

# **CampaignIQ - Design. Deploy. Dominate.**

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## **1. Abstract**

The world of digital advertising is fast-paced and ever-changing, especially for clothing and accessory brands wanting to stand out on social media. CampaignIQ is our answer: an AI-driven, user-friendly platform that helps anyone quickly create, customize, and schedule professional-quality advertising—no design or marketing experience required.

## **2. Introduction**

Advertising matters—whether you’re a boutique launching your summer line or a new brand trying to grab attention. But most small businesses are overwhelmed by creative complexity and the technicalities of campaign timing. CampaignIQ is born from the belief that AI can bridge those gaps: making great ads accessible, simple, and data-driven.

## **3. Problem Statement & Objectives**

### **The Problem:**

Manual ad creation is slow, costly, and requires artistic and marketing skills that most smaller teams lack. Even after you’ve made an ad, it’s a headache figuring out when and where to post for maximum impact.

### **Objectives:**

- Make it possible for anyone to build eye-catching, effective ads in minutes
- Automate the design, copywriting, and scheduling using state-of-the-art AI
- Provide everything in one web platform—that’s fast, intuitive, and affordable

## **4. Literature Review & Existing Landscape**

Today's ecosystem offers tools like AdCreative.ai and Canva, which help with visual design, and automation platforms like Smartly.io for big brands. But these solutions either focus on just one part of the process (look or schedule) or are built for agencies with specialist knowledge. We found very little for non-experts that guides them start-to-finish, especially platforms that optimize both ad creative and timing using live data.

### ***What CampaignIQ does differently:***

Brings together creative generation (text + image), real-time strategic planning, and an ultra-accessible interface, specifically tuned for clothing/accessory businesses.

## **5. Functional & Non-Functional Requirements**

### **What should the system do?**

- Let users input campaign ideas and brand details
- Instantly generate visual and textual ad assets
- Analyze and recommend the best posting times

- Preview and download/export creatives
- Work smoothly, securely, and be easy for anyone to pick up

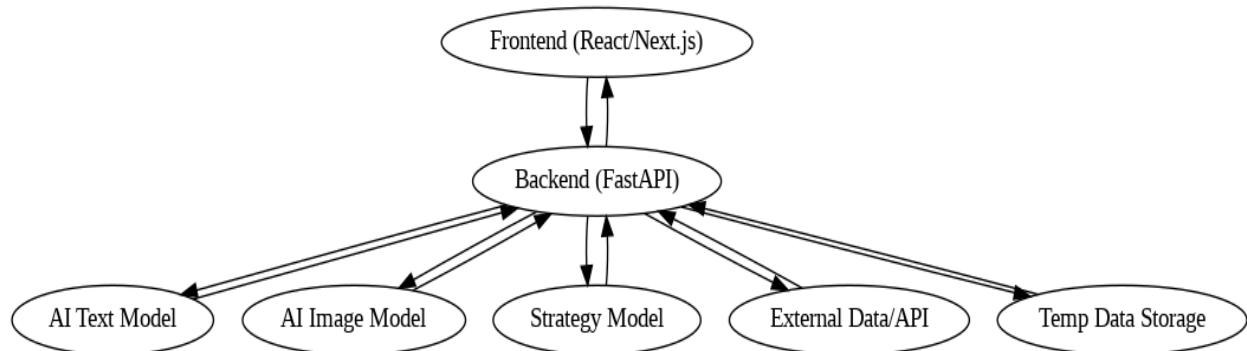
### What quality goals matter?

- Fast response (results in seconds, not minutes)
- Simple, guided experience designed for non-marketers
- Modular backend for future expansion (other ad types, platforms)
- Safe handling of uploads and API calls

## 6. System Architecture

### How does everything fit together?

The heart of CampaignIQ is a backend (FastAPI) that connects the user-facing web app (built with React/Next.js) to a set of powerful AI models—one for generating ad text, one for visuals, and another for smart scheduling. The backend talks to external services (like data sources and APIs), and keeps the whole process moving from campaign idea to ready-to-run ad.



*Figure 1: System Architecture Diagram*

## 7. Data Flow Diagrams (DFDs)

### DFD Level 0: Context Overview

Shows the system's ecosystem: how users, admins, AI APIs, and data sources connect.

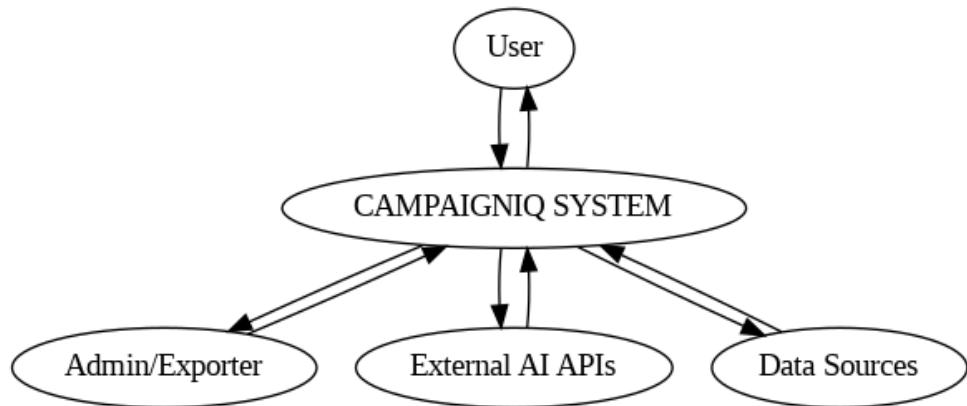


Figure 2: DFD Level 0

### DFD Level 1: Subsystems

Illustrates the internal modules—user input, ad engine, strategy, data adapters, and result review.

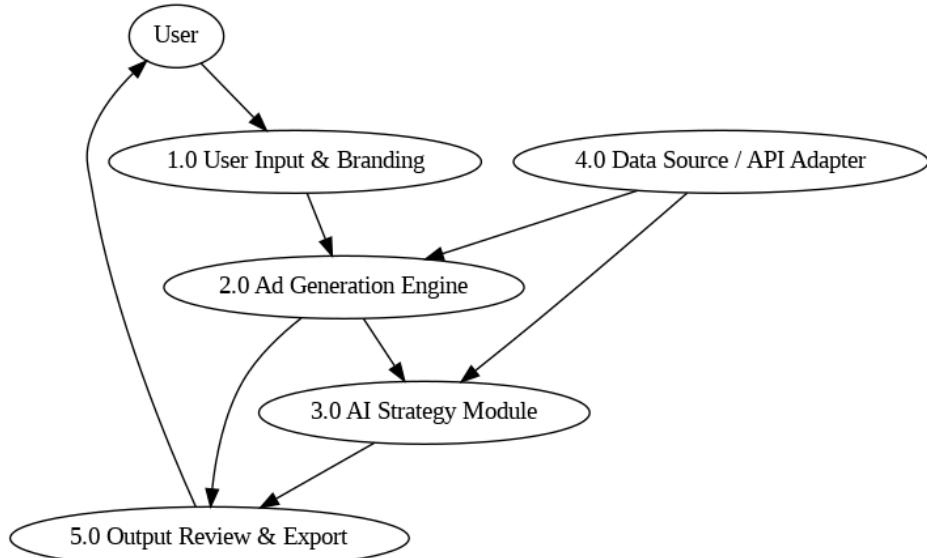


Figure 3: DFD Level 1

## DFD Level 2: Ad Generation Engine

Dives deeper: shows prompt handling, model calls, and integration for a single ad creation request.

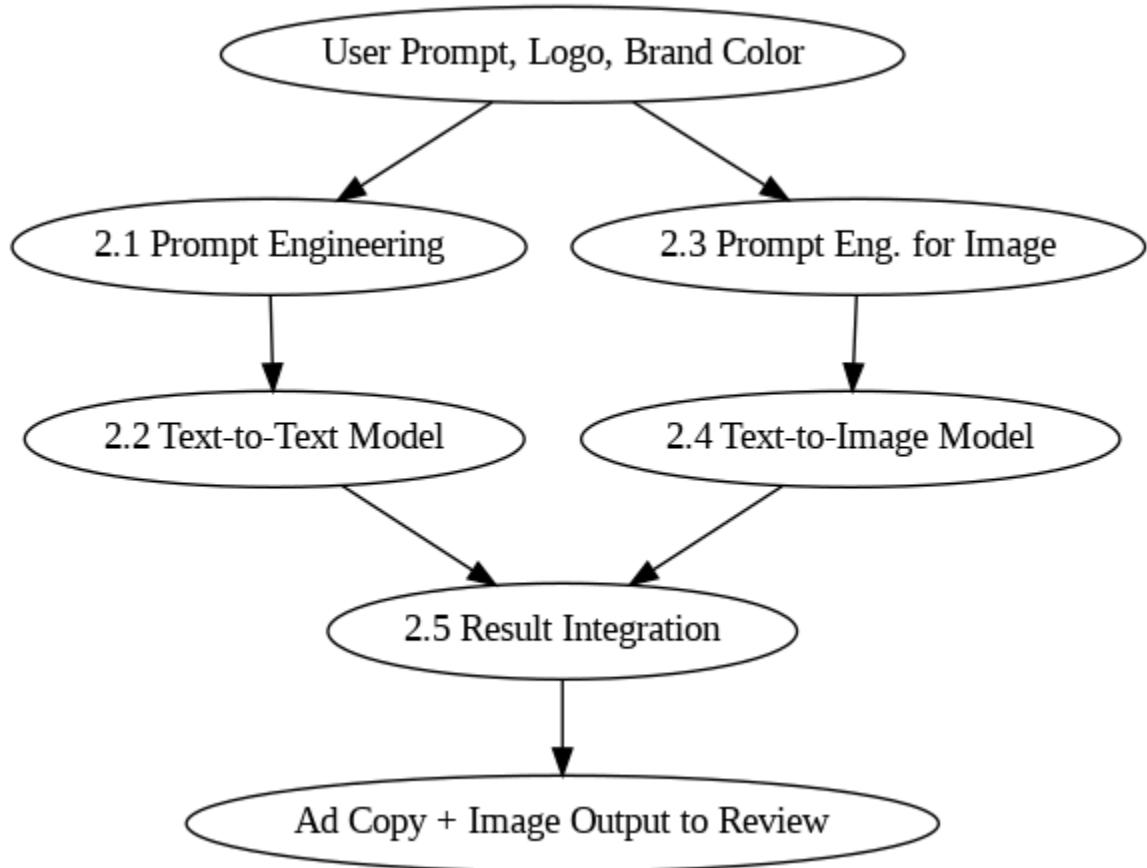
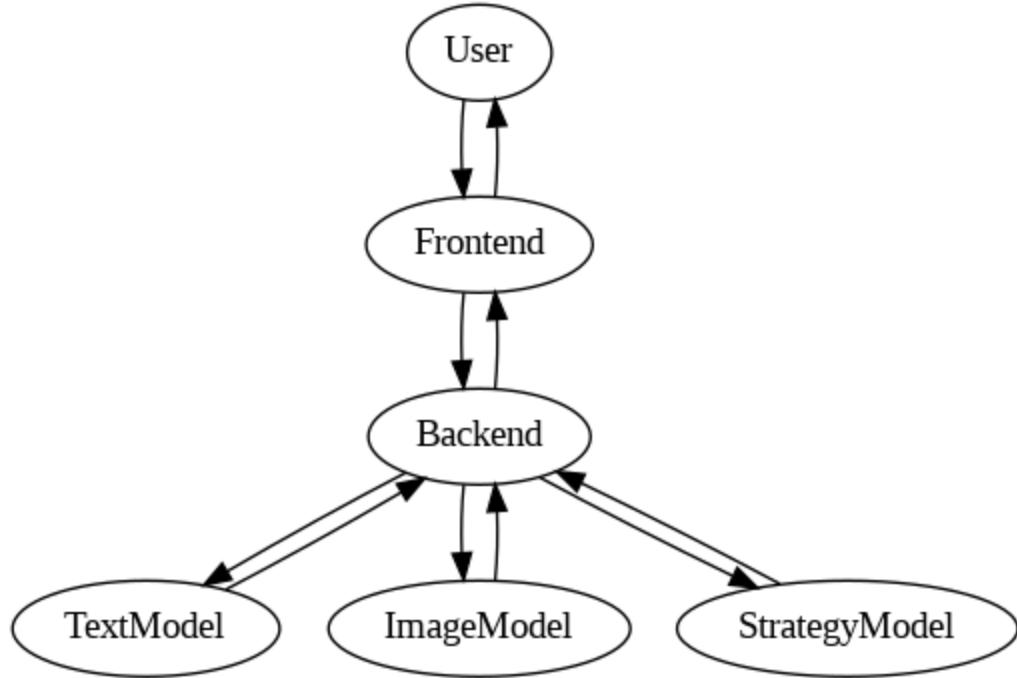


Figure 4: DFD Level 2

## 8. Sequence Diagram

Describes a typical user journey: you start by submitting your campaign idea, the system works behind the scenes to call the right models, and returns everything for your review—all in a clear, stepwise fashion.



*Figure 5: Sequence Diagram*

## 9. Data Collection & Preparation

We pull in real ad/campaign data from sources like Instagram's API, Facebook's Ad Library, Shopify feeds, and Kaggle's marketing datasets. Where real examples are sparse, we use synthetic data generators (like SDV, CTGAN) to create labelled pairs of ad prompts and results, ensuring our models have enough examples to learn from. We rigorously clean and analyze all data before training, focusing on features (like audience, time, visuals) that drive campaign success.

## 10. Model Selection & Justification

We use three model classes:

- **Text-to-Text (Ad Copy):** Pretrained models like T5 or GPT, able to produce catchy, customizable ad lines based on campaign context and branding.
- **Text-to-Image (Creative Visuals):** Models like Stable Diffusion or DALL·E2, chosen for their creative flexibility and ability to generate product-relevant imagery.
- **Scheduling (Posting Time):** XGBoost regression, a robust, explainable model for optimizing when to post (using engagement/time data).

### Why these models?

They represent cutting-edge AI that's proven in creative and predictive sectors, and offer the APIs/support we need for quick, affordable prototyping.

## 11. Hyperparameters & Training Choices

We test and tune a variety of parameters:

- Text model: max length, temperature, top-k/p for control over generation
- Image model: steps, prompt scale, seed for best image fidelity/creativity
- XGBoost: tree number, depth, learning rate for a sweet spot between bias and variance

Every value is backed by small-scale experiments, balancing speed, quality, and what our target users expect from ad content and delivery.

## 12. Training & Validation

We split our data (typically 80/20 train/test) and use standard metrics:

- Text: BLEU, ROUGE for how well our copy matches or improves on real-world ads
- Image: FID or Inception Score to check image realism and diversity
- Regression: RMSE or MAE for scheduling accuracy

Performance checks happen every training run, and we plan for cross-validation to ensure our results aren't just "lucky guesses."

## 13. User Flow & Experience

CampaignIQ is designed so users don't need to think about tech—they just enter a simple campaign idea, add a logo/brand color, and off it goes. The platform takes care of the heavy AI lifting, serving up previews, timing suggestions, and export options, all on one screen.