**POWER BI CAPSTONE PROJECT**

# Importing Data

➢ Import the "*LoanDetails*" and "*BorrowerDetails*" sheets from the "bank loan.xlsx" file into Power BI.

**Open powerBI desktop->go to home tab->get data->excel workbook->loan.xlsx->transform data**.

# 2. Transformation Using Power Query

***Data Cleaning:***

**Handling Missing Values and Duplicates:**

* Replace missing values (null) in the *'emp\_length'* column of the "BorrowerDetails" table with '0 year'.

**Go to ‘borrower details’table->go to** **home tab->select ‘replace values’ tool-> replace null with 0 year. ->click OK**

* Remove rows with missing values in the *'last\_pymnt\_d'* and *'delinq\_2yrs'* columns.

**Select the column ‘last\_pymnt\_’->click on filter option->remove empty->ok.**

**Select the column ‘deling\_2yrs’->click on filter option->remove empty->ok.**

* Remove duplicate rows in the *'id'* column of the "LoanDetails" table.

**Go to ‘Loan details’ table->select ‘id’ column-> go to ‘Remove Rows’ tool->remove duplicates**

**Dealing with Inconsistencies:**

* Ensure words in the *'purpose'* column are separated by spaces instead of underscores (e.g., "credit card" instead of "credit\_card").

**Select the ‘purpose’ column->home tab or transform tab->’replace values’ tools-> replace ‘\_’ with “ “->click ok.**

* Format the *'purpose'* and *'home\_ownership'* columns to proper case.

**Select ‘purpose' columns from Loan Details table->go to Transform tab->’Format’ tool->’Capitalize each word’.**

**Select ‘home\_ownership' columns from BorrowerDetails table->go to Transform tab->’Format’ tool->’Capitalize each word’.**

***Data Transformation:***

**Column Transformation:**

* Change the data type of the *'total\_pymnt'* column to 'Fixed decimal number'.

**Select ‘total\_pymnt’column->go to ‘transform tab’->select ‘DataType’ tool->select ‘Fixed decimal number’.**

* Round off the numbers in the *'funded\_amnt'* column to 2 decimal places.

**After selecting the ‘funded\_amnt' column-> go to ‘transform tab’->select ‘Rounding’ tool->select ‘Rounding’->give 2.->click ok.**

**Column Renaming:**

* Rename the column *'issue\_d'* to *'issue\_date'*.

**Select the column ‘issue\_d’->go to ‘Transform’ tab->Select ‘Rename’ tool-> enter the new name->’issue-date’**

**Or**

**Simply select the column->double click on the column ->give new name->’issue\_date’**

* Rename the column *'last\_pymnt\_d'* to *'last\_pymnt\_date'*.

**Select the column ‘last\_pymnt’-> go to ‘Transform’ tab->Select ‘Rename’ tool-> enter the new name->’last\_payment\_date’**

**Creating New Columns:**

* Create a new custom column named *'total\_amount\_paid'* to calculate the total amount paid by each borrower by subtracting *'out\_prncp'* from *'total\_pymnt'*.

**Go to ‘Add column’ tab-> customcolumn->give custom name as ‘total\_amount\_paid’-> in formula section, give , = [total\_pymnt] – [out\_prncp]->click ok.**

* Add a new conditional column named *'delinquency\_status'* to identify if the borrower has any delinquencies. If the number of delinquencies in *'delinq\_2yrs'* is greater than 0, the status should be "Delinquent", otherwise "Not Delinquent".

**Go to ‘Add column’ tab-> select ‘conditional column-> Give column name as “delinquency\_status”, in if condition section, give column name as “delying\_2yrs”, in operator give, “greater than”, and set value as “0”, Output as” Deliquent”.**

**In else section, give “Not Deliquent”.**

**Column Dropping:**

* Remove the *'sub\_grade'* column as that does not significantly contribute to the analysis.

**Go to ‘LoanDetails’ table, Select ‘sub\_grade' column, ->go to home tab->Select ‘Remove Columns’ tool->Remove column.**

* **Close & apply the transformed data.**

# 3. Data Modeling

➢ Identify the common column between both the tables and establish relationships between the two tables. Ensure the cross-filter direction is set to "Both". This step is crucial for enabling cross-table analysis and ensuring data integrity within the dataset.

**Go to model view-> Select ‘Manage Relationship’ tool-> New Relationship-> select tables-> ‘BorrowerDetails’ and ‘LoanDetails’-> select ‘Loan\_id’ in Borrowerdetails and ‘id’ in LoanDetails table-> give both in cross filter option-> click ok.( the relation formed is an many to one**

# 4. Creating Measures and Calculated Columns using DAX

* Create a new calculated column named *'remaining\_installments'* using DAX in the "BorrowerDetails" table to calculate the number of remaining installments by dividing the remaining principal amount (*'out\_prncp'*) by the monthly installment amount (*'installment'*) and round up the result using the CEILING() function to account for any partial payments.

**Go to ‘BorrowerDetails’ table->go to ‘Table Tools’ tab->select ‘New Column’->type the DAX expression:**

remaining\_installments = 'BorrowerDetails'[out\_prncp] / LOOKUPVALUE ('LoanDetails'[installment], 'LoanDetails'[id], 'BorrowerDetails'[loan\_id])

* Create a measure named *'Non-Verified Borrowers Count'* using DAX to count the number of loans that have been 'Not Verified'.

**Go to ‘BorrowerDetails’ table->go to ‘Table Tools’ tab->select ‘New Measure’ tool-> type the DAX expression:**

Non-Verified Borrowers Count = COUNTROWS(FILTER(BorrowerDetails,

BorrowerDetails[verification\_status]=”Not Verified”))

* Create a measure named *'Fully Paid Loan Percentage'* to calculate the percentage of fully paid loans. Divide the number of loans with a "Fully Paid" loan status by the total number of loans and then format this measure as Percentage.

**Go to ‘LoanDetails’ table->go to ‘Table Tools’ tab->select ‘New Measure’ tool-> type the DAX expression:**

Fully Paid Loan Percentage = DIVIDE(COUNTROWS(FILTER(LoanDetails,

LoanDetails[loan\_status] = “Fully Paid”)),COUNTROWS(LoanDetails),0)\*100

**Then change the data type from general to percentage**

# 5. Creating Comprehensive Reports

## Report 1: Loan Performance Analysis

The Loan Performance Analysis report aims to provide insights into the performance of loans based on various factors such as loan amount, loan status, term, interest rate, and purpose.

* **Total Funded Amount**: Create a card visual to display the total funded amount.

**Go to visualization pane->select ‘Card’->Drag the ‘funded\_amnt’ to the fields->Change the format to Sum.(Change further changes for better visualisation, like background and font).**

**Go to home tab->click on “Text box”->Give title as “Fully Paid Loan Percentage”-> then make some changes(Change further changes for better visualisation, like background and font).**

* **Fully Paid Loan Percentage**: Create a gauge chart to display the '*Fully Paid Loan Percentage*' measure.

**Go to visualization pane->select ‘Guage’->Drag the ‘Fully Paid Loan Percentage’to the value fields..(Change further changes for better visualisation, like background and font).**

**Go to home tab->click on “Text box”->Give title as “Fully Paid Loan Percentage”-> then make some changes(Change further changes for better visualisation, like background and font).**

* **Average Interest Rate by Term**: Create a multi-row card to show the average interest rate for each term.

**Go to visualization pane->select ‘Multi-Row Card’->Drag the ‘int\_rate’ to the fields**

**->Change the format to Average, then drag ‘term’to the fields.(Change further changes for better visualisation, like background and font).**

**Go to home tab->click on “Text box”->Give title as “Average Interest Rate by Term”-> then make some changes(Change further changes for better visualisation, like background and font).**

* **Loan Status Distribution**: Create a pie chart to visualize the sum of total payments by loan status.

**Go to visualization pane->select ‘Pie chart’->Drag the ‘total\_pymnt’to the values field and drag the ‘loan\_stats’ to the legend field.(Change further changes for better visualisation, like background and font).**

**Go to home tab->click on “Text box”->Give title as “Loan Status Distribution”-> then make some changes(Change further changes for better visualisation, like background and font).**

* **Loan Amount by Purpose**: Create a treemap to show the average loan amount by purpose.

**Go to visualization pane->select ‘Tree map’->Drag the ‘loan\_amnt’ to the value fields->Change the format to Average, then drag ‘purpose’to the category fields.(Change further changes for better visualisation, like background and font).**

**Go to home tab->click on “Text box”->Give title as “Loan Amount by Purpose”-> then make some changes(Change further changes for better visualisation, like background and font).**

* **Installment Over Time**: Create a line chart to visualize the sum of installments by Year and Quarter of the issue date.

**Go to visualization pane->select ‘Line chart’->Drag the ‘installment’ to the y axis->Change the format to Sum, then drag ‘Issue date’ to the x axis .->Choose only year and date.(Change further changes for better visualisation, like background and font).**

**Go to home tab->click on “Text box”->Give title as “Installment Over Time”-> then make some changes(Change further changes for better visualisation, like background and font).**

* **Maximum Total Amount Paid by Loan Status**: Create a column chart to display the maximum total amount paid by loan status.

**Go to visualization pane->select ‘Column chart’->Drag the ‘total\_amount\_paid’to the y axis->Change the format to Maximum, then drag ‘loan status’to the x axis.(Change further changes for better visualisation, like background and font).**

**Go to home tab->click on “Text box”->Give title as “Maximum Total Amount Paid by Loan Status”-> then make some changes(Change further changes for better visualisation, like background and font).**

* **Minimum Annual Income by Grade**: Create a funnel chart to show the minimum annual income by grade.

**Go to visualization pane->select ‘Funnel chart’->Drag the ‘annual\_inc’ to the values fields->Change the format to Minimum, then drag ‘grade’to the category fields.(Change further changes for better visualisation, like background and font).**

**Go to home tab->click on “Text box”->Give title as “Minimum Annual Income by Grade”-> then make some changes(Change further changes for better visualisation, like background and font).**

* **Issue Date Slicer**: Add a slicer for the Month of the issue date to enable dynamic data exploration.

**Go to visualization pane->select ‘Slicer’->Drag the ‘issue date’ to the fields.(Change further changes for better visualisation, like background and font).**

**Go to home tab->click on “Text box”->Give title as “Issue Date Slicer”-> then make some changes(Change further changes for better visualisation, like background and font).**

A screenshot of a computer

Description automatically generated

A screenshot of a computer

Description automatically generated

## Report 2: Borrower Profile Analysis

The Borrower Profile Analysis report aims to provide insights into the characteristics of borrowers such as home ownership, annual income, employment length, verification status, debt-to-income ratio, and delinquency history.

* **KPI Visual**: Create a KPI visual with the sum of total payment as the value, the year of last payment date as the trend axis, and the sum of loan amount as the target. Round off to 2 decimal points and format as $ currency.

**Go to visualisation pane->select ‘ KPI’ ->drag ‘ total\_pymnt’->change to Sum . and drag ‘last\_payment\_date’ to Trend field, then select year.**

**Then drag ‘loan\_amnt’ to the Target field->change it to Sum. .(Change further changes for better visualisation, like background and font).**

**Go to home tab->click on “Text box”->Give title as “KPI Visual”-> then make some changes(Change further changes for better visualisation, like background and font).**

* **Average of Annual Income**: Display the average of annual income using a card visual.

**Go to visualisation pane->select ‘card’ ->drag ‘annual\_inc’->change to Average .(Change further changes for better visualisation, like background and font).**

**Go to home tab->click on “Text box”->Give title as “Average of Annual Income”-> then make some changes(Change further changes for better visualisation, like background and font).**

* **Non-Verified Borrowers Count**: Display the count of non-verified borrowers using a card visual.

**Go to visualisation pane->select ‘Card’ ->drag ‘Non Verified Borrowers Count’to the field.(Change further changes for better visualisation, like background and font).**

**Go to home tab->click on “Text box”->Give title as “Non-Verified Borrowers Count”-> then make some changes(Change further changes for better visualisation, like background and font).**

* **Average Debt-to-Income by Delinquency Status**: Create a multi-row card to show the average debt-to-income ratio by delinquency status.

**Go to visualisation pane->select ‘ multi-row card’ ->drag ‘dit’->change to Average . and drag ‘deliquency\_status’ to the field.(Change further changes for better visualisation, like background and font).**

**Go to home tab->click on “Text box”->Give title as “Average Debt-to-Income by Delinquency Status”-> then make some changes(Change further changes for better visualisation, like background and font).**

* **Sum of Loan Amount by Home Ownership**: Create a table to show the total loan amount by home ownership.

**Go to visualisation pane->select ‘table’ ->drag ‘loan amnt’->change to Sum . and drag ‘home\_ownership to the column fields.(Change further changes for better visualisation, like background and font).**

**Go to home tab->click on “Text box”->Give title as “Sum of Loan Amount by Home Ownership”-> then make some changes(Change further changes for better visualisation, like background and font).**

* **Average Remaining Principal by Verification Status**: Create a donut chart to display the average remaining outstanding principal by verification status.

**Go to visualisation pane->select ‘ Donut chart’ ->drag ‘verification status’ to the Legend field and drag ‘out\_prncp’ to the Values field->change it to Average .(Change further changes for better visualisation, like background and font).**

**Go to home tab->click on “Text box”->Give title as “Average Remaining Principal by Verification Status”-> then make some changes(Change further changes for better visualisation, like background and font).**

* **Sum of Delinquencies by Home Ownership**: Create a bar chart to show the total number of delinquencies in the past 2 years by home ownership and filter the visual to display only Mortgage, Rent, and Own.

**Go to visualisation pane->select ‘ bar chart’ ->drag ‘delinq\_2yrs’ to the x axis**

**->change to Sum and drag ‘home\_ownership’ to the y axis..(Change further changes for better visualisation, like background and font).**

**Go to home tab->click on “Text box”->Give title as “Sum of Delinquencies by Home Ownership”-> then make some changes(Change further changes for better visualisation, like background and font).**

* **Max Remaining Installments by Employment Length**: Create a treemap to show the maximum remaining installments by employment length.

**Go to visualisation pane->select ‘tree map’->drag ‘emp\_length’ to the category field.**

**(Change further changes for better visualisation, like background and font).**

**Go to home tab->click on “Text box”->Give title as “Max Remaining Installments by Employment Length”-> then make some changes(Change further changes for better visualisation, like background and font).**

* **Total Amount Paid and Funded Amount Over Time**: Create a line chart to display the sum of total amount paid and the sum of funded amount by the year of last payment date.

**Go to visualisation pane->select ‘line chart’ ->drag ‘last\_payment\_date to the x axis ->select Year. and drag ‘total\_amount’ and ‘funded\_amnt’ to the y axis.-> change to SUM(Change further changes for better visualisation, like background and font).**

**Go to home tab->click on “Text box”->Give title as “Total Amount Paid and Funded Amount Over Time”-> then make some changes(Change further changes for better visualisation, like background and font).**

* **Purpose Slicer**: Add a slicer for loan purpose to enable dynamic data exploration.

**Go to visualisation pane->select ‘Slicer’->drag ‘purpose’ to the field.**

**(Change further changes for better visualisation, like background and font).**

**Go to home tab->click on “Text box”->Give title as “Purpose Slicer”-> then make some changes(Change further changes for better visualisation, like background and font).**

A screenshot of a computer

Description automatically generated

A screenshot of a computer

Description automatically generated