**Project Title:**

**Credit Scoring Model for Loan Applications**

**📝 Objective:**

To build a data-driven credit scoring model to assess loan application risk, predict default probability, and visualize insights for better loan approval decisions.

**🔍 Tools & Technologies Used:**

* **Python:** Data preprocessing and model building
* **Excel:** Scorecard creation using IFS logic
* **SQL:** Data extraction and aggregation
* **Power BI:** Interactive dashboard and simulation model

**📊 Project Summary:**

This project analyzes customer loan application data to build a **credit scoring model** using statistical and machine learning techniques.

**🔧 Step-by-Step Workflow:**

**1. Data Preprocessing (Python):**

* Cleaned and prepared raw data (e.g., handling missing values, encoding categorical variables).
* Engineered new features such as **loan-to-income ratio**, **repayment time**, and **credit score groups**.
* Trained a **Random Forest classification model** to predict the loan default status (loan\_status).

**2. Scorecard Creation (Excel):**

* Created a manual scoring table using the IFS() function in Excel.
* Assigned risk points based on income, employment type, credit score, and term.
* Exported the scorecard for integration into Power BI visualizations.

**3. Data Querying (SQL):**

* Ran SQL queries to calculate:
  + Default count by **loan grade** and **income group**.
  + Average repayment time per borrower.
  + Default rates by **employment type** and **loan term**.

**4. Dashboard Visualization (Power BI):**

* Designed an **interactive Power BI dashboard** with multiple pages:
  + 📈 **Net Default Trend Analysis**
  + 📊 **Repayment Time and Default Rate Analysis**
  + 🧠 **Scorecard View**
  + 🤖 **ML-Based Predictions**
  + 🔁 **Bonus: What-If Simulation**

**🌟 Key Features:**

**✅ KPI Cards:**

* Displayed Net Defaults, Default % by Segment, Avg Repayment Time.

**✅ Charts:**

* Bar/Column charts for **Default Rate by Income Group**, **Employment Type**, and **Loan Grade**.
* Line chart for **default trends over time**.

**✅ Decomposition Tree:**

* Drilldown visualization from **total defaults** to **segments** (grade, employment type, etc.)

**✅ What-If Simulation (Bonus):**

* Built using **Power BI “What-If Parameter” feature**.
* Simulated default probability based on **loan amount, income, credit score, and term**.
* Used a simplified regression equation from the ML model for dynamic predictions.

**💡 Outcome:**

* Delivered a **credit scoring solution** with actionable insights.
* Enabled **real-time simulation** for decision-makers using interactive visuals.
* Supported model interpretability with a **manual scorecard** alongside ML outputs.