

Student ID: 2136685

CCSE Coursework 1

# Global Finance Website

Student ID: 2136685

## Table of Contents

Table of Contents.....	2
Table of Figures.....	2
Table of Tables .....	2
The Problem.....	3
Business Requirements.....	3
The Stakeholders.....	3
Using the Agile Methodology .....	4
Software Architecture .....	4
Data Flow Diagram.....	5
The Prototype .....	6
References .....	8
Appendix .....	9

## Table of Figures

Figure 1 - Agile Software Development Lifecycle (TutorialsCampus, 2023).....	4
Figure 2 - Event-Driven Architecture Diagram (University of Waterloo, 2021).....	5
Figure 3 - Level 0 Data Flow Diagram .....	5
Figure 4 - Level 1 Data Flow Diagram .....	6
Figure 5 - Landing page of the website.....	12
Figure 6 - Car catalogue showing the status of the stock .....	12
Figure 7 - Basket page .....	13
Figure 8 - Full payment page.....	13
Figure 9 - Financing page part 1.....	14
Figure 10 - Financing page part 2.....	14
Figure 11 - Financing page part 3.....	15
Figure 12 - Thank you page.....	15
Figure 13 - Financing page with mobile and address already set.....	16
Figure 14 - Customer checking application in the account page .....	16
Figure 15 - Administration page reserved inventory .....	17
Figure 16 - Administration page showing customer applications .....	17
Figure 17 - Administration page accepting an application .....	18
Figure 18 - Administration page showing sold inventory after accepting an application .....	18

## Table of Tables

Table 1 - Functional and Non-Functional Requirements .....	9
Table 2 - Requirements mapped onto Epics and User Stories.....	11

## The Problem

Global Finance explain that the process of applying for a loan involves a customer calling into a service centre and telling an agent their details. The agent then directs the customer to the dealer where they need to verify the customer's identity documents, afterwards sending the documents to the agent. The agent will then enter the customer's details into the retail system after which an underwriter will follow a manual process to get the customer loan agreement and post it to the dealer. The customer can then sign the documents at the dealer and a new car will be ordered for them.

This process takes up a lot of time for all the parties involved, making it unnecessarily tedious to sell one car. The process makes Global Finance and their partner dealerships inefficient at processing as many customers as possible and possibly even deterring customers from recommending Global Finance or changing their minds.

## Business Requirements

Their solution proposal was developing a modular digital platform via a website where the customers the first module would be a car browser. After selecting a car, the customer is redirected to either the full payment module, where they are asked to visit their closest dealership, or the finance module, where the customer can apply for financing by filling out a form with their personal details and a document for verification. The customer details and the uploaded document are stored onto the server and accessible by the customer through an account portal. Global Finance also suggested the use of an administration portal to keep track of inventory, number of cars sold, the customer finance applications and the uploaded documents to support the applications.

The functional and non-functional requirements are translated from the business requirements and can be seen in Table 1 in the Appendix.

## The Stakeholders

The solution will be beneficial for all the stakeholders involved, including the customers, the partner dealerships' owners and their employees and Global Finance's owners and employees, as well as their respective investors, as the customers will get a rapid processing experience, getting their car much faster, which increases customer satisfaction. This encourages satisfied customers to recommend Global Finance's services to friends and family and they could also return to purchase another car, increasing the sale of cars. The owners of the companies and their investors benefit from increased profits from the increased number of sales, whereas the employees may benefit from a pay increase or hour decrease as a result of the increase in profits.

## Using the Agile Methodology

The Agile SDLC as this methodology is the standard in the industry and for good reason. Agile can build a more quality, more suited product faster as it uses software release iterations called “sprints”. Each sprint, a prototype is built based on the basic requirements set in the beginning. With each sprint, feedback is received, and more requirements are added until the highest quality prototype is built, suited to the stakeholders. The scope of the requirements is defined through epics, which encompass more user stories. Epics get broken down into specific user stories. These user stories - defined in Table 2 - can be mapped using the functional and non-functional requirements defined in Table 1. (TutorialsPoint, 2019)

The user stories defined in Table 2 will be used to develop the Minimum Viable Product (MVP) as the first prototype of the project. The MVP is built out of the minimum features defined so that the loop of sprint cycle can begin. More features will then be added onto each iteration as each sprint is completed, building a new prototype with more features, until the full product is delivered. (ProductPlan, 2022)

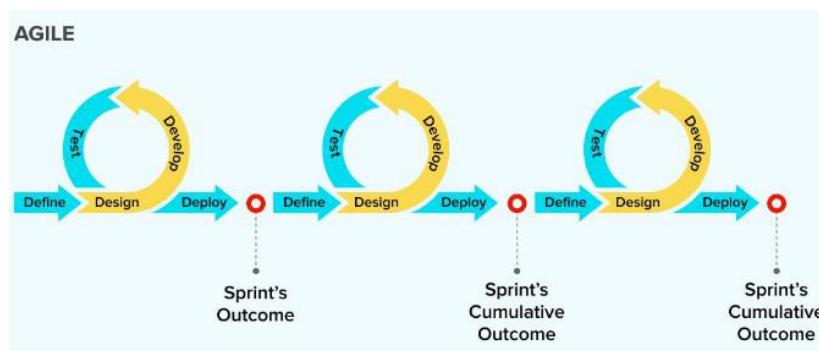


Figure 1 - Agile Software Development Lifecycle (TutorialsCampus, 2023)

## Software Architecture

Websites are specifically built for a user to interact with them, clicking buttons and filling forms. As a result, I chose the event-driven architecture to develop my solution. The event-driven architecture is controlled by external events, which are triggered by event producers. All users of the website are event producers, for example attempting to add a car to basket, or logging into the website. These external events occur in the front-end of the website and when produced, these events get sent to the event bus which gathers all the events occurring and then distributes them either to the event processing engine (or engine consumer) or distributes the response to the events back to the event producer. The event processing engine will take an event from the event bus, and it must generate an appropriate response to it. Taking the example above, the event might be “add a car to basket”. The event processing engine would send the appropriate response back to the event producer through the event bus to set the car in the basket and load the basket page, to display the car in it. (Roddewig, 2022; University of Waterloo, 2021)

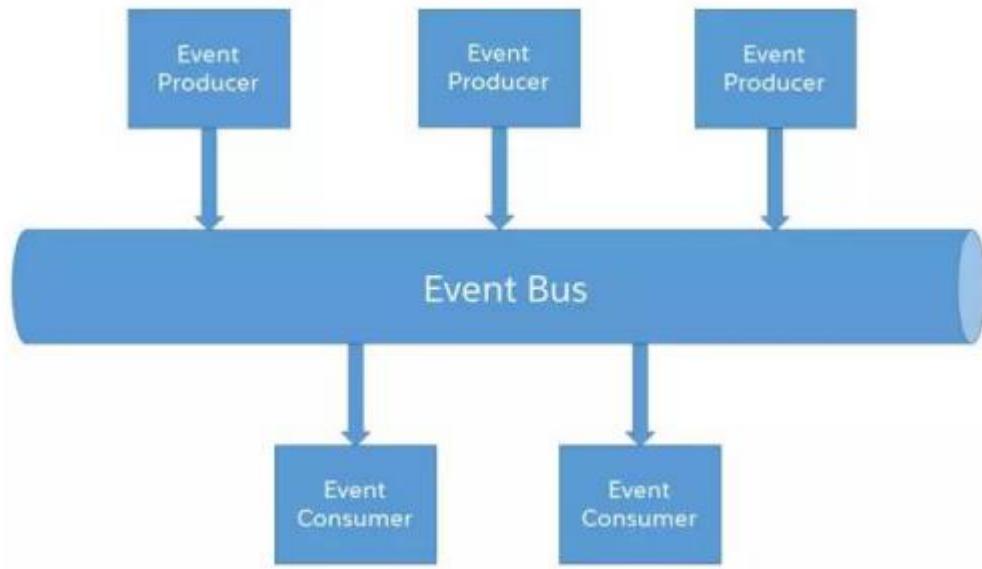


Figure 2 - Event-Driven Architecture Diagram (University of Waterloo, 2021)

## Data Flow Diagram

Data flow diagrams are crucial to show the data flow of the website. To show the flow of data of the solution, I used the Gane-Sarson notation as it was the notation, I believed was easier to expand into deeper levels of the data flow diagram. There are multiple levels to data flow diagrams. A level 0 diagram is very basic and only shows the general data flow of the website. Going up the levels, the diagram gets more granular for the process described in the previous level. For example, a level 0 data flow diagram of the Global Finance's website is shown in the figure below. (Chi, 2021; Lucidchart, 2017; VisualParadigm, 2023)

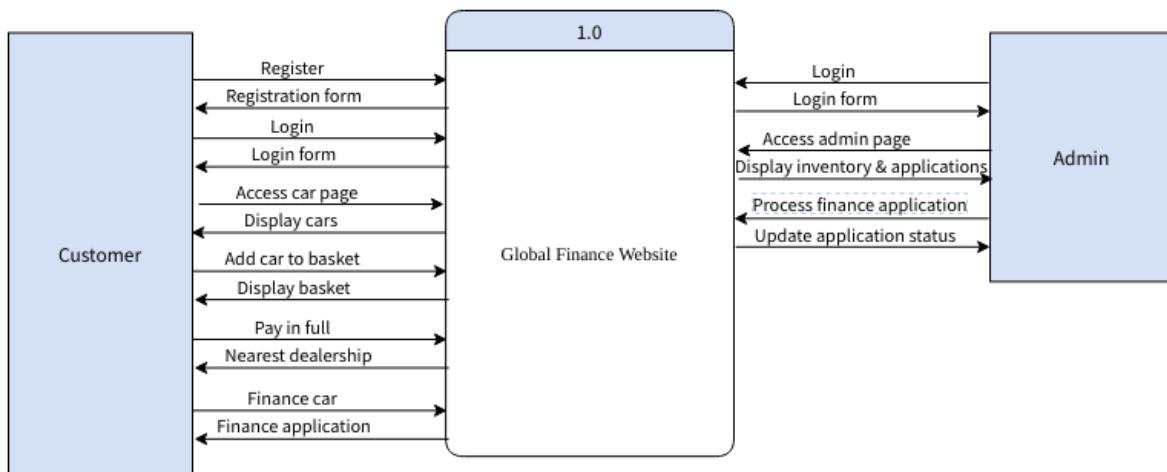


Figure 3 - Level 0 Data Flow Diagram

A level 1 diagram goes a step further into granularity, breaking down the whole process into multiple processes, as shown in the figure below. (Chi, 2021; Lucidchart, 2017; VisualParadigm, 2023)

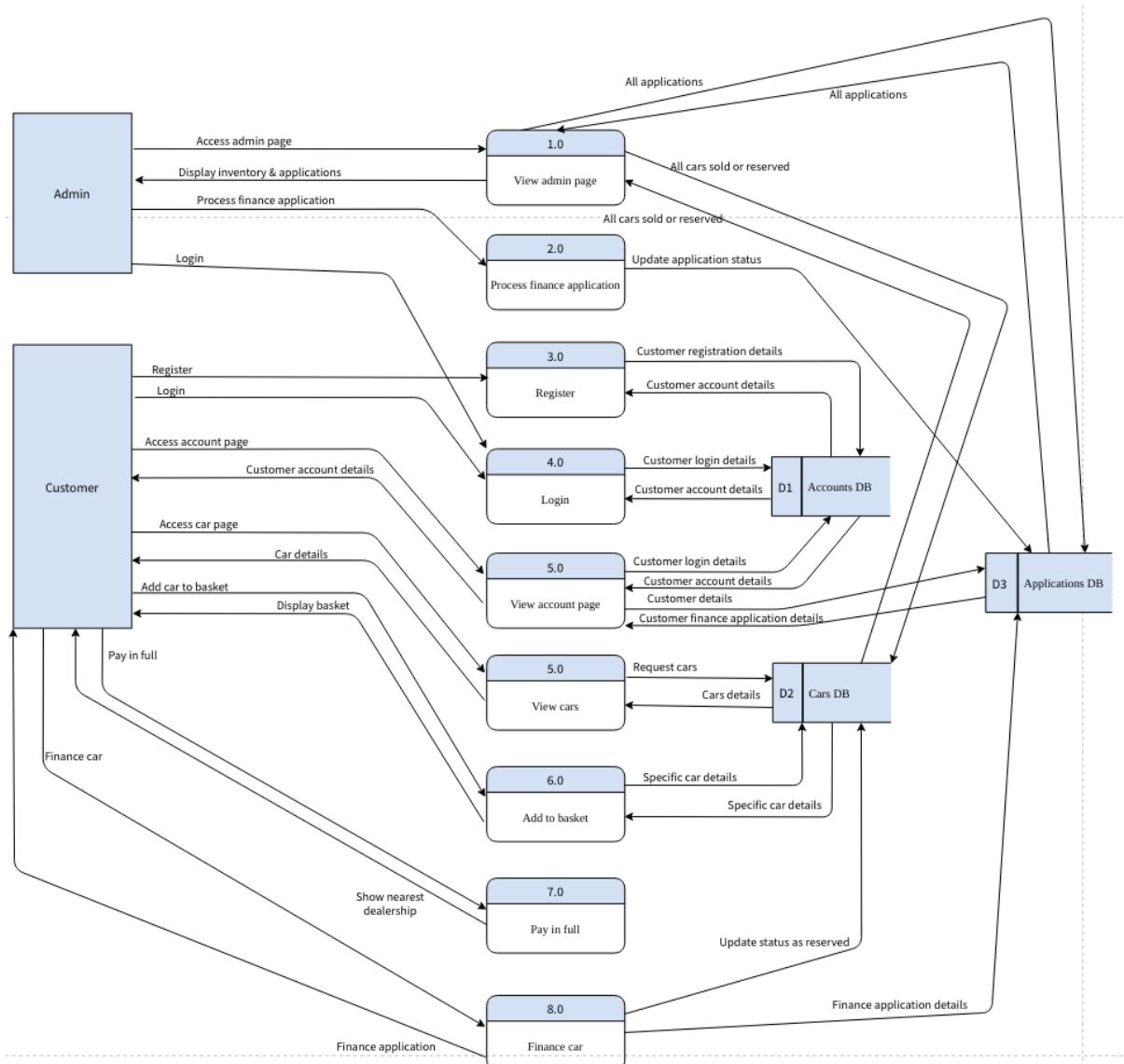


Figure 4 - Level 1 Data Flow Diagram

The data flow diagrams can keep increasing in level and get as granular as they can until they reach pseudocode. (Chi, 2021; Lucidchart, 2017; VisualParadigm, 2023)

## The Prototype

The prototype successfully accomplishes all the business requirements. The successes are outlined below.

In figure 5, the prototype's landing page can be seen. At the top, there is the navigation bar, holding the modules of the website. The prototype can view the entire car catalogue. The prototype displays cars that are sold or reserved for financing customers as "unavailable". The unavailable cars are not selectable, as the button is disabled. The cars that can be bought have a green "add to cart" button, which is clickable. This feature can be seen in Figure 6.

The prototype can add a car to cart, after which the customer is redirected to the basket where they can choose to pay the full price or finance the car. This can be seen in Figure 7.

If the customer chooses to pay the full price, the prototype displays the nearest dealership to the customer. This can be seen in Figure 8.

If the customer chooses to finance the car, the prototype displays the financing application. The customer is shown with four financing options at 12% APR, from one year to four years. The customer's details are displayed, specifically the name and email address as they are already set from the registration form. If their mobile number and address are set, they will be shown, otherwise input fields are shown where the customer can enter them. They also need to upload the verification document and then they can submit the application. After they submit the application, they are shown the thank you page. This feature is shown in Figures 9, 10, 11, 12 and 13.

The customer can see their application in the account page. The application shows the vehicle it is for and the status. The status is displayed as "PENDING", "APPROVED" or "DENIED", with the status colour being grey, green or red respectively. The application date is also shown, along with the supporting file for the application. This feature is shown in Figure 14.

The admin can access an administration portal where they can check the sold inventory, the reserved inventory and all the applications. The admin can decide to approve or deny the applications. Approving an application means that a car has been sold, so the car moves from the reserved inventory to the sold inventory. If the application is denied, the car goes back into the available stock. These features are shown in Figure 15, 16, 17 and 18.

## References

- Chi, C. (2021). *A Beginner's Guide to Data Flow Diagrams*. [online] Hubspot.com. Available at: <https://blog.hubspot.com/marketing/data-flow-diagram> [Accessed 10 Mar. 2023].
- Lucidchart (2017). *What is a Data Flow Diagram | Lucidchart*. [online] Lucidchart.com. Available at: <https://www.lucidchart.com/pages/data-flow-diagram> [Accessed 10 Mar. 2023].
- ProductPlan (2022). *What is a Minimum Viable Product (MVP)? | A Product Mgmt Definition*. [online] www.productplan.com. Available at: <https://www.productplan.com/glossary/minimum-viable-product/> [Accessed 10 Mar. 2023].
- Roddewig, S. (2022). *What Is Event-Driven Architecture? Everything You Need to Know*. [online] blog.hubspot.com. Available at: <https://blog.hubspot.com/website/event-driven-architecture> [Accessed 10 Mar. 2023].
- TutorialsCampus (2023). *Agile Software Development*. [online] www.tutorialscampus.com. Available at: <https://www.tutorialscampus.com/agile/software-development.htm> [Accessed 9 Mar. 2023].
- TutorialsPoint (2019). *SDLC Agile Model*. [online] www.tutorialspoint.com. Available at: [https://www.tutorialspoint.com/sdlc/sdlc\\_agile\\_model.htm](https://www.tutorialspoint.com/sdlc/sdlc_agile_model.htm) [Accessed 10 Mar. 2023].
- University of Waterloo (2021). *Event-based Architecture*. [online] Available at: [https://cs.uwaterloo.ca/~m2nagapp/courses/CS446/1195/Arch\\_Design\\_Activity/Event.pdf](https://cs.uwaterloo.ca/~m2nagapp/courses/CS446/1195/Arch_Design_Activity/Event.pdf) [Accessed 9 Mar. 2023].
- VisualParadigm (2023). *Gane-Sarson Data Flow Diagram Tutorial*. [online] online.visual-paradigm.com. Available at: <https://online.visual-paradigm.com/knowledge/software-design/gane-sarson-dfd-tutorial> [Accessed 10 Mar. 2023].

## Appendix

Functional Requirements	Non-Functional Requirements
The customer must be able to view the catalogue of available cars	The system must be able to take applications at any time of the hour
The customer must be able to register for an account with their name, email and password	The system must be able to display the car catalogue at any time of the hour
The customer must be able to log in with their email and password that they set in the registration	The system must be able to allow customers to log in at any time of the hour
The customer must be able to view their account details and finance application details	The system must be able to allow customers to register at any time of the hour
The customer must be able to add to basket the car they want to buy from the catalogue	The system must be able to allow admins to log in at any time of the hour
The customer must be able to view the car they chose in the basket	The system must be able to allow admins to view the sold inventory at any time of the hour
The customer must be able to choose to make a full payment for the car	The system must be able to allow admins to view the reserved inventory at any time of the hour
The customer must be able to see the dealership where they can pay for their car	The system must be able to allow admins to view the customer applications at any time of the hour
The customer must be able to choose to finance their car	If the system needs to be taken down for updates, the work must be finished within a reasonable time
The customer must be able to fill an application with their personal details in the finance module, along with uploading an identification document for verification, and send it	If the system needs to be taken down for updates, the work window must be announced to the customers
The customer must be able to log out of the website	The system must comply with the UK-GDPR law of data storage
The admin must be able to log in with the hard-set admin credentials	The system must not store passwords, only the hashes of passwords
The admin must be able to access the administration module	The system must be able to handle multiple requests at once from different users
The admin must be able to see the sold inventory in the admin module	The system must have a response time of under one second at the maximum
The admin must be able to see the cars that have been reserved by a customer applying to finance a car	The website should be able to run and display as intended on any device
The admin must be able to see all the customer applications	The website's interface should be intuitive to use and should feel familiar to all users

Table 1 - Functional and Non-Functional Requirements

Epic	User Story	Requirement
As a new customer, I want to buy a car so that I can replace my old broken car	As a new customer, I want to be able to register to the website so that I can view the available cars in the catalogue	The customer must be able to register for an account with their name, email and password
	As a new customer, I want to be able to log in to the website so that I can buy a car	The customer must be able to log in with their email and password that they set in the registration
	As a new customer, I want to be able view the catalogue of cars so that I can choose a car I want to buy	The customer must be able to view the catalogue of available cars
	As a new customer, I want to be able to be able to add the car I want to buy to the basket so that I can choose to finance it or pay it in full	The customer must be able to add to basket the car they want to buy from the catalogue
	As a new customer, I want to be able to be able to view the car I want to buy so that I can choose to finance it or pay it in full	The customer must be able to view the car they chose in the basket
	As a new customer, I want to be able to be able to purchase the car in full so that I can enjoy it immediately	The customer must be able to choose to make a full payment for the car
	As a new customer, I want to be able to be able to see the nearest dealership to me so that I can buy the car as soon as possible	The customer must be able to see the dealership where they can pay for their car
	As a new customer, I want to be able to be able to finance the car so that I can pay for it over time	The customer must be able to choose to finance their car
	As a new customer, I want to be able to fill in an application for financing so that I can finance the car I want to buy	The customer must be able to fill an application with their personal details in the finance module, along with uploading an identification document for verification, and send it
As an existing customer, I want to be able to log in and out so that other people can log into their account on the same computer to buy a car	As an existing customer, I want to be able to log into any account that I own so that I can purchase a car	The customer must be able to log in with their email and password that they set in the registration
	As an existing customer, I want to be able to log out of my	The customer must be able to log out of the website

	account so that someone else can access the website with their account on the same computer	
As an admin, I want to be able to access the administration portal so that I can keep track of the cars sold, reserved or unsold	As an admin, I want to be able to log into the website so that I can see the inventory of cars	The admin must be able to log in with the hard-set admin credentials
	As an admin, I want to be able to access the administration module so that I can see the inventory of cars	The admin must be able to access the administration module
	As an admin, I want to be able to see the cars sold so that I can keep track with the cars that are still available	The admin must be able to see the sold inventory in the admin module
	As an admin, I want to be able to see the cars reserved so that I can keep track with the cars that are going to be financed	The admin must be able to see the cars that have been reserved by a customer applying to finance a car
As an admin, I want to be able to access the administration portal so that I can keep track of the customer finance applications	As an admin, I want to be able to log into the website so that I can see the customer finance applications	The admin must be able to log in with the hard-set admin credentials
	As an admin, I want to be able to access the administration module so that I can see the customer finance applications	The admin must be able to access the administration module
	As an admin, I want to be able to see the customer finance applications so that I can see the status of the application	The admin must be able to see all the customer applications
	As an admin, I want to be able to see the customer finance applications so that I can see the details of the customers from the applications	The admin must be able to see all the customer applications
	As an admin, I want to be able to see the customer finance applications so that I can see the cars that are about to be financed	The admin must be able to see all the customer applications

Table 2 - Requirements mapped onto Epics and User Stories

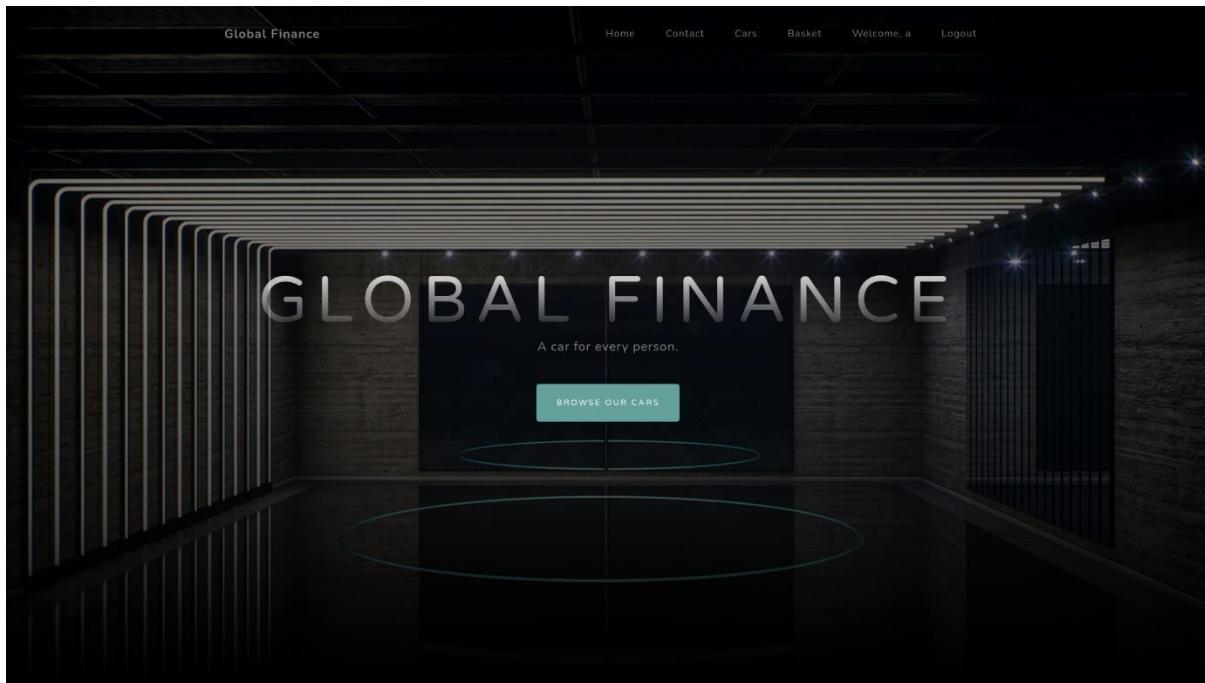


Figure 5 - Landing page of the website

The car catalogue page displays two vehicle options. On the left is a white Renault Megane from 2015, priced at £5,700.00, with a "UNAVAILABLE" status indicated by a purple button. On the right is a white Citroen C1 from 2013, priced at £4,700.00, with an "ADD TO CART" button below it. The top navigation bar remains consistent with Figure 5.

Figure 6 - Car catalogue showing the status of the stock

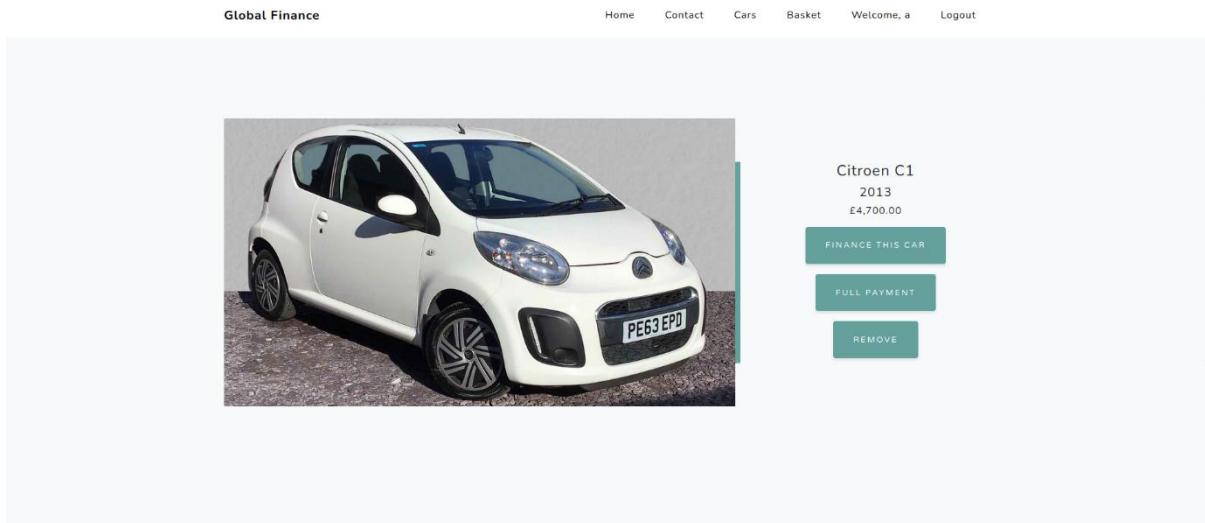


Figure 7 - Basket page

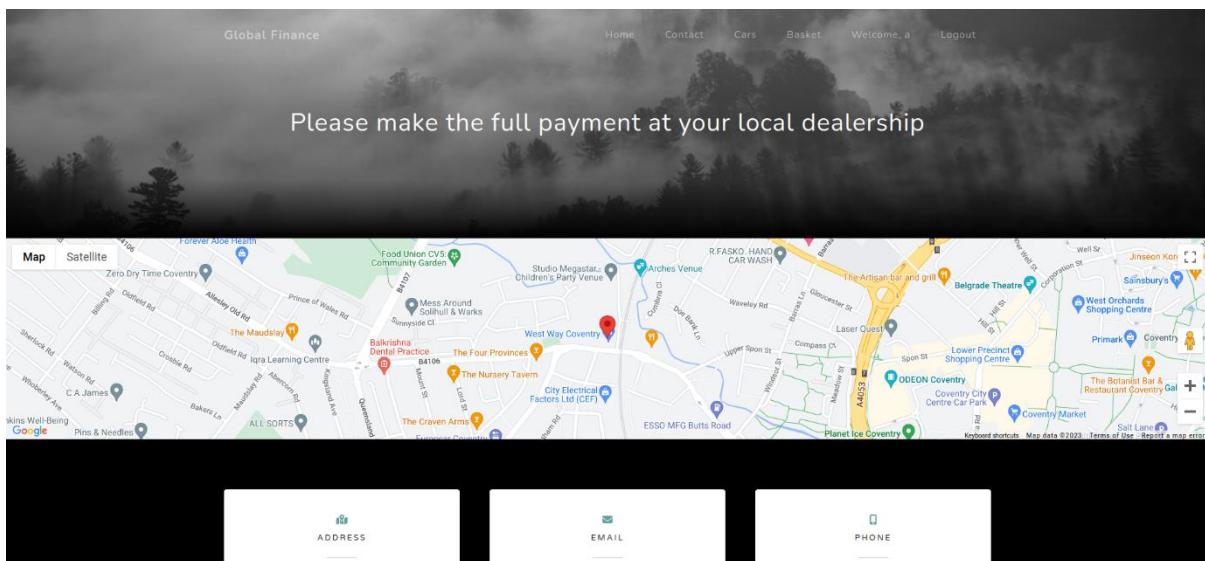


Figure 8 - Full payment page

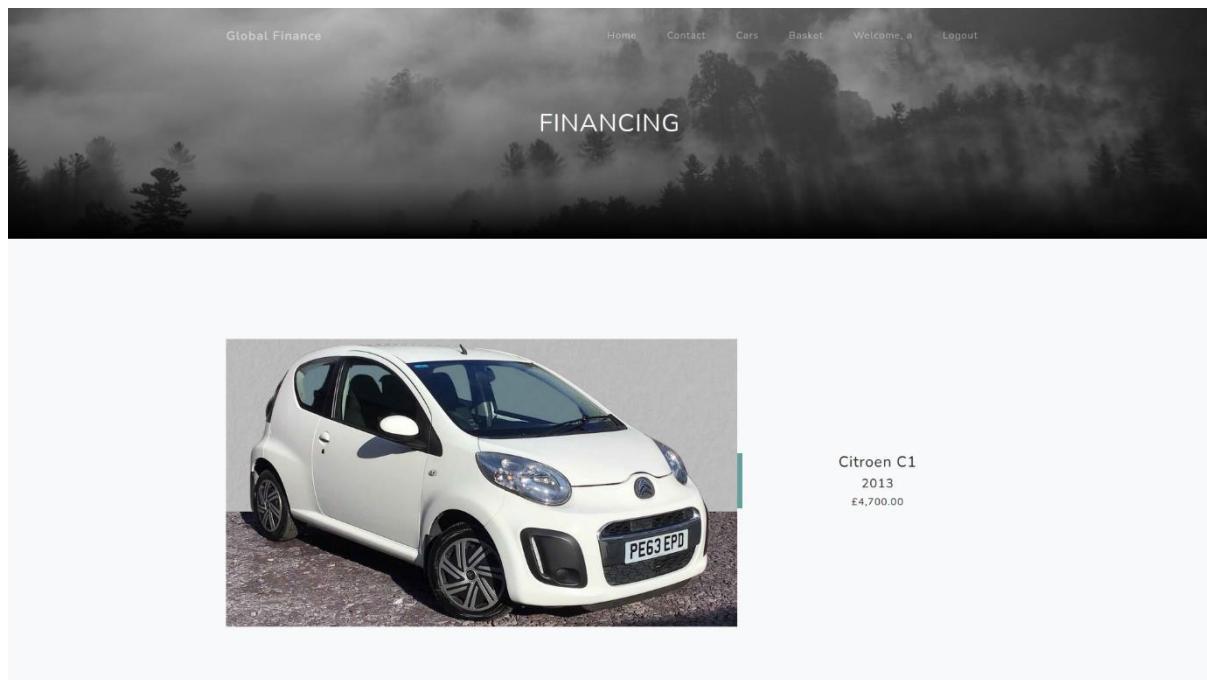


Figure 9 - Financing page part 1

A screenshot of the same website showing the financing options and customer details section. The 'Financing options' section lists five financing plans with their respective monthly payments and total costs:

- 12 months @ £438.67 for a total of £5264.00
- 24 months @ £245.65 for a total of £5895.68
- 36 months @ £183.42 for a total of £6603.16
- 48 months @ £154.07 for a total of £7395.54

The 'Customer Details' section contains fields for 'NAME' and 'EMAIL'. The 'NAME' field has the placeholder 'a a' and the 'EMAIL' field has the placeholder 'a@a.com'.

Figure 10 - Financing page part 2

Global Finance

Home Contact Cars Basket Welcome, a Logout  
a@a.com

---

MOBILE PHONE

Enter Mobile Number

---

ADDRESS

Enter Address

---

UPLOAD DOCUMENT

Browse... No file selected.

---

SUBMIT

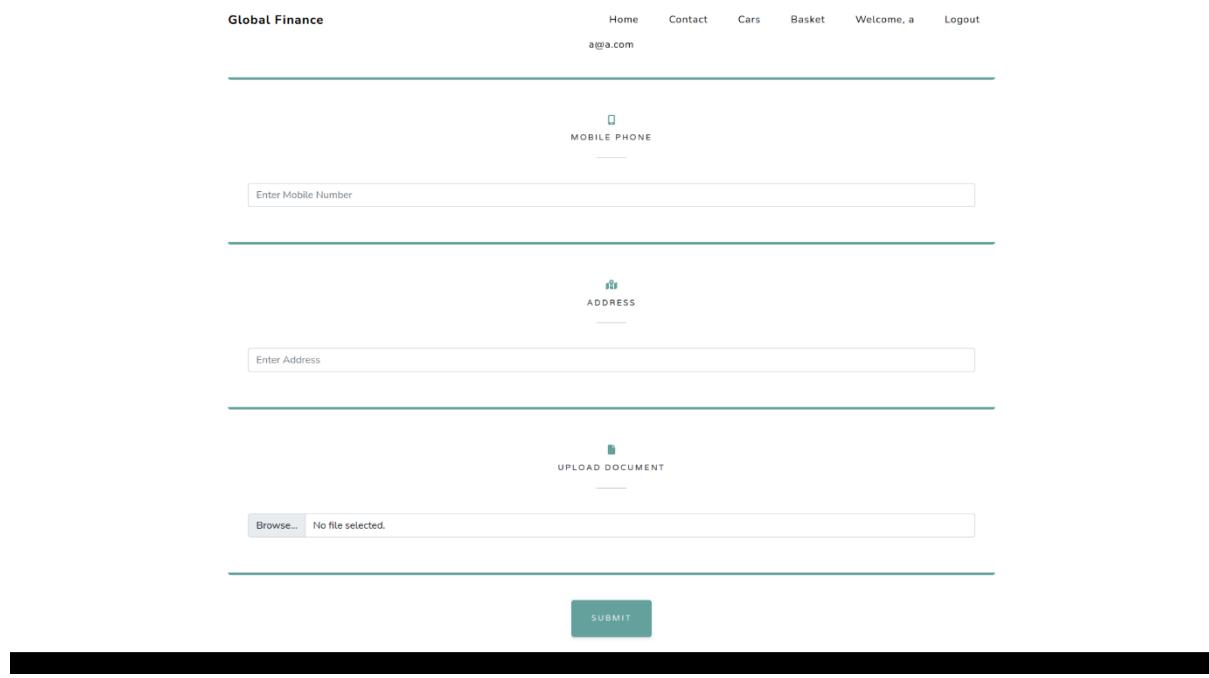


Figure 11 - Financing page part 3

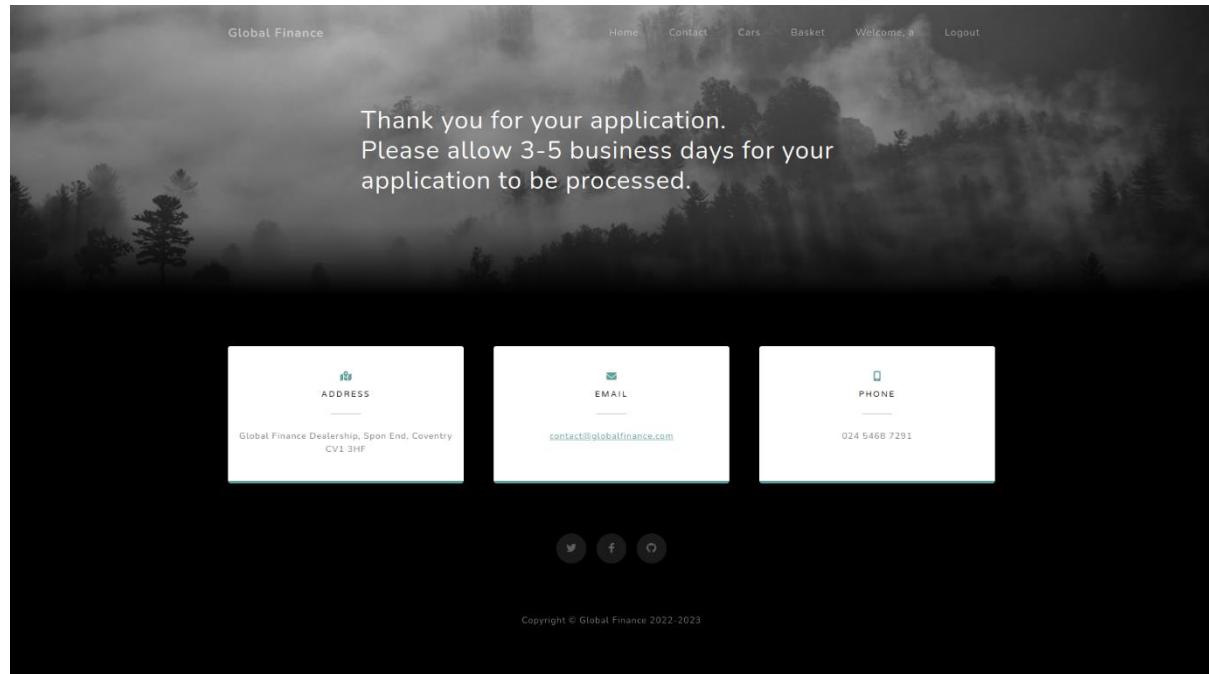


Figure 12 - Thank you page

Student ID: 2136685

Global Finance

Home Contact Cars Basket Welcome, a Logout

---

 NAME  
a a

---

 EMAIL  
a@a.com

---

 MOBILE PHONE  
01234567890

---

 ADDRESS  
123 Person Close, Coventry, UK

---

 UPLOAD DOCUMENT

---

Figure 13 - Financing page with mobile and address already set

Global Finance

Home Contact Cars Basket Welcome, a Logout

---

 APPLICATION STATUS  
CITROEN C1  
2013  
PENDING

---

 APPLICATION DATE  
2023-03-10

---

 UPLOADED FILE  
[feedback.pdf](#)

---

Figure 14 - Customer checking application in the account page

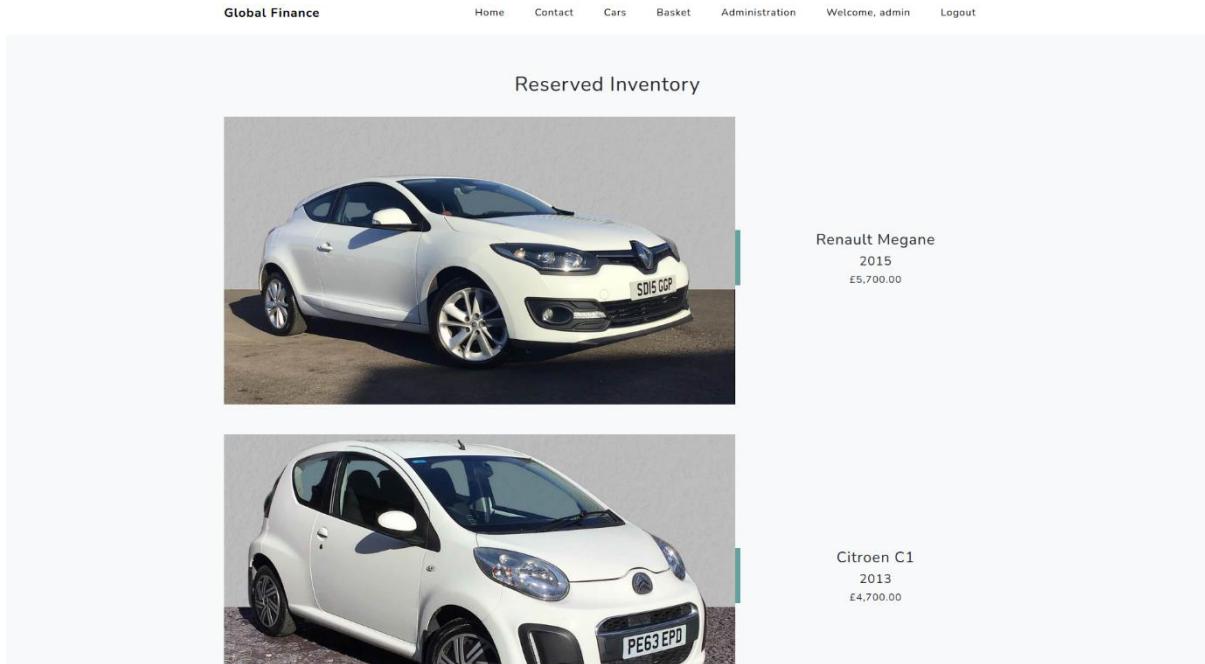


Figure 15 - Administration page reserved inventory

The screenshot shows a list of customer applications. At the top, there is a header bar with links for Home, Contact, Cars, Basket, Administration, Welcome, admin, and Logout. Below the header, the title "Applications" is centered. The first application is for a Citroen C1 from 2013. It includes fields for Customer Email (a@a.com), an Uploaded File (feedback.pdf), Application Date (2023-03-10), Financing Type (48 months @ £263.89 per month. Total: £12666.8), and Status (PENDING). At the bottom, there are two buttons: "APPROVE" and "DENY".

Figure 16 - Administration page showing customer applications

Student ID: 2136685

The screenshot displays the Global Finance administration interface. At the top, there's a navigation bar with links for Home, Contact, Cars, Basket, Welcome, a, and Logout. Below this is a address bar showing '123 Person Close, Coventry, UK'. The main content area is divided into three sections: 'APPLICATION STATUS' showing a green 'APPROVED' button for a 'CITROEN C1 2013'; 'APPLICATION DATE' showing the date '2023-03-10'; and 'UPLOADED FILE' showing a PDF named 'feedback.pdf'.

Figure 17 - Administration page accepting an application

This screenshot shows the 'ADMINISTRATION PAGE' with a dark, atmospheric background image of a forest. The main heading is 'ADMINISTRATION PAGE'. Below it, under the heading 'Sold Inventory', is a photograph of a white Citroen C1 parked on a gravel surface. To the right of the car, its details are listed: 'Citroen C1', '2013', and '£4,700.00'.

Figure 18 - Administration page showing sold inventory after accepting an application