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BSc in Software Systems

06004041

Car Parts & Service Management System

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Technical Report

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- expelling a student from college,
- prohibiting a student from sitting any examination or assessment.,
- the imposition of a fine and
- the requirement that a student to attend additional or other lectures or courses or undertake additional academic work.

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1. Executive Summary

The main objective of this project is to provide a means for the customers and staff of a car service centre to control the servicing process of vehicles. Customers have the ability to request services, contact the service centre and view information relating to the service centre. Service advisors and parts assistants have the ability to control the servicing process from the time the booking is received until the time that the vehicle is returned to the customer. In addition to the website, customers can make use of an app to request that their car be towed to the garage in the event that it breaks down.

2. Introduction

2.1 Background

After consultation with managers and employees of a car service centre in Dublin, a need for an improved system for the processing of car services was discovered. The current setup requires the use of a minimum of three software packages. Separately these are capable of locating specific parts on a car, viewing specific information about the car, such as vehicle identification number and registration, and the third piece of software focuses on the creation of WIPs (work in progress). These are where the details about the customer, the car and the service required are stored. The current system is out dated and uses an old style user interface that can be difficult to use and difficult to train people to use.

Given my history with working in the motor trade, it proved an ideal opportunity to construct an application that would improve on the existing infrastructure in a service centre and given the contacts I have gained while working in the motor trade, there is the possibility that the project could be used in a real world situation.

2.2 Aims

One of the main aims of this project was to create a web based application with the ability to process the management of a car service from the time the service is booked, until the time the customer collects it. The website part of the application was aimed to allow the customer or potential customers to view information about the service centre, make bookings and make enquires. Also, it was to allow the employees of the service centre to login and access functions that relate to processing the service. These include viewing bookings, viewing messages received from the website and viewing customer locations, a function that is specifically used by the parts department when organising parts delivery routes.

The other primary aim of the project was to provide an app that can run on mobile devices and can aid the customers in a time of need, when their car breaks down suddenly. This was to be done by the creation of a phone application for customers to let the service centre know that their car has broken down and that they are in need of a tow into the service centre.

2.3 Technologies

The web part of the project was developed using a variety of web technologies, specifically PHP, HTML and HTML5, CSS, JQuery, JavaScript and MySQL.

The app was built using HTML5, CSS, JavaScript, Ajax, JQuery and wrapped in an Objective-C container generated by Xcode and the Cordova platform from PhoneGap.

2.4 Structure

This report is structured so that in the first section, the reader can get a general overview to the project as to what it is exactly.

The second section details to the reader what the background to the project is, what the main aims of the project are and then it gives an overview of the technologies that were used in its creation.

The third section details two functional requirements, describing what they are, how they are activated, any technical issues associated with them, any risks that could be incurred and any dependencies with other requirements. It then will go on to detail what data requirements, environmental requirements and usability requirements are present.

Following that, the section will go on to detail the design and architecture of the system, how it was implemented and tested and how the user interface is designed. Finally it will discuss how the project got real world testing from people in the motor trade who would use it on a day to day basis and then how it was evaluated.

The fourth section contains any and all conclusions to the project made after it was completed.

The fifth section will describe any further developments planned in relation to the project after it has been submitted.

The sixth section houses the bibliography of all the resources used to complete the project.

The seventh and final chapter contains the appendices to this document, such as the original project proposal and requirement specification, the monthly reflective journals and any other materials used.

3. System

3.1 Requirements

3.1.1 Functional Requirements

3.1.1.1 Requirement 1

User management

3.1.1.2 Description & Priority

This is used to maintain the user table in the database when staff are hired or let go. Administrators need a quick and easy way to add a new user account or remove an existing user.

It is a priority, as staff are required to use their own account when accessing the system.

3.1.1.3 Requirement Activation

When a new staff member is hired, the system administrator accesses the admin.php page of the web site and adds a new user account to the database, enabling the new employee to access the functions of the web site. Also when a staff member is let go, it is necessary that their login details be deleted to protect the integrity of the system and the data stored.

3.1.1.4 Technical Issues

For this function to work, a computer with a web browser installed is required. The computer must have access to the internet in order for the user to access the site.

3.1.1.5 Risks

This function requires the database to run successfully, therefore the database must be available at all times. If the database is offline then it will be unable to function resulting in the users being unable to complete their work.

A way of preventing this would be to host the database on a secure server with multiple backups available that can be easily accessed should it be necessary.

3.1.1.6 Dependencies With Other Requirements

For users to interact with the functions on the website, they would need their login account, therefore the user management requirement is essential.

3.1.1.7 Code Segment

This code segment details how the administrator adds new users to the database so that they can log into the system and access the functions available. It checks to see if the form has been completed successfully with the username and both password fields entered correctly. It will return a message to the user saying the form hasn't been completed properly if that is the case.

```
//Add User
if(isset($_POST['submit'])) {
	if(!$_POST['username'] | !$_POST['pass'] | !$_POST['pass2'] ) {
		die('Form Incomplete');
		}
	if(!get_magic_quotes_gpc()) {
		$_POST['username'] = addslashes($_POST['username']);
		}
```

It will then go on to check the database to see if the username entered has already been taken. If it is already in use then it will alert the user letting them know that it already exists.

```
$usercheck = $_POST['username'];

$check = mysql_query("SELECT username FROM members
WHERE username = '$usercheck'") or die(mysql_error());

$check2 = mysql_num_rows($check);

if($check2 !=0) {
    die('The username '.$_POST['username'].' is already in
use.');
    }
```

Next it will check the two password fields as to whether both fields match. It will alert the user that they do not if that is the case.

```
if($_POST['pass'] != $_POST['pass2']) {
    die('Passwords do not match');
    }
```

This section of code adds MD5 encryption to the password. This ensures that the password that is posted to the database is encrypted therefore making it more secure.

```
$_POST['pass'] = md5($_POST['pass']);

if(!get_magic_quotes_gpc()) {
    $_POST['pass'] = addslashes($_POST['pass']);
    $_POST['username'] = addslashes($_POST['username']);
    }
```

Finally this piece of code is what saves the new user's login data to the database.

```
$insert = "INSERT INTO members (username, password)
VALUES ('".$_POST['username']."','".$_POST['pass']."')";
$add_member = mysql_query($insert);
```

3.1.2.1 Requirement 2

Breakdown Assistance App

3.1.2.2 Description & Priority

This is an app that customers of the service centre can download to their phones and use in the event that their vehicle breaks down. It is capable of alerting the garage to the location of the vehicle. It does this by getting the GPS location of the user when they trigger the app and transmits it along with relevant information about the user such as their name and registration number to the garage so that they can send a tow truck to collect the vehicle and tow it to the garage for assessment and repair.

It is a priority for the service department as it increases the chances that customers who come in for service will use the garage in the event of an unexpected breakdown.

3.1.2.3 Requirement Activation

The application is activated when the user accesses it from their mobile device. This is done by first downloading the app from the appropriate app store and installing it on the user's device. Once that's done, in the event of a break down, the user merely has to locate the app on their phone and open it to begin submitting the request for assistance.

3.1.2.4 Technical Issues

For this function to work, a user must have a device capable of supporting the app such as an iPhone, an internet connection either through the mobile data network or a Wi-Fi signal and have their location services turned on, on their device.

3.1.2.5 Risks

This function requires that you have a connection to the internet and a GPS fix on your device's location. Without them the app will not be able to either get a fix on your location or be able to transmit your location to the garage.

3.1.2.6 Dependencies With Other Requirements

For the users in the service centre to receive the message from the person in need of assistance, they would need to have their login information for the system.

3.1.2.7 Code Segment

The application is waiting on the device to load the application

document.addEventListener("deviceready", onDeviceReady, false);

When the application loads, it attempts to get the device's current location. Depending on whether it does or not, it will either direct the script to continue to the onSuccess function or the onError function.

```
function onDeviceReady() {
    navigator.geolocation.getCurrentPosition(onSuccess, onError);
}
```

Upon successfully locating the device, the app will generate a form for the user to fill in. This form requests the user enter their name and their car's registration number. The reason for that is so that the garage can both identify the car when they the tow truck is on route and it allows the garage to check their records as to previous services carried out. The form has two hidden values that contain the user's longitude and latitude. These are derived from the onDeviceReady function when it gets the user's current location.

```
function onSuccess(position) {
      var element = document.getElementById('geolocation');
      element.innerHTML = '<form
action="mailto:stephenreid88@gmail.com?subject=Breakdown%2
0Service%20Request"" method="post" enctype="text/plain" >' +
     'Name:<input type="text" name="Name"></br>'+
     'Reg. Number:<input type="text" name="Reg. Number"></br>'+
     '<input type="hidden" name="Latitude" value="' +
position.coords.latitude + '">' +
     '<input type="hidden" name="Longitude" value="' +
position.coords.longitude + '">' +
     '<input type="submit" name="submit" value="Submit">' +
     '</form>';
}
```

Should the app not be able to locate the device, whether this is due to the app being out of GPS range or the location services on the device being turned off, an error will be returned to the using letting them know that the device cannot complete the location request.

```
function onError(error) {
      alert('Error Code: '    + error.code    + '\n' +
               'Error Message: ' + error.message + '\n');
   }
```

3.1.3 Data Requirements

All data that is entered should be in a way that other users will understand. The system will be designed so that the database will store all data entered so that it will be up to the individual to understand the information entered.

3.1.4 User Requirements

The main user requirement is specifically for staff members. They need to log into the system to access the functionality that facilitates the service process. Once they've done that, they have full access to tasks such as viewing bookings, for example.

3.1.5 Environmental Requirements

In this section, the environmental settings needed for the system to operate correctly are detailed, this includes the setup and configuration of a potential host system.

The website portion of the project requires a suitable platform on which to run. The ideal environment would contain a web browser capable of processing HTML5, PHP and CSS3. As the website was developed using Google Chrome for testing, that would be the recommended browser.

The apps would require suitable devices on which to run. Specifically, they would require in the case of the Location App, a mobile phone running either iOS or Android.

3.1.6 Usability Requirements

The main usability requirement is that both the website and the app are user friendly. To ensure this is the case, the website is designed in such a way that first time users can easily navigate through the different sections with a clear menu located at the top of each page. This menu differs depending on whether it is an average user or a member of staff in terms of the locations it can direct you towards. The app's interface is similarly easy to use as all functions that require user entry are presented to the user on activation.

3.2 Design And Architecture

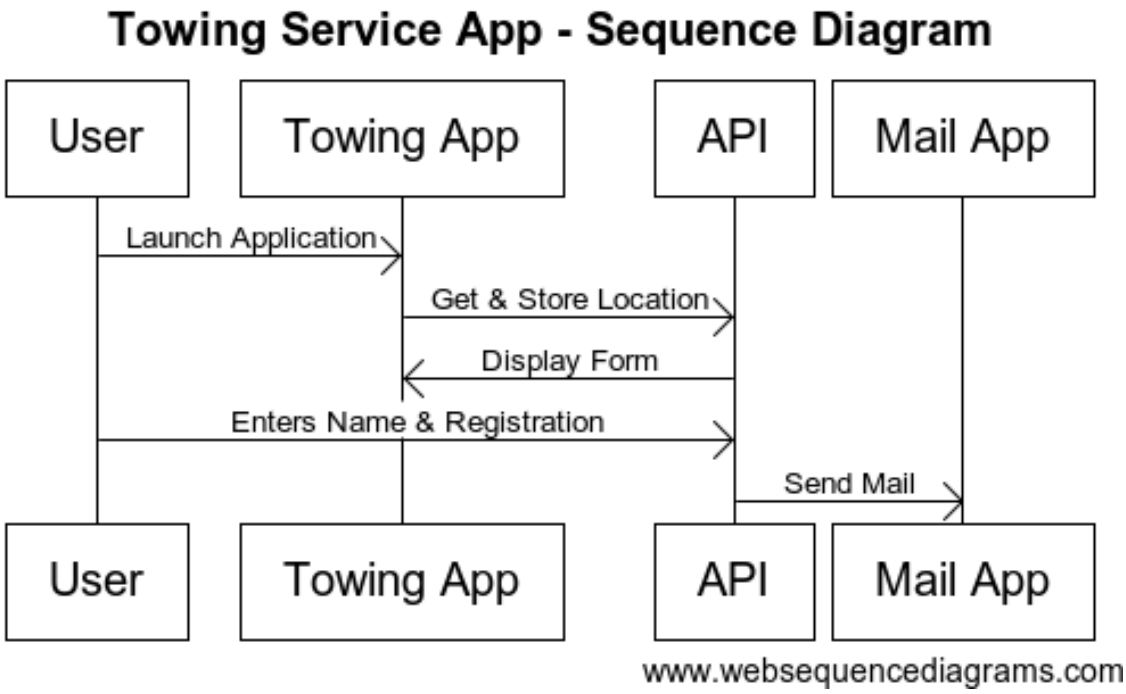
The web site was built primarily using HTML5 and CSS but due to the high number of functions that required access to an SQL database, PHP was used to process the request to the database. PHP was selected over other languages such as Ruby due to its long history of being a reliable way to interact with hosted databases. Also given the requirements and functions that were to be developed, it was my belief that PHP, would have produced an application that looks well and worked better than using an alternative.

The application was developed using HTML5, CSS, JavaScript, JQuery and Ajax. To function on specific phones, it was developed using PhoneGap, as when the HTML5 app was completed, it could then be downloaded and made available for a number of platforms including both iOS based devices and those that run Android.

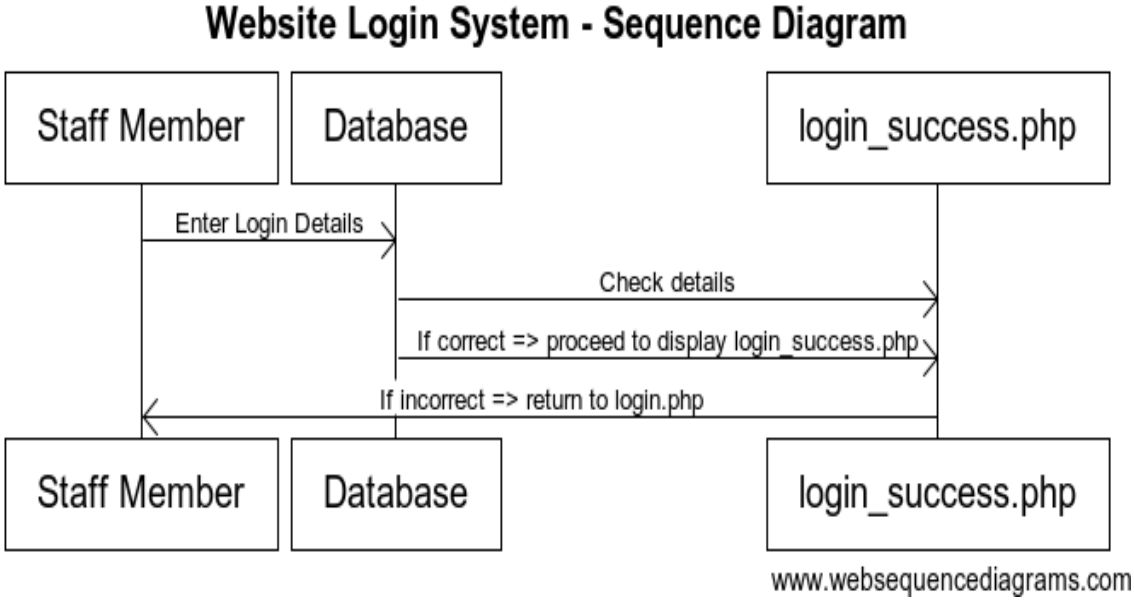
The CSS was designed in such a way that when a user goes through multiple pages on the site, it would seem to be a fluid transition between sections. This technique was implemented in the design of the app, as the same formatting and style is present there also.

Sequence Diagrams

Progression through the Towing Service App

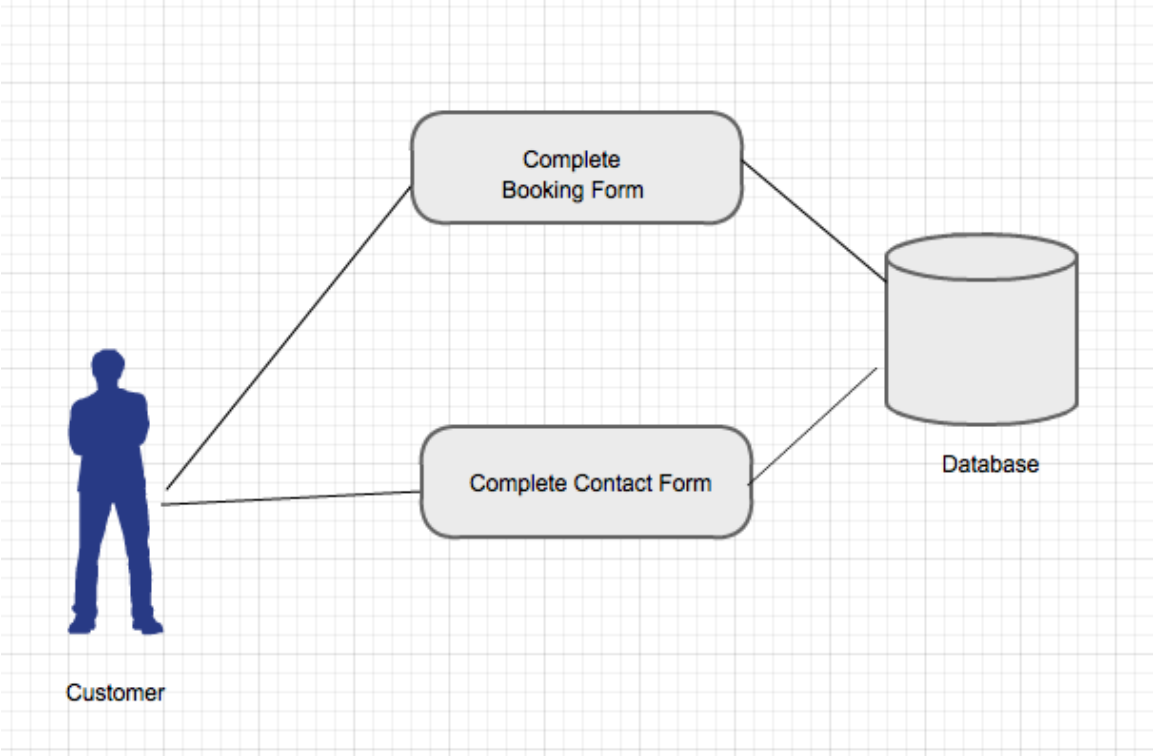


Progression through the Staff Login System

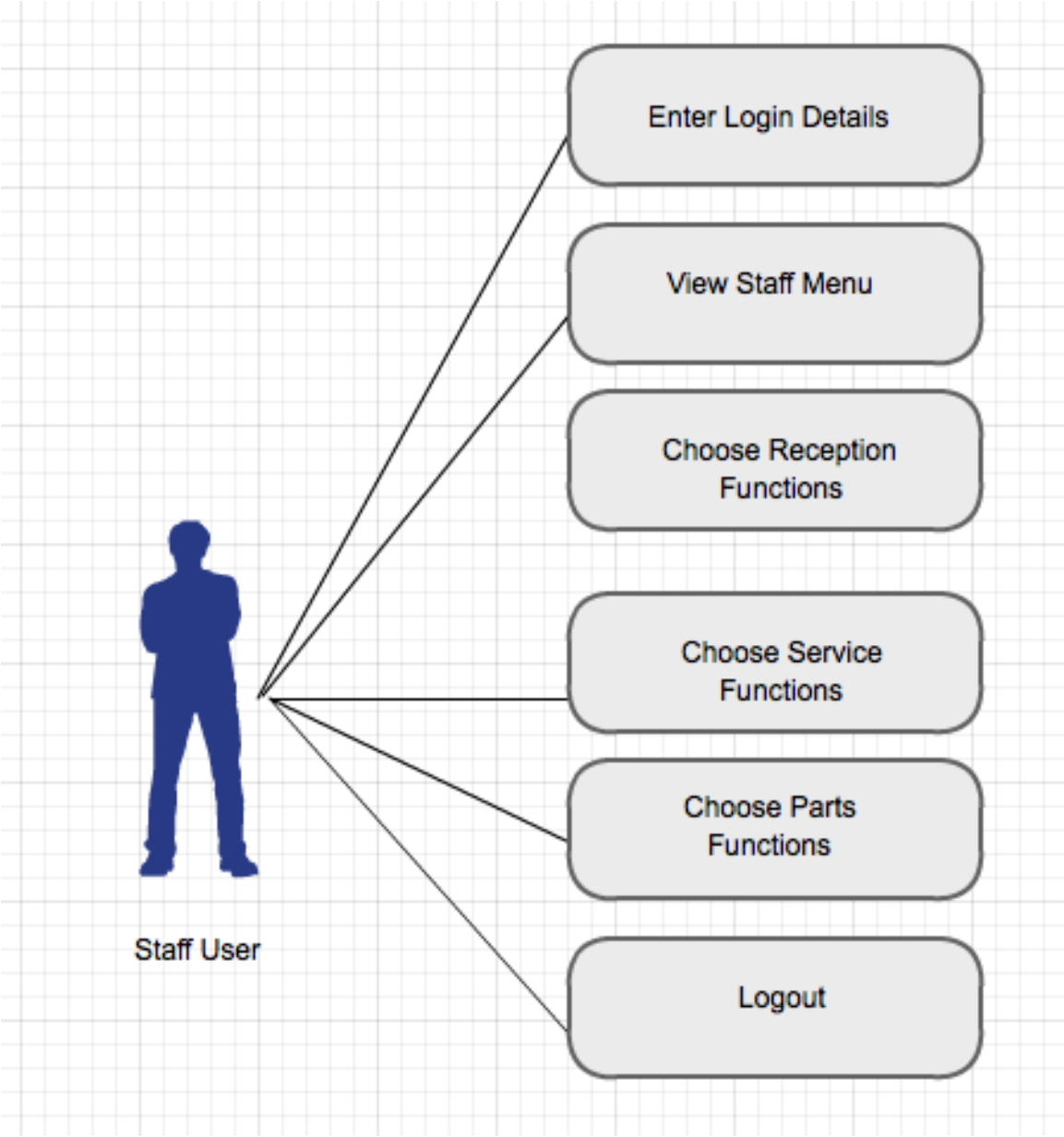


Use Case Diagrams

This diagram demonstrates how a general user can interact with the website. The have the ability to complete a service booking form and fill out a contact form that are both submitted to the SQL database for review by the staff of the service centre.



This diagram demonstrates how the staff of the service centre can interact with the website.



3.3 Implementation

Implementing certain aspects of the project were difficult. The most challenging was the customer map, built based on the Google API. The map is capable of reading a Fusion Table, stored on Google Docs and displaying its contents on a Google Map. It does this because the specific Fusion Table is populated with the longitude and latitude locations for the mechanics, crash repairers and body shops that the garage deals with as well as their contact information. This is very beneficially to the parts department of the service centre as in the case of parts deliveries, there are a great number of garages down back alleys that are impossible to find unless you know where they are.

Upon visiting the page where the map is displayed, the user is either shown their current location or they are shown as being located in Sandyford Industrial Estate, which is the fictional location of the "Volkscedes Service Centre". Whichever location that is displayed depends on whether your web browser and computer are capable of obtaining your current GPS location. The code below sets the variable position to be at the specific coordinates marked in the brackets.

var position = new google.maps.LatLng(53.274594, -6.218423);

There are two methods of getting the current location of where the user is. These are W3C Geolocation and Google Gears. The reason both are used in the code is that Internet Explorer, before version 9, is incapable of using the W3C API. The code is formatted in such a way that W3C is tried first and if it fails, Google Gears takes over. W3C was modeled on Google Gears but due to its browser limitations it is common practice to include both. After both attempts of getting the geolocation fail, the originally set position variable is called, displaying the hardcoded location as your current location on screen.

```
getCurrentPosition = function(callback) {
    if(navigator.geolocation) {
      navigator.geolocation.getCurrentPosition(
        function(pos) {
          position = new google.maps.LatLng(pos.coords.latitude,
pos.coords.longitude);
```

```
          callback(position);
        }, callback(position));
      }
      else if (google.gears) {
       var geo = google.gears.factory.create('beta.geolocation');
       geo.getCurrentPosition(
         function(pos) {
          position = new
google.maps.LatLng(pos.latitude,pos.longitude);
          callback(position);
        }, callback(position));
      }
      else {
       callback(position);
      }
    };
```

This next section of code is how the Fusion Table is called and used to create the Google Map layer that will be displayed on the web page. The id number 3898668, is the id number of the publicly stored Fusion Table on Google Docs.

```
   var layer = new google.maps.FusionTablesLayer({
    query: {
     select: 'Geocodable Address',
     from: '3898668'
     },
    });

    layer.setMap(map);
```

The main difficulty I faced in getting this working was calling the required functions from the Google API. I had to search through the APIs to locate the required method calls. Some tutorials I found were helpful but going through the APIs myself gave me a better idea of what functions are available.

3.4 Testing

To test the system, I gathered a group of people with no programming experience and did not give them access to the code and performed black box testing with them by having them interact with the website and app. The results showed that all users successfully performed the tasks they were set and navigated efficiently through the website.

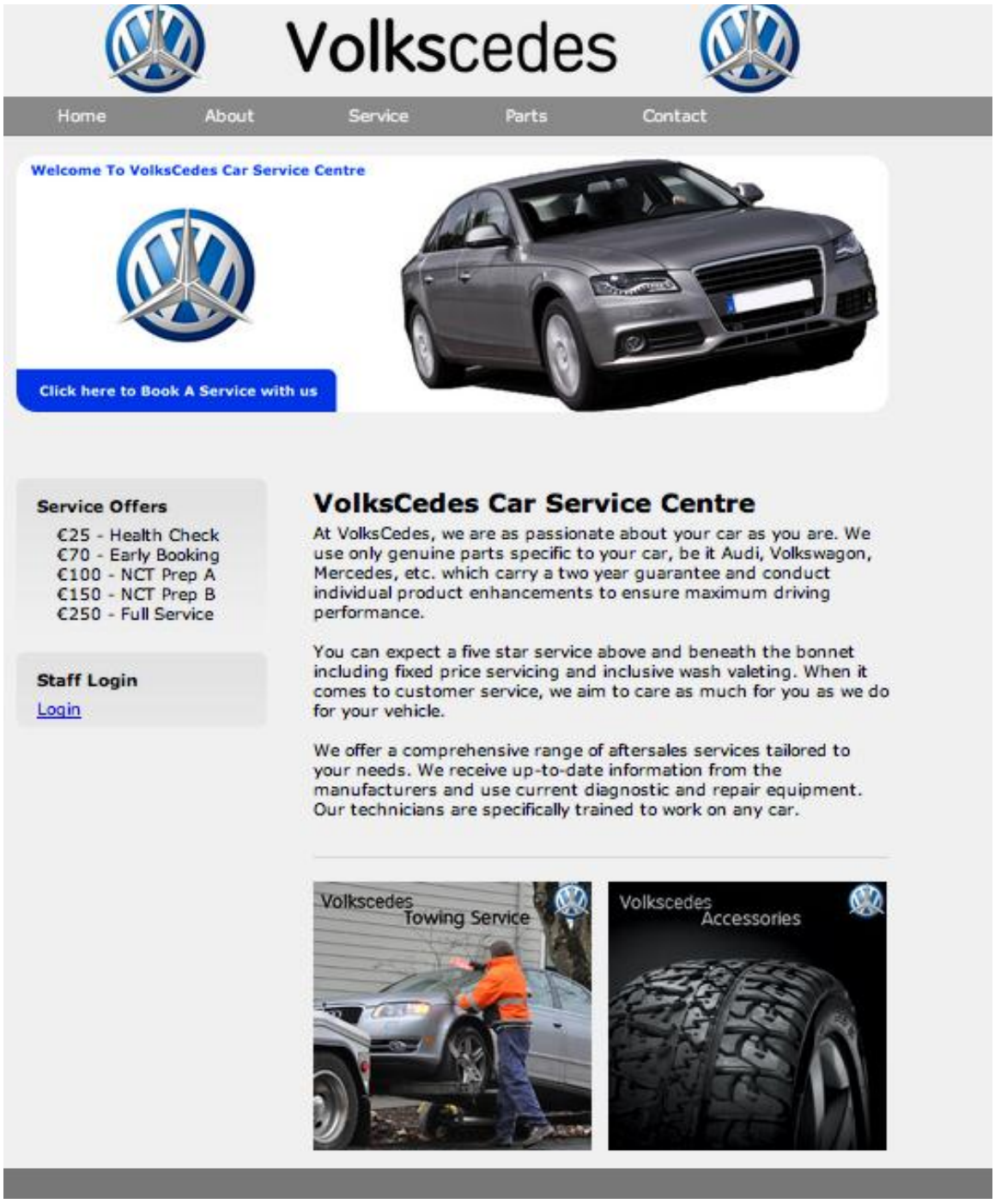
Subsequently, I asked a group of students doing a master's degree in web technologies and performed white box testing with them by giving them full access to the code. Their thoughts and ideas about the progression between functions enabled me to refactor them to make them perform better.

To test the CSS of the website, I went to http://jigsaw.w3.org/css-validator/ and used the tool there to check the CSS. It returned a number of errors but after going through them I was pleased to note that most were to do with the webkit tags required for Firefox.

By switching JavaScript off in my browser I noted that although the website loads and displays all relevant information to do most tasks, the booking form will not work as it requires JavaScript to be enabled for it to process the selection of the customer's car.

3.5 Graphical User Interface (GUI) Layout

Both the web site and the app interact with users by using a Graphical User Interface (GUI). In terms of the website, interactions are carried out using mouse clicks, typing and scrolling. For the app, interactions are carried out by touching the screen and typing in the relevant fields.



3.6 Customer Testing

When I began to think up ideas for what to include in this project, I took them to my former employer in a Dublin car service centre. He gave me positive feedback and allowed me use their facilities and staff during the development process. After speaking with the staff and after collecting information on what features they would like to see in a new system, I began setting out the requirements.

After the prototype was completed, we had another meeting regarding the project and the feedback was generally positive. I consulted with a group of staff members tasked with interacting with customers when they came in to leave their cars in for service. They used the prototype amongst themselves and acted as though one of them was playing the role of a customer. They found the application while in an early stage showed promise and agreed to continue testing it as it progressed.

After development of the break down assistance app began, I brought the idea to the parts manager of a large motor centre in Enniscorthy, Co. Wexford. We had worked together previously in Dublin. He evaluated the app and gave positive feedback and agreed to take the idea to the service managers and have them evaluate it and give recommendations on what they think of it. This could lead to an opportunity where I could be developing it further somewhere down the line in conjunction with them.

3.7 Evaluation

The system was evaluated using an online survey hosted on the Survey Monkey website. The exact results of which can be viewed in the appendix. In summary of the results obtained:

1. 89.9% of people surveyed liked the website a great deal
2. 66.7% of people surveyed believed it looked very professional with the remaining 33.3% saying it looked extremely professional
3. 77.8% of people surveyed said it was extremely easy to navigate through
4. Everyone surveyed agreed that they would use the Towing Service app if they were to break down and they also agreed that the appearance of the company's websites and applications influence them when they are deciding whether or not to use them to service their car.

4 Conclusions

Overall I have enjoyed developing this project. It has proved to be challenging and through my attempts to overcome those challenges, I have achieved a greater understanding of languages I had very little knowledge of before, specifically JavaScript and Objective-C. Cars are something I'm passionate about and creating this project was a lot more interesting because of the enjoyment I get from working with them. My main regret is that I could not get the Car Walkaround app working but it is something I will come back to. I have overcome such a disappointment by focusing on making the website appear to be as professional as possible and ensuring that replacement apps I developed for the project works well and looks well.

Despite the drawback suffered, it has been a good experience that I will long remember and hope that it is a project that will have longevity in some form or another.

5 Further Development

I intend on continuing to develop this project into a practical application that could one day be used in the real world. The break down assistance application is of particular interest to me as from my experience, I do not believe any service centre has anything like that in use. This would provide an ideal opportunity to licence out the app idea to multiple brands and garages. I'm hoping that in the coming weeks, I can get positive feedback from the service management down in Enniscorthy in the hope that they will take on the app idea and allow me to develop it for them. In the meantime I intend on continuing to improve its functionality.

As for the car walkaround app, I fully intend to go back to that and try and solve the database issues that caused it to fail and not perform anywhere near as intended and then continue the development of that as from my discussions with service management, they believe it would revolutionise how their mechanics report faults with the vehicles that they are working on.

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7 Appendix

7.1 Project Proposal

Project Proposal

Service & Parts Management System

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BSc (Hons) in Software Systems

21/9/11

1 Objectives

The main objectives of this project is to provide a web application that allows for the easy management of the day to day operations of a car dealership's service and parts departments along with an integrated reception system and an iPad app.
The following features will be available for users when they log into the application.
For the service department:

- Loan car management – ability to keep track of courtesy cars. Will be able to keep track of who has the car, when it will be back and have the facility to report incidents eg. Damage on return.
- Point of sale – automated service offers, allowing the selection of particular offer and automatically adding the specific parts required based on the chassis number.
- Booking schedule – ability to add, remove, view, and edit service bookings.

For the parts departments:

- Parts Location Map – diagram of the stores with part locations searchable and detailed location provided.
- Suggested stock order – ability to generate a stock order based on current levels of pre-defined stockable items eg. Filters, pads, discs.
- Customer database – complete view of customer order history

iPad App:

- Car walk-around – identify faults on the car and enter them on an iPad using a diagram of the specific car.
- Ability to view the current state of the WIP (work in progress) and add notes and additionals
- Simplified point of sale allowing for estimates and addition of service plans

Integrated Reception:

- Make note of all calls
- Popup and email notification to the intended recipient of the call

2 Background

My reasoning behind this project is that I spent 5 months working full time for a car service centre in Sandyford. I'm currently there on a part time basis which will benefit me when it comes to testing the application. To do simple tasks we must use 3 different systems, namely Kerridge, AS400 and ETKA. We found this to be time consuming and inefficient. On my return to college, I decided that I'd develop an integrated application that would combine the main aspects of the three programs to provide an speedier process.

My hope is that on completion of this project that it may be able to market it so it can be used as a replacement for the current systems used in a service centre.

3 Technical Approach

Once I had figured out what I wanted to do, I discussed it with the managers in work and managed to get a list of requirements that they would like to see in a product such as this. This will be an on-going process with them as I develop the application.

After that, I began to research into what languages I would use in the creation of this project. I settled on building the web application using PHP and MySQL and then construct an iPad app using Objective-C. As I progress through the project, I'll have the opportunity to have it tested by the people who it's being designed for, thus giving me feedback, suggestions and allowing for the software to be given a real world testing environment.

4 Special resources required

Expert PHP and MySQL – Andrew Curioso, Ronald Bradford
Pro PHP Refactoring - Francesco Trucchia and Jacopo Romei
iPhone Development Essentails – Apple Inc.

5 Project Plan

Project Milestones	Intended Completion Date
Setup development environment	29/9/2011
Develop reception system and login system on web app	13/10/2011
Develop service aspect of the application	10/11/2011
Develop rough version of iPad app	8/12/2011
Develop parts aspect of the application	23/2/2012
Add additional requirements as specified by the customer	14//3/2012
Complete development of the iPad app	26/4/2012

6 Technical Details

The project will be written using PHP and MySQL with the iPad app being built using Objective-C. I have chosen PHP and MySQL as they are a proven combination of a web language and a database language in the way that they work together. As for Objective-C for the iPad app, it is the only language you can use when developing an app for an iOS based device unless you were going to build an app that runs through Safari. This would use HTML5 but I would prefer to build an actual app as it would seem a more professional way of doing the intended task.

7 Evaluation

The project will be evaluated using real world testing where people who the product is aimed at will use the application in a real world environment and provide feedback as necessary. This approach will allow me to make changes that will make the product appeal to the intended audience and will allow me to add additional requirements as requested by the testers. This will be done on an on-going basis as the project is developed allowing me to make the changes sooner so that the overall finished product will meet the requirements laid out by the customer.

8 Consultation 1

Paul Stynes
My discussion with Paul was very beneficial as he gave me a few areas in which to expand my scope into. Thanks to his suggestion, I have begun researching into integrating PHP into the cloud. He also suggested I consider open source programs as a base for my application and then expand on them with my own work.

9 Consultation 2

Keith Maycock
When I spoke to Keith it was mainly to do with iOS development, however, he advised me to research onto other database and web deployment methods such as using Google or Microsoft's cloud services as a host for my project. Also that I could look into other languages like Python to build my project with.

7.2 Requirement Specification

Parts & Service Management System Requirements Specification (RS)

Document Control

Revision History

Date	Version	Scope of Activity	Prepared	Reviewed	Approved
14/10/2005	1	Create	AB	X	X
21/10/05	2	Update	CD		

Distribution List

Name	Title	Version
Paul Stynes	Lecturer II	2

Related Documents

Title	Comments
Title of Use Case Model	
Title of Use Case Description	

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Introduction

1.1 Purpose

The purpose of this document is to set out the requirements for the development of a Parts & Service Web Application along with a Car Walkaround iPad Application. The intended customers are any car service centre operating in the motor trade.

1.2 Project Scope

The scope of the project is to develop a web application that will allow users to effectively manage the day to day operations of a car service centre. The system shall make use of an iPad Application to provide the mechanics with a speedy and easy to use way of letting the service advisors know what faults there are with the car so that they can let the customer know and get the required work approved.
I was involved in discussions with Paul Dolan (Aftersales Manager), Glenn O'Reilly (Parts Manager) and Colm Corcoran (Master Technician) from Audi South Dublin Service Centre to elicit the following requirements:

- Loan Car Management System – keep track of cars that are available to be loaned out to customers when their cars are in for service.
- Point Of Sale – allow service advisors keep track of WIPs (Work in Progress) and cost them when work is completed.
- Booking Schedule – allow for the efficient updating and viewing of service bookings
- Part Location Map – allow for the generation of a map of the stores where the Parts Advisors can quickly locate the specific part required.
- Reception – allow for calls to be recorded and the intended recipients of the calls be notified should they not answer the phone when the call is transferred.
- Car Walkaround – iPad application that allows mechanics to update WIPs as the work on the car.

2 User requirements definition

The requirements outlined above by the people I consulted at Audi are the main features they would like to see in this project. Additional requirements will be outlined to me as the project progresses should they prove necessary. In terms of the user interface, the only request that the put to me was that it would be more straight forward than the existing systems as they are poorly designed and not at all user friendly.

3 System architecture

The applications I will develop will be as user friendly as possible. I intend for everything needed to be easily accessible in their respective views, for example, all relevant tasks in the point of sale system will be designed in such a way that the user will quickly pick up their locations and therefore using the applications will become second nature quite quickly.

When starting the application, users merely need to visit the site where it will be hosted and login. After login is complete they will be redirected to their relevant start page. Service, parts and reception users will be directed to their specific start page based on the service they provide, however, as for example, the receptionist may need to do the job of a service advisor, they will be able to go to the service start page if they so wish. Directing them to their specific start page will merely be for their convenience.

The iPad application on launch will show a login screen with a drop down list containing a list of the mechanics names. This is so that the service advisors will know who added the required repairs to the WIP. After that, they will enter the job number (WIP number) and the WIP will appear on the screen. In here they can view what needs to be done to the car, add more repairs by tapping on the car walkaround function or advise the service advisors that the required work is complete. When they tap the car walkaround button, they will be brought to a diagram of the car they are working on where they can tap an area of the car and add additional repairs to the job by either selecting a part with a tick box beside it or entering specific issues in the text field.

To run the applications success fully the hardware required will be:

- PC/Mac
- Monitor
- Mouse
- Keyboard
- iPad

4 Requirements specification

4.1 Interface requirements

My application will run using a Graphical User Interface (GUI). The operations will be carried out using keyboard and mouse and in the case of the iPad application, by touch.
Both applications will be fully integrated due to them being connected to a MySQL database. This allows for all users to access the information and make changes as they see fit.

4.2 Functional requirements

4.2.1 Requirement 1

Point of sale

4.2.2 Description & Priority

This requirement is essential as it is needed for the updating of WIPs, invoicing to customers and viewing what needs to be done on the car.
The point of sale interacts with the database to provide the users with the required information that they use. It updates the database as the users add things to it.

4.2.2.1 Requirement Activation

This is the main feature that users will use as it is central to the smooth operation of a car service centre. Users will go here to update WIPs and assign parts and mechanics to jobs.

4.2.2.2 Technical issues

This requirement requires an active database to be running in the background in order for it to store data entered by the user and access pre-stored data previously entered.

4.2.2.3 Risks

The point of sale requires the database to run successfully, therefore the database must be available at all times. If the database is offline then it will be unable to function resulting in the users being unable to complete their work.
A way of preventing this would be to host the database on a secure server with multiple backups available that can be easily accessed should it be necessary.

4.2.2.4 Dependencies with other requirements

The point of sale requirement will interact with the car walkaround requirement. It is required for the users of the web application to view the information added by the users of the iPad application.

4.2.2.5 Functional Requirements

Use Case 1 *see Appendix 7.1.>*

4.2.3 Requirement 2

Car walkaround

4.2.3.1 Description & Priority

The car walkaround is to be used by the mechanics to update information to the WIPs for the service advisors to view and inform customers of additional jobs that their car requires.
It is a priority in that it will speed up the communication time between the mechanics and advisors so that the car will be completed a faster.

4.2.3.2 Requirement Activation

The mechanics do an inspection of the car as part of the service and determine what it needs in addition to the reason the car is in the garage. The iPad application will allow them to do the inspection a lot quicker as previously it required writing down what additionals the car needs. By tapping the predetermined check boxes it will speed up the time taken to complete the inspection.

4.2.3.3 Technical issues

The application will require an iPad to run. The application once created will be installed on it and will be available for the mechanics to use as required.

4.2.3.4 Risks

As with the point of sale, the car walkaround requires an active database so the risk of it being offline is the main one. Also as it runs on an iPad, the risk of the iPad being damaged in an environment such as a workshop is high. Protective cases would be the ideal way of preventing such damage.

4.2.3.5 Dependencies with other requirements

The car walkaround works in conjunction with the point of sale so for an effective service to be provided both need to connect to each other through the database.

4.2.3.6 Functional Requirements

Use Case 2 *see Appendix 7.2*

4.3 Documentation requirements

4.3.1 Requirement 1

Technical Report

4.3.2 Description & Priority

This document will describe the describe the progression through and results of the project when it is complete. This document is a high priority document.

4.3.3 Requirement 2

User manual

4.3.4 Description & Priority

This documents details how to use the applications' features. It is designed in such a way that the readers will become familiar with the applications very quickly. This is a high priority document.

4.4 Data requirements

4.4.1 Requirement 1

Data input

4.4.2 Description & Priority

All data that is entered should be in a way that other users will understand. The system will be designed so that the database will store all data entered so that it will be up to the individual to understand the information entered.

5 System models

This section presents a more detailed description of the system model. For example DFD, ERD, UC Model etc.

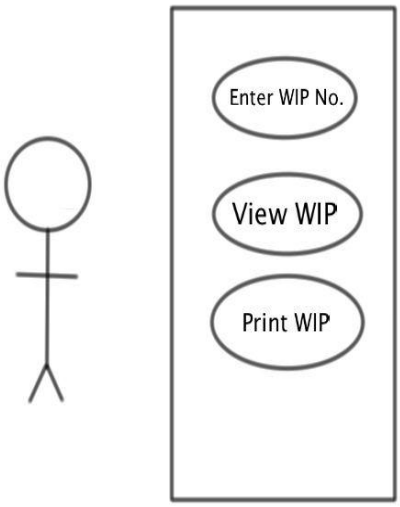
6 System evolution

The system could evolve over time to include other features as the need for them arises.

7 Appendices

7.1 Use case 1

Use case
Point of sale
Scope
The scope of this use case is to allow the user to process invoices to a customer
Description
This use case describes the process of how a service advisor processes and invoice to a customer
Use Case Diagram



Flow Description

Precondition

The system is in initialisation mode and the user has a box where to enter a WIP number to access a job

Activation

This use case starts when a user enters a WIP number

Main flow

1. The system identifies the correct details according to the WIP
2. The user views the WIP and makes changes as necessary (See A1)
3. The system adds these changes to the database (See E1)
4. The user prints the invoice to give to the customer

Alternate flow

A1 : Incorrect WIP

1. The system displays the WIP entered by the user
2. The user views the WIP and determines it's the incorrect one, closes the open WIP and correctly enters the one they were looking for.
3. The use case continues at position 3 of the main flow

Exceptional flow

E1 : More Information added

4. The system saves the information to the database
5. The user reviews the information again and enters more (See E1)
6. The use case continues at position 4 of the main flow

Termination

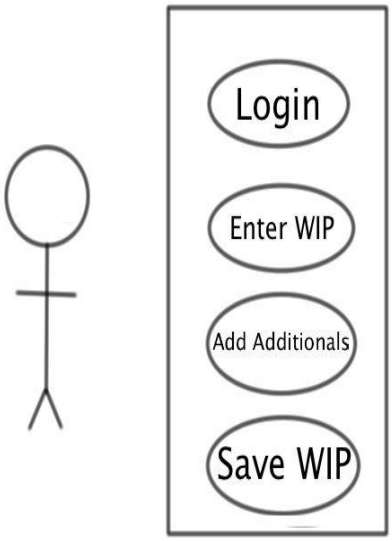
The system presents open WIP screen if when successful. It also sends the completed invoice to the printer.

Post condition

The system goes into a wait state until the user enters another WIP number.

7.2 Use case 2

Use case
Car walkaround
Scope
The scope of this use case is to allow the user add additionals to the job
Description
This use case describes the process of how a mechanic adds additional tasks that need to be done to a car so that it can be reviewed by a service advisor.
Use Case Diagram



Flow Description

Precondition

The system is in initialisation mode and the user has a login screen displayed on the iPad

Activation

This use case starts when a user logs in

Main flow

1. The system identifies the correct user
2. The user enters a WIP number (See A1)
3. The system pulls the information about that WIP from the database (See E1)
4. The user enters in additionals tasks and saves

Alternate flow

A1 : Incorrect WIP

5. The system displays the WIP entered by the user
6. The user views the WIP and determines it's the incorrect one, closes the open WIP and correctly enters the one they were looking for.
7. The use case continues at position 3 of the main flow

Exceptional flow

E1 : More Information added

8. The system saves the information to the database
9. The user re-enters the WIP again and enters more (See E1)
10. The use case continues at position 4 of the main flow

Termination

The system presents open WIP screen if when successful. It also saves all entered information to the database.

Post condition

The system goes into a wait state until the user enters his login details.

7.3 Monthly Log Book

Reflective Journal 1 – 28/10/11

Progress:

Since the beginning of the semester, I have focused on setting up the development environment and progressing with the early stages of developing the website. The first program I went about installing was the latest version of Xcode for Mac (4.2.1) which is capable of developing applications for iOS 5 and below. After that I put provisioning profiles on my iPhone and iPad, which will allow me to develop my apps and put them on the devices for testing. I then went about choosing an appropriate text editor to develop then web site portion of the project. I've chosen TextWrangler for Mac as out of the options available, it seems to be PHP friendly and despite a lack of FTP support will be easy to code with.

With the environment set up and ready to go, I developed a prototype for the reception system, where when a call is received, the receptionist can log it on screen where it is saved to a SQL database. At the moment I'm using MAMP to process localhost SQL requests. I hope to have it hosted by the time the prototype comes around. I have also developed a login system where the users can access secure pages upon correct entry of their username and password.

Reflective Journal 2 – 25/11/11

Progress:

I have spent the last month going through tutorials on how to develop Objective-C apps with Xcode. What I have found however is that with my current version of Xcode, they have updated the user interface and several key features when developing apps. A noticeable and complex new feature is Storyboard. This differs significantly from the tutorials and is making the tutorials more difficult and challenging.

For the website, I have developed an admin page with the options to create users and delete users from the database. The login system has also been refactored to make its more secure. It manages MD5 password encryption, thus making password entry and storage in the database more secure.

Reflective Journal 3 – 16/12/11

Progress:

All development has been geared towards the prototype. I have decided to solely present the progress on the website as the starting the app at this point would be counterproductive.

For the prototype I have completed a loan car management page which derives its information about the available loan cars from the database and allows for the entry of a report specifying any damage or incidents that occurred with the loan car while it was out with a customer. I have created a booking form for when customers wish to book their car in for service. This includes a JavaScript function that changes the values in the select components when the previous one has been changed.

My main goal was for the functionality to be demonstrated so I avoided making a complex CSS template until next semester.

Reflective Journal 4 – 27/1/12

Progress:

Due to exams taking place this month, I have not had the chance to do much for the project. I have, however, begun work on a website for a client which will contain several functions that could prove useful in the development of the project.

Reflective Journal 5 – 24/2/12

Progress:

Having gone through the Stanford iOS development tutorials from iTunes U, I have begun to create the app. unfortunately, connecting to the SQL database is proving tricky. Until I can solve that, any progress on the app will be slowed.

Using a basic CSS template I developed for a client's website, I have begun to integrate and refactor the existing functions. It is my hope to continue using this template as it is simplistic but ideal for what the website is to do.

Reflective Journal 6 – 30/3/12

Progress:

Since the database problems have not been solve, I have gone about researching other ways to develop this app. This includes using a HTML5 app embedded in Objective-C and developed using PhoneGap. I may go down this route as the database problem has basically put a halt to the development of the app. Hopefully, when I begin attempting this path the progress will enable me to get the app working quickly.

Reflective Journal 7 – 27/4/12

Progress:

Due to exams taking place this month, I have not had the chance to do much for the project. At the suggestion of my supervisor, I have redesigned the CSS as it was made clear to me that the colour scheme was a little harsh on users. Looking back on it, I tend to agree. When the new template is done, I will integrate the previous functions and continue to improve on them as I go.

As the app has been given me some amount of difficulty, I have decided to begin the development of an app that will allow for the user to report their location to the garage when they break down so that a tow truck can be dispatched to them and the car towed to the garage for assessment and repair.

7.4 Other Material Used

1. What changes would most improve the website?

More info in the parts section

2. Do you like the look of the website, neither like nor dislike it, or dislike it?

Like a great deal

3. What do you like most about the website?

The Clever Title

4. What do you like least about the website?

Not enough info in the part section

5. How professional is the look and feel of our website?

Very professional

6. How easy is it to navigate the website?

Extremely easy

7. In the case of the app, would you use it if you broke down somewhere?

Yes

8. Would the appearance of the company's websites and applications influence you when you are deciding whether or not to use them to service your car?

Yes

1. What changes would most improve the website?

a little over crowded in some of the images

2. Do you like the look of the website, neither like nor dislike it, or dislike it?

Like a great deal

3. What do you like most about the website?

it easy to navigate

4. What do you like least about the website?

theres really bad about it

5. How professional is the look and feel of our website?

Very professional

6. How easy is it to navigate the website?

Extremely easy

7. In the case of the app, would you use it if you broke down somewhere?

Yes

8. Would the appearance of the company's websites and applications influence you when you are deciding whether or not to use them to service your car?

Yes

1. What changes would most improve the website?

i would stick the name of the company on the cars number plate

2. Do you like the look of the website, neither like nor dislike it, or dislike it?

Like a moderate amount

3. What do you like most about the website?

the clean layout design

4. What do you like least about the website?

lack of color

5. How professional is the look and feel of our website?

Very professional

6. How easy is it to navigate the website?

Moderately easy

7. In the case of the app, would you use it if you broke down somewhere?

Yes

8. Would the appearance of the company's websites and applications influence you when you are deciding whether or not to use them to service your car?

Yes

1. What changes would most improve the website?

Error Messages on failed login

2. Do you like the look of the website, neither like nor dislike it, or dislike it?

Like a great deal

3. What do you like most about the website?

very easy to navigate

4. What do you like least about the website?

nothing

5. How professional is the look and feel of our website?

Very professional

6. How easy is it to navigate the website?

Extremely easy

7. In the case of the app, would you use it if you broke down somewhere?

Yes

8. Would the appearance of the company's websites and applications influence you when you are deciding whether or not to use them to service your car?

Yes

1. What changes would most improve the website?

No Response

2. Do you like the look of the website, neither like nor dislike it, or dislike it?

Like a great deal

3. What do you like most about the website?

Layout

4. What do you like least about the website?

Barely any user interaction.

5. How professional is the look and feel of our website?

Extremely professional

6. How easy is it to navigate the website?

Extremely easy

7. In the case of the app, would you use it if you broke down somewhere?

Yes

8. Would the appearance of the company's websites and applications influence you when you are deciding whether or not to use them to service your car?

Yes

1. What changes would most improve the website?

faster

2. Do you like the look of the website, neither like nor dislike it, or dislike it?

Like a great deal

3. What do you like most about the website?

home page

4. What do you like least about the website?

slow

5. How professional is the look and feel of our website?

Very professional

6. How easy is it to navigate the website?

Very easy

7. In the case of the app, would you use it if you broke down somewhere?

Yes

8. Would the appearance of the company's websites and applications influence you when you are deciding whether or not to use them to service your car?

Yes

1. What changes would most improve the website?

None

2. Do you like the look of the website, neither like nor dislike it, or dislike it?

Like a great deal

3. What do you like most about the website?

Nice look

4. What do you like least about the website?

nothing

5. How professional is the look and feel of our website?

Extremely professional

6. How easy is it to navigate the website?

Extremely easy

7. In the case of the app, would you use it if you broke down somewhere?

Yes

8. Would the appearance of the company's websites and applications influence you when you are deciding whether or not to use them to service your car?

Yes

1. What changes would most improve the website?

More functionality.

2. Do you like the look of the website, neither like nor dislike it, or dislike it?

Like a great deal

3. What do you like most about the website?

The layout and the look.

4. What do you like least about the website?

Nothing negative to say about the website could just do with a few more functions. Very good though.

5. How professional is the look and feel of our website?

Very professional

6. How easy is it to navigate the website?

Extremely easy

7. In the case of the app, would you use it if you broke down somewhere?

Yes

8. Would the appearance of the company's websites and applications influence you when you are deciding whether or not to use them to service your car?

Yes

1. What changes would most improve the website?

I would make login more prominent

2. Do you like the look of the website, neither like nor dislike it, or dislike it?

Like a great deal

3. What do you like most about the website?

The convienient navigation

4. What do you like least about the website?

nothing

5. How professional is the look and feel of our website?

Extremely professional

6. How easy is it to navigate the website?

Extremely easy

7. In the case of the app, would you use it if you broke down somewhere?

Yes

8. Would the appearance of the company's websites and applications influence you when you are deciding whether or not to use them to service your car?

Yes