WEB BASED MANAGEMENT SYSTEM with 3D VIRTUAL TOUR FOR THE NNS RENTAL DORMITORY AND APARTMENT IN UPPER MALVAR, TRACONVILLE, BAGUIO CITY

A Capstone Presented to the Faculty of the College Computer Studies AMA Computer College

In Partial Fulfillment of the Requirements of the Degree of
Bachelor of Science in Information Technology (BSIT)

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This research paper entitled "**WEB BASED MANAGEMENT SYSTEM with 3D VIRTUAL TOUR FOR THE NNS RENTAL DORMITORY AND APARTMENT IN UPPER MALVAR, TRACONVILLE, BAGUIO CITY**", prepared and submitted by Nodo,Gerard, Posadas, Gracelyn, Leynes, Jassie Marie in partial fulfillment of the course requirements for the degree of Bachelor of Science in Information Technology, has been examined and recommended for acceptance and approval for Oral Examination.

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ABSTRACT

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CHAPTER I

Project and Its Background

Project Context

When it comes to studying, working, and travelling in other places and countries, rental dormitories and apartments are among the most popular options. Characteristics of rental dorms and apartments vary. They all strive to provide an atmosphere that protects and promotes the welfare, happiness, and appropriate physical and emotional development of students and renters, while also

safeguarding them from abuse or neglect. Dormitories and apartments offer low-cost housing to some of the community's most marginalized and underprivileged people. Residents and students in the private housing market are often low-income, and many have physical, intellectual, social, and psychological challenges that influence their daily functioning to varied degrees. Dormitories and apartments are a significant source of low-cost housing.

Cagalawan (2003) investigated and recommended an online hotel reservation system for the Bacolod Executive Inn. The study's findings emphasized that various issues exist in their existing system, specifically: a. time lag in email reservation processing, b. difficulty in confirming the availability of rooms through walk-in and phone reservations, and c. Report creation takes time. Following an inquiry and observation of the existing reservation methods, the group concluded that the Bacolod Executive Inn, namely the reservation, should be established through an online system for improved service.

The internet web application will also promote the institution, which will help it gain more consumers. As a result, the system will oversee processing all transactions.

Asupra (2001), investigated an automated billing and reservation system for "Pearl Manor Pension House" Incorporated. Following a thorough investigation, the researchers discovered that the employees face the following issues with their current system: a. Processing check-in takes a long time. b.

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delayed bill calculation and c. time intensive processing of reservation. Following a thorough examination of Pearl Manor Pension House, present Incorporated's system, the group decided to automate their system. The automation of the system will benefit the firm since it will make bill calculating more easier and more accurate.

The automated system offers an online web application that may be accessed from anywhere in the Philippines. The online web application allows paying customers to make direct accommodation reservations. On the other side, the system saves admin and staff time. Tenant information is recorded, maintained, and tracked. provides a simple charging system.

According to Marxent 3D Commerce, Virtual Reality is a platform that allows users to inhabit the reality of what they see in the photographs by wearing special glasses. It is possible to see all that is included in that exact location in an extraordinary way (Joe Bardi). It creates a sense of a real environment by simulating real places and conditions on a computer or television screen. Through our eyes, the kit that this fictitious product comprises consists of 3D glasses. This idea is gaining popularity in a variety of fields. It is used in the military, medical field, education, sports, and design. Aside from those areas, it was subsequently applied in the tourist business, particularly in the hotel booking system. It is projected to grow globally. It is something that exists and is real. It appears to be possible to see, but only in an unrealistic reality.

The idea of 3D Virtual Tour is mostly known in a web-application of hotel management system and is known to be effective in terms of strategizing on

attracting customers online. It allows the potential guests to have a first-person view of the facilities and room and it is a quite advantage on a business as this feature is not used in every hotel website in the Philippines. Integrating it into a system can increase the popularity and engagement of the website online.

Purpose and Description

NNS Rental Dormitory and Apartment which is owned by Mr. Fernando Saturnino that is started on year 2009. It is currently a 3-storey building that has 3 rooms for apartment and 6 rooms for dormitory. Currently, the owner decides to add additional floors to increase the numbers of their rooms for more tenants to occupy since the establishment is located near schools, it is fully occupied every month and the business also accepts short- and long-term rentals. The NNS Rental Dormitory and Apartment is located on Upper Malvar Traconville, Baguio City.

On the NNS Rental Dormitory and Apartment most of its business processes are handled manually on record books such as the management of the records of rental payments as well as the advanced deposits, water, and electric bills. All the contracts of the tenants are all hardcopy and the owner stores in an organized drawer. The owner also tracks and compute the overall net worth of the business based on the payments that he writes on the record book itself.

Due to the manual handling of all of the paper works and business processes it can mostly result into human error. There are tendencies or scenarios that the record book that contains the balance sheet of the business monthly can be misplaced, lost/ destroyed in a natural disaster as well as the hardcopy of contracts. Mr. Fernando Saturnino also said that on managing her business, the business processes must improve and innovate to help her gather automated results for tenants, current occupants as well as their payment history and a website that contains all the information about NNS Rental Dormitory and Apartment due to the current trends on the internet. She also experienced certain errors on writing all the tenant's information on record books.

Statement of the Problem

The study's aim is to design and develop a Web based management system with 3D virtual tour for the NNS Rental Dormitory and Apartment, specifically to solve the following problems:

1. How can the system help the NNS Rental Dormitory and Apartment in terms of managing the records of the tenants?

2. How can the system help the NNS Rental Dormitory and Apartment in managing their dormitories and apartments?

3. How can the system help the NNS Rental Dormitory and Apartment in attracting the new customers in occupying to their establishments?

4. How can the system help the NNS Rental Dormitory and Apartment in providing convenience in terms of the payment process of the tenants?

Hypothesis of the Study

There will be no significant difference between the mean score of the respondents' evaluation of the Web based management system with 3D virtual tour for the NNS Rental Dormitory and Apartment in upper Malvar, Traconville, Baguio city in terms of ISO/IEC 9126 software criteria such as Functionality, Reliability, Usability, Efficiency, Maintainability, and Portability.

Objectives of the Study

The main objective of the study is to provide NNS Rental Dormitory and Apartment an automated system in a web-based application wherein it enables the management and retrieving the tenant's information and also a website to boost their online visibility by providing a 3D Virtual tour of all rooms and facilities.

General Objective

The main goal of the study is to create a web-based application that will help their establishments in managing the tenants of the NNS Rental Dormitory and Apartment as well as attracting customers online.

Specific Objectives

The following specific objectives are developed to provide an aim while conducting the proposed system:

1. To develop web-based application to centralize the tenant's information for NNS Rental Dormitory and Apartment.

2. To provide a system that can reduce the workload and manpower of NNS Rental Dormitory and Apartment.

3. To design and develop a website that contains all the information of the dormitories and apartment's type of rooms and its prices.

4. To provide an accurate computation on billing the tenants on NNS Rental Dormitory and Apartment.

5. To provide a 3D Virtual Tour feature on the website for every room that will serve as a marketing tool on attracting new customers.

6. To provide a feature wherein the tenants can raise their concerns regarding on their experiences on the website

7. To provide a system that will be effective in terms of Functionality, Reliability, Usability, Efficiency, Maintainability, and Portability based on ISO/IEC 9126.

Significance of the Study

Owner/Management. This research aims to help NNS Rental Dormitory and Apartment to having a well-organized and assured record keeping system that requires minimal equipment and effort needed as the web-application can manage most of the administrative tasks. It can also boost the staff's productivity and satisfaction as most of the work can be done in the system. The web system also provides online visibility of NNS for attracting new customers.

Employees. This research aims to help the employees of the NNS Rental Dormitory and Apartment to help some of their tasks to be automated for easier and faster transaction to a guest and to lessen manual errors.

End-users (Visitors/Future Customers). This research also aims to help the future customers of NNS Rental Dormitory and Apartment as it will help them to view the availabilities of the rooms whether it is for apartment or the dormitory purposes. Instead of going on the establishment, and looking at the room photos, the customer can view the room through the 3D Virtual Tour feature. This can be encouraging for the customers, and it can also be a way to gain their trust to rent in NNS.

Tenants This research also aims to help the tenants of NNS Rental Dormitory and Apartment as the web- application provides them a dashboard

wherein they can access their past and present payments, rental unit, contact, profile, and it is also a platform to raise their concerns regarding on the problems that they will encounter on their stay.

Future Researchers. Future researchers can learn, refine, and compare techniques and methods that will aid them in their own study and creation of a comparable system. This research may be used as a reference or a guide for future researchers and developers in domains like information technology, computer science, and others.

Scope and Limitation

This study will focus on developing web-based application for NNS Rental Dormitory and Apartment that will serve as their management system/tool and has a feature of 3D Virtual tour for every room provided by the establishment. The system aims to help the customer to reserve their vacancy on the website and for the owners and management to keep track and monitor the tenant's personal information that is occupying at any room. The website has a register form for the customers that would serve as their profile on the website if they wanted to rent on NNS so that their record will be registered on the system as their customer profile will be activated on the room that they want to occupy and that will all be done by the admin of the system. The website will host 3 different users, the Admin, the Tenant, and the Visitor. The Administrator have the full access of the features of the web application such as: Dashboard of total apartments, dormitories, and

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tenants along with their record of payments, rental category form, rental form, add a new tenant for a specific room and lastly, the list of the full details of payments received and invoiced billing. Meanwhile, the tenants will only be able to access the user dashboard along with their registered information on the user profile, past and present payments, rental unit, and they can also raise their concern virtually as it is one of the privileges as a tenant. The visitor on the other hand will have an access on the main webpage that contains the information about the dormitories and apartments as well as their availability, photos of the room, prices and the 3D Virtual Room feature that is a digital first-person view of the premises to show the amenities and see every area of the room.

CHAPTER II

Related Literature

The following are literature studies on establishing management systems in a boarding house, hotel etc. Both foreign and local literature and studies are included in the related literature. The following research were used as a guide and reference by the system's proponents.

Related Literature

This section contains resources derived from published publications and journals on specific issues relating to the current investigation.

Foreign Literature

In the journal entitled "*International Journal of Computer Techniques*" (*December 2018*) by *A. Nur, D. Ecintia, and L. Adel* stated that because of the high cost of purchasing or renting a property in Indonesia, boarding houses play an important role in reducing the expansion of urban planning space, particularly in major cities. Because of the high level of interest in boarding houses, it generates a business opportunity for people to do business that provides significant profits year after year. As a result, it is essential to manage a solid boarding home company management by converting the manual technique into a system. The technology is designed to assist in making boarding house administration more effective and to provide a solution to current challenges. The created Android-Based Boarding House Management Information System's is a solution for boarding house owner by using an android mobile application in processes such as facilities, rooms, tenants data, and recording bills; help and assist boarding house owners in monitoring bills and rooms and make boarding house tenant easier to communicate with the boarding house owner with complete feature

The previous journal's contribution to the current study is that developing a web-based management system for rental dormitory and apartment can help the owner utilize the business and to easily manage the rooms for the tenants for it to be beneficial on both sides in terms of communication, occupants, and the room's information and as well as the records of payments made.

In the article entitled *"Hotel Property Management Systems: Products and Features"* (*November 2019*) by *Alexsoft* stated that the property management system (PMS) is software that helps hotels handle reservations and administrative activities. Front-desk operations, reservations, channel management, housekeeping, rate and occupancy management, and payment processing are the most critical activities. Although PMS software primarily regulates reservations and financial transactions, it may also allow you to manage housekeeping and human resources. In general, a hotel's primary procedures linked to internal and external operations are facilitated by a PMS. In the 1970s, the first hotel property management systems were launched. Even now, though, hardly every hotel has one. According to Software Advice's "Hotel Management Software BuyerView," just 34% of hotels utilized special software in 2015, while 25% still used pen and paper to run their hotels and 16% had no hotel management system at all. The research is based on data from 385 independent hotel, motel, inn, resort, and other types of hotel property

owners in the United States. Legacy PMS software may only perform one function, need extra modules, or be difficult to combine with other hotel management software. Hotel operators want a one-and-done solution to handle all of their procedures. Many hotels still employ Excel, paper and pen, or old software, none of which meet the demands of a 21st century hotel.

The contribution of the previous article to the current study is that having such an innovation from manual to automated system on managing e rental dormitories and apartments. Creating a system for the business can lessen the time-consuming tasks and helps the employees and the owners as well on handling all the data and doing front-desk tasks at once.

In the journal entitled *"Advances in Social Science, Education and Humanities Research"* (2019) by *G.A. Putra and I.N.* stated that many hotel managers are still utilizing manual techniques or generic computer software It has several advantages. problems, such as a lack of reliable documentation and the need for sophisticated processing to generate a report According to these situations, unique internet software required for hotel management, this has the advantage of being always available worldwide, making it easier and faster for the individual who is in in charge of hotel administration People nowadays utilize the internet. to get travel information before planning their trip The Politeknik Negeri Bali's Tourism

Department now has an The Wing Ed Hotel is a commercially successful education hotel. Interns manage the hotel. This hotel will serve as an example, this hotel management system's deployment. The Waterfall approach was used in the creation of this program. Method of sequential and methodical software development including analysis, design, coding, and testing the tourist industry Business processes are supported by information systems. The application delivers business-related services. sectors and user authority, such as hotel marketing and hotel management operation. All transactions conducted in each business field have been automatically merged and processed to generate Hotel management requires quick, convenient, and reliable information.

The previous journal's contribution to the current study is that the management system delivers most of the required activities that is needed to run the business in long term, by utilizing the internet to attract customers online and managing the hotel's business-related activities all can be done by creating a web-based system.

Local Literature

In the article entitled " *Online Hotel Reservation Software"* (2013) by *B. J. Esparago* stated the (OHRS) is a simple system that allows agents and guests to reserve rooms directly over the internet after they have been

verified. Room availability in accordance with the schedule OHRS is a powerful and amazing piece of software that is very simple to use. The OHRS provides total control and jurisdiction over hotel or motel room reservations made over the internet. This means that you may collect all visitor payments, as well as add your own room descriptions, facilities, prices, and allocations into the Reservation System. OHRS also allows you to confirm your reservation in real time on the hotel's website and complete the transaction quickly.

The article's contribution to the current study is a simple online system can make the customer's trust and convenience on the business because almost anything can be done on the internet. The customer must know the availability of the room online and the admin can collect all of the data of the tenants on the system.

In the article entitled *"Boracay Grand Vista Resort and Spa"* (*2012*) by *S. Martin* stated that Boracay Grand Vista Resort and Spa offers online reservations. It comprises scheduling, reserving facilities and rooms, providing guest information, and confirming with visitors if they are certain to book some rooms. Customers do not need to register an account to visit the resort or make a reservation.

The previous journal's contribution to the present study is that the room reservation system for the tenant can be done online, they are not fully

required to go to the site/ the establishment itself because the webbased system provides a 3D virtual tour for a first-person view of the room that they are interested into. Most of the inquiries of the rooms can be done remotely.

In the journal entitled " *Servo IT Solutions"* (*2020*) by *Softinn* revealed that in the Philippines, Servo IT Solutions has served over 500 hotel clients. The headquarters of the corporation are in Angeles, Central Luzon, Philippines. They have catered to hotels, resorts, inns, and other types of properties ranging in size from 8 to 200 rooms. They provide software solutions such as the Xenia Hotel Management System to assist hotels in efficiently managing their front-desk operations, which include the following features: mobile app for self-check-in and checkout, reservation management, analytics report, third party generation for hardware integration such as the door lock system and event management system as well.

The previous journal's contribution to the present study is that the implementation of the web-based system for rental dormitory and apartment can efficiently help the front-desk operation and they can fully rely all of the functions of the business on the web app's administrator features which can be managed even if the owner is not in the property and the tenant can also view their dashboard on their devices remotely as well.

Related Studies

This part presents local and foreign studies that can help the proponents to comprehend and interpret information that is relevant and like the proposed system.

Foreign Studies

In the study entitled *"Hotel Management System"* (*May 2020*) by *K. Sudhanshu,* mentions that the project hotel management system is a web-based tool that enables hotel managers to manage all hotel operations online. This system is incredibly adaptable and handy due to its interactive GUI and the ability to manage numerous hotel bookings and rooms. The hotel manager is a highly busy individual who does not have time to sit and manually handle all the operations on paper. This program provides him with the capability and flexibility to administer the complete system from a single online interface. The Hotel Management project includes elements such as room booking, personnel management, and other hotel management functions. The management can use the system to post available rooms. Customers may see and book available rooms online. Admin has the authority to approve or deny the customer's booking request. Other hotel services may also be seen and booked by consumers. As a result, the system is valuable for both customers and management to handle hotel operations portably.

The similarities between the previous study and the current study that the proponents are proposing are that it is a web-based feature that consists of the management functions such as tracking and records tenant's information, post available and its prices online, administration functions that handles all the operations of the current study on the system.

In the study entitled *"Apartment Management System"* (*2020*) by *K. Aditya* stated that the apartment management systems are computer-based systems that are used to monitor the varied activities of a typical residential urban society. The concept of apartment management system arose from the fact that various large societies require monitoring and maintenance for their various day to day activities. In a typical residential society, the day-to-day chores include maintenance of the society, plumbing, parking allocations, waste management, security facilities, tracking dues, inventory management, and so on. They necessitate coordination between the individual management societies and the suppliers who supply these services to give the proper convenience. Apartment management, in its widest sense, is the operation, control, and monitoring of real estate. The information of each record is recorded separately in the proposed system, and the expenditures that must be paid by them are calculated. The monthly expenditures are computed automatically for each resident, saving time and staff resources. After the project is implemented, we will be able to maintain track of their growing resident database. This database will assist them in

locating information on available blocks, apartments, inhabitants, installments paid, and expenditures that residents must bear. There is no chance of missing any vital information about the unit in the future.

The similarities between the previous study and the current study are the system is tracking dues monthly and to record the payments to be made and done by the tenants, also the full operations and monitoring of the establishment is all given by the system.

The study entitled "*Hotel Management System*" (March 2020) by M. Nandiraju, S. Rachana, S. Chandini aims to investigate the hotel management component of the hospitality sector. The internet, computers, and other electronic gadgets have made it relatively easy to handle many professions and areas of administration in the twenty-first century. The design and installation of an electronic hotel management system is the focus of this project. This project aims to develop a platform that allows both users and administrators to keep track of transactions such as room reservations, room booking, hotel financial administration, staff record keeping, online reservations, and other day-to-day activities associated with the operation and management of a hotel. The implementation is based on hotel management system specifications. An electronic hotel management information system is necessary to help with data management in the hospitality business as well as to simplify the complete hotel management

process. This project completed the objective of developing a system that assures correct record keeping, which was accomplished by effective customer identification and the right categorization of user functions, with most of the procedures being completed automatically. Microsoft Visual Studio was used to create the system, which can be used to create console and graphical user interface programs, as well as Windows apps and websites. Microsoft SQL server was used to build the database system (MSSQL).

The similarities between the previous study and the current study is that t the web-based system caters 3 different users which is the tenants, visitors/ inquirers, and the owners and they all have different privileges and specific features for each. The administrator has the full control of the features while the tenants and visitors can only access features that is related to their purpose.

Local Studies

In the study entitled "*Hotel Management System Project*" (*July 2021*) by *M.G. Patulada,* the hotel management system's goal is to keep and manage all the hotel's duties and operations. It is basically in charge of hotel management in the core area of the database. This also provides information about the various hotels, as well as their current availability status. Visitors can visit the website and register with the system by entering

the necessary information. Each registered guest can request unit bookings. The visitors were then informed about the availability of the flats based on their request. The application also allows the administrator to manage the whole system through a single internet interface. This offers the administrator additional authority and freedom. The system also includes room booking, personnel management, and other hotel management services. Users can also utilize the system to promote available rooms. Customers may now see and reserve accommodations from the convenience of their own homes. The administrator can then approve or deny a customer's booking request. Therefore, the technology is utilized by both customers and administrators to control hotel operations when they are on the move.

The similarities between the previous study and the current study is that the system provides a website wherein the user can have the information about the rooms along with its prices and availability and also the full features for the administrator or the owner to give flexibility and system-based operations of the business.

The study entitled *"Hotel and Restaurant Management System: Legal Management System"* (*March 2020*) by *J. Casag and D. Lozeno* concentrated on improving the manual procedure of the Legal Management module. This study focused on the problem of losing files, such as permits,

notice legal letters, and memorandums, manual filing for a case that may take longer to solve or see the process, and a pile of contracts and legal papers that may be lost in the future, which are the most important files in this study. The proponents concentrated on creating a system that can convert a large amount of paperwork into a one-click procedure and paperless system. The proponents employed an agile scrum process, which is widely utilized in product development, particularly software development. The product key is the person that represents the users and consumers. The scrum master oversees the function and assists the team in using the scrum method. The findings of the proponents were crucial; most of the hotel business employed a manual administration procedure. Having several copies of crucial files may result in a leak. The proponents devised a practical solution to the needs of legal management transactions and the employees who manage them. The proponents reached an agreement on a comprehensive, integrated information system that aids in the process, management, and facilitation of legal management. The proponents said that the problem in a system may be remedied by researching and identifying a foundation for creating and securing a decent service for the user. This system was suggested by its supporters because its procedures are user-friendly, accurate, and real-time.

The similarities between the previous study and the current study are that the owner and the tenants can utilize the system by minimizing the use

of paper works, especially the contract signing, billing of electricity, water and for the room every month to also track the income of the business which his automatically computed and, the paper works are all organized according to the tenant's information and its bills.

In the study entitled *"Boarding House Locator and Student Monitoring System IN Naval, Biliran Province, Philippines"* (*August 2018*) by *E. Bustillo* conducted the research to create an efficient Student Boarding House Locator and Monitoring System in Naval, Biliran. This project's spiral model is intended to improve the software process model scenario. The spiral model is distinguished by the fact that it produces a risk-driven approach to the software process rather to a predominantly document-driven or code-driven process. It integrates many of the qualities of previous models while also resolving many of their shortcomings. The system assists the Students Affair Service Office in monitoring students to ensure that they are safe and secure with their respective rental Boarding Houses, and the system can perform online service since it is a system with a comprehensive list of services and information. To establish the student profile and the sort of boarding homes or dorms that students are renting. For information updates, the administrator (SASO) and landlord/landlady of the boarding home should coordinate and cooperate. The techniques utilized to collect data for the study include conducting interviews, observations, and research. The proponents discovered that designing, analyzing, executing,

and monitoring the system is an advantage form of developing the system. The proponents of this study met several issues to consider when carrying out this research. The information's confidentiality and authenticity should be updated and checked. Functionality is essential for the efficient and successful running of services.

The similarities between the previous study and the current study are that the administrator can CRUD (create, read, update, and delete) the tenants along with their assigned room. It also provides a security between the tenant and the administrator wherein all the information on the dashboard of the tenant user can only be accessed by their own credentials and from the administrator side, it can access all the tenant's information.

Synthesis

The review of local and foreign literature by A. Nur, D. Ecintia, and L. Adel (2018), AlexSoft (2019), G.A. Putra (2019), B. J. Esparago (2013), S. Martin (2012), SoftInn (2020) provides all the information on how the operations on management system, room reservation and inquiries for the visitors can be and done on the remotely using the system. It makes easier for both the visitors to know more about the rental dormitories as the information of the rooms can be done on the website.

The review of local and foreign studies by S. Sudhanshu (2020), K. Aditya (2020), M. Nandiraju (2020), M. G. Patulada (2021), J. Casag (2020),

E. Bustillo (2018) is useful for the proponents due to the functionalities of their developed system which can be integrated on the proposed system of the study and the features can be separated between different kinds of users such as the administrator, tenants and the visitor of the web-based application.

Technical Background

The proponent's proposed system is a Web Based Management system with 3D Virtual Tour for the NNS Rental Dormitory and Apartment, the system's purpose is to eliminate the manual process and innovate into the automated system that can help the owner to manage the functionalities of the business on the website. It will also help the business to have an edge and attract the customers due to its online visibility on the internet and a 3D virtual tour for a first view of the room which will be convenient for the customers to rent on NNS. The website can run on any internet browser and can run on any devices as long as they are connected in the internet but it is mainly made for desktop and laptop users only.
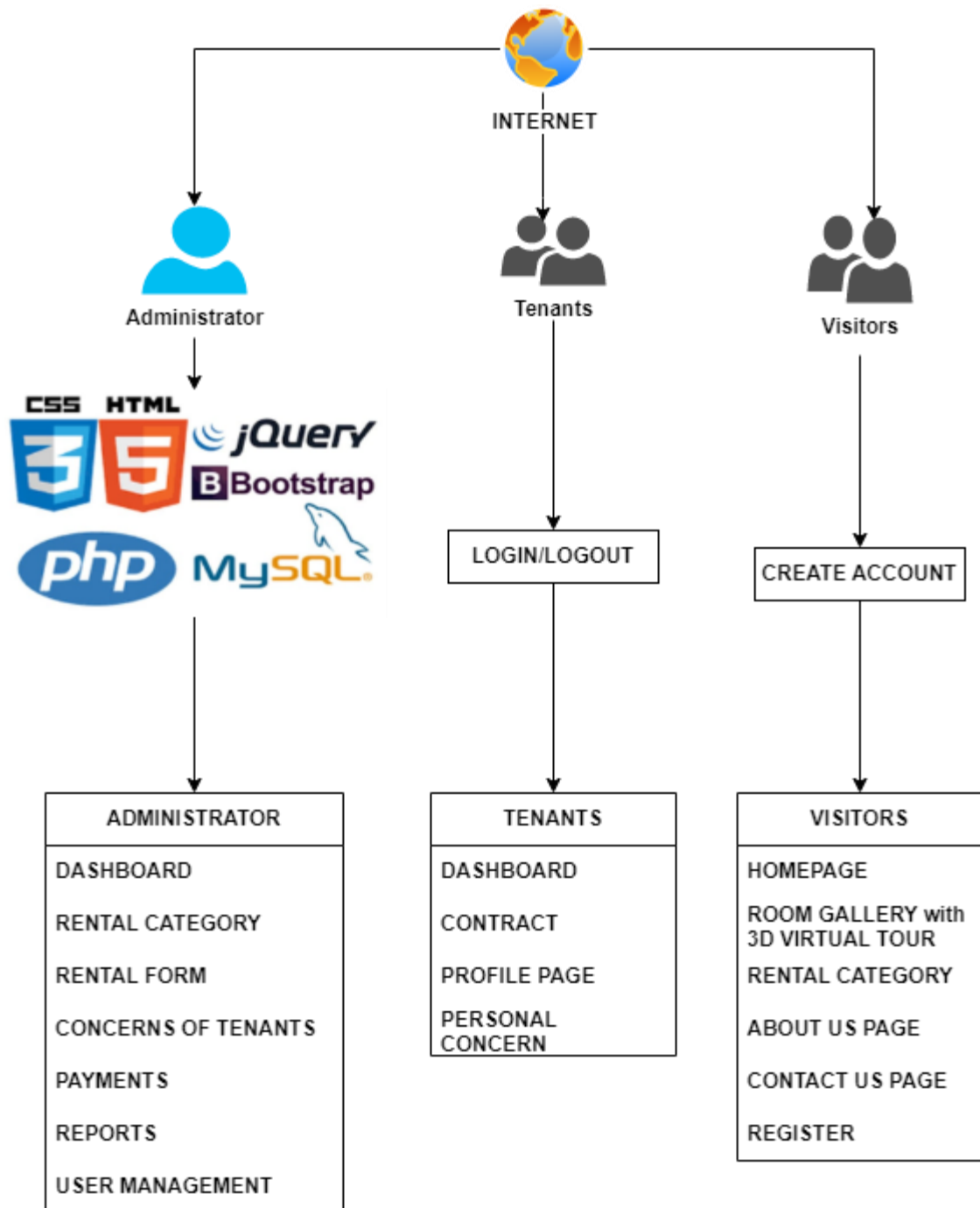
INTERNET

Administrator

Tenants

Visitors

LOGIN/LOGOUT

CREATE ACCOUNT

ADMINISTRATOR
DASHBOARD
RENTAL CATEGORY
RENTAL FORM
CONCERNS OF TENANTS
PAYMENTS
REPORTS
USER MANAGEMENT

TENANTS
DASHBOARD
CONTRACT
PROFILE PAGE
PERSONAL CONCERN

VISITORS
HOMEPAGE
ROOM GALLERY with 3D VIRTUAL TOUR
RENTAL CATEGORY
ABOUT US PAGE
CONTACT US PAGE
REGISTER

Figure 1.0 Technical Background

The illustration in *figure 1.0* shows the steps of the proposed Web Based Management system with 3D Virtual Tour. The Administrator/ owner has full access of the system such as record of all tenants, rental contracts, directed message concerns, user-generated payments, reports, and user managements. The Tenant's created account has access to the user's dashboard wherein it contains contract of the room, profile page of personal information registered from the homepage, and the personal concern which is a direct message on the administrator/ owner. The visitor's feature is the homepage wherein the landing page of the business which contains room gallery along with its availability, prices and a 3D Virtual tour for each room, rental category whether it is a dormitory or an apartment, about us and contact us page and the register which would be optional if the visitor tends to rent a room. The proposed web application will require the user to have an internet connection to run the system and the proponents will use Microsoft Visual code which will serve as the integrated development environment and the programming languages used will be HTML, CSS, Bootstrap for the front-end and PHP, JQuery, MySQL for the back end and database of the system.

CHAPTER III

Methodology Results and Discussion

This chapter will provide an overview and appropriate comprehension of the methodologies, methods, and procedures that the proponents will employ for their study.

This chapter will discuss the Software Design and Processes, System Architecture, Conceptual Design, Cost-Benefit Analysis, Requirement Analysis, System Flow, and Block Diagrams of the system of NNS Rental Dormitory and Apartment.

System Design, Products, and/or Processes

The proponents of this study will implement Agile Software Development, which focuses on incremental development, an iterative work environment, welcomes change, prioritizes user feedback to alter the product to match the changes necessary, and guarantees the product remains relevant. Furthermore, it enables proponents to divide the development process into iterative parts, allowing them to work more efficiently, provide goods faster and cheaply, and, most importantly, create a product that meets the user's desire. The figure below is the several phases of agile methodology.
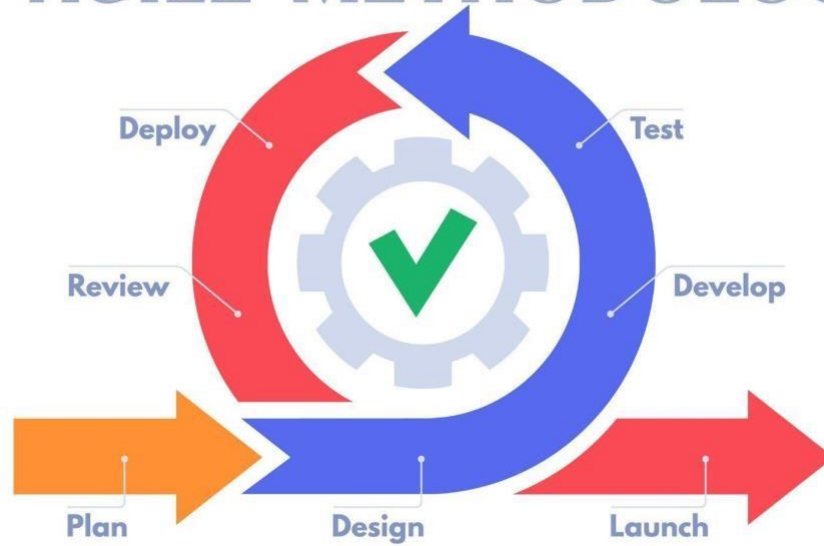
Figure 1.1 Agile Software Development

The Agile Software Development has six phases: Plan, Design, Development, Testing, Deployment, and Review. A discussion of each step follows.

Requirements

The proponents have developed a formal letter asking authorization to conduct research on NNS Rental Dormitory and Apartment on November 5, 2022, during this phase. The proponents then had a first interview with the proprietor of the NNS Rental Dormitory and Apartment on November 25, 2022. The following week, on December 1, the proponents conducted another interview with the owner to understand the specific functions of

business strategy and operations that are currently implemented on running the rental dormitory, which the proponents discovered is being run using the manual method of record books and pen and paper method. The proponents came up with the notion of upgrading the present plan and innovating it utilizing step-by-step methods. The Gantt Chart is also used by supporters to divide the study work into phases. On December 10, an agreement was reached between the proponents and the company owner to construct a web-based application for the NNS Rental Dormitory. Furthermore, the proponents will maintain contact with the owner for certain suggestions of the features that can be implemented in the future.

Design

This phase, the proponents proposed a feature wherein the owner, tenants and the visitor can easily understand the purpose and functionalities of the website. The owner can use the system as most of the business operations such as managing the tenants and the rooms will be implemented as for the tenants, which will have a personal user's dashboard that contains contracts, profile, and room information and for the visitor of the landing page of the website which contains a gallery of rooms along with its availability and price and a 3D Virtual tour each.

Development

It takes the time and research, in which the proponents must adhere to coding standards to increase the code's readability and maintainability. The following will be used by the proponents:

- HTML or HyperText Markup Language is a text-based method for expressing the organizational structure of the content in an HTML file. The markup on a webpage instructs a web browser how to display text, pictures, and other types of multimedia. It is also a text document with specified syntax, file naming standards and naming standards that indicate to the computer and web server that the document is in HTML. A user may create and design a simple webpage by applying these HTML principles to a text file in almost any text editor.

- CSS which stands for Cascading Style Sheets is the one that gives several pages of a website a consistent appearance. They can specify text formatting, table dimensions, and other elements of Web pages that were previously only allowed in the HTML of a page. Commonly used styles only need to be declared once in a CSS document rather than having to specify the style of every table and text block inside the HTML.

- Bootstrap is a vast collection of useful, reusable snippets of HTML, CSS, and JavaScript code. Additionally, it is a frontend

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development framework that helps designers and developers to create completely responsive websites in a timely manner.

- JQuery is for quick website creation, a compact and quick JavaScript library may be utilized to make event handling, HTML page traversal, Ajax interactions, and animation simpler. jQuery makes HTML client-side scripting easier, which makes creating Web 2.0 apps easier.

- MySQL is built on a client-server architecture. The centerpiece of MySQL is its server, which manages all database operations (or commands). Both a standalone software for usage in a client-server networked environment and a library that may be incorporated (or linked) into other programs are offered by MySQL server.

- Visual Studio Code is a Microsoft free open-source text editor. VS Code has recently become one of the most widely used development environment tools, despite the editor's relatively modest weight and robust capabilities.

Testing

In this phase, the proponents will be the first one that will test the overall functionality of the system. This is to track and identify the bugs, errors for early debugging, to test the UI/UX of the system if it can be easily

navigated by any kinds of users and lastly, to ensure that the database can handle multiple users at once for the quality assurance of the system. After the initial testing of the system, the owner of the NNS Rental Dormitory and Apartment can also use the system first-hand and its suggestions and revisions will be evaluated by the proponents if it is capable to integrate in the system. After that, the proponents will reach out to multiple users to test the official website to test the room availability, registration, other webpages and the 3D Virtual tour features per room as their feedback and suggestions will be needed as well. Additionally, when the system is finished, the proponents will collect data on both before and after a test. The survey will be built on top of ISO/IEC 9126.

Deployment

After finalizing the testing, debugging and inclusion of the revisions, the system will now be up on web hosting to be available for the owner, tenants and visitors and it will be now integrated on the business. The system will be supported by the proponents for 1 month due to the subscription of the used web hosting.

Review

The proponents will present and exhibit the web-application's full features to the owner of the NNS Rental Dormitory and Apartment after completing all the necessary steps.

Software System Architecture

      The basic architecture of a software system, as well as the discipline involved in designing such structures and systems. It serves as a blueprint for the system and the evolving project, outlining the activities that must be completed by the proponents.
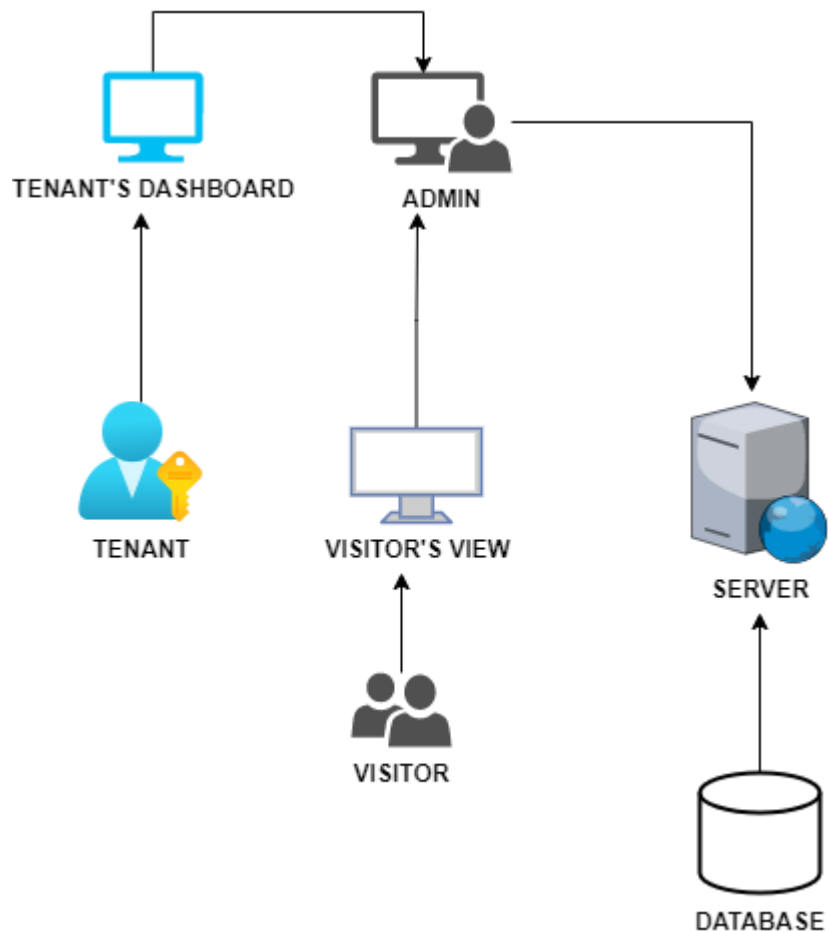
Figure 1.2 System Architecture

The illustration in figure 1.2, shows the structure of the proposed system. The flow from the visitor's view, tenant's dashboard is fully controlled by the administrator and all the data will be stored and retrieved from the database which can be accessed on the web server.

Conceptual Design

This section will graphically explain the proposed system's procedures and interactions. It makes the proposed system simple to understand and visualize. The supporters will construct the database model structure, link the database tables, design data forms, and produce the project presentation. The design and functionality of the system will be reviewed.

Class Diagram

The class diagram is static. It depicts an application's static view. A class diagram is used not only for visualizing, describing, and documenting many parts of a system, but also for building executable code for a software program. The figure below displays a set of classes, interfaces, affiliations, collaborations, and restrictions. A structural diagram is another name for it.
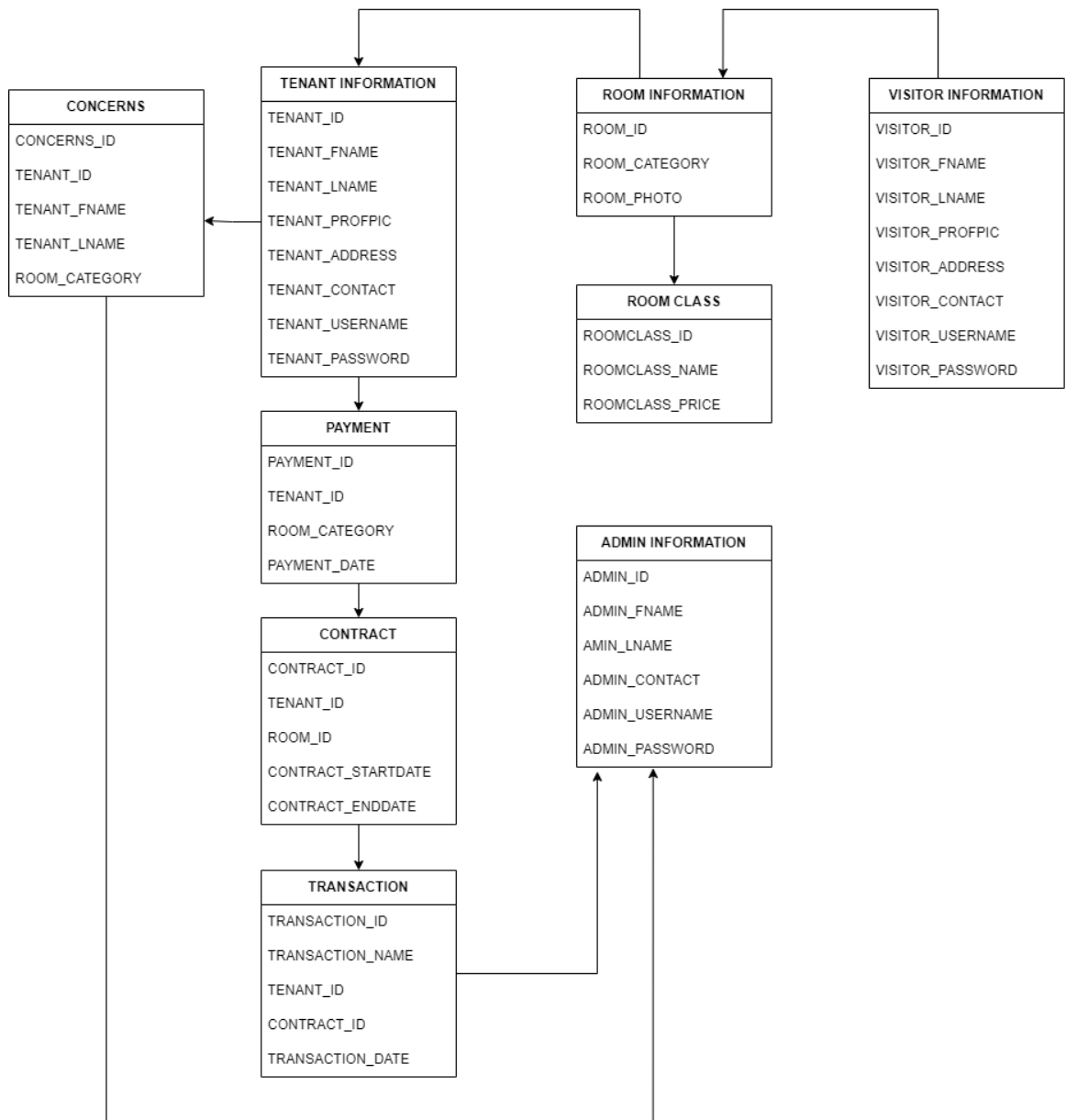
Figure 1.3 Class Diagram

Cost Benefit Analysis

The cost-benefit analysis will aid in identifying how the proposed system would benefit the firm in this section of the research. It will also advise the client

whether the suggested system is worth implementing. The proponents obtained

the appropriate information from the business and compared the system's planned

or expected costs and benefits.

Table 1.0

Cost Benefit Analysis

No	Cost Benefit Analysis	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Total
1	Value of benefits	-	1,301	1,338	1,376.2	1,415.63	1,456.33	6,886.96
2	Discount Factor (10%)	1	0.9091	0.8264	0.7513	0.6830	0.6209	
3	Present value of Benefit	-	1,182.74	1,105.72	1,033.78	966.88	904.23	5,193.35
4	Development Cost	(1,788)	-	-	-	-	-	(1,788)
5	Operating Cost/Ongoing Cost	-	(1,233)	(1,233)	(1,233)	(1,233)	(1,233)	-
6	Discount Factor (10%)	1	0.9091	0.8264	0.7513	0.6830	0.6209	
7	Present Value of Cost	-	1,120.92	1,018.95	926.35	842.14	765.57	4,665.93
8	Present Value of Net Benefits and Costs	-	61.82	86.77	107.43	124.74	138.66	519.42

9	Cumulative Net Present Value	(1,788)	(1,726.18)	1,639.41	1,746.84	1,871.58	2,010.24	5,541.89
10	Payback Period	1 year and 177 days						
11	5 Year Return of Investment	19%						

Table 1.0 shows the cost benefit analysis of the proposed system and how it will benefit NNS Rental Dormitory and Apartment.

Computation of Value of Benefits

Year1: 179 + 216 + 450 + 236 + 220 = **1,301**

Year2: 179 *.02 = 3.58 + 179 = 182.58

216 * .05 = 10.8 + 216 = 226.8

450 * .03 = 13.5 + 450 = 463.5

236 * .02 = 4.72 + 236 = 240.72

220 * .02 = 4.4 + 220 = 224.4

Total: 182.58 + 226.8 + 463.5 + 240.72 + 224.4 = **1,338**

Year3: 182.58 * .02 = 3.65 + 182.58 = 186.23

226.8 * .05 = 11.34 + 226.8 = 238.14

463.5 * .03 = 13.91 + 463.5 = 477.41

240.72 * .02 = 4.81 + 240.72 = 245.53

224.4 * .02 = 4.49 + 224.4 = 228.89

Total: 186.23+ 238.14+ 477.41 + 245.53 + 228.89 = **1,376.2**

Year4: 186.23 * .02 = 3.72 + 186.23 = 189.95

238.14 * .05 = 11.90 + 238.14 = 250.04

477.41 * .03 = 14.32 + 477.41 = 491.73

245.53 * .02 = 4.91 + 245.53 = 250.44

228.89 * .02 = 4.58 + 228.89 = 233.47

Total: 189.95 + 250.04 + 491.73 + 250.44 + 233.47 = **1,415.63**

Year5: 189.95 * .02 = 3.78 + 189.95 = 193.73

250.04 * .05 = 12.50 + 250.04 = 262.54

491.73 * .03 = 14.75 + 491.73 = 506.48

250.44 * .02 = 5 + 250.44 = 255.44

233.47 * .02 = 4.67 + 233.47 = 238.14

Total: 193.73+ 262.54 + 506.48 + 255.44 + 238.14 = **1,456.33**

Total: 1,301 + 1,338 + 1,376.2 + 1,415.63 + 1,456.33 = 6,886.96

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Computation of Discount Factor

Year0: $1 / (1+0.1)^0 = 1$

Year1: $1 / (1+0.1)^1 = 0.9091$

Year2: $1 / (1+0.1)^2 = 0.8264$

Year3: $1 / (1+0.1)^3 = 0.7513$

Year4: $1 / (1+0.1)^4 = 0.6830$

Year5: $1 / (1+0.1)^5 = 0.6209$

Computation of Present Value of Benefits

Year1: 1,301 * 0.9091 = **1,182.74**

Year2: 1,338 * 0.8264 = **1,105.72**

Year3: 1,376.2 * 0.7513 = **1,033.78**

Year4: 1,415.63 * 0.6830 = **966.88**

Year5: 1,456.33 * 0.6209 = **904.23**

Total: 1,182.74 + 1,105.72 + 1,033.78 + 966.88 + 904.23= 5,193.35

Computation of Present Value of Cost

Year1: 1,233 * 0.9091= **1,120.92**

Year2: 1,233 * 0.8264= **1,018.95**

Year3: 1,233 * 0.7513= **926.35**

Year4: 1,233 * 0.6830= **842.139**

Year5: 1,233 * 0.6209= **765.57**

Total: 1,120.92 + 1,018.95 + 926.35 + 842.139 + 765.57 = 4,655.93

Computation of Present Value of Net Benefit and Cost

PVOB – PVOC = TOTAL

Year1: 1,182.74 - 1,120.92 = 61.82

Year2: 1,105.72 - 1,018.95 = 86.77

Year3: 1,033.78 - 926.35 = 107.43

Year4: 966.88 - 842.139 = 124.74

Year5: 904.23 - 765.57 = 138.66

Total: 61.82 + 86.77 + 107.43 + 124.74 + 138.66 = 519.42

Computation of Cumulative Net Present value

Year0: (1,788)

Year1: (1,788) + **61.82 =** (**1,726.18**)

Year2: (**1,726.18**) + **86.77 =** 1,639.41

Year3: 1,639.41+ **107.43** = 1,746.84

Year4: 1,746.84 + **124.74** = 1,871.58

Year5: 1,871.58 + **138.66** = 2,010.24

Total: (**1,726.18**) + 1,639.41 + 1,746.84 + 1,871.58 + 2,010.24 = 5,541.89

Table 2.0

Value of Benefits

Value of Benefits	Amount	Details
Reduce the use of record books Increasing 2% per year	Php 179	Php 89 500 pages per book 2 pcs per year
Reduce the use of pressboard folders Increasing 5% per year	Php 216	Php 24 9pcs per box 10 box per year
Reduce the use of plastic envelopes Increasing 3% per year	Php 450	Php 50 9pcs per box 10 box per year
Reduce the use of short bond paper Increasing 2% per year	Php 236	Php 118 (8.5x11) 108 Sheets, 108pcs per year

Reduce the use of HBW Ballpen Increasing 2% per year	Php 220	Php 220 (50 pcs per box) 1 Box per year
Total	**Php 1,301**	

Table 2.0 indicates the monetary worth of the advantages that the firm

would receive from the proposed system. The record books, pressboard folders,

plastic envelopes, short bond paper, HBW Ballpen will be less commonly utilized

and some of them will be disposed if the system is fully integrated.

Figure 1.4 Supporting details for Value of Benefits

The illustration in Figure 1.3, shows the prices of items in the value of benefits, which can be found in the National Bookstore and online stores in Lazada and Shopee

Development Cost

This section will go through the expenditures that may be incurred when developing the proposed system.

Table 3.0

Development Cost

Expense Category	Amount
Salaries/Wages	N/A
Webhosting	Php 1,788
Programming	N/A
Total	**Php 1,788**

The illustration in Table 3.0 shows the expenses during the development of the proposed system. The client already has a laptop and computer which already met the minimum requirements for the web-application and the building of rental dormitory and apartment already has a setup of Wi-Fi internet connection.

The proponents will utilize 000Webhost services, the web hosting has a promo up to 90% and it will cost Php 149 per month for 2 years of subscription with a free domain for a year and free SSL certificate. Therefore, the total expense for developing the proposed system will be Php 1,788.
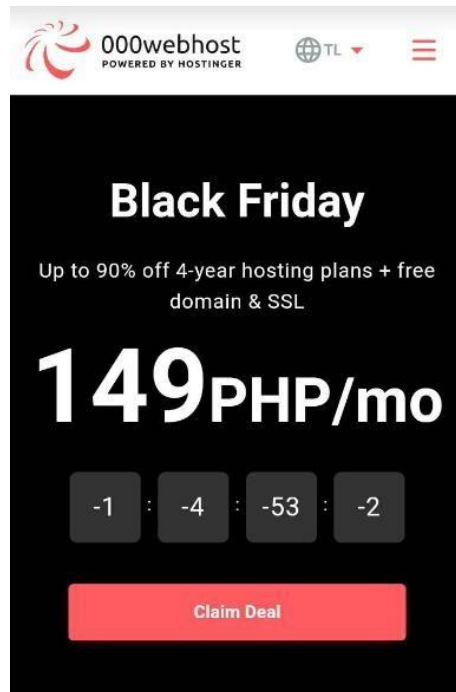

Figure 1.5 Supporting details for development cost

The illustration in Figure 1.4, displays the cost of the web hosting subscription, domain registration and an SSL certificate from 000webhost.

Operating Cost

This section will discuss the probable expenses of adopting the proposed system within the business.

Table 4.0

Operating Cost

Expense Category	Amount
Internet Connectivity	N/A
Utilities/Electricity	1,068
CAT6 Ethernet Cable	165
Facilities	N/A
Total	**Php 1,233**

Table 4.0 shows the operational costs if the suggested system is implemented, with an electricity cost of Php 1,233 owing to Meralco's kWh. The calculated electricity will be utilized to charge the company's laptop, and the CAT6 Ethernet Cable will be used for the expanded routers in the facilities.

Figure 1.6 Supporting detail for Operating Cost

Figure 1.5 shows an illustration of the estimated cost of electricity which costs Php 89.02 per month multiplied by 12 months equals Php 1068.36 a year. And also, the CAT6 Ethernet cable for the extension for routers in different floors.

Payback Period

The payback period is the length of time it takes to repay the cost of an investment.

Formula

$$\text{Year of last negative value} + \frac{\text{Year of first positive value}}{\text{Year of first positive value} + \text{next positive value}} \, x \, 365$$

Computation

$$1 \ year + \frac{1{,}639.41}{1{,}639.41 + 1{,}746.84} \ x \ 365 = 177.71$$

Payback Period = 1 year and 177 days

Return of Investment

In this part, it will show how much the company will benefit from the proposed system's investment.

Formula:

$$ROI = \frac{PVoB - (DC + PVoC)}{DC + PVoc} \ x \ 100$$

Where:

ROI = Return of Investment

PVoB = Present Value Benefit

PVoC = Present Value of Cost

DC = Development Cost

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Computation

$$ROI = 5 \underline{\hspace{4cm}},193.35 - (1,788 + 4,665.93)$$

$$x\ 100 = 19\% \ (1,788 + 4,665.93)$$

Requirement Analysis

<div align="center">

Table 5.0

Requirement Analysis

</div>

Hardware	CPU	Dual Core Processor/ 1.6GHZ clock rate
	RAM	4GB
	OS	Windows 7/8/10/11
Software	Browser	Any Browser

Table 5.0 shows the hardware and software requirements. The proponents have calculated the broad minimum hardware requirements for the system, which include a dual-core CPU or a processor with a 1.6 GHZ clock rate, 4GB of RAM, and the most recent version of Windows down to windows 7. In terms of software, the system may run on any internet browser if the device is connected on the internet

System Architecture/System Flow

This exhibits the process flow of the proposed system which allows to visualize and easily understand the system interactions.
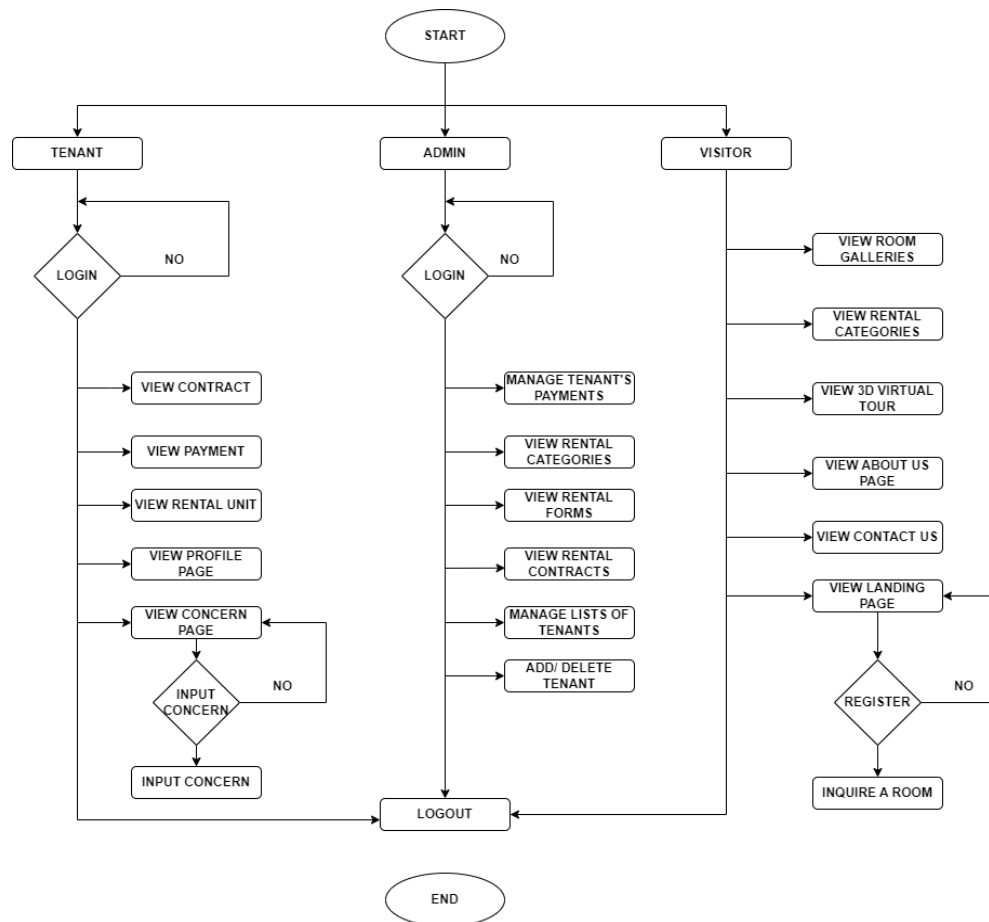

Figure 1.7 System Flow

The Illustration in Figure 1.6 shows the proposed system flow for the NNS Rental Dormitory and Apartment.

Block Diagrams

        This section will depict the proposed system's processes as blocks connected by lines that demonstrate the relationships between the blocks.
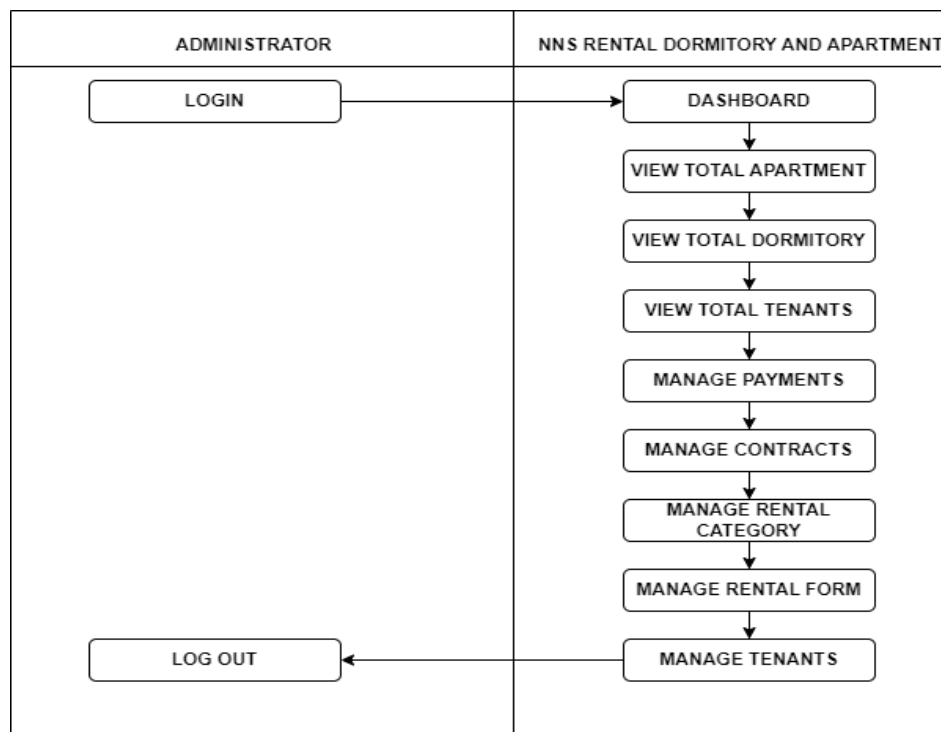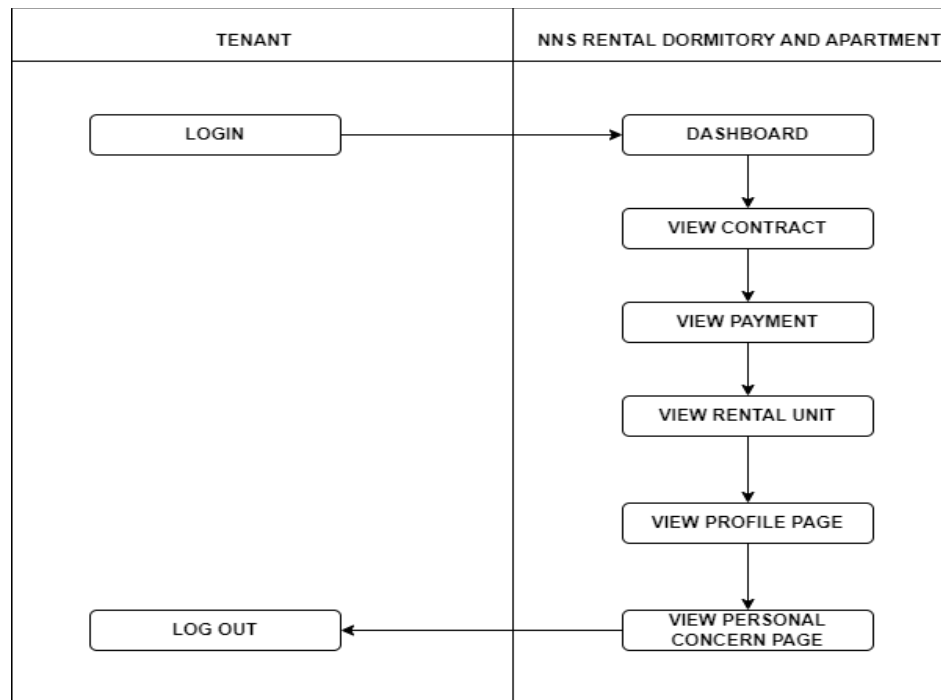
Figure 1.8 Administrator's Block Diagram

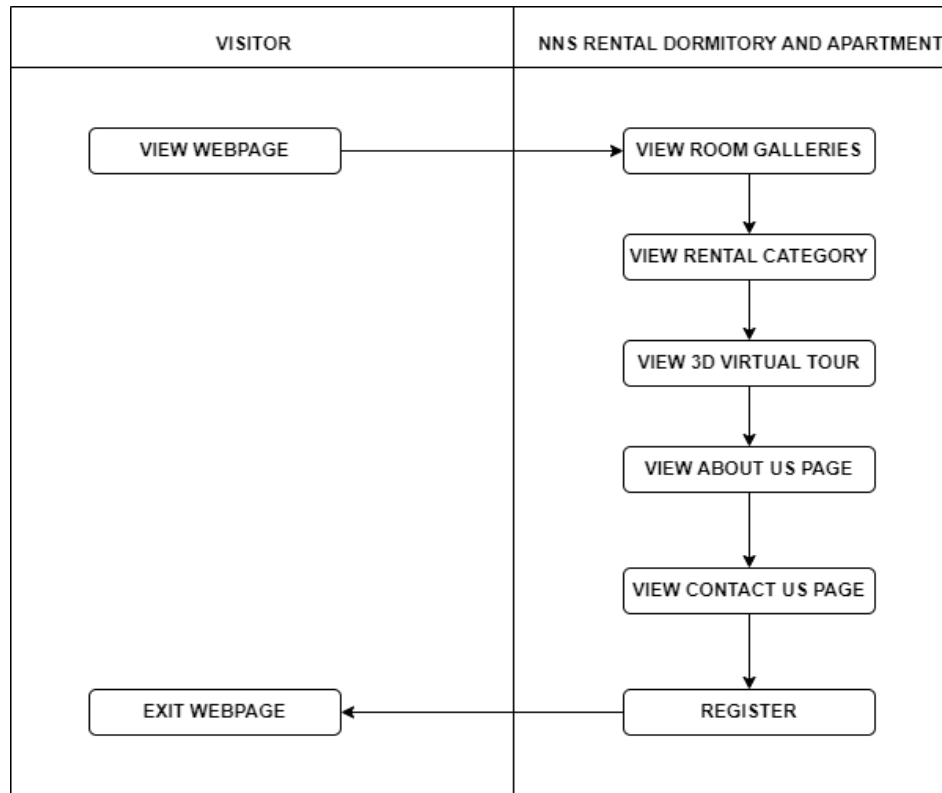**Figure 1.9 Tenant's Block Diagram**

Figure 2.0 Visitor's Block Diagram
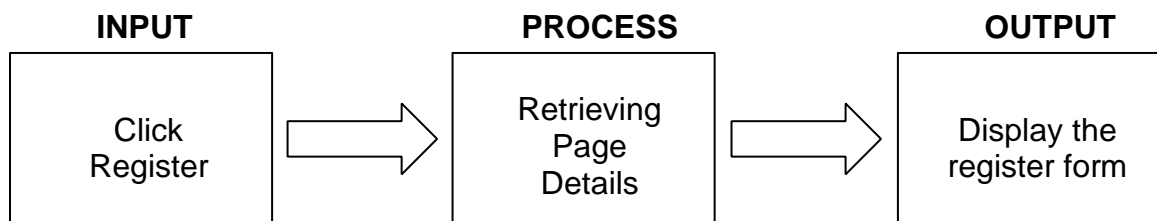
Development and Testing

The proposed system will be built in accordance with the business owner and tenant's needs. The proponents employ agile software development for thorough testing along with the inclusion of the suggestions and revisions from the feedback and data gathered from the evaluation. The proposed system will be developed on Microsoft Visual Studio code based on the comfortability of the proponents as well as the problems can be easily debugged. For the frontend, the

proponents will be using HTML, CSS, Bootstrap and JQuery and for the back end, PHP and MySQL for functionalities and database purposes. Furthermore, the proponents will use 000webhost services for web hosting and domain registration.
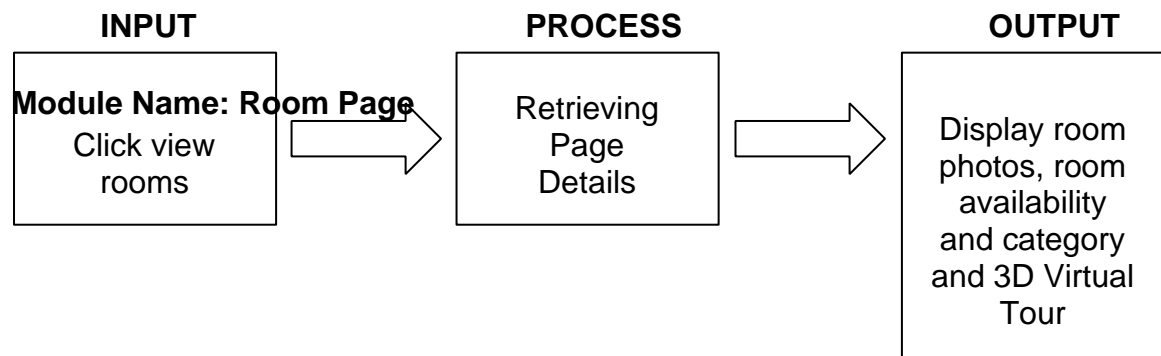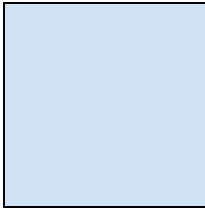
The proponents will use pre and post-tests to test the proposed system, with respondents evaluating both the current system (pre-test) and the proposed system (post-test). The administrator, tenants within the business and the visitors that will be selected by the proponents is based on ages 18 and up, as they will be the potential tenants of the apartment and dormitory. Furthermore, the survey used by the proponents will be based on ISO/IEC 9126 and will be validated before being distributed.
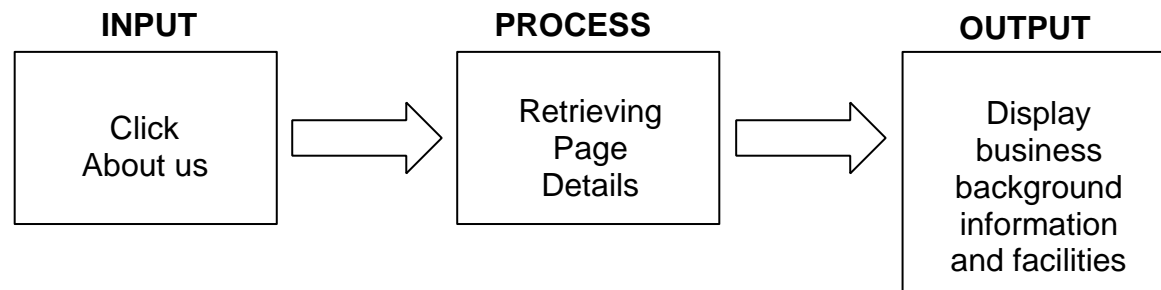
Input and Output Reports and Analysis
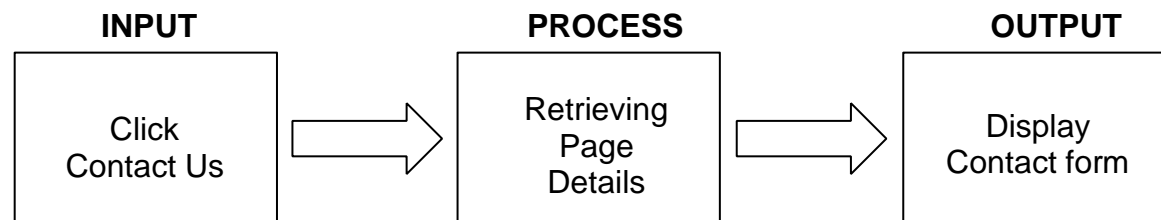
Module Name: Visitor Register

INPUT	PROCESS	OUTPUT
Click Register	Retrieving Page Details	Display the register form

Module Name: Visitor Login

INPUT	PROCESS	OUTPUT
Module Name: Room Page Click view rooms	Retrieving Page Details	Display room photos, room availability and category and 3D Virtual Tour

Module Name: About us Page

INPUT	PROCESS	OUTPUT
Click About us	Retrieving Page Details	Display business background information and facilities

Module Name: Contact Us Page

INPUT	PROCESS	OUTPUT
Click Contact Us	Retrieving Page Details	Display Contact form

	INPUT		PROCESS		OUTPUT

INPUT **PROCESS** **OUTPUT**

Enter Admin
Login Page
Module Name: Admin Login

Retrieving
Page
Details

Display Admin
Login Page
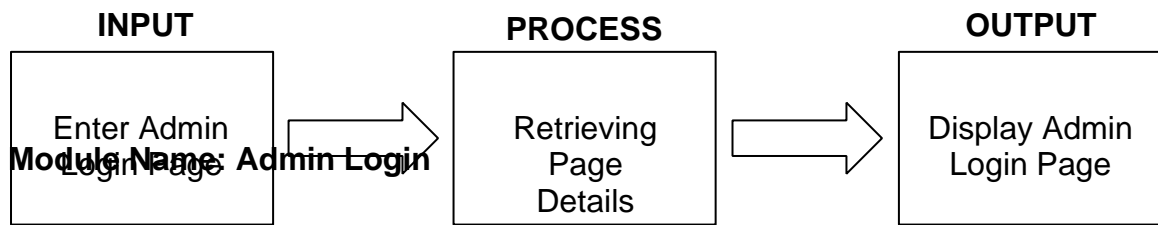
Module Name: Admin Dashboard

INPUT **PROCESS** **OUTPUT**

Click
Dashboard

Retrieving
Page
Details

Displays
numbers of
apartments,
dormitory and
tenants
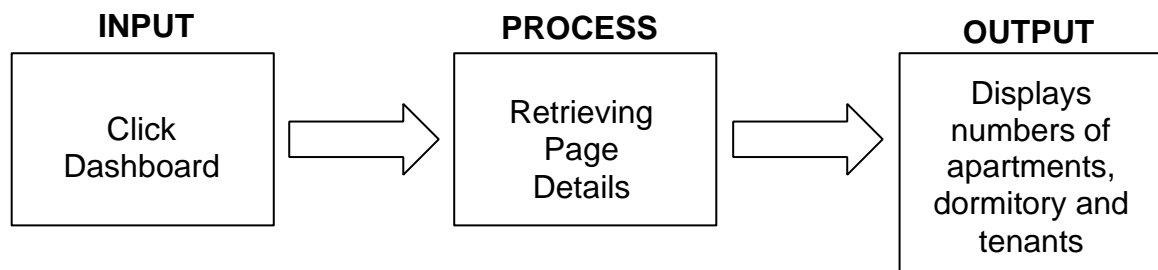
Module Name: Admin Payment Page

INPUT **PROCESS** **OUTPUT**

Click
Payment

Retrieving
Page
Details

View
Payment's
made by the
tenants
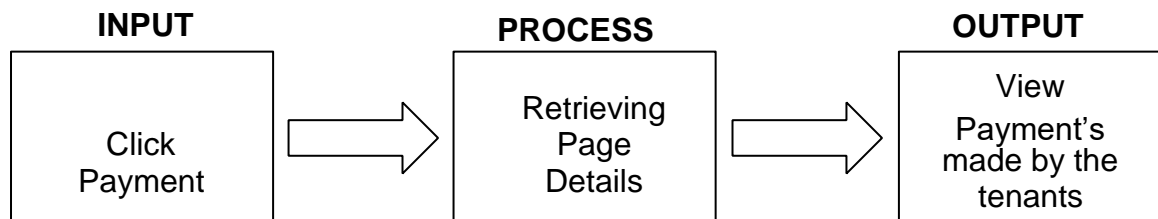
Module Name: Manage Tenant Page

INPUT **PROCESS** **OUTPUT**

Click
Tenant

Retrieving
Page
Details

Display lists of
tenants with
add and
delete
functions

Module Name: Admin Rental Add

INPUT	PROCESS	OUTPUT
Click Rental Add	Retrieving Page Details	Display add rental page

Module Name: Admin Rental Form

INPUT	PROCESS	OUTPUT
Click Rental Form	Retrieving Page Details	Displays list of contracts and add contract function
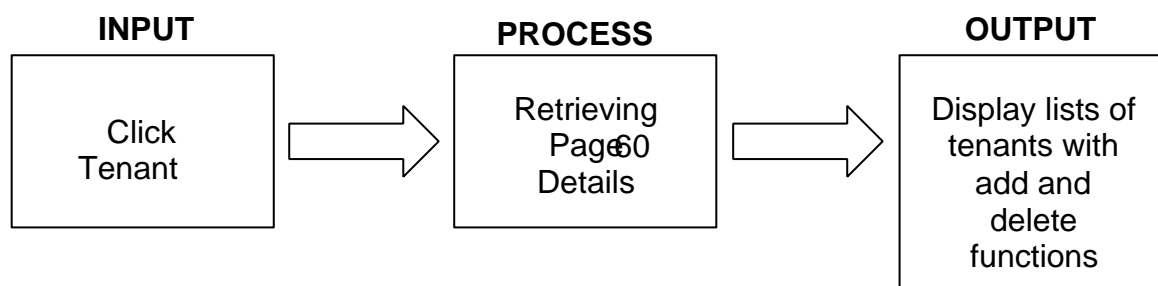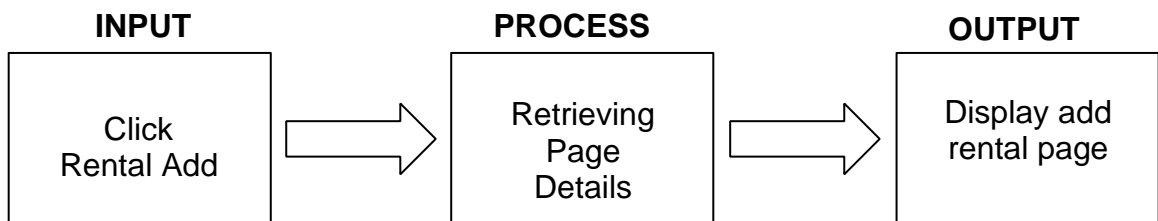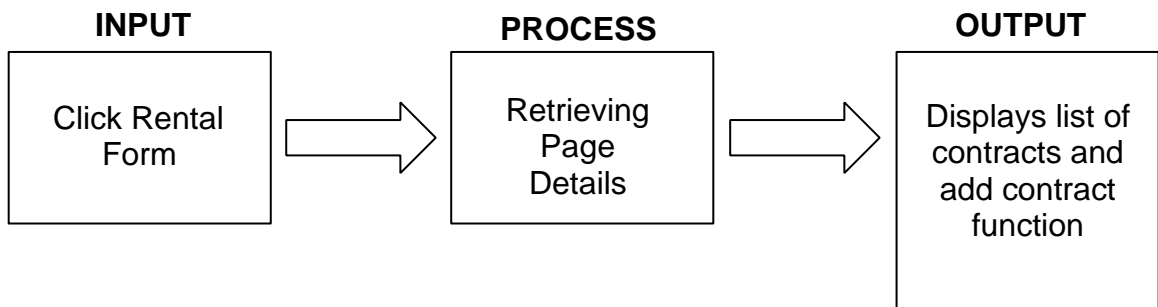
Module Name: Admin Concern Page

INPUT	PROCESS	OUTPUT
Click Reports	Retrieving Page Details	Displays the concern of tenants

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Module Name: Tenant Login

INPUT		PROCESS		OUTPUT
Click Tenant Login	→	Retrieving Page Details	→	Displays login form for tenants
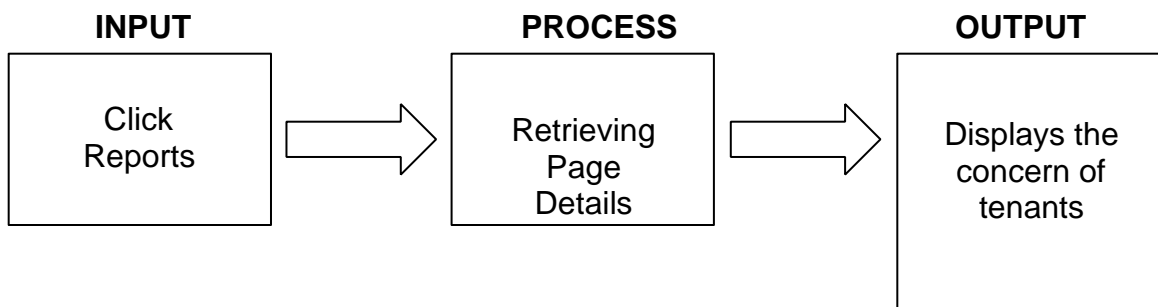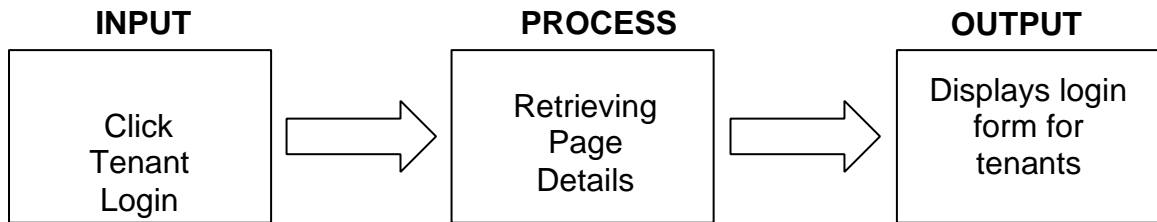
Module Name: Tenant Profile page

Module Name: Tenant Contract page

INPUT		PROCESS		OUTPUT
Click Contract	→	Retrieving Page Details	→	Displays contract details
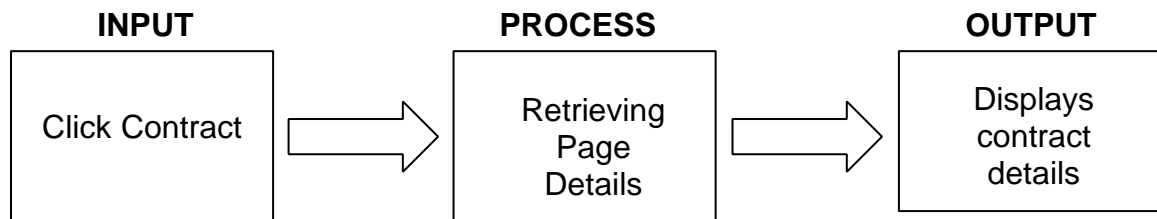
Module Name: Tenant Payment page

INPUT		PROCESS		OUTPUT
Click Payment	→	Retrieving Page Details	→	Displays payment made and current balance of the tenant
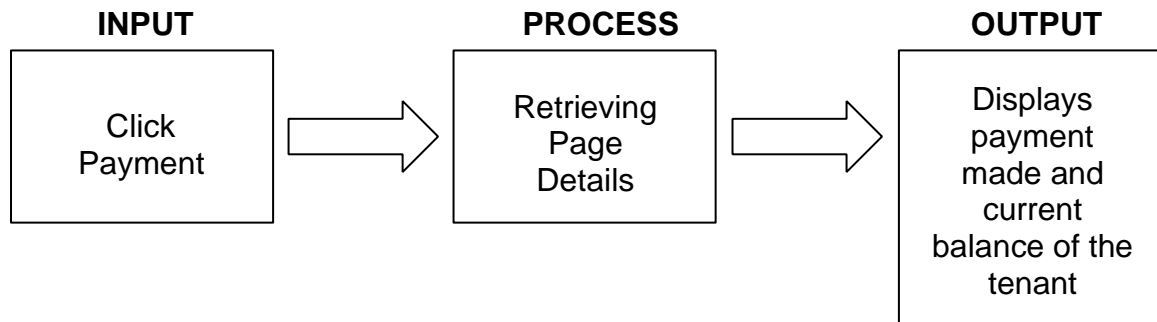
Module Name: Tenant Concern page

INPUT		PROCESS		OUTPUT
Click Concern	→	Retrieving Page Details	→	Displays concern chat page

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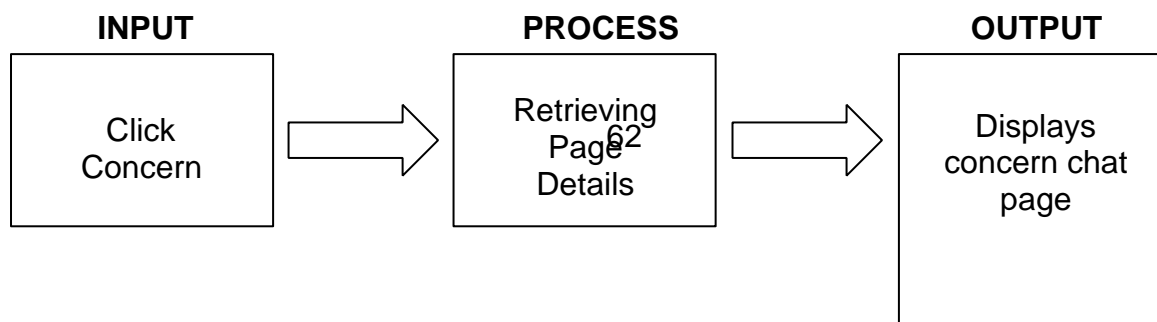
Description of the Prototype

The users can access the proposed web-application system via desktop,

laptop, and mobile phones if it is accessed on the browser, and it has an internet

connection. The proposed system has three types of users which is the

admin,tenant, and the visitor. The web-application allows the administrator to

control the full features of the system while for the tenant, they have a user's

dashboard contains all their information, contract, concerns page, room

information page, contract, and payment page. The visitor can only access the

landing page of the website that contains all of the gallery of the room along with

its price and availability and a 3D virtual tour as well. (See Figure 1.7).

Implementation Plan

After all the procedures of testing are done, the proposed system will be

used by the company and the web-application will accommodate the visitors and

the current tenants of NNS Rental Dormitory and Apartment. After the

implementation, the proponents will fully demonstrate the full functionalities of the

system and the separated features for three different users. The proponents will

give assistance to the owner for 30 days until the system is fully integrated and

the frequently answered questions will be addressed for both the tenants and the

business owner.

INPUT	**PROCESS**	**OUTPUT**
Click Profile	Retrieving Page Details	Displays profile picture, name, address, contact, username, password, change password and profile