Project Report Format

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Final Project Report Template

1. Introduction

The real estate market is influenced by various factors such as house age, renovation status, number of bedrooms and bathrooms, and overall size. This project aims to analyze housing market trends and visualize key insights using Tableau to better understand how different features impact sale prices**.**

1.1. Project overviews

The dataset contains Transformed housing data and 21,609 house sale records, including Property features such as Sales price, area, bedrooms, bathrooms, floors and location. There are a total of 31 columns, out of which Sale Price can be supposedly taken as a dependent variable. The other variables are different features, locations and date, etc. regarding the houses. This project, "Visualizing Housing Market Trends: An Analysis of Sale Prices and Features using Tableau," aims to explore and analyze housing market trends using the Transformed Housing Data 2 dataset from Kaggle. The objective is to identify key factors influencing house prices, such as location, size, number of bedrooms, bathrooms, floors and basement area.

By leveraging Tableau, the project will create interactive dashboards, story, bar chart, histogram, summary dashboard to visualize patterns, compare regional price variations, and gain insights into how different features impact house sale prices. The analysis will help in making data-driven decisions for buyers, sellers, and real estate professionals.

1.2. Purpose

- Identify **key factors** influencing house prices.
- Analyze the **effect of renovations** on property value.
- Explore the **distribution of house sales** across different price ranges.
- Create **interactive Tableau dashboards** to present findings effectively.
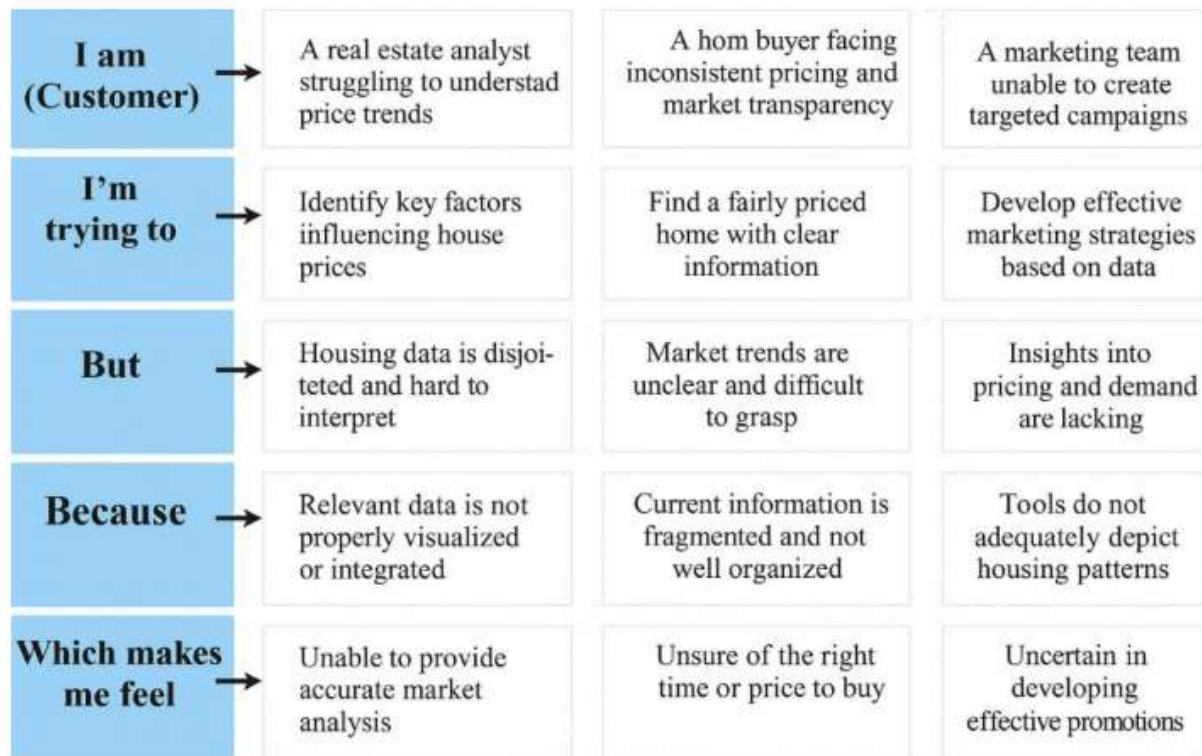
2.Ideation Phase

2.1 Problem Statement

Visualizing Housing Market Trends: An Analysis of Sale Prices and Features using Tableau

Real estate analysts, home buyers, and marketing teams struggle with unclear housing market data. Analysts can't accurately identify price trends. Home buyers are unsure of when and what to buy. Marketing teams lack insights to create data-driven campaigns. This is due to fragmented, poorly visualized, and disjointed data. As a result, decision-making becomes difficult and confidence is lost.

Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	A real Estate analyst Struggling to understand price trends	Identify key factors influencing house prices	Housing data is disjointed and hard to interpret	Relevant data is not properly visualized or integrated	Unable to provide accurate market analysis
PS-2	A Home buyer facing inconsistent pricing and market transparency	Find a fairly priced home with clear information	Market trends are unclear and difficult to grasp	Current information is fragmented and not well organized	Unsure f the right time or price to buy
PS-3	A marketing team unable to create targeted campaigns	Develop effective marketing strategies based on data	Insights into pricing and demand are lacking	Tools do not adequately depict housing patterns	Uncertain in developing effective promotions

I am (Customer)	A real estate analyst struggling to understad price trends	A hom buyer facing inconsistent pricing and market transparency	A marketing team unable to create targeted campaigns
I'm trying to	Identify key factors influencing house prices	Find a fairly priced home with clear information	Develop effective marketing strategies based on data
But	Housing data is disjoi-teted and hard to interpret	Market trends are unclear and difficult to grasp	Insights into pricing and demand are lacking
Because	Relevant data is not properly visualized or integrated	Current information is fragmented and not well organized	Tools do not adequately depict housing patterns
Which makes me feel	Unable to provide accurate market analysis	Unsure of the right time or price to buy	Uncertain in developing effective promotions

2.2 Empathy Map

Empathy Map Canvas:

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviours and attitudes.

It is a useful tool to helps teams better understand their users.
Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.

The image is an **Empathy Map** designed for a housing market analysis dashboard project using Tableau. It visually represents what key users—such as real estate analysts, home buyers, and marketing teams— **think, feel, see, hear, say, and do** in relation to the housing market and data tools.

Key Insights from the Image:

- **Think & Feel**: Users are confused about inconsistent house pricing and unsure of the impact of renovations on value.

- **See**: They encounter outdated spreadsheets and disconnected data, leading to poor understanding of trends.

- **Hear**: Feedback includes doubts about visual clarity and skepticism toward renovation value impact.

- **Say & Do**: Users spend excessive time manually cleaning data, building dashboards, and making guesses instead of informed decisions.

- **Pain Points**: Include disjointed data, lack of visual clarity, and difficulty in identifying pricing influencers.

- **Gains**: A Tableau-powered dashboard provides clarity, interactive visualizations, accurate insights, and a competitive advantage.

This empathy map emphasizes the **need for a centralized, visual, and intuitive solution** to help stakeholders confidently navigate and interpret housing market data.

2.3 Brain Stroming

Brainstorm & Idea Prioritization Template:

Brainstorming provides a free and open environment that encourages everyone within a team to participate in the creative thinking process that leads to problem solving. Prioritizing volume over value, out-of-the-box ideas are welcome and built upon, and all participants are encouraged to collaborate, helping each other develop a rich amount of creative solutions.

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

Reference: https://www.mural.co/templates/brainstorm-and-idea-prioritization

Step-1: Team Gathering, Collaboration and Select the Problem Statement

Step-2: Brainstorm, Idea Listing and Grouping

Brainstorm

Write down any ideas that come to mind that address your problem statement

○ 10 minutes

Group ideas

Take turns sharing yor ideas while clustering similar or related notes as you go. Once aZ sticky notes have been grouped, give each cluster a sendence like label. If clater is bigger than six sticky notes, try and see if you can break it up into smaller sub-groups.

○ 20 minutes

Real Estate Analyst	Home Buyer
Conduct a market analysis	Review mortgage rates
Examine regional housing trends	Search listings on popular real estate apps
Identify affordable areas recommend	Discuss preforred locations with family

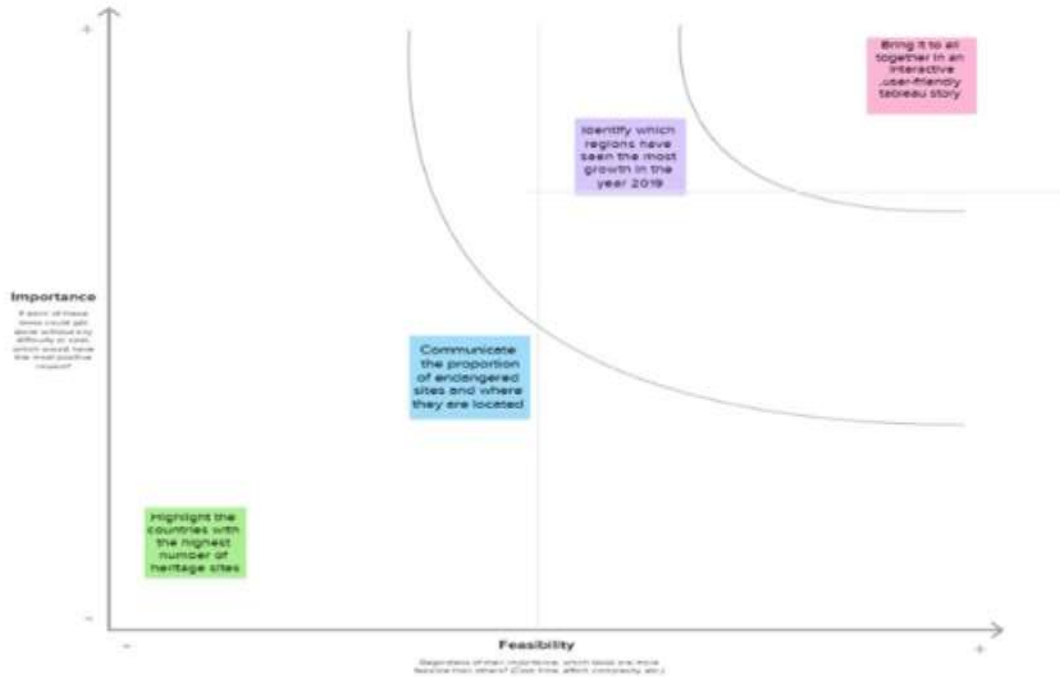We can consider this sequence of actions from the first note to sixth note

4

Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

⏱ 20 minutes

3.Requirement Analysis

3.1 Customer Journey Map

3.2 Solution Requirement

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Data Upload	Upload housing dataset in CSV/Excel format Connect to external data sources (e.g., SQL, cloud data)
FR-2	Data Cleaning & Transformation	Remove duplicates Handle missing values Transform date and numeric fields
FR-3	Data Visualization & Exploration	Create charts (bar, line, scatter) Build dashboards with filters Use geographic maps to visualize housing prices
FR-4	Report Sharing & Collaboration	Publish dashboards to Tableau Server Set permissions for stakeholders Enable exporting reports to PDF/Excel

Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	The dashboards should be intuitive, with clear navigation, filters, and visual cues for easy analysis.

NFR-2	Security	Only authorized users can access or modify the dashboards and data; rolebased access control applied.
NFR-3	Reliability	The Tableau server must maintain consistent data updates with minimal downtime and data consistency.
NFR-4	Performance	Dashboards should load within 3 seconds for standard filters and data sizes.
NFR-5	Availability	Tableau dashboards should be available at least 99% of the time during business hours.
NFR-6	Scalability	The system should support future growth, handling larger datasets and more users without performance loss.

3.3 Data Flow Daigram

Data Flow Diagrams:

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.
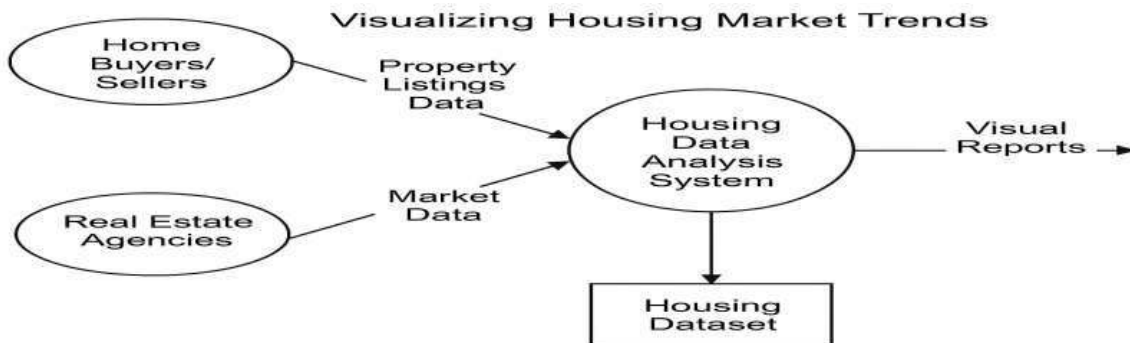
User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance Criteria	Priority	Rel
Data Analyst (Customer)	Data Upload	USN-1	As an analyst, I can upload the housing dataset to Tableau for analysis.	Dataset successfully uploaded	High	Spr
Data Analyst (Customer)	Data Cleaning	USN-2	As an analyst, I can filter out missing or duplicate values from the data in Tableau.	Data is cleaned and validated	High	Spr
Data Analyst (Customer)	Data Visualization	USN-3	As an analyst, I can create interactive dashboards showing housing sale price trends by region and features.	Dashboards display correct aggregated data	High	Spr
Data Analyst (Customer)	Filters and Drill Down	USN-4	As an analyst, I can apply filters (e.g., by year, region, property type) to the dashboards	Filters work and update dashboards dynamically	Medium	Spr
Data Analyst (Customer)	Sharing Reports	USN-5	As an analyst, I can publish and share Tableau dashboards with stakeholders	Stakeholders can access shared dashboards	High	Spr
Administrator	User Access Management	USN-6	As an admin, I can manage user permissions to control who can view or edit dashboards	User permissions applied correctly	High	Spr
User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance Criteria	Priority	Rel

3.4 Technology Stack

Technical Architecture:

The Deliverable shall include the architectural diagram as below and the information as per the table1 & table 2

Reference: https://developer.ibm.com/patterns/ai-powered-backend-system-for-order-processing-during-pandemics/

S.No	Component	Description	Technology
1	User Interface	How user interacts with Tableau dashboards (filters, charts, map	Tableau Desktop, Tableau Server, Table
2	Application Logic-1	Data extraction, transformation, and loading (ETL)	Python / Tableau Prep
3	Application Logic-2	Data cleaning and validation logic	Tableau Prep / Python scripts
4	Application Logic-3	Visualization logic and calculated fields (aggregations, KPIs, filte	Tableau Calculated Fields
5	Database	Stores housing data with sale prices, property features, and loca	MySQL, PostgreSQL, SQL Server
S.No	Component	Description	Technology
6	Cloud Database	Cloud database service for storing and refreshing datasets	Amazon RDS, Google BigQuery, Snowfl
7	File Storage	File storage for datasets in CSV/Excel format	AWS S3, Google Cloud Storage
8	External API-1	Purpose of pulling external data sources, e.g., real-time housing	Zillow API, Realtor API
9	External API-2	Geolocation or demographic enrichment	Google Maps API
10	Machine Learning Model	Predict housing prices based on features	Linear Regression / XGBoost models in
11	Infrastructure (Server / Clo	Tableau deployment on server or cloud infrastructure	Tableau Server on AWS, Azure VM, Kub

References:

https://c4model.com/ **https://developer.ibm.com/patterns/online-order-processing-system-duringpandemic/** **https://www.ibm.com/cloud/architecture** **https://aws.amazon.com/architecture** **https://medium.com/the-internal-startup/how-to-draw-useful-technical-architecture-diagrams-2d20c9fda90d**

4.Project Design
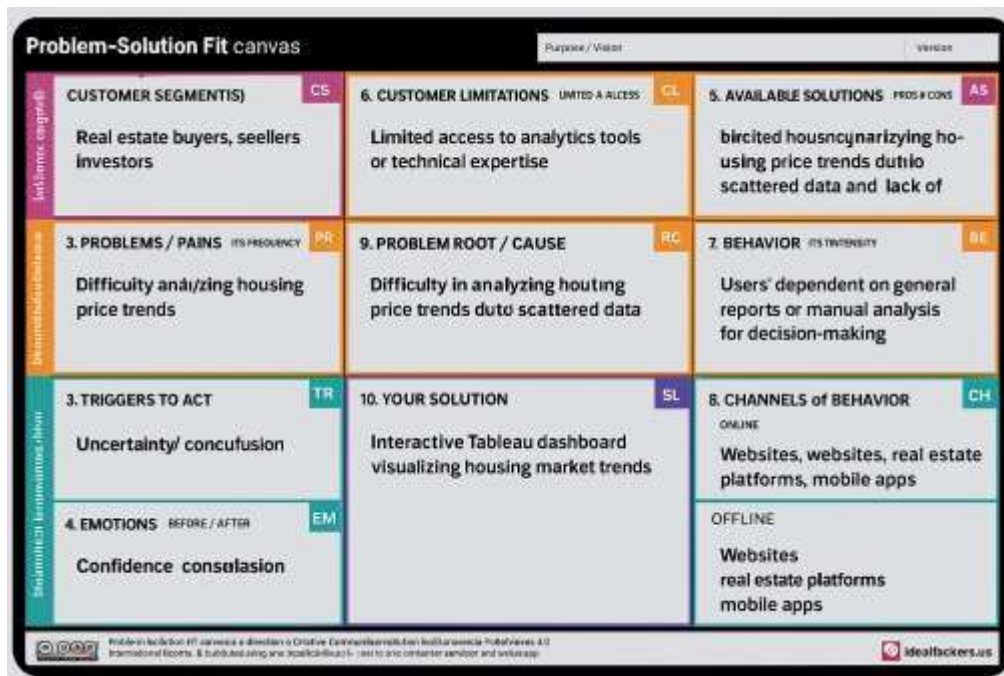**4.1 Problem Solution Fit**
Problem – Solution Fit Template:

The Problem-Solution Fit simply means that you have found a problem with your customer and that the solution you have realized for it actually solves the customer's problem. It helps entrepreneurs, marketers and corporate innovators identify behavioral patterns and recognize what would work and why

Purpose:

❑ Solve complex problems in a way that fits the state of your customers.

❑ Succeed faster and increase your solution adoption by tapping into existing mediums and channels of behavior.

❑ Sharpen your communication and marketing strategy with the right triggers and messaging.

❑ Increase touch-points with your company by finding the right problem-behavior fit and building trust by solving frequent annoyances, or urgent or costly problems.

❑ **Understand the existing situation in order to improve it for your target group.**

Template:

4.2 Proposed Solution

Proposed Solution Template:

Project team shall fill the following information in the proposed solution template.

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Real estate buyers, sellers, and investors face difficulty understanding housing price trends due to scattered data and lack of visualization tools.

2.	Idea / Solution description	The solution is an interactive Tableau dashboard that visualizes housing market trends using various features like location, size, year, and price. It helps users make data-driven decisions.
3.	Novelty / Uniqueness	The project provides a user-friendly, real-time visual analysis combining multiple housing features in a single dashboard with filters and drilldown capabilities.
4.	Social Impact / Customer Satisfaction	Enhances decision-making for homebuyers and real estate agencies, leading to better investments, transparency, and trust in the housing market.
5.	Business Model (Revenue Model)	Freemium model: basic dashboards are free; advanced features or API integrations available on subscription for agencies or property platforms.
6.	Scalability of the Solution	The solution can be scaled to include multiple cities, integrated with live real estate databases, and expanded for mobile or web applications.

4.3 Solution Architecture
Solution Architecture:

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:

- Find the best tech solution to solve existing business problems.

- Describe the structure, characteristics, behavior, and other aspects of the software to project stakeholders.

- Define features, development phases, and solution requirements.

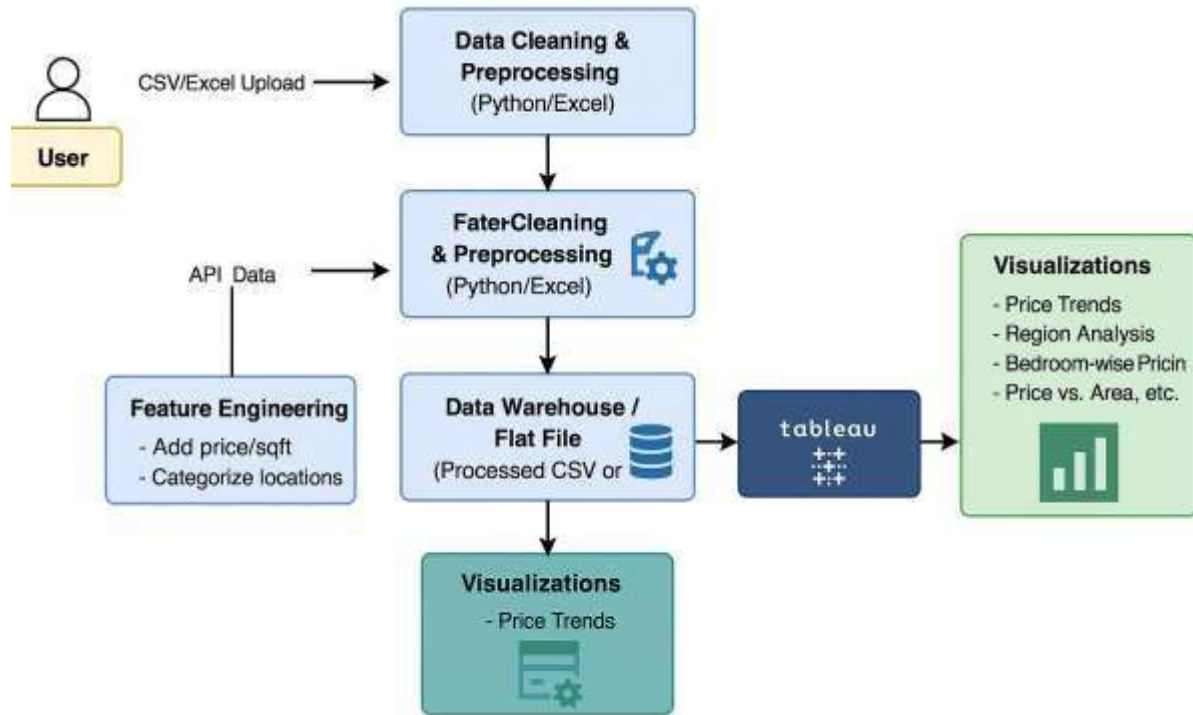- Provide specifications according to which the solution is defined, managed, and delivered.

Figure 1: Architecture and data flow of the Housing Market Visualization System

5.Project Planning & Scheduling

5.1 Project Planning

Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Use the below template to create a product backlog and sprint schedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members	Sprint Start Date	Sprint End Date (Planned)
Sprint-1	Data Collection & Extraction from Database	VHMTUT-2	Downloading the dataset	2	High	K Tulasi	24-6-2025	26-6-2025
Sprint-1	Data Preparation	VHMTUT-4	Explanation video links	1	High	K Tulasi	24-6-2025	26-6-2025
Sprint	**Functional Requirement (Epic)**	**User Story Number**	**User Story / Task**	**Story Points**	**Priority**	**Team Members**	**Sprint Start Date**	**Sprint End Date (Planned)**
Sprint-2	Data Visualization	VHMTUT-6	No. of Unique Visualizations	2	Low	K Tulasi	27-6-2025	28-6-2025
Sprint-2	Data Visualization	VHMTUT-7	Visualizations	2	High	K Tulasi	27-6-2025	28-6-2025
Sprint-3	Dashboard	VHMTUT-9	Responsive and Design of Dashboard	1	High	K Tulasi	28-6-2025	29-6-2025
Sprint-3	Story	VHMTUT-11	No of Scenes of Story	2	High	S Sumedha Sarvani	28-6-2025	29-6-2025
Sprint-3	Story	VHMTUT-12	Utilization of Filters	1	Medium	S Sumedha Sarvani	28-6-2025	29-6-2025
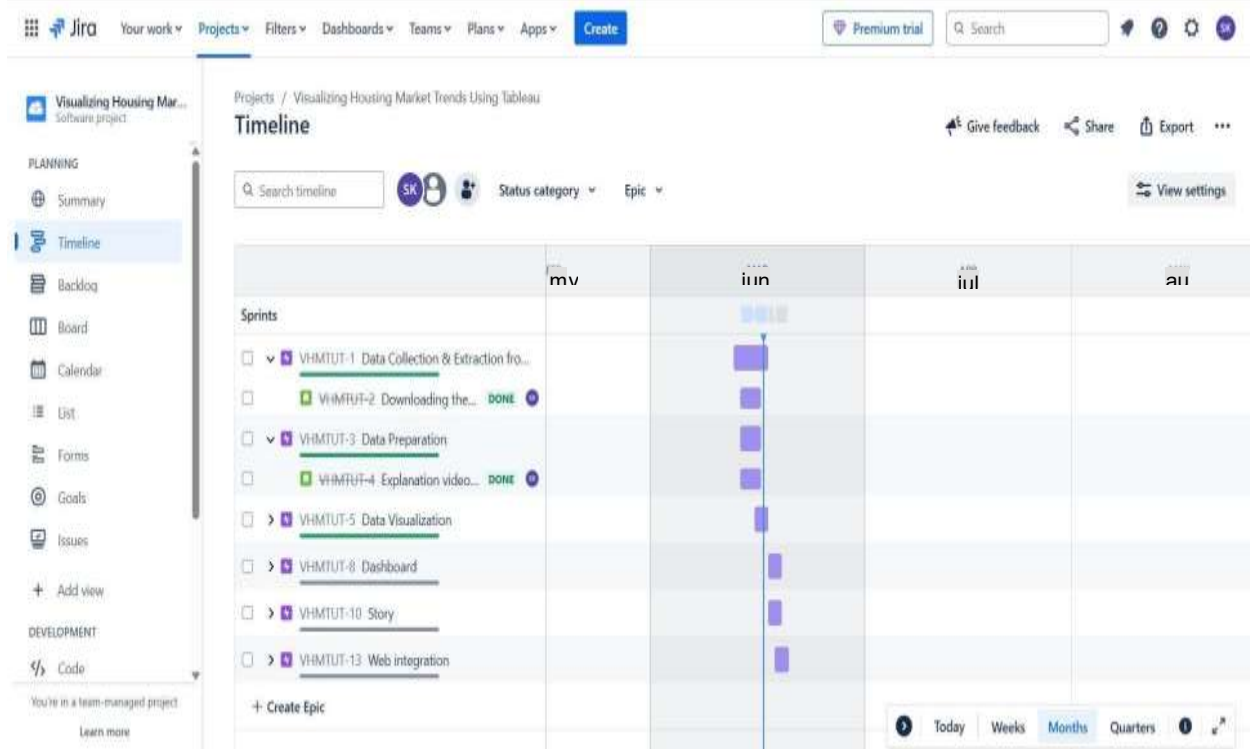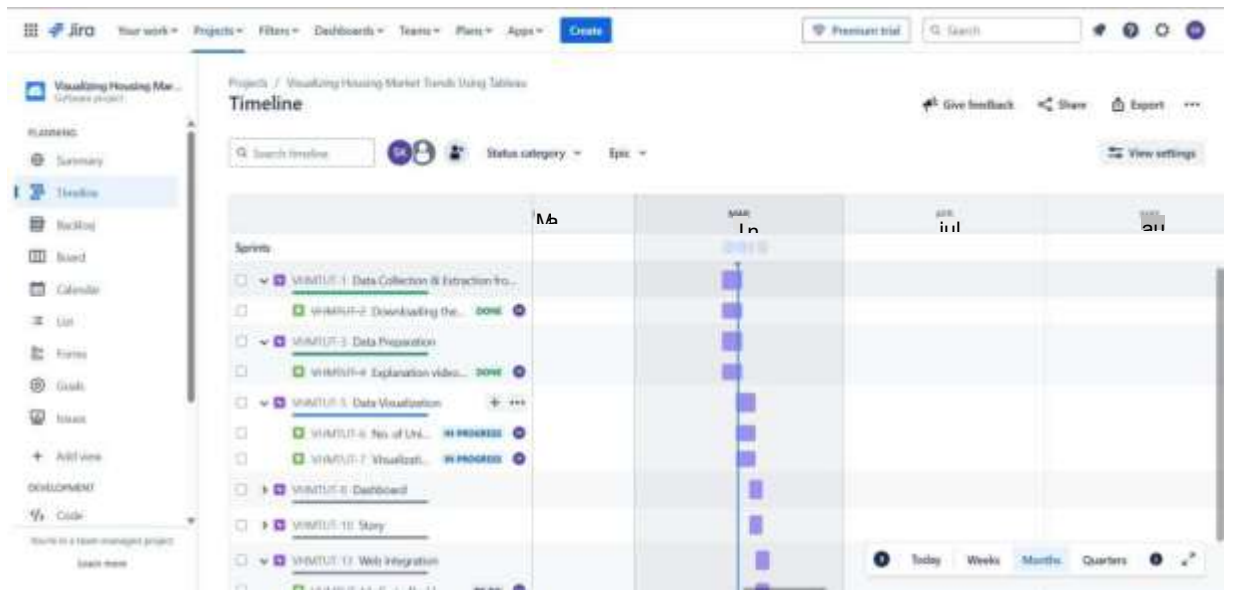
6.Functional and Performance Testing
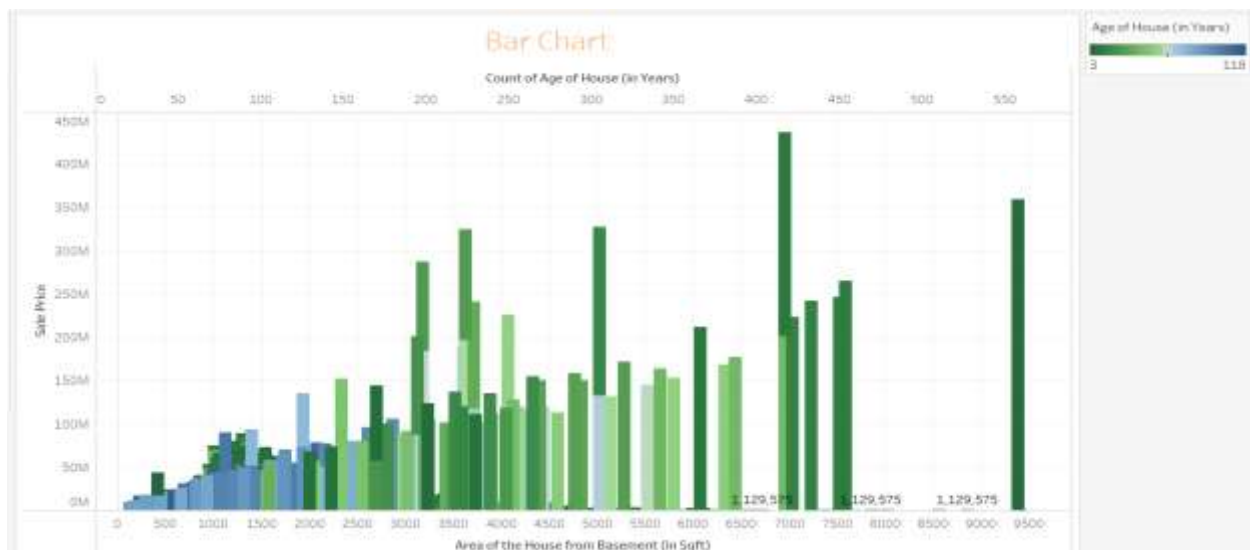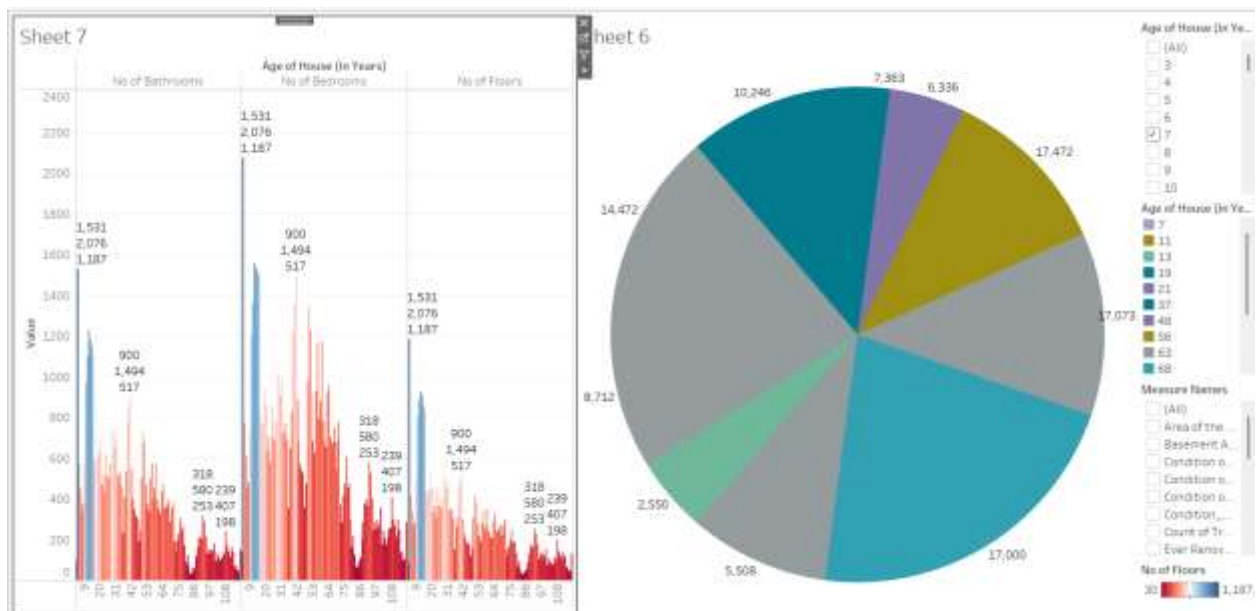## 6.1 Performance Testing
Model Performance Testing:

Project team shall fill the following information in model performance testing template.

S.No.	Parameter	Screenshot / Values
1.	Data Rendered	done
2.	Data Preprocessing	done
3.	Utilization of Filters	2
4.	Calculation fields Used	2
5.	Dashboard design	No of Visualizations / Graphs – 3 or 2
6	Story Design	No of Visualizations / Graphs - 3

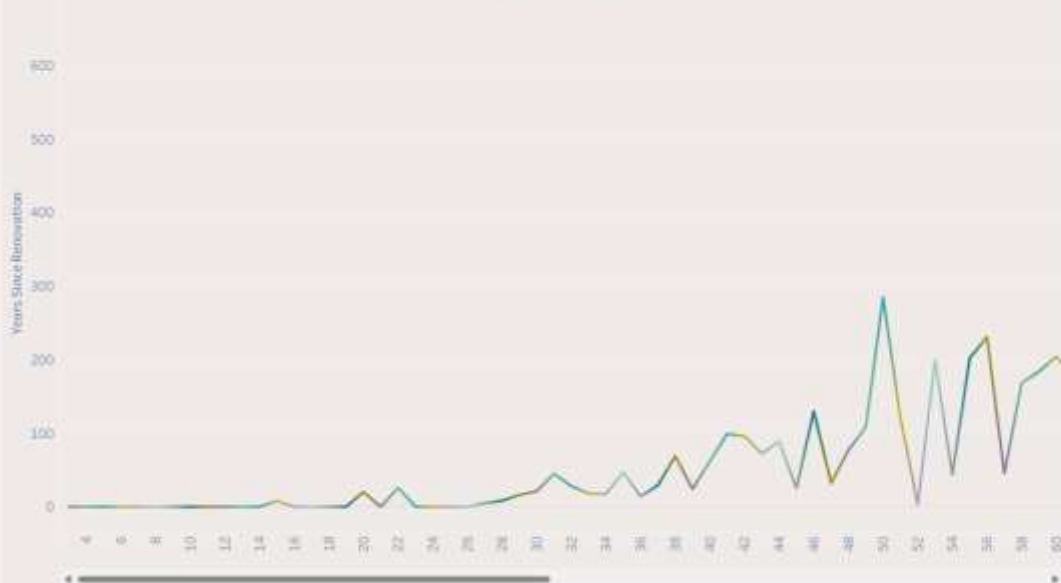## 7.Results
7.1 Output Screenshots

Total Sales By Years Since Renovation

Sale Price (bin)

SUM(Years Since Reno...
0 — 2,789

Count of Transformed_Housing_Data2.csv

✓ Keep Only	⊘ Exclude
Sale Price (bin)	920K
Count of Transformed_Housing_Data2.csv:	137
Sale Price:	127,085,020
Years Since Renovation:	112

Sheet 7

Age of House (In Years)

No of Bathrooms | No of Bedrooms | No of Floors

Value

1,531
2,076
1,187

1,531
2,076
1,187

900
1,494
517

900
1,494
517

1,531
2,076
1,187

318
580
253 239
407
198

900
1,494
517

318
580 239
253 407
198

318
580 239
253 407
198

Sheet 6

Age of House (In Ye...
(All)
3
4
5
6
☑ 7
8
9
10

Age of House (In Ye...
7
11
13
19
21
37
40
58
63
68

Measure Names
(All)
Area of the...
Basement A...
Condition o...
Condition o...
Condition o...
Condition,...
Count of Tr...
Ever Renov...

No of Floors
30 — 1,187

7,383 6,336
10,246
17,472
14,472
17,073
8,712
2,550
5,508
17,000

Avg Sales Price Of Houses

The majority of house sales cluster between ₹200K and ₹400K, showing a strong market preference for mid-range properties. Exceptionally high sales outliers above ₹1 million suggest a few luxury transactions, highlighting a skewed distribution
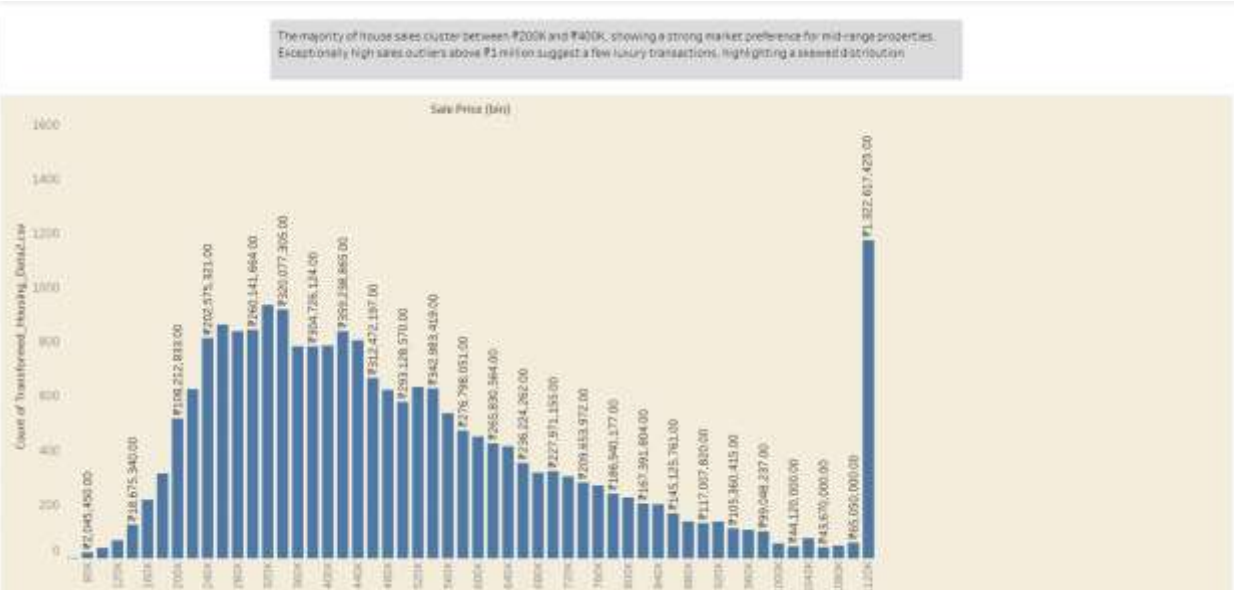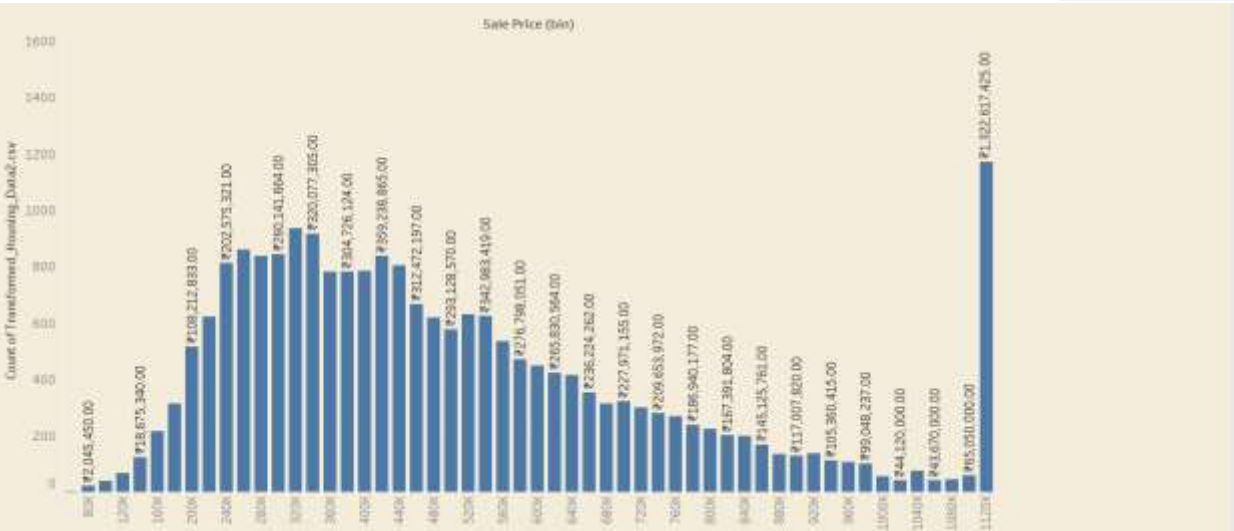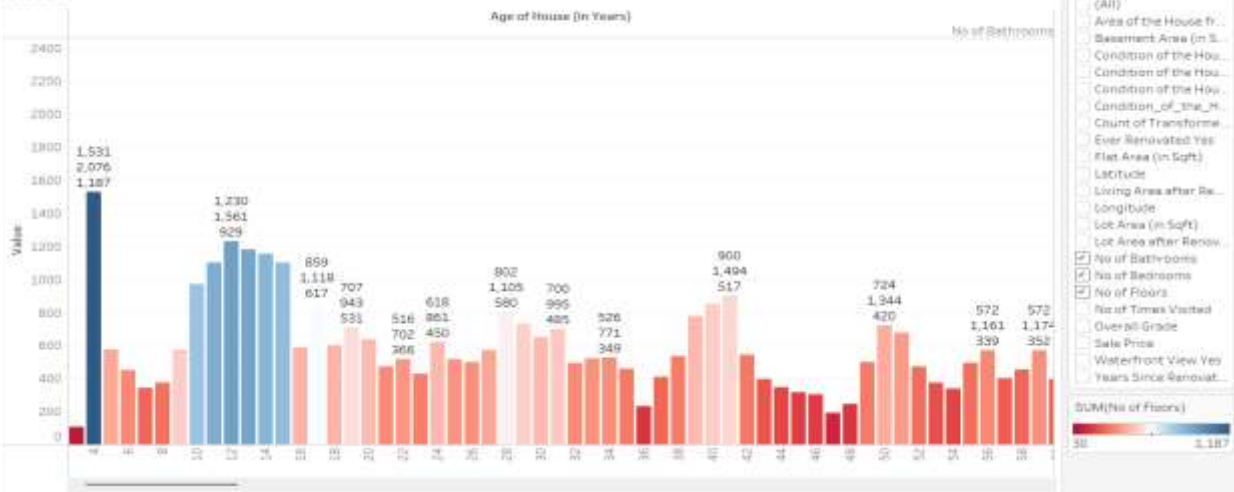
8.Advantages & Disadvantages

Advantages:

1. Interactive Data Exploration
   Tableau dashboards enable users to filter, drill down, and explore housing data visually and intuitively.
2. Data-Driven Decision Making
   Helps stakeholders like real estate analysts, buyers, and marketers make informed choices based on historical and current trends.
3. Pattern Identification
   Reveals insights such as the effect of renovations, location, or number of rooms on house pricing.
4. Customization for Stakeholders
   Dashboards can be tailored for different users — e.g., price insights for buyers, trend analysis for analysts.
5. Improved Market Competitiveness
   Enables companies to optimize pricing strategies and forecast demand effectively.

Disadvantages:

1. Data Dependency
   The quality and accuracy of insights depend entirely on the completeness and reliability of the housing dataset.
2. Learning Curve
   Users unfamiliar with Tableau or data visualization may need time or training to use the dashboards effectively.
3. Limited Predictive Power
   While good for visualization, Tableau is not designed for predictive modeling without integration with other tools.
4. Static External Data
   If not connected to live sources, dashboards may become outdated and require frequent updates.
5. Tool Licensing Cost
   Tableau Public is free, but enterprise versions with full features may incur costs for companies.

9.Conclusion

The project *"Visualizing Housing Market Trends: An Analysis of Sale Prices and Features using Tableau"* successfully highlights the power of data visualization in understanding the dynamics of the housing market. By analyzing key factors such as renovation history, property features, and sales trends, the Tableau dashboards provide actionable insights for real estate analysts, home buyers, and marketing teams. This approach not only enhances strategic decision-making but also helps identify patterns that influence pricing and market behavior. Ultimately, the project demonstrates how interactive visual tools can transform raw housing data into meaningful, user-friendly insights that support better forecasting, pricing strategies, and competitive advantage in the real estate domain.

10.Future Scope

1. Integration with Predictive Analytics

Future iterations can include machine learning models to predict future house prices based on trends and features.

2. Real-Time Data Updates

Connecting Tableau to live real estate databases or APIs will enable dynamic, real-time analysis of market fluctuations.

3. Geospatial Analysis

Adding detailed map-based insights can help identify location-specific trends and high-demand zones.

4. User-Specific Dashboards

Personalized dashboards for buyers, sellers, and agents can be created to improve user engagement and relevance.

5.Mobile and Web Deployment

Optimizing dashboards for mobile and web platforms will make insights more accessible to field agents and home buyers.

6.Integration with CRM and Sales Tools

Linking Tableau with CRM platforms can help real estate companies align market insights with client management and sales strategies.

7.Enhanced Feature Comparison Tools

Users could interactively compare houses by year built, number of bathrooms, renovation status, etc., with more advanced filtering and ranking options.

11.Appendix

Dataset link- https://www.kaggle.com/datasets/rituparnaghosh18/transformed-housing-data-2
Github link-
https://github.com/Tulasi2005/Visualizing-Housing-Market-Trends-An-Analysis-of-Sale-Prices-and-Features-using-Tableau
Project Demo Link-
https://drive.google.com/file/d/1gBkCOU39dWd3DdxtwziqwbJJVgvpZYvP/view?usp=sharing