System Design Document: Influencer - Marketing Analysis System

1. Introduction

1.1 Purpose

This document explains the detailed system design of our Social Media Influencer Marketing Analysis System. It reports on the project's architecture, database, API structure, security measures, and scalability.

1.2 Scope

The system will allow e-commerce companies to analyze how successful or unsuccessful an influencer-led campaign has been in their advertising efforts. It will enable detailed measurement and observation of the expenses made from the budget, the conversion rates of those expenses into sales, and return on investment (ROI).

1.3 Target Audience

- Software Developers
- Database Administrators
- Data Analysts
- Marketing Teams

2. General Overview

2.1 Architecture

It will consist of three main layers:
- **Frontend:** A web-based dashboard for analysis and reporting.
- **Backend:** A RESTful API service for data processing.
- **Database:** A relational database (PostgreSQL) for structured data storage.

Technologies:
- **Frontend:** React.js
- **Backend:** Python (Django/Flask)
- **Database:** PostgreSQL
- **Authentication:** JWT
- **Cloud Deployment:** Azure

3. System Components

3.1 User Management Module

Manages user accounts within the system.
• User registration, secure login, and authentication processes
• Role-based access control: different permission levels such as Admin, Marketing Manager, Data Analyst, Campaign Manager, Finance Manager
• Password recovery and account deletion features
• Additional security via Two-Factor Authentication (2FA)

3.2 Influencer Analysis Module

Module for tracking and analyzing influencer performance.
• Automatic import of influencer campaign data (spending, engagement, conversion rates)
• Analyzing influencer performance metrics (CTR, ROI, revenue contribution)
• Ranking algorithm to determine the most effective influencers

3.3 Campaign Management Module

Manages influencer campaigns run by brands.
• Create, edit, and manage campaigns (budget, influencer selection, campaign duration)
• Measure campaign success: conversion rates, ROI, customer engagement
• Target audience analysis for better influencer recommendations
• Reporting and visualization: detailed graphs for campaign performance

3.4 Finance and Payment Management Module

Manages influencer payments, campaign budgets, and financial analysis.
• Tracking and calculating influencer payments (performance-based model)
• Campaign budget planning and expense reports
• Analysis of financial data from sales and returns
• Identifying most profitable collaborations through influencer ROI calculations

3.5 Product and Sales Analysis Module

Analyzes sales performance on the e-commerce platform.
• Track return rates and perform influencer-based return analysis (e.g., which influencer referrals result in more returns)
• Generate category-based sales reports

3.6 Reporting and Visualization Module

Visual report analysis of campaign, influencer, and financial data.
• Detailed reporting with custom filtering options (time range, influencer, campaign-based)
• Graphical visualizations (bar charts, pie charts, line graphs)
• Report downloads in formats such as Excel, PDF, CSV

4. Database Design

Customers Table

COLUMN	TYPE	CONSTRAINTS	DESCRIPTION
customer_id	SERIAL (PK)	NOT NULL	Customer Unique ID
customer_name	VARCHAR(50)	NOT NULL	Customer Name
customer_mail	VARCHAR(255)	NOT NULL, UNIQUE	Customer e-mail Address
customer_phone	VARCHAR(15)	NOT NULL,UNIQUE	Customer Phone Number
customer_address	TEXT	NOT NULL	Customer Address
channel	INTEGER	DEFAULT -1	Channel the Customer Came From
since	DATE	NOT NULL, CHECK (<= CURRENT_DATE)	Channel Registration Date
is_account_deleted	BOOLEAN	NOT NULL	Is Account Deleted?

Products Table

COLUMN	TYPE	CONSTRAINTS	DESCRIPTION
product_id	SERIAL (PK)	NOT NULL	Product Unique ID
stock_quantity	INTEGER	NOT NULL, CHECK (>= 0)	Product Stock Quantity
category	VARCHAR(100)	NOT NULL	Product Category
sales_quantity	INTEGER	NOT NULL, CHECK (>= 0)	Number of Sales
description	TEXT	-	Product Description
product_price	DOUBLE PRECISION	NOT NULL, CHECK (>= 0)	Product Prices
on_sale	BOOLEAN	NOT NULL	Whether the Product is on Sale or Not
title	VARCHAR(100)	NOT NULL	Name of the Product Ad

Influencers Table

COLUMN	TYPE	CONSTRAINTS	DESCRIPTION
influencer_id	SERIAL (PK)	NOT NULL	Influencer's Unique ID
influencer_name	VARCHAR(50)	NOT NULL	Influencer Name
platform	VARCHAR(50)	NOT NULL	Platform Active On
follower_count	INTEGER	NOT NULL, CHECK (>= 0)	Number of Followers
clicked_number	INTEGER	NOT NULL, CHECK (>= 0)	Number of Clicks
category	VARCHAR(100)	NOT NULL	Influencer's Category
influencer_mail	VARCHAR(255)	NOT NULL, UNIQUE	Influencer e-mail Address
still_partner	BOOLEAN	NOT NULL	Still a Partner?
member_since	DATE	NOT NULL, CHECK (<= CURRENT_DATE)	Influencer Participation Date

Users Table

COLUMN	TYPE	CONSTRAINTS	DESCRIPTION
user_id	SERIAL (PK)	NOT NULL	User ID
user_role	user_role_enum	NOT NULL	User Role (enum)
user_mail	VARCHAR(255)	NOT NULL, UNIQUE	User e-mail Address
user_name	VARCHAR(50)	NOT NULL	Username
user_password	VARCHAR(100)	NOT NULL	Password
is_active	BOOLEAN	NOT NULL	Is User Still Active or Not
member_since	DATE	NOT NULL, CHECK (<= CURRENT_DATE)	Membership Start Date

Campaigns Table

COLUMN	TYPE	CONSTRAINTS	DESCRIPTION
campaign_id	SERIAL (PK)	NOT NULL	Campaign ID
campaign_name	VARCHAR(50)	NOT NULL	Campaign Name
start_date	DATE	NOT NULL, CHECK (<= end_date)	Campaign Start Date
end_date	DATE	NOT NULL	Campaign End Date
budget	NUMERIC(10,2)	NOT NULL, CHECK (>= 0)	Campaign Budget

Arranges Table

COLUMN	TYPE	CONSTRAINTS	DESCRIPTION
product_id	INTEGER	NOT NULL, FK (products) ON DELETE CASCADE	Product ID
influencer_id	INTEGER	NOT NULL, FK (influencers) ON DELETE CASCADE	Influencer ID
user_id	INTEGER	NOT NULL, FK (users) ON DELETE CASCADE	User ID
campaign_id	INTEGER	NOT NULL, FK (campaigns) ON DELETE CASCADE	Campaign ID

Payment Table

COLUMN	TYPE	CONSTRAINTS	DESCRIPTION
campaign_id	INTEGER	NOT NULL, FK (campaigns) ON DELETE CASCADE	Campaign ID
influencer_id	INTEGER	NOT NULL, FK (influencers) ON DELETE CASCADE	Influencer ID
amount	NUMERIC(10,2)	NOT NULL, CHECK (>= 0)	Payment Amount
status	enum	NOT NULL	Payment Status
date	DATE	NOT NULL	Payment Date

Adjusts Table

COLUMN	TYPE	CONSTRAINTS	DESCRIPTION
user_id	INTEGER	NOT NULL, FK (users) ON DELETE CASCADE	User ID
product_id	INTEGER	NOT NULL, FK (products) ON DELETE CASCADE	Product ID
date_time	TIMESTAMP	NOT NULL, CHECK (<= CURRENT_TIMESTAMP)	Edit Date
is_active	BOOLEAN	NOT NULL	Is Active?
field	adjust_field_enum	NOT NULL	Modified Field
old_value	DOUBLE PRECISION	NOT NULL, CHECK (>= 0)	Previous Value
new_value	DOUBLE PRECISION	NOT NULL, CHECK (>= 0)	New Value

Bought By Table

COLUMN	TYPE	CONSTRAINTS	DESCRIPTION
product_id	INTEGER	NOT NULL, FK (products) ON DELETE CASCADE	Product ID
customer_id	INTEGER	NOT NULL, FK (customers) ON DELETE CASCADE	Customer ID
status	bought_status_enum	NOT NULL	Purchase Status (enum)
channel	INTEGER	DEFAULT -1	Sales Channel
rating	INTEGER	CHECK (1 <= rating <= 5)	Product Rating
quantity	INTEGER	CHECK (quantity > 0)	Quantity Purchased
bought_date	DATE	CHECK (<= CURRENT_DATE)	Purchase Date

Liked By Table

COLUMN	TYPE	CONSTRAINTS	DESCRIPTION
customer_id	INTEGER	NOT NULL, FK (customers) ON DELETE CASCADE	Customer ID
product_id	INTEGER	NOT NULL, FK (products) ON DELETE CASCADE	Product ID
channel	INTEGER	DEFAULT -1	Channel Liked On
liked_date	DATE	CHECK (<= CURRENT_DATE)	Date Liked

5. Security Measures

- **User Authentication:** Secure login with JWT
- **Data Encryption:** Encryption for sensitive financial data
- **Access Control:** Role-based permission restrictions for data access
- **Audit Logs:** Logging of system actions for security monitoring

6. Scalability and Performance

- **Load Balancing:** To handle high traffic during campaign analysis
- **Database Optimization:** Indexing and caching mechanisms to increase query speed
- **Cloud Auto-Scaling:** Dynamic resource allocation based on system usage

7. Conclusion

This document covers the design, architecture, database, API structure, security measures, and scalability features of the Influencer Marketing Analysis System. The system will ensure efficiency in influencer marketing analysis.