Here is a brief explanation of each graph to help you understand them clearly:

1. **Heatmap: Correlation of Critical Columns**:
   * **Purpose**: This heatmap shows the correlation between Total\_Payment\_Delays and PENALTY\_COUNT.
   * **Interpretation**: The correlation coefficient between Total\_Payment\_Delays and PENALTY\_COUNT is 0.15, indicating a low positive correlation. This means that as Total\_Payment\_Delays increases, there is a slight tendency for PENALTY\_COUNT to increase as well.
2. **Donut Chart: Distribution of Loans by Status Description**:
   * **Purpose**: This chart shows the distribution of loans across different STATUSDESCRIPTION categories.
   * **Interpretation**: The majority of loans (94.5%) are in the "Normal" status. Other statuses like "Substandard", "Doubtful", "Special Mention", and "Loss" make up smaller proportions of the total loans.
3. **Boxplot: Penalty Count by Status Description**:
   * **Purpose**: This boxplot illustrates the distribution of PENALTY\_COUNT across different STATUSDESCRIPTION categories.
   * **Interpretation**: Loans categorized as "Loss" have the highest median PENALTY\_COUNT, followed by "Doubtful" and "Substandard". "Normal" and "Special Mention" statuses have lower PENALTY\_COUNT.
4. **Scatter Plot: Total Payment Delays vs. Penalty Count**:
   * **Purpose**: This scatter plot shows the relationship between Total\_Payment\_Delays and PENALTY\_COUNT, with different colors representing different STATUSDESCRIPTION.
   * **Interpretation**: Most data points are clustered at lower values of Total\_Payment\_Delays and PENALTY\_COUNT. There are some outliers with very high Total\_Payment\_Delays and PENALTY\_COUNT, particularly in the "Loss" and "Doubtful" categories.
5. **Histogram: Distribution of Penalty Count**:
   * **Purpose**: This histogram shows the distribution of PENALTY\_COUNT across the dataset.
   * **Interpretation**: The majority of loans have a low PENALTY\_COUNT, with a steep drop-off as the PENALTY\_COUNT increases. Most loans have a PENALTY\_COUNT of less than 10.
6. **Histogram: Distribution of Total Payment Delays**:
   * **Purpose**: This histogram shows the distribution of Total\_Payment\_Delays across the dataset.
   * **Interpretation**: Most loans have low Total\_Payment\_Delays, with a steep drop-off as the Total\_Payment\_Delays increases. A few loans have very high Total\_Payment\_Delays.
7. **Boxplot: Total Payment Delays by Status Description**:
   * **Purpose**: This boxplot illustrates the distribution of Total\_Payment\_Delays across different STATUSDESCRIPTION categories.
   * **Interpretation**: The "Loss" and "Doubtful" categories have higher median Total\_Payment\_Delays compared to other categories. The "Normal" category has the lowest Total\_Payment\_Delays.

These visualizations help to identify patterns and relationships in the data that are critical for assessing loan defaults, particularly focusing on PENALTY\_COUNT, Total\_Payment\_Delays, and STATUSDESCRIPTION.

Heat map New

The heatmap visualizes the correlation between critical columns in the dataset, including Total\_Payment\_Delays, PENALTY\_COUNT, STATUSDESCRIPTION, and COMPONENT\_NAME. Here's a breakdown of what the heatmap shows:

1. **Total\_Payment\_Delays**:
   * **Positively Correlated with**:
     + PENALTY\_COUNT (0.15): Customers with more payment delays tend to have higher penalty counts.
     + COMPONENT\_NAME\_PRINCIPAL (0.24): Loans with delays have higher amounts related to the principal component.
   * **Negatively Correlated with**:
     + STATUSDESCRIPTION\_Normal (-0.071): Normal status loans tend to have fewer payment delays.
     + COMPONENT\_NAME\_PENALTY (-0.098): Loans with delays are less associated with penalty components.
2. **PENALTY\_COUNT**:
   * **Positively Correlated with**:
     + Total\_Payment\_Delays (0.15): Higher penalty counts are associated with more payment delays.
     + STATUSDESCRIPTION\_Loss (0.12): Loans marked as loss have higher penalty counts.
     + STATUSDESCRIPTION\_Substandard (0.12): Substandard loans also show a higher penalty count.
     + COMPONENT\_NAME\_PENALTY (0.16): Penalty components are closely linked to higher penalty counts.
   * **Negatively Correlated with**:
     + STATUSDESCRIPTION\_Normal (-0.27): Normal status loans have lower penalty counts.
     + COMPONENT\_NAME\_PRINCIPAL (-0.23): Principal components are less associated with high penalty counts.
3. **STATUSDESCRIPTION\_Loss**:
   * **Positively Correlated with**:
     + PENALTY\_COUNT (0.12): Loans marked as loss tend to have higher penalty counts.
   * **Negatively Correlated with**:
     + STATUSDESCRIPTION\_Normal (-0.27): Loans marked as loss are not normal.
     + STATUSDESCRIPTION\_Substandard (-0.12): Loss status loans are inversely related to substandard loans.
4. **STATUSDESCRIPTION\_Normal**:
   * **Positively Correlated with**:
     + STATUSDESCRIPTION\_Substandard (0.072): There is a slight positive correlation with substandard loans.
   * **Negatively Correlated with**:
     + PENALTY\_COUNT (-0.27): Normal loans have lower penalty counts.
     + Total\_Payment\_Delays (-0.071): Normal loans have fewer payment delays.
5. **COMPONENT\_NAME\_PENALTY**:
   * **Positively Correlated with**:
     + PENALTY\_COUNT (0.16): Penalty components are associated with higher penalty counts.
   * **Negatively Correlated with**:
     + STATUSDESCRIPTION\_Normal (-0.28): Normal status loans are less associated with penalty components.
6. **COMPONENT\_NAME\_PRINCIPAL**:
   * **Positively Correlated with**:
     + Total\_Payment\_Delays (0.24): Loans with principal components have more payment delays.
   * **Negatively Correlated with**:
     + PENALTY\_COUNT (-0.23): Loans with principal components have lower penalty counts.
     + STATUSDESCRIPTION\_Normal (0.086): Loans with principal components are less likely to be normal.

**Summary:**

* Loans with high payment delays tend to have high penalty counts and are often associated with principal components.
* Normal loans generally have fewer delays and penalty counts.
* Loss and substandard status loans show higher penalty counts, whereas normal loans show the opposite trend.
* Penalty components are closely linked to higher penalty counts and negatively correlated with normal loan statuses.

This heatmap provides a clear visual representation of how different loan characteristics and components interact with each other, particularly focusing on payment delays, penalty counts, and loan statuses.