PROJECT REPORT ON

CREDIT CARD FINANCIAL DASHBOARD USING POWER BI

Submitted to

Department of Computer Applications in

partial fulfillment for the award of the degree

of

BACHELOR OF COMPUTER APPLICATION

Batch (2022-2025)

Submitted by

Name of the student: Reshma pun

Enrollment Number: 22212998

Under the Guidance of Ms.Ayushi Dwivedi

(Assistant Professor)

GRAPHIC ERA DEEMED TO BE UNIVERSITY DEHRADUN

December -2024

CANDIDATE'S DECLARATION

I hereby certify that the work presented in this project report entitled

"Credit card Financial dashboard using power BI "in partial fulfilment of the requirements

for the award of the degree of Bachelors of Computer Applications is a

Bonafede work carried out by me during the period of October2024 to December 2024 under the supervision of Ms.Ayushi Dwivedi(Assistant Professor) , Department of Computer Application, Graphic Era

This work has not been submitted elsewhere for the award of a degree/diploma/certificate.

Name and Signature of Candidate

This is to certify that the above mentioned statement in the candidate's declaration is correct to the best of my knowledge.

Date: _____   **Name and Signature of Guide**

Signature of Supervisor   **Signature of External Examiner**

HOD

Acknowledgement

I would like to express my sincere gratitude to all those who have contributed to the successful completion of this project. This project has been an incredible journey, and I am truly thankful for the support and guidance I have received.

First and foremost, I would like to extend my heartfelt thanks to [Ms.Ayushi Dwivedi], my project supervisor, for their invaluable guidance, encouragement, and constructive feedback throughout the project. Their expertise and willingness to share knowledge have been instrumental in shaping the direction of this work.

Candidate Name and Signature

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CHAPTER -- 1

INTRODUCTION

1.1 **Background**

In today's data-driven economy, businesses heavily rely on credit analysis to ensure financial stability and minimize risks. This is particularly critical in industries such as hospitality, where timely payments and effective credit management are essential to sustain operations.

Credit analysis involves evaluating the creditworthiness of customers and identifying potential risks associated with delayed or non-payments. Traditionally, this process relied on manual techniques, which were not only time-consuming but also prone to inaccuracies. The introduction of advanced tools like Power BI has transformed credit analysis by enabling businesses to process large datasets, uncover hidden trends, and make informed decisions in real-time.

For organizations like Diamond Peak Hotel, which manage diverse customer profiles, understanding credit behavior is essential. A thorough credit analysis helps the hotel:

1. Identify high-risk customers to prevent financial losses.

2. Monitor overdue payments to improve cash flow.

3. Segment customers by risk levels, allowing for tailored credit policies.

Evolution of Credit Analysis

Credit analysis has evolved significantly over the decades:

Manual Analysis: Involves reviewing financial statements and customer records.

Automated Tools: Tools like Excel and basic CRM systems streamlined data management.

Modern BI Platforms: Tools such as Power BI integrate machine learning and predictive analytics to offer actionable insights.

the shift toward Business Intelligence (BI) tools ensures that even small anomalies in credit patterns can be detected early, enabling businesses to implement corrective measures promptly

1.2 Objectives

The primary objective of this report is to employ Power BI to analyze Diamond Peak Hotel's historical credit and transactional data to derive actionable insights. The specific goals of the project include:

1. **Analyze Historical Credit Data**:
   To understand the payment patterns and credit behaviors of different customer segments. This includes identifying frequent late payers and categorizing them by risk level.

2. **Segment Customers by Credit Risk**:
   To create customer groups based on their payment behaviors and credit scores. This segmentation allows the hotel to tailor its credit management strategies for different types of customers.

3. **Develop Predictive Models**:
   To forecast future payment behaviors based on historical trends. For example, by identifying factors that indicate when a customer is likely to default, the hotel can take proactive steps to reduce overdue balances.

4. **Create Interactive Dashboards**:
   To visualize key metrics such as overdue amounts, payment timelines, and customer credit scores in a user-friendly manner, facilitating decision-making for management.

5. **Provide Actionable Recommendations**:
   Based on the data analysis, the report will propose strategies for improving the hotel's credit management policies. This includes suggestions for better risk mitigation, customer retention, and payment recovery.

1.3 **Scope**

The scope of this project focuses primarily on analyzing the historical credit data and generating insights that will assist in improving credit management at Diamond Peak Hotel. The main areas of focus include:

1.3.1 Credit Data Collection

- The project will begin by collecting and organizing historical credit data related to Diamond Peak Hotel's customer base. This will include:

    - **Payment histories**: Delays, frequency of late payments, and overdue balances.

    - **Credit scores**: For each customer, whether individual or corporate.

    - **Customer demographics**: Age, location, business type (for corporate clients), and other relevant factors.

1.3.2 Data Analysis Techniques

- Using Power BI, the data will be cleaned, processed, and transformed to create visual representations of payment trends, risk levels, and overdue amounts.

- **Statistical Analysis** will be employed to determine the factors that most influence customer payment behaviors, such as age, income level, or region.

- **Predictive Analytics** will be used to create models that can predict future payment behaviors, especially identifying customers at high risk of default.

1.3.3 Dashboards and Reporting

- **Power BI Dashboards**: Interactive dashboards will be created to visualize credit risk levels, overdue balances, and payment trends, allowing management to make real-time decisions.

- **Reports**: Detailed reports will summarize key findings and offer strategic recommendations for improving payment recovery rates and mitigating risks.

System Analysis & Requirements Specifications

2.1 Data Overview

The dataset includes information on customer credit activities:

- **Customer Demographics**: Age, location, and income.

- **Credit Data**: Balances, payment history, overdue payments.

- **Key Metrics**: Credit scores, risk indicators.

- Data analysis is the first and most critical step in any project. For this credit analysis, the raw data includes customer transactional data, credit scores, and payment histories. The primary focus is on identifying patterns in payment behavior, overdue balances, and customer demographics.
- The data provided consists of the following elements:

Field	Description	Type
Customer_ID	Unique identifier for customers	String
Credit_Score	Numerical score (0-850)	Integer
Overdue_Amount	Outstanding payments	Currency
Payment_Date	Last payment date	Date

2.1.1 Key Data Fields

1. **Customer Demographics**: Includes basic details of customers such as age, location, and occupation. These details help in understanding how different customer segments behave financially.

   o Example: Age, Gender, Geographic Location, Occupation.

2. **Credit History**: Consists of the customer's credit scores, balances, and the number of overdue payments.

o Example: Credit Score, Credit Limit, Outstanding Balances, Delinquency Rate.

3. **Payment History**: Contains records of the customer's payment behavior over time.

   o Example: Date of Payment, Amount Paid, Overdue Amount.

4. **Risk Indicators**: Includes metrics and factors used to identify the risk level of a customer based on their past behavior.

   o Example: Payment Delays, Credit Utilization Rate, Credit Default Rate.

2.1.3 Data Quality Considerations

- **Missing Data**: Ensure that the missing values in the dataset are either imputed or handled appropriately to avoid biased results.

- **Outliers**: Identify extreme values that may skew the analysis. For example, very high credit scores or unusually large overdue amounts might require special handling.

- **Data Consistency**: Verify that the data is consistent across all records (e.g., payment dates, amounts).

2.2 Challenges and Limitations

Despite the vast amounts of data available, there are several challenges that need to be addressed for a successful credit analysis. Below are the most significant challenges:

2.2.1 Data Preprocessing

Before the analysis can begin, the raw data requires significant cleaning and transformation to ensure its quality and usefulness. Some issues that might arise include:

- **Missing Values**: Certain records might have missing payment histories or demographic information. These gaps must be handled appropriately through imputation techniques or removal of the affected records.

- **Inconsistent Formats**: Dates or numeric values might be recorded in different formats across datasets (e.g., different date formats or currency symbols), which could hinder the analysis.

2.2.2 Large Data Volumes

Handling large volumes of data can be resource-intensive. Power BI allows handling vast datasets with its in-memory analytics engine. However, careful consideration is needed to ensure data is aggregated appropriately for real-time reporting and dashboard visualization.

2.2.3 Predictive Model Accuracy

Building accurate predictive models based on historical data can be challenging, especially when external factors (like market conditions, seasonality, or economic downturns) may influence credit behavior. Ensuring the accuracy and precision of these models requires iterative testing and validation. The model will also need to be periodically recalibrated as new data is collected.

2.3 Tools and Technologies

Several tools and technologies have been used to analyze the data and generate actionable insights. Below are the key tools employed for the project:

2.3.1 Power BI

Power BI is the primary tool for data visualization and reporting. It is used to create interactive dashboards that allow stakeholders to explore the data and gain insights into key metrics like overdue payments, risk levels, and payment trends.

Power BI Features Used:

Data Connectivity: Integration with SQL databases and Excel sheets to pull raw data into Power BI for analysis.

- **Data Modeling**: Creation of relationships between different datasets (e.g., customer demographics, credit history, payment history).
- **Dashboards**: Visual representation of key data points such as overdue amounts, payment trends, and customer segmentation.
- **Predictive Analytics**: Power BI's forecasting feature, powered by the Azure Machine Learning integration, is used to predict future overdue payments based on historical data.

2.4 Analysis Approach

1. **Data Cleaning**: Removing duplicates, filling missing values.
2. **Exploratory Data Analysis**: Identifying patterns, trends, and outliers.
3. **Segmentation**: Categorizing customers based on risk factors.
4. **Predictive Modeling**: Using tools to forecast overdue payments.

CHAPTER – 3

SYSTEM DESIGN

3.1 Overview of the System Design

In today's data-driven economy, businesses heavily rely on credit analysis to ensure

3.1 Overview of the System Design

System design is crucial to structuring an efficient approach for analyzing and managing credit data. In this chapter, we will describe how the data flows from its source to actionable insights within the Power BI platform. This design aims to simplify data management, enhance risk detection, and provide dynamic insights to stakeholders.

3.1.1 Key Objectives

- To design a comprehensive system that integrates all necessary data points for credit analysis.

- To ensure that the system allows for real-time monitoring and forecasting of overdue payments.

- To enable the creation of interactive dashboards to display results and insights for decision-makers.

3.2 Data Flow Design

The data flow design outlines the journey of the credit-related data from the initial collection to its final presentation in Power BI dashboards. It helps ensure that data is correctly processed, analyzed, and visualized.

3.2.1 Data Collection

- **Source Data**: The primary data source is customer credit data from Diamond Peak Hotel's internal system. This includes transactional data, customer credit scores, payment history, overdue amounts, and demographic information.

- **External Data**: If applicable, external data such as market conditions, regional economic factors, and payment trends will be integrated to refine credit risk predictions.

3.2.2 Data Integration

- **ETL Process (Extract, Transform, Load)**:

  o **Extract**: Data is extracted from different sources like databases, CSV files, or APIs.

  o **Transform**: Raw data undergoes transformation to correct errors, remove inconsistencies, and fill missing values. This process also standardizes data formats.

- **Load**: Once the data is clean, it is loaded into Power BI for visualization and further analysis.

3.2.3 Data Storage and Preprocessing

- The data will be stored in **structured data formats** (like SQL databases or CSV files) that Power BI can easily connect to for processing.

- **Preprocessing Steps**: The data will undergo cleaning to handle missing values, outliers, duplicates, and formatting issues. Key features like overdue balances, payment trends, and customer risk scores will be derived during this phase.

3.3 Components of the System

The system consists of several key components that work together to enable efficient credit data analysis and reporting. Each component has a specific role in the overall process.

3.3.1 Data Sources and Data Integration

- **Transactional Database**: Contains detailed customer transaction records, including payment amounts, dates, and outstanding balances.

- **CRM System**: Contains customer details such as demographics, credit history, and behavior.

- **External Data Providers**: These may include APIs or datasets with regional economic indicators, which can influence creditworthiness (e.g., inflation rate, unemployment rate).

3.3.2 Data Processing Engine

- The **Data Processing Engine** will process data, applying necessary transformations like normalization, aggregation, and calculation of new variables (e.g., overdue balances, risk levels).

- This engine also computes key performance indicators (KPIs) such as average overdue amounts, delinquency rates, and customer segmentation by risk.

3.3.3 Reporting and Visualization

- **Power BI Dashboards**: Visualizations will allow stakeholders to easily interpret key insights. Dashboards will display various visual representations such as bar charts, line graphs, heat maps, and predictive models.

  - **Customer Segmentation Dashboard**: Displays customer categories (e.g., high, medium, low risk) and their associated overdue amounts.

  - **Trend Dashboard**: Shows historical trends of payments, overdue balances, and credit score changes.

  - **Regional Risk Dashboard**: Visualizes credit risk by geographic location, identifying patterns in different areas.

3.3.4 Predictive Modeling

- **Machine Learning Models**: To predict future payment behavior and the likelihood of delinquencies, the system can integrate machine learning algorithms, such as logistic regression or decision trees. These models will be used to predict which customers are most likely to default in the near future.

  - **Training the Model**: The model will be trained using historical data, considering features like payment history, credit score, and demographic information.

  - **Model Evaluation**: The model will be evaluated using precision, recall, and F1-score to ensure that it provides accurate predictions.

3.4 System Architecture

The architecture of the credit analysis system can be divided into three primary layers:

1. **Data Layer**

   - Data sources (CRM, transaction data, external data providers) feed into the system. This layer is responsible for collecting and storing data.

2. **Processing Layer**

   - This layer handles the cleaning, transformation, and feature engineering of the data. Here, ETL processes are applied, and raw data is converted into usable forms for reporting.

3. **Presentation Layer**

   - Power BI is the primary tool for presenting insights. This layer includes dynamic reports, dashboards, and interactive visualizations that provide stakeholders with real-time insights into the data.

3.4.1 Data Security and Privacy

- Ensuring data security is paramount, especially when handling sensitive customer information. The system will implement security measures like:

  - **Data Encryption**: Protecting data in transit and at rest using encryption techniques.

  - **Access Control**: Only authorized personnel will have access to the credit analysis system and the data it contains.

  - **Compliance**: Ensuring that the system complies with relevant data privacy laws such as GDPR or other local data protection regulations.

3.5 Dashboard Design

The design of the dashboards is critical for presenting complex credit data in a digestible format. The key features of the Power BI dashboards will include:

3.5.1 Customer Overview

- Displays summary statistics on customer credit behavior, including:

    o Total overdue amount.

    o Credit score distribution.

    o Percentage of customers in high, medium, and low-risk categories.

3.5.2 Payment Trends

- Visualizes the overall trends in payments over time, highlighting months or seasons with higher delinquency rates.

3.5.3 Predictive Insights

- Predictive models in Power BI will show the probability of customer defaults based on historical data. This section helps forecast future trends and potential high-risk scenarios.

3.5.4 Segmentation

- Interactive filters will allow users to drill down into specific customer groups based on risk levels, demographics, and payment histories.

CHAPTER – 4

PROJECT MANAGEMENT

4.1 Project Planning and Scheduling

4.1.1 Project Development Approach (Process Paradigm) and Justification

The development approach for this project follows an Agile methodology, which emphasizes iterative progress, flexibility, and collaboration with stakeholders. The Agile approach is particularly suitable for this project due to the dynamic nature of the hotel's operations and the evolving requirements for credit analysis. Agile allows for frequent reassessments of priorities, feedback loops, and continuous integration of new data insights as the project progresses.

Justification for Agile Approach:

1. Iterative Process: Credit analysis involves continuous data updates and trend monitoring. An iterative process ensures the model is adjusted as new information becomes available.

2. Stakeholder Collaboration: Regular interactions with key stakeholders, such as the finance and data teams, are essential to adapt the dashboard designs and risk assessment models based on real-time business needs.

3. Flexibility: As unexpected challenges or changes in the hotel's customer base arise, Agile allows the project to pivot and adjust quickly.

4. Customer-Centric Focus: Agile supports the creation of prototypes and testing with end-users, allowing immediate feedback for refining the dashboards and data models.

By using this approach, the project can remain flexible, and necessary changes can be incorporated as the project evolves without the need for major overhauls.

Milestone	Deliverable	Completion Time
Project Kickoff	Initial meeting, scope definition	Week 1
Data Collection & Analysis	Cleaned and transformed datasets	Week 2-3
Dashboard Prototype	Initial Power BI dashboard	Week 4
Risk Segmentation Model	Risk analysis model development	Week 5
Forecasting Model Development	Predictive analytics model	Week 6
Final Testing & Review	Final dashboards, report and documentation	Week 7-8
Project Closure	Completed project report and presentation	Week 8

4.1.2 Project Plan Including Milestones, Deliverables, Roles, Responsibilities, and Dependencies

The following is a detailed project plan, outlining key milestones, deliverables, and roles for team members, as well as dependencies between tasks.

Project Milestones and Deliverables:

Roles and Responsibilities:

- **Project Manager** (You or Assigned Manager):
  - Oversee project execution, ensuring adherence to timelines and quality standards.
  - Coordinate between different teams and stakeholders.
  - Ensure communication channels remain open and address issues promptly.

. Data Analyst:

- o Handle data collection, cleaning, and transformation.

- o Analyze customer data to identify patterns, trends, and anomalies.

- **Power BI Developer**:

  - o Develop the dashboards, implement visualizations, and ensure that the Power BI platform integrates smoothly with the data.

- **Risk Analyst**:

  - o Focus on identifying and analyzing risks, ensuring all potential issues are addressed in the project.

- **Software Developer**:

  - o Responsible for creating predictive models and performing necessary coding for integration of analytical tools into the dashboard.

- **Testing Team**:

  - o Responsible for testing the project deliverables, ensuring dashboards function properly and data is accurate.

Dependencies:

- **Data Collection** must be completed before analysis can begin.

- **Dashboard Design** depends on completed data analysis and final segmentation.

- **Predictive Models** require insights from the initial risk analysis to be effective.

- **Final Testing** can only proceed once the dashboard and models are completed and integrated.

4.2 Risk Management

Effective risk management is crucial for ensuring the timely and successful delivery of this project. Potential risks need to be identified, analyzed, and planned for early on to avoid delays or obstacles.

4.2.1 Risk Identification

Risk identification is concerned with discovering potential risks that could impact the successful delivery of the project. Below are some possible risks:

- **Data Inaccuracies or Gaps**: There might be missing data or inconsistencies in the customer credit data, which could lead to inaccurate analysis or biased insights.

- **Technology Integration Issues**: There could be challenges integrating Power BI with existing data management systems, especially if systems are outdated or poorly documented.

- **Predictive Model Accuracy**: The predictive analytics model might not perform as expected if the data does not fit the assumptions or models used.

- **Budget Overruns**: Unforeseen costs, such as additional software or labor costs, could result in the project exceeding its budget.

- **Stakeholder Resistance**: Some stakeholders might be resistant to the proposed changes or updates, potentially delaying feedback or project progression.

4.2.2 Risk Analysis

Once risks have been identified, each should be analyzed in terms of its probability and impact. The risks identified above can be assessed as follows:

Justification of Risk Severity:

- **Data Inaccuracies**: Inaccurate data will directly affect the project's credibility and the insights derived from it. Hence, it's of high impact and high severity.

- **Technology Integration Issues**: While manageable, integration issues may cause delays in the implementation of dashboards or predictive models.

Risk	Mitigation Strategy
Data Inaccuracies or Gaps	Conduct thorough data audits early on. Implement data cleaning and validation checks.
Technology Integration Issues	Involve IT early in the process and conduct integration testing. Prepare for backup tools.
Predictive Model Accuracy	Use robust machine learning techniques and validate models with real-world data.
Budget Overruns	Keep a detailed cost estimate and monitor spending regularly. Have contingency funds available.
Stakeholder Resistance	Involve stakeholders early in the process, get their feedback, and align project outcomes with their goals.

- **Predictive Model Accuracy**: Since predictions drive much of the strategic decision-making, errors here can severely impact the outcome and require a rework.

- **Budget Overruns**: Although unlikely, budget overruns would result in delays or require extra approvals for funds, thus causing medium-level impact

Stakeholder Resistance: Resistance might delay progress but can be mitigated through proper stakeholder engagement and communication strategies.

4.2.3 Risk Planning

For each identified risk, specific strategies can be implemented to manage it effectively:

4.3 Estimation
4.3.1 Cost Analysis

The total cost of the project involves several components, including labor costs, software/hardware purchases, and additional costs such as training or third-party services. Below is a breakdown of the estimated costs:

Labor Cost Breakdown:

Area	Estimated Cost
Project Management	$5,000
Data Collection & Cleaning	$3,500
Data Analysis & Reporting	$4,000
Power BI Development	$6,000
Predictive Model Development	$5,500
Testing & Quality Assurance	$2,500
Documentation & Training	$2,000
Miscellaneous (Contingencies)	$2,000
Total Labor Cost	**$31,500**

Software and Hardware Costs:

Item	Cost
Power BI Licenses	$1,200
Computing Resources (Cloud, Servers)	$3,000
Miscellaneous Software	$1,000
Total Software/Hardware Cost	**$5,200**

Total Project Cost Estimate:

Total Cost (Labor + Software/Hardware): $36,700

This breakdown highlights the major cost centers in the project, which include labor, software, and resources for data handling and development. It's essential to monitor these costs throughout the project to avoid budget overruns and ensure the project is delivered on time and within scope.

CHAPTER 5:
INPUT DESIGN

5.1 Overview of Input Design

The input design is a critical component of the overall system, as it determines how efficiently and accurately data is captured and processed. Input forms should be designed in such a way that they are user-friendly, intuitive, and easy to navigate while ensuring that the data entered is valid, complete, and properly structured.

The primary input forms in this project are focused on:

1. **Customer Profile Input**: Captures demographic and financial details of the customers.
2. **Credit History Input**: Records customer payment behavior and overdue payments.
3. **Risk Assessment Input**: Allows users to input credit scores and other relevant financial data for risk evaluation.

Each of these screens will be developed with user experience (UX) in mind, ensuring smooth workflows and consistency across the system. Below are the details for each input form.

5.2 Customer Profile Input Form

Purpose:

The **Customer Profile Input Form** collects essential demographic information about the customer, which helps in segmenting customers for analysis. This form will allow the system to track customer behavior based on age, income, type of customer (corporate, individual, or event organizer), and other essential details that might influence credit behavior.

Fields:

Field	Description	Input Type
Customer ID	A unique identifier for the customer.	Auto-generated
Full Name	The customer's full name (first and last).	Text (required)
Email Address	Customer's email for communication and reminders.	Text (required)
Phone Number	The customer's phone number for direct contact.	Text (optional)
Address	Customer's residential or business address.	Text (required)
Customer Type	The type of customer (individual, corporate, event organizer).	Dropdown (required)
Income Range	Income level range (e.g., low, medium, high).	Dropdown (required)
Region	Geographical region (Urban/Suburban/Rural).	Dropdown (required)

Design Considerations:

- **Validation**: Required fields must be filled before submission. For example, phone numbers will be validated for proper formatting.

- **Error Handling**: If a user tries to leave a required field blank, a prompt will appear guiding them to complete it.

- **User Experience**: The form should be simple and not overwhelm the user with too many fields. Fields such as "Income Range" and "Region" will be drop-downs to standardize entries.

Input Workflow:

1. The customer's details are entered into the form.

2. Once the user completes the form, they can click **Submit** to save the data.

3. The data is then stored in a centralized database, linked to the customer's unique ID.

5.3 Credit History Input Form

Purpose:

The **Credit History Input Form** tracks payment behaviors and overdue payments for each customer. It includes payment history over time and identifies trends that indicate potential risks. This form is essential for understanding how a customer manages their finances and payments.

Fields:

Field	Description	Input Type
Customer ID	The unique ID assigned to the customer.	Auto-filled
Payment Date	Date of the payment.	Date Picker
Amount Paid	Total amount paid by the customer for that period.	Numeric (required)
Outstanding Amount	Amount that remains unpaid after the payment.	Numeric (required)
Payment Method	Method used to make the payment (e.g., Credit Card, Cash, Bank Transfer).	Dropdown (required)
Payment Status	Indicates whether the payment was on time or overdue.	Dropdown (required)

Design Considerations:

- **Pre-populated Customer ID**: The customer ID field is automatically filled when the customer's profile is selected, minimizing manual entry errors.

- **Dynamic Fields**: The form allows users to input payments for multiple months. For each new payment period, the user can click **Add Payment** to generate a new set of fields.

- **Validation**: The system will ensure that the **Amount Paid** and **Outstanding Amount** are numeric and that the **Payment Date** is a valid date.

Input Workflow:

1. The user selects a customer from the dropdown menu.

2. The user enters the **Payment Date**, **Amount Paid**, and **Payment Status** for each month.

3. The user clicks **Submit** to save the payment history, or they can add additional payment records.

4. The system validates the data and stores it in the **Customer Credit History Database**.

5.4 Risk Assessment Input Form

Purpose:

The **Risk Assessment Input Form** captures critical data needed to evaluate the creditworthiness of a customer. The primary data includes credit scores, payment delinquencies, and other financial metrics that will be used to assess the overall risk.

Fields:

Field	Description	Input Type
Customer ID	The unique ID for the customer being assessed.	Auto-filled
Credit Score	Numerical score representing the customer's creditworthiness.	Numeric (required)
Delinquency Count	Number of times the customer has missed payments.	Numeric (required)
Total Outstanding Debt	Total amount of debt the customer currently owes.	Numeric (required)
Risk Category	Based on analysis, categorizes the customer's risk level (Low, Medium, High).	Dropdown (auto-generated)

Design Considerations:

- **Auto-Generation**: The **Risk Category** field is auto-generated based on the **Credit Score** and **Delinquency Count** values, ensuring consistency in risk assessments.

- **Data Validation**: All numeric fields must be validated to ensure they are within acceptable ranges (e.g., **Credit Score** should be between 300 and 850).

- **Error Handling**: Any discrepancies, such as incorrect credit score values or missing fields, will prompt users to correct the data before submission.

Input Workflow:

1. The user inputs the **Credit Score**, **Delinquency Count**, and **Outstanding Debt** fields.

2. Based on the input data, the **Risk Category** is automatically generated.

3. The user clicks **Submit** to finalize the risk assessment and store the data in the **Risk Assessment Database**.

5.5 Conclusion

The **Input Design** chapter outlines the key forms that will be used to capture customer, payment, and risk assessment data for the credit analysis system. Each form is designed to be intuitive, easy to use, and to ensure data accuracy. The forms ensure that all required information is gathered and validated before being submitted into the database, where it can be processed, analyzed, and visualized.

These forms will feed into the broader system, which generates insights into credit risk and payment behaviors. By providing easy-to-understand input screens, users can effectively contribute to the data collection process, enabling the system to provide accurate and actionable reports.

IncomeGroup table (top)

Format: Text | Summarization: Don't summarize | Data category: Uncategorized | Sort by column | Data groups | Manage relationships | New column

```
IncomeGroup = SWITCH( TRUE(),'public cust_detail'[income]<35000,"low",'public cust_detail'[income]>=35000&& 'public cust_detail'[income]<70000,"med",'public cust_detail'[income]>=70000,"high","unknown")
```

Data: public cc_detail — activation_30, annual_fees, avg_utilization, card_category, client_num, credit_limit, current_week, current_year, customer_acq, delinquent_acc, exp_type, interest_earned, prev_week_rev, qtr, Revenue, total_revolving, total_trans_am, total_trans_ct, use_chip, week_num, week_num2, week_start_dat, wow_revenue, wow_revenue2; public cust_detail — agegroup, car_owner, client_num

agegroup table (bottom)

Format: Text | Summarization: Don't summarize | Data category: Uncategorized | Sort by column | Data groups | Manage relationships | New column

```
agegroup = SWITCH(true(),'public cust_detail'[customer_age]<30,"20-30",'public cust_detail'[customer_age]>30&&'public cust_detail'[customer_age]<40,"30-40",'public cust_detail'[customer_age]>=40&&'public cust_detail'
[customer_age]<50,"40-50",'public cust_detail'[customer_age]>=50&&'public cust_detail'[customer_age]<60,"50-60",'public cust_detail'[customer_age]<60,"60+","unknown")
```

customer_age	gender	dependent_count	education_level	marital_status	state_cd	zipcode	car_owner	house_owner	personal_loan	contact	customer_job	income	cust_satisfaction_score	IncomeGroup	agegroup
47	F	3	Graduate	Married	CA	91750	yes	no	yes	cellular	Blue-collar	37378	3	med	40-50
43	F	3	Graduate	Married	CA	91750	yes	no	yes	cellular	Selfemployed	57111	3	med	40-50
43	F	3	Graduate	Married	CA	91750	no	no	no	cellular	Selfemployed	1250	2	low	40-50
46	M	3	Graduate	Married	CA	91750	yes	no	no	cellular	White-collar	64783	2	med	40-50
58	F	3	Graduate	Married	CA	91750	no	yes	no	cellular	Retirees	48210	3	med	50-60
43	M	3	Graduate	Married	CA	91750	yes	yes	no	cellular	Selfemployed	87414	2	med	40-50
46	F	3	Graduate	Married	CA	91750	no	no	no	cellular	Selfemployed	14975	1	low	40-50
45	F	3	Graduate	Married	CA	91750	no	no	no	cellular	Businessman	43175	3	med	40-50
43	M	3	Graduate	Married	CA	91750	no	no	no	cellular	Govt	112593	2	med	40-50
47	F	3	Graduate	Married	CA	91750	no	no	yes	cellular	Selfemployed	39032	2	med	40-50
39	M	3	Graduate	Married	CA	91750	no	yes	yes	cellular	Govt	57930	2	med	30-40
37	M	3	Graduate	Married	CA	91750	yes	yes	no	cellular	Govt	76798	1	med	30-40
46	F	3	Graduate	Married	CA	91750	no	yes	yes	cellular	Retirees	22553	1	low	40-50
46	F	3	Graduate	Married	CA	91750	no	no	no	cellular	Selfemployed	9535	2	low	40-50
41	F	3	Graduate	Married	CA	91750	no	yes	no	cellular	Selfemployed	56312	1	med	40-50
42	F	3	Graduate	Married	CA	91750	no	no	no	cellular	White-collar	25311	1	low	40-50
35	F	3	Graduate	Married	CA	91750	no	no	no	cellular	Selfemployed	35387	1	med	30-40
42	F	3	Graduate	Married	CA	91750	no	no	no	cellular	Govt	34162	2	low	40-50
41	F	3	Graduate	Married	CA	91750	yes	no	no	cellular	Govt	30945	2	low	40-50
44	M	3	Graduate	Married	CA	91750	no	no	no	cellular	White-collar	78822	2	med	40-50
48	M	3	Graduate	Married	CA	91750	yes	no	no	cellular	Businessman	67908	3	med	40-50
35	M	3	Graduate	Married	CA	91750	yes	no	no	cellular	Retirees	69512	1	med	30-40
48	F	3	Graduate	Married	CA	91750	yes	yes	yes	cellular	Blue-collar	34850	1	low	40-50
46	F	3	Graduate	Married	CA	91750	no	no	no	cellular	Selfemployed	28815	2	low	40-50
41	F	3	Graduate	Married	CA	91750	no	no	no	cellular	Selfemployed	5525	3	low	40-50
48	F	3	Graduate	Married	CA	91750	yes	yes	no	cellular	Govt	35706	3	med	40-50
48	F	3	Graduate	Married	CA	91750	no	no	no	cellular	Businessman	53332	2	med	40-50
36	F	3	Graduate	Married	CA	91750	no	yes	no	cellular	Selfemployed	32038	1	low	30-40
43	F	3	Graduate	Married	CA	91750	no	yes	yes	cellular	Businessman	44807	1	med	40-50
48	F	3	Graduate	Married	CA	91750	yes	yes	no	cellular	Govt	24119	3	low	40-50
42	F	3	Graduate	Married	CA	91750	yes	yes	yes	cellular	Businessman	54107	3	med	40-50
48	F	3	Graduate	Married	CA	91750	yes	no	no	cellular	White-collar	23176	3	low	40-50
40	F	3	Graduate	Married	CA	91750	yes	no	no	cellular	Selfemployed	14144	3	low	40-50
35	M	3	Graduate	Married	CA	91750	no	no	yes	cellular	Businessman	80401	3	med	30-40
50	F	3	Graduate	Married	CA	91750	no	no	no	cellular	Blue-collar	56630	3	med	50-60

CHAPTER 5

OUTPUT DESIGN

The Output Design defines how data, insights, and actionable information will be presented to users after it is processed and analyzed through the system. A good output design ensures that the right information is displayed in a user-friendly format that helps stakeholders make informed decisions quickly. Below, we describe the various types of outputs and the design principles that will govern how these outputs are presented.

5.2.1 Credit Risk Dashboard (Interactive Overview)

Purpose:

The Credit Risk Dashboard is the central output where all key metrics related to customer credit, overdue payments, and financial risk are visualized. It serves as an interactive tool for quick decision-making and a real-time snapshot of the financial health of the customer base.

Features:

Risk Segmentation Overview:

Pie Chart: Displays the distribution of customers across different risk categories (High Risk, Medium Risk, Low Risk).

Bar Chart: A side-by-side comparison of overdue amounts for each customer segment, providing an immediate view of where financial risks lie.

Interactive Filtering: Allows users to filter customers by customer type (individual, corporate, event organizer), payment history, and regions (Urban, Suburban, Rural).

Overdue Payment Trends:

Line Graph: Tracks the trend of overdue payments over the past months or quarters. This helps identify any seasonal or recurring patterns, such as higher overdue payments during holiday seasons or after major events.

Tooltip: Hovering over any point on the graph will show specific details such as the exact overdue amount for that month and customer count.

Customer Insights:

Detailed List: A grid view displaying detailed information about the top customers with the highest overdue amounts. Each row could include:

Customer ID

Total Overdue Amount

Credit Score

Risk Category

Last Payment Date

Sorting/Filtering: Users can sort or filter by overdue amount, risk level, or credit score to focus on the highest-priority customers.

Drill-down Capability: Users can click on a customer name or ID to view a detailed history of payments, outstanding debts, and risk evaluations.

Payment History Visualization:

Stacked Bar Chart: This chart breaks down payments and overdue amounts month by month, allowing stakeholders to see how overdue amounts are growing or shrinking over time.

Trend Analysis: A trend line shows the general trajectory of overdue amounts and compares it with actual payments made.

Design Considerations:

Interactivity: The dashboard allows users to hover over elements for more detailed information, click on specific segments (e.g., high-risk customers), and adjust time periods or regions for tailored views.

Data Refresh: The dashboard will pull real-time data to ensure the information displayed is always up to date. Any changes in payment statuses or overdue amounts will reflect instantly.

Color Coding: Different risk levels and overdue amounts will be color-coded for quick visual reference (e.g., green for low risk, yellow for medium, red for high).

Accessibility: The design will consider accessibility needs, ensuring that charts and tables are legible with high contrast and that screen readers can interpret the data correctly.

5.2.2 Detailed Credit Report (Exportable PDF/Excel)

Purpose:

A detailed Credit Report will be generated periodically (monthly, quarterly, or annually) and can be exported as a PDF or Excel document. This report will provide a comprehensive view of the credit risk, payment patterns, and overall financial health of the customer base.

Features:

Executive Summary:

A high-level overview of key findings, such as the total overdue amounts, number of customers at risk, and general trends in payment behaviors. This will be aimed at senior management or external stakeholders.

Risk Assessment:

A detailed section that lists customers by risk category (High, Medium, Low) with a breakdown of overdue amounts and payment history.

Tables: Display customer names, credit scores, outstanding debt, and overdue amounts, allowing for easy identification of high-risk clients.

Payment History Summary:

Tabular View: Shows a summary of monthly payments for each customer, including paid amounts and overdue balances.

Trend Graph: A graph comparing the total amount of overdue payments versus total payments over the report period.

Forecast and Projections:

Forecasting Insights: Based on historical data, projections for future overdue amounts and risk assessments will be generated. This helps management to plan resources, make financial decisions, and implement risk mitigation strategies.

Recommendations Section:

Based on the analysis of overdue payments and credit risks, the report will include actionable recommendations. For example:

High-Risk Customers: Suggest strategies like adjusting payment terms or offering incentives for early payment.

Medium-Risk Customers: Recommend follow-up actions such as payment reminders or offering flexible repayment options.

Design Considerations:

Exportability: Users can export the report in both PDF (for presentation purposes) and Excel (for further analysis or data manipulation).

Formatting: Ensure that the report is well-structured, with a clear hierarchy (headings, subheadings) and visually distinct sections for easy navigation.

Automation: The report should be automatically generated on a set schedule and delivered to relevant stakeholders via email or downloadable from the dashboard.

5.2.3 Alerts and Notifications (Automated System)

Purpose:

Automated Alerts and Notifications will notify key stakeholders about critical issues such as overdue payments, high-risk customers, or any unusual financial activity.

Features:

Payment Due Alerts:

Automatic reminders sent to both customers and internal stakeholders when payments are approaching or overdue. Alerts will be customized based on the customer's profile (e.g., corporate clients may receive weekly reminders, while individual customers get a one-time reminder).

High-Risk Customer Alerts:

When a customer's credit score drops below a certain threshold or if overdue amounts exceed a predefined limit, an alert will be triggered. The system will notify the credit risk team with details about the customer and the nature of the risk.

Customizable Notification Settings:

Stakeholders can customize which notifications they wish to receive and how often. For example, finance team members may opt for daily summaries of overdue payments, while senior management may only require weekly updates.

Alert Delivery Channels:

Alerts will be sent via email, in-app notifications, or SMS (for critical issues), ensuring that the team is always informed and can take timely action.

Design Considerations:

Real-Time Delivery: Alerts should be delivered in real-time, ensuring no overdue payments or high-risk situations go unnoticed.

Clear Information: Each notification should contain essential details, such as the affected customer, overdue amount, and suggested actions.

User Control: Users should be able to manage the frequency and type of alerts they receive through a user-friendly settings page.

5.2.4 Customer Profile Summary (Customer-Specific Output)

Purpose:

The Customer Profile Summary is a detailed output view specific to each individual customer. This output will be useful for relationship managers or finance teams who need to monitor the financial status of specific customers.

Features:

Customer Information:

Displays basic demographic data, including customer type, contact details, and business information.

Credit History Overview:

A breakdown of all payments made by the customer, showing paid amounts, overdue amounts, and payment method for each period.

Risk Level Assessment:

Displays the customer's current credit risk level (Low, Medium, High) based on their payment history, overdue amounts, and credit score.

Debt Summary:

Total outstanding debt, overdue amounts, and payment trends.

Design Considerations:

Personalization: Each summary is tailored to the specific customer, pulling only relevant data from the system.

Export Functionality: Users can export the customer profile summary for meetings or internal review.

5.3 Conclusion

The Output Design chapter ensures that the system generates useful, actionable insights for users in various formats—dashboards for real-time decision-making, detailed reports for deep analysis, alerts for timely actions, and personalized customer profiles for targeted management. These outputs will empower stakeholders at all levels of the organization to respond quickly to potential issues and drive better financial outcomes for the hotel.

REPORT ANALYSIS:

1.OTR Revenue and Total Transaction count

At 14235480, Q3 had the highest Sum of Revenue and was 7.07% higher than Q4, which had the lowest Sum of Revenue at 13295001. Sum of Revenue and total Sum of total_trans_ct are positively correlated with each other. Q3 accounted for 25.74% of Sum of Revenue. Sum of Revenue and Sum of total_trans_ct diverged the most when the qtr was Q3, when Sum of Revenue were 14068914 higher than Sum of total_trans_ct.

2. Card Category:

At 46139398, Blue had the highest Sum of Revenue and was 3,962.97% higher than Platinum, which had the lowest Sum of Revenue at 1135608. Blue had the highest Sum of Revenue at 46139398, followed by Silver, Gold, and Platinum. Blue accounted for 83.41% of Sum of Revenue. Across all 4 card_category, Sum of Revenue ranged from 1135608 to 46139398.

3. Revenue By Age Group:

Total Sum of Revenue was higher for M (30221637) than F (2,50,93,773.19). 40-50 in gender M made up 24.45% of Sum of Revenue. Average Sum of Revenue was higher for M (50,36,939.51) than F (41,82,295.53). Sum of Revenue for M and F diverged the most when the agegroup was 40-50, when M were 2760319 higher than F.

4. REVENUE USE CHIP TYPE :

At 34912797, Swipe had the highest Sum of Revenue and was 916.15% higher than Online, which had the lowest Sum of Revenue at 3435790. Swipe had the highest Sum of Revenue at 34912797, followed by Chip at 16966823 and Online at 3435790. Swipe accounted for 63.12% of Sum of Revenue. Chip had 16966823 Sum of Revenue, Swipe had 34912797, and Online had 3435790.
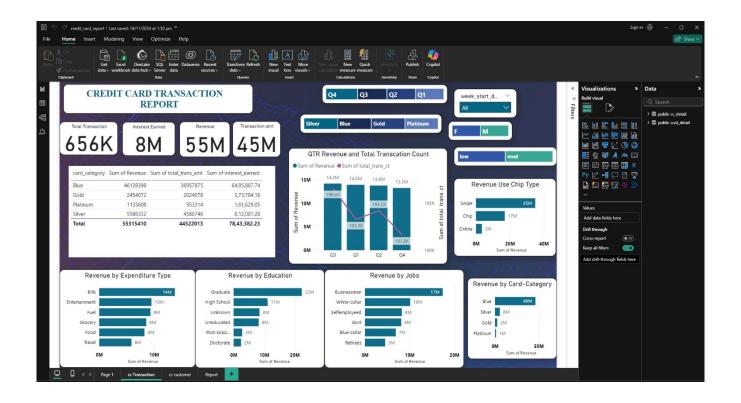
5. Revenue By Education

Total Sum of Revenue was higher for M (30221637) than F (2,50,93,773.19). Graduate in gender M made up 22.59% of Sum of Revenue. Average Sum of Revenue was higher for M (50,36,939.51) than F (41,82,295.53). Sum of Revenue for M and F diverged the most when the education_level was Graduate, when M were 2688227 higher than F.

6.Revenue By Jobs:

At 17387832, Businessman had the highest Sum of Revenue and was 283.40% higher than Retirees, which had the lowest Sum of Revenue at 4535184. [] Businessman accounted for 31.43% of Sum of Revenue. Across all 6 customer_job, Sum of Revenue ranged from 4535184 to 17387832.

7.Revenue By Week

Sum of Revenue for M (8.65% increase) trended up while F (28.15% decrease) trended down between Sunday, January 1, 2023 and Sunday, December 24, 2023. The most recent Sum of Revenue anomaly was on Sunday, May 21, 2023, when M had a high of 771655. Sum of Revenue for F started trending down on Sunday, November 26, 2023, falling by 19.13% (88710) in 28 days.

CREDIT CARD TRANSACTION REPORT

Q4 | Q3 | Q2 | Q1

week_start_d... — All

Silver | Blue | Gold | Platinum

F | M

Total Transaction	Interest Earned	Revenue	Transaction amt
656K	8M	55M	45M

low | med

card_category	Sum of Revenue	Sum of total_trans_amt	Sum of interest_earned
Blue	46139398	36957875	64,95,887.74
Gold	2454072	2024078	3,73,784.16
Platinum	1135608	953314	1,61,629.05
Silver	5586332	4586746	8,12,081.28
Total	55315410	44522013	78,43,382.23

QTR Revenue and Total Transcation Count
- Sum of Revenue ● Sum of total_trans_ct

Q3: 14.2M, 166.6K; Q1: 14.0M, 163.3K; Q2: 13.8M, 164.2K; Q4: 13.3M, 161.6K

Revenue Use Chip Type
- Swipe 35M
- Chip 17M
- Online 3M

Revenue by Expenditure Type
- Bills 14M
- Entertainment 10M
- Fuel 9M
- Grocery 9M
- Food 8M
- Travel 6M

Revenue by Education
- Graduate 22M
- High School 11M
- Unknown 8M
- Uneducated 8M
- Post-Grad... 3M
- Doctorate 2M

Revenue by Jobs
- Businessman 17M
- White-collar 10M
- Selfemployeed 8M
- Govt 8M
- Blue-collar 7M
- Retirees 5M

Revenue by Card-Category
- Blue 46M
- Silver 6M
- Gold 2M
- Platinum 1M

Credit Card Customer Report

week_start_d... — All

Silver | Blue | Gold | Platinum

Average of client_num by Incor...
IncomeGroup med
Average of client_num 738954329.64

Revenue	Income	Interest Earned	customer satisfaction
55M	576M	8M	3.19

Swipe | Online | Chip

M | F

QTR Revenue and Total Transcation Count
- Sum of Revenue ● Sum of total_trans...

Q3: 14M, 167K; Q1: 14M, 163K; Q2: 14M, 164K; Q4: 13M, 162K

Revenue by week

Revenue by age group
gender ● F ● M
- 20-30 0M
- 30-40 4M / 5M
- 40-50 14M / 11M
- 50-60 10M / 9M
- 60+ 0M
- unknown 1M

customer_job	Sum of Revenue	Sum of interest_earned	Sum of income
Businessman	17387832	25,39,390.31	186959919
White-collar	10114656	14,41,073.93	103930055
Govt	8111701	11,60,016.37	88773989
Selfemployeed	8261758	11,19,741.81	75313288
Blue-collar	6904279	9,52,800.57	72262158
Retirees	4535184	6,30,359.24	48675030
Total	55315410	78,43,382.23	575914439

Revenue by dependent
gend... ● F ● M
- 5: 1.1M / 3.8M / 4.9M
- 8.7M / 7.1M / 8.1M
- 0: 2.0M / 2.1M

Top 5 states by revenue
gender ● F ● M
- TX 6.2M / 6.7M
- NY 5.6M / 7.1M
- CA 6.5M / 6.1M
- FL 3.9M / 5.8M
- NJ 1.5M / 2.7M

Revenue by Education
gender ● F ● M
- Graduate 9.8M / 12.5M
- High Sch... 5.1M / 6.1M
- Unknown 4.4M / 3.7M
- Uneducat... 2.5M
- Post-Grad... 1.2M
- Doctorate 1.2M

Revenue by Expenditure Type
gender ● F ● M
- med 15M / 30M
- low 10M / 1M

Revenue Use Chip Type
gend... ● F ● M
- Married 13M / 15M
- Single 11M / 12M
- Unkn... 2M / 2M

CHAPTER 6

SYSTEM TESTING, IMPLEMENTATION &
MAINTENANCE

6.1 System Testing

6.1.1 Testing Overview

System testing is a crucial phase in the development process that ensures the credit analysis system functions as expected before deployment. Testing will ensure that the system handles all forms of input correctly, processes the data without errors, generates accurate reports, and meets the functional requirements of the stakeholders.

For the **Credit Analysis System**, testing will focus on the following areas:

- **Functionality Testing**: Verifying that the system performs all required functions.

- **Usability Testing**: Ensuring the system is easy to use and intuitive for both technical and non-technical users.

- **Performance Testing**: Testing the system's response time, especially under high data load scenarios.

- **Security Testing**: Ensuring that the system secures sensitive customer data, such as payment details and credit scores.

- **Integration Testing**: Verifying that the system integrates seamlessly with existing hotel management tools and databases.

- **User Acceptance Testing (UAT)**: Ensuring the system meets the end-users' expectations and business needs before going live.

6.1.2 Types of Tests

Unit Testing

Unit tests will be performed on individual components of the system such as the data input forms, credit score calculation algorithms, and risk assessment models. For example:

- **Input Forms**: Test if all fields accept the correct data type (e.g., numbers, text, dates) and validate whether mandatory fields are being entered.

- **Credit Score Calculation**: Verify that the scoring algorithm produces the correct risk levels based on provided criteria.

Integration Testing

Integration testing will be done to ensure all parts of the system work together, particularly:

- **Database Integration**: Confirm that data entered into input forms (e.g., customer profiles, payment histories) is correctly stored in the database and retrievable for reporting.

- **Power BI Integration**: Validate that Power BI dashboards accurately pull and display data from the underlying database.

System Testing

- **End-to-End Testing**: This includes testing the entire system's workflow. For example, after inputting customer data and payment histories, the system should produce the correct risk assessment, display it on the dashboard, and generate a report for the finance team.

- **Error Handling**: Test how the system reacts to incorrect data (e.g., invalid customer ID, out-of-range values) and verify that proper error messages are displayed to users.

Security Testing

- **Data Protection**: Test how the system handles sensitive information, ensuring that it adheres to security protocols such as encryption and secure logins.

- **Access Control**: Verify that only authorized personnel can access sensitive areas of the system (e.g., customer financial data, risk reports).

Performance Testing

- **Load Testing**: Simulate multiple users entering data and generating reports to evaluate how the system performs under heavy load.

- **Stress Testing**: Push the system beyond its limits to observe how it behaves under extreme conditions and ensure it fails gracefully.

User Acceptance Testing (UAT)

- After unit, integration, and system tests are complete, the system will undergo **UAT**, where a group of actual end-users (e.g., finance team, credit managers) will use the system in a real-world scenario to validate its functionality and usability. Feedback from UAT will be used to fine-tune the system before deployment.

6.2 Implementation

6.2.1 Implementation Overview

The **implementation phase** involves deploying the system into the operational environment of Diamond Peak Hotel. It will include migrating any historical data, training users, and ensuring that the system is fully integrated into the hotel's daily operations.

Implementation Steps

1. **System Setup and Installation**:

2. Install the **Power BI dashboard** and **database management system** on hotel servers.

   o Set up user accounts and assign permissions based on roles (e.g., admin, credit analyst, finance manager).

   o Ensure all systems are connected and operational, including integration with the hotel's **Property Management System (PMS)** for real-time data updates (e.g., customer profiles and transaction history).

3. **Data Migration**:

   o **Historical Data Import**: Import legacy customer credit data, payment histories, and other relevant financial records into the new system.

   o **Data Cleansing**: Cleanse any legacy data to ensure that it is consistent and accurate for analysis. Any gaps or inconsistencies in the data should be identified and corrected before analysis begins.

4. **User Training**:

   o **Training Sessions**: Provide training for staff who will use the system, including finance, credit analysts, and customer support teams. Focus on how to input data, interpret dashboard results, and generate reports.

   o **Documentation**: Provide detailed user manuals and video tutorials on using the system, highlighting key features such as data entry, report generation, and system navigation.

5. **Go-Live**:

   o The system will be officially deployed and go live after successful testing and user training. A **soft launch** may be conducted first to ensure all processes run smoothly before the system is fully rolled out.

   o **Post-launch Support**: Provide ongoing support to handle any immediate issues or bugs that may arise during the initial usage phase.

6.3 Maintenance

6.3.1 Maintenance Overview

Once the **Credit Analysis System** is operational, regular **maintenance** will be required to ensure the system continues to function smoothly, remains secure, and stays aligned with the hotel's evolving business needs.

Maintenance Tasks

- **Data Management**:

  o Regular updates to customer profiles, credit data, and payment histories as new transactions are made.

  o Ongoing data validation and quality checks to ensure that all input data remains accurate and up to date.

- **System Monitoring**:

  o Routine checks to monitor system performance, database integrity, and report generation. Ensuring that dashboards continue to update correctly and reflect real-time data.

  o **Backup and Recovery**: Regularly back up the system and ensure a disaster recovery plan is in place in case of system failure.

- **Security Updates**:

  o Applying security patches to both the database and the application to protect against vulnerabilities.

  o Regular penetration testing and security audits to ensure that sensitive customer data is adequately protected.

- **Software Updates**:

  o Periodic updates to the Power BI dashboards and predictive models to improve performance, incorporate user feedback, or update financial analysis techniques.

  o Adding new features or extending the system's functionality as the hotel's needs evolve.

- **User Support**:

  o Provide ongoing user support and troubleshoot any issues that may arise. This includes addressing any concerns about report accuracy, data discrepancies, or dashboard errors.

  o **Help Desk**: Establish a help desk to address system errors, technical questions, and user inquiries.

6.3.2 Continuous Improvement

- **Feedback Collection**: Regularly collect feedback from end-users (finance, credit teams) to identify areas for improvement. This feedback can lead to incremental updates, such as additional dashboards or modified report formats.

- **Performance Evaluation**: After 6 months to 1 year of use, evaluate the system's performance. This includes assessing user satisfaction, the accuracy of predictive models, and the effectiveness of risk management strategies.

6.4 Conclusion

The **System Testing, Implementation, and Maintenance** phases are vital to ensuring the **Credit Analysis System** delivers consistent, reliable, and actionable insights for Diamond Peak Hotel. By thoroughly testing the system, deploying it carefully into the hotel's environment, and ensuring continuous support and updates, the hotel can confidently rely on the system for better risk management, improved customer relationship management, and more efficient credit analysis.

Chapter 7

Summary and Future Scope

7.1 Summary

7.1.1 Project Objective

The Credit Analysis System was developed with the primary objective of enabling Diamond Peak Hotel to better manage its customer credit profiles, identify high-risk customers, and forecast payment behaviors. The system leverages modern Business Intelligence (BI) tools like Power BI and integrates advanced predictive models to provide the hotel with actionable insights to optimize financial decisions and minimize risks. This system aims to ensure the hotel can manage credit effectively, particularly in identifying and addressing overdue payments, improving cash flow, and maintaining financial stability.

7.1.2 Key Achievements

Throughout the course of this project, several key achievements were realized:

1. Improved Data Management

The system centralized customer credit data, including demographic details, payment histories, credit scores, and risk assessments, into a unified platform. This streamlined data flow and enabled more effective analysis and reporting.

- Data cleaning and integration were carried out to ensure that historical data was consistent and aligned with the new system.

- The database management was optimized to store customer profiles, payment transactions, overdue balances, and other credit-related metrics.

2. Enhanced Risk Analysis and Segmentation

One of the key functionalities of the system is its ability to segment customers by credit risk. By categorizing customers into risk levels (High, Medium, Low), the hotel can make better-informed decisions regarding payment terms, customer engagement, and follow-up actions.

- Risk assessment algorithms were developed and integrated into the system to calculate customer risk based on their credit score, overdue balances, and payment history.

- Dashboards and reports provide real-time visualization of risk levels, overdue amounts, and payment trends, which help the management team focus on high-risk clients promptly.

3. Predictive Analytics

Predictive models were developed to help the hotel forecast future payment behaviors and identify potential risks before they occur. This feature allows the hotel to take preemptive action to avoid overdue payments and minimize financial risks.

- The predictive model uses historical data to forecast the likelihood of overdue payments, enabling more accurate cash flow predictions.

- Based on the delinquency rate, risk factors, and customer payment patterns, the system suggests optimal follow-up actions.

4. Automated Reporting and Alerts

The system enables automated report generation, which reduces manual effort and enhances decision-making. It also provides real-time alerts when high-risk customers are detected or when overdue payments reach critical levels.

- Customizable reports can be generated for stakeholders (e.g., finance teams, management) to analyze credit trends and risks.

- Alerts and notifications ensure that the team is promptly informed of overdue payments or new high-risk customers, allowing timely intervention.

5. User-Friendly Interface

The system incorporates an intuitive user interface, designed to be accessible for both technical and non-technical users. The Power BI dashboards offer interactive views of the data, where users can drill down into specific segments, view trends over time, and generate detailed reports with ease.

- Users can easily interact with the dashboard to filter data, explore customer segments, and visualize payment behaviors without needing advanced technical skills.

- The input forms for entering customer data are streamlined to ensure data is correctly entered, and errors are minimized.

7.1.3 System Testing and Deployment

The system underwent thorough testing to ensure its functionality, security, and performance. From unit testing to user acceptance testing (UAT), the system was validated to ensure it met all requirements and delivered the expected outcomes.

- System performance testing confirmed that the dashboard and reports function efficiently even with large volumes of data.

- Security testing was carried out to ensure that sensitive customer information, such as payment details, was securely stored and processed.

Upon completion of testing, the system was implemented at Diamond Peak Hotel with full integration into the hotel's operational processes, including training for users and support teams. The

implementation phase also involved migrating historical credit data, configuring user access levels, and ensuring smooth interaction with the hotel's Property Management System (PMS).

7.2 Future Scope

While the Credit Analysis System has proven to be a powerful tool for improving financial risk management at Diamond Peak Hotel, there are several areas where the system can be further enhanced in the future. Here are some potential directions for the future scope of the project:

7.2.1 Integration with External Data Sources

Objective:

To improve the accuracy and depth of the predictive models and risk assessments, the system could integrate with external data sources, such as credit bureaus, economic indicators, or market data.

Future Enhancement:

- Third-Party Data Integration: Incorporating external customer credit reports from established credit bureaus (e.g., Equifax, Experian) could allow the system to assess risk more comprehensively by combining internal data with industry-standard financial metrics.

- Economic Trends: By integrating economic data (e.g., inflation rates, unemployment rates), the system could provide insights into how macroeconomic factors influence customer payment behavior, thus offering a more nuanced analysis.

7.2.2 Artificial Intelligence (AI) and Machine Learning (ML) Integration

Objective:

To enhance the system's predictive capabilities, particularly in forecasting future customer payment behaviors, the incorporation of AI and ML could further improve the accuracy and granularity of the system's predictions.

Future Enhancement:

- Machine Learning Models: Implement advanced machine learning algorithms, such as neural networks or random forests, to improve the forecasting of overdue payments. These models could identify hidden patterns in customer data that traditional models might miss.

- Deep Learning for Risk Prediction: By using deep learning techniques, the system could assess more complex relationships between multiple risk factors (e.g., payment history,

customer demographics, external data) to predict the likelihood of defaults with greater precision.

- Personalized Customer Interventions: The system could use AI-driven recommendations to suggest tailored payment plans or offers to individual customers based on their payment history and current financial behavior.

7.2.3 Mobile Application Development

Objective:

To enhance user engagement and provide real-time access to credit analysis and customer payment data, a mobile application could be developed for credit managers and staff.

Future Enhancement:

- Mobile Dashboards: Create mobile-friendly versions of the Power BI dashboards so that credit managers and finance teams can access key information on-the-go, improving the responsiveness and agility of the team.

- Mobile Alerts: Push notifications could alert staff to overdue payments, high-risk customers, or significant changes in customer behavior directly on their mobile devices.

- Mobile Data Entry: Allow for mobile-based data entry for sales teams, customer service representatives, or field agents to update customer profiles or payment statuses in real-time.

7.2.4 Advanced Analytics for Customer Segmentation

Objective:

To refine the segmentation of customers based on more detailed criteria, such as behavioral patterns, payment preferences, and transaction history.

Future Enhancement:

- Behavioral Segmentation: Incorporating behavioral data, such as purchase frequency, product/service type preference, and loyalty program activity, could help the hotel develop more accurate risk profiles and offer personalized services.

- Dynamic Segmentation: Implement a dynamic segmentation system that allows the system to automatically adjust risk profiles as new data is entered, ensuring the hotel is always working with the most up-to-date customer insights.

7.2.5 Real-Time Payment Tracking and AI-Driven Follow-Up

Objective:

To enable the hotel to track customer payments in real-time and use AI-powered follow-up actions to reduce overdue amounts.

Future Enhancement:

- Real-Time Payment Updates: Integrate the system with payment processing platforms (e.g., online payment gateways) to track payments as soon as they are made, instantly reflecting this data in the credit analysis system.

- AI-Driven Follow-Up: Develop automated AI-driven follow-up emails or messages that adapt to a customer's payment history and behavior, encouraging timely payment or offering payment plans to reduce the chances of overdue balances.

7.2.6 Scalability and Global Expansion

Objective:

As the hotel chain expands or operates in multiple locations, the system needs to scale to accommodate a larger number of customers and varied regional needs.

Future Enhancement:

- Multi-Region Support: Extend the system's capabilities to handle multi-currency transactions, localized tax calculations, and different credit policies in various regions where the hotel operates.

- Scalable Infrastructure: Use cloud-based infrastructure to scale the system easily, ensuring the system can handle growing volumes of customer data and analytical tasks

7.3 Conclusion

The Credit Analysis System for Diamond Peak Hotel has significantly enhanced the hotel's ability to manage customer credit, predict financial risks, and optimize cash flow. The system's key features—data integration, risk segmentation, predictive analytics, and automated reporting—have streamlined

the financial decision-making process, enabling the hotel to focus on high-risk customers while maintaining positive customer relationships.

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