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Corner Shop Specialist

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**Abstract**

This report outlines a software development project to build a system that can be used by staff and customers of corner shops to assist both staff to more effectively carry out their jobs. The system allows customers to check the stock and products of their nearby shop and has a click and collect service for item reservation. For staff, the system allows managers to handle stock, deliveries and their staff.

The report begins by outlining the background, deliverables and objectives of this project, delving into the industry area, what is currently used and the drawbacks of the current solutions. Moving on from that the report will then cover the approach taken during the project and the social legal and ethical concerns related to this project. I will next then describe the architecture and design process used to set out the framework for the project. I will then cover how the project was managed to ensure its success.

The next section of the report will cover the development phases of the project and the iterations that were taken that build upon each other to create a completed system. I will also overview issues encountered during the project and how they were overcome.

To conclude, this report will cover a post-mortem of the project to evaluate what went well and what could be improved on for future projects of this manner.

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# Introduction

The idea for this project came from the developer’s experience working in retail for a year and using the systems provided to him to carry out his job. This project has no specific client in mind but has the potential to be commercialised as an off the shelf system for businesses.

In a retail environment, there is historically the case that the systems they use to store corporate information such as stock information, staff details and other corporate details on a shop to shop level are being handled by decades old software and hardware that is not kept up to date due to cost and other corporate concerns. This system has been built to modernise the systems used by shop managers and staff to help enhance the potential of these systems and add features to make working in retail more convenient and easier on both the staff and customers.

This software has been developed to be both a website and desktop application with the website providing an interface for staff and customers and the desktop application primarily for managers to handle corporate information and manage their individual shop.

# Background, Objectives and Deliverables

## Motivation

The main reason this project was conceived was to make working in retail more straightforward for the staff by alleviating some of the issues they currently encounter.

One major issue is the use of very outdated software for back office computer systems that is often slow and normally running on outdated operating systems that are no longer supported by their providers with updates thus making them very unsecure to recent security exploits which could be crippling for a company’s corporate information that is stored on these computer systems.

Another issue with these currently used systems they do not accommodate areas such as staff shifts and holidays as these are still done via paper. This provides the limitation of staff members having to physically come into the shop to see when they are working or to request and check their holiday. Having this on an online platform would allow staff to check shifts online for instance if they have been off work for holiday.

Another problem that shop staff face when working on the shop floor is questions from customers regarding if they stock a certain item or when items will be back in stock. This is something that can be moved to an online platform to free up staff members to more effectively carry out their duties and responsibilities.

The final issue that has been identified is pertaining to the usability of the systems currently employed by companies as most of them are ageing systems they are using very outdated usability techniques that provide a poor user experience for their end users with some systems seen using an almost command line system for certain sub-systems of the software.

The solution to be developed to address the issues outlined above to provide a better user experience for staff and allow customers to access information about their local corner shop online so that they do not need to travel to the shop to get the desired information. It will also provide a more secure system for corporate information on an up to date operating system to prevent data leaks.

## Project Objectives

The objectives outlined below consist of the desired outcome of this project and are:

1. For the developer to gain experience and understanding in full stack development and specifically vertical slice development.
2. Build a system that solves as many of the problems outlined to be resolved by the system as best as possible for the end users.
3. To provide a good user guide for the end users to be able to effectively use the system produced.
4. For the developer to gain insight into how commercial systems are produced and the requirements surrounding them in a business environment.

## System Requirements

A set of system requirements has been produced to quantify if the system is considered complete. These requirements were derived from requirements engineering performed in section 5.1 of this document. These will be broken down in more detail in the form of user stories in section 5.1 of this document.

1. Allow staff members to access information about their work remotely.
2. Allow customers to access information about shops and their products remotely.
3. Allow managers to manage stock and deliveries to their shop.
4. Have the ability for an administrator to mange aspects of all shops covered by the system.
5. Have functionality for staff members to perform basic work tasks from home that are not required for their presence in store.
6. Allow customers to check stock and reserve products for collection from their desired shop.
7. Have functionality for the management of newspaper delivery services if shops require them.

## Deliverables

Outlined below is a set of deliverables at a high level that the system should have upon completion:

1. A Desktop application to be used by both managers as an in-store back office computer system and by administrators in a head office to manage corporate information for shops.
2. A website for customers and staff to use to access information remotely about shops and staff information.
3. A backend Rest-API to securely provide data to the front-end systems
4. A database to store corporate and customer information.
5. User Guide
6. Project Report

# Legal, Social, Ethical and Professional issues

## Legal Considerations

### Licencing

**Mongo DB Compass**

As a free plan of Mongo DB compass is used, the developer must adhere to the software terms of use. (Mongo DB, 2020)

**JavaScript Node packages**

Most of the JavaScript libraries used fall under the MIT licencing under the open source initiative making them freely available and are thus suitable for the intended use on this project.(The Open Source Initiative, 2020)

**Visual Studio**

Microsoft Visual studio is licenced through the Microsoft image program by the university. This allows for Visual Studio to be used for this project. However, this does mean that this system cannot be published for profit under this current licence and a full Visual studio licence would need to be acquired for this to be done. (Microsoft Imagine, 2020)

### Data Handling

### GDPR

## Ethical Considerations

The only human participants used to get feedback on this project were colleagues on the developer’s course. This is covered by the generic ethical approval submitted on behalf of the department for this module and covers all the ethical issues that would have been faced during the project.

## Social Considerations

This system was developed purely for the completion of the PRCO403 module to fulfil the requirements outlined. This means that the system is not intended to be deployed

# Project Management

## Agile Project Management

For this project, an agile approach has been used to manage the project and ensure its success. This is outlined by the PRCO304 module specification as the recommended project management style to use for the project.

Agile Project management as detailed in the agile manifesto has the key principle of continuous delivery of software to end users/clients at regular intervals. (Agile Manifesto, 2001) This was established by developing according to iterations or sprints with the design allowing for something to be ready to be shown to the end user at the end of each iteration.

## GitHub

GitHub has been used to manage the code base of the project

## Trello

## Vertical Slice Development

Vertical slice development was employed as part of an agile approach to maintain quality of the code produced and to verify completeness of functionality.

# Stages

## Stage 0 – Architecture research and requirements engineering

### Objectives

The objectives of this stage of the project are as follows:

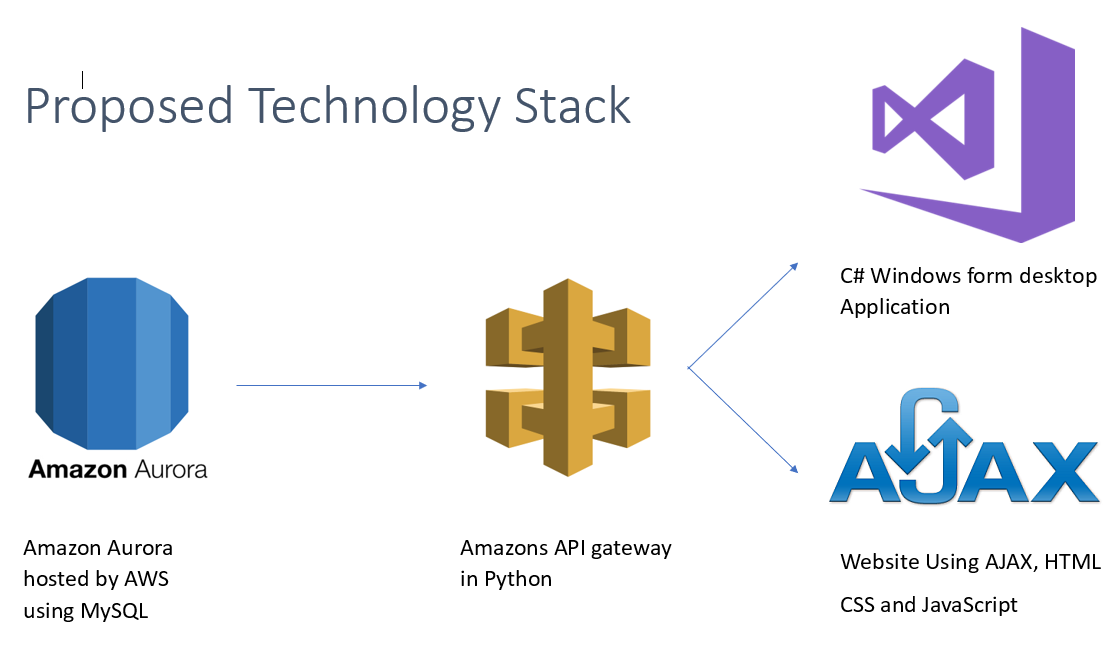
1. Research into potential technologies to use and analyse their effectiveness for producing a solution.
2. Identify relevant requirements.
3. Draw up user stories to be completed throughout the project.
4. Prioritise those user stories into what is most critical to the system and what is optional.
5. Draft a sprint plan to plan out how the development cycle will go over the coming stages.

### Outcomes of this stage

**Technology Stack**

Initially, it was decided to research into a cloud hosting solution for the project not only to give the developer more experience with this kind of framework, but also since it would allow for more seamless deployment of the software across multiple devices. To this end Amazon Web Services (AWS) was identified as a potential back-end technology stack as it has a free plan that would be suitable for the needs of the project in terms of performance and compatibility with the developer’s skills.

In terms of the front-end systems to consume the database and API, I decided to build a website using HTML, CSS and JavaScript due to the developer’s experience using these languages from previous study. To handle the requests to the server jQuery and specifically AJAX was identified as a suitable solution. To create the desktop application, C# windows forms were chosen to be used due to the developer’s previous knowledge of the software and the “drag and drop” nature of the practice allowing for effective user interface design.

Figure 1: Proposed technology stack to be researched and used at the start of stage 0.

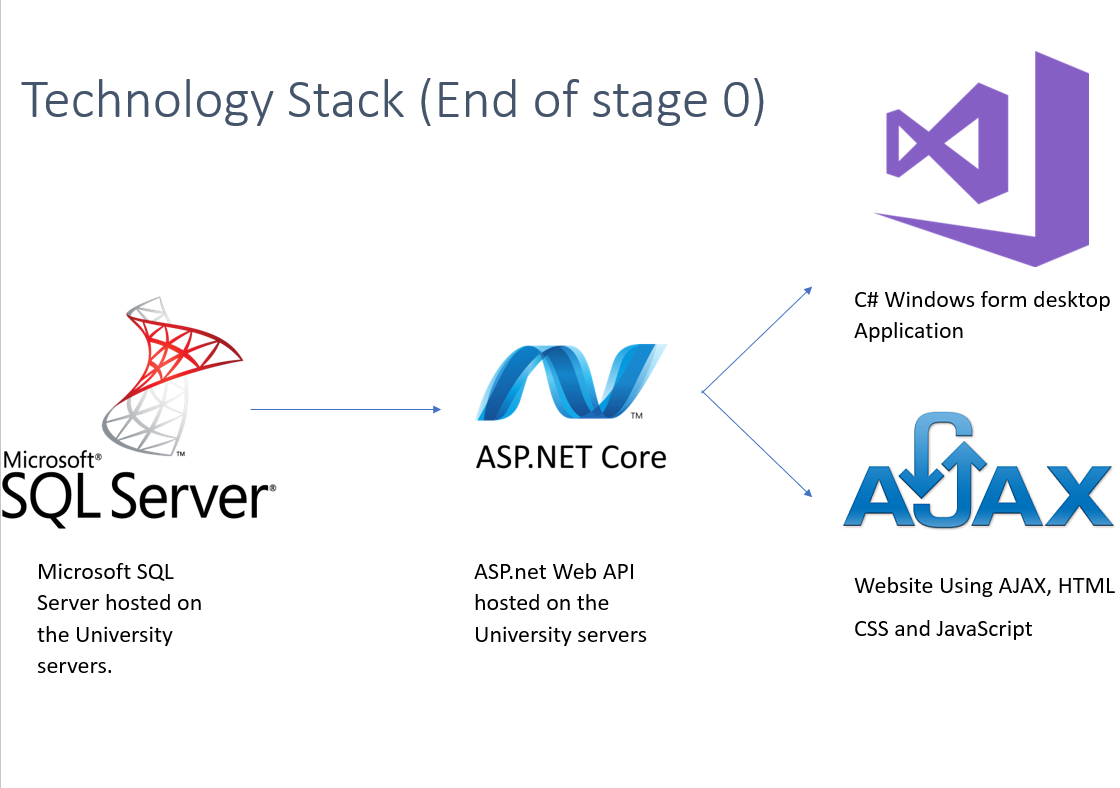
After further research into how AWS works and integrating it into software present on the developer’s devices. It was established that there were technical issues with connecting MySQL Workbench to an AWS MySQL database. This had the knock-on effect of using Amazon’s API Gateway much more complicated to use as it works most effectively with Amazon hosted services. This meant that the back-end technology stack was changed during this stage to move to technologies that the developer had used in the past and was more confident would work. The technologies for the Database and API were replaced with a Microsoft SQL Server and ASP.net Web API respectively.

Figure 2: Technology Stack post stage 0 research.

**Requirements**

During this stage requirements were elicited from both the developers experiences and desires for the system in terms of improving user experience for shop staff and also through consultation with family who have worked in management rolls of shops in the past to see what they would require out of the system.

From this a set of functionalities in the form of user stories was devised and prioritised into 3 categories. These categories include: Core, Stretch and Optional. Core functionality is functionality that is critical to the system functioning as intended and must be completed by the time the project is completed. Stretch functionality is functionality that ideally would be completed by the end of the project as it is important to be included. Optional functionality is user stories that are not as important to be included in the context of the overall system but would be welcome inclusions to extend the overall functionality of the system.

The following is the user stories identified sorted into these three categories:

Core:

* As a customer, I want to be able to set up an account so that I can use the website
* As a customer, I want to be able to log into the website so that I can access the features on the systems
* As a manager, I want to be able to log into the back-office system so that I can manage my shop
* As a Staff member, I want to be able to log onto the systems to access my features
* As a manager, I want to be able to set up accounts for my staff so that they can access the system
* As a customer, I want to be able to update my account details so that they are accurate
* As a customer, I want to be able to search for products so that I can see if my shop sells them
* As a manager, I want to be able to see what Items are on my next delivery so that I know what stock is due into the store
* As a manager, I want to be able to see how much stock of each item we sell we have so that I can know what to order for delivery
* As a staff member, I want to be able to change my payroll details so that I am paid into the right bank account
* As a staff member, I want to be able to request holiday so that I can have a break from work
* As a manager, I want to be able to approve holidays so that my staff can have time off when they have requested
* As an admin, I want to be able to add deliveries to the system so shops know when their deliveries will arrive
* As a manager, I want to be able to set up rota's so that my staff know when they are working
* As a staff member, I want to be able to look at the shop rota so that I can see when I have to work.

Stretch:

* As a customer, I want to see if the product I want is in stock so that I know if I can go and get it.
* As a customer, I want to be able to reserve the product that I want so that I can go and pick it up
* As a manager, I want to be able to view click and collect orders so that the items can be put aside for customers to collect
* As a customer, I want to see if the product I want is in stock so that I know if I can go and get it.
* As a manager, I want to be able to add staff members to the system so that they can access the system.
* As an admin, I want to be able to add managers to the system so that they can manage their shops

Optional:

* As a customer, I want to be able to set up a news delivery so that I can have papers delivered to me
* As a customer, I want to be able to cancel my newspaper deliveries If I do not want them delivered anymore
* As a customer, I want to be able to edit my newspaper deliveries so that I can get the paper I want delivered
* As a manager, I want to be able to view newspaper rounds so that I can organise papers for paper staff to deliver.
* As a customer, I want to be able to pay for my newspapers online so that I don't have to go into the shop to pay regularly

**Sprint Plan**

After the above requirements were elicited, they were organised into 2-week sprints to be completed throughout the project. The functionality was organised based on both its priority to the system and its connections to other user stories so that the system could be build up more efficiently layer by layer. The full sprint plan can be seen in appendix 11.2.

### Stage Review

Overall this stage was a success.

This stage identified key issues with the technology stack that if they had not been picked up before development could have cause significant delays to the overall project timeline due to the need to decide on and change technology stacks once issues arose. This also had the added benefit of moving development to more familiar architecture that would have then allow for a more efficient development process.

The requirements elicited were detailed and gave a clear vision for the specific functionality points that would need to be developed for this system to be fit for purpose in a real retail business environment. The prioritising of the functionality also allowed for the sprint plan to be more focussed on the core functionality and reduced the amount of gold plating that could creep into the project over time.

## Stage 1 – Log in and sign up

## Stage 2 – Stock and Deliveries

## Stage 3 – Catchup from Technical Issues

## Stage 4 – Staff Rota’s and Click and Collect

## Stage 5 - Holiday, payroll and further deliveries

# Changes during development

# End-project report

# Project Post-mortem

# Conclusions

# Reference List

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# Appendices

## User Guide

## Project Management

### Trello Boards

### Sprint plan