# Mayvn

Project Team

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# Chapter 1

# Introduction

This proposal introduces Mayvn, an AI-powered, autonomous marketing and brand management platform. It outlines the scope, design, and expected outcomes of the project. The document provides a structured overview of the system, including its objectives, features, stakeholders, and technical direction as well.

Marketing technology (MarTech) has undergone rapid evolution in the recent years. It has long since gone from manual campaign execution to partial automation and AI-assisted content generation. However, businesses still face challenges in streamlining their marketing workflows and competing in an increasingly crowded digital space. What they need are solutions that are cost-effective, easy to use, and capable of maintaining consistent engagement with their audience.

Mayvn was conceived as part of this growing demand for smarter marketing tools. It is designed to integrate AI-driven content generation, campaign automation, and analytics into a single, unified platform. Our initial focus is on producing Gen-Z-friendly content that matches current market trends. This proposal establishes the groundwork for the system's development and its potential to simplify marketing operations for businesses of all sizes.

"Marketing analytics in 2024 is complex and difficult, and it requires a tremendous effort across the entire team to derive any value." [1]

## 1.1 Problem Statement

Digital marketing has become essential to the growth of businesses, but the process is tedious, time-consuming, and depends on large, expensive teams. This process begins with content creation and continues through posting, engagement, and analytics. Although AI content generators exist, they stop at text generation and require manual intervention for

scheduling, campaign planning, and performance tracking. This results in fragmented workflows, where multiple disconnected tools must be used in parallel, hence causing inconsistencies in brand voice.

In addition, existing tools fail to continuously learn and adapt to a brand's identity. This leads to generic output that dilutes the personality of the brand and does not resonate with their target audiences.

Our project, Mayvn, addresses these challenges by building an end-to-end AI-powered marketing platform that not only generates content but also posts, engages, and analyzes campaigns automatically. By continuously learning from user behavior, performance data, and trends, Mayvn ensures that brand tone remains consistent while campaigns remain relevant and impactful. This eliminates the need for large marketing teams, reduces costs, simplifies analytics for non-technical users, and makes funnel optimization accessible to everyone.

## 1.2 Scope

This project aims to create an intelligent web-based platform called Mayvn that automates the complete digital marketing funnel for businesses. Users will be able to connect their social media accounts and let the system generate, schedule, and publish posts automatically. A fine-tuned AI model, trained on Gen Z marketing content, will classify trends and generate personalized campaign material. Campaign interactions such as comments and engagements will be monitored, and automated replies will ensure active presence without manual effort. Publicly available data will be scraped to refine targeting, while analytics will categorize results into performance insights and funnel optimizations. These insights will then be converted into actionable recommendations for improving campaigns. The system will also include an admin portal to manage users, monitor campaigns, and handle subscription payments. The scope includes developing a user-friendly client dashboard, a secure backend system, and an adaptive AI engine, while excluding offline or non-digital marketing activities.

## 1.3 Modules

### 1.3.1 Module 1 - Campaign Automation

The campaign automation module allows users to run and manage automated campaigns across multiple platforms. It focuses on simplifying the marketing process.

1. Automated Pipeline - Content creation, scheduling, and posting.

2. Full Campaign Generation - End to end Campaign setup with minimal manual input
3. Feedback-Refined Funnels - Auto-optimization using campaign insights.

### 1.3.2 Module 2 - Engagement and Personalization

This module improves personalization and active social presence. It ensures that the users maintain consistency without having to manually engage everywhere.

1. User Customization - Tailored Settings for personalized campaigns.
2. Profile Refinement - Continuous optimization based on interactions.
3. Social Interactions – Cross-platform engagement features.
4. Comment responses - automated responses driven by AI.

### 1.3.3 Module 3 - Analytics and Insights

This module provides data-driven decision-making tools by simplifying analytics for non-technical users.

1. Post-analytics - Track performance and generate reports.
2. Tag-Based Website Analysis – Insights via embedded tracking codes.
3. Smart Data Scraping – Collects public data to improve campaign targeting.

### 1.3.4 Module 4 - Oversight and Management (admin)

This module is designed for administrators to supervise system usage, compliance, and service management.

1. User Management – Manage access, roles, and accounts.
2. Campaign Oversight – Monitor and regulate ongoing campaigns.
3. Funnel Management - Ensure the proper functioning of automated pipelines.
4. Payment and subscription handling - Manage pricing plans, billing, and transactions.

### 1.3.5 Module 5 - AI Engine Module – Core Intelligence

This is the backbone of the system that powers automation, personalization, and adaptability.

1. Fine-tuned AI model – trained in Gen Z marketing content to align trends.
2. Trend Awareness – Generates content that matches current trends.
3. Continuous Learning – Adapts campaigns using real-time feedback.

## 1.4 User Classes and Characteristics

| User Class | Description |
|---|---|
| Business Owner | The Business Owner is the primary decision-maker who oversees marketing performance and brand growth. They use Mayvn to monitor campaign results, approve final strategies, and review AI-generated insights. Business Owners generally interact with the Analytics Dashboard and Insights Panel. They expect visual data summaries and actionable reports rather than detailed editing tools. Most Business Owners access the system through the web dashboard, requiring minimal technical training. |
| Marketing Team Member | Marketing Team Members are responsible for creating, scheduling, and optimizing content. They interact daily with modules such as Campaign Creation, AI Content Generation, Scheduler, and Engagement Tracking. They rely on Mayvn's fine-tuned AI model for generating personalized captions, visuals, and marketing content, which they refine before publishing. Marketing Team Members need moderate familiarity with social media analytics and AI-assisted content tools. |
| Brand Manager | The Brand Manager defines tone, style, and compliance guidelines for all AI-generated content. They use the Brand Guidelines Editor to manage restricted keywords, tone settings, and approved brand templates. Brand Managers primarily review and approve AI-generated posts before publication. They require training to use guideline customization features and to interpret compliance reports generated by the system. |
| System Administrator | The System Administrator manages user accounts, permissions, and backend configurations. They also monitor API usage, server performance, and model integrations. Administrators ensure smooth system operation and are responsible for troubleshooting access or synchronization issues. This user class requires advanced technical knowledge of databases, authentication, and deployment environments. |

Table 1.1: User Classes and Characteristics for Mayvn AI Marketing System

Example: User Classes and Characteristics

# Chapter 2

# Project Requirements

This chapter describes the functional and non-functional requirements of the Mayvn AI Marketing System.

## 2.1 Use Case Representation

Since the Mayvn AI Marketing System is an interactive, user-driven application, the **Use Case Modeling** approach has been selected to represent the system's functional behavior. The use case diagram captures the major interactions between external actors (users) and the system's core functionalities.

### 2.1.1 Use Case Diagram

Figure 2.1 illustrates the primary use cases of the Mayvn AI Marketing System. It shows how different actors such as Marketing Team Members, Brand Managers, and Administrators interact with various system components like Campaign Management, AI Content Generation, and Analytics.


Figure 2.1: Use Case Diagram of the Mayvn AI Marketing System

### 2.1.2 Detailed Use Case Descriptions

The following tables describe the nine primary use cases identified for the Mayvn AI Marketing System. Each use case defines the specific functionality, interacting actors, and expected system behavior.

| **Use Case ID** | UC01 |
|---|---|
| **Use Case Name** | Campaign Creation and Setup |
| **Actors** | Business Owner |
| **Type** | Primary |
| **Description** | The Business Owner defines a new campaign by entering its goals, audience, and platforms. The system validates inputs and saves the campaign for future automation and content generation. |

Table 2.1: Use Case UC01 – Campaign Creation and Setup

| **Use Case ID** | UC02 |
|---|---|
| **Use Case Name** | AI-Based Content Generation |
| **Actors** | System |
| **Type** | Primary |
| **Description** | The system generates AI-driven posts, captions, and descriptions based on campaign details and brand guidelines. The generated drafts are stored for review and refinement. |

Table 2.2: Use Case UC02 – AI-Based Content Generation

| **Use Case ID** | UC03 |
|---|---|
| **Use Case Name** | Refine Content |
| **Actors** | Marketing Team, Brand Manager |
| **Type** | Primary |
| **Description** | The Marketing Team or Brand Manager reviews and edits AI-generated content. The system saves changes as new versions, checks compliance, and updates approval status. |

Table 2.3: Use Case UC03 – Refine Content

| **Use Case ID** | UC04 |
|---|---|
| **Use Case Name** | Scheduling and Publication |
| **Actors** | Marketing Team |
| **Type** | Primary |
| **Description** | The Marketing Team schedules approved posts for publishing. The system handles timing, connects to platforms, and posts automatically while logging publish results. |

Table 2.4: Use Case UC04 – Scheduling and Publication

| | |
|---|---|
| **Use Case ID** | UC05 |
| **Use Case Name** | Engagement Tracking |
| **Actors** | System |
| **Type** | Primary |
| **Description** | The system monitors audience interactions and automatically responds or suggests replies according to engagement rules and brand tone to maintain active communication. |

Table 2.5: Use Case UC05 – Engagement Tracking

| | |
|---|---|
| **Use Case ID** | UC06 |
| **Use Case Name** | Analyze Campaign Performance |
| **Actors** | Business Owner, Analyst |
| **Type** | Primary |
| **Description** | The system collects and aggregates campaign performance data from multiple platforms, presenting visualized analytics and metrics for decision-making. |

Table 2.6: Use Case UC06 – Analyze Campaign Performance

| | |
|---|---|
| **Use Case ID** | UC07 |
| **Use Case Name** | Provide Insights |
| **Actors** | System |
| **Type** | Primary |
| **Description** | The system analyzes performance data to generate actionable insights, identifying top-performing content, best posting times, and optimization recommendations. |

Table 2.7: Use Case UC07 – Provide Insights

| | |
|---|---|
| **Use Case ID** | UC08 |
| **Use Case Name** | Optimize Campaigns |
| **Actors** | Business Owner |
| **Type** | Primary |
| **Description** | The Business Owner applies optimization suggestions to improve campaign ROI. The system validates changes, updates campaign parameters, and monitors the post-change impact. |

Table 2.8: Use Case UC08 – Optimize Campaigns

| | |
|---|---|
| **Use Case ID** | UC09 |
| **Use Case Name** | Maintain Brand Guidelines |
| **Actors** | Brand Manager |
| **Type** | Primary |
| **Description** | The Brand Manager edits and updates tone, banned phrases, and design rules. The system validates and saves changes, ensuring new content aligns with the brand identity. |

Table 2.9: Use Case UC09 – Maintain Brand Guidelines

### 2.1.3 Expanded Use Cases

#### UC01: Campaign Creation and Setup

<table>
<tr><td>Use Case Name</td><td colspan="2">Campaign Creation and Setup</td></tr>
<tr><td>Scope</td><td colspan="2">Mayvn – AI-powered marketing platform</td></tr>
<tr><td>Level</td><td colspan="2">User goal</td></tr>
<tr><td>Primary Actor</td><td colspan="2">Business Owner</td></tr>
<tr><td>Stakeholders and Interests</td><td colspan="2">Business Owner: Wants a quick way to define a campaign, set goals, and target Gen-Z audiences.<br>Marketing Team: Needs clarity on campaign objectives to collaborate effectively.<br>System: Needs to store structured campaign data to enable automation.</td></tr>
<tr><td>Preconditions</td><td colspan="2">User is logged in and has an active brand profile.</td></tr>
<tr><td>Success Guarantee (Postconditions)</td><td colspan="2">Campaign is saved with goals, platforms, and audience settings. Campaign data is available for content generation.</td></tr>
<tr><td rowspan="4">Main Success Scenario</td><td>Action</td><td>System</td></tr>
<tr><td>1. Business Owner selects “Create Campaign.”</td><td>Presents campaign creation form (fields: name, goals, platforms, audience).</td></tr>
<tr><td>2. Business Owner enters campaign details.</td><td>Validates inputs (completeness, format).</td></tr>
<tr><td>3. Business Owner confirms creation.</td><td>Persists campaign record to DB, indexes campaign for downstream modules, returns confirmation and next-step options (Generate Content).</td></tr>
</table>

| | |
|---|---|
| **Extensions** | 2a. Missing/invalid data: System highlights required/invalid fields and requests correction; return to step 2.<br>3a. Save/persistence failure: System retries save; if retry fails, notifies user, logs error, allows retry or save draft locally.<br>1b. Unauthorized user selects create: System blocks action and prompts for authentication. |
| **Special Requirements** | Campaign creation should take $<$ 2 minutes. |
| **Technology and Data Variations** | Data entered via web; stored in cloud DB. |
| **Frequency of Occurrence** | Once per campaign, typically a few times per month. |
| **Miscellaneous** | Campaigns can be edited later if needed. |

Table 2.10: EUC-01-campaign-creation-and-setup

### UC02: AI Based Content Generation

| | |
|---|---|
| **Use Case Name** | AI Based Content Generation |
| **Scope** | Mayvn |
| **Level** | User goal |
| **Primary Actor** | System (AI Engine) |
| **Stakeholders and Interests** | Business Owner / Marketing Team: Want trend-aware content that saves time.<br>Brand Manager: Wants content aligned with voice.<br>System: Needs data for learning and personalization. |
| **Preconditions** | Campaign exists with audience and goals defined. |
| **Success Guarantee (Postconditions)** | AI-generated posts, captions, and product descriptions are stored and ready for refinement. |

<table>
<tr><td rowspan="4">Main Success Scenario</td><td>Action</td><td>System</td></tr>
<tr><td>1. Actor triggers “Generate Content” for a specific campaign.</td><td>Fetches campaign context: goals, brand profile, audience, platform constraints.</td></tr>
<tr><td>2. (Optional) Actor may supply prompts/inputs (brief, tone tweak).</td><td>Merges user brief with stored brand guidelines and generation template.</td></tr>
<tr><td>3.</td><td>3.1 Calls content generation model(s) (LLM / fine-tuned) with prepared prompt.<br>3.2 Receives generated outputs (posts, captions, hashtags, descriptions).<br>3.3 Stores generated drafts with metadata (timestamp, model version).<br>3.4 Notifies user that drafts are available.</td></tr>
<tr><td>Extensions</td><td colspan="2">1a. Campaign context missing or account disconnected when actor triggers generation: System returns error and prompts user to reconnect or select a valid campaign.<br>2a. User-supplied prompt conflicts with brand rules: System warns user and suggests compliant alternative prompts.<br>3a. Model inference failure or timeout at step 3.1: System retries; if still failing, falls back to a simpler template-based generator and flags for later model investigation.<br>3b. Generated output violates banned phrases or safety rules: System quarantines that draft, flags the issue to Brand Manager, and either requests human review or regenerates with stricter constraints.</td></tr>
<tr><td>Special Requirements</td><td colspan="2">Generation time $<$ 10s per content piece.</td></tr>
<tr><td>Technology and Data Variations</td><td colspan="2">Uses LLM or fine-tuned model; may include image generation APIs.</td></tr>
</table>

| | |
|---|---|
| **Frequency of Occurrence** | Multiple times per campaign. |
| **Miscellaneous** | Logs generation metadata for future tuning. |

Table 2.11: EUC-02-AI-Based-Content-Generation

### UC03: Refine Content

| | |
|---|---|
| **Use Case Name** | Refine Content |
| **Scope** | Mayvn |
| **Level** | User goal |
| **Primary Actor** | Marketing Team / Brand Manager |
| **Stakeholders and Interests** | Marketing Team: Adjusts for accuracy and engagement.<br>Brand Manager: Ensures tone, compliance, and consistency.<br>System: Learns from refinements to improve future outputs. |
| **Preconditions** | Content exists in draft state. |
| **Success Guarantee (Postconditions)** | Content is edited, approved, and marked ready for scheduling. |
| **Main Success Scenario** | **Action** / **System**<br>1. Actor opens a generated draft for review. / Retrieves draft and displays version/metadata.<br>2. Actor edits text, images, hashtags or comments inline. / 2.1 Persist edits as a new version in version history.<br>2.2 Run quick checks (tone compliance, banned terms).<br>3. Actor approves or rejects the draft. / 3.1 If approved: mark draft as “Ready.”<br>3.2 If rejected: mark draft “Needs Regeneration” and optionally submit feedback to generation model. |

| | |
|---|---|
| **Extensions** | 1a. Draft not found or stale: System notifies actor and offers to regenerate or recover the latest saved draft.<br>2a. Edit introduces non-compliant content (brand or safety): System highlights problematic segment and suggests compliant rewrites.<br>3a. Approval conflict (two approvers with different decisions): System enforces approval policy (e.g., majority or Brand Manager overrides) and logs conflict for audit. |
| **Special Requirements** | Must support collaboration and comments. |
| **Technology and Data Variations** | Changes are stored with the version history. |
| **Frequency of Occurrence** | Several times per campaign. |
| **Miscellaneous** | All feedback logged to retrain the personalization model. |

Table 2.12: EUC-03-Refine-Content

### UC04: Scheduling and Publication

| | |
|---|---|
| **Use Case Name** | Schedule & Post Content |
| **Scope** | Mayvn |
| **Level** | User goal |
| **Primary Actor** | System (with approval from Marketing Team) |
| **Stakeholders and Interests** | Marketing Team: Wants timely posting.<br>Business Owner: Maximizes engagement by posting at optimal times. |
| **Preconditions** | Content is approved and ready. |
| **Success Guarantee (Postconditions)** | Content is scheduled and published successfully across chosen platforms. |

| | | |
|---|---|---|
| **Main Success Scenario** | **Action** | **System** |
| | 1. Actor selects approved posts to schedule and requests scheduling. | Fetches approved items and platform integrations; suggests optimal posting times. |
| | 2. Actor confirms or edits its suggested schedule. | 2.1 Saves schedule metadata (time, timezone, platform).<br>2.2 Enqueues post jobs in scheduler/message queue. |
| | 3. At scheduled time, system executes posting. | 3.1 Dispatcher calls SocialConnector adapter for each platform.<br>3.2 Handles API responses and logs publish results.<br>3.3 Updates post status to "Published" with timestamps. |
| **Extensions** | 1a. No platform connected or token expired: prompts user to reconnect.<br>2a. Manual override conflicts with optimal suggestion: accepts override and logs reason.<br>3a. API transient failure: retries with backoff, queues next attempt, notifies user.<br>3b. Permanent API rejection: marks post as failed, provides error details, flags for human review. | |
| **Special Requirements** | Must support bulk scheduling and cross-platform posting. | |
| **Technology and Data Variations** | Uses APIs/webhooks for social platforms. | |
| **Frequency of Occurrence** | Daily or weekly. | |
| **Miscellaneous** | Supports calendar view of posts. | |

Table 2.13: EUC-04-scheduling-and-publication

**UC05: Engagement Tracking**

<table>
<tr><td>Use Case Name</td><td colspan="2">Engage Audience</td></tr>
<tr><td>Scope</td><td colspan="2">Mayvn</td></tr>
<tr><td>Level</td><td colspan="2">User goal</td></tr>
<tr><td>Primary Actor</td><td colspan="2">System (AI Engine)</td></tr>
<tr><td>Stakeholders and Interests</td><td colspan="2">Audience: Expects quick replies.<br>Business Owner: Wants to boost engagement without manual effort.</td></tr>
<tr><td>Preconditions</td><td colspan="2">Campaign posts are live and receiving interactions.</td></tr>
<tr><td>Success Guarantee (Postconditions)</td><td colspan="2">Relevant replies are posted, spam is handled, and engagement is logged.</td></tr>
<tr><td>Main Success Scenario</td><td colspan="2"><table>
<tr><th>Action</th><th>System</th></tr>
<tr><td>1. Actor enables auto-engagement or sets policy (auto/review).</td><td>Activates monitoring and applies engagement rules (auto-approve thresholds, escalation rules).</td></tr>
<tr><td>2. System monitors comments, DMs, mentions in real time.</td><td>2.1 Ingests interactions via webhooks or periodic pulls.<br>2.2 Runs classification (intent, sentiment, spam/toxicity).</td></tr>
<tr><td>3. For each interaction, if auto-mode: system responds; if review-mode: suggests reply.</td><td>3.1 Generate suggested reply(s) using reply model templates and brand guidelines.<br>3.2 If auto-mode: publish reply; else present suggestion to actor.<br>3.3 Log interaction and response with metadata.</td></tr>
</table></td></tr>
<tr><td>Extensions</td><td colspan="2">2a. Webhook failures or API limit reached: queues events, shows “data lag” warning.<br>2b. Detected toxic/spam content: hides or flags content, escalates to moderator.<br>3a. Reply contains sensitive/ambiguous info: blocks auto-posting, routes to human agent.</td></tr>
<tr><td>Special Requirements</td><td colspan="2">Replies must reflect brand tone and be culturally relevant.</td></tr>
</table>

| | |
|---|---|
| **Technology and Data Variations** | Uses NLP models for sentiment and toxicity detection. |
| **Frequency of Occurrence** | Multiple times daily during campaigns. |
| **Miscellaneous** | Human escalation option for complex queries. |

Table 2.14: EUC-05-engagement-tracking

### UC06: Analyze Campaign Performance

| | |
|---|---|
| **Use Case Name** | Analyze Campaign Performance |
| **Scope** | Mayvn – AI-powered marketing platform |
| **Level** | User goal |
| **Primary Actor** | Business Owner / Analyst |
| **Stakeholders and Interests** | Business Owner: Wants simple, actionable insights.<br>Analyst: Wants deeper insights for optimization.<br>System: Needs to collect and process engagement data for recommendations. |
| **Preconditions** | Campaign has been published and data is available. |
| **Success Guarantee (Postconditions)** | Analytics dashboard displays results with recommendations. |

<table>
<tr><td rowspan="4">Main Success Scenario</td><td>Action</td><td>System</td></tr>
<tr><td>1. Actor requests analytics or system runs scheduled fetch.</td><td>Trigger data collection job for platforms (pull via API or process webhooks).</td></tr>
<tr><td>2. -</td><td>2.1 Normalize and aggregate metrics (impressions, reach, likes, CTR, conversions).<br>2.2 Store aggregated metrics in analytics DB and update time-series.<br>2.3 Emit events for downstream Insights module.</td></tr>
<tr><td>3. Actor views dashboard.</td><td>Serve precomputed visualizations and allow filtering by time/platform/campaign.</td></tr>
<tr><td>Extensions</td><td colspan="2">1a. API credentials invalid or revoked: marks connector as disconnected, notifies owner.<br>2a. Partial data due to rate-limits: records partial results, annotates gaps, schedules retry.<br>3a. Huge data lag or inconsistency detected: triggers re-ingest job and alerts analyst.</td></tr>
<tr><td>Special Requirements</td><td colspan="2">Insights should be easily understood by non-technical users.</td></tr>
<tr><td>Technology and Data Variations</td><td colspan="2">Supports multiple platforms (Meta, LinkedIn, TikTok APIs).</td></tr>
<tr><td>Frequency of Occurrence</td><td colspan="2">Daily or weekly during active campaigns.</td></tr>
<tr><td>Miscellaneous</td><td colspan="2">Reports can be exported via Documentation Generator Agent.</td></tr>
</table>

Table 2.15: EUC-06-analyze-campaign-performance

**UC07: Provide Insights**

| **Use Case Name** | Provide Insights |
|---|---|

<table>
<tr><td>Scope</td><td colspan="2">Mayvn</td></tr>
<tr><td>Level</td><td colspan="2">User goal</td></tr>
<tr><td>Primary Actor</td><td colspan="2">System</td></tr>
<tr><td>Stakeholders and Interests</td><td colspan="2">Business Owner: Needs actionable recommendations.<br>Marketing Team: Uses insights to adjust campaigns.</td></tr>
<tr><td>Preconditions</td><td colspan="2">Performance data available.</td></tr>
<tr><td>Success Guarantee (Postconditions)</td><td colspan="2">System shows recommendations (best times, formats, platform mix).</td></tr>
<tr><td>Main Success Scenario</td><td colspan="2"><table>
<tr><th>Action</th><th>System</th></tr>
<tr><td>1. Actor requests recommendations or opens insights view.</td><td>Retrieve recent metrics and apply analysis algorithms (trend detection, anomaly detection).</td></tr>
<tr><td>2. -</td><td>2.1 Identify top/low performing posts and segments.<br>2.2 Run correlation analysis (format vs engagement, time vs reach).<br>2.3 Generate prioritized action list (e.g., “post more images at 7–9pm”).</td></tr>
<tr><td>3. Actor reviews and may accept suggestions.</td><td>Present explainable recommendations with supporting data and confidence levels.</td></tr>
</table></td></tr>
<tr><td>Extensions</td><td colspan="2">1a. Insufficient historical data: reports “insufficient data” and suggests collecting more or running A/B experiments.<br>2a. Conflicting signals across platforms: surfaces platform-specific suggestions and explains divergence.<br>3a. Actor requests deeper drill-down: queues heavy analysis job and provides ETA.</td></tr>
<tr><td>Special Requirements</td><td colspan="2">Recommendations should be explainable.</td></tr>
<tr><td>Technology and Data Variations</td><td colspan="2">ML model for trend prediction and pattern mining.</td></tr>
</table>

| | |
|---|---|
| **Frequency of Occurrence** | After each reporting cycle. |
| **Miscellaneous** | Supports exporting insights into reports. |

Table 2.16: EUC-07-provide-insights

### UC08: Optimize Campaigns

<table>
<tr><td>Use Case Name</td><td colspan="2">Optimize Campaigns</td></tr>
<tr><td>Scope</td><td colspan="2">Mayvn</td></tr>
<tr><td>Level</td><td colspan="2">User goal</td></tr>
<tr><td>Primary Actor</td><td colspan="2">Business Owner / System</td></tr>
<tr><td>Stakeholders and Interests</td><td colspan="2">Business Owner: Wants improved ROI.<br>System: Learns from feedback to refine automation.</td></tr>
<tr><td>Preconditions</td><td colspan="2">Insights have been generated.</td></tr>
<tr><td>Success Guarantee (Postconditions)</td><td colspan="2">Campaign parameters updated and saved.</td></tr>
<tr><td rowspan="4">Main Success Scenario</td><td>Action</td><td>System</td></tr>
<tr><td>1. Actor opens optimization panel after seeing insights.</td><td>Present suggested optimizations (reschedule, change creatives, re-budget).</td></tr>
<tr><td>2. Actor selects one or more optimizations to apply.</td><td>2.1 Validate requested changes for conflicts and constraints.<br>2.2 Apply updates to campaign schedule, targeting or creative (may enqueue regenerate tasks).</td></tr>
<tr><td>3. Actor confirms changes.</td><td>3.1 Persist optimization changes and version campaign state.<br>3.2 Trigger monitoring to measure impact post-change.</td></tr>
</table>

| | |
|---|---|
| **Extensions** | 2a. Optimization conflicts with platform policies or budgets: System rejects change and suggests alternative.<br>2b. Actor cancels during application: System rolls back partial changes.<br>3a. Real-time optimization fails due to transient error: System retries and marks optimization as pending. |
| **Special Requirements** | Optimization must not delete existing data. |
| **Technology and Data Variations** | Reinforcement learning loop or rules-based engine. |
| **Frequency of Occurrence** | Weekly or after major campaign milestones. |
| **Miscellaneous** | Can trigger content regeneration automatically. |

Table 2.17: EUC-08-optimize-campaigns

### UC09: Maintain Brand Guidelines

| | |
|---|---|
| **Use Case Name** | Maintain Brand Guidelines |
| **Scope** | Mayvn |
| **Level** | User goal |
| **Primary Actor** | Brand Manager |
| **Stakeholders and Interests** | Brand Manager: Ensures tone, color, values stay consistent.<br>System: Applies guidelines to all generated outputs. |
| **Preconditions** | Brand profile exists. |
| **Success Guarantee (Postconditions)** | Updated guidelines are stored and applied to new content. |

| | | |
|---|---|---|
| **Main Success Scenario** | **Action** | **System** |
| | 1. Brand Manager opens Brand Guidelines module. | Load current guideline set (tone, banned phrases, preferred hashtags, style rules). |
| | 2. Brand Manager edits tone rules, adds banned phrases, or updates templates. | 2.1 Validate changes (format, constraints).<br>2.2 Persist update to BrandProfile metadata. |
| | 3. Brand Manager saves changes. | 3.1 Invalidate cached generation templates and update prompt templates.<br>3.2 Log change with author/time for audit. |
| **Extensions** | 2a. Invalid guideline format: System rejects change and highlights error.<br>3a. Propagation failure: System retries and notifies admin.<br>1b. Unauthorized user tries to edit: System blocks action and logs attempt. | |
| **Special Requirements** | Changes should propagate immediately. | |
| **Technology and Data Variations** | Stored as structured data linked to AI prompt templates. | |
| **Frequency of Occurrence** | Infrequent (rebranding cycles). | |
| **Miscellaneous** | All updates logged for audit. | |

Table 2.18: EUC-09-maintain-brand-guidelines

## 2.2 Functional Requirements

This section describes the functional requirements of the Mayvn AI Marketing System, organized by modules. Each module focuses on a key feature set that collectively enables automated, AI-driven marketing, engagement, analytics, and administration.

### 2.2.1 Module 1 - Campaign Automation

The Campaign Automation module allows users to run and manage automated campaigns across multiple platforms. It focuses on simplifying the marketing process by enabling full automation and optimization of campaign workflows.

Following are the functional requirements for Module 1:

1. **FR1: Automated Pipeline** – The system shall automate the end-to-end process of content creation, scheduling, and posting across multiple platforms.
2. **FR2: Full Campaign Generation** – The system shall enable users to generate complete campaign setups with minimal manual input by leveraging AI recommendations.
3. **FR3: Feedback-Refined Funnels** – The system shall continuously optimize campaign performance based on analytics feedback and engagement insights.

### 2.2.2 Module 2 - Engagement and Personalization

This module improves personalization and active social presence. It ensures that users maintain consistency across platforms without manually engaging everywhere.

Following are the functional requirements for Module 2:

1. **FR1: User Customization** – The system shall allow users to personalize their campaign settings, content tone, and audience preferences.
2. **FR2: Profile Refinement** – The system shall refine user and brand profiles continuously based on engagement metrics and campaign performance.
3. **FR3: Social Interactions** – The system shall facilitate automated cross-platform engagement features such as likes, shares, and replies.
4. **FR4: Comment Responses** – The system shall generate AI-driven comment responses to improve user engagement and maintain activity on published posts.

### 2.2.3 Module 3 - Analytics and Insights

The Analytics and Insights module provides data-driven tools for evaluating performance and improving marketing decisions. It simplifies analytics for non-technical users by visualizing complex data.

Following are the functional requirements for Module 3:

1. **FR1: Post Analytics** – The system shall track post-level performance metrics and generate visualized reports for campaigns.
2. **FR2: Tag-Based Website Analysis** – The system shall collect and analyze user activity through embedded tracking tags on client websites.
3. **FR3: Smart Data Scraping** – The system shall gather public marketing and audience data to improve future targeting and campaign strategies.

### 2.2.4 Module 4 - Oversight and Management (Admin)

This module is designed for administrators to supervise system usage, compliance, and service management. It provides essential tools for maintaining platform integrity and user access.

Following are the functional requirements for Module 4:

1. **FR1: User Management** – The system shall allow administrators to create, update, and delete user accounts, manage access levels, and assign roles.
2. **FR2: Campaign Oversight** – The system shall enable administrators to monitor and regulate ongoing campaigns for compliance and ethical standards.
3. **FR3: Funnel Management** – The system shall allow admins to ensure the proper functioning of automated campaign pipelines.
4. **FR4: Payment and Subscription Handling** – The system shall support management of pricing plans, billing processes, and transaction records.

### 2.2.5 Module 5 - AI Engine Module (Core Intelligence)

The AI Engine serves as the backbone of the system that powers automation, personalization, and adaptability. It uses a fine-tuned model trained on marketing datasets to generate creative and trend-aligned content.

Following are the functional requirements for Module 5:

1. **FR1: Fine-Tuned AI Model** – The system shall use an internally trained AI model specialized in Gen Z marketing content to generate relevant and engaging posts.
2. **FR2: Trend Awareness** – The AI Engine shall detect and adapt to emerging market trends to keep generated content contextually relevant.
3. **FR3: Continuous Learning** – The AI Engine shall learn from approved and high-performing content to refine future generations automatically.

## 2.3 Non-Functional Requirements

This section specifies the non-functional requirements of the Mayvn AI Marketing System. These quality attributes ensure that the system performs efficiently, remains secure, and provides an optimal user experience. Each requirement is specific, measurable, and verifiable.

### 2.3.1 Reliability

Reliability requirements define how consistently the system performs its intended functions without failure. The Mayvn AI Marketing System must ensure dependable automation, stable API connections, and consistent content generation across all modules.

- **REL-1:** The system shall maintain an uptime of at least 99.5% over a one-month operating period.
- **REL-2:** The system shall recover from transient failures (e.g., API disconnections, network errors) within 30 seconds without manual intervention.
- **REL-3:** In the event of a failure, all in-progress campaign data shall be safely stored and recoverable upon system restart.
- **REL-4:** The system shall maintain Mean Time Between Failures (MTBF) of at least 500 operational hours.

### 2.3.2 Usability

Usability requirements focus on ensuring an intuitive, accessible, and efficient user experience. Since Mayvn caters to business owners, marketing professionals, and brand managers, the system must provide a clean interface with minimal learning curve.

- **USE-1:** The system shall allow a Marketing Team Member to create and launch a campaign within 5 interactions from the dashboard.
- **USE-2:** The system shall provide onboarding tooltips and guided tutorials for first-time users.
- **USE-3:** 90% of users shall be able to successfully navigate and complete core actions (campaign creation, scheduling, analytics view) without external assistance.
- **USE-4:** The system shall provide role-based dashboards (Business Owner, Brand Manager, Marketing Team, Admin) tailored to each user's goals and permissions.

### 2.3.3 Performance

Performance requirements ensure that Mayvn's automated and AI-driven operations run efficiently even under high traffic or heavy campaign load.

- **PER-1:** 95% of dashboard pages shall load completely within 3 seconds over a 20 Mbps or faster Internet connection.
- **PER-2:** The AI content generation process shall return results within 8 seconds for a standard text prompt of 50–100 words.
- **PER-3:** The system shall handle a minimum of 1,000 concurrent campaign operations without degradation in response time exceeding 5%.
- **PER-4:** The system shall synchronize data with social media APIs at least every 60 seconds to ensure real-time analytics accuracy.

### 2.3.4 Security

Security requirements protect the integrity of user data, campaigns, and proprietary AI models. The system must enforce access control, data confidentiality, and resistance to unauthorized manipulation.

- **SEC-1:** The system shall implement role-based access control to restrict sensitive actions (e.g., billing, model retraining) to authorized users only.
- **SEC-2:** All user data, including authentication tokens and campaign content, shall be encrypted during transmission using HTTPS (TLS 1.3 or higher).
- **SEC-3:** The system shall automatically log out inactive users after 15 minutes of inactivity to prevent unauthorized access.
- **SEC-4:** The system shall detect and block suspicious activity (e.g., repeated failed login attempts) using rate limiting and anomaly detection techniques.
- **SEC-5:** Backups of databases and AI model parameters shall be taken daily and stored in a secure, access-controlled environment.

### 2.3.5 Scalability

The Mayvn AI Marketing System should efficiently scale with the number of users, campaigns, and data interactions without compromising performance or stability.

- **SCA-1:** The system architecture shall support horizontal scaling to accommodate increasing workloads.
- **SCA-2:** The system shall allow the addition of new AI modules or services without requiring downtime.
- **SCA-3:** The system shall handle up to a 200% increase in concurrent users without requiring infrastructure redesign.

### 2.3.6 Maintainability

Maintainability ensures that the system can be easily updated, debugged, and extended with minimal downtime.

- **MAI-1:** The system's codebase shall follow modular microservices architecture for easier updates and debugging.
- **MAI-2:** Each microservice shall include comprehensive documentation and unit tests covering at least 80% of its code.
- **MAI-3:** Updates and deployments shall be automated through CI/CD pipelines, minimizing manual intervention.

## 2.4 Domain Model

The Domain Model of the Mayvn AI Marketing System represents the key conceptual entities involved in the system and how they relate to one another. It abstracts the essential business logic by identifying core objects such as users, campaigns, content, analytics, and engagement data. This model helps establish a shared understanding between the development team and stakeholders regarding the data relationships within the system.

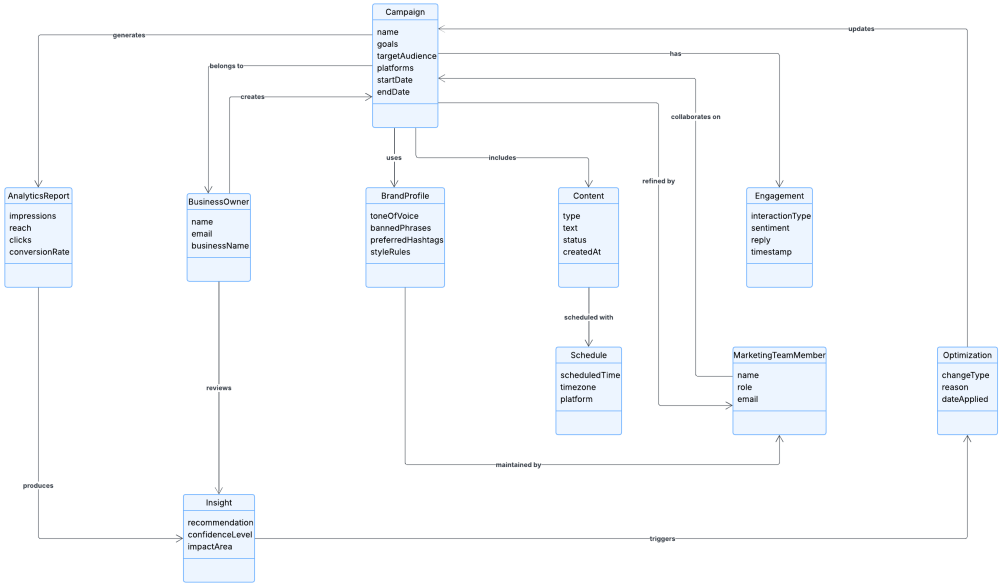


Figure 2.2: Domain Model of the Mayvn AI Marketing System

# Chapter 3

# System Overview

The Mayvn AI Marketing System is an intelligent, automated marketing platform designed to assist businesses and marketing teams in creating, managing, and optimizing social media campaigns with minimal manual effort. By integrating artificial intelligence, automation pipelines, and analytics-driven insights, Mayvn enables organizations to maintain consistent digital presence and brand identity across multiple social media platforms.

## 3.1 Architectural Design

The architectural design of the Mayvn AI Marketing System is based on a **Microservices-Based Layered Architecture**. This approach decomposes the system into small, independent, and loosely coupled services that communicate through RESTful APIs. Each service handles a specific functional domain, ensuring modularity, scalability, and fault tolerance. This design allows the system to evolve easily while maintaining high availability and performance.

### 3.1.1 Overview

The system is composed of several key services, each performing a specialized function that contributes to the overall marketing automation process:

1. **Campaign Service** – Handles campaign creation, goal definition, and coordination of marketing activities.

2. **AI Content Generation Service** – Utilizes the fine-tuned AI model to generate personalized marketing content aligned with Gen-Z trends.

3. **Content Review Service** – Provides content validation, refinement, and approval workflows before publication.

4. **Scheduler Service** – Automates scheduling, publishing, and synchronization of posts across multiple social media platforms.

5. **Engagement Service** – Manages automated social interactions such as comment replies, post engagement, and audience response tracking.

6. **Insights & Optimization Service** – Collects engagement data and analytics from social platforms to refine campaign strategies using feedback loops.

All services communicate through a centralized **API Gateway**, which manages routing, authentication, and load balancing between the client and backend services.

### 3.1.2 Architecture Pattern

Mayvn follows a **Microservices-Based Layered Architecture Pattern**, combining aspects of client-server and multi-tier design. Each layer encapsulates a distinct role in the system's operation:

1. **Presentation Layer:** This layer includes the *Marketing Team / User Interface*, through which users manage campaigns, review AI-generated content, and view analytics. The frontend communicates with the backend via the API Gateway. It is developed using React.js to ensure responsiveness and smooth user experience.

2. **API Gateway Layer:** Serves as the single communication channel between the frontend and backend services. It authenticates users, routes requests to corresponding services, manages rate limiting, and ensures secure API transactions.

3. **Microservices Layer:** Consists of independent services such as the Campaign Service, AI Content Generation Service, Content Review Service, Scheduler Service, Engagement Service, and Insights & Optimization Service. Each service is containerized and communicates through RESTful APIs or asynchronous messaging.

4. **Data Management Layer:** Each service has its own dedicated database (e.g., CampaignDB, ContentDB, EngagementDB, AnalyticsDB), ensuring data isolation and service autonomy. The fine-tuned AI model is also integrated at this layer as part of the AI Content Generation Service.

### 3.1.3 Microservice Collaboration and Workflow

The following describes the collaborative interaction among the services, as illustrated in Figure 3.2:

- The **Marketing Team/User** initiates a campaign request via the frontend interface.
- The **Campaign Service** coordinates campaign setup and requests content ideas from the **AI Content Generation Service**.
- The **AI Content Generation Service** interacts with the **Fine-Tuned AI Model** to generate campaign-specific content.
- The generated content is forwarded to the **Content Review Service** for validation, refinement, and approval.
- Once approved, the **Scheduler Service** automates publishing across various **Social Media Platforms**.
- The **Engagement Service** monitors and responds to user interactions such as comments and mentions.
- The **Insights & Optimization Service** gathers performance analytics and provides feedback to improve future campaigns.

This architecture ensures asynchronous and scalable communication between services, maintaining system performance even under high workloads.

### 3.1.4 Design Rationale

This microservices-based architecture was selected because it:

- Enables **independent deployment and scaling** of each service to meet specific performance demands.
- Provides **fault isolation**, ensuring that issues in one service (e.g., Scheduler Service) do not disrupt others.
- Enhances **maintainability** by allowing teams to update and redeploy services independently.
- Supports **technology flexibility**, allowing each service to use the most suitable programming language or database.
- Facilitates **cloud-native development**, with containerized services easily orchestrated through platforms like Kubernetes or Docker Swarm.

### 3.1.5 Box and Line Diagram

Figure 3.1 presents the Box and Line Diagram of the Mayvn AI Marketing System. It illustrates how different services communicate with each other and with external entities such as the fine-tuned AI model and social media platforms. This diagram provides a conceptual overview of the system's microservice interactions and overall workflow.

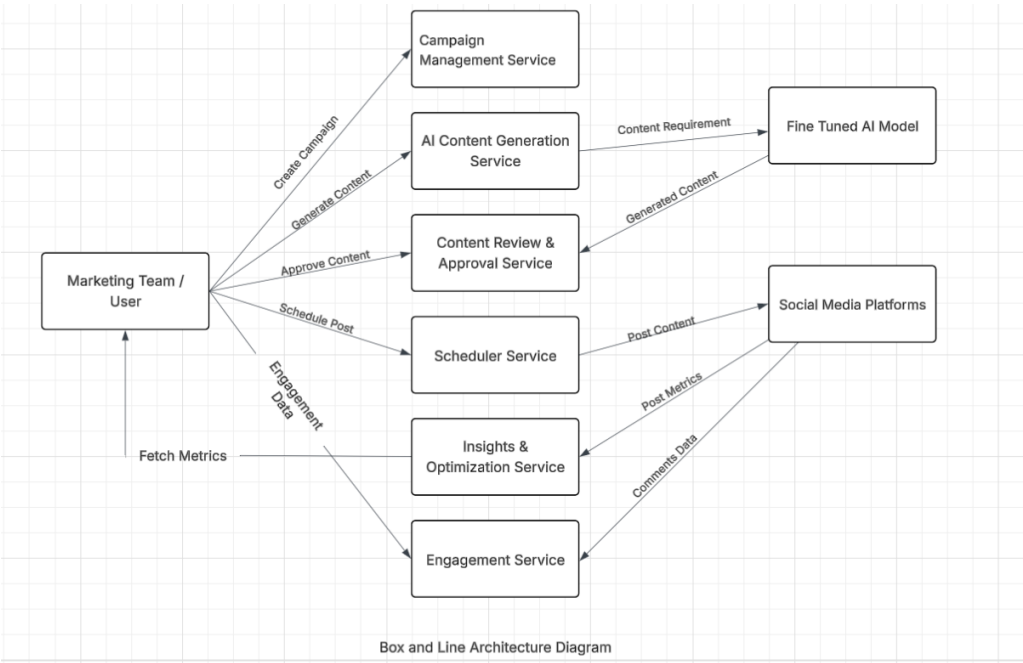


Figure 3.1: Box and Line Diagram of the Mayvn AI Marketing System

### 3.1.6 System Architecture Diagram

Figure 3.2 illustrates the high-level microservices-based architecture of the Mayvn AI Marketing System, showing the interaction between the Marketing Team, core services, and external entities.

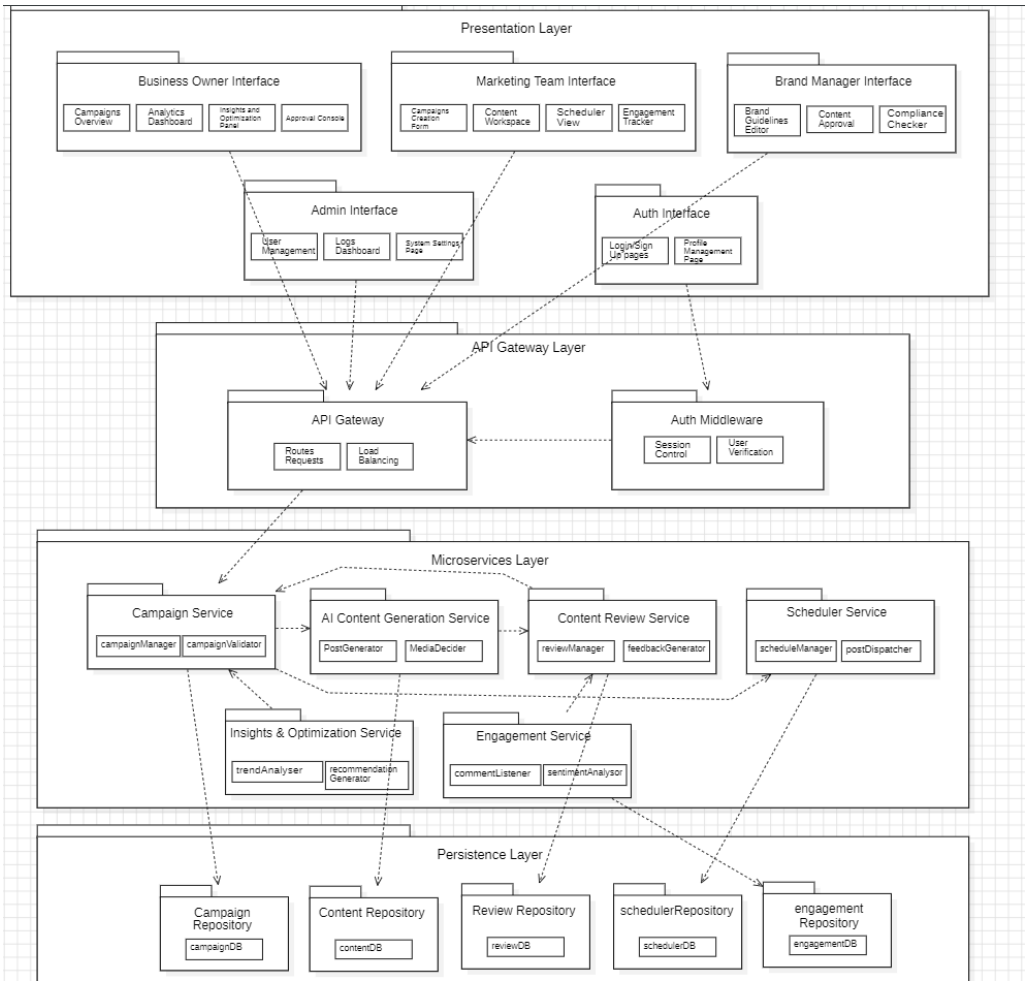


Figure 3.2: Microservices-Based Architecture of the Mayvn AI Marketing System

### 3.1.7 Mapping of Components to Architecture Layers

| Architecture Layer | Mapped Components / Services |
|---|---|
| Presentation Layer | Web Dashboard, User Interface, Analytics Panel, Campaign Management UI |
| API Gateway Layer | API Gateway, Authentication Middleware, Request Router |
| Microservices Layer | Campaign Service, AI Content Generation Service, Content Review Service, Scheduler Service, Engagement Service, Insights & Optimization Service |
| Persistence Layer | CampaignDB, ContentDB, EngagementDB, AnalyticsDB, AIModelStorage |

Table 3.1: Mapping of Mayvn Components to Microservices Architecture Layers

## 3.2 Design Models

This section presents the design models for the Mayvn AI Marketing System, developed using a **procedural design approach**. The system has been structured into interrelated processes and data flows to describe its internal logic, control mechanisms, and data movement. These models help visualize the functional structure, data interactions, and dynamic behavior of the system.

### 3.2.1 Design Approach

The procedural approach was selected because the Mayvn AI Marketing System consists of multiple interconnected services that perform well-defined tasks in a sequential and event-driven manner. Each process, such as Campaign Automation, Content Review, Scheduling, and Engagement Tracking handles specific operations, making it suitable for process-oriented modeling.

The following design models were developed to represent the system's workflow and structure:

- **Activity Diagram** - Describes the overall flow of user and system activities.
- **Data Flow Diagrams (DFDs)** - Illustrate how data moves between processes, data stores, and external entities.
- **System-Level Sequence Diagram** - Models the interaction between different system components over time.
- **State Transition Diagram** - Represents the change of states within a process (e.g., campaign lifecycle) based on specific events.

### 3.2.2 Activity Diagram

The activity diagram illustrates the overall operational flow of the Mayvn AI Marketing System and how the nine use cases interact to form a complete workflow. Each activity represents a major function of the system that corresponds to a specific use case, depicting how users and backend processes collaborate to execute marketing automation tasks.

The nine primary use cases modeled in this diagram include:

1. Campaign Creation and Setup
2. AI-Based Content Generation
3. Refine Content
4. Scheduling and Publication
5. Engagement Tracking
6. Analyze Campaign Performance
7. Provide Insights
8. Optimize Campaigns
9. Maintain Brand Guidelines

Each activity diagram focuses on the control flow of one use case — showing actions, decisions, and transitions between activities. These diagrams collectively capture the procedural behavior of the entire system, aligning with its microservices-based architecture.

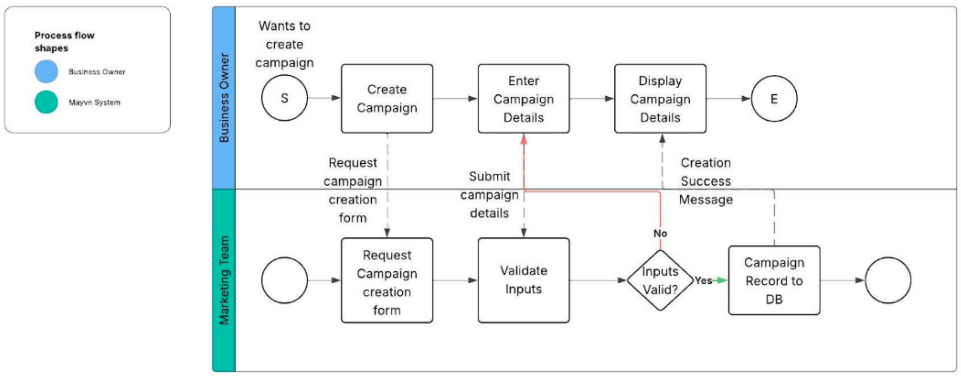


Figure 3.3: Activity Diagram for Use Case: Campaign Creation and Setup

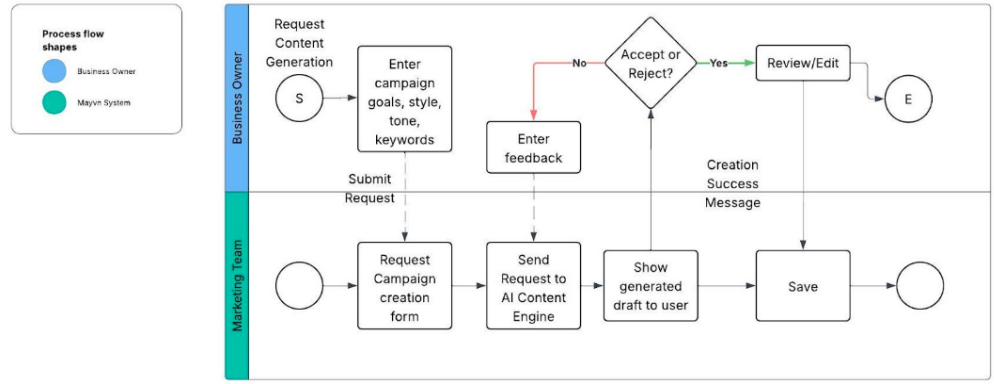


Figure 3.4: Activity Diagram for Use Case: AI-Based Content Generation

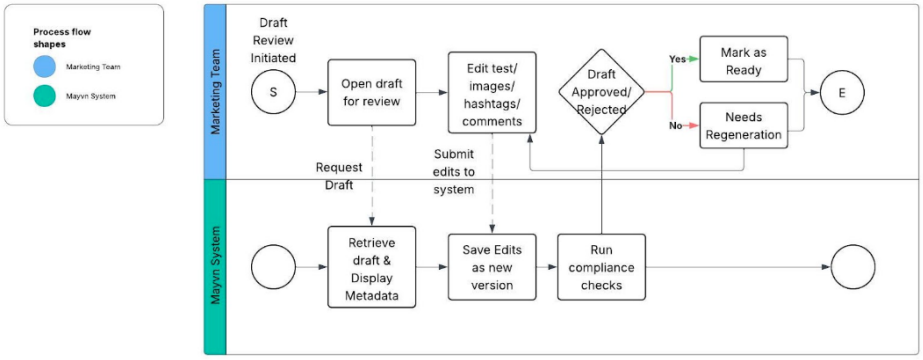


Figure 3.5: Activity Diagram for Use Case: Refine Content

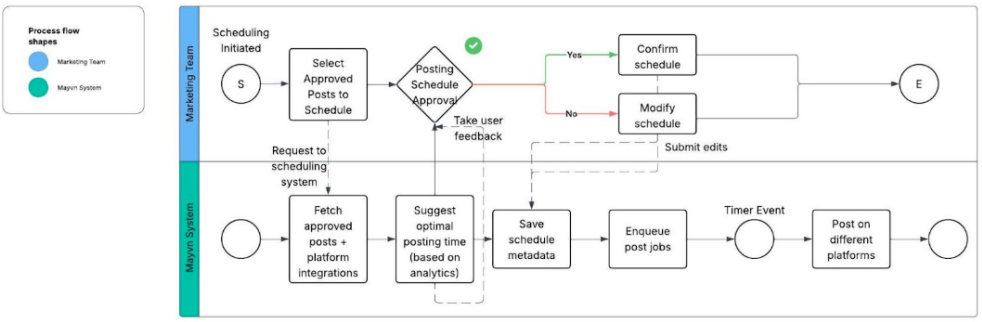


Figure 3.6: Activity Diagram for Use Case: Scheduling and Publication

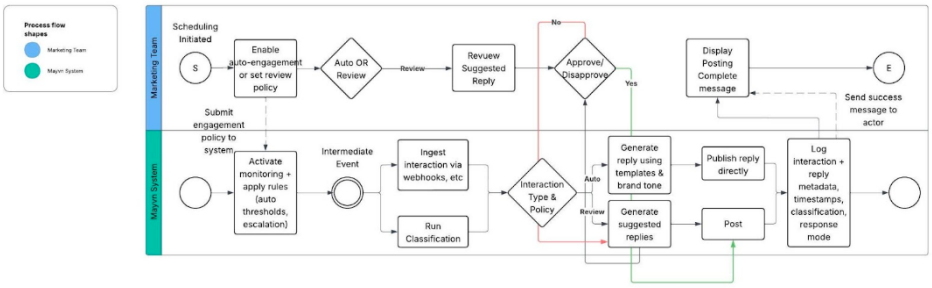


Figure 3.7: Activity Diagram for Use Case: Engagement Tracking

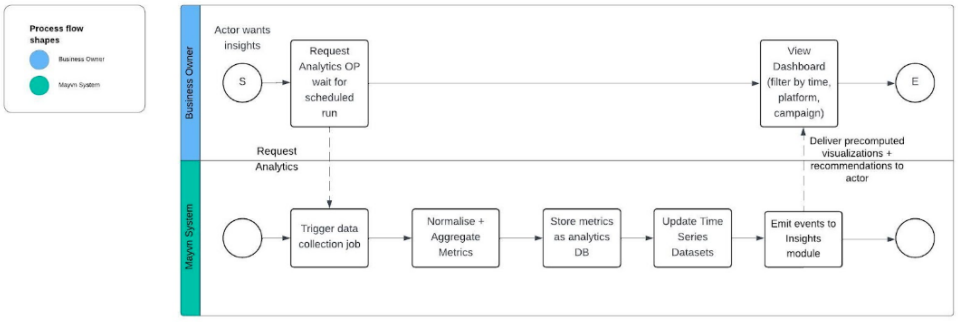


Figure 3.8: Activity Diagram for Use Case: Analyze Campaign Performance

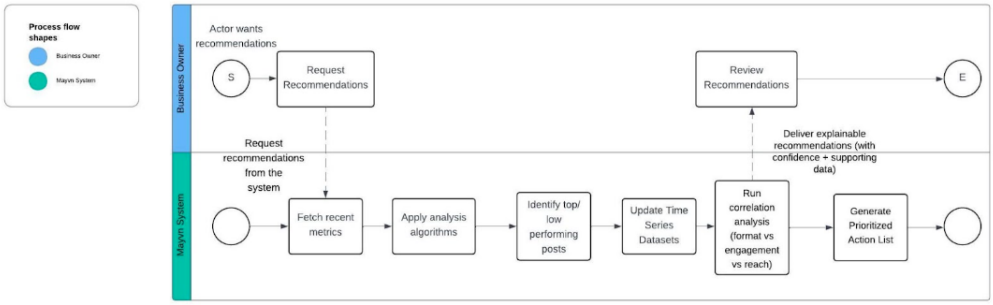


Figure 3.9: Activity Diagram for Use Case: Provide Insights

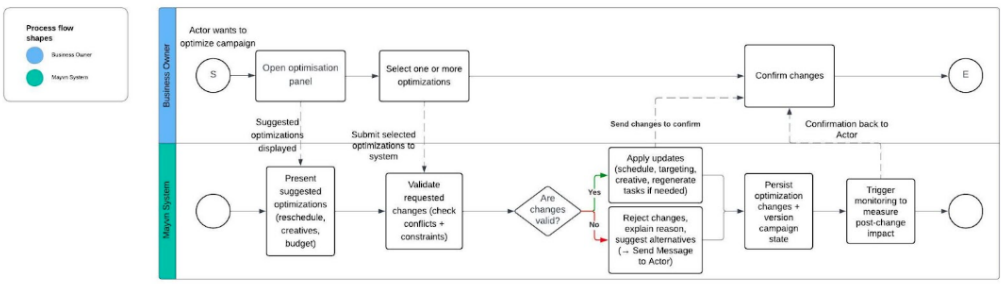


Figure 3.10: Activity Diagram for Use Case: Optimize Campaigns

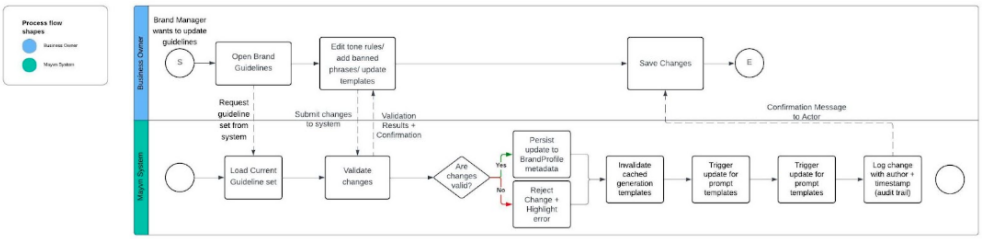


Figure 3.11: Activity Diagram for Use Case: Maintain Brand Guidelines

### 3.2.3 Data Flow Diagrams (DFDs)

Data Flow Diagrams provide a detailed view of how data moves within the system, across different levels of abstraction.

- **Level 0 (Context Diagram):** Shows the Mayvn AI Marketing System as a single process interacting with external entities such as the Marketing Team and Social Media Platforms.
- **Level 1 (System Overview):** Decomposes the system into major processes: Campaign Automation, AI Content Generation, Review, Scheduler, and Engagement Tracking.
- **Level 2 (Detailed DFDs):** Explores the internal flow within each process (e.g., Content Review Service, Scheduler Service, Engagement Service), detailing specific data transformations and interactions with databases.

Each DFD includes labeled arrows representing data flows, data stores, and sources/sinks to ensure clarity and completeness.

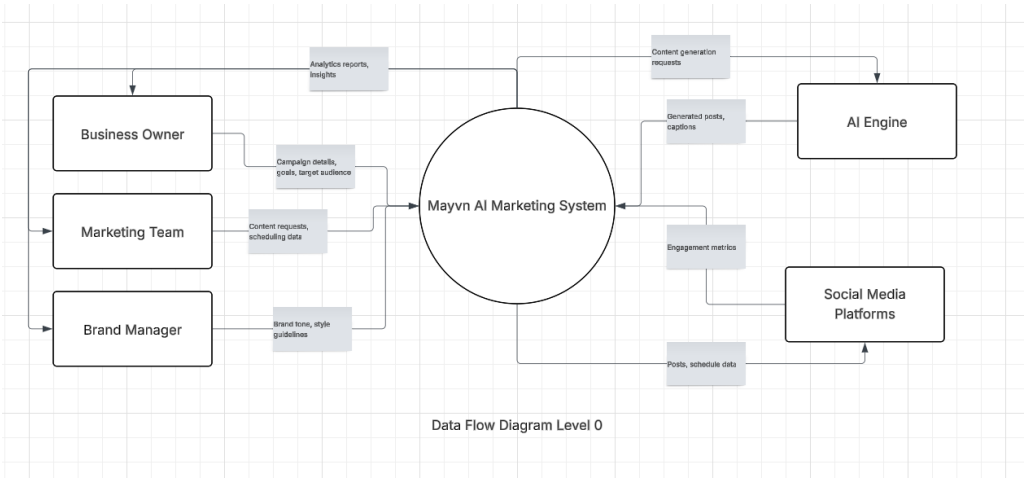


Figure 3.12: Level 0 Data Flow Diagram for Mayvn AI Marketing System

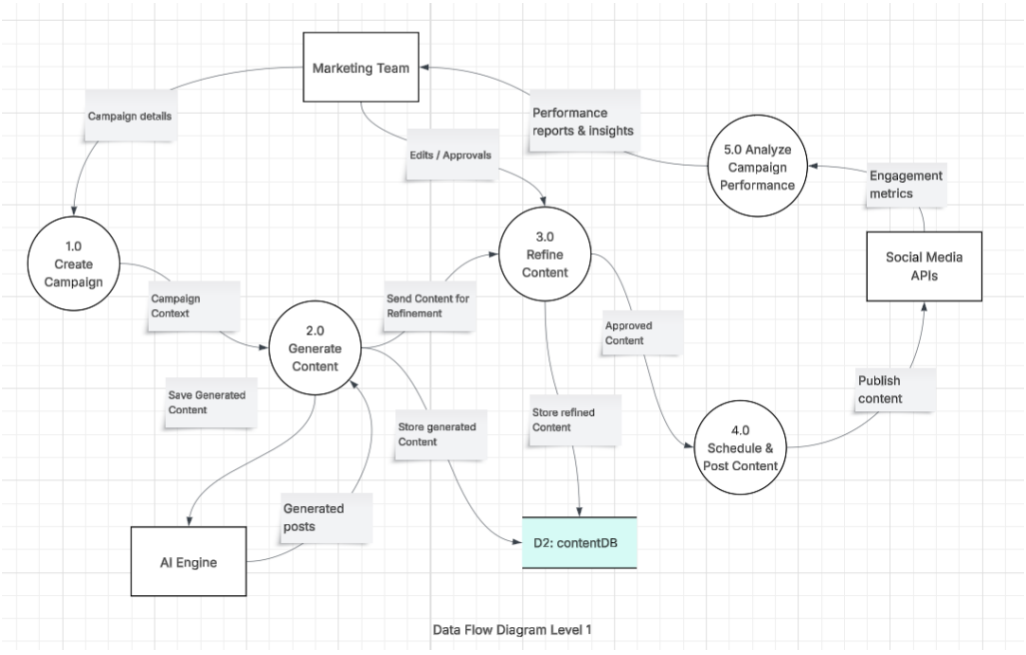


Figure 3.13: Example: Level 1 Data Flow Diagram for Mayvn AI Marketing System

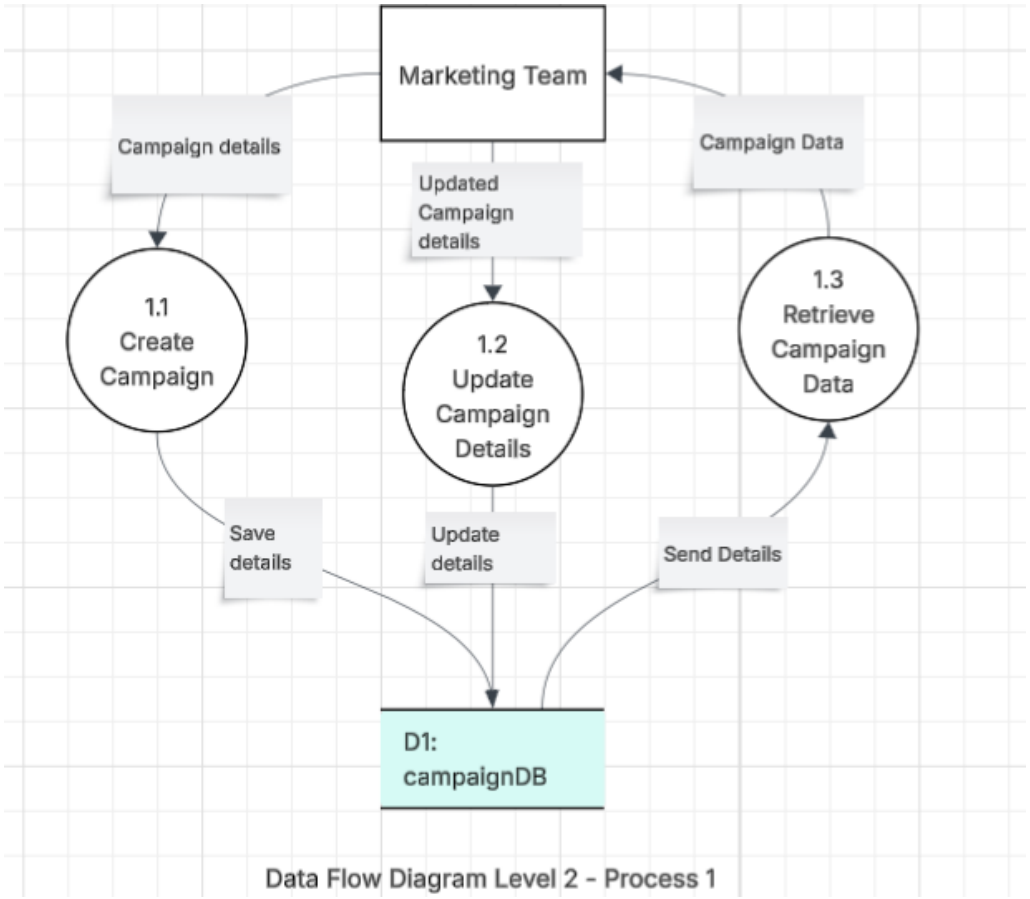


Figure 3.14: Example: Level 2 Data Flow Diagram for Campaign Management

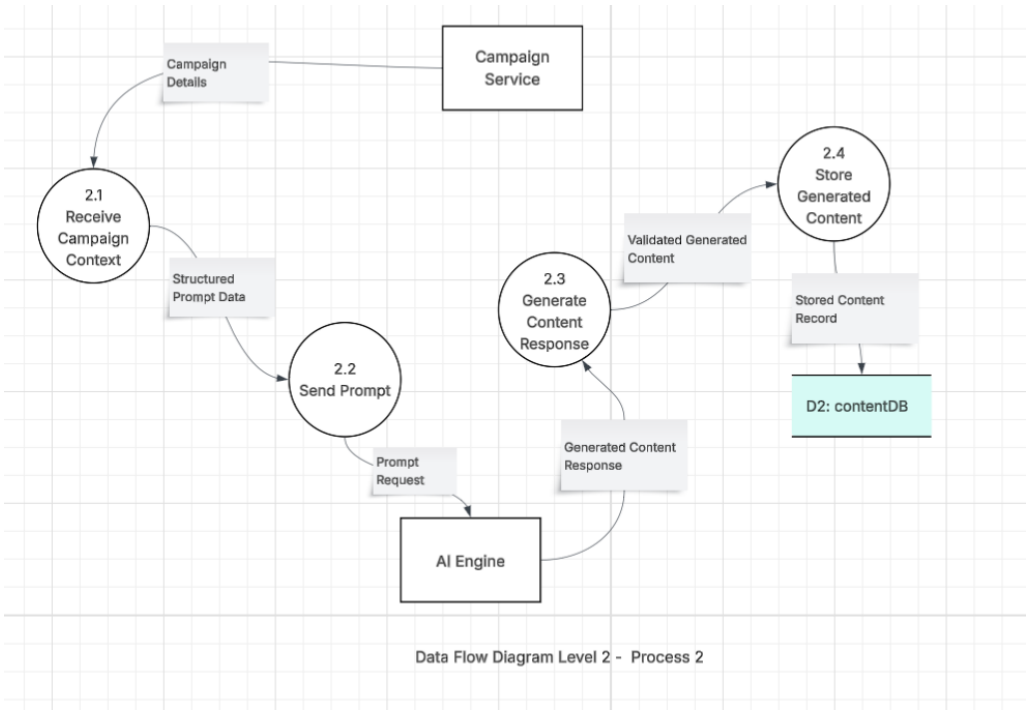


Figure 3.15: Example: Level 2 Data Flow Diagram for Content Generation

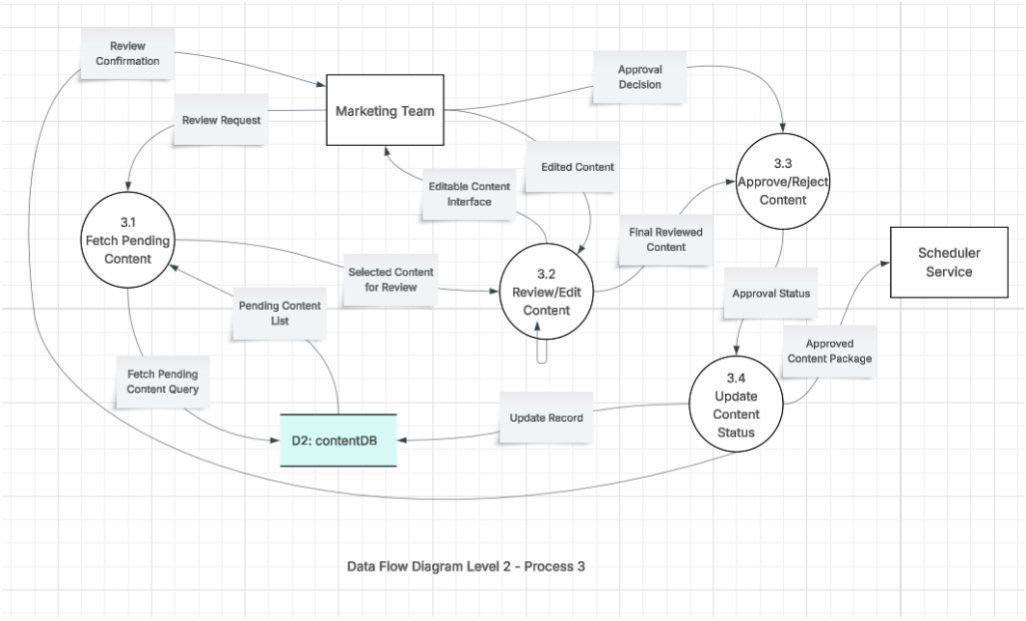


Figure 3.16: Example: Level 2 Data Flow Diagram for Content Review

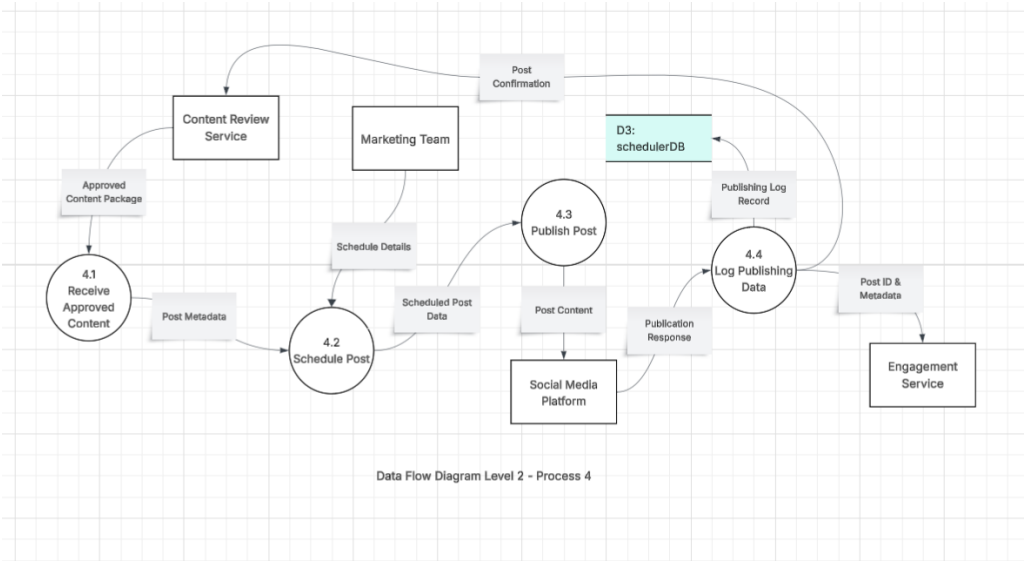


Figure 3.17: Example: Level 2 Data Flow Diagram for Scheduler Service

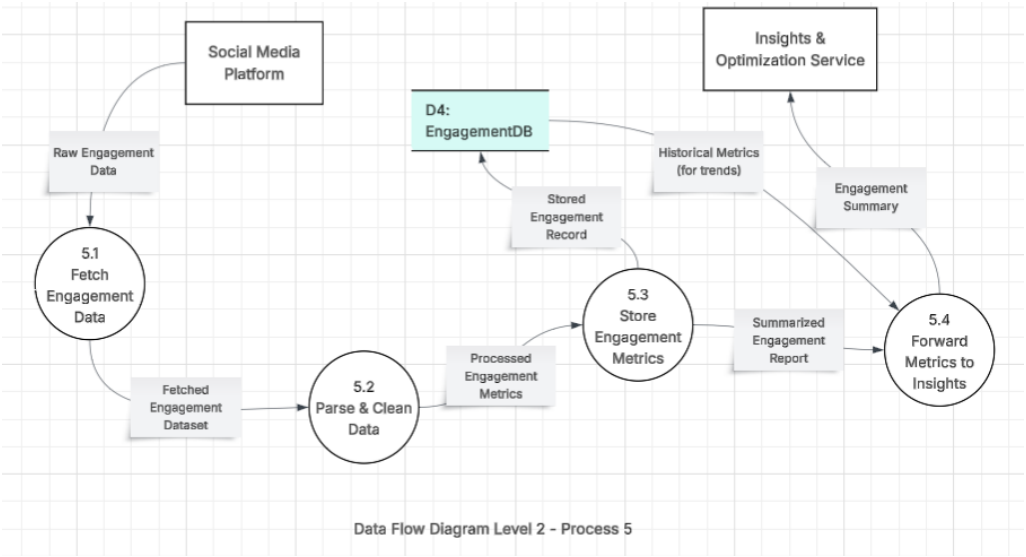


Figure 3.18: Example: Level 2 Data Flow Diagram for Engagement Service

### 3.2.4 System-Level Sequence Diagram

The system-level sequence diagram illustrates how different system components interact over time. It depicts the flow of control and communication between the User Interface, API Gateway, Microservices (Campaign, Scheduler, Engagement), and Databases. This model helps in understanding the chronological order of system operations and message passing between services.


Figure 3.19: System-Level Sequence Diagram for the Mayvn AI Marketing System

### 3.2.5 State Transition Diagram

The state transition diagram represents how a campaign progresses through various stages during its lifecycle - from creation, review, and scheduling to publication and analysis. It visually captures the triggers that move the campaign from one state to another, reflecting backend automation and event handling logic within the system.

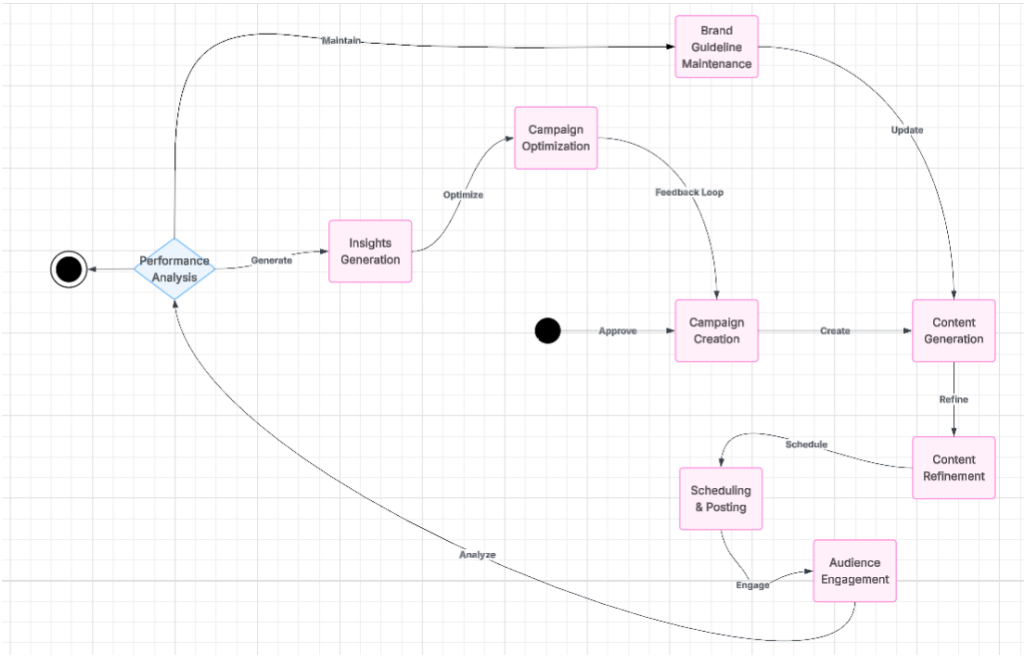


Figure 3.20: State Transition Diagram for Campaign Lifecycle

### 3.2.6 Model Integration

Together, these models provide a comprehensive view of the system's design:

- The **Activity Diagram** defines the overall functional flow.
- The **DFDs** detail how data moves between processes.
- The **Sequence Diagram** shows timing and order of interactions.
- The **State Diagram** captures dynamic changes in system entities.

These models collectively ensure that both the logical and data perspectives of the Mayvn AI Marketing System are clearly defined and aligned with the procedural design philosophy.

## 3.3 Data Design

The data design of the *Mayvn AI Marketing System* defines how the information from the marketing domain—such as campaigns, content, analytics, and brand guidelines—is structured, stored, and processed within the system. The goal is to ensure efficient data retrieval, consistency, and scalability for AI-driven operations.

### 3.3.1 Information Domain Transformation

The system transforms real-world marketing activities into structured and interrelated data entities. Each domain concept (e.g., a campaign, post, or guideline) is represented as a data model with defined attributes and relationships.

For example:

- **Campaigns** represent marketing efforts defined by goals, target audience, and platforms.
- **Content Items** store AI-generated and refined marketing assets such as posts, captions, and creatives.
- **Brand Guidelines** represent tone, banned phrases, and style rules used by the AI engine.
- **Analytics Records** capture performance metrics including reach, engagement, CTR, and impressions.

These domain objects are mapped to a relational schema and accessed through an ORM layer to maintain consistency and abstraction between the database and the business logic layer.

### 3.3.2 Major Data Entities and Relationships

Table 3.2: Major Data Entities and Relationships

| **Entity** | **Description** | **Key Attributes** | **Relationships** |
|---|---|---|---|
| User | Represents a registered stakeholder (Business Owner, Marketing Team, Brand Manager, Admin). | user_id, name, email, role, permissions | One-to-many with Campaigns |
| Campaign | Defines a marketing initiative with goals, target audience, and platforms. | campaign_id, title, objective, start_date, end_date, status | One-to-many with Content and Analytics |
| Content | Stores AI-generated or refined posts, captions, and hashtags. | content_id, campaign_id, text, media_url, version, status | Belongs to Campaign; linked to Brand Guidelines |
| BrandGuideline | Defines tone, banned phrases, and style rules enforced during generation. | guideline_id, tone, banned_phrases, style_rules | One-to-one with Brand Manager; referenced by AI Engine |
| Analytics | Stores campaign performance metrics from platforms. | analytics_id, campaign_id, impressions, reach, CTR, conversions | Belongs to Campaign; feeds Insights Engine |
| Insight | Represents AI-generated recommendations based on analytics data. | insight_id, campaign_id, suggestion, confidence_score | Derived from Analytics; used in Optimization |
| Optimization | Tracks parameter changes or strategy adjustments. | optimization_id, campaign_id, applied_changes, date | References Insights |
| Engagement | Logs comments, replies, and auto-responses from platforms. | engagement_id, platform, message, sentiment, timestamp | Belongs to Campaign and Content |

### 3.3.3 Data Storage and Organization

Document Storage (e.g., MongoDB/Firestore): Used for AI-generated outputs, prompts, and model metadata.

### 3.3.4 Data Processing and Flow

The following sequence represents how data is processed through the system:

1. **Campaign Creation:** User inputs are validated and stored in the Campaign table.
2. **Content Generation:** Campaign and brand data are passed to the AI Engine; results are stored in the Content entity.
3. **Content Refinement:** Edited versions are versioned and updated in the Content table.
4. **Publishing:** Scheduled posts are logged in the system and status updated upon publication.
5. **Engagement:** Audience interactions are fetched from APIs and analyzed; results stored in Engagement.
6. **Analytics and Insights:** Data from platforms are aggregated, analyzed, and stored in Analytics and Insights tables.
7. **Optimization Loop:** Recommended improvements are applied and new campaign states saved.

### 3.3.5 Summary

The proposed data design ensures that the *Mayvn AI Marketing System* remains modular, scalable, and secure. The interlinked entities (Campaign, Content, Analytics, Insights, and Optimization) enable seamless transitions across different phases of the AI-driven marketing workflow: from content generation and publishing to performance analysis and optimization.

# Bibliography

[1] Michael Marolda. How ai is changing marketing analytics today. *Tellius Blog*, January 2025.