating a set budget of \$10,000 for the development of the route scheduling system. This will bring the total cost of the information system to be roughly around \$58,000.

Off the shelf software: \$3,000

Customer database: \$15,000

Inventory management: \$15,000

Accounting system: \$15,000

Route scheduling: \$10,000

Total: \$58,000

Feasibility analysis

• Economic:

- Tangible benefits: Automated, so there will be less room for error, Increased speed due to automated payroll, route, invoices.
- Intangible benefits: Forecasting tool providing faster and higher quality information.
- Tangible costs: Employee training, cost of creating a system.
- Intangible cost: Decreased customers' satisfaction who liked the personal handwritten invoices.
- Recurring costs: System maintenance.

Technical:

- Ryan and his team are not familiar with information systems so training will be needed.
- Ryan will hire a team that is familiar with customising information systems to reduce potential risks

• Scheduling:

• With Gantt charts, appropriate milestones and deadlines our system will be completed in the necessary time frame.

Legal:

• Use of icons were from a free to use png website.

Functionality that should be included:

We think that including all of the required systems that Ryan asked for is possible however from all the systems, there are some optional functionality that Ryan may want to opt out from. This could save costs and time building the systems and also make it potentially more efficient.

From the route scheduling system, there are four functionalities included which are creating a daily schedule, the ability to sync with customer databases, the ability to transfer data between vehicle and the system, and efficient route navigation with GPS. Out of these four, the ability to create daily schedules and sync with customer databases are necessary for the system to work so it needs to be included. The third functionality to transfer data back and forth from vehicle to the main system can be done manually through employee's phone for example but including this will save more time not

only for the employee but Ryan as well considering how many jobs he will have once he has expanded. The last functionality however is totally optional and not as important as the other function because employees can do this manually and doesn't really help Ryan in saving time.

In the customer management system there are seven functionalities. From these functionalities, we think that the database system, analytic and personalised offer, website, and the ability to integrate with other systems need to be included since it is the backbone of this system. The other functionalities are totally optional but would help the system and attract more customers.

Inventory system only has 2 functionalities and the first one which is the inventory management is a functionality that Ryan needs. The truck management will be important if he wants to add more trucks to his business when he expands so we think this should be included as well for future-proofing.

Accounting is the fourth system and will have four functionalities which we think are all important to be added to the system because all of these are really time-saving functionalities. Ryan won't have to calculate and keep track of every single invoice he has since it is automatically saved to the system and calculated as well so at the end of the period he will get a report containing the summary of how his business is going.

Lastly we have LaMotte which is not a required system that Ryan asked but could help grow his business. There are two functionalities and these are not necessary at all since the system will function well even without them.

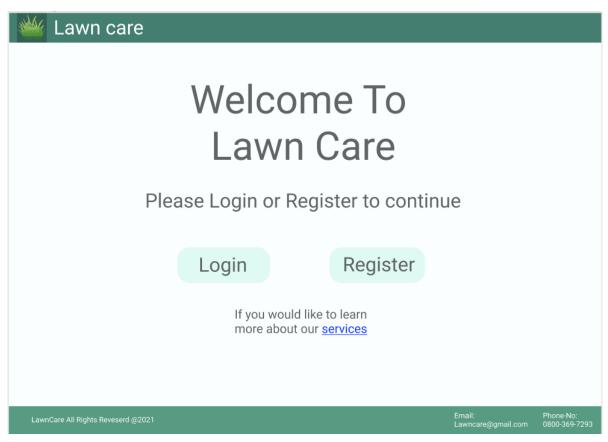
Group Organization and Peer Evaluations of Contribution

- 1. Each member put in the required amount of quality in their work, after their parts were submitted the rest of the members reviewed their part and then either a. Found a problem which was then properly adjusted or b. There were no problems, no further action was taken.
- 2. The level of effort performed by each member was uniform among all members. Everyone strived to perform at their best in order for the project to receive the highest possible mark. When there were parts one member did not understand, others would help contribute their ideas to support them.
- 3. All members participated actively in group meetings. Everyone will collectively discuss the date, time and location prior to each meeting that fits each other's schedules so that we all can make it. In every meeting, each individual will voice out their opinions or any remarks for discussion. Each activity was analysed and then organised into equal workloads, which then was divided equally among each teammate.

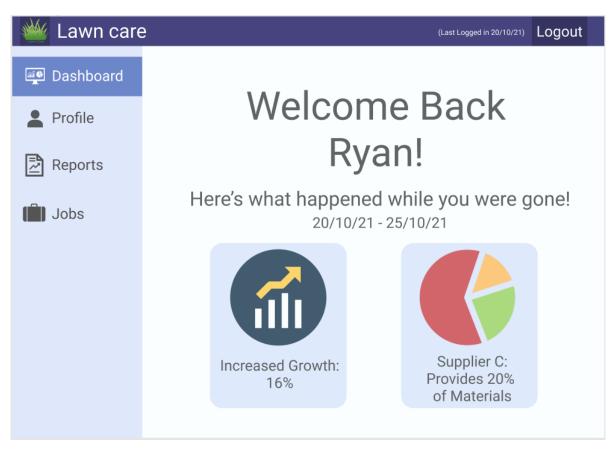
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- 3. https://optimoroute.com/business-types/

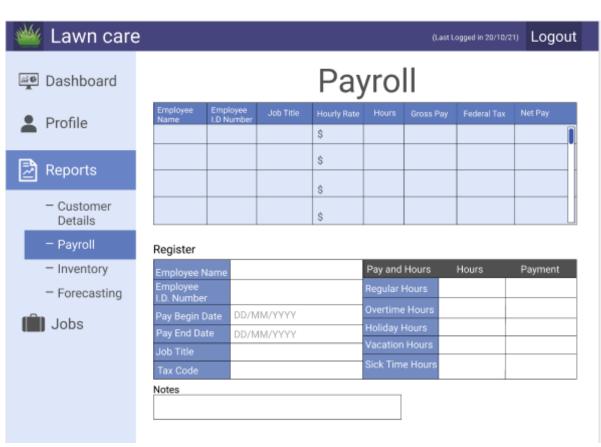
Prototype

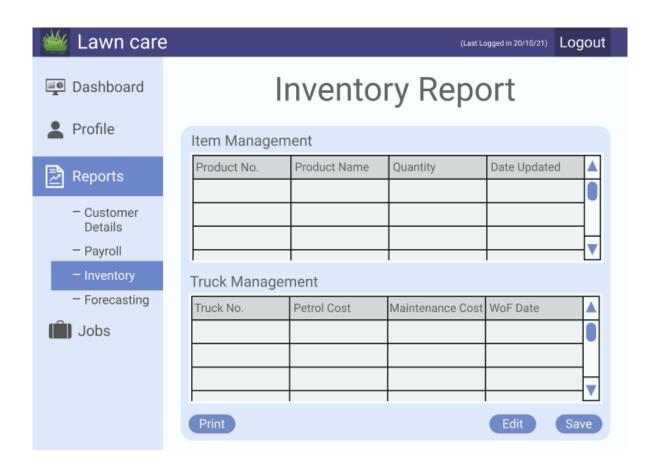


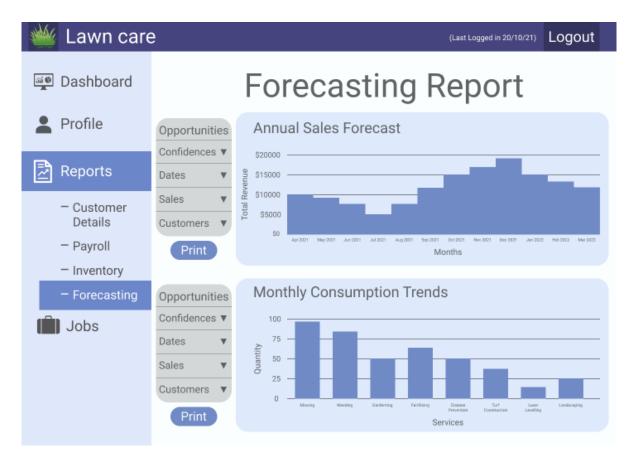
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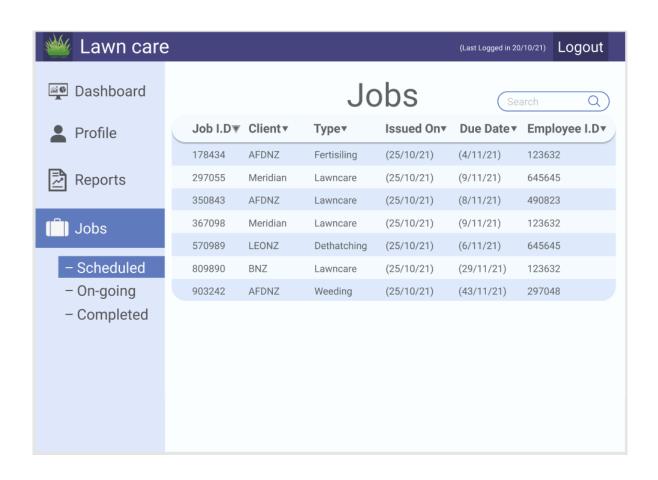








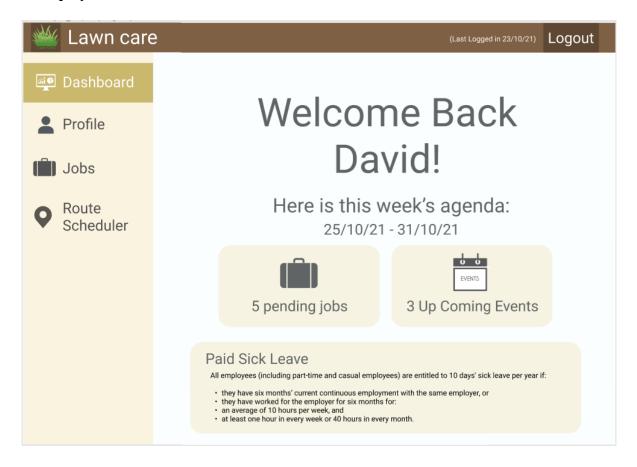




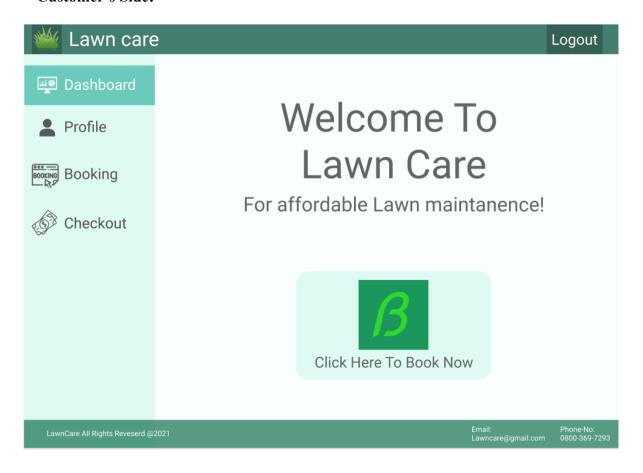


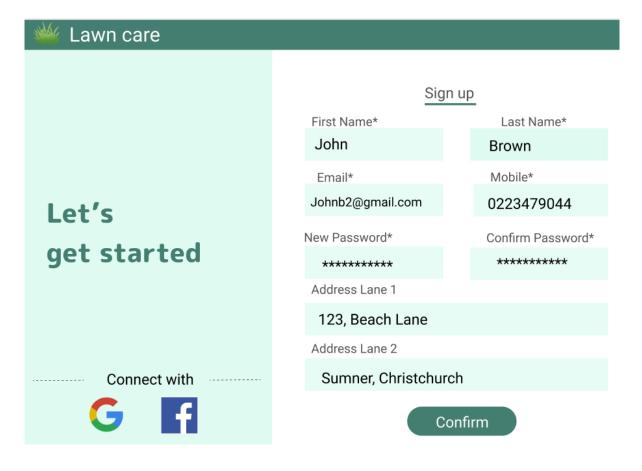


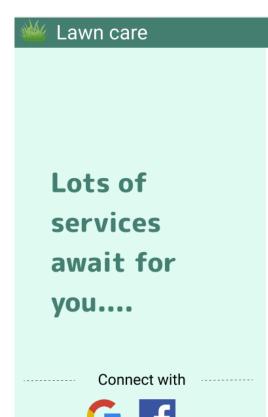
• Employee's Side:



• Customer's Side:







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