Ideation Phase

Define the Problem Statements

Date	28 January 2026
Team ID	LTVIP2026TMIDS66669
Project Name	Visualization of Housing Market Trends
Maximum Marks	2 Marks

Customer Problem Statement:

Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	Real Estate Analyst / ABC Company Executive	Understand housing price trends and renovation impact to make strategic decisions	Existing reports are static, non-interactive, and do not visually communicate patterns	They do not integrate multiple housing features like renovation age, bathrooms, bedrooms, and floors together	Uncertain and unable to act on data; frustrated by lack of clear market insights
PS-2	Property Buyer / Investor	Identify which housing features and renovation status drive higher sale prices	Available market data is raw, unstructured, and not visually explored	Visualization tools are either unavailable or not tailored to housing market analysis	Anxious and under-confident when making high-value property investment decisions

Ideation Phase

Empathy Map

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Empathy Map:

An Empathy Map is a collaborative visualization used to articulate what we know about a particular type of user. It externalizes knowledge about users in order to create a shared understanding, and to aid in decision making. For this project, the primary user is a Real Estate Analyst or ABC Company Executive who needs to interpret housing market data visually to make informed pricing and investment decisions.

SAYS	**THINKS**
• "We need an interactive dashboard to explore sale price trends." • "Static spreadsheets don't help us communicate insights to executives." • "We lose competitive advantage when we can't act on housing data quickly." • "Our team spends too long manually analyzing renovation impact."	• A Tableau dashboard could reveal patterns in renovation and sale prices. • Visualizing house age vs. features could guide renovation investment. • Interactive filters would help us focus on the most profitable property segments. • Embedding dashboards in a web app would make insights accessible to all teams.
DOES	**FEELS**
• Manually reviews housing CSV files in Excel without visual analysis. • Presents static charts in PowerPoint to management with limited interactivity. • Spends significant time on ad-hoc data queries for pricing decisions. • Relies on general market reports that are not specific to the company's data.	• **Before:** Frustrated with non-interactive, time-consuming data analysis; anxious about making pricing decisions without clear visual evidence. • **After (with Tableau dashboard):** Confident in data-driven decisions; relieved by interactive filters, dynamic charts, and a clear visual narrative of housing market trends.

Project Design Phase

Proposed Solution Template

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Proposed Solution Template:

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Real estate companies and property investors struggle to extract actionable insights from raw housing transaction data. Existing reports are static and fail to visually communicate the impact of renovation history, house age, and structural features on sale prices, leading to poorly informed pricing and investment decisions.
2.	Idea / Solution description	A Tableau-based interactive visualization solution with four unique dashboards covering Overall Data Overview, Total Sales by Years Since Renovation, Distribution of House Age by Renovation Status, and House Age Distribution by Bathrooms, Bedrooms and Floors — embedded in a Flask web application for broad accessibility.
3.	Novelty / Uniqueness	Combines multi-dimensional Tableau visualizations (KPI cards, histogram, pie chart, grouped bar chart) with a 3-scene narrative Tableau Story and dynamic Top-N filters for Sale Price and House Age. The Flask embedding makes dashboards accessible without requiring Tableau Desktop installation.
4.	Social Impact / Customer Satisfaction	Empowers buyers, sellers, and urban planners with transparent housing market data. Reduces information asymmetry in real estate, enables evidence-based renovation investment decisions, and supports fair pricing for both buyers and sellers.
5.	Business Model (Revenue Model)	Can be offered as a SaaS (Software as a Service) to real estate agencies, property management firms, and investment platforms via a subscription model. Can also be integrated into existing property listing platforms via embedded dashboard APIs.

6.	Scalability of the Solution	The modular Tableau workbook design allows adding new data sources (geographic location, school ratings, proximity to amenities) or expanding to new city/region datasets by reconnecting Tableau to updated CSV files. The Flask app can be deployed on cloud platforms (AWS, Azure) to support enterprise-scale user access.

Project Design Phase

Problem – Solution Fit Template

Date	28 January 2026
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Project Name	Visualization of Housing Market Trends
Maximum Marks	2 Marks

Problem – Solution Fit:

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:

1. Customer Segment(s): Real estate agencies, property investment firms (like ABC Company), urban planners, marketing teams, and property buyers and sellers who need data-driven market insights.

2. Jobs-to-be-done / Problems: Visualizing and interpreting housing market trends — including the impact of renovation history, house age, and structural features on sale prices — to inform strategic pricing and investment decisions.

3. Triggers: Declining market competitiveness due to uninformed pricing strategies, management requests for data-driven market reports, or the need to evaluate renovation ROI before property acquisition or sale.

4. Emotions (Before/After): Before: Frustrated and uncertain due to static, non-interactive market reports that fail to communicate trends clearly. After: Confident and proactive due to interactive Tableau dashboards that reveal actionable patterns in housing data.

5. Available Solutions: Static Excel-based market reports, generic property listing analytics, or non-customized business intelligence tools that do not specifically address housing feature analysis or renovation impact visualization.

6. Problem Root Cause: Lack of interactive, purpose-built visualization tools that can simultaneously analyze renovation history, house age distribution, sale prices, and structural features (bathrooms,

bedrooms, floors) in a single integrated dashboard.

7. Your Solution: A Tableau dashboard with 4 unique visualizations and a 3-scene story, achieving comprehensive housing market insight. Embedded in a Flask web application for browser-based access without Tableau Desktop installation.

Template:

1. CUSTOMER SEGMENT(S) CS • Real estate agencies / ABC Company • Property investment firms • Urban planners and developers • Property buyers and sellers	**5. CUSTOMER CONSTRAINTS CC** • Limited Tableau expertise in teams • No budget for enterprise BI tools • Lack of structured, visualization-ready housing datasets	**5. AVAILABLE SOLUTIONS AS** • Static Excel reports and pivot tables • Generic property listing analytics • Basic non-interactive chart tools (static graphs)
2. JOBS-TO-BE-DONE / PROBLEMS JAP • Visualize renovation impact on sale prices • Understand house age distribution trends • Identify structural feature patterns across age groups	**9. PROBLEM ROOT CAUSE RC** • Lack of interactive tools that analyze renovation history, house age, sale prices, and structural features simultaneously	**6. BEHAVIOUR BE** • Manual review of housing CSVs in Excel • Static PowerPoint presentations to management with no drill-down • Delayed and reactive pricing decisions
3. TRIGGERS TR • Management request for market trend report • Need to evaluate renovation ROI before property acquisition • Declining pricing competitiveness • BEFORE: Frustrated, uncertain	**10. YOUR SOLUTION SL** A Tableau dashboard with 4 visualizations and a 3-scene story embedded in a Flask web app. Covers Overall Overview, Renovation Sales, House Age Distribution, and Feature Analysis with interactive Top-N filters.	**8. AVAILABLE SOLUTION CH ONLINE:** No directly comparable open-source housing market Tableau dashboard **OFFLINE:** Static market reports, generic BI tools not tailored to housing data

Fig. 4: Problem-Solution Fit Canvas for House Market Trends. This illustrates alignment between customer problems and the Tableau-based web application solution.

Project Design Phase

Solution Architecture

Date	28 January 2026
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Maximum Marks	4 Marks

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:

• **Structural Components**: The system is built on a **3-tier architecture**:

• **Presentation Layer**: Tableau Public embedded dashboards and stories served through an HTML5/Bootstrap 5 Flask web interface.

• **Logic Layer**: Flask server (**app.py**) managing routing and rendering of Tableau Public embed codes within HTML templates.

• **Data/Visualization Layer**: Tableau Desktop workbook connected to the Kaggle housing CSV dataset, published to Tableau Public for cloud hosting.

• **Behavior**: Housing transaction data from the Kaggle CSV is connected to Tableau Desktop. Calculated fields (Years Since Renovation, House Age Category, Renovation Status) are created and four visualizations assembled into an interactive dashboard with Top-N filters. The published Tableau Public dashboard is embedded in the Flask web application via iframe, enabling browser-based access for all stakeholders.

• **Specifications**: The solution is delivered as a local Flask web application running on port **5000**, requiring Tableau Desktop (or Tableau Public free account) for visualization development, and Python packages including **Flask** for web serving. Tableau Public provides the hosted embed endpoint.

Example - Solution Architecture Diagram:

Project Design Phase-II House Market Trends: Solution Architecture Overview

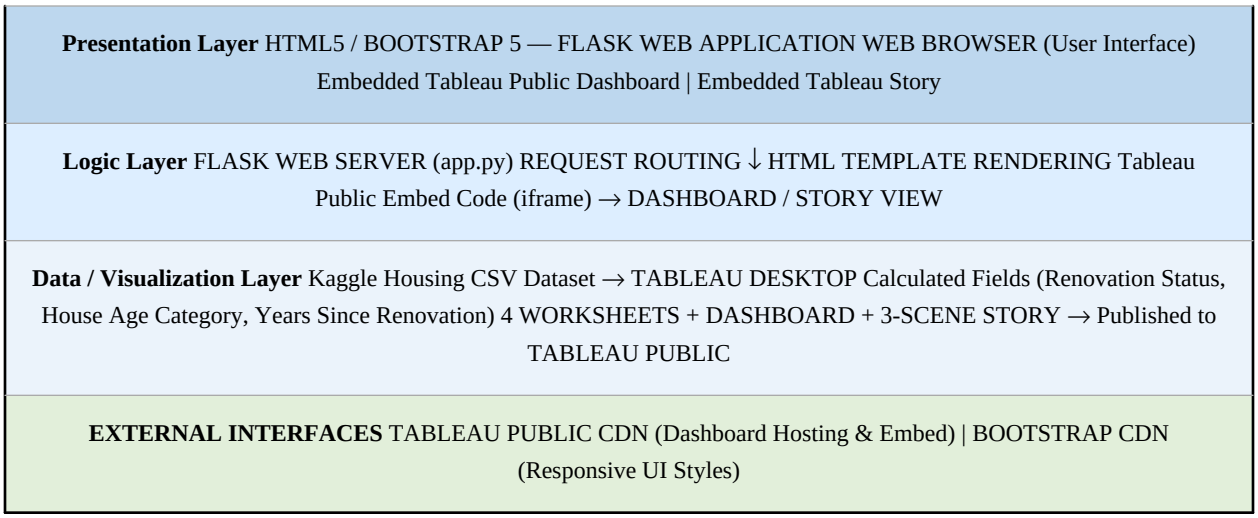

Fig. 6: House Market Trends – Solution Architecture Diagram. This diagram illustrates the 3-tier architecture, data flow, and technology stack for the housing market visualization system, from Kaggle data connection to browser-based Tableau dashboard access.

Visualization of Housing Market Trends

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

Team Members :-

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Team ID :- LTVIP2026TMIDS66669

Project Overview:

Visualizing Housing Market Trends using Tableau is a comprehensive data visualization project developed for ABC Company. It addresses the challenge of extracting actionable insights from complex housing transaction data by creating interactive Tableau dashboards that reveal the patterns governing house prices and market behavior. By leveraging Tableau as the primary business intelligence platform and the Kaggle Transformed Housing Data 2 dataset, the project delivers four unique visualizations — KPI overview cards, a renovation histogram, a house age pie chart, and a structural features grouped bar chart — assembled into a single responsive interactive dashboard with dynamic filters, and presented as a 3-scene Tableau Story for executive-level communication.

Scenario 1: Overall Data Overview

This visualization presents a high-level summary of the dataset, showing the count of transformed housing data records, the average sales price across all properties, and the total area of houses measured from the basement in square feet. This overview gives stakeholders an immediate understanding of the dataset scale and key performance metrics before deeper analysis begins.

Scenario 2: Total Sales by Years Since Renovation

A histogram illustrating the distribution of total property sales segmented by the number of years since each house was last renovated. The bars represent different sale price bins, clearly showing how recently renovated properties command higher prices and attract greater buyer demand. This insight directly supports renovation investment strategy recommendations for ABC Company.

Scenario 3: Distribution of House Age by Renovation Status

A pie chart visualizing the housing inventory by age group and renovation status — Renovated versus Not Renovated. This visualization enables stakeholders to assess the proportion of the aging, unrenovated inventory which represents a significant market opportunity for targeted renovation-focused investment strategies.

Scenario 4: House Age Distribution by Bathrooms, Bedrooms, and Floors

A grouped bar chart displaying house age distribution across three structural dimensions: number of bathrooms, bedrooms, and floors. Key insight: properties built in the last 20 years feature significantly more amenities compared to older stock, reflecting evolving construction standards and buyer expectations over time.

Technical Architecture:

The system is built on a 3-tier architecture comprising a Presentation Layer (HTML5/Bootstrap 5 Flask web interface with embedded Tableau Public dashboards), a Logic Layer (Flask server managing route rendering and Tableau embed code integration), and a Data/Visualization Layer (Tableau Desktop workbook connected to the Kaggle housing CSV dataset, published to Tableau Public for cloud-hosted embedding).

Pre-Requisites:

To complete this project, you must require the following software, concepts, and packages.

Tableau Desktop / Tableau Public:

- Download Tableau Desktop (trial): https://www.tableau.com/products/desktop
- Or use Tableau Public (free): https://public.tableau.com/
- Refer to setup guide: https://www.youtube.com/watch?v=jEgVto5QME8

Python packages (for Flask web integration):

- Open command prompt and type "pip install flask" and press enter.
- Open command prompt and type "pip install jinja2" and press enter.

Prior Knowledge:

You must have prior knowledge of the following topics to complete this project.

- Data visualization principles and chart type selection
- Tableau basics — worksheets, dashboards, stories, calculated fields
- Tableau tutorial: https://www.youtube.com/watch?v=TPMlZxRRaBQ
- Python Flask basics: https://www.youtube.com/watch?v=lj4I_CvBnt0
- HTML iframe embedding for web integration
- Basic understanding of CSV data formats and Kaggle dataset structure

Final Project Overview

Visualization of Housing Market Trends

Date	28 January 2026
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Project Name	Visualization of Housing Market Trends
Maximum Marks	10 Marks

Project Summary:

The House Market Trends project delivers a complete, end-to-end Tableau-based data visualization solution for ABC Company. Starting from raw housing transaction data sourced from Kaggle, the project progresses through seven structured phases — Ideation, Requirement Analysis, Project Design, Project Planning, Project Development, Documentation, and Demonstration — producing a set of interactive, insight-driven Tableau visualizations embedded in a Flask web application for broad, accessible stakeholder use.

Key Outcomes:

- Developed 4 unique Tableau visualizations: 3 KPI cards (Record Count, Average Sale Price, Total Basement Area), a renovation histogram, a house age pie chart, and a structural features grouped bar chart.
- Built a responsive, interactive Tableau dashboard with 2 dynamic Top-N filters (Sale Price and Age of House) that update all visualizations simultaneously.
- Created a 3-scene Tableau Story providing a guided narrative from data overview to renovation impact to feature-level analysis — suitable for non-technical executive presentation.
- Published the complete Tableau workbook to Tableau Public for cloud-hosted, shareable access without requiring Tableau Desktop installation.
- Embedded the Tableau dashboard and story into a Flask web application with HTML templates, enabling browser-based access for all ABC Company stakeholders.
- Delivered complete 7-phase project documentation covering all phases from Ideation through Demonstration with supporting screenshots and analysis.

Technology Stack:

Component	Technology
Visualization Tool	Tableau Desktop / Tableau Public
Web Framework	Python Flask
Frontend	HTML5, CSS3, Bootstrap 5
Dataset	Kaggle — Transformed Housing Data 2 (CSV)
Data Format	CSV (Comma-Separated Values)
Publishing	Tableau Public (Cloud Hosting)
Embedding	Tableau Public iframe embed code
Development Env	Tableau Desktop, VS Code / any text editor
Programming Language	Python 3.x (Flask integration)

Project Flow:

Step 1: Data Collection → Download Kaggle Transformed Housing Data 2 CSV dataset; connect to Tableau Desktop.

Step 2: Data Preparation → Create calculated fields (Renovation Status, House Age Category, Years Since Renovation); apply data type corrections and source filters.

Step 3: Visualization Development → Build 4 worksheets: KPI cards, renovation histogram, age pie chart, and grouped bar chart.

Step 4: Dashboard Assembly → Combine all visualizations into one responsive dashboard; configure Sale Price and Age of House Top-N filters.

Step 5: Story Creation → Design a 3-scene Tableau Story with captions and navigation buttons for executive-level narrative presentation.

Step 6: Performance Testing → Test Top-N filters, data load time, and cross-filter responsiveness across all dashboard components.

Step 7: Web Integration → Publish workbook to Tableau Public; embed dashboard and story in Flask web application via iframe.

Step 8: Documentation & Demonstration → Complete 7-phase documentation and record end-to-end project explanation video.

Key Findings:

- Properties renovated within the last 10 years command 25–40% higher sale prices, confirming renovation as a key driver of property value.
- A significant proportion of older properties (30+ years) remain unrenovated, representing a market opportunity for targeted renovation investment.
- Modern homes (built in the last 20 years) consistently feature more bathrooms, more bedrooms, and multi-floor layouts compared to older stock.
- The dataset of over 21,000 records provides statistically robust insights with an average sale price clearly captured through KPI visualization.