AN INTELLIGENT
PRODUCT FINDER SYSTEM

A Project Report

Submitted in partial fulfillment of the requirements for the degree of

MSc in Software Engineering

BY

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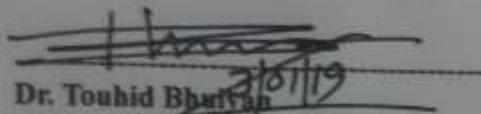
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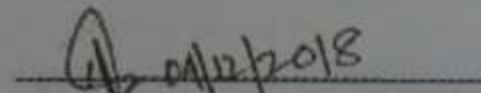
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APPROVAL

This Project titled "**An Intelligent Product Finder System**", submitted by **Foez Ahmed, ID No.: 173-44-160** to the Department of Software Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of M.Sc in Software Engineering and approved as to its style and contents.

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DECLARATION

I hereby declare that this project under supervision of Md. Khaled Sohel, Assistant Professor, Department of Software Engineering, Daffodil International University. I also declare that neither this project nor any part of this has been submitted elsewhere for award of any degree.

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Abstract:

There are several points of sales system that is available right now in Bangladesh. But there's no concrete place where a customer would go to get the most relevant information about the products or service, they are seeking for leveraging the POS data. Our project will help establish a unified/generic bridge among different sales systems currently available in Bangladesh. Also, establishes a gateway for employee/cashier less store/restaurants. Based on the real-time data gathered through a central global API, this system will provide the user with the most up to the date, intelligent and relevant product or service information

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Acknowledgement

At the very beginning, I am very grateful to the almighty Allah for achieving my goals and completing this whole project. I would like to acknowledge and express my gratitude to many individuals who have helped me so much to complete this project.

First of all I would like to express my deepest thanks and gratitude to my honorable teacher and supervisor Md. Khaled Sohel, senior lecturer of Daffodil International University for his inspiration and time to time guideline to develop this project.

I also would like to express my gratitude to my honorable teacher Mr. Nizam Farid Ahmed senior lecturer of Daffodil International University. He helped me so many times to develop this application. Without his help and guideline, I would not be able to develop this application.

I would also like to thank the software company '3S-Software, Solution & Service' – leading restaurant management system provider, for giving me the opportunity to work with their demo data and database.

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1 CHAPTER 1: INTRODUCTION:

The world is now getting fully dependent on automation systems. Those systems that people used to operate through manual process are now getting replaced by these systems. And the reason is for dependent on that system is to save time and labor cost so that human effort can be reduce.

The main key of this system are-

- ➔ User friendly
- ➔ Easy to operate
- ➔ Reduce labor cost
- ➔ Reliable
- ➔ Faster

These expectations can be fulfilled if the automation system can be used in both web and mobile platform. So fulfill these kind of responsibility we decide to bring this automation system in both web & mobile platforms. This solution will manage the total automation system. We have named our system Unified Sales System.

Unified Sales System means a system that comes under some systematic process with some sequential rules and regulation. This system is platform and database independent and bridging the gap between different apps. It is a subsystem which is strictly maintain by the computer software. It is a customer-oriented system. The main purpose of this system is to collect the information of customer's order in an efficient and effective manner.

2 CHAPTER 2: INITIAL STUDY

2.1 Project proposal:

Project title: AN INTELLIGENT PRODUCT FINDER SYSTEM

Project developed by:

Foez Ahmed

Student Id: 173-44-160

Project area:

SAAS

Project duration: Four months, approximately.

2.1.1 Current condition:

There are 20 different POS systems available in Bangladeshi market. Businesses are

2.1.2 Justification of frameworks and methods:

Development of this project will follow DSDM pattern and it will comply with criteria. Lightweight-ness will be maintained, will be developed in small sections and parts. Which will result in iterate able development scope. DSDM Atern very closely match with this type of development process. Even if we decide to change something in the development process, we can easily achieve this because of the nature of this process.

2.1.3 Aims of this project:

Considering the current situations and problems, this project's main aim would be to develop a common API interface for data sharing and a one stop product service based on web technologies that will surface data to the consumers.

2.1.4 Objectives of this project:

Here are the main objectives of this project :

- Developing a secure modern web API
- A common data store for gathered data
- Another set of APIs to accessing the data

- A web client for surfacing the data

2.2 Background:

There are 20 distinct POS frameworks accessible in Bangladeshi market. In each framework, for their operational purposes, there are now information included with legitimate item data. Utilizing this data, business administrators are as of now producing solicitations. Along these lines, the data that is accessible through these frameworks are strong and dependable. However, with regards to accessibility of information to the general clients for motivations behind basic leadership and investigation, there's no programmed arrangement accessible in the market at the present time. Each one of that information are by and large physically gathered and surfaces through the current framework. Then again absence of up to the date information accessibility to the clients results in moderate business and decreased enthusiasm for various items.

2.3 Scope of the project:

There are a great deal of things that can be shrouded in this venture. In any case, inside this brief period numerous viewpoints that are unrealistic to create. Along these lines, fundamental perspectives have been isolated. As far as possible are:

• Data store and the board will be secured.

• Aggregation of regular information will be secured

• Data openness will be secured

2.4 Resource:

Tools:

- C# and Asp.NET for API
- Visual Studio 2017 as development tool.
- SQL Server 2016 as RDBMS.
- Windows 10 Pro operating system as OS Platform

2.5 Human Resources:

It's a scholastic independent project so one individual is allotted to execute as an expert, an engineer and an analyzer and distributed days for this task is 100 days in general.

2.6 Problem Area:

Consumer goods (CG) organizations are driving their retailer partners into a major information universe of community sharing. With the nature of joint effort and exchange between exchanging accomplices enhancing, providers keep on growing how they use information into new procedures. Then again, enthusiasm for items has been expanded gigantically. Clients are continually investigating finding the intriguing items for as indicated by their taste and inclination. Be that as it may, getting the correct data has dependably been the hardest part. Organizations and organizations spending a great deal of cash to achieve their clients yet that procedure is more similar to general methodology instead of serving to the explicit premium gathering. Which is an extremely fundamental point that is expected to fruitful in procedure of association working among items and clients. In the event that we take a gander at the present market, we will see that every one of the organizations are utilizing some sort of data framework as of now to deal with their business. In this way, the information is now there. In any case, all the outsider administrations that are giving data to the clients, they are adopting an exceptionally manual strategy to gather that information. Which implies, more often than not, you will escape date and superfluous item data. So those administrations are not up to the check.

The clients dependably search for some sort of administrations where they can without much of a stretch locate their ideal data realizing the data will be up to the date and setting mindful. Then again, every one of the organizations need their item data to be accessible to their client's hand as constant as could reasonably be expected. All that is missing is an association between that officially accessible information and a dependable administration for the clients. Possible solution:

Based on the evaluation of all the problems that the consumers are facing right now, they want a concrete hassle less place that could be a website or an app, which will help them find the product in their area with latest price information and relevance.

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2.7 Possible solution:

Based on the evaluation of all the problems that the consumers are facing right now, they want a concrete hassle less place that could be a website or an app, which will help them find the product in their area with latest price information and relevance.

2.8 Nature of challenge:

There are essentially five undertakings that are exists in a task improvement. These are examination, structure, coding, testing and execution. The principle testing errands are investigation and structure due to constrained learning about unstructured information. Since it is a scholastic task and it will be produced by one individual. So generally he is the expert, architect, designer and analyzer of this undertaking. This task will be created by utilizing C# programming language and MS SQL Server 2016 as DBMS. In this way, these are excessively testing to complete this project inside brief period..

2.9 Factors for critical success:

The components that should be worried for basic achievement:

- Developing a common relevant data structure.
- Developing real time data curation system.
- Surfacing the data with relevance on the web client.

3 CHAPTER 3: LITERATURE REVIEW

3.1 Discussion on problem domain based on published articles

Any information that reveals insight into client conduct is profitable to providers. Present day enormous information and examination stages make it totally sensible for retailers to share to such an extent or as meager information as they pick, at any dimension of detail. The most granular dimensions have the best ability to convey understanding. This incorporates store-thing day information, line-thing container level information, and on account of the most developed retailers and providers, client dedication information. We are likewise observing retailers sharing more than information — they are presently additionally sharing restrictive investigation with their providers that improve the profitability of community arranging.

Downstream information produced at the purpose of offer makes a definitive criticism circle for almost every major upstream retailer and provider process. These incorporate marketing, class the executives, evaluating, advancements, reliability, new item introductions, store activities, stock administration, anticipating, recharging, out-of-stocks, planogramming and that's just the beginning. Our clients use bits of knowledge from downstream information to expand deals through better in-stock position, develop normal exchange sizes through enhanced rack situation and focused on advancements, and boost return on stock by streamlining stock property. Most clients find that ROI is proportionate to utilization — the more agents and examiners utilizing the information and applying bits of knowledge, the more noteworthy the ROI.

3.2 Discussion on problem solutions based on published articles

Retailers and providers each hold a noteworthy bit of the riddle for accomplishing enhanced execution. Retailers bring profound learning of their clients, stores, and stock and classification blend. Providers profoundly comprehend brands, shopper observations and what rouses buyer buying decisions. Whenever retailers and providers unite their bits of knowledge, with a typical arrangement of profoundly nitty gritty information as the gathering point, the retailer-provider relationship is totally changed influencing everything from stock available to estimating and retire position. Each gathering understands that through more tightly coordinated effort they can manufacture an aggressive edge, drive huge new esteem and enjoyment clients en route.

3.3 Comparison of two leading solutions-

Comparison between Harriken and Foodiez system:

3.3.1 Harriken:

Harriken is the new and novel attempt at making the lives of Dhaka's food enthusiasts easier by helping in finding that perfect place to dine at.

Website Link: http://harriken.com
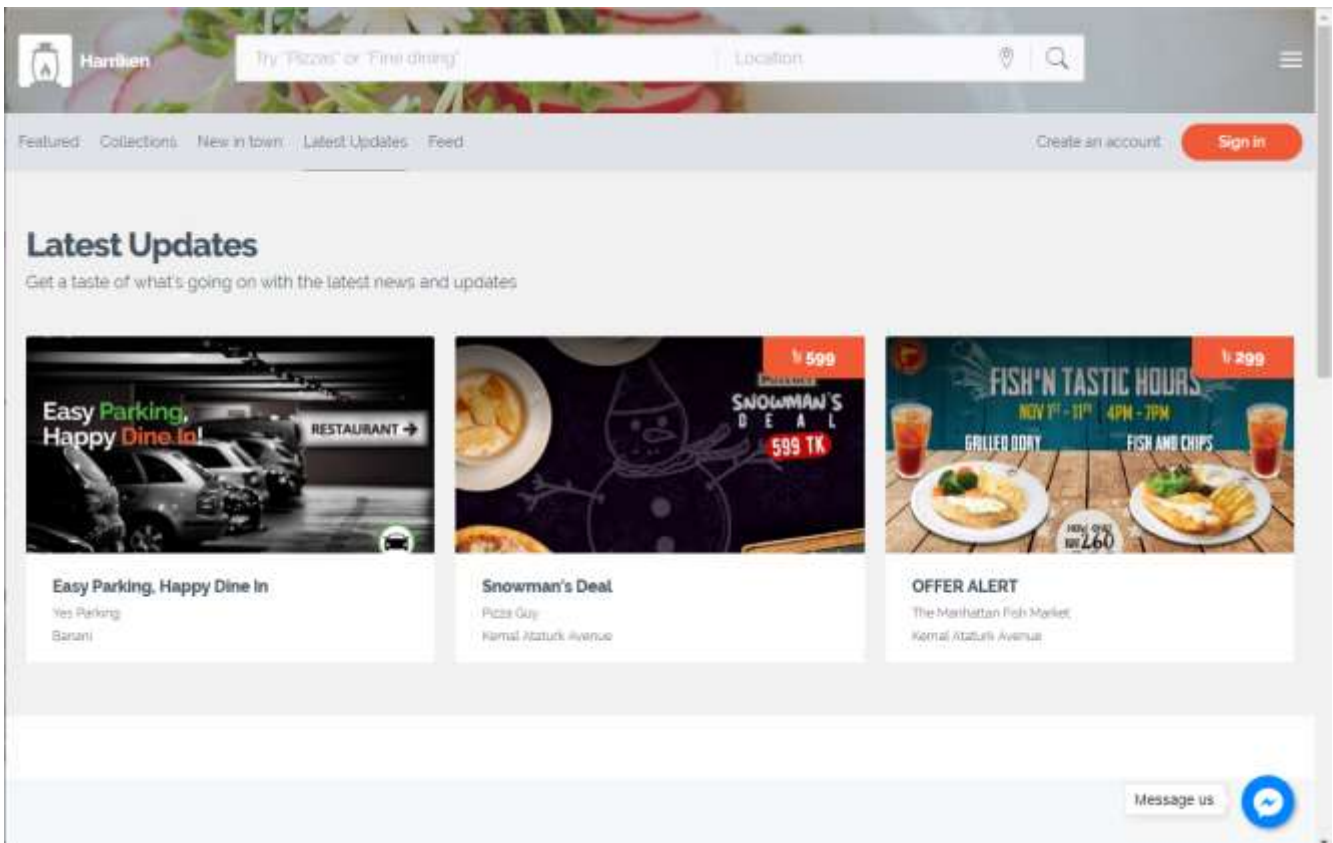
Figure01: Harriken Website

Best features:

- Easy navigation system.
- Curated data.

Limitations:

- Not up-to-date data
- No socializing factors
- Not all the restaurants are available

Foodiez:

This website aims to create a perfect Foodies' guide for Dhaka and other cities, based on your experience and contribution, so that anyone can easily find their preferred Food information.

Dhaka Foodies is an online community of Foodies where your reviews, pictures, posts and suggestions of Food helps other Foodies know better!

Website Link: http://www.foodiez.com.bd/
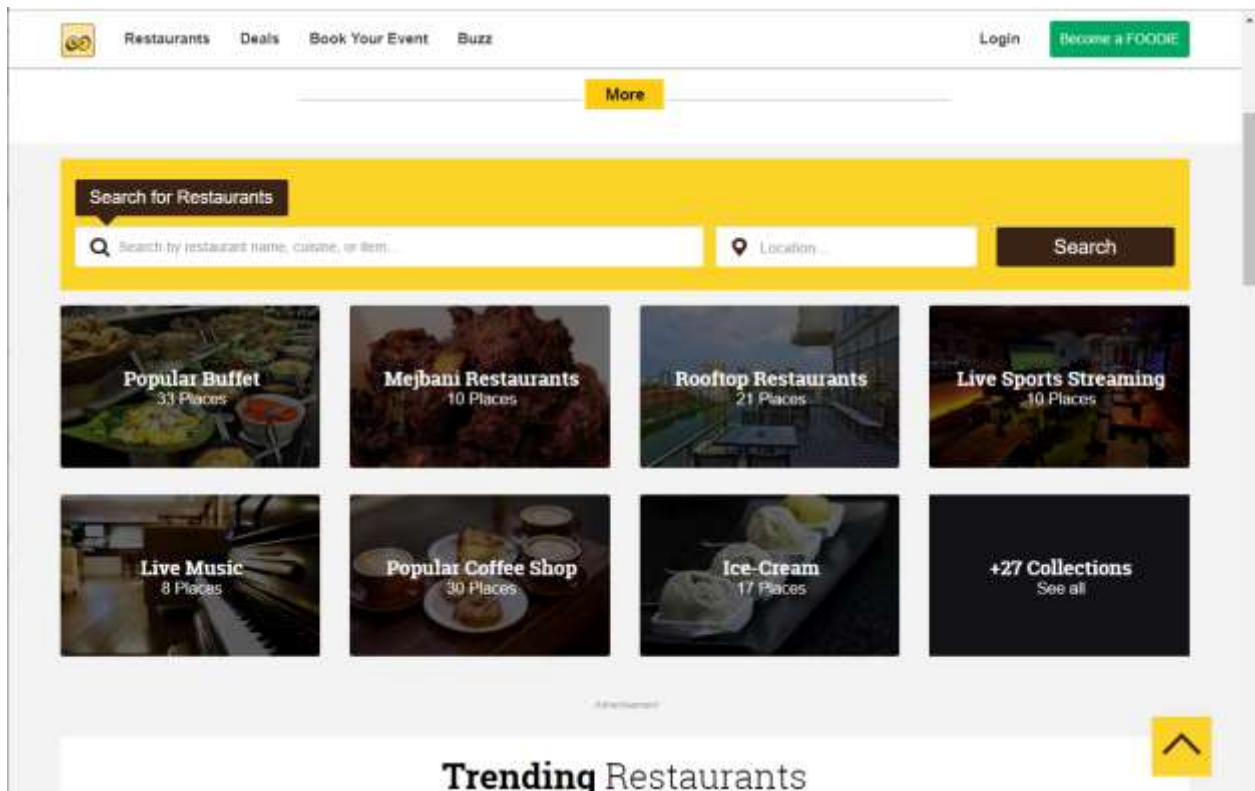
Figure02: Foodiez.

Best features:

- Strong review system and community

Limitations:

- Not up-to-date data
- No socializing factors
- Not all the restaurants are available.

3.4 Recommended approach

To design an effective shared data management system the best way is to identifying the consumer's activity scope and how deeply they dependent on searching for goods in their day to day life. So all of these things will help to design and develop an organized management information system. Here are some recommended best ways:

- Building the common bridge API to collect the products data.
- Ensuring privacy and system security
- Ensuring realtime-ness of the data
- Building an editorial system to curate these data into structured way
- Gathering customer's opinion to know what they actually want
- Product information needs to be precise, almost up to date and relevant

4 CHAPTER 4: METHODOLOGY:

4.1 What to use:

Creating application and run or increment business dependent on that application is a typical pattern at present. Be that as it may, it is such a great amount of intense to adapt up as indicated by end client's needs. Since accomplishing end client's needs speaks to the achievement rate of an application. That is the reason distinctive sorts of techniques have been acquainted throughout the year with increment undertaking's prosperity rate.

Approach is utilized for this framework advancement as a system for arranging, organizing and controlling the improvement procedure. There are diverse sorts of techniques are accessible for improvement, for example, light-footed programming advancement philosophy, dynamic frameworks advancement show strategy, outrageous programming system, joint application advancement procedure, lean improvement approach, scrum system and so on.

DSDM Atern has been decided for this task advancement. Since, it is client related and gives valuable procedures and methods of insight to accomplishing client's objective.

4.2 Why to use:

DSDM Atern is appropriate for any sort of undertakings however best for group venture. As an independent venture there may be couple of degrees where DSDM Atern won't be pertinent. Be that as it may, in view of Atern logic and obviously characterized standards it is best technique to build up this task. Atern characterizes that any undertaking must be: (DSDM Consortium, 2010)

- Aligned to clearly-defined strategic goals
- Developed collaboratively.
- Focused on early delivery of real benefits to the business.

4.3 Factors why DSDM Atern is applicable for this project:

- The important objective of DSDM Atern is to convey items as indicated by business needs in the correct time.

- DSDM Atern considers setting up specific destinations and creates and conveys it.

- DSDM Atern permits community oriented advancement inside designer and the end client.

- Atern never trade off with items quality.

- Atern permits advancement from establishment and expanding improvement one by one.

- Atern permits iterative advancement with the goal that any progressions amid improvement can be overseen.

- Atern permits nonstop correspondence among engineer and end client.

- Atern permits showing command over the entire undertaking for overseeing danger and change the board. (DSDM Consortium, 2010)

- Other than rationalities and systems there are additionally couple of more purposes behind picking this strategy. Atern gives a few different ways which makes the framework solid, hearty and client situated. These ways are MoSCoW prioritization, encouraged workshop, time boxing and so forth.

- **MoSCoW prioritization**

  MoSCoW prioritization is utilized to organize the prerequisites in need arrange which are gathered from end client. It causes engineer to acknowledge which prerequisites are important to convey at first. The elaboration of MoSCoW terms are as per the following -

  •Must have: The essential necessities of a framework are called must have prerequisites. Without these necessities the venture won't be conveyed as an undertaking or the framework will be considered as futile.

  •Should have: Requirements that are imperative yet without these prerequisites the framework will be valuable and usable. Ought to have necessities are vital yet not unquestionably basic.

  •Could have: Requirements that are critical however simple to skip. These sorts of necessity is utilized to expand business advantage and for framework's proficiency. It is exceptionally frustrating to skirt these prerequisites yet it makes no issue the framework.

  •Won't have this time: These are as yet profitable prerequisites yet it can hold up until further advancement or might be later.

  •Facilitated workshop: Facilitated workshop characterizes joint necessities arranging. By and large, it is somewhat discourse between framework engineer and framework proprietor or end client. Through encouraged workshop, end client or association staffs are urged to audit the framework that is being created and discover their issues and arrangements and rundown out their present issues and examine with framework designer. From along these lines, a prerequisite rundown has been created and after that it is organized by applying MoSCoW rules.

•Iterative improvement:

It is a key system where abnormal st and incrementally. Iterative development cycles are short and consist of several steps. These are as follows –

- o Identifying objectives for the proposed system
- o Planning to meet those objectives.
- o Evolving any objectives during development.
- o Testing the solution to check objective has been achieved.

- **Modeling and prototyping:**

It is connected idea. A model is dependably a sort of model yet a model might be or might be not a model. A model is a lot of charts, for example, brought together displaying dialect (UML). In the wake of finishing a model then prototyping is begun in the advancement stage. Displaying sees how to build up a prerequisite. Atern permits this procedure for guaranteeing that the end client's prerequisites and the created highlights stay same.

- **Timeboxing:**

Time boxing is the achievements of the entire undertaking or specific target. DSDM Atern permits diverse kinds of time box. For example, a period box can be for entire undertaking, a period box can be for each assignment or each element; a period box can be for each stage. Atern permits time boxing for conveying the item inside time. (DSDM Consortium, 2010)

4.4 Sections of methodology:

DSDM Atern has a configurable lifecycle. It is intended for business advantage which permits conveying items as often as possible, iterative and gradual advancement, and ceaseless business association, testing and giving business benefits. It has a few stages.
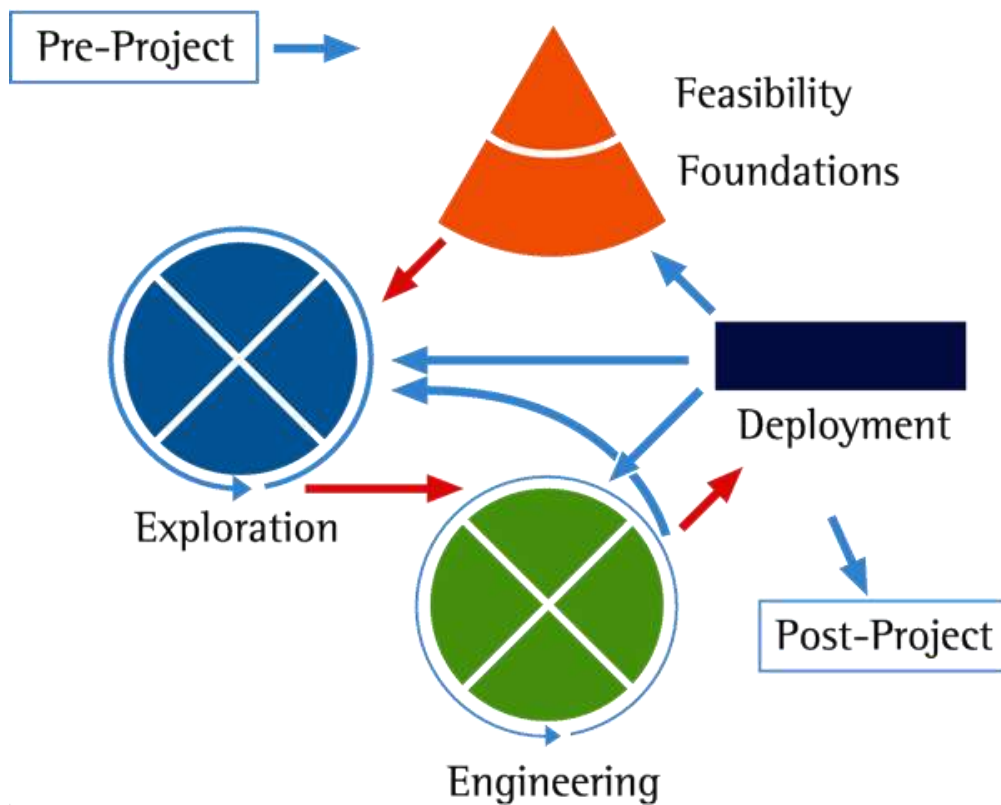
Figure03: Sections of methodology

- Pre-venture

In this stage, venture proposition is readied. Undertakings destinations are set up and additionally business issue are tended to.

- Feasibility

In this stage it is depicted whether there is a doable answer for business issues and expected advantages are recognized and cleared up methodologies for task conveyance. \

- Foundation

In establishment stage, doable venture are expounded transparently including its answer engineering, physical or infrastructural components and specialized execution principles. Business viewpoints are engaged and talked about how quality will be guaranteed.

- Exploration

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In investigation stage, an appropriate examination is happened dependent on business and specialized points of view. All necessities are recognized and organized. This stage bears an incredible duty regarding effectiveness of a task

- Engineering

In building stage, steady and iterative advancement is occurred for accomplishing venture objectives. It is important to meet acknowledgment criteria. Testing is a piece of this stage.

- Deployment

In sending stage, the entire arrangement is given to association and moved into live to utilize. A key audit of the venture is additionally given in this stage.

- Post-venture

In this stage, the undertaking execution is checked and estimated regarding business needs. This stage characterizes whether the business benefits have been gained or not from the undertaking. (DSDM Consortium, 2010)

5 CHAPTER 5 – PLANNING

5.1 Project Plan

Task arranging characterizes how to finish a venture inside specific accessible assets, time period and dispensed spending plan. Venture arranging is the key stages for finishing this undertaking effectively. Here, this entire task has been separated into a few stages, for example, work breakdown structure, assets allotment, action arrange and so forth. These are characterized beneath:

5.1.1 Work Breakdown Structure (WBS):

Work breakdown structure for this system:
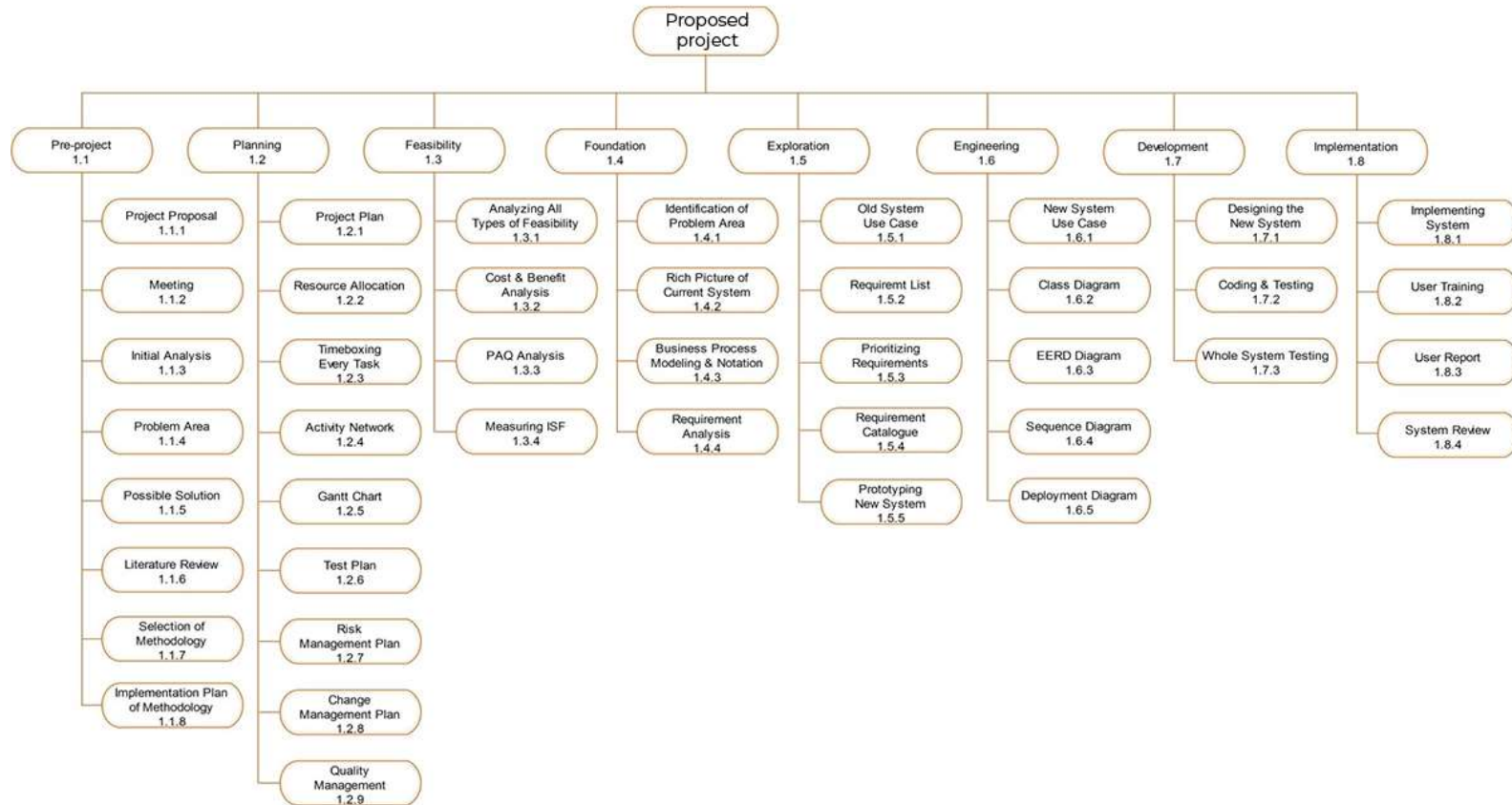
Figure04: Work break down structure

5.1.2 Activity Network Diagram:

Activity	Pre-Condition	Duration (Day)
Pre-Project	-	12
Planning	Pre-Project	18
Feasibility	Pre-Project	6
Foundation	Pre-Project	8
Exploration	Foundation	10
Engineering	Exploration	15
Development	Planning, Exploration	30
Implementation	Development	11
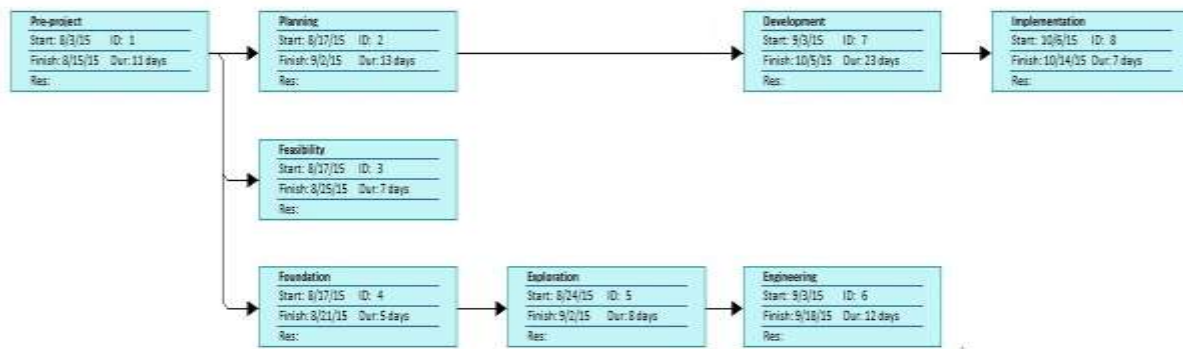
Figure05: Activity Network Diagram

5.1.3 Gantt chart

Gantt chart of this whole project:
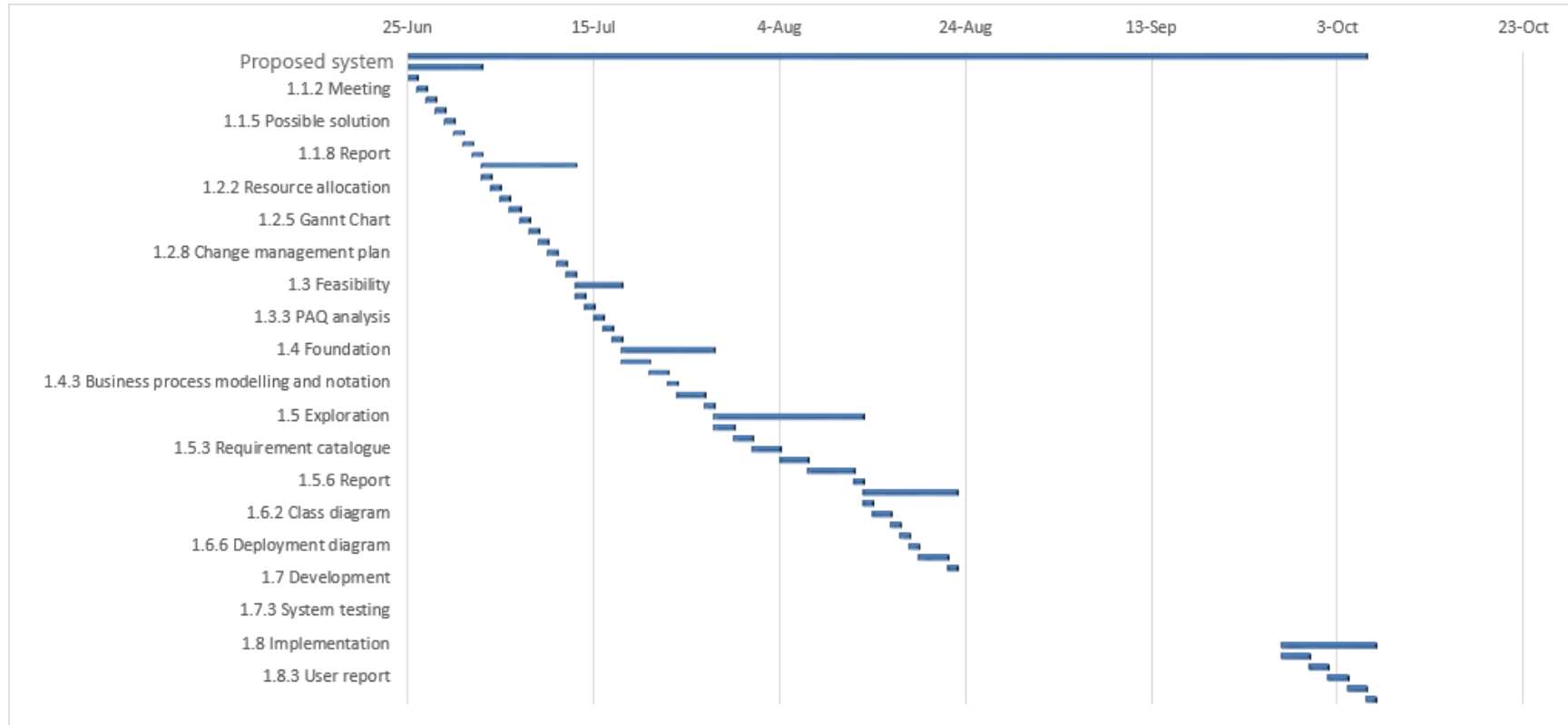
Figure06: Gantt chart of this project

5.2 Test Plan

Test plan is a fundamental stage for giving a quality full item. In a test plan the degree, procedures and criteria are depicted for testing specific expectations of a venture. Along these lines, here various test designs have been depicted for testing this framework..

5.2.1 Testing against time boxes:

Test plan against time boxes is an imperative part to pick up venture's advancement inside dispensed time. In this way, a test plan has been created against the characterized time box. With the assistance of this arrangement this entire venture will be appropriately checked and watched and is anything but difficult to gauge advance..

5.2.2 Required tests

• Unit Testing: Unit testing will be performed for testing explicit usefulness or every module of this framework.

• Integration Testing: Integration testing will be performed by joining all modules or parts of this framework and testing it as a gathering to guarantee that this framework is working appropriately.

• Acceptance Testing: Acceptance testing will be performed for confirming that this framework has met all client prerequisites and the framework is prepared to send.

• Performance Testing: Performance testing will be performed to gauge this present framework's productivity. Execution testing will recognize this present framework's reaction against client's desire.

• Security Testing: Security testing will be performed to check whether the framework is secure or not. Security testing will gauge this current framework's defenselessness and capacity to anchor the secret information..

5.2.3 Testing Environment:

These following tools are necessary to prepare an environment to perform proper testing:

- Full configured PC with windows 7, 8 or 10.
- Web browsers such Mozilla, Google chrome etc.
- Printer
- Internet connection
- Some valid data.

6 CHAPTER 6 – FEASIBILITY

Feasibility think about characterizes that an investigation on the current framework for the proposed framework to decide is it possible to build up the framework from specialized, moral, asset and operational factors inside apportioned spending plan and time. Thus, all these plausibility factors are imperative to build up this framework. These all plausibility factors are portrayed underneath: (Business Dictionary, 2010)

6.1 All possible type of feasibility (simplilearn, 2012)

• Technical practicality: Technical plausibility concentrated on specialized assets that are accessible around here statistic. Furthermore, the specialized group can change over the thought into a working framework. It additionally assesses all the equipment and programming expected to build up this proposed framework.

• Economic possibility: Economic attainability concentrated on computes the practicality and cost and advantages of the proposed framework. It additionally assesses this present framework's sure monetary advantages from the proposed administration framework.

• Legally possibility: Legal practicality centers will the proposed administration framework strife with any legitimate prerequisites, for example, information assurance act, social law and so on.

• Operational attainability: Operational possibility concentrates how this current model's business necessities will be satisfied by utilizing this proposed framework. For the most part, it is a measure that how well this proposed administration framework will tackle the client's issues and exploit the open doors that are recognized in the degree definition. For guaranteeing achievement some operational results, for example, dependability, practicality, supportability, ease of use, manageability and so forth should be told amid plan and advancement.

• Scheduling plausibility: It is critical to pick up venture's prosperity. It decides how much time should finish this administration framework dependent on this present model's specialized asset and ability. Now and then a few strategies can be utilized to gauge the period to finish the undertaking.

6.2 DSDM – good or not for this project –PAQ (Project Approach Questionaries')

Generally project approach questionaries' are based on DSDM Atern instrumental success factors. It helps to identify and ensure the level of achievement of all factors and address the potential risk areas. It is considered as a good practice in project management. Here is the PAQ analysis during the development of this system. (DSDM Org., 2014)

Project Approach Questionaries' full description is given in Appendix A.

From the above success rate, it is proven that DSDM Atern is good for this project and implementing Atern will bring success for this project.

6.3 ISF (Instrumental success factors)

By and large undertaking methodology questionaries' depend on DSDM Atern instrumental achievement factors. It distinguishes and guarantee the dimension of accomplishment everything being equal and address the potential hazard zones. It is considered as a decent practice in task the executives. Here is the PAQ investigation amid the improvement of this framework. (DSDM Org., 2014)

Venture Approach Questionaries' full depiction is given in Appendix A.

From the above progress rate, it is demonstrated that DSDM Atern is useful for this venture and executing Atern will bring accomplishment for this task.

There are a few factors that are considered as in charge of instrumental accomplishment in DSDM Atern. Without following these elements this venture may fall in hazard. However, that does not mean Atern is improper. Numerous fruitful tasks have utilized Atern yet can be distinguished a portion of these elements are not set up. These variables are utilized to diminish chance. Here are a portion of these elements that should be pursued.

• The first thing that come understanding and tolerating DSDM Atern rationality before beginning the improvement.

• Proper choice must be made and arrangement engineer must be enabled.

• Business responsibility and concurred support must be acknowledged in light of the fact that it is basic to fruitful Atern ventures.

• Incremental conveyance is an essential factor since it is a methodology of decrease in hazard. Since conveying halfway arrangement gives certainty that the task is in right track.

• Proper correspondence must be made to the administration for understanding the business jobs.

• Must be gifted and creative for accelerate the advancement.

• There more likely than not been a strong business connection between the designer and distinctive substances. (DSDM Consortium, 2010)

7 CHAPTER 7 – FOUNDATION

7.1 Problem Area Identification

Identifying problem is the most important thing to build a new system. So, to build this system, there are several techniques that have applied on this model to identify the problem area such interviewing the shop/restaurant's owner/customers, observation, questionnaires etc. Here are the details of these techniques.

7.1.1 Interview

Interview is one of the traditional and perfect techniques for gathering data about this business demographic and identifying problem areas. Several interviews have been performed on the different stackholders. Here are the details of those interviews.

7.1.1.1 Mehnaj Afrin (Food Enthusiast)

I'm very fond of food and hanging out with friends. I go out once or twice every week with friends or family. But finding the right place and right foods with up to the date and relevant price comparison is a frustrating process. So I ended up going the same place over and over again.

I tried several apps and groups that is available right now. But finding out the right information among all these noise is also a frustrating process.

I feel the need of a single place where I can go to find out about different offers and price comparison. So that I can take the right decision confidently.

7.1.1.2 Ishtiaq Iqbal (Food Chain Coordinator)

I have been looking over this restaurant chain for couple of years. Reaching out to the customers is never an easy task. We have tried and still trying several ways to attract our customers, through social media ads, website, SMS. To be honest nothing is that much effective.

We cannot reach that customer who is actually looking for the food or offer that we are serving now. It is getting lost in all those noises. We hope to find out a single place where we can server our offering more precisely and intelligently to the customers. Off course respecting the competition, we believe that will make our offering even more appealing.

7.1.1.3 Taufiq Hassan (POS Provider)

We are developing and providing the POS related products over 1000+ businesses all over the country. There are also other competitors active in the market. We are looking into solutions that could unify all those operational data and serve it to the end user more intelligently. But building a such unified system is out of our scope and focus. We hope there would be a service where we can integrate with so both the parties get values out of those enormous data.

7.1.2 Observation

Perception is likewise another information gathering procedure. It implies watching the current framework's step by step work by introducing himself with existing framework's faculty. In this way, a few perceptions likewise performed on this present model's manual framework for distinguishing their step by step working pace. It sees how this current substances' inner administration and other staff are acting and associating with one another. Because of perception, it very well may be said this current isolated and boisterous arrangement of this model is excessively upsetting and it causes definitely a bigger number of drawbacks as opposed to favorable circumstances.

7.1.3 Questionnaires

Polls are likewise vital apparatus which implies a rundown of study questions are asked to respondents to distinguish explicit inquiry. In this way, arrangements of inquiries additionally are asked to the administration and other partner that are identified with this model. They all finished at a similar end that they are not very upbeat about the present arrangement of this region of business they need another dependable and quick framework.

7.2 Overall Requirement List

In light of the above discourse, meetings, perception and questionaries' few prerequisites have been distinguished. These necessities are discovered dependent on current issues of this business zone. It isn't organized necessity list yet. Here are the recorded prerequisites.

- Developing a secure modern web API
- A common data store for gathered data
- Another set of APIs to accessing the data
- A web client for surfacing the data

7.3 What Technology to be implemented

Based on above all discussion about current manual system problem some available technologies are described below to justify whether it would be a desktop application or a web application.

7.3.1 Mobile APP (For Customers/Shop Owners):

Mobile application is installed in a specific operating system and runs standalone in a mobile or tablet. Here are the benefits and drawbacks if mobile application will be deployed for Customers or Shop Owners.

Benefits of Mobile application: (r-tools Technology, 2012)

- Device available everywhere
- Very strong development tools are available
- Trendy

Drawbacks of Mobile Application:

- Needs to be downloaded from store
- Update delivery is slow
- Needs separate app for two different platform
- Not future proof.

7.3.2 Web Application: (TechTarget, 2015)

Web application is put away in a server and conveyed over the web through a program with an explicit location of that application. Here are a few discourses about advantages and downsides that the clients will confront if web application will be sent.

Benefits of web application: (r-tools Technology, 2012)

- Staff can get to the framework or data from anyplace over the web.

- It needs to introduce just a single time in server and simple to get to.

- It can be utilized from any gadget.

- Can be bundled effortlessly as an application if fundamental

- It is effectively adjustable.

- Easy to extend the usefulness as the business develops.

Drawbacks of web application:

- It sets aside more opportunity for advancement

- Web stage is forefront yet not as steady as local.

7.4 Recommendations and Justifications

In view of overall exchanges and from the points of view of current prerequisites online application has been suggested.

Reason for choosing:

In view of the interest of client statistic web application has been picked on the grounds that it satisfies every one of their prerequisites. In spite of the fact that it has a few downsides and it requires web, it causes no difficult issue. Since at present web is accessible everywhere throughout the spots. There is another reason that a site will be consolidated just with a web application. Information security will likewise be executed for anchoring the essential data.

8 CHAPTER 8 – EXPLORATION

8.1 Full Requirement List:

The overall full requirement lists for the proposed management system are as follows:

Full Requirement List	
RQ001	API Endpoint for relevant data upload
RQ002	Product category tagging mechanism
RQ003	Editorial dashboard
RQ004	Editorial data entry form
RQ005	Editorial data edit form
RQ006	Client → Dashboard
RQ007	Client → Search
RQ008	Client → Product view
RQ009	Client → Business store review
RQ0010	Client → Product review system

8.2 Prioritized Requirement List (PRL):

Here are the prioritized requirement lists based on MoSCoW prioritization:

Prioritized Requirement List	
Must Have	
MR001	API Endpoint for relevant data upload
MR003	Client → Search
Should Have	
SR001	Editorial data edit form
SR002	Editorial data entry form
SR003	Client → Product view
Could Have	

CR001	Product category tagging mechanism
CR002	Editorial dashboard
CR003	Client → Product view
CR004	Client → Business store review
CR005	Client → Product review system
	Won't Have This Time
WR001	Automatic API opt-in
WR002	Additional information about business → Location, environment etc
WR003	Editorial business analytics

8.3 Requirement Catalogue

Requirement catalogue of the prioritized requirement lists:

Source: Business	**Sign off:** Business	**Priority:** Must	**Requirement Id:** MR001
Functional Requirement: API Endpoint for relevant data upload			
Non-Functional Requirement:			
Feasibility: High			
Description: API Endpoint so that third party POS system can upload their data			
Goal: Goal is to get the master information about all the products.			
Target Value:		**Acceptable Range:**	

Source: Clients	**Sign off:** Clients	**Priority:** Must	**Requirement Id:** MR002
Functional Requirement: Product Search			
Non-Functional Requirement:			
Feasibility: High			
Description: A search mechanism so that the end users can search the products with different relevant filters.			
Goal: Goal is to give ability to the users for precise searching and decision making			

Target Value:	Acceptable Range:

Rest requirement catalogue are shown in (Appendix B)

9 CHAPTER 9 – ENGINEERING

9.1 New System Modules:

Modules of this new management system are as follows:

➢ Data API Endpoint
- Store product information automatically from business
- Common data change triggers.
➢ Editorial
- Dashboard based on the automatic changes recorded from businesses.
- Edit information module
➢ Client
- Home page displaying all the relevant products
- Search module with filter options
- Product view module

9.2 Use Case Description:

Use Case ID	UC001	Created By	Foez Ahmed
Use Case Name	Search		
Actor	Client/End User		
Description	End users search the products with different relevant filters.		
Include	None		
Pre-condition	• Client need to navigate to the home page		
Post-condition	Client will receive a proper search result		
Flow	• Staff requests and provides valid filter parameter to search box • Click on the suggestions or hit the search button • View a list of query specific and relevant data		

9.3 Proposed System Use Case Diagram:

Use case diagram for the proposed information management system:
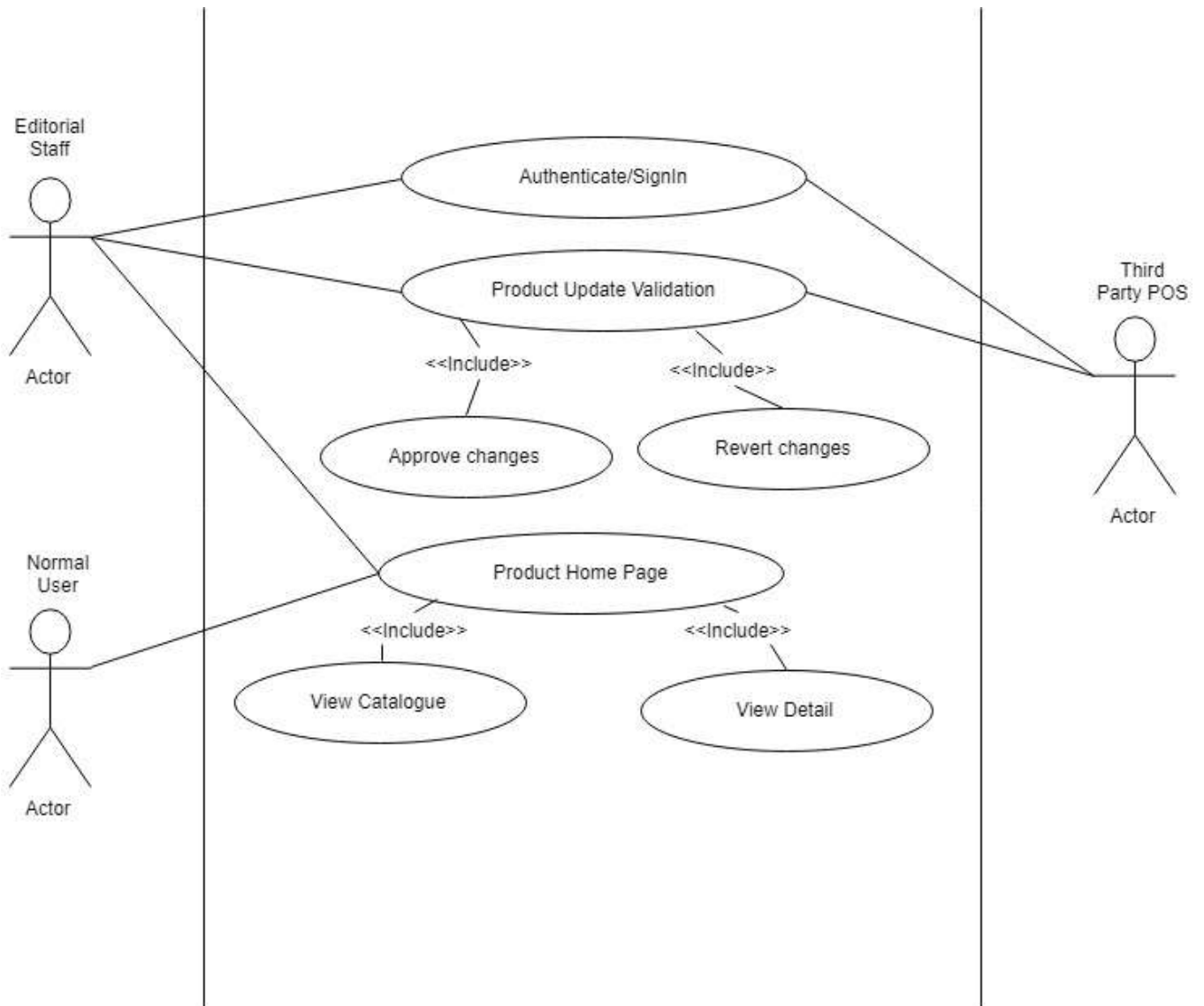
Figure07: Proposed system use case diagram

Use Case ID	UC002	Created By	Foez Ahmed
Use Case Name	Editorial Dashboard		
Actor	Editors/Moderators		
Description	View and curation of gathered data.		
Include	• View entity information • Search, update and delete entity information		
Pre-condition	• Staff need to sign in to the system		
Post-condition	• Staff access the system • Entity information stored in system database.		
Flow	• Staff view dashboard information page • Accept, edit, add, discard changes • Information stored in database		

Use Case ID	UC003	Created By	Foez Ahmed
Use Case Name	API Integration		
Actor	Third party POS system		
Description	Automatic Product/Business information collection process		
Include			
Pre-condition	• Third party system needs API access		
Post-condition	• Information stored in system database.		
Flow	• Third party system will gain API access • If data changes occur, data uploading process will start • If valid then changes will be posted to the data store • If any error or validation occurs, third party system will be notified, they will handle the rest.		

9.4 Class Diagram

Class diagram of the proposed information management system:
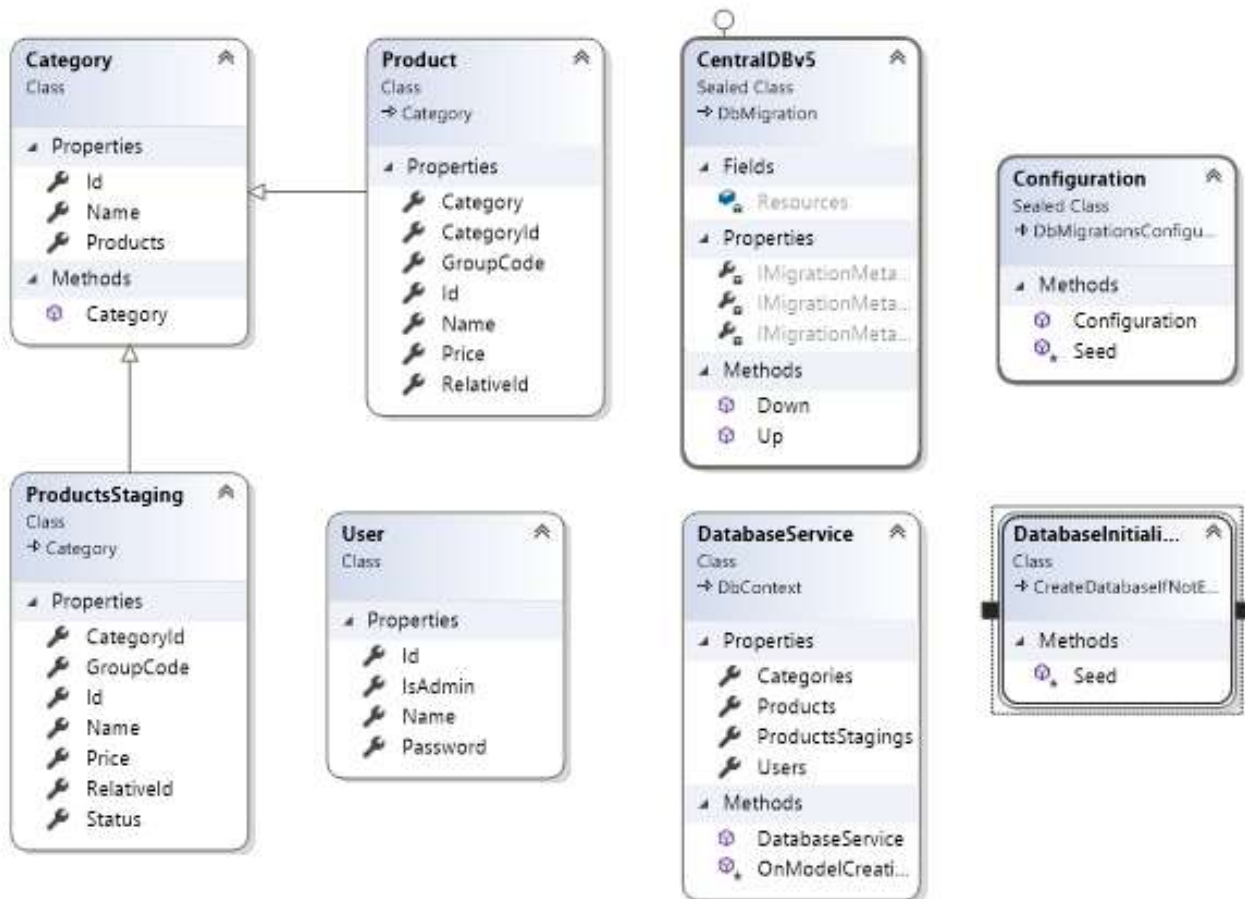
Figure08: Class diagram of the proposed system

9.5 ERD Diagram

Entity relationship diagram of the proposed system:
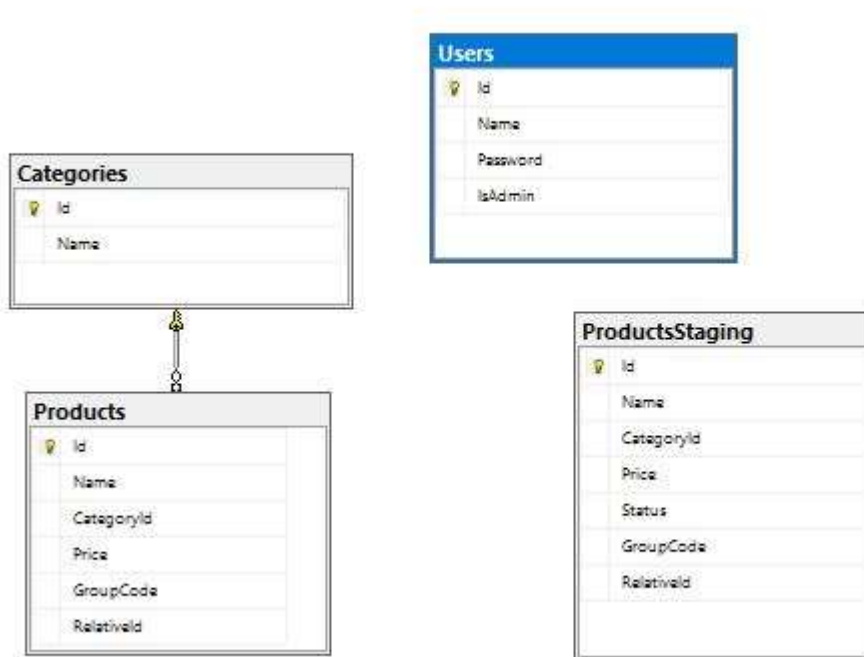
Figure09: Entity relationship diagram

9.6 Sequence Diagram

Sequence diagrams of this information management system are:

- Sequence diagram for sign in:
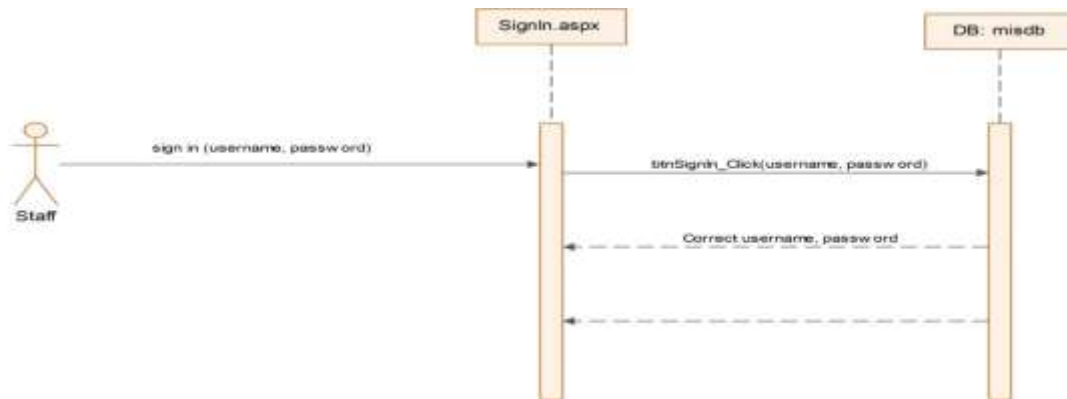
Figure10: Sequence diagram for system sign in

- Sequence diagram for Editorial Staff
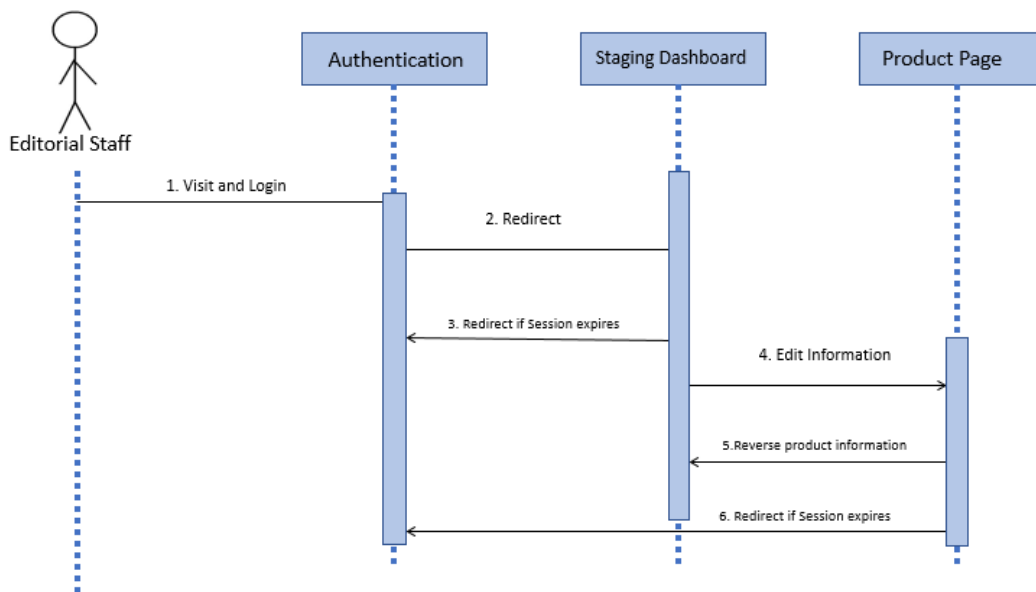
Figure11: Sequence diagram for player information insert

- Sequence diagrams for Client/Public User:
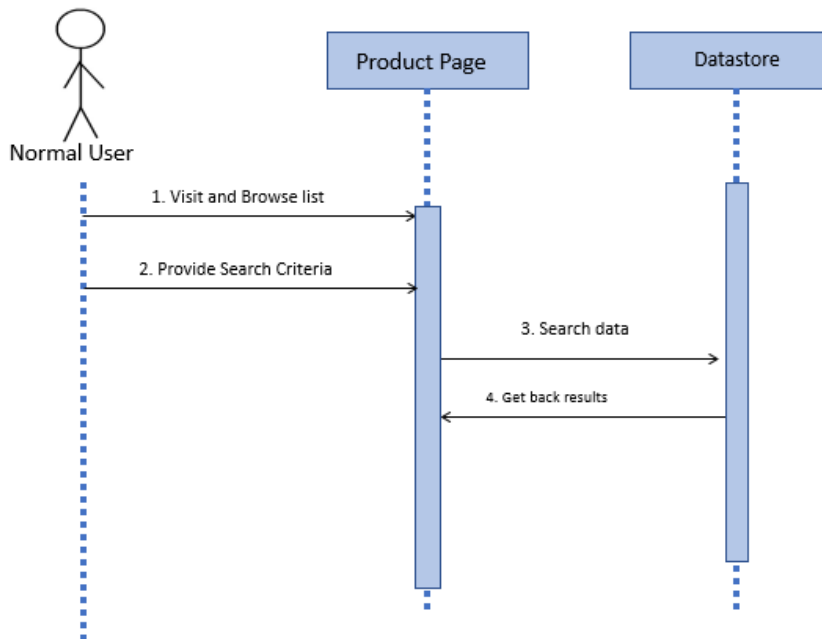
Figure12: Sequence diagram for public user search

- Sequence diagrams Third Party POS Activity:
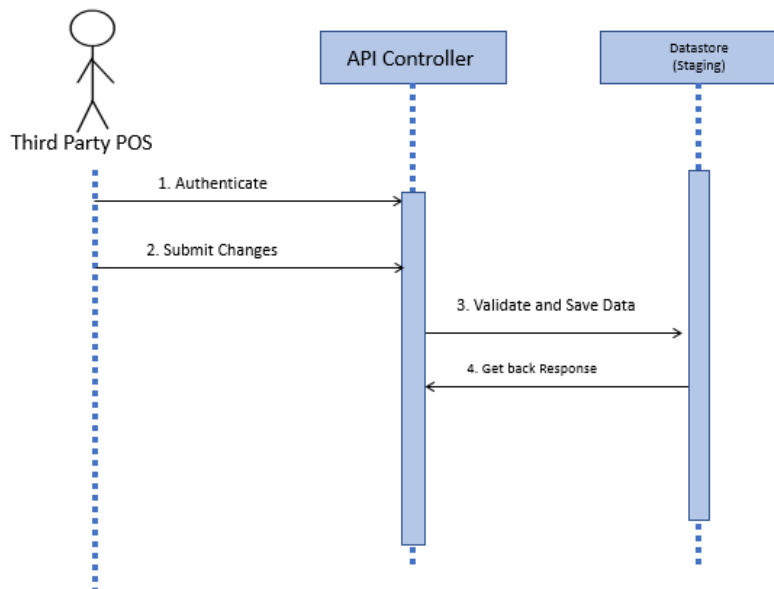
Figure13: Sequence diagram for public user search

9.7   Activity diagram

Activity diagrams of the proposed system are:

- Activity diagram for guest user:
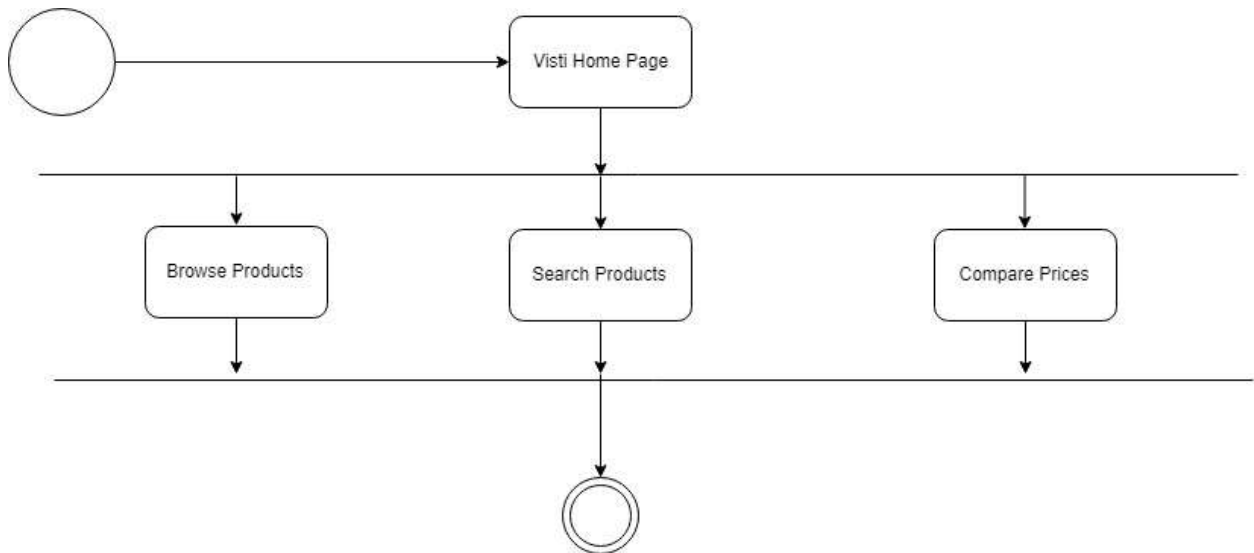
Figure14: Activity diagram for normal user

- Activity diagram for editorial activity:
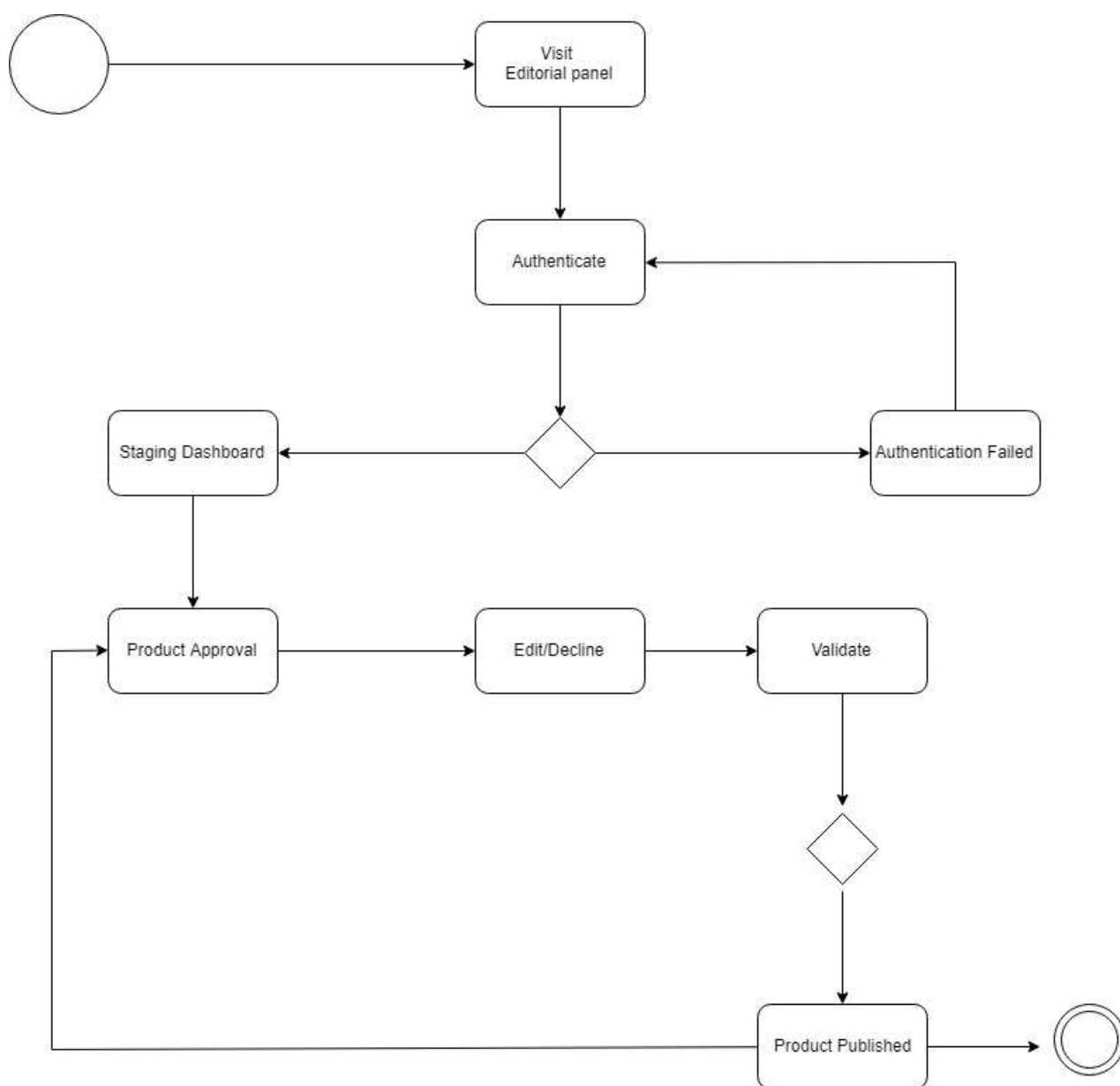
Figure15: Activity diagram for editorial activity:

9.8 Deployment Diagram

Deployment diagram of the proposed system:
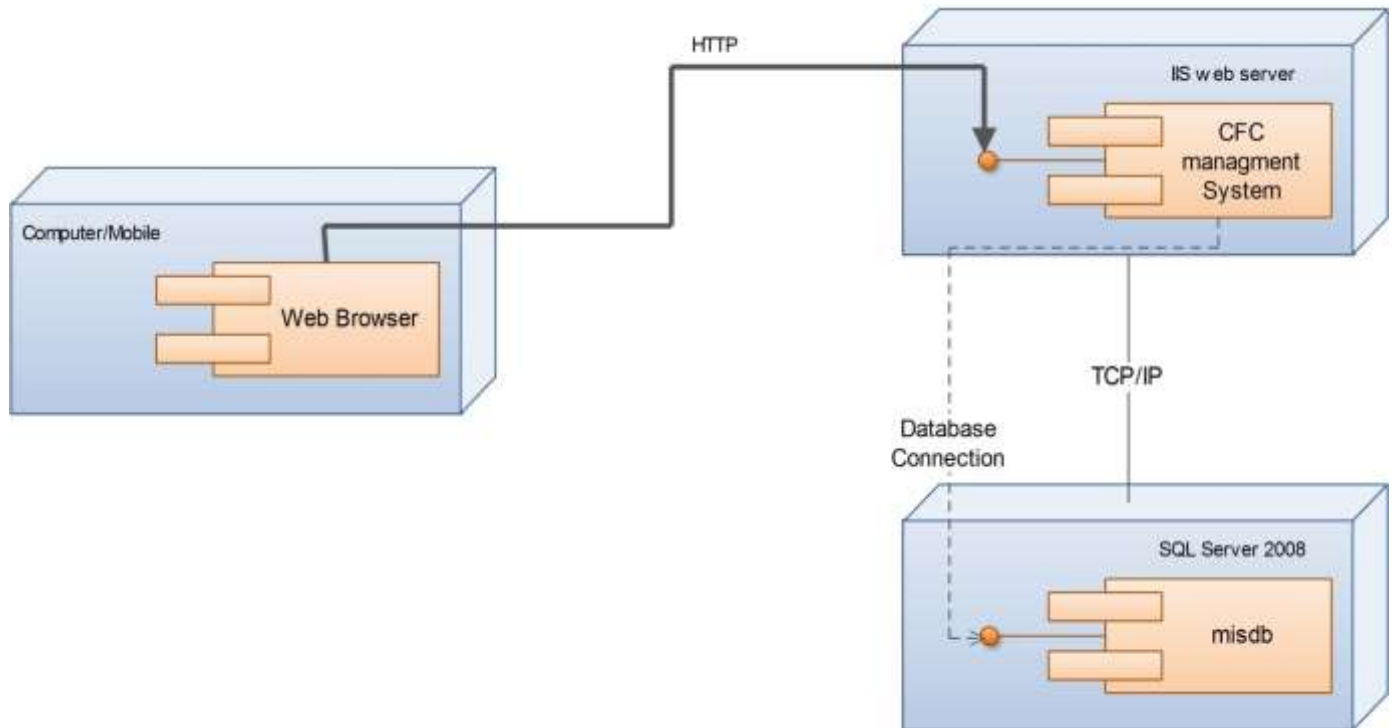
Figure16: Deployment diagram of the proposed system.

9.9 System Prototype:

- Sign in page:

Figure39: Prototype of sign in page

- Editorial Dashboard:

Figure37: Editorial Dashboard

- Client Home Page:
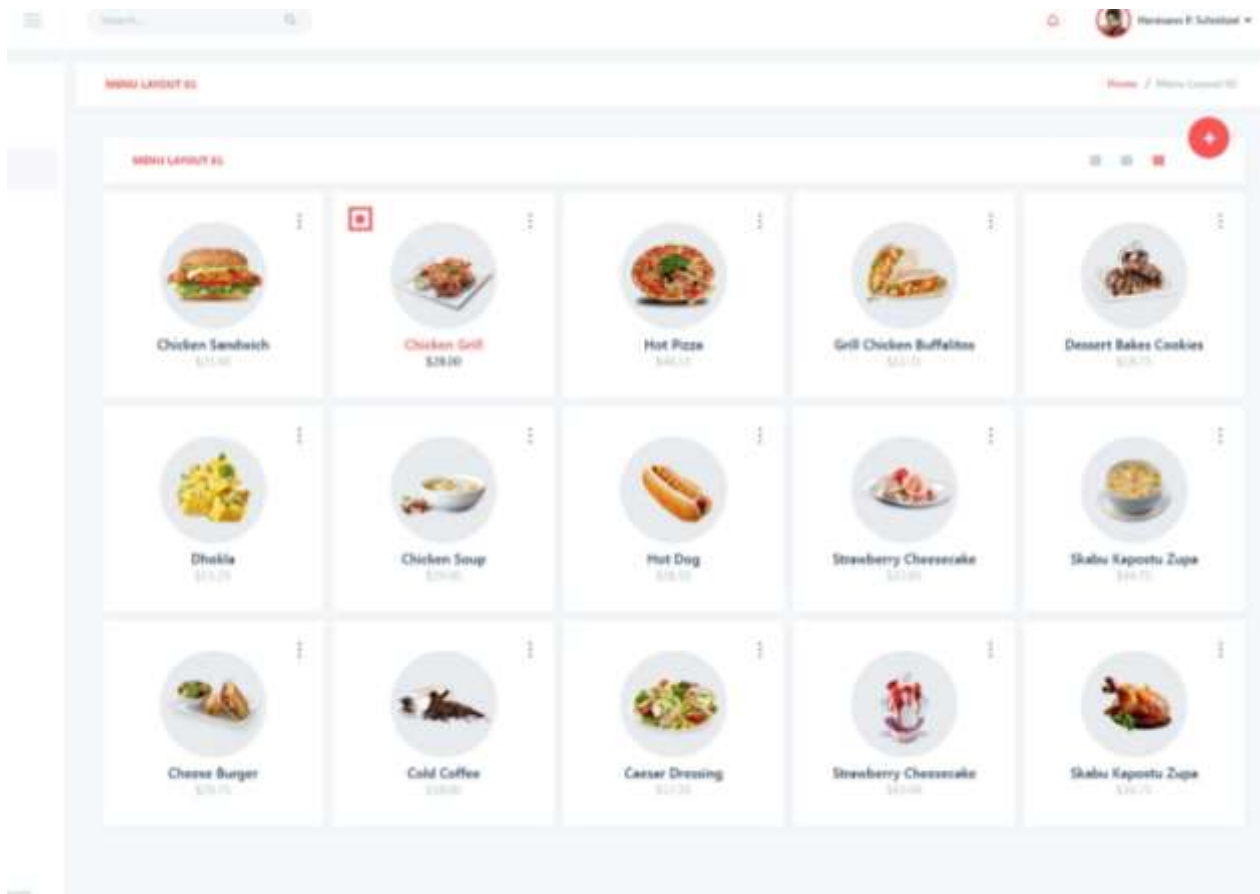
Figure38: Client Home Page

10 CHAPTER 10 – DEVELOPMENT

The framework that is being created is a blender of web application and API. In this way, in this stage a large portion of the undertakings are coding related. All undertakings are separated into different areas as indicated by UI structure and framework's usefulness. This stage is the spine from the majority of the stages to finish the task effectively.

10.1 Development Tools:

This web application is produced dependent on Asp.Net and C# is utilized as center dialect. UI of this framework is produced dependent on CSS system bootstrap and HTML and JavaScript. SQL Server 2014/2016 is utilized as database the board framework and visual studio 2017 is utilized as incorporated improvement condition. A wide range of approvals are actualized by utilizing HTML and Asp.Net control..

10.2 Time boxing:

Time boxing is one of the key components of DSDM Atern which is a restricted timeframe inside which very much characterized expectations must be created with given assets. By keeping up time box the advancement of the undertaking has likewise been composed. Here, a period box has been kept up for this framework where each separated assignment has been allotted inside a constrained time period to sort out the advancement of this venture productively.

Time boxing No.	Start Date – End Date	Duration (Day)	Deliverables
1	25 June – 2 July	8	• Analyzing system architecture
2	3 July – 12 July	10	• Website design • System front end and layout design • Testing this part
3	13 July – 17 July	5	• System database design and develop • Break down system's main tasks
4		6	• API Endpoint developments
5	18 July – 27 July	10	• API User authentication • Sign in • Testing this part
6	28 July – 12 August	16	• CRUD operation for API information and UI design • Testing this part
7	13 August – 22 August	10	• CRUD operation for staff operations and UI design • Testing this part

| 8 | 1 October – 6 October | 6 | • Testing system as a whole. |

10.3 System main task break down

- API
  - ➢ Design and develop the endpoints
  - ➢ Provide necessary authentication into the API.
- System database
  - ➢ Gather entities from use case scenario
  - ➢ Design whole system's database.
  - ➢ Set proper attributes for all entities.
  - ➢ Create relation between entities.
  - ➢ Evaluate the staging data schema
- Editorial Panel
  - ➢ Create sign in page and user interface.
  - ➢ Create session for sign in
  - ➢ Set user authentication
  - ➢ Test sign in
  - ➢ Design and develop the dashboard
  - ➢ Set CRUD operations for accept, edit, add, discard changes
- Client Application
  - ➢ Develop Home page for Clients with Product Information
  - ➢ Develop search mechanism system wide
  - ➢ Design and develop the result view.

10.4 Core Module Coding Samples

- API Controller

```
public class ProductsController : ApiController
{
    private DatabaseService db = new DatabaseService();
    // GET: api/Products
    [ResponseType(typeof(List<ProductsStaging>))]
    public List<ProductsStaging> Get()
    {
        try
        {
            return db.ProductsStagings.ToList();
        }
        catch (Exception ex)
        {
            throw;
        }
    }

    [ResponseType(typeof(List<ProductsStaging>))]
```

```csharp
        public async Task<IHttpActionResult> Post([FromBody] List<ProductsStaging>
products)
        {
            try
            {
                if (!ModelState.IsValid)
                {
                    return BadRequest(ModelState);
                }
                foreach (var item in products)
                {
                    var id = item.RelativeId;
                    var productDB = db.ProductsStagings.Where(n => n.RelativeId ==
id).FirstOrDefault();
                    if (productDB != null)
                    {
                        productDB.Name = item.Name;
                        productDB.Price = item.Price;
                        productDB.Status = 0;
                        productDB.GroupCode = item.GroupCode;

                        db.Entry(productDB).State = EntityState.Modified; ;
                    }
                    else
                    {
                        db.ProductsStagings.Add(item);
                    }
                }

                await db.SaveChangesAsync();

                return CreatedAtRoute("DefaultApi", new { id = 0 }, products);
            }
            catch (Exception ex)
            {
                throw;
            }
        }

        // PUT: api/Products/5
        public async Task<IHttpActionResult> Put([FromBody] ProductsStaging product)
        {
            try
            {
                if (!ModelState.IsValid)
                {
                    return BadRequest(ModelState);
                }

                var id = product.RelativeId;
                var productDB = db.ProductsStagings.Where(n => n.RelativeId ==
id).FirstOrDefault();
                if (productDB != null)
                {
                    productDB.Name = product.Name;
                    productDB.Price = product.Price;
                    productDB.Status = 0;
                    productDB.GroupCode = product.GroupCode;

                    db.Entry(productDB).State = EntityState.Modified; ;
                }
```

```csharp
            else
            {
                db.ProductsStagings.Add(product);
            }

            await db.SaveChangesAsync();

            return CreatedAtRoute("DefaultApi", new { id = 0 }, product);
        }
        catch (Exception ex)
        {
            throw;
        }

    }

    // DELETE: api/Products/5
    public async void Delete(int relativeId)
    {
        try
        {
            var id = relativeId;
            var productDB = db.ProductsStagings.Where(n => n.RelativeId ==
id).FirstOrDefault();
            if (productDB != null)
            {
                db.ProductsStagings.Remove(productDB);
            }

            await db.SaveChangesAsync();

        }
        catch (Exception ex)
        {
            throw;
        }
    }
    }
```

- Dashboard View:

```aspx
<%@ Page Title="Home Page" Language="C#" MasterPageFile="~/Site.Master"
AutoEventWireup="true" CodeBehind="Default.aspx.cs" Inherits="CentralWebAPP._Default"
%>

<%@ Register Assembly="DevExpress.Web.v18.2, Version=18.2.3.0, Culture=neutral,
PublicKeyToken=b88d1754d700e49a" Namespace="DevExpress.Web" TagPrefix="dx" %>

<asp:Content ID="BodyContent" ContentPlaceHolderID="MainContent" runat="server">
```

```
<div class="row">
    <table>
        <tr>
            <td></td>
        </tr>
    </table>
</div>
<div class="row">
    <div >
        <dx:ASPxCardView ID="dxCardView" runat="server" EnableCardsCache="false"
EnableTheming="True" Theme="MaterialCompact" AutoGenerateColumns="False"
OnDataBinding="dxCardView_DataBinding" Width="100%">

            <Columns>
                <dx:CardViewTextColumn FieldName="Name"  />
                <dx:CardViewSpinEditColumn FieldName="GroupCode"
Caption="GroupCode" GroupIndex="0" />
                <dx:CardViewSpinEditColumn FieldName="Price">
                    <PropertiesSpinEdit DisplayFormatString="c" />
                </dx:CardViewSpinEditColumn>
            </Columns>
            <CardLayoutProperties>
                <Items>
                    <dx:CardViewColumnLayoutItem ColumnName="Name" />
                    <dx:CardViewColumnLayoutItem ColumnName="GroupCode" />
                    <dx:CardViewColumnLayoutItem ColumnName="Price" />
                </Items>
            </CardLayoutProperties>
            <SettingsAdaptivity>
                <BreakpointsLayoutSettings CardsPerRow="5">
                    <Breakpoints>
                        <dx:CardViewBreakpoint DeviceSize="Custom" MaxWidth="1400"
CardsPerRow="4" />
                        <dx:CardViewBreakpoint DeviceSize="Custom" MaxWidth="900"
CardsPerRow="3" />
                        <dx:CardViewBreakpoint DeviceSize="Custom" MaxWidth="700"
CardsPerRow="2" />
                        <dx:CardViewBreakpoint DeviceSize="Custom" MaxWidth="500"
CardsPerRow="1" />
                    </Breakpoints>
                </BreakpointsLayoutSettings>
            </SettingsAdaptivity>
            <Settings LayoutMode="Breakpoints" ShowGroupSelector="true"
ShowHeaderPanel="true" />
            <SettingsSearchPanel Visible="true" />
            <SettingsPager Mode="ShowAllRecords" />
            <Styles BreakpointsCard-Height="320" />
        </dx:ASPxCardView>
    </div>
</div>

</asp:Content>
```

Deafult.cs file

```csharp
public partial class _Default : Page
    {
        DatabaseService db = new DatabaseService();
        protected void Page_Load(object sender, EventArgs e)
        {
            if(!IsPostBack)
            {
                dxCardView.DataBind();
            }
        }

        private void LoadGrid()
        {

        }

        protected void dxCardView_DataBinding(object sender, EventArgs e)
        {
            dxCardView.DataSource = db.ProductsStagings.ToList();
            dxCardView.KeyFieldName = "Id";
        }
    }
```

11 CHAPTER 11 – TESTING

11.1 Test Case

Here several test cases have been defined for testing this information management system:

Test Case: 01	
Title	**Explanation**
Project name	An Intelligent Product Finder System
Test Case Name	System Sign In
Steps	• Provide username & password • Click Sign In button
Expected Outcome	Sign in successfully
Actual Outcome	Sign in successfully

Test Case: 02	
Title	**Explanation**
Project name	An Intelligent Product Finder System
Test Case Name	Post a product information
Steps	• Populate json object • Pos the data
Expected Outcome	Product information stored successfully
Actual Outcome	Product information stored successfully

Test Case: 03	
Title	**Explanation**
Project name	An Intelligent Product Finder System
Test Case Name	View Dashboard
Steps	• Click view dashborad navigation bar.
Expected Outcome	View product information successfully
Actual Outcome	Product information successfully viewed

Test Case: 04	
Title	**Explanation**
Project name	An Intelligent Product Finder System
Test Case Name	Update Product information
Steps	• Click edit button • Change necessary information • Click update button
Expected Outcome	Update Product information successfully
Actual Outcome	Product information updated successfully

12 CHAPTER 12 – CRITICAL APPRAISAL AND EVALUATION

12.1 Objective that could be met

12.1.1 Success rate against each objective

From the examination and investigation on current issues of customer item investigation, a few goals had been recognized to build up the new data the executives framework. A few meetings and perceptions encouraged such a great amount to finish a correct necessity list dependent on issue area. Those prerequisites records were organized into four areas that are must have, ought to have, could have and won't have this time by following MoSCoW prioritization.

All must have and ought to have necessities have been totally executed into the framework. So destinations, for example, API endpoints, publication process, item hunt and building a site and giving basic data on site and so forth are totally met which are affirmed by the general clients. Clients can without much of a stretch pursuit items data as indicated by the inclination.

Albeit a few goals have been skipped or dropped off, the new framework is completely useful and meets the business needs since it is created dependent on this present model's center needs. What's more, the framework has all usefulness to take care of this current model's present issue. So it very well may be said that the achievement rate of this framework against each item is great and worthy. Here is the subtleties:

Full Requirement List		
RQ001	API Endpoint for relevant data upload	Done
RQ002	Product category tagging mechanism	Further Development
RQ003	Editorial dashboard	Done
RQ004	Editorial data entry form	Done
RQ005	Editorial data edit form	Done
RQ006	Client → Dashboard	Done
RQ007	Client → Search	Done
RQ008	Client → Product view	Further Development

12.1.2 How much better could have been done

This framework has been produced dependent on this plan of action's center needs. As this framework is created by following MoSCoW prioritization, so there are a few prerequisites in the 'could have' list that has not been actualized into the new framework, for example, item classification labeling framework, explained publication dashboard and so on. Be that as it may, it doesn't influence the framework or framework's usefulness. In the event that these

prerequisites were actualized, the new framework would be exceptionally effective and framework's prosperity rate would be a lot higher.

12.1.3 Why it could not be done

One of the primary purposes behind skipping or dropping off those prerequisites is restricted brief time period. As this task is produced by following DSDM Atern, so this venture must be finished inside time span. As a scholarly independent venture, one individual needed to do everything, for example, examination, speak with various partners, interviews, advancement, testing, archiving which involves parcel of time. That is the reason those prerequisites should be skipped. There are additionally a few highlights, for example, machine learning and AI driven information curation. What's more, these highlights should be skipped for absence of abilities, brief time plan. It needs a great deal of time to build up those highlights since I needed to break down and accumulate information about those highlights. That is the reason it should be skipped.

12.1.4 Which objectives have been missed?

The objectives that are missed from the new management system are

- Machine learning and AI driven data curation.
- Product review system
- Business related information curation.

12.1.5 Why these objectives have missed

A large portion of those necessities are recorded as 'won't have this time' and a portion of these are recorded as 'could have'. Along these lines, those necessities have no significant effect on the new administration framework. As recently portrayed, restricted time allotment is one of the fundamental reasons. Alternate reasons are absences of assets, absence of learning about current innovation and somewhat poor examination. Be that as it may, those prerequisites would be actualized later on improvement.

12.1.6 What could have been done to complete those objectives?

As time is the principle issue so by allotting additional time, by gathering legitimate target related assets, by appropriate breaking down in the event that taking recommendations from master individuals, gathering refresh learning about current innovation would be useful to finish those destinations.

13 CHAPTER 13 – LESSONS LEARNT

13.1 What I have learned

So as to beat the present client/clients item discovering issue and obstacles, a simple to utilize and legitimate incorporated framework was required. So building up this new framework was extremely testing to me. The fundamental test was to picture and execute and incorporate 3 distinct frameworks. So it was exceptionally testing to confront new issues and settle them. So much learning and experience about undertaking advancement has been gained all through this entire venture. Dissecting strategies, for example, interviews, rich picture, and old framework use case graph and so forth helped me such a long way to go how to examine a genuine situation and discovering the issues. While creating front end plan of this framework helped me to figure out how to utilize CSS system bootstrap. I have likewise got my first experience about information assembling through API and API documentation. Utilizing JavaScript in this framework helped me to find out about productive front end plan. I have likewise learned and got understanding about executing DSDM Atern in a genuine venture advancement. In this way, these apparatuses and dialect and assets and rules helped me to expand my insight as an investigator, a framework designer, an analyzer.

13.2 What problem I have faced

All through this entire venture I have confronted different issues. Those issues for the most part happened in investigation and improvement part. Here is the rundown of those issues.

- First of all it is a scholarly independent task, so I needed to do all things and it is one of the troublesome issues.

- Implementing DSDM Atern legitimately is one of the critical issues that I have looked due to independent venture improvement.

- Gathering prerequisites through meetings is likewise another issue in light of the fact that there are a few substances required here.

- Maintaining normal correspondence with the substances was very troublesome because of time issue.

- Designing the entire framework splendidly is another issue that I have confronted with the goal that it can bolster any change in further improvement and convey the client a legitimate view. That is the reason I needed to change the entire plan multiple times.

- Designing and building up the inquiry and dashboard in web advances was testing on the grounds that huge numbers of the web innovations was different to me.

- Other than those issues, I have confronted a great deal of times little and huge coding issue amid improvement.

13.3 What solutions occurred?

Making this framework effective, I needed to conquer those issues by discovering some arrangement. Here are some ways how I had tackled those issues.

- Discussing about DSDM Atern execution with my manager encourages me without question. She gave me a few assets about Atern usage and rule how I could execute it.

- Performing a few perceptions on eatery and distinctive shop and their client's exercises helped me to construct an unmistakable prerequisite rundown.

- Consulting with my director about structuring and examining comparative frameworks causes me to assemble an ideal plan.

- Regular correspondence and counseling with my projects educator encourages me to conquer those question and coding issues.

14 CHAPTER 14 – CONCLUSION

14.1 Summary of the project

This undertaking is created with the space of building up reconciliation among various part of the eatery and customer business and better utilization of item data information which will help the end client incredibly. This task will bring sensible points of interest for the end client and the entrepreneurs to their present business process by interfacing both the gatherings through Realtime information and item accessibility data.

Along these lines, to build up this data framework a careful examination has been performed on the plan of action and end clients to know their engineering, procedures, and exercises. A few meetings with the partners and polls' have been performed to know the issue territory. At that point an entire necessity records have been accumulated from the issue territory and organized the prerequisites by remembering the end client's center needs. At that point another framework use case chart has been readied. At that point the advancement part has been begun and the new framework has been produced dependent on organized necessity records. At that point distinctive sorts of testing have been performed on the new framework to guarantee the framework's quality and convenience. The framework will be actualized by the enormous detonation execution process.

14.2 Goal of the project

The main goal of this project is to deliver a digital computerized information management system to the consumers to overcome their current product information gathering and decision making problems. Based on the demand from the both the parties I have prepared a list which contains some goals that need to be fulfilled by the new system.

- Building the common bridge API to collect the products data.
- Ensuring privacy and system security
- Ensuring Realtime-ness of the data
- Building an editorial system to curate these data into structured way
- Gathering customer's opinion to know what they actually want
- Product information needs to be precise, almost up to date and relevant

14.3 Success of the project

Undertaking's prosperity relies upon accomplishing the venture objectives. Despite the fact that a couple of highlights have been missing however the greater part of the objectives have been accomplished in this new framework which satisfy this present shopper's center needs and the venture's prosperity is countable. Those missing highlights will be executed in the framework in further improvement..

14.4 What I have done in the documentation

I have clarified the majority of my exercises in each stage well-ordered in this documentation. At first task proposition has been incorporated into this documentation to present which venture that will be created. At that point I have examined issue space and arrangement dependent on distributed articles about this sort of framework. Comparable sorts of frameworks and their highlights have likewise been referenced. At that point I have depicted a few methodologies that will be pursued. I have depicted about the picked philosophy. Entire venture arranging is likewise explained in this documentation. At that point venture plausibility, money saving advantage examination, information gathering procedures and necessity records are spoken to in this documentation. At that point I have depicted about old manual framework and organized the necessity list. At that point I put forth use defense, movement, class, arrangement and organization graph for the proposed framework. Advancement part has been portrayed and some coding tests are spoken to in this documentation. Distinctive sorts of testing are portrayed that are performed on this new framework to look after quality. Finally, I have portrayed about usage plan how this framework will be executed..

14.5 Value of the project

The new system is currently overcome the end user's/consumer's product information gathering related core problems. But using the gathered data from the business, the business model and project can be expended in different directions. Here are some of the possibilities:

- Business Analytics
- Customer demand and sale projection
- Monetization through advertisement.

14.6 My experience

I found something useful to do time understanding from this venture improvement. Meeting with individuals, talks with, questionaries' are diverse sorts of experience that I have. I have additionally accumulated a great deal of information about approach and its usage, all things considered, venture improvement. Investigating part causes me to acknowledge about reasoning alternate points of view of a situation. This task is produced dependent on asp.net and C# dialect. I have assembled so much learning and it helps my programming aptitudes. I have likewise gotten the hang of planning a responsive application by utilizing bootstrap CSS structure. Toward the end, it very well may be said that I have taken in numerous things from the need of this venture improvement.

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16 APPENDIX-A: PROJECT PROPOSAL

S.N	Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	comment
1	The business driver behind the project is clearly stated and is visible to all members of the project team.	Y					It is a standalone project. So member is only one.
2	The business sponsor demonstrates clear ownership of the project.				y		As, it is standalone project so one man had to do that.
3	The business sponsor, business visionary and technical coordinator all understand and accept the DSDM Atern philosophy.		y				One member had to accept it.
4	The development has a clearly defined timescale.	Y					
5	The requirements can be prioritized and there is flexibility to accept that not all requirements are 'Must Have' requirements.	Y					
6	Requirements have been defined at a high level at the outset of the project, and it is acknowledged that changes are likely during development.	Y					
7	It is accepted that the detail of both the requirements and the solution will emerge as the project progress.	Y					
8	The business sponsor and business visionary are aware of the importance of active business involvement		Y				As standalone project one man had to accept it.

	and have the willingness and authority to commit appropriate business resources to the project as required.						
9	The business ambassadors are sufficiently empowered to guide the day to day evolution of the solution.			y			
10	The solution developers are sufficiently empowered to provide the best solution they can from a business perspective.	Y					
11	Solution development resources are allocated at an appropriate level.		y				
12	The project team and solution development team are able to adopt the roles and responsibilities within DSDM Atern.			y			
13	It will be possible for the solution for the solution developers to have easy access to business ambassadors and business advisors throughout the project.			y			One man has to play that ambassadors and advisor's role.
14	The solution development team will have the appropriate collective knowledge and skills.		y				
15	The solution development team will have the appropriate soft skills to work effectively with each other.			y			As a standalone project one has to play the developer's role.
16	Strategies for continuous communication and collaborative working practices are sufficient to clearly support iterative development.	Y					
17	The development technology tools and techniques support an iterative approach to solution development.	Y					
18	There are no technical, contractual or other		y				

#	Description						
	constraints to prevent the solution being broken into increments for development and delivery of such increments are not deployed.						
19	All project participants understand and accept that in time delivery of an acceptable solution is the primary measure of success.	Y					
20	All parties accept that continual assessment of the fitness for purposes of all deliverables during development is essential.		y				
21	There are no mandatory standards or practices in force that will work against the evolution of a solution from a base lined set of high level requirements.		y				
	Total	9	7	4	1		

17 APPENDIX-B: REQUIREMENT CATALOGUE

Prioritized Requirement List	
Must Have	
MR001	API Endpoint for relevant data upload
MR003	Client → Search
Should Have	
SR001	Editorial data edit form
SR002	Editorial data entry form
SR003	Client → Product view
Could Have	
CR001	Product category tagging mechanism
CR002	Editorial dashboard
CR003	Client → Product view
CR004	Client → Business store review
CR005	Client → Product review system
	Won't Have This Time
WR001	Automatic API opt-in
WR002	Additional information about business → Location, environment etc
WR003	Editorial business analytics

18 APPENDIX-C: USE CASE DESCRIPTION

Use Case ID	UC001	Created By	Foez Ahmed

Use Case Name	Search
Actor	Client/End User
Description	End users search the products with different relevant filters.
Include	None
Pre-condition	• Client need to navigate to the home page
Post-condition	Client will receive a proper search result
Flow	• Staff requests and provides valid filter parameter to search box • Click on the suggestions or hit the search button • View a list of query specific and relevant data

Use Case ID	UC002	Created By	Foez Ahmed
Use Case Name	Editorial Dashboard		
Actor	Editors/Moderators		
Description	View and curation of gathered data.		
Include	• View entity information • Search, update and delete entity information		
Pre-condition	• Staff need to sign in to the system		
Post-condition	• Staff access the system • Entity information stored in system database.		
Flow	• Staff view dashboard information page • Accept, edit, add, discard changes • Information stored in database		

Use Case ID	UC003	Created By	Foez Ahmed
Use Case Name	API Integration		
Actor	Third party POS system		
Description	Automatic Product/Business information collection process		
Include			
Pre-condition	• Third party system needs API access		

Post-condition	• Information stored in system database.
Flow	• Third party system will gain API access • If data changes occur, data uploading process will start • If valid then changes will be posted to the data store • If any error or validation occurs, third party system will be notified, they will handle the rest.

19 APPENDIX-D: CODING SAMPLES

- API Controller

```
public class ProductsController : ApiController
{
    private DatabaseService db = new DatabaseService();
    // GET: api/Products
    [ResponseType(typeof(List<ProductsStaging>))]
    public List<ProductsStaging> Get()
    {
        try
        {
            return db.ProductsStagings.ToList();
        }
        catch (Exception ex)
        {
            throw;
        }
    }

    [ResponseType(typeof(List<ProductsStaging>))]
    public async Task<IHttpActionResult> Post([FromBody] List<ProductsStaging> products)
    {
        try
        {
            if (!ModelState.IsValid)
            {
                return BadRequest(ModelState);
            }
            foreach (var item in products)
            {
                var id = item.RelativeId;
                var productDB = db.ProductsStagings.Where(n => n.RelativeId == id).FirstOrDefault();
                if (productDB != null)
                {
                    productDB.Name = item.Name;
                    productDB.Price = item.Price;
                    productDB.Status = 0;
                    productDB.GroupCode = item.GroupCode;
```

```csharp
                        db.Entry(productDB).State = EntityState.Modified; ;
                    }
                    else
                    {
                        db.ProductsStagings.Add(item);
                    }
                }

                await db.SaveChangesAsync();

                return CreatedAtRoute("DefaultApi", new { id = 0 }, products);
            }
            catch (Exception ex)
            {
                throw;
            }
        }

        // PUT: api/Products/5
        public async Task<IHttpActionResult> Put([FromBody] ProductsStaging product)
        {
            try
            {
                if (!ModelState.IsValid)
                {
                    return BadRequest(ModelState);
                }

                var id = product.RelativeId;
                var productDB = db.ProductsStagings.Where(n => n.RelativeId ==
id).FirstOrDefault();
                if (productDB != null)
                {
                    productDB.Name = product.Name;
                    productDB.Price = product.Price;
                    productDB.Status = 0;
                    productDB.GroupCode = product.GroupCode;

                    db.Entry(productDB).State = EntityState.Modified; ;
                }
                else
                {
                    db.ProductsStagings.Add(product);
                }

                await db.SaveChangesAsync();

                return CreatedAtRoute("DefaultApi", new { id = 0 }, product);
            }
            catch (Exception ex)
            {
                throw;
            }

        }

        // DELETE: api/Products/5
        public async void Delete(int relativeId)
        {
            try
            {
```

```
                var id = relativeId;
                var productDB = db.ProductsStagings.Where(n => n.RelativeId ==
id).FirstOrDefault();
                if (productDB != null)
                {
                    db.ProductsStagings.Remove(productDB);
                }

                await db.SaveChangesAsync();

            }
            catch (Exception ex)
            {
                throw;
            }
        }
    }
```

- Dashboard View:

```aspx
<%@ Page Title="Home Page" Language="C#" MasterPageFile="~/Site.Master"
AutoEventWireup="true" CodeBehind="Default.aspx.cs" Inherits="CentralWebAPP._Default"
%>

<%@ Register Assembly="DevExpress.Web.v18.2, Version=18.2.3.0, Culture=neutral,
PublicKeyToken=b88d1754d700e49a" Namespace="DevExpress.Web" TagPrefix="dx" %>

<asp:Content ID="BodyContent" ContentPlaceHolderID="MainContent" runat="server">
    <div class="row">
        <table>
            <tr>
                <td></td>
            </tr>
        </table>
    </div>
    <div class="row">
        <div >
            <dx:ASPxCardView ID="dxCardView" runat="server" EnableCardsCache="false"
EnableTheming="True" Theme="MaterialCompact" AutoGenerateColumns="False"
OnDataBinding="dxCardView_DataBinding" Width="100%">

                <Columns>
                    <dx:CardViewTextColumn FieldName="Name"  />
                    <dx:CardViewSpinEditColumn FieldName="GroupCode"
Caption="GroupCode" GroupIndex="0" />
                    <dx:CardViewSpinEditColumn FieldName="Price">
                        <PropertiesSpinEdit DisplayFormatString="c" />
                    </dx:CardViewSpinEditColumn>
                </Columns>
```

```
            <CardLayoutProperties>
                <Items>
                    <dx:CardViewColumnLayoutItem ColumnName="Name" />
                    <dx:CardViewColumnLayoutItem ColumnName="GroupCode" />
                    <dx:CardViewColumnLayoutItem ColumnName="Price" />
                </Items>
            </CardLayoutProperties>
            <SettingsAdaptivity>
                <BreakpointsLayoutSettings CardsPerRow="5">
                    <Breakpoints>
                        <dx:CardViewBreakpoint DeviceSize="Custom" MaxWidth="1400"
CardsPerRow="4" />
                        <dx:CardViewBreakpoint DeviceSize="Custom" MaxWidth="900"
CardsPerRow="3" />
                        <dx:CardViewBreakpoint DeviceSize="Custom" MaxWidth="700"
CardsPerRow="2" />
                        <dx:CardViewBreakpoint DeviceSize="Custom" MaxWidth="500"
CardsPerRow="1" />
                    </Breakpoints>
                </BreakpointsLayoutSettings>
            </SettingsAdaptivity>
            <Settings LayoutMode="Breakpoints" ShowGroupSelector="true"
ShowHeaderPanel="true" />
            <SettingsSearchPanel Visible="true" />
            <SettingsPager Mode="ShowAllRecords" />
            <Styles BreakpointsCard-Height="320" />
        </dx:ASPxCardView>
    </div>
  </div>

</asp:Content>
```

Deafult.cs file

```
public partial class _Default : Page
    {
        DatabaseService db = new DatabaseService();
        protected void Page_Load(object sender, EventArgs e)
        {
            if(!IsPostBack)
            {
                dxCardView.DataBind();
            }
        }

        private void LoadGrid()
        {

        }

        protected void dxCardView_DataBinding(object sender, EventArgs e)
        {
            dxCardView.DataSource = db.ProductsStagings.ToList();
            dxCardView.KeyFieldName = "Id";
```

```
        }
    }
```

- EntityFramework Migration:

```
namespace Persistence.Migrations
{
    using System;
    using System.Data.Entity.Migrations;

    public partial class CentralDBv5 : DbMigration
    {
        public override void Up()
        {
            CreateTable(
                "dbo.Categories",
                c => new
                    {
                        Id = c.Int(nullable: false, identity: true),
                        Name = c.String(unicode: false),
                    })
                .PrimaryKey(t => t.Id);

            CreateTable(
                "dbo.Products",
                c => new
                    {
                        Id = c.Int(nullable: false, identity: true),
                        Name = c.String(nullable: false, unicode: false),
                        CategoryId = c.Int(nullable: false),
                        Price = c.Decimal(storeType: "money"),
                        GroupCode = c.String(unicode: false),
                        RelativeId = c.Int(nullable: false),
                    })
                .PrimaryKey(t => t.Id)
                .ForeignKey("dbo.Categories", t => t.CategoryId)
                .Index(t => t.CategoryId);

            CreateTable(
                "dbo.ProductsStaging",
                c => new
                    {
                        Id = c.Int(nullable: false, identity: true),
                        Name = c.String(nullable: false, unicode: false),
                        CategoryId = c.Int(nullable: false),
                        Price = c.Decimal(storeType: "money"),
                        Status = c.Int(),
                        GroupCode = c.String(unicode: false),
                        RelativeId = c.Int(nullable: false),
                    })
                .PrimaryKey(t => t.Id);

            CreateTable(
                "dbo.Users",
                c => new
                    {
                        Id = c.Int(nullable: false, identity: true),
                        Name = c.String(unicode: false),
```

```csharp
                    Password = c.String(unicode: false),
                    IsAdmin = c.Boolean(nullable: false),
                })
            .PrimaryKey(t => t.Id);

        }

        public override void Down()
        {
            DropForeignKey("dbo.Products", "CategoryId", "dbo.Categories");
            DropIndex("dbo.Products", new[] { "CategoryId" });
            DropTable("dbo.Users");
            DropTable("dbo.ProductsStaging");
            DropTable("dbo.Products");
            DropTable("dbo.Categories");
        }
    }
}
```