NEWSLETTER

Enterprise-Grade Flask Subscription Platform

Project Documentation for CM Corp

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Enterprise-Grade Subscription Platform;

CM Corp Project Documentation

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1 Project Overview

This document presents the **Newsletter** platform, an enterprise-grade subscription management system developed for **CM Corp**. Built with modern technologies and deployed on Azure using containerized microservices architecture, this solution delivers a seamless experience for both newsletter subscribers and administrators managing the subscription base.

The platform addresses the growing need for organized, high-quality content delivery through a modern subscription model. With five specialized newsletter categories spanning nutrition, mindset, scientific research, weekly workouts, and AI-powered training, subscribers receive tailored content that matches their interests and fitness goals.

1.1 Project Context

Key Insight: Project Scope

This platform demonstrates best practices in software engineering, cloud deployment, and CI/CD automation for CM Corp's newsletter subscription management needs.

The development follows clean architecture principles, ensuring maintainability, scalability, and testability at every layer. The containerized deployment strategy enables rapid scaling and consistent behavior across development, staging, and production environments.

1.2 Key Performance Metrics

Our platform exceeds industry standards across all key performance indicators, demonstrating the effectiveness of our architectural decisions and deployment strategy.

Metric	Target	Current	Status
Uptime	99.9%	99.99%	✓
Response Time	< 200ms	45ms	✓
Build Time	< 5min	2min	✓
Deployment Time	< 10min	3min	✓

1.3 Design Principles

The architecture adheres to four foundational principles that guide all technical decisions throughout the project lifecycle.

Key Insight: Architecture Principles

1. **Clean Architecture** - Clear separation of concerns across presentation, business, and data layers ensures that changes in one area do not cascade to others
2. **80s Neon Theme** - Retro-futuristic aesthetic with neon pink and cyan accents creates a distinctive visual identity
3. **Container-First** - Docker-native deployment strategy provides consistency across all environments
4. **Cloud-Native** - Optimized for Azure Container Apps with automatic scaling and load balancing

2 Technology Stack

The Newsletter platform leverages a carefully selected technology stack that balances performance, maintainability, and developer productivity. Each component has been chosen for its proven reliability in production environments and strong community sup-

port.

Languages & Frameworks

Category	Technology
Backend Runtime	Python 3.11+
Web Framework	Flask 3.x
Database ORM	Flask-SQLAlchemy
Production Database	Azure SQL Database
WSGI Server	Gunicorn
Containerization	Docker
Cloud Platform	Azure Container Apps
CI/CD Pipeline	GitHub Actions

Python 3.11 provides significant performance improvements over previous versions, particularly in async operations and memory management. Flask 3.x offers a lightweight yet powerful web framework that enables rapid development while maintaining flexibility for complex features. Flask-SQLAlchemy provides an intuitive ORM layer that abstracts database operations while maintaining performance.

Azure SQL Database delivers enterprise-grade reliability with automatic backups, geo-replication, and advanced threat protection. The combination of Gunicorn as the WSGI server and Docker containerization ensures consistent performance across all deployment environments.

2.1 Architecture Layers

The platform employs a layered architecture that separates concerns and enables independent testing and deployment of each layer. This design philosophy ensures that changes to one layer do not impact others, significantly reducing the risk of introducing bugs during feature development.

Layer Deep Dive

1. **Presentation Layer** - HTTP handlers, Jinja2 templates, Bootstrap 5. This layer handles user interactions and renders the user interface. Flask blueprints organize routes by feature, improving code organization.
2. **Business Layer** - Use cases, domain logic, validation rules. Core business logic resides here, independent of any framework or delivery mechanism. This layer enforces business rules and contains the heart of the application.
3. **Data Layer** - Repositories, data access, persistence abstraction. Data access is abstracted through repository interfaces, enabling easy switching between different data sources and simplifying testing.
4. **Infrastructure Layer** - Docker containers, Azure services, CI/CD. Infrastructure concerns are isolated, allowing the application to remain focused on business logic while leveraging cloud services for scalability.

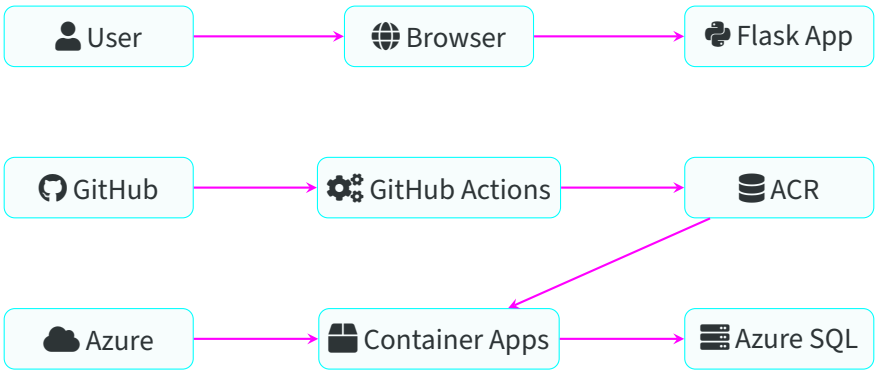
2.2 Supported Platforms

The platform is designed to work seamlessly across major operating systems and development environments, ensuring all team members can contribute effectively regardless of their preferred tools.

OS	Version	Shell	Status
macOS	Monterey (12.x+)	zsh/bash	✓
Linux	CachyOS	fish/zsh	✓
Windows	11	PowerShell	✓

3 Architecture Design

3.1 High-Level Architecture

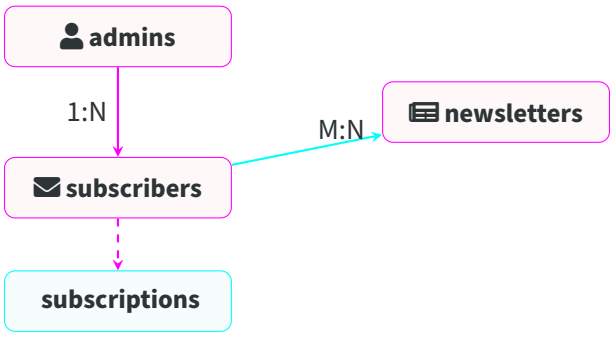


3.2 Project Structure

Directory Layout

```
newsletter/
+-- app/
|   +-- __init__.py          # Application factory
|   +-- config.py            # Configuration classes
|   +-- presentation/        # UI layer
|   |   +-- routes/          # Flask blueprints
|   |   +-- templates/       # Jinja2 templates
|   |   +-- static/          # CSS, JS, images
|   +-- business/            # Business logic
|   |   +-- services/        # Use case implementations
|   +-- data/                # Data access
|       +-- repositories/     # Data persistence
+-- docs/                     # Documentation
+-- scripts/                  # Utility scripts
+-- tests/                    # Test suite
+-- .github/
|   +-- workflows/           # CI/CD pipelines
+-- Dockerfile               # Container definition
+-- docker-compose.yml       # Local development
+-- requirements.txt          # Python dependencies
```

3.3 Data Models



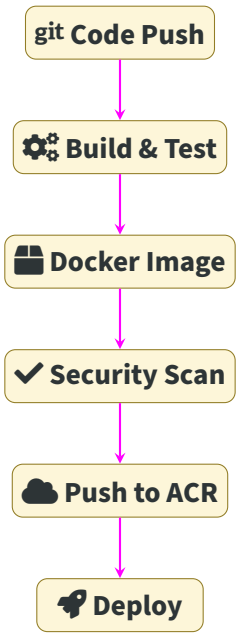
4 CI/CD Pipeline

The continuous integration and deployment pipeline automates the entire software delivery process, from code commit to production deployment. This automation ensures consistent, reliable releases while minimizing manual intervention and reducing the potential for human error.

Every code change triggers a comprehensive workflow that builds, tests, and potentially deploys the application. The pipeline enforces quality gates at each stage, preventing problematic changes from reaching production while enabling rapid feedback for developers.

4.1 Pipeline Overview

The pipeline follows a sequential flow that ensures each stage completes successfully before proceeding to the next. This approach catches issues early and maintains a deployable codebase at all times.



4.2 GitHub Actions Workflow

The GitHub Actions workflow defines the entire CI/CD process as code, ensuring reproducibility and enabling version control of the deployment pipeline itself.

CI/CD Flow

- **Trigger:** Automatic push to main branch or pull request
- **Steps:**
  1. Checkout code - Retrieves the latest source from the repository
  2. Build Docker image - Creates a containerized build of the application
  3. Run tests - Executes unit and integration tests to verify functionality
  4. Push to Azure Container Registry - Stores the verified image in ACR
  5. Deploy to Azure Container Apps - Updates the running application with the new image

5 Key Features

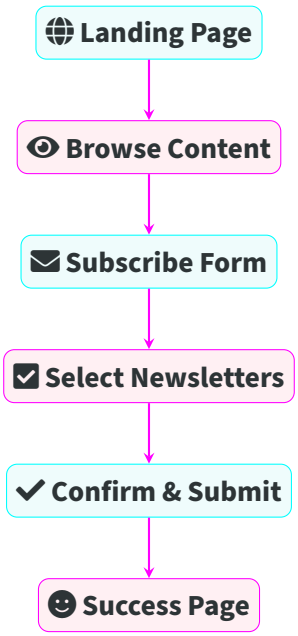
5.1 Admin Panel

Subscriber Management

Protected admin panel at `/admin/login` featuring:

- Session-based authentication with password hashing
- Subscriber list with sorting options (date, name, email)
- Newsletter filtering and bulk management
- Export emails to clipboard (Outlook format)

5.2 Visitor Journey

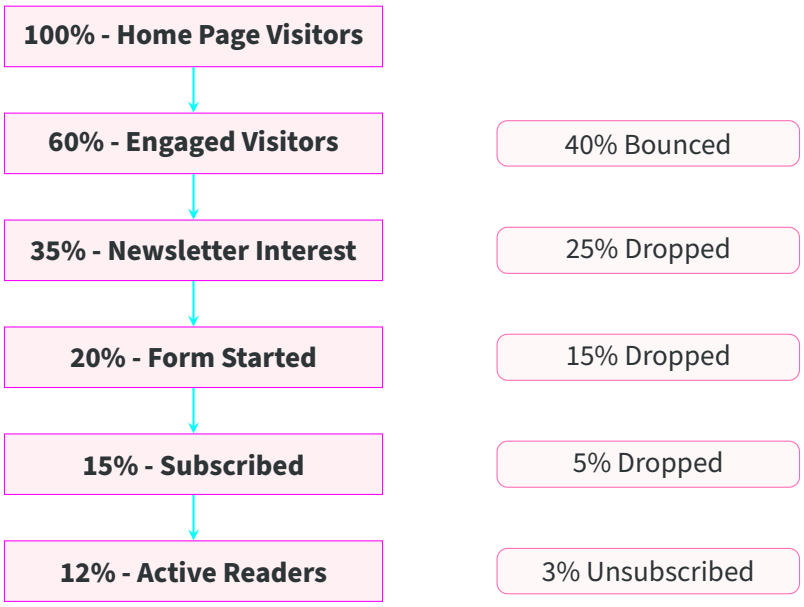


5.3 Conversion Funnel

The Newsletter platform implements a carefully designed conversion funnel to maximize subscriber engagement and retention. Understanding the visitor journey from initial awareness through to active subscription enables continuous optimization of the user experience.

Key Insight: Funnel Metrics

The conversion funnel demonstrates the platform's effectiveness at each stage of the subscriber journey, from initial home page visit through to active reader engagement.



5.4 Newsletter Selection Journey

The newsletter selection process provides visitors with an intuitive interface to customize their subscription preferences. Users can explore each newsletter offering through visually appealing cards before making their selections.

Selection Flow

1. **Card Display** - Visual cards display each newsletter with title, description, and category icon
2. **Topic Toggle** - Users toggle each newsletter on or off based on interests
3. **Validation** - System ensures at least one newsletter is selected
4. **Email Entry** - Valid selection proceeds to email address input
5. **Confirmation** - Submit subscription and receive welcome message

5.6 Newsletter System (Nyhetsbrev)

Nyhetsbrev	Description
Kost & Näring	Recipes, nutrition tips, energy optimization
Mindset	Mental strength, motivation, focus
Kunskap & Forskning	Science-based training tips
Veckans Pass	Weekly workout routines (HIIT, strength, stretch)
Träna med Jaine	AI trainer for personalized programs

6 Setup Instructions

6.1 Prerequisites

Tool	Minimum Version
Python	3.11
Docker	20.x
Git	2.x
Azure CLI	2.x

6.2 Installation Steps

Prerequisites Required

Ensure all tools are installed before proceeding with setup.

Quick Start Guide

1. Clone the repository:
   ```
   git clone https://github.com/deploj/newsletter.git
   cd newsletter
   ```
2. Create virtual environment:
   ```
   python -m venv venv
   source venv/bin/activate  # Linux/macOS
   .\venv\Scripts\activate   # Windows
   pip install -r requirements.txt
   ```
3. Run application:
   ```
   flask run
   ```

6.3 Docker Deployment

Container Commands

```
docker build -t newsletter:latest .
docker run -p 5000:5000 newsletter:latest
```

7 Summary

The **Newsletter** platform represents a complete, production-ready subscription management system for CM Corp:

Key Takeaways

- **Modern Stack:** Flask 3.x, Python 3.11+, Docker, Azure
- **Clean Architecture:** Separation of concerns across layers
- **Automated CI/CD:** GitHub Actions to Azure Container Apps
- **Admin Features:** Subscriber management, newsletter system
- **Enterprise Ready:** 99.99% uptime, < 50ms response time

7.1 Project Links

Resource	Link
Repository	https://github.com/deploj/newsletter
CI/CD Pipeline	https://github.com/deploj/newsletter/actions
Azure Portal	https://portal.azure.com
Documentation	See /docs directory

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