

PROPERTY LISTING MANAGEMENT PLATFORM

A Thesis
Presented to the Faculty of
Computer Studies Department
College of Science
Technological University of the Philippines
Ayala Boulevard, Manila

By

Cujardo, Gwynn R.
Florendo, Cyrus Nathaniel P.
Jaime, Jewel Vaida A.
Quiambao, Aeron Justin C.
Salangsang, Arsenic M.

**In Partial Fulfillment of the
Requirements for the Degree
Bachelor of Science in Information System**

2024

Chapter 1

THE PROBLEM AND ITS SETTING

Introduction

The Philippines, an archipelago of over 7,000 islands, is home to many residential dwellings. From single-family homes to high-rise condominiums, a wide variety of options are available to cater to the diverse needs and preferences of the population. It is a major milestone for most people to purchase a house and is often considered a symbol of stability and success. However, as condominiums redefine modern life, they have recently emerged as the new choice among urban Filipinos. In the Philippines' biggest cities, high-rise condominiums are starting to be a prominent feature of the skyline (Mioten, 2024).

As the field of information technology continues to grow, productivity tools have become essential in both personal and professional environments. According to Simplilearn (2024), productivity tools are programs to simplify tasks and streamline workflow. These tools transform the way people work by enabling employees, teams, and individuals to collaborate remotely, communicate efficiently, and manage tasks in real time without needing to engage in person. Productivity tools have features that are helpful in streamlining processes and increasing overall productivity.

Managing clients, tracking commissions, and keeping up with available units is a crucial challenge for brokers, as the people of today prefer to buy units such as condominiums to not only keep up with the trends, but also because of the many benefits that comes with owning one. In addition, it can also prove to be a challenging task for developers to track the available units, brokers, and clients if no proper system is put in place. However, with the emergence of advanced technology, web applications and

systems that facilitate productivity tools make these tasks simpler. However, with the emergence of advanced technology, web applications and systems that facilitate productivity tools make these tasks simpler. Additionally, listing units, whether sold or available, improves communication and streamlines tasks like tracking milestones, units, and deals between brokers and developers, leading to a smoother and more efficient process.

Fortunately, the current study can help both brokers and developers track their clients, units, and commissions. By utilizing the agile scrum methodology and a quantitative research approach, the researchers aim to achieve the desired outcomes of the study.

In conclusion, as more people move to urban areas in the Philippines, the demand for housing is evolving, creating a growing need for innovative solutions in the real estate market. This research project introduces a system that harnesses the power productivity tool to make the developers' and brokers' tasks simpler. By offering a user-friendly approach, the system helps streamline the tracking of clients, deals, and commissions, benefiting both developers and brokers.

Background of the Study

Real estate is a tangible asset made up of the property and the land on which it sits. As people began to recognize the value of real estate, there were those who saw opportunities in land and housing. Many nurtured and supported this process, ultimately shaping the industry into what it is today. Additionally, individuals can earn income from their real estate assets by turning them into businesses, such as renting through platforms like Airbnb or leasing them as apartments. Though it is immovable, real estate, like other assets, is also

subject to supply and demand. This means that property prices and rent are heavily affected by these forces. When demand increases, prices rise; when demand decreases, prices fall.

The Philippines offers a wide range of living arrangements, from single-family homes to modern high-rise condominiums, catering to diverse housing needs. In recent years, however, condominiums have surged in popularity and become the preferred choice for residential property among Filipinos. The condominium market in the Philippines is rising and is being driven by rapid urbanization. As more people migrate to urban areas such as Manila in search of employment and better opportunities, the need for space-efficient, convenient living arrangements has grown. In addition, modern condominiums are designed with the needs of people, offering a self-contained lifestyle without the need to leave the general premises. Lastly, the market is willing to adapt to changes in consumer demands and market conditions (Mioten, 2024).

With the increase in the condominium market, the presence of real estate agents has become more prominent. Whether in public spaces or on social media, it is now usual to see agents actively promoting condominium projects to potential buyers. As the demands are rising, developers and investors are capitalizing on the growing condominium market, building new projects to supply the increasing demand (Mioten, 2024). These projects often emphasize prime locations, modern amenities, and flexible payment terms to attract a wider range of potential buyers.

Mentioned are the many factors that work together to form a thriving condominium market in the Philippines. From the rise of urban migration and shifting lifestyle trends to the active efforts of real estate agents and developers, these factors have played a key role in contributing to the steady growth and transformation of the condominium sector. In

property listing, many websites and platforms have been created to handle properties, yet there are no consistent and well-known brands. There is currently no well-known productivity tool specifically designed for developers and brokers, highlighting a crucial gap in the market. A dedicated tool could streamline the process of tracking and managing clients, facilitating better communication between agents and buyers. This would provide a consistent way to stay updated on matters such as buyer payments and other relevant concerns. By leveraging technology and data analytics, these platforms can provide agents or brokers with valuable insights helping them stay and be more motivated and productive. Moreover, while technology has undoubtedly made the buying process easier in many ways, it can also introduce new complexities and challenges. Combining the concepts of listing and productivity tools can help create a platform that promotes efficiency and encourages productivity.

In conclusion, the condominium market in the Philippines presents significant opportunities for innovation and growth. With the increasing urbanization and economic development in the country, demand for efficient and high-quality properties are on the rise, presenting an opportunity for services to capitalize and develop an integrated system that focuses on the agents' productivity, from viewing milestones, tracking commissions and units, to managing clients. By providing sustainable and accessible solutions, and fostering innovation and collaborative relationships, the proper platform can unlock and enhance the potential of the developers and their respective brokers, contributing to a better experience for everyone involved.

Objectives of the Study

General Objective

The study's main objective is to develop a productivity tool through a website application catering to both developers and brokers. The platform allows developers to list units, generate payment schedules and commissions, while simultaneously allowing brokers to view their milestones and manage their clients.

Specific Objectives

The following are the specific objectives of the study:

1. Create and design the system with the following characteristics:
 - a. A platform for developers to list their available units for sale, generate commission rates, and set payment schedules.
 - b. Tools for brokers to track clients, units, commissions, view their milestones, and submit customer information including documentary requirements.
 - c. A feature for buyers to access their payment schedules and documentary requirements.
 - d. The system will use automated calculations to generate reports for the brokers' milestones.
2. Create the website application using the following software development tools and scripting language:
 - a. Front-end tools
 - HTML

- JS
 - CSS
 - Vue
 - b. Back-end tools
 - Python
 - c. Framework
 - Django
 - d. Database Management System
 - PostgreSQL
 - e. Version Control
 - GitHub
 - f. IDE
 - Visual Studio Code
 - g. User-Interface Tools
 - Adobe XD
3. Test and improve the website application based on functional suitability and reliability
 4. Evaluate the acceptability of the website application by gathering multiple users to operate the system. The tool that will be used to evaluate the application is ISO25010, which will evaluate the application's acceptability in terms of sustainability, timeliness, accuracy, and maintainability.

Significance of the Study

With urban expansion, changing lifestyles, and attractive investment prospects, the condominium market in the Philippines has been rising steadily, especially in major cities.

For developers, the web-based system will offer a platform to list and oversee available and unavailable units efficiently. For brokers, the system will be a productivity tool to view their milestones, manage clients, and track units together with possible deals. For buyers, the system will provide a practical tool to easily identify their payment schedule and required documents.

Finally, this capstone project will be valuable for future researchers. It can serve as a reference to enhance future studies with similar objectives, and future researchers can build upon the data and features introduced in this study, thereby solidifying, and expanding the work initiated by the current researchers.

Scope and Limitations

This study centers on the development of a productivity tool website dedicated to brokers and developers. It endeavors to provide developers with a robust platform to list their units, enabling them to effectively connect with brokers. Through a user-friendly interface, developers will have the flexibility to create, update, customize, and remove their listings within the system, ensuring accurate representation and efficient management of their units.

In addition to serving developers, this study strives to address the critical needs of brokers who work to connect clients with the right condominium units. By facilitating easier access to available units, this initiative aims to enhance convenience and streamline the brokers' tasks, simplifying the sales process and fostering a more seamless transition into their new living arrangements or commercial spaces.

This study's overarching goal is to foster mutual benefits for both developers and brokers alike. By leveraging property listings, commission tracking, and payment schedules, brokers can pinpoint units that align closely with their clients' preferences, budgetary constraints, and lifestyle requirements. Simultaneously, brokers stand to gain increased visibility for their transactions and successes, helping them attract more clients and generate more sales.

The property listing management platform is meticulously crafted using a diverse array of innovative web development technologies and frameworks, including but not limited to Python, HTML, JS, CSS, Vue.js, Django, PostgreSQL, GitHub, Visual Studio Code, and Adobe XD. By harnessing the power of these tools, the platform offers unparalleled scalability, reliability, and performance, ensuring a seamless user experience across various devices and browsers.

Moreover, the system's web-based architecture eliminates the need for cumbersome downloads or installations, providing users with instant access to its full suite of features and functionalities directly through popular web browsers such as Chrome, Safari, Firefox, Opera, and Edge. By implementing stringent security measures and encryption protocols, the platform safeguards sensitive user data and ensures uncompromising privacy and data integrity.

Developers can use their accounts to display available units to brokers, as well as generate payment schedules and commissions. They can also manage brokers' accounts by creating or updating their information, providing hands-on access to organizational details. Additionally, brokers can use their accounts to submit customer information and track ongoing or completed transactions.

Furthermore, the platform adopts a seamless user experience design, allowing users to seamlessly transition between distinct roles and functionalities with minimal friction. Whether brokers are viewing listings and client details or developers are updating unit availability, the platform offers intuitive navigation and robust backend support, empowering users to achieve their respective objectives with ease and efficiency.

Chapter 2

CONCEPTUAL FRAMEWORK

This chapter presents the related literature, studies, and systems, a synthesis of the whole literature review, the conceptual model of the study, and the operational definition of terms relevant to Property Listing Management Platform.

Review of Related Literature

This part contains literature related to the Property Listing Management Platform.

Condominium

A condominium, or condo, is a privately owned residential unit within a larger complex or building that contains multiple similar units (Chen, 2024). Similarly, McMillin (2022) defines a condo as an independently owned unit within a larger community, with shared ownership of communal spaces and facilities such as pools, garages, and gyms. According to Faelnar (2024), in the Philippines, there are different types of condominiums to cater to the varying needs of the residential market. The different types of condominiums include:

- High-rise condominiums. It is located in urban areas with easy access to public transport, shopping, and dining, and offers stunning views, especially from higher floors.
- Mid-rise condominiums. It is located near the city but not in its center and typically has 4-6 stories.

- Low-rise condominiums. Provide more outdoor space, often including garages, and offer greater privacy, similar to townhouses.
- Garden-type condominiums. It is detached, surrounded by landscaped areas or pools, and offers the most privacy and exclusive outdoor space.

Additionally, Arranz (2021) mentioned that condo units vary in size and design, each offering unique characteristics and style. The types of condo units include:

- Studio. The layout of this unit is an open-plan apartment, the smallest and most affordable type.
- Bedroom Unit. This unit has partitions to separate the bedrooms from the different areas of the unit.
- Loft. This unit offers high ceilings and an open design, with a living area on the lower level and a bedroom above.
- Bi-level Type. This unit has a second floor, with common areas on the lower level and bedrooms upstairs.
- Penthouse Type. This unit is located at the top of a building and is the largest and most exclusive unit.

The current study aims to collaborate with developers to list units, allowing their respective brokers to easily search and access comprehensive details of the available units. In addition, the current study has considered and understood the distinct types of condominium units. The current will apply this understanding in filtering the search, which will assist brokers in finding the appropriate unit that will match their potential buyer's preferences.

Payment Schedule

A payment schedule is a contract between buyer and seller outlining the timing and method of payment for a transaction. It assists businesses in monitoring the amounts their customers owe them as well as the debts they owe to their creditors. Payment schedules are applicable in a variety of situations, such as loans, mortgages, and credit agreements. (What is a payment schedule?, 2024). Supported by Kintu (2018), a payment schedule is an agreement between two parties regarding the amounts and payment dates. In addition, there are different types of payment schedules, and this includes:

- Lump sum payment. A one-time payment is made at the end of a transaction.
- Installment payment. A payment is divided into several parts and made over a specified timeframe.
- Deferred payment. A payment that is postponed to a later date than initially planned.
- Fixed payment. A payment that occurs at regular intervals, such as every two weeks or monthly.
- Variable payment. A payment that fluctuates based on factors like sales or performance metrics.
- Milestone payment. A payment triggered by the completion of specific predetermined goals.
- Revolving payment. A recurring payment is made regularly, similar to a subscription service.

The current study has considered and understood the distinct types of payment schedules. The current study will apply this understanding in the computation or quotation of payment schedules, which will assist both broker and potential buyer.

Broker – Agent

In an article written by Segal (2024), he differentiated real estate agents and real estate brokers. Both of them are licensed professionals who assist clients in buying or selling properties and earn a commission once the deal is finalized. The difference is that brokers have additional training and licensing requirements. They can hire an agent to work for them and get a cut of the agent's commissions.

The current study aims to collaborate with the developer's respective brokers or agents to manage clients, track deals, and view their milestones, allowing them to work more efficiently and productively.

Commission

According to CFI Team (2024), commission is the payment given to an employee upon completing a task, typically related to selling a specific quantity of products or services. The methods companies use to structure and distribute commissions can differ. Two approaches are:

- Flat commission. Where the employee receives a fixed rate or percentage for every sale.
- Ramped commission. Where the percentage increases as the employee achieves higher sales or meets set targets.

Folger (2024) stated that real estate agents and brokers typically earn their income through commissions, which are often based on a percentage of the property's selling price. Commissions are paid directly to the brokers, who then distribute the agent's share. This payment is deducted from the sale proceeds before the seller receives their portion.

The current study has understood the concept of commission. The current study will apply this understanding in the computation of the agent's or broker's commission, which will be seen in their milestone in the system.

Web-based System

In an article written by (Senthil, 2024), in the past, web-based applications had limited functionality, but improvements in technology, security, and internet speed have significantly expanded the possibilities for web-based systems. A web-based system is an application that you access using HTTP, typically describing applications that operate within a web browser. A web-based system is an application that you access using HTTP. Typically, it is used to describe applications that work in a web browser. Web-based systems are accessible anywhere and have lower development costs, increased efficiency, and reduced hardware costs.

The current study proposed a property listing management platform that is web-based because of its accessibility, that can be accessed if there is an internet connection and browser.

Data Analytics

Based on an article by The Investopedia Team (2024), data analytics is the science of examining raw data to draw conclusions. Shao et al. (2022) added that data analytics involves estimation, statistics, organization, user experience, and computing technologies, encompassing various theoretical and statistical methods and trends. According to Ghasemaghahi (2019), data analytics use refers to how many companies use technologies designed to efficiently get useful information from substantial amounts of diverse types of

data. Moreover, data analytics tools help share and improve knowledge. Finally, using advanced data analytics tools is key to better decision-making.

The current study will employ data analytics in a web-based system to assist respective brokers and agents by providing valuable insights about their successful deals.

Adobe XD

Adobe XD is a tool that uses vector graphics to help user experience (UX) designers and user interface (UI) designers make realistic, interactive digital interfaces for websites and mobile apps. It was designed to offer features that are specifically useful for interface design (Myre, 2022). According to The Upwork Team (2022), Adobe XD has many features and uses, making it an essential tool for any UX and UI designer. In addition, an article entitled "What is Adobe XD?" (2024), mentioned that Adobe XD not only aids in the design process but also fosters collaboration among design teams and others through integration with platforms like Slack and Microsoft Teams.

The current study will employ Adobe XD in the user interface design phase to create and test interactive prototypes. This approach aims to streamline the design process, enhance collaboration among team members, and ensure that the final product meets user expectations. By leveraging Adobe XD's robust set of tools and its integration capabilities with collaboration platforms, the study seeks to demonstrate the effectiveness of this software in producing high-quality, user-centered designs while facilitating seamless communication and cooperation within the design team.

Visual Studio Code

Visual Studio Code, often abbreviated as VS Code, is a free, lightweight, yet powerful source code editor available for Windows, macOS, Linux, and Raspberry Pi OS, running on both desktop and web platforms (Heller, 2022). According to Chris (2023), VS Code is like Sublime Text and Atom, offering a rich text editing experience like a miniature version of Visual Studio. VS Code provides developers with a customizable environment through various plugins, making it versatile and adaptable to different programming needs (Your Ultimate Guide To Visual Studio vs Visual Studio Code, n.d.). Lastly, Heller (2022) mentioned that VS Code has built-in support for JavaScript, TypeScript, and Node.js, along with a vast ecosystem of extensions for other languages, runtimes, environments, and clouds, catering to a wide range of development tasks.

In the current study, Visual Studio Code, or VS Code, will serve as the IDE (Integrated Development Environment) due to its compatibility with various programming languages required for the development of the web-based system. Additionally, its rich ecosystem of extensions can aid in debugging tasks. Lastly, the researchers' familiarity with VS Code further supports its selection as the preferred IDE.

GitHub

GitHub, an online interface, facilitates real-time collaboration among users (Coursera, 2023). According to Lutkevich and Courtemanche (2023), it serves as a web-based version control and collaboration platform primarily targeted at software developers. The platform's expansive features redefine the collaborative landscape for software development projects, extending beyond mere code storage to encompass version control,

issue tracking, and code review functionalities, all crucial components in contemporary software development processes (Webb, 2024).

GitHub claims that it is utilized by over four million organizations and more than one hundred million developers (GitHub, n.d.). Webb (2024) notes that GitHub's popularity among software developers stems from its comprehensive feature set, which supports every aspect of the development process, fostering collaboration without boundaries. Additionally, its user-friendly interface simplifies code management for users of all skill levels. Furthermore, GitHub integrates seamlessly with many development tools and automates tasks through GitHub Actions, enhancing efficiency, productivity, and code security with automated fixes.

Given GitHub's robust collaboration features and widespread adoption, the current study will primarily utilize it to enhance collaboration among researchers. Leveraging its real-time collaborative capabilities, version control system, and issue tracking functionalities, the study aims to streamline project management processes and facilitate seamless collaboration on code development and review tasks.

Python

Python, as Lukaszewski (2019) notes, is a versatile programming language suitable for any modern computer operating system. Similarly, Coursera (2024) describes Python as a general-purpose language that is not specialized for any specific problems. In addition, Miller (2023) stated that Python's versatility enables it to be used in a wide range of applications across various industries. According to a study by Statista, Python ranks as the third most popular programming language worldwide among developers.

In web development, Python plays a significant role in back-end development, handling server-side tasks like interacting with databases and APIs, as outlined by Miller (2023). Coursera (2024) supports this by highlighting Python's back-end development capabilities, including data processing, database communication, URL routing, and security measures.

The current study will employ Python due to its simplicity, extensive libraries, security capabilities, and strong community support. Python also easily integrates with various databases, web services, and other programming languages, making it flexible and powerful in terms of developing a robust, scalable, and maintainable web application. Python ensures that both the development and operational aspects of the system are efficient and effective.

Django

Django, a Python-based web framework, earns the moniker 'batteries included web framework' for its abundance of built-in features, enabling the rapid development of efficient web applications (GeekforGeeks, 2024). It encompasses everything from the Django Admin Interface to default databases like SQLite3. Moreover, an article on Django Introduction (2024) emphasizes its high-level nature, facilitating the creation of secure and easy-to-manage websites.

Additionally, Noble Desktop (2024) stated that Django is currently among the top ten (10) frameworks used by web developers as it offers many attractive attributes, including:

- Robust - it automatically comes with a wide range of extra features capable of handling common web development tasks.

- Fast - it simplifies the creation of web applications from conception to completion to reduce the amount of time and expertise required for development.
- Simple - it benefits from being built on Python with a reputation for being simple and accessible
- Secure - it includes many default features that help protect your application and its users, making it one of the most secure frameworks around
- Scalable - it comes equipped with various components that can be easily unplugged and replaced for effortless scalability
- Versatile - it can be customized to fit applications of any type, size, or scope
- Well-Supported - it is well supported both by the official governing body and the programmers who regularly utilize the framework

Django, the framework that the current study will employ, provides many benefits in terms of creating the rental property listing and management web application. Django's built-in features and modular design makes it a proper choice for this system. Django also has full support for PostgreSQL, ensuring that the web application's queries are done in a clean and powerful manner.

Hyper Text Markup Language (HTML)

HTML, or Hyper Text Markup Language, serves as the foundational language for constructing web pages (Astari S., 2023). It enables the creation and organization of webpage elements such as sections, paragraphs, and links using tags and attributes. Lutkevich (2020) highlights HTML's role as a text-based method for defining content

structure within HTML files, guiding web browsers in rendering text, images, and multimedia elements on webpages.

Additionally, Lutkevich (2020) underscores HTML's widespread adoption, accessibility across all browsers, ease of learning, clean source code, open-source nature, and compatibility with backend programming languages. Meanwhile, Adetunji (2023) emphasizes HTML's significance as a standard markup language for developing websites, applications, and highlights that it lacks aesthetics and functionality.

The current study will use HTML, justified by its fundamental role in web development, ability to structure content effectively, widespread adoption, ease of learning, open-source nature, compatibility with backend languages, and status as the standard markup language for web development.

Cascading Style Sheets (CSS)

CSS, short for Cascading Style Sheets, is a language developed in the 1990s to style web documents, which has become crucial for web developers and plays a vital role in enhancing the user experience online, working alongside various markup languages (BasuMallick, 2022). According to (Domantas G., 2023), it is used to style elements written in markup languages like HTML, which forms the foundation of websites, while CSS focuses on the visual aesthetics of the entire site. Unlike programming languages such as C++ or JavaScript, CSS is specifically designed for styling web pages and is not considered a programming language (Eygi, 2019).

The current study will use CSS to enhance user experience, separate content from presentation, and provide specific styling capabilities. By using CSS, it will enable the

creation of visually appealing, user-friendly, and consistently styled web pages that are easier to maintain and perform efficiently across different platforms and devices.

JavaScript

JavaScript, a dynamic programming language, offers various functionalities such as performing math calculations, dynamically modifying HTML content in the DOM, generating dynamic style declarations, fetching content from other websites, and more (Megida, 2021). According to Jordana (2024), JavaScript, recognized as a scripting language, enhances web pages by adding interactive elements like dropdown menus and animated graphics, thus improving user engagement. In addition, GeekforGeeks (2024) further emphasizes its lightweight, cross-platform nature, known for its versatility in web development and its application beyond web browsers. JavaScript's dynamic nature enables its utilization not only in web development but also in web applications and game development, facilitating the implementation of dynamic features not achievable with HTML and CSS alone. Lastly, developers often pair JavaScript with HTML and CSS to enhance websites with interactivity, and they may leverage third-party libraries to incorporate advanced features into their projects without coding them from scratch (Jordana, 2024).

The current study will use JavaScript because of its ability to provide dynamic functionality, enhance user engagement, offer versatility and cross-platform capabilities, enable the implementation of dynamic features, complement HTML and CSS, and allow the use of third-party libraries for advanced features. Additionally, JavaScript is essential for creating responsive and interactive user interfaces and is widely supported by modern

web browsers. Its extensive ecosystem, including frameworks and tools, further extends its applicability in both front-end and back-end development. JavaScript's large developer community and extensive documentation make it easier to find resources and support, facilitating a smoother development process.

Vue.js

Vue.js offers several advantages, including its speed, simplicity, and strong support from both libraries and its community (Kugell, 2022). According to Simplilearn (2022), its features encompass a range of functionalities such as virtual DOM, data binding, components, event handling, transitions, computed properties, templates, directives, and routing. In addition, combining Angular-influenced approaches with streamlined features, Vue.js focuses on front-end interfacing and application development. Its core library emphasizes the view layer and is designed for incremental adoption into projects (Corbo, 2022). These features make Vue.js a popular choice for building user interfaces and single-page applications, offering developers the flexibility and efficiency they need for modern web development projects.

As Vue.js is a versatile and efficient framework that simplifies the development of modern web applications, the current study will employ this technology. Vue.js provides developers with a comprehensive set of tools and features that streamline the development process and enable the creation of highly interactive and responsive user interfaces. Additionally, Vue.js has a rich ecosystem that will provide the researchers with access to a wealth of resources, enabling them to extend its functionality, solve common development challenges, and accelerate the development process.

PostgreSQL

PostgreSQL is an open-source object-relational database management system (ORDBMS) that offers scalability, high performance, and robust features for analytics and data management. It is widely utilized across various applications, businesses, and organizations (Scott, 2024). In addition, Hilbert (2023) mentioned that using PostgreSQL has many advantages, including customization, extensibility, scalability, robustness and reliability, and community support. According to Doerrfeld (2024), PostgreSQL is a hugely popular object-relational database. The latest State of PostgreSQL report shows that it's used more today in their organizations than a year ago.

PostgreSQL, as mentioned, is an object-relational database management system and is the database that the current will employ. As noted by Scott (2024), PostgreSQL is used by the majority of e-commerce systems to produce, process, and manage product catalogs, customer information, orders, and transactions. With its scalability and dependability, e-commerce platforms can accommodate the large volume of transactions and dynamic inventory changes that improve consumer experience and operational efficiency.

ISO 25010

ISO 25010, known as "Systems and software engineering – Systems and software Quality Requirements and Evaluation (SQuaRE) – System and software quality models," is a standard that focuses on defining and assessing quality requirements and models for both systems and software (Britton, 2021). As outlined by Obrenović (2021), this standard serves as a set of guidelines and suggestions for assessing the quality of software products.

It forms a component of the ISO/IEC 25000 series, which comprises various international standards in the realm of software engineering.

According to ISO 25000, ISO/IEC 25010 comprises nine quality characteristics, and these are:

Functional Suitability pertains to the extent to which a product or system can deliver that satisfies both stated and implied requirements. This characteristic is composed of the following sub-characteristics:

- **Functional Completeness** pertains to the range of functions encompassing all specified tasks and user objectives.
- **Functional Correctness** pertains to the accuracy and precision with which a product or system delivers the required results.
- **Functional Appropriateness** pertains to how effectively functions fulfill designated tasks and objectives.

Performance Efficiency pertains to how effectively resources are utilized in relation to performance. This characteristic is composed of the following sub-characteristics:

- **Time Behavior** pertains to the speed of response, processing times, and throughput rates of a product or system during its operation.
- **Resource Utilization** pertains to the quantity and types of resources consumed by a product or system during its operation.
- **Capacity** pertains to the maximum limits of a parameter within a product or system.

Compatibility pertains to the ability of a product, system, or component to effectively exchange information and fulfill its intended functions within a shared hardware or software environment. This characteristic is composed of the following sub-characteristics:

- **Co-existence** pertains to the ability of a product to efficiently fulfill its functions within a shared environment alongside other products, without causing adverse effects on them.
- **Interoperability** pertains to the proficiency of two or more systems, products, or components to communicate and utilize exchanged information effectively.

Interaction Capability pertains to the extent to which a product or system allows designated users to exchange information through its user interface to accomplish specific tasks across various usage scenarios. This characteristic is composed of the following sub-characteristics:

- **Appropriateness recognizability** pertains to the extent to which users can determine if a product or system is suitable for their requirements.
- **Learnability** pertains to the extent to which users can learn the functions of a product or system to use it within a specified period.
- **Operability** pertains to the extent to which a product or system possesses attributes that make it simple to operate and manage.
- **User error protection** pertains to how much a system safeguards users against operational errors.
- **User engagement** pertains to the extent to which a user interface presents functions and information in an inviting manner, encouraging ongoing interaction.

- **Inclusivity** pertains to the extent to which a product or system is accessible to individuals from diverse backgrounds.
- **User assistance** pertains to the extent to which a product accommodates users with a wide range of characteristics and capabilities to achieve specific goals in a defined context of use
- **Self-descriptiveness** pertains to the extent to which a product provides necessary information to users, making its capabilities and usage immediately understandable without excessive reliance on additional resources,

Reliability pertains to the ability of a system, product, or component to execute designated functions under predefined circumstances. This characteristic is composed of the following sub-characteristics:

- **Faultlessness** pertains to the extent to which a system, product, or component performs designated functions without errors during regular operation
- **Availability** pertains to the extent to which a system, product, or component is operational and available for use when needed.
- **Fault tolerance** pertains to the extent to which a system, product, or component continues to function as intended despite the presence of hardware or software faults.
- **Recoverability** pertains to the extent to which a product or system can recover affected data and restore the desired system state in the event of an interruption or failure.

Security pertains to the level at which a product or system safeguards information and data against potential security threats or vulnerabilities. This characteristic is composed of the following sub-characteristics:

- **Confidentiality** pertains to the extent to which a product or system ensures that data is accessible only to authorized individuals.
- **Integrity** pertains to the extent to which a system, product, or component ensures that its state and data are safeguarded from unauthorized modification or deletion, whether due to malicious actions or computer errors.
- **Non-repudiation** pertains to the extent to which actions or events can be verified to have occurred, preventing denial of these events or actions afterward.
- **Accountability** pertains to the extent to which the actions of an entity can be uniquely linked back to that entity.
- **Authenticity** pertains to the extent to which the identity of a subject or resource can be verified to be as claimed.
- **Resistance** pertains to the extent to which a product or system can continue operating despite being targeted by malicious actors.

Maintainability pertains to the degree of ease with which a product or system can be altered for enhancements, corrections, or adjustments to suit evolving environmental conditions and needs. This characteristic is composed of the following sub-characteristics:

- **Modularity** pertains to the extent to which a system or computer program is constructed from separate components, allowing changes to one component with minimal impact on others.

- **Reusability** pertains to the extent to which a product can serve as an asset in multiple systems or in the construction of other assets.
- **Analysability** pertains to the effectiveness and efficiency of assessing the impact of changes on a product or system, diagnosing deficiencies or failures, or identifying parts for modification.
- **Modifiability** pertains to the ease and efficiency with which a product or system can be modified without introducing defects or diminishing existing quality.
- **Testability** pertains to the effectiveness and efficiency of establishing test criteria for a system, product, or component, and conducting tests to verify if those criteria are met.

Flexibility pertains to the extent to which a product or system can adjust to alterations in its requirements, usage contexts, or system environment. This characteristic is composed of the following sub-characteristics:

- **Adaptability** pertains to the extent to which a product or system can be efficiently adjusted for or moved to various hardware, software, or operational environments.
- **Scalability** pertains to the extent to which a product can manage increasing or decreasing workloads or adjust its capacity to handle fluctuations effectively.
- **Installability** pertains to the effectiveness and efficiency with which a product or system can be installed and/or uninstalled in a specific environment.
- **Replaceability** pertains to the extent to which a product can substitute another specified software product for the same purpose within the same environment.

Safety pertains to the extent to which a product or system can prevent endangerment to human life, health, property, or the environment under specified conditions. This characteristic is composed of the following sub-characteristics:

- **Operational Constraint** pertains to the extent to which a product or system limits its operation within safe parameters or states when faced with operational hazards.
- **Risk Identification** pertains to the extent to which a product can recognize events or operations that may pose unacceptable risks to life, property, or the environment.
- **Fail Safe** pertains to the extent to which a product can automatically switch to a safe operating mode or return to a safe condition in case of failure.
- **Hazard Warning** pertains to the extent to which a product or system provides alerts about unacceptable risks to operations or internal controls, enabling timely reactions to maintain safe operations.
- **Safe Integration** pertains to the extent to which a product can ensure safety during and after integration with other components.

The current study will employ ISO 25010 in testing and evaluating the developed system. It is an ideal choice as it provides a comprehensive framework that encompasses not only functional aspects but also non-functional characteristics. ISO 25010 offers a structured approach to assess these critical aspects, ensuring that the system meets basic functional requirements and performs optimally and reliably under various conditions, enhancing user satisfaction and system effectiveness.

Synthesis of Review of Related Literature

Based on the information gathered by the researchers, condominiums are one of the options for living arrangements that cater to the diverse housing needs of people today. A condominium is a privately owned residential unit in a building with shared ownership of communal spaces and facilities. Additionally, condominiums have different types, ranging from garden-type condominiums to high-rise condominiums. Lastly, condominium units also encompass several types.

Additionally, real estate brokers and agents are needed to sell and buy condominiums. Depending on the company, sometimes, the agents or brokers are paid through commissions when they successfully sell a unit, and it also has different times. The researchers also gathered information about payment schedules. They learned that there are also several types of payment schedules, and it depends on the client or the developer what kind of payment they can offer and do. Recognizing this diversity in these topics, the researchers aim to develop a web-based listing management platform and productivity tool tailored for developers, brokers, and agents. By leveraging web-based technology, the system will prioritize accessibility and ease of use for developers and brokers, enhancing the overall experience.

Moreover, the system will incorporate data analytics to offer valuable insights for viewing milestones. This integration aims to improve managing clients, tracking units, provide actionable insights for brokers, and streamline property searches for prospective clients, making the process more efficient and user-friendly.

The web-based system will be developed using a suite of integrated tools to ensure efficiency and effectiveness throughout its creation and operation. User interface design will be facilitated by Adobe XD, a powerful UX/UI design tool, which will streamline collaboration and the design process by enabling the creation of interactive prototypes, ensuring user-centered designs, and seamless communication within the design team. Version control will be managed through GitHub, serving as a collaborative platform for efficient project management, facilitating version control and issue tracking to streamline collaboration among researchers and developers, and ensuring an organized and transparent development process. Visual Studio Code will serve as the Integrated Development Environment (IDE), offering versatility and compatibility with various programming languages, supported by an extensive ecosystem of extensions for efficient development and debugging tasks. Database management will be handled by PostgreSQL, an open-source ORDBMS, which will efficiently manage structured data with scalability and security, ensuring that the system's data is well-structured and manageable. Django, a Python-based framework, will simplify web application development, providing built-in features and scalability to create a robust and secure listing and management system. Both backend and frontend development will be supported by HTML, JavaScript, CSS, and Vue.js, with HTML forming the foundation of web pages, JavaScript adding interactivity and dynamic functionality, CSS enhancing user experience through styling capabilities, and Vue.js simplifying frontend development by enabling the creation of highly interactive and responsive user interfaces. Python will power the system's backend, known for its simplicity and versatility, ensuring efficient development and operation through its

compatibility with databases and web services. Lastly, after the system is developed, it will undergo testing and evaluation using ISO 25010 as an assessment tool.

Review of Related Studies

This part contains related studies and works that have already been conducted on the topic of rental property listing systems and management systems.

A capstone project by Setty (2022) entitled "Management System for an Apartment" successfully aimed to create a standard web-based online platform that will benefit both renters and homeowners. The author developed a system wherein the homeowners can list their properties that are for rent, and the renters will be able to see the listed properties.

A similar work was conducted by Monteverde et al. (2023) entitled "A Web-Based Rental House Smart Finder using Rapid Application Development Basis for Evaluation of ISO 20501". The authors developed a system that provides necessary information on specific rental properties and aids prospective tenants in finding affordable variations of rental houses. Its goals are to simplify the process of looking for a rental home, lessen the time consumed in finding rental homes, and quickly access the information about it.

In addition, several other works have developed systems with similar features aimed at improving the rental process for both renters and homeowners. These include works by Voumick et al. (2021), Paul (2022), Rathore et al. (2021), and Rastogi et al. (2023). Each of these studies focused on creating platforms that list rental properties, provide essential information, simplify the search process, reduce the time required to find rental homes, and offer quick access to detailed property information.

Moreover, some studies have integrated an additional payment feature into their system. For example, Ikuomola and Asefon (2022) and Misyam and Selamat (2021) developed a system that not only lists rental properties and provides essential information but also integrates an online payment system. This feature allows renters to make rental payments directly through the platform, thereby streamlining the rental process even further and providing a comprehensive solution for both property listings and financial transactions.

Focusing on a different aspect of the rental market, Hamzah et al. (2022) addressed the specific needs of boarding house tenants, particularly students. According to their study, there is a significant lack of information about the availability of boarding houses, which makes it challenging for prospective tenants to find suitable accommodations. To address this issue, the authors developed an Android-based Boarding House Rental Location Search System Application. This application helps tenants easily find the location and details of boarding houses, while also enabling boarding house owners to provide updated information about their properties.

While the studies have primarily focused on listing and searching for rental properties, there are also works that delve into systems that will help brokers and agents in their work, offering solutions beyond mere property discovery.

In a study entitled “The Real Estate Transaction Trace System Model Based on Ethereum Blockchain Platform” VO and Nguyen (2022) developed a Real Estate Transaction Trace designed using blockchain network architecture. The RETT system can manage and track the entire process of real estate transactions involving all participants.

Similarly, Pankratov et al. (2020) studied blockchain technology and real estate transaction and their management. This study revealed that the use of blockchain

technology in real estate transactions makes it faster, more secure, transparent, and cost-effective, as it will minimize human errors.

Lastly, Song et al. (2022) devised a model-agnostic, milestone-based task tracker emphasizing tracking task progress. Their tracker helps users identify the subtasks needed to complete the overall task and monitor progress.

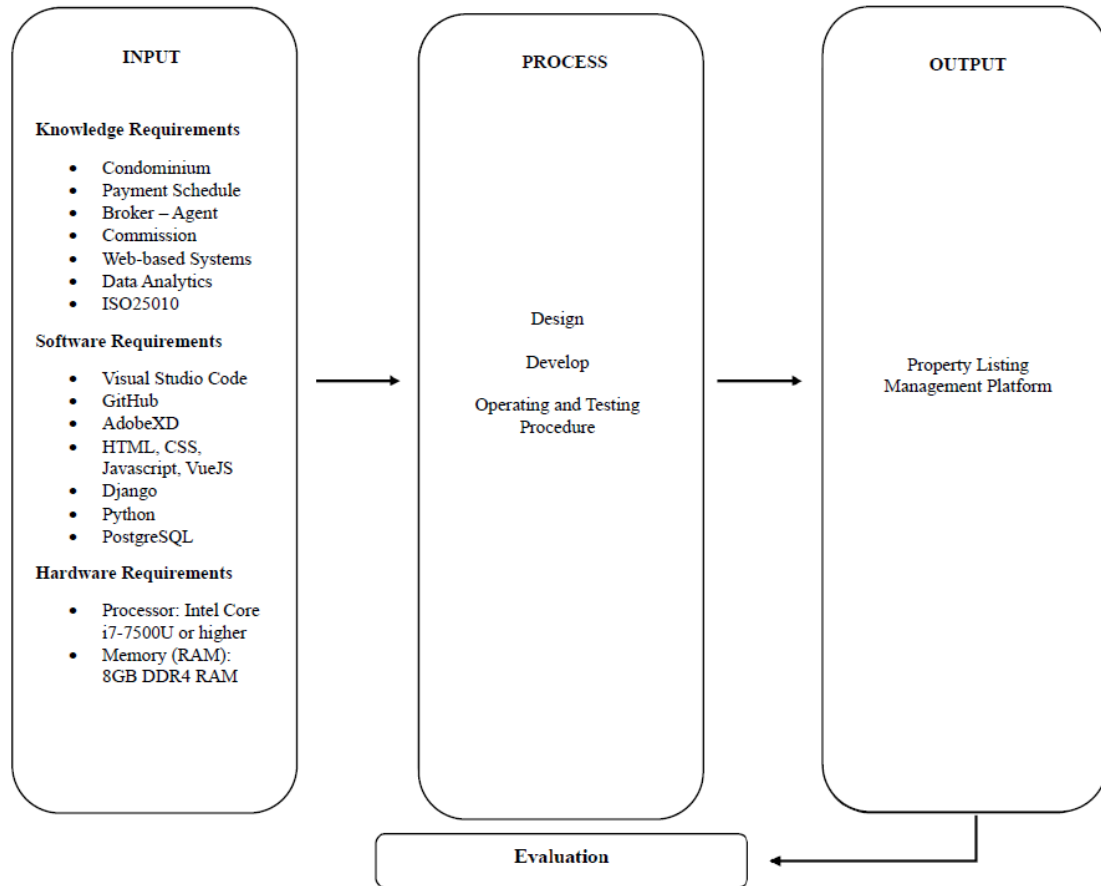
These studies collectively highlight the evolution of residential management systems and technology, introducing innovative features to streamline property searching and real estate transactions.

The current study will develop a platform that caters to property listing and productivity tool for the agents and brokers. By integrating features from previous research, it will offer a comprehensive solution for developers, brokers, and agents alike. The property listing management platform aims to aid brokers and agents. Leveraging insights from the authors, the current study aspires to address existing gaps in the market and provide an all-encompassing, user-friendly platform for the real estate ecosystem.

Conceptual Model of the Study

Figure 1

Conceptual Model of the Study



The figure above shows the study's conceptual model, which depicts the overview of the flow and the whole concept of the study.

Input

The content of the input phase is the three (3) major requirements of the system. First are the knowledge requirements under this requirement, the knowledge the researchers should understand to establish a foundation for the study. It consists of condominium, payment schedule, broker-agent, commission, web-based system, data analytics, Google Maps API, and ISO25010. Second, the software requirements needed to develop the system. It consists of Visual Studio Code, GitHub, Adobe XD, HTML, CSS, JavaScript, Vue.js, Django, Python, and PostgreSQL. Lastly, the hardware requirements to access the system.

It consists of a Processor: Intel Core i7-7500U or higher, and Memory (RAM): 8GB DDR4 RAM.

Process

The content of the process phase outlines how the system will be developed. This phase involves tasks such as designing, developing, operating, and testing procedures.

Design: In this phase, the researchers should create an entity relationship diagram, use case diagram, system flowchart, module hierarchy, data flow diagram, and architecture diagram. These diagrams help visualize and summarize the specifics of the system.

Develop: In this phase, the researchers will develop the property listing management platform using front-end tools, back-end tools, frameworks, a database management system, version control, and an IDE.

Operating and Testing Procedures: After development, the system will undergo testing to assess its functionality.

Output

The developed system, Property Listing Management Platform.

Evaluation

The developed system will be evaluated using ISO 25010, an assessment tool to examine the system's applicability, efficiency, compatibility, usability, dependability, security, maintainability, and portability.

Operational Definition of Terms

For better understanding of the study, the researchers gave several terms that were defined operationally used in the study.

Agent refers to a person who works for the developers to sell units. May be a broker or a person that is under brokers.

Broker refers to a person who works for the developers to sell units.

Developer refers to the property developer of the condominium projects.

Property Listing Management Platform refers to the listing and productivity tool for developers and respective brokers.

REFERENCES

- Adetunji, H. (2023, December 28). What is HTML: A detailed explanation of the programming language. *Medium*. <https://medium.com/@hikmohadetunji/what-is-html-a-detailed-explanation-of-the-programming-language-1d0ab69f475d>
- Arranz, M. M. G. (2021, December 26) 5 Condo unit types: Which one is for you? Federal Land, Inc. <https://federalland.ph/articles/condo-unit-types/>
- BasuMallick, C. (2022, November 7). *CSS Guide: How it Works and 20 Key Properties - Spiceworks Inc.* Spiceworks Inc. <https://www.spiceworks.com/tech/tech-general/articles/what-are-css/>
- Britton, J. (2021, May 6). *What is ISO 25010?* Perforce Software. <https://www.perforce.com/blog/qac/what-is-iso-25010>
- CFI Team. (2024, July 10). Commission. Corporate Finance Institute. <https://corporatefinanceinstitute.com/resources/career/commission/>
- Chen, J. (2024, July 25). What is a condominium? How condos work compared to apartments. Investopedia. <https://www.investopedia.com/terms/c/condominium.asp>
- Chris, K. (2023, February 3). *Visual Studio vs Visual Studio Code – What's The Difference Between These IDE Code Editors?* freeCodeCamp.org. <https://www.freecodecamp.org/news/visual-studio-vs-visual-studio-code/>
- Corbo, A. (2022, December 29). *What is vue JS?* Built In. <https://builtin.com/software-engineering-perspectives/vue-js>
- Coursera. (2023, November 29). *What is GitHub and why should you use it?* Coursera. <https://www.coursera.org/articles/what-is-git>
- Coursera. (2024, April 3). *What is Python used for? A beginner's guide.* Coursera. <https://www.coursera.org/articles/what-is-python-used-for-a-beginners-guide-to-using-python>
- Customer stories.* (2024). GitHub. <https://github.com/customer-stories>
- Django introduction - Learn web development | MDN.* (2024, February 28). MDN Web Docs. <https://developer.mozilla.org/en-US/docs/Learn/Server-side/Django/Introduction>
- Doerrfeld, B. (n.d.). *PostgreSQL: The database that quietly ate the world.* LeadDev.

<https://leaddev.com/tech/postgresql-database-quietly-ate-world>

Eygi, C. (2021, December 9). CSS for Beginners: What is CSS and How to Use it in Web Development? *Medium*. <https://medium.com/swlh/css-for-beginners-what-is-css-and-how-to-use-it-in-web-development-5985afe53096>

Faelnar, I. C. (2024, February 24). Different types of condominiums in the Philippines - now realty brokerage. Now Realty Brokerage. <https://www.nowrealtybrokerage.com/different-types-condominiums-philippines/>

Folger, J. (2024, August 27). How do real estate agents get paid? Investopedia. <https://www.investopedia.com/articles/personal-finance/080714/how-do-real-estate-agents-get-paid.asp>

G, D. (2023, May 15). *What is CSS and how does it work?* Hostinger Tutorials. <https://www.hostinger.ph/tutorials/what-is-css>

GeeksforGeeks. (2024, February 2). *Introduction to JavaScript*. GeeksforGeeks. <https://www.geeksforgeeks.org/introduction-to-javascript/>

GeeksforGeeks. (2024, April 18). *Django Tutorial Learn Django Framework*. GeeksforGeeks. <https://www.geeksforgeeks.org/django-tutorial/>

Ghasemaghahi, M. (2019). Does data analytics use improve firm decision making quality? The role of knowledge sharing and data analytics competency. *Decision Support Systems*, 120, 14–24. <https://doi.org/10.1016/j.dss.2019.03.004>

Hamzah, Muhammad Akram, Mustika, Nur , Mustapa, Mahmud, Rahmah, Ummiati (2022). Application of Boarding House Rental Location Search System Based on Android from http://eprints.unm.ac.id/32270/1/Hamzah_2022_Ceddi_Application%20of%20Boarding%20House%20Rental%20Location%20Search%20System%20Based%20on%20Android%20.pdf

Heller, M. (2022, July 8). *What is Visual Studio Code? Microsoft's extensible code editor*. InfoWorld. <https://www.infoworld.com/article/3666488/what-is-visual-studio-code-microsofts-extensible-code-editor.html>

Hilbert, M. (2023, May 4). *What is PostgreSQL, and why do businesses need to know more about it?* Redgate. <https://www.red-gate.com/blog/database-development/what-is-postgresql-and-why-do-businesses-need-to-know-more-about-it>

Ikuomola, A. J., & Asefon, M. P. (2020). A secured mobile cloud-based house rental management system. In *Proceedings of 3rd International Conference on Applied Information Technology (AIT)* (pp. 1-17).

https://www.researchgate.net/publication/340926278_A_Secured_Mobile_Cloud-Based_House_Rental_Management_System

ISO 25010. (n.d.). <https://iso25000.com/index.php/en/iso-25000-standards/iso-25010?start=5>

Jordana, A. (2024, May 13). *What Is JavaScript: A Beginner's Guide to the Basics of JS*. Hostinger Tutorials. <https://www.hostinger.ph/tutorials/what-is-javascript>

Kintu, V. (2018, December 6). Payment schedule. Capital Com SV Investments Limited. <https://capital.com/payment-schedule-definition>

Kugell, A. (2022, April 24). In-Depth look at VueJs: pros, cons, and real-life applications in 2024 - Trio. *Trio*. <https://trio.dev/why-use-vue-js/>

Lukaszewski, A. (2019, July 3). *What is Python programming Language?* ThoughtCo. <https://www.thoughtco.com/what-is-python-2813564>

Lutkevich, B. (2020, February 17). *HTML (Hypertext Markup Language)*. TheServerSide.com. <https://www.theserverside.com/definition/HTML-Hypertext-Markup-Language>

Lutkevich, B., & Courtemanche, M. (2023, February 21). *GitHub*. IT Operations. <https://www.techtarget.com/searchitoperations/definition/GitHub>

Mansa, Julius. (2023, July 16). How Does Supply and Demand Affect the Housing Market? *Investopedia*. <https://www.investopedia.com/ask/answers/040215/how-does-law-supply-and-demand-affect-housing-market.asp>

McMillin, D. (2022, September 22). What is a condo? Bankrate. <https://www.bankrate.com/real-estate/what-is-a-condo/#why-buy>

Megida, D. (2021, April 28). *What is JavaScript? A Definition of the JS Programming Language*. freeCodeCamp.org. <https://www.freecodecamp.org/news/what-is-javascript-definition-of-js/>

Miller, S. (2023, May 4). *What is Python Used For?* Codecademy Blog. <https://www.codecademy.com/resources/blog/what-is-python-used-for/>

Mioten, E. (2024, June 27). Condominium living further on the rise. BusinessWorld Online. <https://www.bworldonline.com/special-features/2024/06/28/604807/condominium-living-further-on-the-rise/>

Mioten, E. (2024, June 27). The Philippine condominium market in review. BusinessWorld Online. <https://www.bworldonline.com/special-features/2024/06/28/604831/the->

[philippine-condominium-market-in-review/#:~:text=Although%20condominium%20prices%20also%20declined,for%20condominiums%20as%20residential%20property.](#)

Misyam, M. R., & Selamat, N. (2021, November 30). House Rental Management System. *Applied Information Technology And Computer Science*, 2(2), 1745P-1754. <https://publisher.uthm.edu.my/periodicals/index.php/aitcs/article/view/2488>

Monteverde, A. L., Maderazo, J. J. S., Cruz, K. C. M., & Magnaye, N. A. (2023). A web-based rental house smart finder using rapid application development basis for evaluation of ISO 205010. *International Journal of Metaverse (IJM)*, 1(1), 1-12. <https://doi.org/10.54536/ijm.v1i1.1464>

Myre, M. (2022, July 26). The UX Designer's Guide to Adobe XD | DesignLab. *Designlab*. <https://designlab.com/blog/ux-designer-guide-to-adobe-xd>

Noble Desktop. (2024, May 15). *What is Django and How is it used?*. <https://www.nobledesktop.com/classes-near-me/blog/what-is-django>

Obrenović, B. Ž. (2021, October 21). ISO 25010 Standard. *Grounded Architecture: Redefining IT Architecture Practice*. <https://grounded-architecture.io/concepts-iso25010>

Pankratov, E., Grigoryev, V., & Pankratov, O. (2020). The blockchain technology in real estate sector: Experience and prospects. *IOP Conference Series Materials Science and Engineering*, 869(6), 062010. <https://doi.org/10.1088/1757-899x/869/6/062010>

Paul, J. (2022). The Rental Zone (House Renting Website). *International Research Journal of Modernization in Engineering Technology and Science*, 4(8), 2243-2248. https://www.irjmets.com/uploadedfiles/paper/issue_8_august_2022/29592/final/fi_n_irjmets1662125360.pdf

Peek, S. (2023, November 13). What is Agile scrum methodology? <https://www.businessnewsdaily.com/4987-what-is-agile-scrum-methodology.html>

Rastogi, R., Jain, R., Mishra, P., & Prateek. (2023). Rental House Management System: An Empirical Approach with Simulation. *Acta Scientific COMPUTER SCIENCES*, 5(4). <https://actascientific.com/ASCS/pdf/ASCS-05-0434.pdf>

Rathore, K., Syed, A., & Patel, R. (2021). Rental house management system. *International Research Journal of Modernization in Engineering Technology and Science*, 3(5), [1098]. https://www.irjmets.com/uploadedfiles/paper/volume3/issue_5_may_2021/10054/1628083403.pdf

- S, A. (2023, August 25). *What is HTML? Hypertext Markup Language Basics explained*. Hostinger Tutorials. <https://www.hostinger.ph/tutorials/what-is-html>
- Segal, T. (2024, March 25). The differences between a real estate agent, a broker, and a realtor. Investopedia. <https://www.investopedia.com/ask/answers/101314/what-are-differences-among-real-estate-agent-broker-and-realtor.asp>
- Scott, P. (2024, February 28). *What is PostgreSQL? Everything You Need to Know*. Percona Database Performance Blog. <https://www.percona.com/blog/what-is-postgresql-used-for/>
- Senthil.k-Wp. (2024, March 13). *The Benefits of Web-Based Systems for Business - Aezion*. Aezion. <https://www.aezion.com/blogs/the-benefits-of-web-based-systems-for-business/>
- Setty, Y. (2020) Management System for an Apartment. Opus Open Portal to University Scholarship. <https://opus.govst.edu/cgi/viewcontent.cgi?article=1542&context=capstones>
- Shao, C., Yang, Y., Juneja, S., & GSeetharam, T. (2022). IoT data visualization for business intelligence in corporate finance. *Information Processing and Management*, 59(1), 102736. from <https://doi.org/10.1016/j.ipm.2021.102736>
- Simplilearn. (2022, September 22). *The Best Guide to Know What is Vue JS*. Simplilearn.com. <https://www.simplilearn.com/tutorials/java-tutorial/what-is-vue-js>
- Simplilearn. (2024, May 28). Top 25 Productivity tools to get you More time in 2024. Simplilearn.com. <https://www.simplilearn.com/tutorials/productivity-tutorial/best-productivity-tools-to-maximize-your-time>
- Song, C. H., Kil, J., Pan, T.-Y., Sadler, B. M., Chao, W.-L., & Su, Y. (2022). One step at a time: Long-horizon vision-and-language navigation with milestones. In 2022 IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) (pp. 15461–15470). IEEE. <https://doi.org/10.1109/CVPR52688.2022.01504>
- Statista. (n.d.). Residential Real estate Leases - Philippines | Forecast. <https://www.statista.com/outlook/fmo/real-estate/residential-real-estate/residential-real-estate-leases/philippines#analyst-opinion>
- Tan, V. K., & Nguyen, T. (2022). The real estate transaction trace system model based on Ethereum blockchain platform. In 2022 14th International Conference on Computer and Automation Engineering (ICCAE) (pp. 173–177). IEEE. <https://doi.org/10.1109/ICCAE55086.2022.9762429>

The Investopedia Team. (2024, April 23). Data Analytics: What It Is, How It's Used, and 4 Basic Techniques. Investopedia. <https://www.investopedia.com/terms/d/data-analytics.asp>

Visual Studio vs Visual Studio Code - What's Best In 2024? (n.d.). <https://www.turing.com/kb/ultimate-guide-visual-studio-vs-visual-studio-code>

Voumick, D. , Deb, P. , Sutradhar, S. and Khan, M. (2021) Development of Online Based Smart House Renting Web Application. *Journal of Software Engineering and Applications*, **14**, 312-328. doi: [10.4236/jsea.2021.147019](https://doi.org/10.4236/jsea.2021.147019)

Webb, M. (2024, February 19). *GitHub*. Techopedia. <https://www.techopedia.com/definition/github>

What is a payment schedule? (2024, July 17). Corporate. https://www.allianz-trade.com/en_global/news-insights/business-tips-and-trade-advice/what-is-a-payment-schedule.html

What is Adobe XD? (2024, May 10). The Interaction Design Foundation. <https://www.interaction-design.org/literature/topics/adobe-xd>

What is Adobe XD? Top uses, features, and applications / Upwork. (2022, June 29). <https://www.upwork.com/resources/what-is-adobe-xd>