

# Customer Churn Prediction Tool

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## Executive Summary

Project Type: Web Application

**The Customer Churn Prediction Tool is an intelligent analytics system that helps businesses identify customers who are likely to stop using their product or service before it actually happens.**

### Core Features

- Reduce customer attrition
- Improve customer lifetime value (CLV)
- Optimize retention campaigns

### Constraints

- Performance
- Cost
- Security

User Scale: 100-1000 MAU, 10 concurrent users

## System Overview

### Functional Goals

- Predict customer churn risk at an individual customer level
- Provide actionable insights to reduce customer loss
- Enable proactive retention strategies

### Non-Functional Requirements

- High accuracy of predictions
- Fast processing of large datasets
- Secure handling of sensitive customer data

### Primary User Personas

- Business analyst
- Marketing manager

## Architecture Design

The Customer Churn Prediction Tool will be built using a microservices architecture, with separate services for data ingestion, predictive analytics, and visualization.

### System Components

Component	Responsibility	Technologies	Interfaces
Data Ingestion Service	Collect and process historical customer data	Apache Kafka, Apache Spark	REST API
Predictive Analytics Service	Train and deploy machine learning models for churn prediction	TensorFlow, Scikit-learn	REST API
Visualization Service	Create interactive dashboards for business users	Tableau, D3.js	Web application

## Database Design

Database Type: Relational database

High availability, high performance

### Table: customers

Column	Type	Nullable	Description
customer_id	int	False	Unique customer identifier
name	varchar	False	Customer name
email	varchar	False	Customer email
phone	varchar	False	Customer phone number

### Table: churn\_risks

Column	Type	Nullable	Description
customer_id	int	False	Unique customer identifier
churn_risk	float	False	Churn risk score
prediction_date	datetime	False	Date of prediction

## Cost Estimation

Cost Item	Monthly Cost	Rationale
Infrastructure costs	\$1000.0	Cloud infrastructure costs
Personnel costs	\$5000.0	Employee salaries and benefits
Software costs	\$500.0	Software licenses and subscriptions

## Testing & QA Strategy

Unit testing – Individual components

Integration testing – Component interactions

End-to-end testing – Full system

Load and stress testing – System performance

Security testing – System security

## Appendices

### Glossary

Churn risk: The likelihood of a customer stopping use of a product or service

Predictive analytics: The use of statistical models and machine learning algorithms to predict future events

Retention campaigns: Marketing campaigns aimed at retaining customers

### References

[https://en.wikipedia.org/wiki/Customer\\_churn](https://en.wikipedia.org/wiki/Customer_churn)

[https://en.wikipedia.org/wiki/Predictive\\_analytics](https://en.wikipedia.org/wiki/Predictive_analytics)

This document provides a comprehensive overview of the Customer Churn Prediction Tool.

## System Architecture & Diagrams

### System Architecture Diagram (Mermaid Code):

flowchart LR

User -->| Requests | API\_Gateway

API\_Gateway -->| Routes | Predictive\_Analytics\_Service

Predictive\_Analytics\_Service -->| Uses | Data\_Ingestion\_Service

```
Data_Ingestion_Service -->| Provides | Predictive_Analytics_Service
Predictive_Analytics_Service --> API_Gateway
API_Gateway --> User
```

### **User Flow Diagram (Mermaid Code):**

```
graph TD
    Start --> Login
    Login --> Predictive_Analytics
    Predictive_Analytics --> Retention_Campaigns
    Retention_Campaigns --> End
```

### **Database ER Diagram (Mermaid Code):**

```
erDiagram
    CUSTOMERS ||--o{ CHURN_RISKS : predicts
```