# Bank Loan Analysis Project Documentation

## Introduction

This project aims to analyze bank loan data using MS SQL Server and Power BI. The goal is to extract key insights, track loan performance, and assist decision-makers in optimizing lending strategies. The analysis covers loan application trends, funded amounts, borrower risk factors, and regional loan distributions.

## Project Objectives

1. To analyze loan application trends and track financial performance.

2. To categorize loans as 'Good' or 'Bad' based on repayment data.

3. To identify regional and employment-based lending patterns.

4. To create interactive dashboards for real-time insights.

## MS SQL Server - Part 1: Data Analyst Portfolio Project

1. Import Data  
 - Using MS SQL Server

### Database Creation & Query Execution

- Creating Database in MS SQL Server

- Writing SQL Queries for Business Problem Solving

- Using SQL Joins, Aggregate Functions, and Subqueries

- Comparing Results with Power BI, Tableau, and Excel

## Data Cleaning & Preprocessing

- Handling missing values and incorrect data types.

- Removing duplicate records and normalizing data.

- Standardizing date formats and financial figures.

- Using SQL functions like CAST, CONVERT, and STRING manipulation.

## Power BI - Part 2: Data Visualization & Reporting

1. Data Connection & Analysis  
 - Connecting to MS SQL Server from Power BI

## Dashboard 1: Summary

Key Performance Indicators (KPIs):

- Total Loan Applications (including Month-to-Date and Month-over-Month tracking)

- Total Funded Amount (disbursed loans and MTD changes)

- Total Amount Received from borrowers for cash flow monitoring

- Average Interest Rate to assess lending cost fluctuations

- Average Debt-to-Income Ratio (DTI) to evaluate borrower financial health

## Dashboard 2: Overview

Key Visualizations:

- Monthly Trends by Issue Date (Line Chart) to identify seasonal lending trends.

- Regional Analysis by State (Filled Map) to understand geographical loan distribution.

- Loan Term Analysis (Donut Chart) to observe loan term preferences.

- Employment Length Analysis (Bar Chart) to analyze loan approvals based on job tenure.

- Loan Purpose Breakdown (Bar Chart) to highlight why borrowers seek financing.

- Home Ownership Analysis (Tree Map) to assess the impact of home ownership on loans.

## Dashboard 3: Loan Details

- To provide a comprehensive overview of loan data in a single dashboard.

- To assist decision-makers in evaluating borrower risk profiles and loan health.

- To enhance transparency with real-time metrics for monitoring performance.

## Advanced SQL & Power BI Functionalities

### SQL Skills:

- Using CTEs, Window Functions, and Indexing.

- Data Cleaning and Query Optimization.

### Power BI Skills:

- DAX Functions, KPI Calculations, Row-Level Security.

- Interactive Dashboards with Filters & Slicers.

## Business Insights & Recommendations

1. \*\*Loan Performance Analysis\*\*: Loans with lower DTI ratios perform better.

2. \*\*Regional Lending Trends\*\*: Default rates vary by state; stricter assessments needed.

3. \*\*Interest Rate Optimization\*\*: High interest rates correlate with higher defaults.

4. \*\*Employment-Based Loan Approvals\*\*: Longer job tenure improves repayment rates.

## Software Used

- Microsoft SQL Server 2022

- SQL Server Management Studio (SSMS) 19.1

- Power BI (February 2025 Version)

- Microsoft Excel 2024

- Tableau (for comparison with Power BI)