

# 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
<b>Data Ingestion Service</b>	Collect and process historical customer data	Apache Kafka, Apache Spark	REST API
<b>Predictive Analytics Service</b>	Train and deploy machine learning models for churn prediction	TensorFlow, Scikit-learn	REST API
<b>Visualization Service</b>	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
<b>customer_id</b>	int	False	Unique customer identifier
<b>name</b>	varchar	False	Customer name
<b>email</b>	varchar	False	Customer email
<b>phone</b>	varchar	False	Customer phone number

**Table: churn\_risks**

Column	Type	Nullable	Description
<b>customer_id</b>	int	False	Unique customer identifier
<b>churn_risk</b>	float	False	Churn risk score
<b>prediction_date</b>	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):**

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

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

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