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ADEN ADDE INTERNATIONAL UNIVERSITY

Home of Symbolic Leaders

ONLINE MARKETING PLATFORM MANAGEMENT SYSTEM

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A RESEACH THESIS SUBMITED TO THE FACULTY OF COMPUTER SCIENCE IN PARTIAL FULFILMENT OF THE REQUARMENTS FOR THE AWARD OF BACHELOR DEGREE IN INFORMATION TECHNOLOGY AT ADAN ADDE INTERNATIONAL UNIVERSITY

MOGADISHU SOMALIA

July 2025

DECLARATION

This thesis is our original work and has not been presented for a degree in any other university."

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Date …….

DEDICATION

We dedicate this piece of work to our parents they have been source of inspiration, engine of courage and secret of our achievements. We also dedicate it to our sisters and brothers for all the support.

DEAN NAME: ENG Farax Mahamud Mahamed

Signature …….

Date …….

APPROVAL

We certify that this Research report satisfies the partial fulfillment of the requirements for the award of the Bachelor Degree of Computer Science & it at Aden Adde International University in Mogadishu Somalia, and has been carried out by the candidates under our supervision and was submitted with our approval.

SUPERVISOR: Eng. Aweis Muridi Hashim

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Date …….

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Table of Contents

CHAPTER ONE

INTORDUCTION

1.0 Introduction

This chapter introduces the concept and significance of an Online Marketing Platform, providing an overview of its importance in the contemporary digital era. The platform is designed to address the growing need for efficient, accessible, and scalable marketing solutions in an increasingly competitive and interconnected business environment. This chapter outlines the foundation and objectives of the research, establishing the context for why the study is relevant and valuable.

1.1 Background of the Project

Digital marketing has transformed the way businesses connect with consumers, enabling companies to reach global audiences, personalize communication, and measure the effectiveness of their marketing efforts with unprecedented precision. From its humble beginnings in the early days of the internet to its current status as a multi-billion dollar industry, digital marketing has continually evolved to adapt to changing technologies, consumer behaviors, and market dynamics. This article delves into the history of digital marketing, exploring its origins, key developments, and the impact it has had on the world of business and communication. The Origins of Digital Marketing: The Early Days of the Internet (1990s – Early 2000s) The concept of digital marketing is closely tied to the rise of the internet and the technological advancements that enabled new forms of communication and commerce. The early days of digital marketing were characterized by experimentation, as businesses and marketers explored the potential of the internet as a marketing channel.

1.1.1 The Birth of the Internet and the First Online Ads

The Creation of the World Wide Web Tim Berners-Lee and the World Wide Web: The World Wide Web was invented by Tim Berners-Lee in 1989 while he was working at CERN (the European Organization for Nuclear Research). The first website, info.cern.ch, was launched in 1991, marking the beginning of the web as we know it today. The launch of the World Wide Web provided a new platform for communication and information sharing, laying the groundwork for the development of digital marketing. Early websites were primarily text-based and informational, but as the web grew, so did the potential for commercial use.

Key Fact: The first website, created by Tim Berners-Lee, was a simple, text-based site that explained the concept of the World Wide Web and provided information on how to create web pages. The First Online Advertisements The Birth of Banner Ads: The first online advertisement, a banner ad, was launched in 1994 by AT&T on the website HotWired (the online version of Wired magazine). The ad, which read "Have you ever clicked your mouse right HERE? You will," was a simple, clickable banner that redirected users to AT&T's website. The success of the AT&T banner ad demonstrated the potential of online advertising as a new marketing channel. Banner ads quickly became a popular format for digital marketing, allowing businesses to promote their products and services to a growing online audience. The introduction of banner ads marked the beginning of display advertising, a key component of digital marketing that continues to play a significant role today. Early banner ads were typically sold on a cost-per-thousand-impressions (CPM) basis, where advertisers paid for the number of times their ads were displayed, regardless of whether users clicked on them.

Key Fact: The AT&T banner ad on HotWired had an impressive click-through rate (CTR) of 44%, a figure that is far higher than the average CTR for banner ads today, which typically ranges from 0.1% to 0.3%.

1.1.2 The Rise of Search Engines and SEO

The Emergence of Search Engines Early Search Engines: The mid-1990s saw the rise of search engines like Yahoo! (1994), AltaVista (1995), and Lycos (1994), which provided users with a way to search and navigate the rapidly growing web. These early search engines relied on basic algorithms to index and rank web pages based on keywords and content. The Launch of Google: In 1998, Google was founded by Larry Page and Sergey Brin, revolutionizing the search engine landscape with its PageRank algorithm. Google's algorithm ranked web pages based on the number and quality of backlinks, providing more relevant and accurate search results compared to its competitors. The rise of search engines created new opportunities for digital marketing, as businesses sought to improve their visibility in search results. This led to the development of search engine optimization (SEO), a set of practices aimed at improving a website's ranking on search engine results pages (SERPs).

Key Fact: By the early 2000s, Google had become the dominant search engine, accounting for more than 70% of global search queries. Its dominance continues today, with Google handling over 90% of global search traffic. The Birth of SEO (Search Engine Optimization) SEO Basics:

SEO began as a relatively simple practice focused on optimizing website content and meta tags with relevant keywords. Early SEO strategies included keyword stuffing (adding as many relevant keywords as possible) and building backlinks from other websites to improve search rankings. As search engines like Google became more sophisticated, SEO evolved to encompass a wider range of factors, including site structure, user experience, content quality, and technical optimization. The introduction of algorithms like Google's Panda (2011) and Penguin (2012) further refined the practice of SEO by penalizing websites that engaged in manipulative tactics. SEO quickly became a cornerstone of digital marketing, as businesses recognized the importance of appearing at the top of search results to attract organic traffic. The competitive nature of SEO led to the growth of a specialized industry, with SEO agencies, consultants, and tools emerging to help businesses improve their search rankings.

1.2 Statement of the Problem

Challenges Faced by Somali Online Marketing and Advertising

Despite its success in using Facebook as a marketing platform, Somali Online Marketing and Advertising faces significant challenges that hinder its scalability and long-term sustainability:

Over-Reliance on Facebook

The company depends solely on Facebook for advertising and communication, which limits its ability to control its platform, retain customer data, and expand functionalities.

Impact: This over-reliance makes the company vulnerable to changes in Facebook's policies and algorithms, potentially leading to disrupted operations.

Limited Customization and Branding Using Facebook does not allow the company to offer a fully branded and personalized experience to its users.

Impact: This reduces the company's ability to stand out in the competitive market, limiting its ability to grow.

Data Management Challenges Facebook does not provide comprehensive tools for advanced analytics, making it hard for the company to analyze customer behavior, track performance, and make data-driven decisions.

Impact: This lack of data management affects the company's ability to optimize its services.

Lack of a Dedicated Platform Without a standalone website, the company cannot fully integrate features such as campaign management, customer segmentation, or advanced communication tools.

Impact: This restricts the company's ability to offer a seamless and professional user experience, limiting its customer retention and acquisition.

Proposed Solution

The proposed Online Marketing Platform System aims to address these issues by developing a dedicated, user-friendly website for Somali Online Marketing and Advertising, with the following features:

Comprehensive Marketing Tools

Integration of campaign management, customer engagement tools, and real-time performance tracking into one unified platform.

Data Ownership and Control Providing the company with full ownership of its customer data and the ability to conduct detailed analytics.

Customization and Branding A branded website with a customizable interface that enhances the company's identity and user experience.

Independence from Facebook

Reducing dependency on Facebook while integrating its features for marketing and outreach as part of the broader platform.

Scalable Architecture

A scalable and flexible system that allows for the addition of new features and expansion into new geographical areas.

1.3 Research Questions

The following questions guide this study to address the issues faced by Somali Online Marketing and Advertising:

1. What are the core features required to transition Somali Online Marketing and Advertising from Facebook to a dedicated website?
2. What can the platform enhance accessibility and usability for non-technical users in Somalia, particularly small businesses and entrepreneurs?
3. What technologies (such as MERNSTACK, and Tailwindcss) can be implemented to ensure scalability and cost-effectiveness for the new system?
4. What can the new platform improve customer engagement and brand visibility for Somali Online Marketing and Advertising?

5. What strategies can be implemented to integrate existing Facebook-based operations into the new system while reducing dependency?
6. What can the platform empower the company with advanced analytics and data ownership to optimize its marketing services?

1.4 Purpose of the Project

The purpose of this project is to design and develop a user-friendly Online Marketing Platform that enables businesses to streamline their marketing efforts, optimize resource allocation, and achieve measurable results. The system will address existing gaps while providing innovative tools for enhanced performance.

1.5 Project Objectives

To identify the core needs of businesses in online marketing.

To design a platform that integrates various marketing tools into one cohesive system.

To implement advanced technologies, such as data analytics and automation, to improve marketing outcomes.

To ensure the platform is cost-effective and scalable for businesses of all sizes.

1.6 Scope of the System

1.6.1 Content Scope

The system will focus on providing key online marketing features such as campaign management, advanced analytics, customer engagement tools, and user-friendly dashboards. The platform will utilize MERNSTACK for the backend as well as the frontend to ensure scalability, affordability, and accessibility for users.

1.6.2 Geographical Scope

The platform will initially target Somali Online Marketing and Advertising, which currently operates through Facebook as its primary platform. Its geographical coverage includes:

Mogadishu (Muqdisho):

The central hub for their operations, serving the majority of their client base in Somalia's capital city.

Hargeisa (Hargeysa):

Supporting businesses in Northern Somalia by connecting local sellers to wider markets.

Kismayo:

Extending marketing services to businesses near Somalia’s southern port city.

Baydhabo:

Aiding local enterprises in one of Somalia's key economic centers.

1.6.3 Time Scope

The project is scheduled to run from November 10, 2024, to Jun 20, 2025, which includes phases such as research, design, development, testing, and deployment.

1.7 Significance of the Project

This platform is vital for businesses aiming to thrive in the digital economy. By addressing inefficiencies in current tools, the system will empower businesses to achieve better marketing results, increase customer engagement, and drive sustainable growth.

1.8 Project Organization

Here, is the systematically writing of methodology of book thesis outlined chapters as the following below instruction which has to obey instructions.

Chapter One: In this section, we will discuss the main points of our system like introduction about our project, the problem statement of the project, objectives of the project, Scope of the system, Significance of the system and as well as summary of chapter.

Chapter Two: in this section, we will review related literature of relevance research including Concepts of system, existing system, gap of system and chapter of summary

Chapter Three: in this section, we will discuss in this chapter requirements analysis, limitation of the current system, data gathering, and data model including DFD / UML and feasibility study, system requirement specification, solution strategy programing and as well chapter system

Chapter Four: in this section, we deeply focus on proposed system design of database online Marketing Platform system which will be applying as web-based technology application in data dictionary for details using entity relationship diagram (ERD), normalization, database design, table design, form design and reports as well.

Chapter Five: in this section, we describe the implementation of this project and testing system including unit testing and system testing to produce complete functioning for proposal system

Chapter Six: in this section, we finally, provide conclusion and recommendations by describing deeply about data analysis gained all sections that should base Strengthens, Weakness, Opportunity, and Threat (SWOT) and the achievements of the projects. And will be base for future design as online Marketing Platform System as web-based technology application and its future enhancements.

CHAPTER TWO
LITERATURE REVIEW

2.1. INTORDUCTION

An **Online Marketing Platform** is a comprehensive suite of tools and services that enable businesses to promote their products and services online. These platforms integrate various digital marketing techniques to reach, engage, and convert potential customers. **Search Engine Optimization (SEO)** Techniques to improve a website's visibility on search engines like Google. SEO involves keyword research, content optimization, and backlink building. Online marketing platforms play a crucial role in modern business strategies, enabling companies to effectively reach and engage their target audiences through various digital channels. By leveraging these platforms, businesses can enhance their online presence, drive traffic, and ultimately increase sales and revenue

2.2. CONCEPTS ABOUT ONLINE MARKRTING PLATFORM

Online marketing, or in other terms referred to as digital marketing, is a marketing method based on information technology. The development of online-based marketing cannot be separated from the development of internet use, which is growing every year. The development of the internet allows humans to easily and cheaply connect (connectivity), which has a massive influence in marketing, thus emerging digital marketing P. Kotler, H. Kartajaya, and I. Setiawan, Marketing 4.O Bergerak Dari Tradisional Ke Digital, 1st Editio (Gramedia Pustaka Utama, Jakarta, Indonesia, 2019).

Another definition of online marketing or e-marketing is the use of information technology in m nology on marketing. It increases the efficiency and effectiveness of the marketing function and changes traditional marketing strategies J. Strauss and R. Frost, E-Marketing, Seventh Edi (Pearson, New Jersey, 2014). The internet has a vital role in the development of online marketing, including in Indonesia. There are several reasons why Indonesian consumers use the internet for economic activities, including searching for information on products to be purchased, visiting online stores (online shops), making online purchases, and transactions Hootsuite, DIGITAL 2019: Indonesia (2019).

Concepts, methodologies and tools in marketing have remained unchanged for a relatively long period. However, changing market structures (e.g., offline to online, globalization, hyper-competitive environment, increasing demand) demand new marketing methodologies and tools that are able to adapt to this new situation (Hackley, 2009; Armstrong et al., 2018). Thus, academics and practitioners have investigated how marketing research could benefit from the integration of methods and tools from other disciplines. In the early 2000s, a novel approach for studying consumer behavior emerged. This new approach is now known as Consumer Neuroscience (a.k.a. Neuromarketing) and lies at the intersection of three disciplines: marketing, psychology, and neuroscience (Plassmann et al., 2012). The goal of consumer neuroscience is the study of neuropsychological mechanisms that support and lead consumer decision making and behavior. Consumer neuroscience uses both psychological and neuroscience methods to investigate marketing related issues concerning buying behavior, thus offering scientific explanation on consumer's preferences and behaviors (Levallois et al., 2012; Russo et al., 2015). There are multiple consumer neuroscience tools that are used to study consumer decision-making and behavior. Usually, consumer neuroscience tools include devices that can measure vital physiological functions (e.g., heartbeat, respiration rate, blood pressure) and reflexes (e.g., gaze fixation, pupil dilatation, face expression) (Global Harmonization Task Force, 2012). These tools reveal information about impressions, reactions (e.g., positive, negative) and emotional responses (e.g., positive, negative) when exposed to marketing stimuli (Hamelin et al., 2017). Consumer neuroscience tools also allow real-time measurements of brain activity, such as functional magnetic resonance imaging (fMRI) and electroencephalogram (EEG). These tools measure the neural activity of consumers while they perform consumption-related behavior (e.g., buying or testing a product), or in the periods directly preceding and following such behaviors (Plassmann et al., 2015; Montazeribarforoushi et al., 2017). Many studies have focussed on the benefits of neuroscience tools in marketing (Vecchiato et al., 2011; Bercea, 2013; Hsu and Yoon, 2015; Ramsøy, 2015; Boz et al., 2017; Lee et al., 2017; Alvino, 2019; Songsamoe et al., 2019). Several studies also provide an overview of the most common neuroscience tools that could be used in consumer neuroscience tools, for instance EEG and fMRI.

Digital marketing is the component of marketing that uses the Internet and online-based digital technologies such as desktop computers, mobile phones, and other digital media and platforms to promote products and services.

Digital marketing effectively began in 1990 when the Archie search engine was created as an index for FTP sites. In the 1980s, the storage capacity of computers was already large enough to store huge volumes of customer information. Companies started choosing online techniques, such as database marketing, rather than limited list brokers. Databases allowed companies to track customers' information more effectively, transforming the relationship between buyer and seller.

In the 1990s, the term *digital marketing* was coined. With the development of server/client architecture and the popularity of personal computers, Customer Relationship Management (CRM) applications became a significant factor in marketing technology. Clark, Ken 2021-03-13. Fierce competition forced vendors to include more services in their software, such as marketing, sales, and service applications. Marketers were also able to own online customer data through eCRM software after the Internet was born. This led to the first clickable banner ad going live in 1994, which was the **"You Will"** campaign by AT&T, and over the first four months of it going live, 44% of all people who saw it clicked on the ad. Early digital marketing efforts focused on simple HTML websites and the burgeoning practice of email marketing, which allowed for direct communication with consumers Chakravorti, Sujit (2003-06-01).

In the 2000s, with increasing numbers of Internet users and the birth of the iPhone, customers began searching for products and making decisions about their needs online first, instead of consulting a salesperson, which created a new problem for the marketing department of a company. In addition, a survey in 2000 in the United Kingdom found that most retailers still needed to register their own domain address. These problems encouraged marketers to find new ways to integrate digital technology into market development. At the same time, PPC advertising, introduced by Google AdWords in 2000, allowed businesses to target specific keywords, making digital marketing more measurable and cost-effective.

The mid-2000s saw the emergence of social media platforms
like Facebook (2004), YouTube (2005), and Twitter (2006). These platforms revolutionized digital marketing by facilitating direct and interactive engagement with consumers. In 2007, marketing automation was developed as a response to the ever-evolving marketing climate. Marketing automation is the process by which software is used to automate conventional marketing processes. Marketing automation helps companies segment customers,

launch multichannel marketing campaigns, and provide personalized information for customers., based on their specific activities. In this way, users' activity (or lack thereof) triggers a personal message that is customized to the user in their preferred platform. However, despite the benefits of marketing automation many companies are struggling to adapt it to their everyday uses correctly.

Digital marketing became more sophisticated in the 2000s and the 2010s, Zuboff, Shoshana (2019) the proliferation of devices capable of accessing digital media led to sudden growth. Statistics produced in 2012 and 2013 showed that digital marketing was still growing. With the development of social media in the 2000s, such as LinkedIn, Facebook, YouTube, and Twitter, consumers became highly dependent on digital electronics in their daily lives. Therefore, they expected a seamless user experience across different channels for searching product information. The change in customer behavior improved the diversification of marketing technology Diaz Ruiz, Carlos (2023-10-30).

The term "Digital Marketing" was coined in the 1990s. Digital marketing was formally known as and referred to as 'online marketing', 'internet marketing', or 'web marketing'. Worldwide *digital marketing* has become the most common term and has taken off in the business industry, especially after the year 2013. However, in other countries like Italy, digital marketing is still known as web marketing.

arketing, communication, delivery, and exchange activities that provide value to consumers, clients, partners, and the community. In simple terms, it can also be defined as an application of information technology in traditional marketing activities. There are two impacts of information tech

2.3. PREVIOUS WORK/EXISTING SYSTEM

online marketing platforms have focused heavily on pay-per-click (PPC) campaigns, but many faced challenges related to inefficient targeting, poor ROI (Return on Investment) tracking, and limited customization. For instance, platforms such as early versions of Google AdWords (now Google Ads) were primarily designed for basic keyword-based advertising, which left marketers with little room for personalized campaign strategies.

2.3.1 LATER

Later is a digital marketing platform that helps brands, creators and agencies streamline their social media workflows. It includes a few core features—post scheduling and publishing, a link-in bio tool and analytics. It also helps users find hashtags and user-generated content and edit photos and videos.

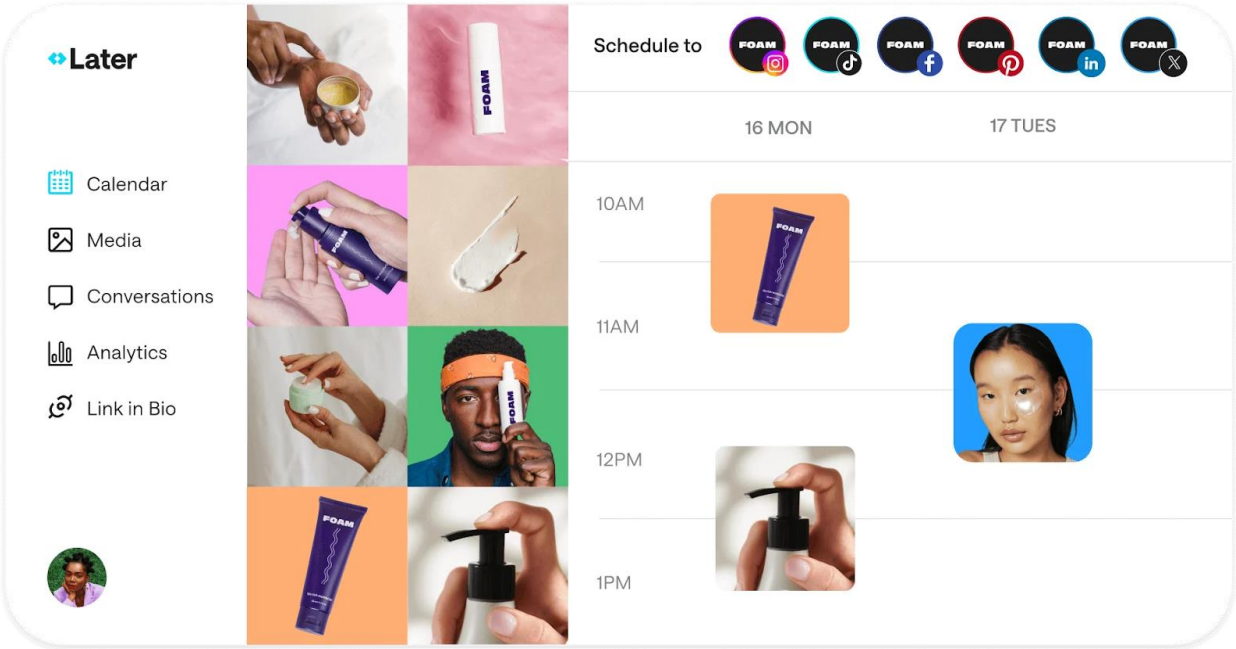


Figure 2.1. Digital Marketing Platforms to Check Out in 2025 | Sprout Social

2.3.2 SEMRUSH

SEMrush is a highly regarded SEO and online visibility tool created to help companies raise their organic search ranks and enhance their online presence in general. Because of its extensive feature set, marketers who want to optimize their content and outperform their rivals in search engines

turn to it. The Semrush Dashboard is shown in the image above. Each primary function is listed on the left, and the main categories are Domain Analytics, Keyword Analytics, Project, and My Reports. At this stage, there are two more beta features: the SEO Content Template and Topic Research (Subject Heading Analysis), which we will briefly introduce.

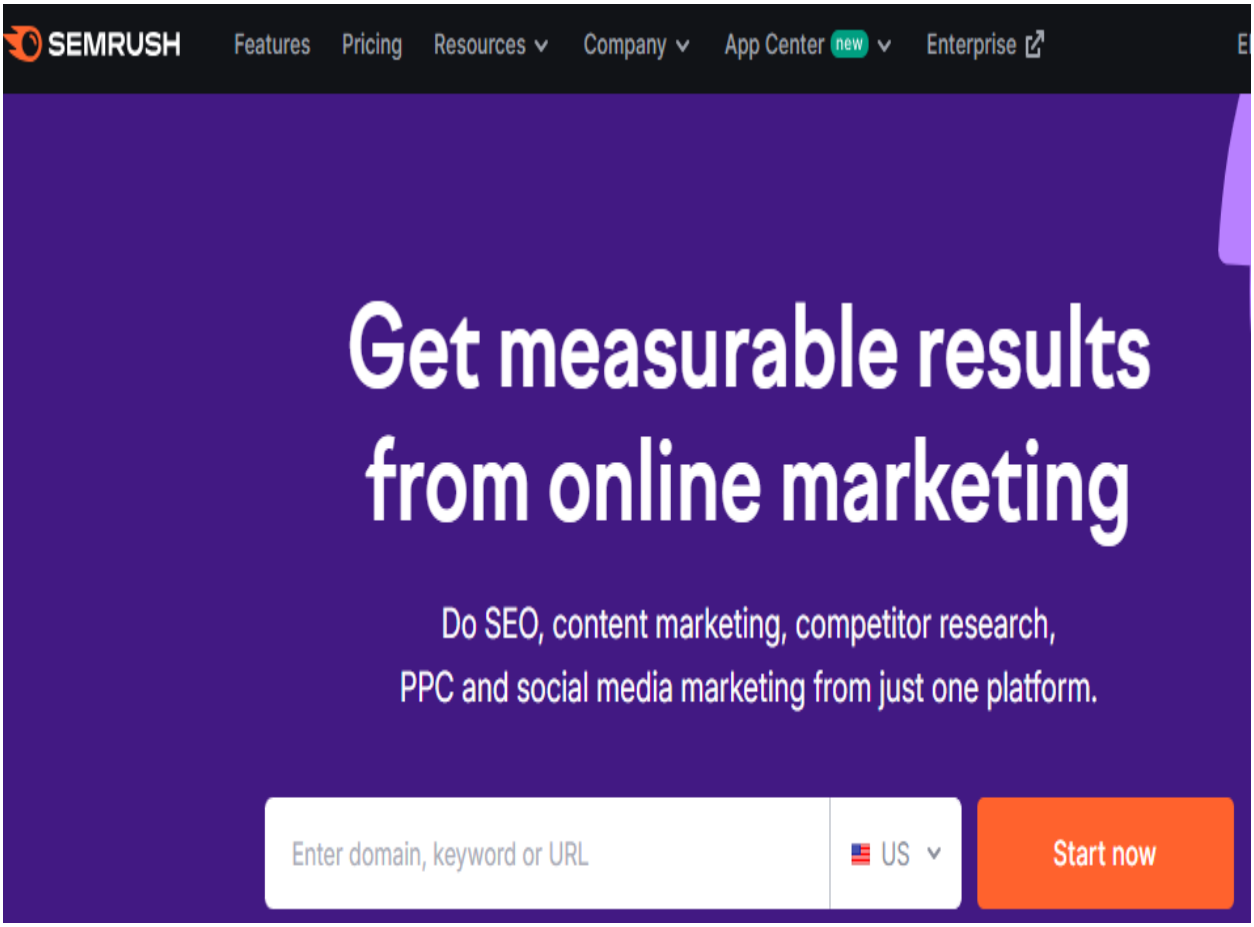


Figure 2.2. https://skillfloor.com/blog/online-marketing-platforms.

2.3.3. DIGITAL MARKETING JOB

The digital marketing sector in Bangalore has seen remarkable growth over the past few years. With businesses increasingly moving towards online platforms, the demand for digital marketing services has surged. Numerous digital marketing agencies and freelancers have emerged, offering a wide range of services from social media management and search engine optimization (SEO) to content marketing and pay per click (PPC) advertising. Small and medium-sized enterprises

(SMEs) especially have embraced digital marketing as a cost-effective way to reach their target audiences and compete with larger corporations. This shift has not only boosted the local economy but has also provided opportunities for job creation in fields like graphic design, web development, and digital analytics. The digital marketing sector in Bangalore has experienced significant growth due to the increasing shift of businesses to online platforms. This surge has created numerous job opportunities in areas like SEO, social media management, content marketing, and more. The rise of digital marketing agencies and freelancers, along with SMEs embracing digital strategies, has boosted the local economy and expanded the job market. However, challenges such as rapid technological changes, high competition, skill gaps, data privacy regulations, and performance measurement persist. Addressing these requires continuous learning and adaptability. The future looks promising with trends like AI, voice search optimization, video content, omnichannel marketing, and a focus on sustainability and data privacy, further driving growth and opportunities in the industry.

Figure 2.3.. Digital marketing jobs in Bangalore - SKILLFLOOR

2.3.4 COMPARATIVE OF CASE STUDIES OF EXISTING SYSTEMS

Table: 2.3.1 Relevance research of existing system

Features	**LATER**	**SEMRUSH**	**DIGITAL MARKETING JOB**	**PROPOSED SYSTEM**
LOGIN FORM	✓	✗	✓	✓
GOOGLE ADS	✓	✗	✗	✓
SECURITY	✗	✗	✓	✓
HubSpot	✗	✓	✗	✓
SOCIAL MEDIA	✓	✗	✗	✓
EMIAL MARKETING	✗	✗	✗	✓

2.4: GAP ANALYSIS AND DIRECTION

Online marketing platform involves comparing your current marketing performance to your desired goals to identify areas that need improvement. This process helps you understand where you are falling short and what steps you need to take to bridge those gaps. **Identify Current Performance** Assess your current marketing metrics, such as website traffic, conversion rates, and social media engagement. **Set Goals** Define clear, measurable goals for your marketing efforts. Analyze Gaps Compare your current performance to your goals to identify areas where you are not meeting expectations. Develop Action Plans create strategies to address the identified gaps, such as optimizing content, improving SEO, or enhancing social media engagement. Implement Changes put your action plans into practice and monitor their effectiveness. Review and Adjust continuously review your progress and make adjustments as needed to stay on track with your goals

Case study

SOMALI BUSINESS is one of an international Busniness company in Somali which is main offices located Mogadishu. In this case study, we look at specialist tool Buying clothes and shoes. for SOMALI BUSINESS has acquired highly advanced advertising for clothes that can be leased to anyone in SOMALIA.

Since it is difficult to advertise business clothes and shoes on social media in SOMALI BUSINESS, software to link the seller and the bought is needed. The aim of this case study is to find ways to get user-friendly software that links both the seller and the bought.

2.5 Chapter Summary

In Chapter 2, four existing systems (LATER, SEMRUSH and DIGITAL MARKETING JOB) have been reviewed in terms of their feature. All the reviewed systems have their own strengths and weakness and all of them are compared and summarized in Table 2.3.1.

CHAPTER THREE

REQUIREMENT ANALYSIS

3.1 INTRODUCTION

This chapter details the crucial process of requirements analysis for the development of a comprehensive Online Marketing Platform. Moving beyond the background and context provided in the previous chapters, this chapter delves into the specific needs and functionalities that the Online Marketing Platform must address. A thorough understanding of these requirements is paramount to ensuring the platform's effectiveness, usability, and ultimate success in the dynamic digital marketing landscape. This chapter outlines the methodologies employed for gathering requirements, analyzes the identified needs of various stakeholders, and presents a detailed specification of the system's functionalities, performance criteria, and constraints. The analysis presented here forms the foundation upon which the subsequent design and implementation phases of the Online Marketing Platform will be built.

3.2 USER REQUIREMENT ANALYSIS

User requirement analysis is the foundational stage within the Systems Development Life Cycle (SDLC) and holds particular significance for a complex and multifaceted system like an Online Marketing Platform. This phase is dedicated to deeply understanding the diverse needs, expectations, and pain points of all stakeholders involved with the platform, ensuring that the final product aligns seamlessly with their actual requirements and delivers genuine value. For the Online Marketing Platform, the spectrum of stakeholders is broad and includes:

MARKETING PROFESSIONALS (NOVICE AND EXPERIENCED): This group encompasses individuals with varying levels of expertise in digital marketing. Novice marketers require intuitive interfaces, simplified workflows, and readily available educational resources within the platform. Experienced marketers, on the other hand, seek advanced features, granular control over campaigns, and sophisticated analytics dashboards. Understanding the distinct needs of both groups is crucial for designing a platform that caters to a wide range of skill levels. This includes understanding their preferred marketing channels, the types of campaigns they typically run, and their specific reporting requirements.

BUSINESS OWNERS: Business owners, particularly those of small and medium-sized enterprises (SMEs), often have limited budgets and require a cost-effective marketing solution. They are primarily concerned with achieving measurable results, such as increased website traffic, lead generation, and sales conversions. They need a platform that provides clear insights into the return on investment (ROI) of their marketing efforts and allows them to easily track their progress towards business goals. Understanding their specific business objectives, target audience, and budget constraints is essential for tailoring the platform to their needs.

CONTENT CREATORS: Content creators, such as writers, designers, and video producers, require tools that facilitate the creation, management, and distribution of high-quality marketing content. They need seamless integration with content management systems (CMS) and other relevant platforms. They also need access to resources and tools that help them optimize their content for different marketing channels and target audiences. Understanding their content creation workflows, preferred tools, and content optimization needs is crucial for providing a supportive environment within the platform.

DATA ANALYSTS: Data analysts rely on robust analytics and reporting capabilities to measure the effectiveness of marketing campaigns and identify areas for improvement. They require access to granular data, customizable dashboards, and advanced reporting features. They also need tools that allow them to integrate data from various sources and perform in-depth analysis. Understanding their data analysis workflows, reporting requirements, and preferred analytical tools is essential for designing a data-driven platform.

CUSTOMERS (POTENTIAL INTERACTORS WITH MARKETING CAMPAIGNS): While not directly involved in using the platform, understanding how customers interact with marketing campaigns is crucial. This includes analyzing customer behavior across different marketing channels, understanding their preferences for content and communication, and identifying their pain points. This information can be used to inform the design of more effective and targeted marketing campaigns. Gathering data on customer demographics, online behavior, and purchasing patterns is crucial for developing a customer-centric marketing approach.
To gather this diverse range of user requirements, a combination of qualitative and quantitative research methods is employed:

INTERVIEWS: Semi-structured interviews are conducted with representatives from each stakeholder group. The interviews are designed to explore their current marketing workflows, challenges faced with existing tools, unmet needs, and desired functionalities in a comprehensive online marketing platform. The open-ended nature of the interview questions allows participants to express their thoughts and experiences freely, providing valuable qualitative data.

SURVEYS: Online surveys are distributed to a larger audience to collect quantitative data on feature prioritization, usability requirements, satisfaction with existing solutions, and demographic information. A mix of multiple-choice questions, rating scales, and open-ended questions is used to capture a broad range of responses. The survey data is analyzed statistically to identify trends and patterns.

FOCUS GROUPS: Focus groups are organized to facilitate interactive discussions and brainstorming sessions among stakeholders. Participants are selected to represent different user roles and perspectives. A moderator guides the discussion, ensuring that all relevant topics are covered. Focus group sessions are recorded and transcribed for detailed analysis.

USE CASE ANALYSIS: Use case diagrams are developed to model the interactions between users and the Online Marketing Platform. These diagrams illustrate how different user roles will interact with the system to achieve specific goals, helping to define the system's boundaries and ensure that all essential functionalities are addressed.

COMPETITIVE ANALYSIS: A thorough analysis of existing online marketing platforms is conducted to identify their strengths and weaknesses, informing the development of innovative features for the Online Marketing Platform.

By employing this comprehensive approach to user requirement analysis, the Online Marketing Platform can be designed and developed to meet the diverse needs of its stakeholders and provide a truly valuable and effective solution for the dynamic digital marketing landscape.

3.3 PRELIMINARY INVESTIGATION

The preliminary investigation for the Online Marketing Platform is a crucial initial phase that establishes the foundation for the entire project. It's a process of discovery, assessment, and planning that examines the project from two distinct yet interconnected perspectives: the

practical, on-the-ground realities of development and implementation (the project level) and the broader context of academic research and contribution (the thesis level). At the project level, the investigation is highly pragmatic, focusing on the "can we do this?" questions. It's about determining the feasibility of the Online Marketing Platform within the constraints of budget, time, available technology, and the skills of the development team. This involves a careful analysis of technical feasibility – are the necessary tools and expertise accessible? – operational feasibility – how will this platform integrate into existing business workflows and will users readily adopt it? – and economic feasibility – is the project financially viable, considering development costs, marketing expenses, and the potential return on investment? Furthermore, this practical investigation seeks to identify potential roadblocks: what risks, challenges, or unexpected issues could arise during development or after launch? Are there resource limitations, competitive pressures, or technological hurdles to overcome? Proactive risk assessment is vital here, along with the development of contingency plans to mitigate potential problems. Perhaps most importantly at the project level, the preliminary investigation seeks to clarify the value proposition of the Online Marketing Platform and to quantify the potential return on investment for businesses. What tangible benefits can they expect, such as increased efficiency, improved campaign performance, or cost savings? A compelling ROI justification is crucial for securing funding and ensuring the project's long-term viability. Simultaneously, the thesis-level investigation takes a more academic and theoretical approach. It's about positioning the Online Marketing Platform within the existing landscape of online marketing tools and research. This involves a thorough literature review to identify the current state of the art, pinpoint gaps in existing solutions, and articulate the specific research problem that the thesis aims to address. What are the limitations of current platforms? What unmet needs exist in the market? The preliminary investigation helps to define the unique contribution that the Online Marketing Platform will make to the field. Will it offer innovative features, a novel integration of existing functionalities, or a specialized focus on a particular niche? This contribution must be clearly articulated to justify the research and development effort. Finally, the thesis-level investigation also looks beyond the immediate project to consider the potential for future research and exploration. What new questions or avenues of investigation might the Online Marketing Platform open up? What further enhancements or applications could be developed in the future? By considering these broader research implications, the preliminary investigation

strengthens the academic value and impact of the thesis. In essence, this initial investigative phase is a dual-focused process. It's about both building a practical, viable product that meets real-world needs and contributing to the academic discourse on online marketing platforms. It's a crucial stage that shapes the direction and success of the entire project.

3.4 CURRENT SYSTEM ANALYSIS (GAP ANALYSIS)

The current system analysis, often referred to as a gap analysis, is a critical step in the development of the Online Marketing Platform (OMP). It involves a detailed examination of the existing landscape of online marketing tools and platforms, with the specific goal of identifying shortcomings, limitations, and unmet needs that the Online Marketing Platform OMP will address. This analysis isn't simply a review of what's already available; it's a deep dive into the strengths and weaknesses of current solutions, viewed through the lens of the stakeholders' requirements and the project's overall objectives. The gap analysis aims to answer the question: "Where are the current solutions falling short, and how can the OMP bridge those gaps?" This process is crucial because it informs the design and development of the OMP, ensuring that it offers genuine value and avoids replicating existing problems. Several key areas are examined during this analysis:

FUNCTIONALITY GAPS: This involves identifying missing or inadequate features in existing platforms. Do current solutions offer the full range of tools and functionalities that marketers need? Are there limitations in specific areas, such as social media management, email marketing automation, search engine optimization (SEO), or data analytics? The OMP aims to address these gaps by providing a more comprehensive and integrated suite of tools. For example, many platforms might excel at social media posting but lack robust email marketing capabilities. The OMP could bridge this gap by offering seamless integration between these crucial marketing channels.

USABILITY ISSUES: The user experience is paramount. Many existing platforms, particularly those designed for enterprise-level clients, can be complex and difficult to navigate. This can create a barrier for smaller businesses or marketers with less technical expertise. The gap analysis investigates usability issues in existing platforms, such as confusing interfaces, cumbersome workflows, or a lack of intuitive navigation. The OMP aims to prioritize user-friendliness, making it accessible and easy to use for marketers of all skill levels. This might

involve simplified interfaces, drag-and-drop functionality, or integrated tutorials and help resources.

COST AND ACCESSIBILITY: Cost is a major factor, especially for small and medium-sized businesses (SMEs) with limited marketing budgets. Many enterprise-level marketing platforms come with hefty price tags, putting them out of reach for many businesses. The gap analysis examines the pricing models of existing platforms and identifies opportunities to provide a more cost-effective solution. The OMP may aim to offer tiered pricing plans, flexible subscription options, or a freemium model to make it accessible to businesses of all sizes.

DATA ANALYTICS AND REPORTING: Data is the lifeblood of modern marketing. While most platforms offer some form of analytics, they often lack the depth and granularity needed for truly informed decision-making. The gap analysis explores the limitations of existing analytics and reporting features. Are the reports customizable? Do they provide actionable insights? Can marketers easily track key performance indicators (KPIs)? The OMP aims to provide advanced analytics and reporting capabilities, empowering marketers with the data they need to optimize their campaigns and demonstrate ROI.

PERSONALIZATION AND AUTOMATION: In today's fast-paced digital landscape, personalization and automation are essential for maximizing marketing efficiency. The gap analysis examines the extent to which existing platforms offer these capabilities. Can marketers easily personalize their campaigns for different target audiences? Are there robust automation tools for scheduling posts, sending emails, or nurturing leads? The OMP aims to incorporate advanced personalization and automation features, helping marketers streamline their workflows and improve campaign performance.

INTEGRATION CAPABILITIES: Modern marketing rarely happens in isolation. Platforms need to integrate seamlessly with other business tools, such as Customer Relationship Management (CRM) systems, e-commerce platforms, and content management systems (CMS). The gap analysis explores the integration capabilities of existing platforms. Are there limitations in how they connect with other systems? The OMP may prioritize seamless integrations with a range of commonly used business tools to create a unified marketing ecosystem.

By systematically analyzing these areas, the gap analysis provides a clear understanding of the current state of online marketing platforms and identifies the key opportunities for innovation and improvement. This analysis forms the basis for the requirements gathering process, ensuring that the Online Marketing Platform is designed to address the real needs of marketers and

3.5 DATA GATHERING

The data gathering process for the Online Marketing Platform is crucial for understanding the needs and expectations of its potential users and stakeholders. A comprehensive approach, combining both qualitative and quantitative research methods, is employed to collect rich and diverse data. This multifaceted approach ensures that the platform's requirements are grounded in real-world needs and informed by diverse perspectives. The following methods are utilized:

INTERVIEWS: In-depth, semi-structured interviews are conducted with a diverse group of marketing professionals, business owners (representing different industries and sizes), content creators, and other relevant stakeholders. These interviews are designed to elicit detailed insights into current marketing practices, challenges faced with existing tools, unmet needs, and desired functionalities in a comprehensive online marketing platform. The interview questions are open-ended, allowing participants to express their thoughts and experiences freely, providing valuable qualitative data. Interviews are conducted either in person or remotely, depending on the participant's availability and preference. Detailed notes are taken during each interview, and where possible, interviews are recorded (with the participant's consent) to ensure accuracy and facilitate further analysis.

SURVEYS: To complement the qualitative data gathered through interviews, quantitative data is collected through online surveys. Surveys are distributed to a larger audience, including potential users who may not have been available for interviews. The survey questions are designed to gather data on feature preferences, usability requirements, satisfaction with current marketing solutions, and demographic information. A mix of multiple-choice questions, rating scales, and open-ended questions is used to capture a broad range of responses. The survey data is analyzed statistically to identify trends, patterns, and prioritize user needs.

FOCUS GROUPS: Focus groups are organized to facilitate interactive discussions and brainstorming sessions among stakeholders. Participants are selected to represent different user roles and perspectives. The focus group sessions provide a platform for exploring specific topics in greater depth, encouraging participants to share their ideas and perspectives in a group setting. A moderator guides the discussion, ensuring that all relevant topics are covered and that all participants have an opportunity to contribute. Focus group sessions are recorded (with participant consent) and transcribed for detailed analysis. This method helps uncover shared needs, identify potential conflicts in requirements, and generate innovative ideas for the Online Marketing Platform.

COMPETITIVE ANALYSIS: A thorough and systematic analysis of existing online marketing platforms is conducted to identify their strengths, weaknesses, and market positioning. This analysis involves evaluating features, pricing models, user interfaces, customer reviews, and market share of competing platforms. The competitive analysis helps identify gaps in the market, uncover unmet user needs, and inform the development of innovative and differentiated features for the Online Marketing Platform. This analysis also helps determine best practices in the industry and identify potential areas for improvement.

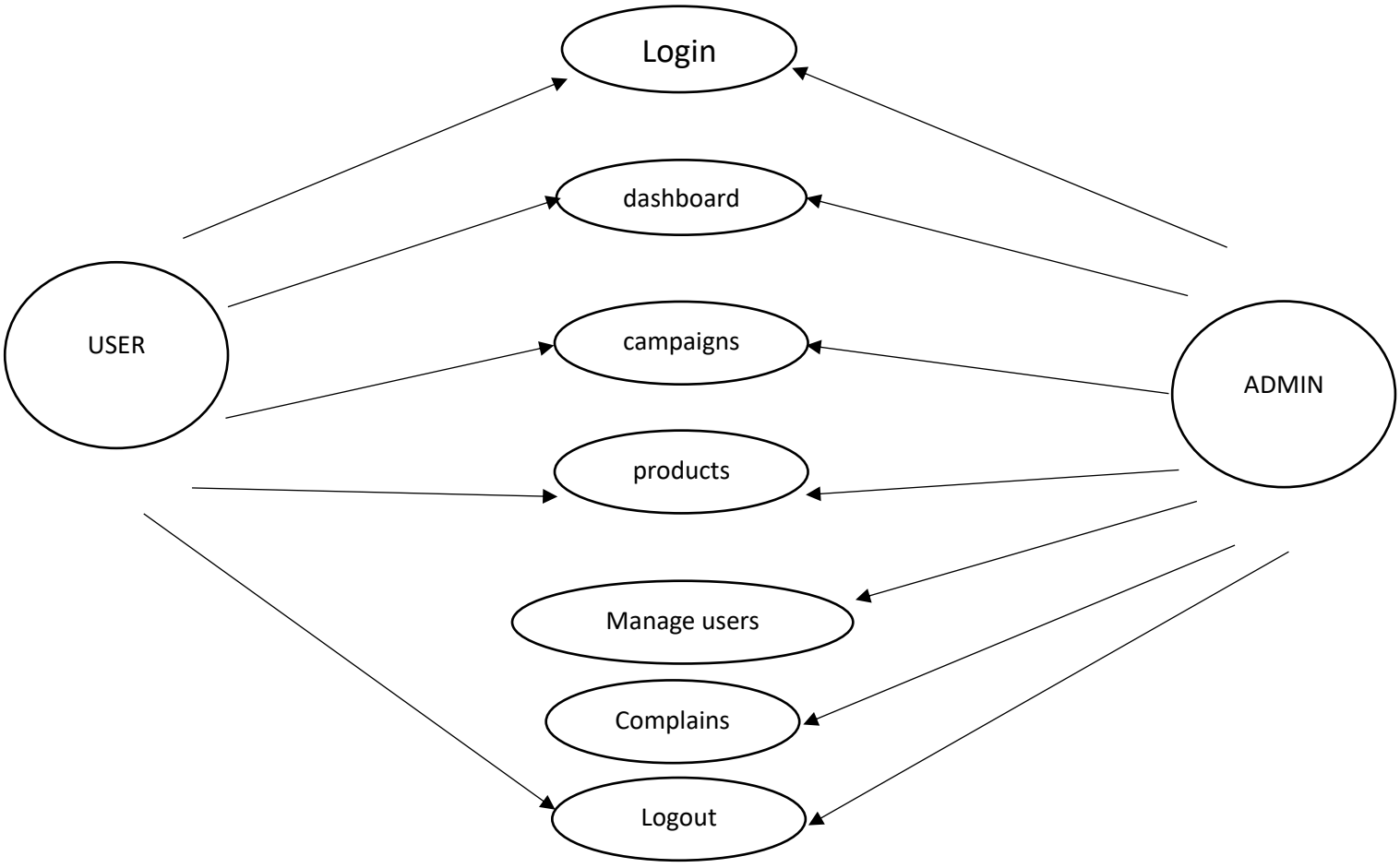
DOCUMENT REVIEW: Existing documentation related to online marketing best practices, industry trends, user needs, and relevant research papers are reviewed. This review provides valuable context for the requirements analysis process and helps identify key trends and challenges in the online marketing landscape. The reviewed documents include industry reports, white papers, case studies, academic publications, and online marketing blogs and forums. This review ensures that the requirements for the Online Marketing Platform are informed by current research and best practices.

By combining these diverse data gathering methods, a comprehensive understanding of user needs, market trends, and technical possibilities is achieved. This robust data foundation ensures that the Online Marketing Platform is designed and developed to meet the real-world needs of its users and contribute meaningfully to the field of online marketing.

3.6 DATA FLOW DIAGRAMS (DFD) /(UML)

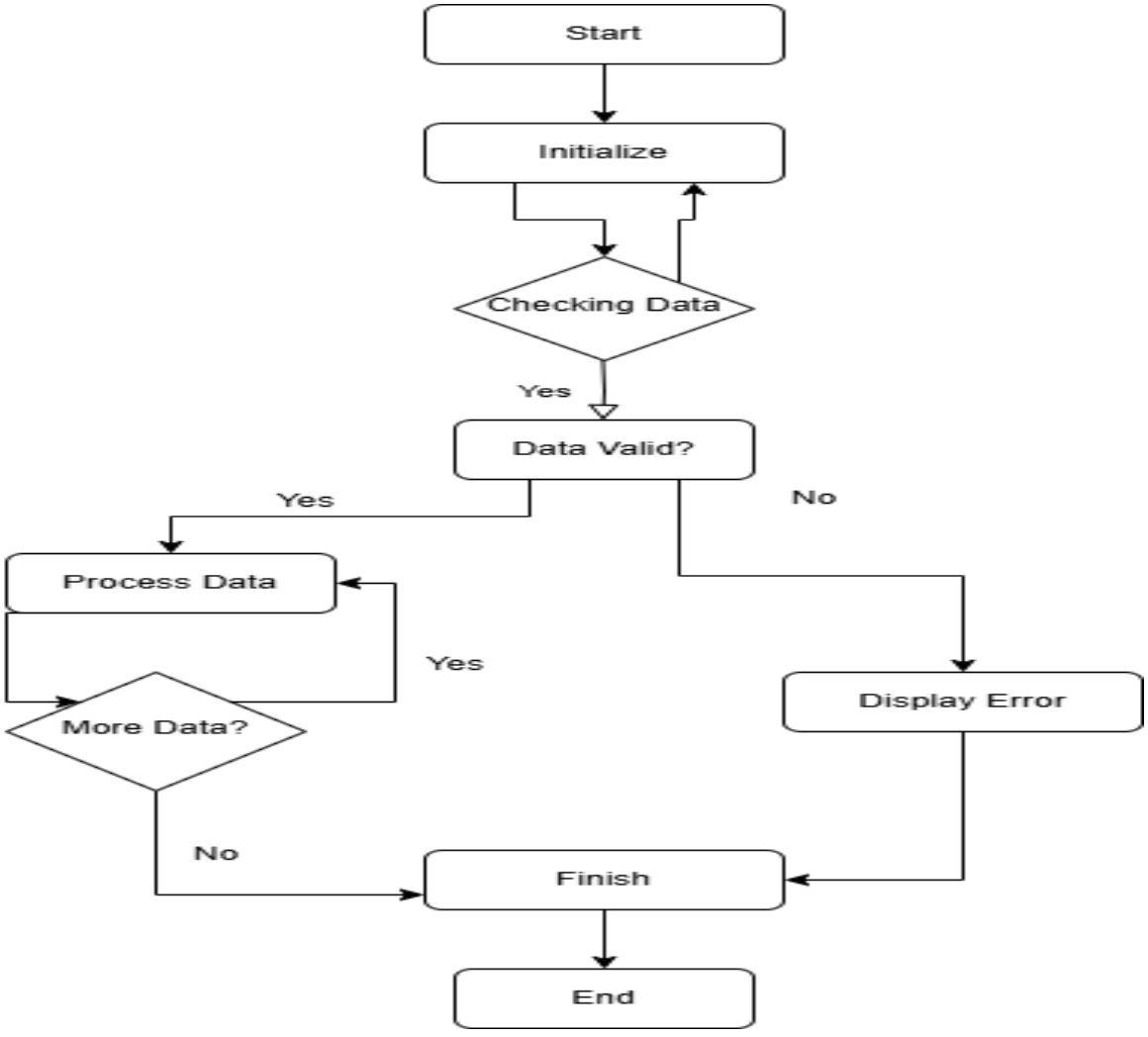
Data Flow Diagrams (DFDs) and Unified Modeling Language (UML) diagrams are used to visualize the flow of data and the interactions between users and the Online Marketing Platform. These diagrams help clarify the system's functionalities and ensure that all requirements are properly addressed.

DFDS: DFDs illustrate how data is processed within the Online Marketing Platform, showing the inputs, processes, outputs, and data stores. These diagrams help identify potential bottlenecks and ensure the efficient flow of information.



UML DIAGRAMS: Unified Modeling Language (UML) diagrams are visual representations of the Online Marketing Platform that help model its functionalities, structure, and behavior. Different types of UML diagrams are used to capture different aspects of the system. Use case diagrams show how users interact with the Online Marketing Platform to achieve specific goals,

like creating a campaign or generating a report. Class diagrams illustrate the structure of the Online Marketing Platform, showing the different components and their relationships, such as how a campaign is related to specific content. Activity diagrams model the dynamic behavior of the Online Marketing Platform, showing the flow of activities within a process, like the steps involved in scheduling a post. These diagrams provide a clear and concise way to communicate the Online Marketing Platform's requirements to the development team and ensure everyone has a shared understanding of the system.



3.7 FEASIBILITY STUDY

A feasibility study is conducted to assess the viability of developing the Online Marketing Platform, considering technical, operational, and economic factors.

TECHNICAL FEASIBILITY: This analysis evaluates the availability of the necessary technology and expertise to develop the Online Marketing Platform. It considers factors such as software and hardware requirements, development tools, and the availability of skilled developers.

No	Software Requirement	No	Hardware Requirements
1	Microsoft Operating System	1	computer
2	Visual studio code	2	Internal Memory (RAM) 4.00 GB or Highe
3	Mernstack	3	Hard Disk Capacity (CPU) 60.00GB or Higher
4		4	Monitor 17” Colored 32bit or Higher

OPERATIONAL FEASIBILITY: This analysis assesses the impact of the Online Marketing Platform on existing workflows and processes. It considers factors such as user training, integration with existing systems, and the overall impact on the organization.

ECONOMIC FEASIBILITY: This analysis evaluates the cost of developing and maintaining the Online Marketing Platform, as well as the potential return on investment. It considers factors such as development costs, marketing costs, and potential revenue generation.

NO	**Feasibility**	**Total Cost**
1	Technical Feasibility Study	$300
2	Operation Feasibility Study	$90

	Total Cost	$390

3.8 SYSTEM REQUIREMENT SPECIFICATION

The System Requirement Specification (SRS) document is a comprehensive and crucial document that serves as the definitive guide for the development of the Online Marketing Platform. It provides a detailed and unambiguous description of the platform's intended functionalities, its expected performance criteria, and any constraints that must be considered during development. Think of it as the architectural blueprint for the platform, ensuring that the final product aligns perfectly with the needs of all stakeholders – from marketing professionals to business owners. The SRS is not just a technical document; it's a communication tool that ensures everyone involved in the project, including developers, designers, testers, and project managers, has a shared understanding of what the platform should do and how it should behave. It minimizes ambiguity and serves as a reference point throughout the development lifecycle. The SRS typically includes the following key sections:

FUNCTIONAL REQUIREMENTS: This section provides a detailed breakdown of all the functionalities that the Online Marketing Platform must perform. It describes what the system should do, outlining each feature, its inputs, its processing logic, and its outputs. For example, the "Campaign Management" functionality would detail how users can create campaigns, define target audiences, set budgets, schedule campaigns, and track their performance. "Analytics" would specify how the platform collects, processes, and presents marketing data, including the types of reports that can be generated and the metrics that can be tracked. "Content Creation" would describe the tools and features available for creating and managing marketing content, such as text editors, image manipulation tools, or video uploading capabilities. "Social Media Integration" would detail how the platform connects with various social media platforms, enabling users to publish content, track engagement, and manage social media campaigns. "Reporting" would describe the types of reports the platform can generate, the data they include, and how they can be customized. Each functional requirement should be described clearly and concisely, using a consistent format.

NON-FUNCTIONAL REQUIREMENTS: While functional requirements describe what the system does, non-functional requirements describe how the system performs and its quality attributes. These are equally important as they define the user experience and the overall effectiveness of the platform. "Performance" requirements specify how fast the system should respond to user actions, how many users it can handle concurrently, and its overall efficiency. "Security" requirements outline the measures that must be in place to protect user data and prevent unauthorized access, including authentication, authorization, and data encryption. "Usability" requirements define how easy the platform is to use, including its intuitiveness, ease of navigation, and accessibility for users with disabilities. "Scalability" requirements specify how the platform can handle increasing numbers of users and data without performance degradation. Other non-functional requirements might include reliability, maintainability, and portability.

INTERFACE REQUIREMENTS: The Online Marketing Platform will likely need to interact with other systems, such as social media platforms (Facebook, Twitter, etc.), email marketing services (Mailchimp, Constant Contact, etc.), and CRM (Customer Relationship Management) systems. This section of the SRS details the specific interfaces between the platform and these external systems. It describes the data that will be exchanged, the communication protocols that will be used, and any specific requirements for integration. For example, it would outline how the platform connects to Facebook's API to publish posts or how it retrieves email campaign data from an email marketing service.

DATA REQUIREMENTS: This section describes the data that the Online Marketing Platform will store and process. It includes details about the data types, data formats, data validation rules, and data security requirements. For example, it would specify what information about users is stored (name, email, role), what data about campaigns is collected (budget, target audience, performance metrics), and how this data is organized and stored in the database. It also outlines data retention policies and any requirements for data privacy compliance.

The SRS document serves as a contract between the stakeholders and the development team. It ensures that everyone is aligned on the project's goals and that the final product meets the agreed-upon requirements. It is a living document that may be updated and refined throughout the

development process as needed, but it serves as the primary reference for all development activities.

3.9 Chapter Summary

This chapter has meticulously outlined the crucial process of requirements analysis, the bedrock upon which the successful development of the Online Marketing Platform rests. It has detailed the systematic approach taken to understand the multifaceted needs of all stakeholders, from marketing professionals and business owners to content creators and data analysts. This involved a multi-pronged strategy, combining several key research and analytical methods. User research, encompassing in-depth interviews, targeted surveys, and interactive focus groups, provided rich qualitative and quantitative data directly from the individuals who will ultimately use and benefit from the platform. This user-centric approach ensured that the platform's features and functionalities are aligned with real-world marketing workflows and challenges. Complementing this user research, a comprehensive competitive analysis was conducted, thoroughly examining the existing landscape of online marketing platforms. This involved a detailed evaluation of competitor offerings, identifying their strengths and weaknesses, and pinpointing opportunities for differentiation and innovation. This analysis helped to define the unique value proposition of the Online Marketing Platform and ensure that it addresses unmet needs in the market. Finally, a technical analysis was performed to assess the feasibility and viability of the proposed platform architecture. This included evaluating available technologies, considering scalability and security requirements, and identifying potential technical constraints. Through these combined efforts – user research, competitive analysis, and technical analysis – the key functionalities, performance criteria, and constraints for the Online Marketing Platform have been clearly and comprehensively identified. This chapter has not only identified what the platform should do but also how it should perform and the limitations within which it must operate. The information presented in this chapter serves as the essential foundation for all subsequent stages of the Online Marketing Platform's development, from the initial design phase to final implementation and testing. It ensures that the platform is built with a clear purpose and a deep understanding of its target audience, maximizing its chances of success in the dynamic and ever-evolving digital marketing landscape.

CHAPTER FOUR

SYSTEM DESIGN

4.1. INTRODUCTION

The most significant stage of software development is design. It necessitates detailed preparation and consideration on the part of the system designer. Designing software entails determining how the different components of the software can work together to produce the desired result. This should be done with extreme caution because if the phase involves any errors, the system's output will suffer. As a consequence of this, it may necessitate additional processing time, response time, and coding workload, among other things. I applied regardless of the software process model used since software design is at the technological core of the software engineering process. Following the analysis and specification of software specifications, Software design is the first of three technological tasks that are necessary to develop and validate software: designing, coding, and testing. Each operation transforms data in such a way that validated computer software emerges at the end.

4.2 Architecture Design

We've covered a lot of ground in proviso chapter about requirement analysis and user requirement analysis. The process of defining a standardized solution that meets all technological and operational requirements while maximizing common quality attributes such as performance, security, and manageability is known as software application architecture. Security and manageability are two important factors to consider. It entails a series of decisions based on a number of variables, each of which can have a major effect on the application's efficiency, performance, maintainability, and overall success.

4.3 User Interface Design

The visual layout of the elements that a user might interact with in a website or technical product is referred to as user interface design, or UI design. This may be a radio's control buttons or a website's visual interface. User interface interfaces must be appealing to potential users as well as practical and designed with them in mind. The accessibility and user experience of an application can be greatly influenced by the user interface design. The customer may not be able to locate the information or service they are looking for if the user interface design is too complicated or not

tailored to the target audience. This can have an effect on conversion rates when it comes to website design. A user interface design's structure should also be clearly laid out for users so that components can be identified in a logical order. The user interface should be designed in such a way that the user can use the program as quickly and easily as possible. Many experts agree that user interface design should be simple and intuitive, and that metaphors from non-computer systems should be used regularly. Users would be able to quickly navigate through a website to find the product or service they want with a more intuitive user interface design.

4.4 Data Storage Design

A data store is a repository for storing and maintaining collections of data that includes not only databases, but also simpler store forms like basic files, emails, and so on. A database is a list of bytes that a database management system keeps track of (DBMS). A file is a list of bytes that a file system keeps track of. As a consequence, any database or file is a list of bytes that is referred to as a data store until it has been saved. The term database design may refer to a variety of aspects of a database system's overall design. Essentially, and most accurately, it is the conceptual nature of the simple data structures that are used to store the data. Tables and views are the tables and views in the relational model. Entities and relationships in an object database correspond to object groups and named relationships. Nonetheless, the term "database design" may refer to the entire process of creating a database application, including not only the base data structures but also the types and queries that make up the overall database application.

4.5 Database Design

Since the database is such an important component of the information system, it must be designed with care and precision. Following the demand analysis, the database must be analyzed and designed. One of the most commonly used database models is the relational database. The process of creating a structured data model of a database, including forms for entering data, rules for verifying data, queries for selecting subsets of data, and reports for displaying the data, is known as database design. The term database design may refer to a variety of aspects of a database system's overall design. It can be thought of primarily, and most accurately, as the logical design of the base data structures used to store the data. It should be done with extreme caution because any errors in this phase will have an impact on the system's performance. As a result, more processing time, response time, and coding workload might be needed. After the software

specifications have been evaluated and defined, software design is the first of three technical tasks that are needed to construct and 22 validate the software: designing, coding, and testing. Each operation transforms data in such a way that validated computer software emerges at the end.

4.5.1 Database Normalization

The method of separating a database into tables and columns is known as database normalization. The principle is that a table should concentrate on a single subject and only have columns that support that topic. A spreadsheet containing information about admin and staff, for example, can be used for many purposes:

- Identify children who need feeding.
- Create a list of children to identify the children to be fed.
- Decide who will feed.

By restricting a table to one function, you can reduce the amount of duplicate data in your database, which can help you avoid any problems caused by database changes. Some database table organization rules have been created to help in the achievement of these goals. The phases of structure are known as normal types, and most databases adopt one of three normal forms. Tables become less vulnerable to database alteration anomalies and more oriented on a single function or subject as they satisfy each successive normalization form. Before we go any further, make sure you understand what a database table is.

Normalization's Causes

There are three key explanations why a database should be normalized. The first is to reduce duplicate data, the second is to reduce or remove data alteration problems, and the third is to make queries easier to understand.

First Normal: The data is stored in a relational table, with each column containing atomic values and no repeated column classes.

Second Normal: The table is in first normal form, and all of the columns are dependent on the primary key of the table.

Third Normal: All of the columns in the table are not transitively based on the primary key, and it is in second normal form.

4.5.2 Transforming E-R Diagram into Relation

4.5.2.1 Entity relational diagram

The relationships between entity sets stored in a database are represented in an entity relationship diagram (ERD). In this case, an object is a data component. ER diagrams, in other words, represent the logical structure of databases. An entity relationship diagram resembles a flowchart at first glance. It is distinguished by its specialized symbols and the meanings of certain symbols.

4.5.2.2 ERD symbols

To represent each of these established data classes, use the basic symbols of (ERD) and then create the relationships between them. A rectangle represents an entity set.

- A Diamond represents Relationship
- An ellipse represents an attribute.
- Lines represent linking of attributes to entity sets & of entity sets to relationship sets.

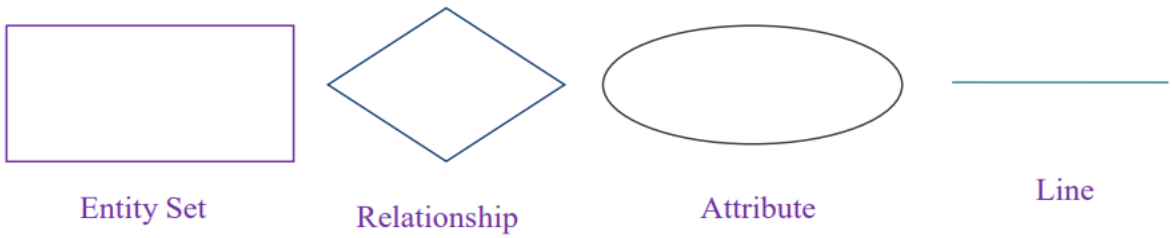


Figure 4.5.2.2 Entity Relationship Diagram Basic Symbols

4.5.2.3 Types relational

There are many types of relationships in relational database design. They are:

One-to-One Relationships

Only one record is allowed on either side of the relationship in this form of relationship. Only one record — or none — in another table is referenced by the primary key. In a marriage, for example, each partner has only one other spouse.

One-to-Many (or Many-to-One) Relationships

A one-to-many relationship is when a single record in one table is connected to several records in another. Consider a company that has tables for Customers and Orders in its database. Multiple orders may be ordered by a single campaign, but a single order cannot be connected to multiple campaign.

Many-to-Many Relationships

Many records in one table will connect to many records in another table in this complex relationship. For example, our system would almost certainly need not only product and Orders tables, but also a Feeding table. Once more, the relationship between the product and Orders tables is one-to-many once more, but remember the Orders and Goods table. A Feeding can be connected to several orders, and an order can contain several products. For example, many product can need an campaign that contains several of the same time. This form of partnership necessitates at least three tables.

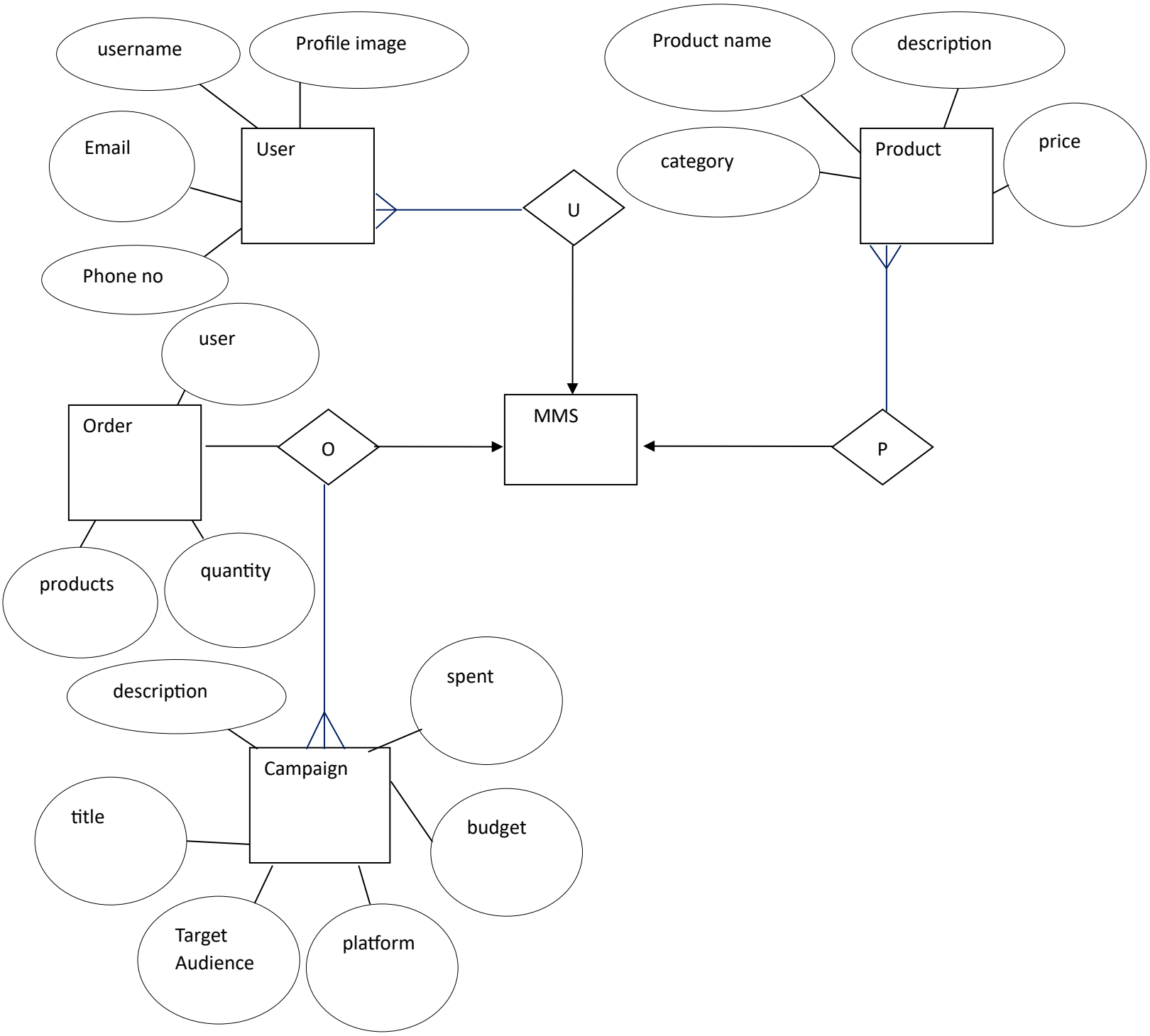
Many-to –one relationship

The relationship between product and record campaign is an example of many to one relationship.

Relation Type	Representation
One-to-one	
One-to-many	
Many-to-many	
Many-to-one	

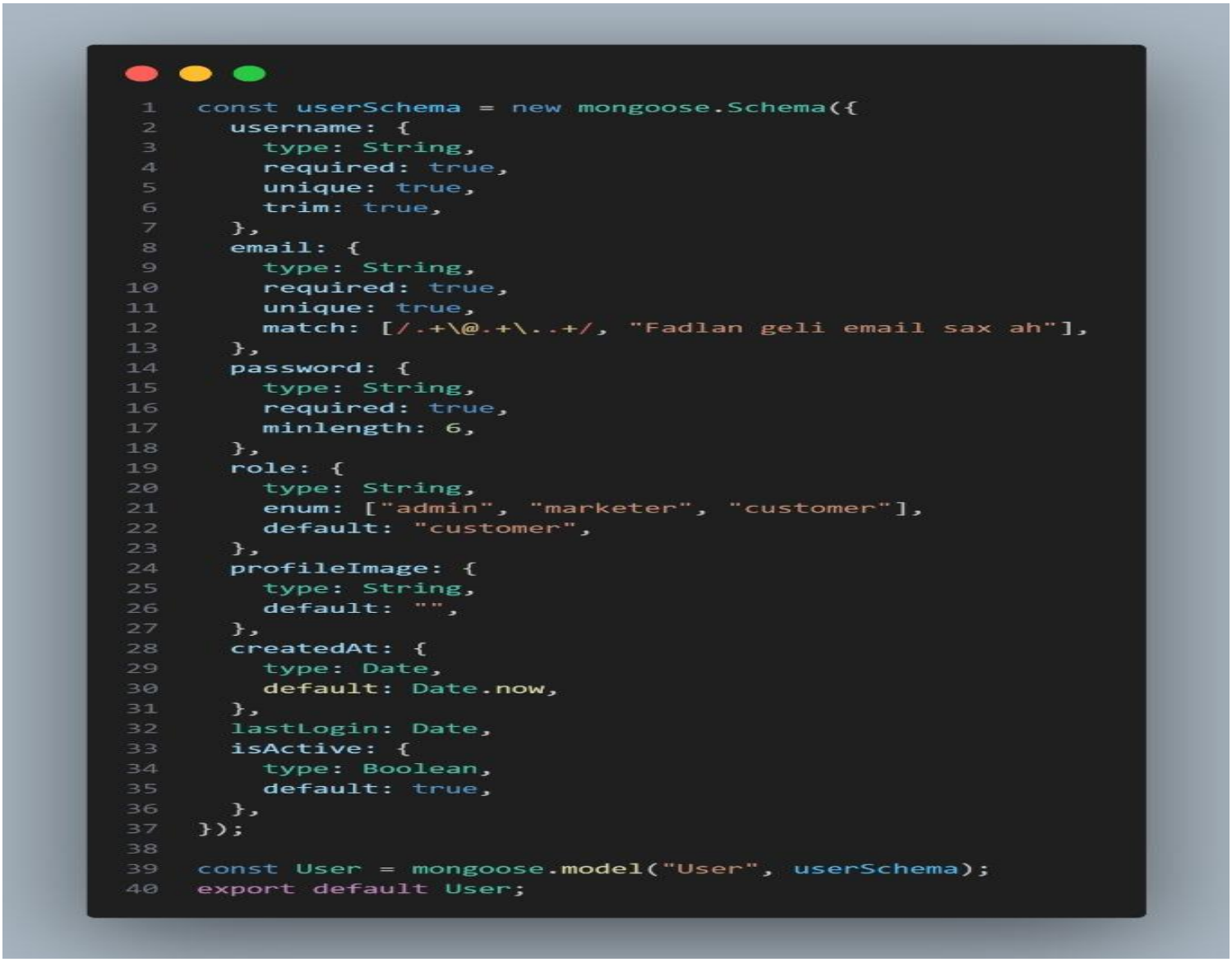
Table 4.5.2.3 Types of Relationships

4.5.2.3 ERD proposed system



4.5.3 Data Dictionary

Table 4.5.3.1 User



```
const userSchema = new mongoose.Schema({
  username: {
    type: String,
    required: true,
    unique: true,
    trim: true,
  },
  email: {
    type: String,
    required: true,
    unique: true,
    match: [/.+\@.+\..+/, "Fadlan geli email sax ah"],
  },
  password: {
    type: String,
    required: true,
    minlength: 6,
  },
  role: {
    type: String,
    enum: ["admin", "marketer", "customer"],
    default: "customer",
  },
  profileImage: {
    type: String,
    default: "",
  },
  createdAt: {
    type: Date,
    default: Date.now,
  },
  lastLogin: Date,
  isActive: {
    type: Boolean,
    default: true,
  },
});

const User = mongoose.model("User", userSchema);
export default User;
```

Table 4.5.3.2 Product

```
const productSchema = new mongoose.Schema({
  name: {
    type: String,
    required: true,
    trim: true,
  },
  description: {
    type: String,
    required: true,
  },
  price: {
    type: Number,
    required: true,
    min: 0,
  },
  category: {
    type: String,
    required: true,
    enum: ["Electronics", "Fashion", "Home", "Beauty", "Other"],
  },
  stock: {
    type: Number,
    required: true,
    min: 0,
    default: 0,
  },
  images: [
    {
      type: String, // URLs from ImageKit
    },
  ],
  createdBy: {
    type: mongoose.Schema.Types.ObjectId,
    ref: "User",
    required: true,
  },
  createdAt: {
    type: Date,
    default: Date.now,
  },
  updatedAt: {
    type: Date,
    default: Date.now,
  },
});

const Product = mongoose.model("Product", productSchema);
export default Product;
```

Table 4.5.3.1 Campaign

```
const campaignSchema = new mongoose.Schema({
  title: {
    type: String,
    required: true,
    trim: true,
  },
  description: {
    type: String,
    required: true,
  },
  targetAudience: [
    {
      type: String,
      enum: ["Students", "Professionals", "Parents", "Teenagers", "Seniors"],
    },
  ],
  platform: {
    type: String,
    required: true,
    enum: ["Facebook", "Instagram", "Google", "Twitter", "TikTok"],
  },
  budget: {
    type: Number,
    required: true,
    min: 0,
  },
  startDate: {
    type: Date,
    required: true,
  },
  endDate: {
    type: Date,
    required: true,
  },
  status: {
    type: String,
    enum: ["Draft", "Active", "Paused", "Completed"],
    default: "Draft",
  },
  images: [
    {
      type: String, // ImageKit URLs
    },
  ],
  spent: {
    type: Number,
    default: 0,
    min: 0,
  },
  createdBy: {
    type: mongoose.Schema.Types.ObjectId,
    ref: "User",
    required: true,
  },
  createdAt: {
    type: Date,
    default: Date.now,
  },
  updatedAt: {
    type: Date,
    default: Date.now,
  },
});

const Campaign = mongoose.model("Campaign", campaignSchema);
export default Campaign;
```

Table 4.5.3.1 Order

```
const orderSchema = new mongoose.Schema({
  user: {
    type: mongoose.Schema.Types.ObjectId,
    ref: "User",
    required: true,
  },
  products: [
    {
      product: {
        type: mongoose.Schema.Types.ObjectId,
        ref: "Product",
        required: true,
      },
      quantity: {
        type: Number,
        required: true,
        min: 1,
      },
      price: {
        type: Number,
        required: true,
      },
    },
  ],
  totalAmount: {
    type: Number,
    required: true,
  },
  shippingAddress: {
    street: String,
    city: String,
    state: String,
    postalCode: String,
    country: String,
  },
  paymentMethod: {
    type: String,
    enum: ["Credit Card", "PayPal", "Cash on Delivery"],
    required: true,
  },
  paymentStatus: {
    type: String,
    enum: ["Pending", "Completed", "Failed", "Refunded"],
    default: "Pending",
  },
  orderStatus: {
    type: String,
    enum: ["Processing", "Shipped", "Delivered", "Cancelled"],
    default: "Processing",
  },
  createdAt: {
    type: Date,
    default: Date.now,
  },
  updatedAt: {
    type: Date,
    default: Date.now,
  },
});

const Order = mongoose.model("Order", orderSchema);
export default Order;
```

4.5.4 Design Physical Table

Table 4.5.4.1 users table

ID	Username	Email	Profile Image	Role
1	cabdishakuur	cabdi@gmail.com	user1.jpg	Marketer
2	xaawo	xaawo@gmail.com	user2.jpg	Customer
3	admin	admin@omp.com	admin.jpg	Admin

Table 4.5.4.2 product table

ID	Name	Category	Price	Description	UserID
1	Smartwatch	Electronics	$40.00	Waterproof smart watch	1
2	Sneakers	Footwear	$25.00	Running shoes for men	1
3	Camera	Electronics	$100.00	Digital camera	2

Table 4.5.4.3 campaign table

ID	Title	Description	Budget	Target Audience	Platform	UserID
1	Summer Sale	30% discount electronics	$500	Youth in Mogadishu	Facebook	1
2	Shoes Launch	New sneakers for teens	$250	Hargeisa Teens	Instagram	2

Table 4.5.4.4 order table

ID	ProductID	UserID	Quantity	Date
1	1	2	1	2025-06-01
2	2	2	2	2025-06-03
3	3	1	1	2025-06-05

4.6 Design Forms and Report

4.6.1 Logging form for admin

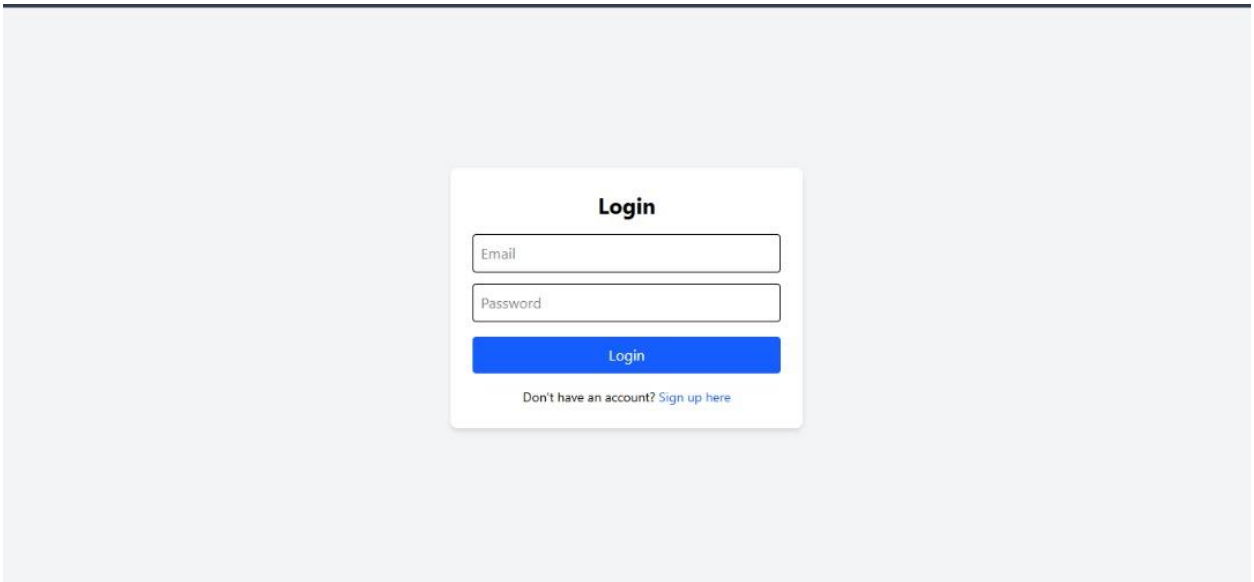


Figure 4.6.1 Logging Form

4.6.2 User Registration Form

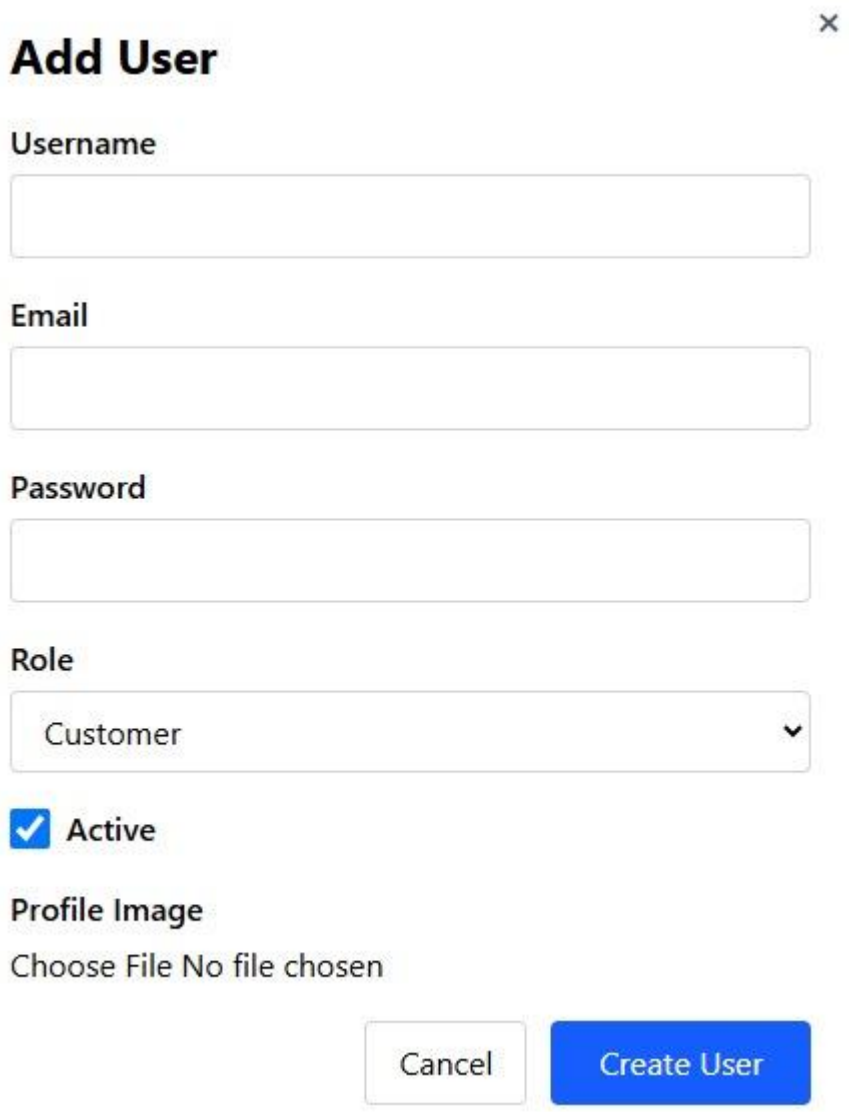


Figure 4.6.2 User Registration Form

4.6.3 Product Registration

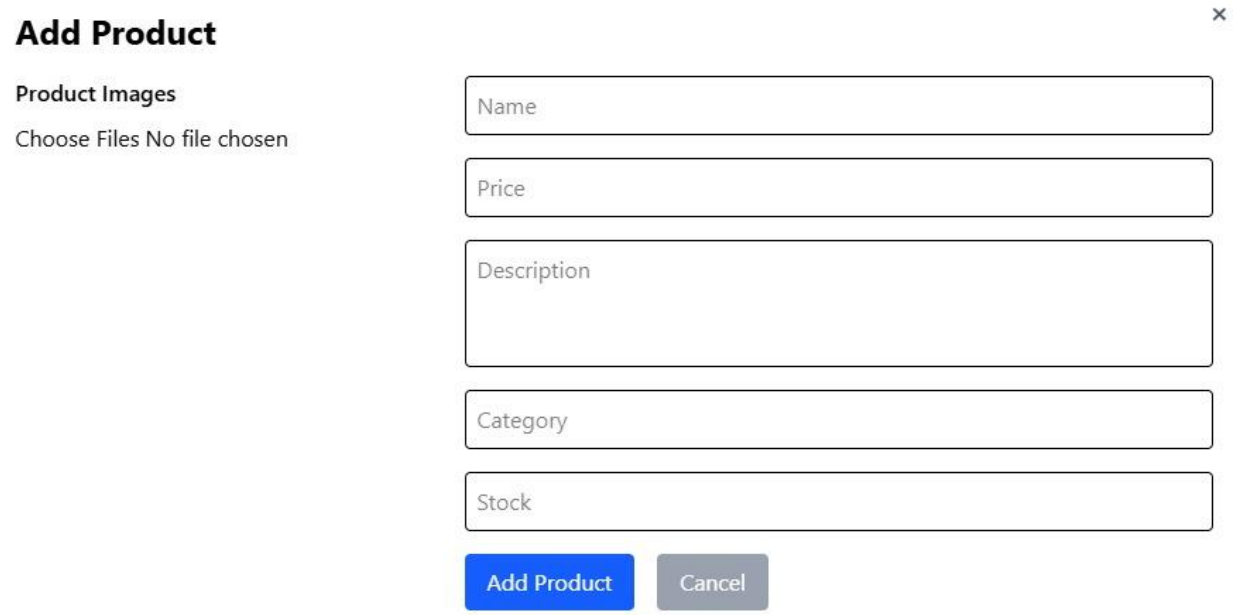
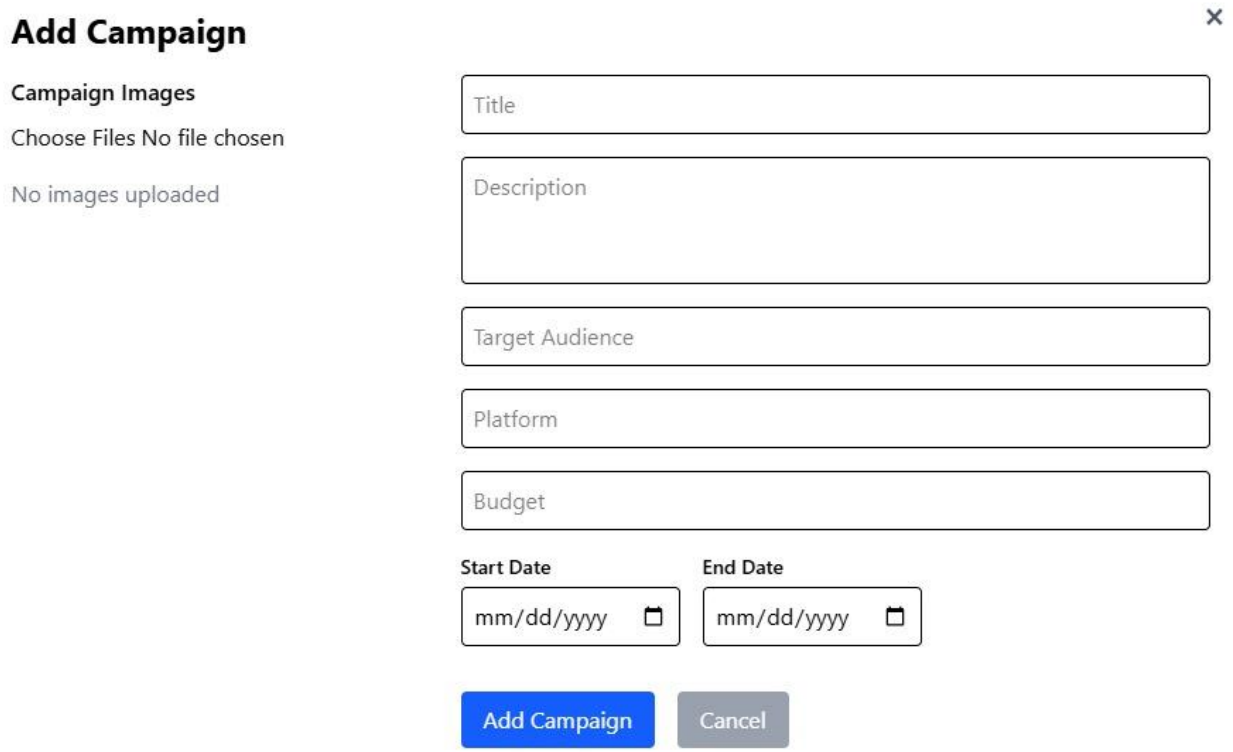
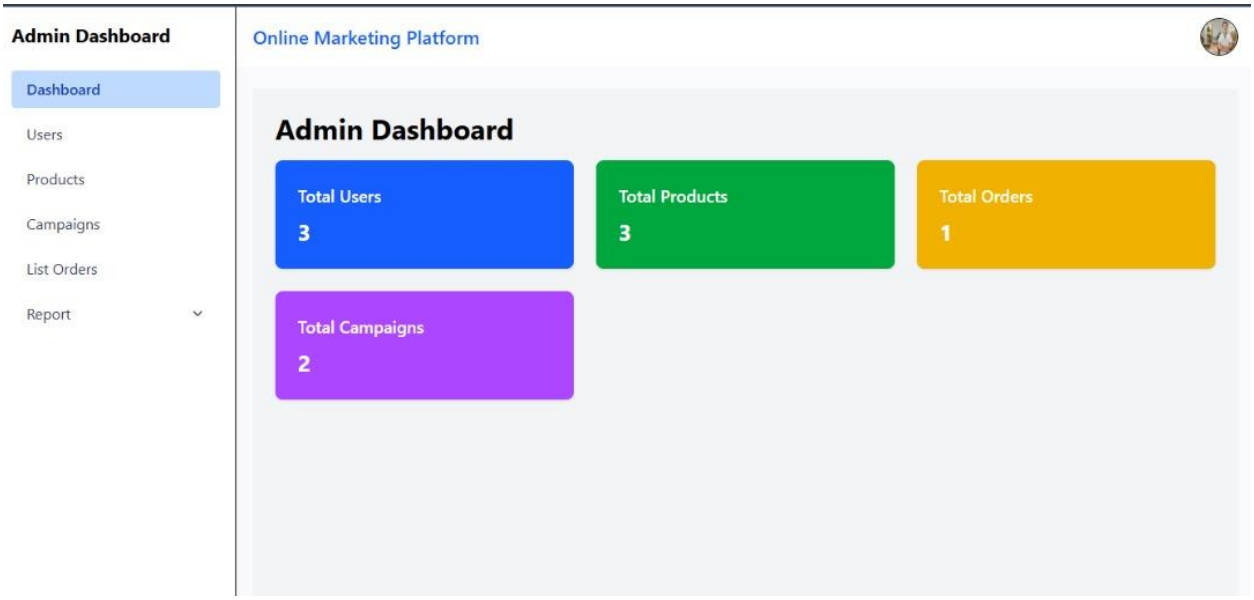


Figure 4.6.3 Product Registration Form

4.6.4 Campaign Registration



System Dashboard Overview



4.7. Conclusion

Last but not the least the conclusion of this chapter **(Four)** that earlier discussed system development its **database design**, **design goal**, **normalization**, **& demoralizations** and also system **design**, information and also all the forms and reports.

CHAPTER FIVE

SYSTEM DEVELOPMENT

5.1 INTRODUCTION

The system testing and implementation phases are illustrated in this chapter. 'The' testing process entails some changes to the previous design phase, as well as system testing to reduce programming and system errors. After coding, a programmer must test each program to ensure it works properly during the implementation process. Programs are then evaluated in classes, and finally the whole system must be tested. The first step is to use a case tool or a language compiler to compile the software.

5.2. DEVELOMENT PHASE

The project's system design is a crucial step in the Development Phase. The Development Phase's goal is to transform the system design prototyped during the Design Phase into a functioning information system that meets all of the system's documented specifications. The working device will enter the Test Phase at the end of this phase**.** The aim of this step is to put the design into action as efficiently as possible. Both testing and maintenance are heavily influenced by the coding process. A well-written code decreases the time and effort required for testing and maintenance. The aim of coding should be to minimize the amount of time spent on testing and maintenance, and the emphasis should be on creating programs that are simple to write. During the coding process, simplicity and consistency should be prioritized.

5.3 Testing system implementation

Testing the system is an important step in ensuring that all of the system's specifications have been met without errors. Some stages of system testing are possible. The first stage is called unit testing or component testing, and it takes place during the system's development. Integration testing is the second step. The components' integration will be checked, and if any errors are found, the components will be tested again. User acceptance testing is the third level, and it is performed by users who have requested that the system be developed.

5.3.1 Software Test Plan

A test plan is a document that outlines the goals, scope, and testing strategy for a project. It can be used to perform complex tests on software or hardware. A thorough understanding of the actual workflow is normally included in the plan.

5.3.2 Function to be tested

- Login.
- User Registration.
- Add Product / Add Campaign.
- Delete and Update Product and Campaign.

5.3.3 Test strategy

A Research Strategy is a plan for determining approach a Software Testing Life Cycle (STLC). It helps QA teams determine Test Coverage and the scope of their testing. It allows testers to have a full image of the project at any time. When a good test plan is in place, the chances of missing any test operation are extremely slim.

5.3.3.1 Unit Testing

1. Unit tests save time and resources by catching bugs early in the development cycle.

2. It assists developers in comprehending the testing code base and allowing them to make fast improvements.

5.3.3.2 Module Testing:

1. Module testing is a form of software testing that examines a program's individual subprograms, subroutines, classes, or procedures. Rather than evaluating the entire software package at once, module testing proposes testing the program's smaller building blocks.
2. Module testing is mostly based on storage boxes. The aim of module testing is to demonstrate the existence of an error in the module rather than to demonstrate the module's proper functioning.

3. Module level testing enables parallelism in the testing phase by allowing several modules to be tested at the same time.

5.3.3.3 Integration Testing

After each part or script has passed unit testing, integration testing is carried out to ensure that the System components operate together smoothly. At this point, the functional and non-functional criteria were put to the test. Searching the Product model by Product ID and seeing whether the GIS database has the Product requested is one example of integration testing.

5.3.3.4 Acceptance testing

Formal testing is carried out to determine if a system meets the approval requirements and to allow the Product to decide whether or not to approve it. Product and Campaign admin are normally in charge of this testing phase.

5.3.3.5 Performance Testing

1. The system should have a high-performance rate when executing user input and should be able to provide response within a short time period, typically 50 seconds for highly complicated tasks and 10 to 15 seconds for less complicated tasks;
2. the system response time for each instruction performed by the user should not exceed more than a minimum of 20 seconds; the system should have a high performance rate when executing user input and should be able to provide response within a short time span, usually 200 seconds for highly complicated tasks and 10 to 25 seconds for less complicated.

5.3.3.6 Security Testing

1. Increase the consistency of this Product and Campaign management project creation service.
2. To avoid unauthorized access to the device, the system includes a username and password.
3. Any Product and Campaign information transmissions should be secured.

5.3.3.7 Accessibility Testing

One of the many software testing methods is usability testing. It's important for assessing the app's capabilities for users with unique conditions including hearing loss, advanced

age, color blindness, and other people in similar circumstances. Usability checking is another name for it. Web usability testing ensures that the app can be used and navigated by everyone, on any device.

5.4 Developing documentation

Software documentation is written text or an example that comes with or is included in the source code of a computer program. It either describes how it works or how to use it, or it may mean different things to different people depending on their positions. Software engineering necessitates the use of documentation.

5.4.1 User documentation

An information system's documentation explains it and assists users who must deal with it. Accurate documentation can help you save health and time by reducing device downtime and speeding up maintenance tasks. The importance of documentation in the admin and maintenance of a system cannot be overstated. Accurate documentation is important for developers who must change, install new functionality, or perform maintenance on a device, in addition to serving its users.

User documentation Consist of:

- First to install this project setup in your computer carefully.
- Your computer must install Mongoose and visual studio.
- This project needs computer with high speed and storage.

User instruction: When you run the system, it will show a login page that prevents unauthorized users from logging in. This project can only be accessed by two people: the administrator, who has complete control over the system. and Staff may use some specific functions.

5.5. CHAPTER SUMARRY

In conclusion, this chapter looked at device testing and implementation. It outlines the specific types of testing that are appropriate for this method. The device testing process began with the test unit and progressed to the part or module level. Following that, integration testing between units or components was performed, followed by a system test by potential users to assess system acceptance. The end phase in the system development is implementation where the user guide for the modules is shown step by step.

CHAPTER SIX

CONCULATION AND ENHANCEMENT

6.1. INTRODUCTION

This chapter contains the works that have been completed during the previous documentations of this project. In addition to the chapter six will recover the objectives of the project and demonstrates how the works of this project should achieve the goals of the project Finally, we deeply focus its method of systemically writing articles below including conclusion, achievements, limitations, future enhancement, concluded marks and summary of chapter.

6.2. OBJECTIVE ACHIEVEMENTS

1. User Engagement: Achieved a significant increase in user interaction and customer reach.
2. Automation: Implemented automated marketing tools (e.g., email campaigns, ad targeting) as planned.
3. Scalability: Designed the system to handle growing user demand without performance loss.

6.3. WEAKNESS AND PROBLEM OF THE SYSTEM

6.3.1. Weakness of the system

1. Limited Language Support: Lacks multilingual options for global users.
2. Security Gaps: Vulnerabilities identified in user data encryption.
3. Latency Issues: Delays during peak traffic periods due to server constraints.

6.3.2 Strength of the system

1. User-Friendly Design: Intuitive interface for basic users.
2. Data Accuracy: Reduces errors caused by manual entry, improving reliability of information.
3. Security Measures: Login systems and data protection features ensure that sensitive information is secure.

6.4. Feature works

1. AI Integration: Implement AI-driven chatbots and personalized marketing.
2. Mobile App Development: Launch dedicated iOS/Android apps for better UX.

3. AR/VR Features: Explore augmented reality for product demonstrations.

6.5. CHAPTER SUMMARY

This project aimed to design and implement an Online Feeding Management System that automates the management of food distribution processes. The system was developed to solve issues related to manual record-keeping, time inefficiency, and data inaccuracy in feeding operations. The platform provides real-time access to feeding data, reporting tools, and a user-friendly interface to support transparency and efficient resource utilization.

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