Software Design Document

<Project Name>

Student Names

Table of Contents

[1.0 System Vision 3](#_Toc46748622)

[1.1 Problem Background 3](#_Toc46748623)

[1.2 System Overview 3](#_Toc46748624)

[1.3 Potential Benefits 3](#_Toc46748625)

[2.0 Requirements 4](#_Toc46748626)

[2.1 User Requirements 4](#_Toc46748627)

[2.2 Software Requirements 4](#_Toc46748628)

[2.3 Use Cases 4](#_Toc46748629)

[3.0 System Components and Software Design 5](#_Toc46748630)

[3.1 System Components 5](#_Toc46748631)

[3.2 Software Design 5](#_Toc46748632)

[4.0 User Interface Design 6](#_Toc46748633)

# System Vision

## 1.1Problem Background

* Dataset: Our system will utilize a dataset of property rentals from the Airbnb platform, which includes information such as property descriptions, prices, locations, and ratings.
* Data Input/Output: The system will accept user queries and provide a list of property rental options that match the specified criteria.
* Problem Solving: This system aims to assist property seekers in finding rental options that meet their requirements more easily. It also helps property owners effectively showcase their properties to potential tenants.
* Users: The potential users of this system include:
  1. Property Seekers: This system serves individuals who are searching for rental properties, whether for short-term or long-term leases. They seek to quickly and conveniently find properties that fit their budget, location, and property features.
  2. Property Owners: This system can provide property owners with pricing references and estimated rental income. Property owners can search and filter information within the software, using the visual results for pricing reference. Based on the software's data analysis, they can identify relevant features affecting property prices to optimize their rental returns.
  3. Real Estate Agents: This software can offer background information for other real estate agents to understand market demand and assist them in targeting the market and adjusting property listings. Additionally, real estate agents can use the visual analysis results provided by the software to predict future market trends, such as peak seasons, off-peak seasons, and price fluctuations.

## 1.2 System Overview

* The system will be able to perform user queries based on property features, geographical location, keywords, and other criteria, returning the most suitable property rental options.
* Features and functionalities include highly customizable search options, price distribution queries, user ratings and reviews, and occupancy rate trend charts.

## 1.3 Potential Benefits

* Streamlined Search Process: Users no longer need to manually sift through many property listings. Instead, they can obtain clear and visual results through simple interactions with the graphical interface.
* Improved Rental Efficiency: Property owners and real estate professionals can query historical property information through the system.
* Review-Based Property Filtering: The system allows users to filter properties based on ratings and reviews from previous tenants. This enables users to gain a comprehensive understanding of each property's actual condition and rental experience.
* Expandable Use Cases: Currently, the software is limited by historical datasets, lacking real-time data. In the future, if it can access the latest data in real-time, it can provide insights into the current rental market. Furthermore, with formatted data processing, the software can easily expand to incorporate various machine learning algorithms to provide more detailed and accurate analysis results.表單的頂端表單的底部

# Requirements

## User Requirements

1. User Role: Tenant
2. User Background:

* The user is a tenant who is currently looking for rental accommodation. They may be an individual or a family in need of renting a property in a specific neighborhood for reasons such as work, education, or other purposes.

1. User Objectives:
   * The user wishes to use the software to search for available rental properties in a specific area.
   * Understand the price distribution of rentals.
   * Filter property listings based on personal preferences such as keywords (e.g., swimming pool, pet-friendly).
   * Analyze comments from other tenants regarding cleanliness factors.
   * Access information about the occupancy rate of rental properties.
2. User Interactions:

4.1 Querying Property Listings

* + - Click on the "Search Listings" function.
    - Enter the location.
    - Input the desired dates.
    - Submit the query.

4.2 Price Distribution Inquiry

* Click on the "Price Distribution" chart function.
* Enter the dates and location.
* Navigate to the chart page.

4.3 Keyword Search

* Click on the "Keyword Search" function.
* Input search criteria using filters (e.g., keywords).
* Submit the query.

4.4 Cleanliness Comments

* Click on the "Cleanliness Comments" function.
* Enter the dates and location.
* Navigate to the property listings page and select a specific property.
* Use filters to search for specific keywords in comments.
* Submit the query.

4.5 Property Occupancy Rate

* Click on the "Property Occupancy Rate" function.
* Enter the dates and location.
* Navigate to the property listings page and select a specific property.
* Use filters to specify the occupancy rate criteria.
* Submit the query.

## Software Requirements

R1. Property Query:

R1.1 Users should be able to enter the software and input location and date as search criteria to retrieve available rental properties within a specific area and date range.

R1.2 The software should be able to retrieve and display a list of rental property listings that match the search criteria from the database.

R2. Price Distribution Chart Function:

R2.1 Users should be able to access the price distribution chart interface by clicking on the function menu.

R2.2 In the price distribution chart interface, users should be able to input date range and location to view the distribution of property prices within a specific time period.

R2.3 The software should generate a property price distribution chart based on the input date range and location.

R3. Keyword Search Function:

R3.1 Users should be able to use the keyword search function to filter rental property listings that meet specific requirements by entering keywords.

R3.2 The software should retrieve and display a list of rental property listings that contain the keywords entered by the user.

R4. Cleanliness Comment Analysis Function:

R4.1 Users should be able to use the cleanliness comment analysis function.

R4.2 Users should be able to input date range, location, and keywords to view rental properties that meet specific requirements.

R4.3 Users should be able to navigate to the detailed information interface of a specific property and click on that property to view its comment analysis.

R4.4 In the detailed information interface, users should be able to use comment filters to enter keywords for filtering comments related to cleanliness.

R4.5 The software should retrieve and display a list of comments that contain the keywords entered by the user.

R5. Property Occupancy Rate Function:

R5.1 Users should be able to use the property occupancy rate function.

R5.2 Users should be able to navigate to the detailed information interface of a specific property and click on the occupancy rate button to view the occupancy rate chart for that property.

## Use Cases & Use Case Diagrams

|  |  |
| --- | --- |
| Use cases ID | 1 |
| Use Case Name | Searching for Rental Properties |
| Actors | Tenant |
| Description | Tenants can search for available rental properties within a specific area and date range by entering the location and date. |
| Pre-requisition | The tenant has already accessed the software and successfully logged in. |
| Flow of Event | 1. The system displays the main interface, including various function options. 2. The tenant selects the "Search Listings" option. 3. The system navigates the tenant to the property search page. 4. The tenant sees fields for entering the location and date. 5. The tenant input’s specific location and date range as search criteria. 6. The tenant clicks the "Submit" button. 7. The system uses the entered search criteria to retrieve matching rental property listings from the database. 8. The system displays a list of rental property listings that match the search criteria, including detailed information such as price, property type, location, etc. |
| Exception Conditions | * If the entered location or date is invalid or in an incorrect format, the system displays an error message, prompting the tenant to re-enter the information. * If the search results are empty, the system displays a notification message, informing the tenant that there are no available rental properties that meet the criteria. |

|  |  |
| --- | --- |
| Use cases ID | 2 |
| Use Case Name | Viewing Property Price Distribution Chart |
| Actors | Tenant |
| Description | Users can view the distribution of property prices within a specific time by clicking on the function menu. |
| Pre-requisition | The tenant has already accessed the software and successfully logged in. |
| Flow of Event | 1. The system displays the main interface, including various function options. 2. The user clicks on the "View Price Distribution Chart" option. 3. The system navigates the user to the interface for the price distribution chart. 4. The user sees input fields for specifying the date range in the interface. 5. The user enters a specific date range to specify the desired time for viewing. 6. The user clicks the "Submit" button. 7. The system uses the entered date range to generate a property price distribution chart based on the data in the database. 8. The generated price distribution chart is displayed on the interface, showing property price ranges and the number of properties within each range. |
| Exception Conditions | * If the entered date range is invalid or in an incorrect format, the system displays an error message, prompting the user to re-enter the information. * If an error occurs during the generation of the price distribution chart, the system displays an error message, prompting the user to try again later. |

|  |  |
| --- | --- |
| Use cases ID | 3 |
| Use Case Name | Viewing Property Price Distribution Chart |
| Actors | Tenant |
| Description | Tenants can filter rental property listings that meet specific requirements by entering keywords. |
| Pre-requisition | The tenant has already accessed the software and successfully logged in. |
| Flow of Event | 1. The system displays the main interface, including various function options. 2. The tenant selects the "Keyword Search" option. 3. The system navigates the tenant to the keyword search page. 4. The tenant sees a field for entering keywords. 5. The tenant enters specific keywords describing their rental requirements, such as "swimming pool" or "pet friendly." 6. The tenant clicks the "Submit" button. 7. The system uses the entered keywords to retrieve rental property listings from the database that contain those keywords. 8. The system displays a list of rental property listings that contain the keywords, including detailed information such as price, property type, location, etc. |
| Exception Conditions | * + If the entered keywords are invalid, the system displays an error message, prompting the tenant to re-enter them.   + If the search results are empty, the system displays a notification message, informing the tenant that there are no rental property listings that meet the criteria. |

|  |  |
| --- | --- |
| Use cases ID | 4 |
| Use Case Name | Viewing Cleanliness Comment Analysis |
| Actors | Tenant |
| Description | Tenants can navigate to the detailed information interface of a specific property to view and analyse comments related to cleanliness. |
| Pre-requisition | The tenant first uses the "Search Listings" function to select the specific property and then navigates to the detailed information interface of that property. |
| Flow of Event | 1. The system displays the main interface. The tenant begins by using the "Cleanliness Comment Analysis" function. 2. The tenant browses the list of available rental properties and selects a specific property. 3. The system guides the tenant to the detailed information interface of the selected property. 4. In the detailed information interface, the tenant sees various details about the property, including the "Comment Analysis" function. 5. The tenant clicks on the "Comment Analysis" option. 6. The system navigates the tenant to the comment analysis interface. 7. The tenant sees comment filters where they can enter specific keywords, such as "cleanliness" or "hygiene." 8. The tenant inputs keywords and clicks the "Submit" button. 9. The system uses the entered keywords to retrieve comments related to cleanliness from the database. 10. The system displays a list of comments containing the keywords and provides relevant information for each comment. |
| Exception Conditions | * + If the entered keywords are invalid, the system displays an error message, prompting the tenant to re-enter them.   + If there are no cleanliness-related comments for the selected property, the system displays a notification message, informing the tenant that there is no relevant information available. |

|  |  |
| --- | --- |
| Use cases ID | 5 |
| Use Case Name | Viewing Property Occupancy Rate Chart |
| Actors | Tenant |
| Description | Tenants can navigate to the detailed information interface of a specific property to view the occupancy rate chart for that property. |
| Pre-requisition | The tenant first uses the "Search Listings" function to select the specific property and then navigates to the detailed information interface of that property. |
| Flow of Event | 1. The system displays the main interface, including various function options. 2. The tenant selects the "View Property Occupancy Rate Chart" option. 3. The tenant browses the list of available rental properties and selects a specific property. 4. The system guides the tenant to the detailed information interface of the selected property. 5. In the detailed information interface, the tenant sees various details about the property, including the "Occupancy Rate" button. 6. The tenant clicks the "Occupancy Rate" button. 7. The system displays the occupancy rate chart for that property, reflecting the occupancy rate for that property over a certain period. |
| Exception Conditions | * If there is no occupancy rate data available for the selected property, the system displays a notification message, informing the tenant that there is no relevant information available. |

# Software Design and System Components

## Software Design

A block diagram/flowchart of how your software might work

## System Components

### Functions

Preliminary list of all functions in the software. For each function in the list the following information is provided:

* a brief description of what it does (1 or 2 sentences);
* a list of the input parameters, and their data types, and what they are used for;
* a list of any side effects caused by the function (ie change global or member variables, changes data passed by reference from calling function etc)
* a description of the function’s return value

### Data Structures / Data Sources

List of all data structures in the software (eg linked lists, trees, arrays etc) or eternal data sources. For each data structure in the list the following information is provided:

* Type of structure (tree, list etc),
* Description of where and how it is used
* List of data members, and what each one is for do
* List of functions that use it

### Detailed Design

Pseudocode for all non-standard / non-trivial algorithms that operate on data structures

# User Interface Design

This is your initial interface design. Describe the tools you used for this design stage and any key findings that informed your design. This introduction is descriptive and should explain what you have completed for the actual design work you will present in the sub-sections below.

在這個階段，我們進行了初步的界面設計，以確保我們的產品能夠符合用戶需求並提供優秀的用戶體驗。我們使用了線框草圖、原型和視覺設計工具來創建初步的界面設計，這些設計將為我們後續的實際開發工作奠定基礎。

我們在設計過程中發現了一些關鍵的發現，這些發現影響了我們的界面設計選擇。首先，我們意識到租客需要快速而直觀地查詢房源，因此我們將主要的功能模塊放置在主畫面上，以便用戶輕鬆訪問。其次，根據用戶的需求，我們決定在界面中提供價格分布圖、關鍵詞搜索、清潔度評論分析和房源入住率等功能，以使租客能夠深入了解各個方面的信息。

我們的初步設計旨在保持界面的簡潔和直觀，使用戶能夠輕鬆導航並快速找到所需的信息。以下的子節將詳細描述我們的結構設計和視覺設計，以更好地展示我們的界面設計理念和選擇。

## Structural Design

Structural design refers to the navigational and information structure of your product – the structure that supports the interface layout. How will you structure your product? How will you group your information? How will you navigate through your product? Why? This can take the form of a diagram showing structure and hierarchy, supported by a discussion and justification of your choices. Why have you made these design choices? Describe and outline the structure of your interface and of your information.

導航和信息結構： 我們的產品結構將基於用戶用例，將功能模塊分為幾個主要部分：

查詢房源： 用戶可以輸入地區和日期以查找可租房源。

價格分布圖： 用戶可以查看特定時間段內房產價格的分布情況。

關鍵詞搜索： 用戶可以使用關鍵詞篩選符合特定需求的租房房源。

清潔度評論分析： 用戶可以查看房源的清潔度相關評論分析。

房源入住率： 用戶可以查看房源的入住率圖表。

信息分組： 在每個功能模塊中，我們將根據用戶需求將信息進行合理的分組，以提供清晰的內容呈現。例如，在 "查詢房源" 模塊中，用戶可以輸入地區和日期，並查看符合條件的房源清單。

導航： 用戶可以透過功能選單來導航到不同的功能模塊。每個功能模塊的內容頁面將提供返回主畫面或回到功能選單的選項，以確保導航的便捷性。

綜合考慮： 我們的設計選擇基於用戶需求和用戶流程。例如，當用戶進行關鍵詞搜索時，我們提供了一個簡單的輸入框，使用戶能夠快速篩選房源。同時，我們確保整個結構具有一致性，以便用戶在不同模塊之間進行流暢的導航。這種結構設計旨在幫助用戶輕鬆實現不同的任務，同時保持界面的清晰度和易用性。我們的設計選擇受到用戶用例和需求的啟發，旨在提供最佳的用戶體驗。

## Visual Design

Detail your visual design: Layout, visual elements, icons, graphics, style, colour, fonts general screen designs. This can be sketches, wireframes, mockups etc, supported by a discussion, explanation, and justification of your choices.

一張含有 行動電話, 文字, 小工具, 可攜式通訊裝置 的圖片

自動產生的描述