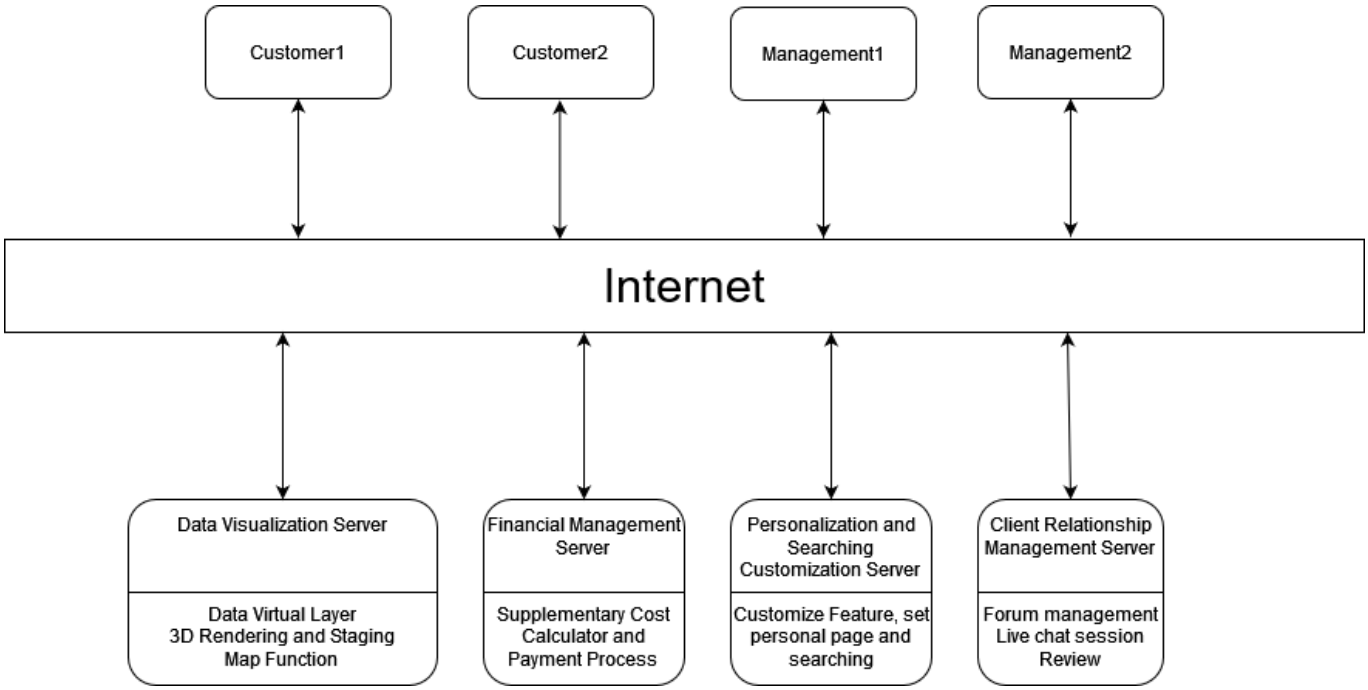
## 4.0 System Architectural Pattern

### 4.1 Software Architecture




### 4.2 Description of Software Architecture

Client-server architecture is used where the components of the system is organized into four servers, data visualization server, financial management server, personalization and searching customization server and client relationship management server. Each server provides different services to customers or managements across different location. The customers access the server to use their respective service. Moreover, some servers are accommodated to process real-time data and artificial intelligence servers are used to improve its performance to avoid overhead when large number of users across different geographical area accessing the server at the same time.

The reason for choosing client server is based on the distribution of services, the geographical area of users, and the method of processing data. The functionality of system is organized into services to partition the tasks, each service is delivered from their respective servers. There are data visualization server, financial management server, personalization and searching customization server, and client relationship management server.

Both clients are independent to other clients, and server is independent to other server. Since the services provided by each server are independent to each other, implementing the client-server architecture is a good choice. If a single client or server is crashed, the other client or server will not

be affected, and thus reduce the possibility of whole system being down. Furthermore, the security of client-server is high, this can protect the client as the system authenticates their client's account when the client login and makes payment.

Client request services from the server and the server provides the service to the client. The number of clients is scalable without affecting the system. Clients and management staff which can access to the server and use their services. Client server architectural pattern is used because it requires a lot of algorithms and calculations. Besides, Clients can access the server from a range of locations. Data virtualization delivers an integrated information in real time to the function used by the clients or management staff. Each server is independent from each other, and they can interact with each other without go through central database.

#### 4.2.1 Data Visualization Server

The Data Visualization Server contain of data virtual layer which allow management staff to view tenant information in real time when accessing internet. It also contains virtual staging function that allow management to décor the property, 3D scanning functions which allow them to capture image and create 3D model and create a virtual tour of the property.
Users or clients can also access to the map function at the same time through the Data Visualization Server to locate the location and check the crime rating via crime data functions. Another user also can 3D render the property and make an interior design of the property. Since data visualization server need to process so many functions, it need to be a powerful server. This includes a powerful CPU to handle large amount of data and response to client's request quickly, it also need sufficient RAM to handle multiple requests concurrently, it also need a fast and reliable storage such as SSD to store the data, high network speed interface for efficient communication with clients, cooling effects, and robust security such as firewalls, data encryption.

#### 4.2.2 Financial Management Server

Financial Management Server provides supplementary cost calculator service and payment process service for the customers.

When the customer decided to buy the property, they can check the amount of tax need to pay to the local government using property tax calculator. If the customer is from foreign country, they can check their currency against the local currency using currency calculator. The customer also can check their affordability using affordability calculator based on their salary, then if they cannot afford to buy the property by full payment, they can use home loan calculator to determine how much repayment need to pay, besides, they can use refinance calculator to calculate the refinance amount from their existing property for new property. Once the customer confirmed that they can afford to buy the property, they

can now check the rental they can obtained if they choose to rent out their property using rental property calculator. Then, the customer can calculate the property depreciation after some years of purchase. Lastly, the customer can summarize total amount need to pay including all the fee and taxes using closing cost calculator.

When the customer has selected the property and decided to pay the property's owner, the customer accesses the financial management server. The customer enters the payment method into the browser and necessary information required to make payment, the server then send OTP request to the browser for payment validation. Next, the customer enters the OTP, then the server validates the OTP and perform fraud checking, if the payment is validated, the payment will transfer to the company's wallet and subsequently to the property owner's wallet after the customer enters the proof of receiving the property. While in contrast, if the payment is checked to be a fraud, the server makes a report for further investigation.

#### 4.2.3 Personalization and Searching Customization Server

Personalization and searching customization server provide extra functions and features for the customers to navigate the browser conveniently.

Personalization stores various features or functions to ease the navigation of customers in addition of basic features or functions. When the customers required the browser provides extra features, they access the personalization and searching customization server, the customer enter the features they want by selecting the features from a list, then the server activate the features in the browser and apply them.

Searching customization involve tailoring search content and result based on customer's preferences and their searching history. These will require using algorithms, cloud services and advanced data management system to store, process and analyse the data which to serve the personalized content to the customers. Server can facilitate its storage capacity from the cloud services implemented to store customers data including their search history, browsing behaviour and preferences. Large storage capacity of the server allows it to store enormous amounts of data and information that can be beneficial for management to perform detailed and complex data analysis that can improve the accuracy and efficiency on personalization and searching customization. Next, machine learning algorithms is implemented inside the server to learn and serve personalized search result on property according to customer's searching preferences and habits such as label, locations and property type. The machine learning algorithm will also make use of the collected data to make personalized recommendation and result based on similar behaviours from other customers. Accordingly, it is perceivable that the server will require high processing power and sufficient data storage to perform

personalized searching effectively, which complex algorithms and calculations must be performed relentlessly from the increasing property data store into the database in order to provide the relevant search result accurately and swifty.

### 4.2.4 Client Relationship and Management Server

Client relationship management requires support from a server to manage and facilitate communication between users on different functions implemented. Forum as one of the applications included, it is responsible to display existing forum post, content, and allow any users to create post, messages, and discussions on the website. Owing to this, server would be necessary for forum to function by hosting and handling any request from users and establishes a connection with database in order to update and returns the specific data. For example, server can handle forum searching request from the user and execute the specific query using DBMS to search for the specific forum data from the database, and hence return user with the exact forum information. The server for the forum expected to be capable of managing usage of multiple users on the website and handling heavy traffic and load when multiple users updating and retrieving forum data from the database. This can benefit different users from accessing to the forum concurrently while maintaining the optimal responsiveness for actions performed by users.

For live chat session, server is used to establishes a connection between the customer and the staff who currently available to assist us. The live chat session allows customers to initiate a conversation with the staffs available in real-time either through calling or messages. As customer make a connection request in live chat session, the server will redirect the request to the support staff who currently online. Subsequently, the staff that receive the message through server can immediately respond to the customer in real-time. Besides that, the conversation history as the live chat session progresses will be track and store in the database through assistance from a server, which allow customers and staff to refer to the previous conversation whenever the chat session is invoked from the customer. As live chat session only available for limited staffs available in real-time, the server will not be burden by heavy traffic and load as multiple live chat progresses concurrently, subsequently can provide a reliable and smooth chat experience between customers and staff.

The goal of client relationship management is to fulfil the needs of the customers. We built a review function into our application to maintain the standard of communication between the management staff and the customer. Customers acquire reviews regarding legal firms and property managers. Additionally, management personnel can publish reviews on customers. These reviews are stored to the server after explicit words filtering. Customers will be more equipped to decide which agencies to use that are capable to provide high-quality services. After the customer pays for the purchase, they will need to contact an experienced attorney. Our program has built-in a tool for direct communication with law

firms. Customers can quickly contact the legal firm through our application. Customers will initially evaluate the law firm's reviews before making contact to arrange for an appointment with an attorney.

When a legal firm enters an appointment time, the meet-up scheduler starts functioning and notifies management to input available time. After processing, a message informing customers of the ideal meeting time will be sent. Following that, customers are notified via the in-app chat feature. We have included an Al dispute feature to our chat function. This enables swiftly reply to clear up any misunderstandings between our customers and management staff. Customers can inquire about legal issues regarding the property procedure, and management personnel can do study on those issues before responding to customers. Databases on our server provide a useful environment for the AI function to learn. Following document execution and assessment, management has the option to gather consumer information from our server, such as reviews. These reviews will be interpreted, and the interpretation will provide a graph for further evaluation.