

Property Management System

System Requirements Specification

COE 420 Software Engineering
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1. Introduction

1.1 Purpose

The American University of Sharjah Mall (AUSM) will be a newly opened establishment, having its inauguration at the end of 2023. The stakeholders have requested a brand new system for their business to allow potential tenants to purchase property in the most convenient way possible. As such, Team DevOps was created to fulfill these requirements. The **Property Management System (PMS)** is a web-based system that allows tenants to access the database of properties, set up appointments to discuss the transaction, and purchase and maintain properties in a way that makes it the most convenient for them. There will be potential tenants, tenants, leasing agents, and maintenance employees who will be interacting with the system. The **Software Requirements Specification (SRS)** document is an IEEE-formatted document to affirm that the design and the details requested by the stakeholders have been understood without ambiguity in order to produce the most correct product efficiently. The SRS document highlights the scope of the project, its overall description, the user interfaces, and lastly the features and non-features of the software.

1.2 Scope of Project

The PMS is scoped to include the following:

- The user can create new accounts for the PMS system or login into an existing account
- The user can navigate through the database of properties
- The user has access to the details about each property
- The user can make appointments with a specific leasing agent for a specific property
- The user can access the payment gateway for leasing and service payments
- The user can purchase and sign for a property virtually
- The user can send requests for maintenance
- The user can access their profile which lists a summary of certain details on their property

1.2.1 Stakeholders

- AUSM Management Team: They are the higher-ups that requested and funded the creation of the PMS. They will also be responsible for selecting the property database.
- Tenants and Potential Tenants: They are the main focus of the website and will be able to search properties, make appointments, buy properties, and send maintenance requests.
- Leasing Agents: They are hired by the company to set appointments for their schedules for potential tenants and sell properties

- Maintenance Employees: They are third-party employees hired by the AUSM. They will be able to access the maintenance queue, see the maintenance requests, and will be informed when a maintenance request has arrived.
- Software Administrative Team: They are leading members of the software developing team that oversees any software-related issues or actions required by Team DevOps.

1.3 Overview

The state of most leasing estate systems is characterized by inefficiency based on human facilitation and ineffective automation. This results in many long-term issues and unnecessary costs. By using the web interface, the PMS will make many features efficient and focuses on minimizing human interaction. These features include but are not limited to keeping track of appointments, deadlines, maintenance logs, and owned properties. The SRS Document will provide explicit detail about the overall description of the product, the system's external interface requirements, and the functional and non-functional requirements. This document will ensure that the features requested by the stakeholders are accurately consolidated for the stakeholder's approval.

2. Overall Description

2.1 Product Perspective

The PMS is a stand-alone application that is not part of a larger system; it is responsible for the automation of a real estate development company. It is a fully-fledged system that makes it possible for managers, tenants, and potential tenants to look up specific details about properties, such as the location, space, rate, class, and description. Potential tenants can schedule a meeting with leasing agents through the PMS to learn more about the store. Once the lease is set up, the tenants can access the contract, submit maintenance requests, make payments, and examine ordered property via the online portal. The PMS monitors contracts and notifies users as needed. If a tenant makes at least one purchase, the company managers may elect to give them a discount; the user will instantly receive the discount before they make a subsequent purchase. The PMS will not cover data related to property, and appointments, which will instead be supplied by stakeholders and leasing agents.

2.2 Product Functions

The PMS provides but is not limited to the following functions:

- Loads database of the property
- Loads description of the property
- Book an appointment with the leasing agent

- Virtual payment and sign for the property
- Make payments online, including bills, leases, maintenance
- Request maintenance system
- Allows viewing of currently owned properties
- Allows discount program for users renting multiple properties in different locations

2.3 User Characteristics

For the end user, no specialized domain expertise or higher educational requirements is necessary. The bare minimum is the ability to access basic online web-based services.

2.3.1 User Environment

Most browsers that are based on **Chromium** support the PMS, but there some exceptions that include Safari and Firefox. Regardless, these browsers are capable of hosting the PMS.

2.4 Constraints

The development of the PMS system by Team DevOps has constraints that include:

- Complexity Constraints: large **Application Programming Interfaces (APIs)** will not be implemented. Additionally, some APIs are prohibited in some regions, which could cause exclusivity.
- Time Constraint: Limited time to complete the project
- Software Constraint: Software will be limited to open-source software only due to budget constraints
- Expertise: Team DevOps has limited domain expertise in the domain of real estate leasing systems
- Legislation: PMS is constrained by the legislation under the **Ministry of Economy** in the United Arab Emirates (UAE). Therefore, Team DevOps must abide by the Sharjah government rules and regulations.

2.5 Assumptions and Dependencies

The development of the PMS system by Team DevOps has certain assumptions and dependencies that have been made:

- A database of the properties and tenants involved in the leasing transaction is provided and managed by the companies that own the property
- The formula for calculating the rental fees based on the payment plan is provided by the company
- The fine for damaged material is set up by a third-party maintenance system, and the costs are estimated in advance and provided

- Assumptions of pricing based on “quality” will be determined by the stakeholder involved
- Service fees will be charged by the tenant with the same plan that they had selected for their leasing plan (monthly, quarterly, biannually, or annually)
- Misuse of maintenance request is subjected to the damage done by the tenant and will be charged by the third-party maintenance company
- The class (quality) of a location for a property will be defined by the stakeholders
- The service and maintenance fees will be charged at the same time as the lease will be, which depends on the leasing plan selected by the user

3. External Interface Requirements

3.1 User Interfaces

3.1.1 Main Page

The interface will serve as a hub for the users and will contain a navigation system to allow for quick access to any other pages involved in the leasing system. The interface can be accessed by all actors involved. The main page is where the tour option will take place; if the user wants to continue, they will be briefly shown all the pages, but the tour option can be closed if the user does not want a tour. The main page will contain quick links to places such as the tenant account page, the Login Sign-Up Page (3.1.2), the Property Search Page (3.1.3), the Payment Page (3.1.6), the Maintenance Request Page (3.1.8) and the Tenant Account Page (3.1.9). Though all actors involved can access this page, it was designed mainly for users and leasing agents.

3.1.2 Login / Sign-Up Page

The interface represents a logging-in or registering system where the user is prompted to their name, email address, and password to create an account on the website. The account will be protected with a **Multi-Factor Authentication System (MFA)** where the user can either use their email or their phone to confirm the sign-in or they can use a link sent to their email to log in. There will also be a “Remember me” option to allow the password and user to be saved on the local device. The user can specify whether they are a tenant, a leasing agent, or a maintenance employee, to allow them to access certain pages. Once signed up, the user will return to the Main Page (3.1.1).

3.1.3 Property Search Page

The interface can be accessed from the Main Page (3.1.1) after making an account for the website. After being clicked, the website should automatically take the user to a list of properties. A filtering system will be available above the list of properties to allow for quick navigation, such as searching for the property. Other leasing agents can access this page, but the maintenance employees cannot.

3.1.4 Detail of Property Page

The interface can be accessed after clicking on a property from the Property Search Page (3.1.3). The user will be taken to a page where all the required characteristics of the property are available. This includes a map that shows the property's location and the floor on which it is available. Furthermore, there will be a button to allow the user to contact the leasing agent, as well as a purchase option that requires prior authorization before they can purchase the property. All users including potential tenants, leasing agents, and maintenance workers can access this page, though it is designed for potential tenants.

3.1.5 Appointment System Page

The interface can only be accessed from the Detail of Property Page (3.1.4). Once clicked, it will display a weekly schedule of the leasing agents employed to coordinate with potential tenants and their availability. From there, the user can choose a suitable appointment, which will notify the leasing agent of the booking and will prevent other users from booking that session. This page can be accessed by both leasing agents and users; however, the leasing agents can set their own appointment time and the users can only pick from the appointments given.

3.1.6 Contract Page

The interface can be accessed once a property is available to the user, and the property has prior approval to be purchased by the leasing agent. The user then will be taken to a page where further information will be required to be filled in, and the terms and conditions will be revealed to the user to read. Once again, the user will be able to access this page as a contract view, whereas the leasing agents will only be able to set the contract and terms and conditions based on what they have agreed upon with their team. After the user has read through the terms and conditions, an electronic signature selection will be available to send an e-signature. Finally, the user will be taken to the payment page for payment.

3.1.7 Payment Page

This interface allows the user to finalize the purchase of their property. The user will be forwarded to a third-party online payment gateway for the completion of the purchase. Furthermore, after the purchase, the user will be able to return to this page from the main page to pay for a lease renewal or pay for any other fees involved. Once the deposit is made, the user will be asked to enter their credit card information and confirm the payment. The receipt and leasing contract will be sent to the user by email that they had signed up with, and the page will be automatically redirected to the Main Page (3.1.1). Leasing agents and maintenance employees cannot access the specific payment page or payment history of the tenants. There will be an option to select what type of payment the user will be making, and that entire session, cannot be changed until the payment period is over.

3.1.8 Maintenance Request Page

The interface allows the user to file a request for maintenance problems. Some details about the maintenance issue should be added to allow the arrangement of the request in the queue. This page can be accessed by all parties involved. The users or leasing agents will have two options: emergency and non-emergency. On the other hand, the maintenance employees will be able to see the queue of maintenance requests, as well as the employee assigned to the request. They will be notified when they have been requested for a maintenance session.

3.1.9 Tenant Account Page

The following interface can be accessed from the main page. It allows the tenant to see their account details, which properties they currently own, and any relevant details such as maintenance request logs, payment history, and the deadline for the leasing payment. Leasing agents can see this page as well, but it will mimic their page from the Detail of the Property Page (3.1.4).

3.2 Hardware Interface

Not applicable in the PMS system.

3.3 Software Interface

The PMS system by Team DevOps will utilize the functionality of a few open-source systems:

- MFA will be implemented in the system to provide security for users using open source software
- Online Payment Gateway will be implemented in the system to provide users with the ability to complete their transactions online. The Credit Card providers are but are not limited to Visa and Mastercard.

3.4 Communication and Interfaces

Not applicable in the PMS system.

4. System Features

4.1 Feature #1

Load the description of the property.

4.1.1 Description

The information for each property will be available on their respective webpages. This information includes location, space, rate/price, class, and description of the property. There will be a ranking system established for each property based on location. These classes are listed as A, B, C, and D, where A is the highest rank, and D is the lowest.

4.1.2 Functional Requirements

- Maintains information on properties, such as location, space, rate/price, class, and description
- A system of categorization that divides properties into four levels according to their level of excellence

4.1.3 Non-Functional Requirements

- The information will be organized in a table reflecting the property and its value. This is to accommodate user accessibility.
- The description of the property space characteristic can be viewed in m² or ft².

4.2 Feature #2

A search system for properties.

4.2.1 Description

The user will have the option to browse various properties and apply filters based on different attributes mentioned in Feature #1 (4.1). The filters can be used in combination with each other, such as Price Range, Class, and Location.

4.2.2 Functional Requirements

The proposed system will enable tenants to look for properties.

4.2.3 Non-Functional Requirements

The Filtering System provides a set of filters that can be used in combination to refine search results based on various characteristics of a property.

4.3 Feature #3

Booking appointments system

4.3.1 Description

The user will be able to see a weekly calendar of the availability of the leasing agents that are affiliated with the property in question. The user will be able to select any available timings to be able to see the property.

4.3.2 Functional Requirements

- The system is available to the tenant to schedule an appointment
- The prospective tenant has the option of choosing a time for the appointment based on the leasing agents' availability

4.3.3 Non-Functional Requirements

Only available after the appointment has been completed and the purchase is approved by the leasing agents.

4.4 Feature #4

Electronic rental application system with signature and lease renewal features.

4.4.1 Description

The user will be able to access the contact page, where the leasing terms and conditions will be listed for the user to read. Once read, the user will be able to electronically sign the leasing contract. The lease renewal will be accessible after a property has been purchased and renewing lease period is available.

4.4.2 Functional Requirements

The system under consideration should have the capability to enable users to manage rental applications online, electronically sign lease agreements, and monitor lease renewals.

4.4.3 Non-Functional Requirements

Not applicable in the PMS system.

4.5 Feature #5

A payment system for the property lease and service fees.

4.5.1 Description

After the user has confirmed the property purchase, they will be forwarded to the Payment Page System. There is no initial deposit, so users can select their preferred payment frequency (monthly, quarterly, biannually, or annually) upon purchasing the property. The payment is based on the property rate, and tenants who are late with their payments will be notified by the system. Furthermore, stakeholders will determine discounts owned in different locations. Utility payments, including water, electricity, and waste charges, will be merged and unified with the corresponding bill. Additionally, service fees will be added to the user's selected payment frequency and billed together in a single payment.

4.5.2 Functional Requirements

- The system should have the ability to automate the process of collecting rent payments
- The system needs to keep track of rent payments and send appropriate notifications to tenants who are late in paying. Rent payments may be made on a monthly, quarterly, biannual, or annual basis.
- Different rental rates are established by the company for the same property depending on the payment schedule
- The system is also required to manage different discount programs that may be offered to potential tenants. For example, a tenant who rents multiple stores in various locations may be eligible for a special discount.
- Besides paying rent, the tenant is also responsible for paying for utilities such as electricity, water, and waste management
- The usage of utilities should be documented, and a single bill encompassing all utilities should be sent to the tenant

4.5.3 Non-Functional Requirements

- Users will receive a receipt email of their purchase as well as a formal contract to the email they signed up with
- The users will be informed one week and one day prior to their lease payment deadline, reminding them to make the payment.

4.6 Feature #6

User maintenance request system

4.6.1 Description

The user will be able to request maintenance offered by the stakeholders from a third-party company. The system keeps track of maintenance requests, on a first-come, first-serve basis. However, emergency requests will be made a priority using the queueing system. There will be two types of maintenance requests with different costs: Routine Requests (free), and Misuse Requests (will be charged depending on the damage done).

4.6.2 Functional Requirements

- The system should be capable of managing and monitoring maintenance requests through a user-friendly online platform. Maintenance requests are queued and attended to in the order they are received, with emergency requests being prioritized.
- Regular maintenance requests are not subject to a fee. Nonetheless, maintenance requests resulting from misuse or negligence are billed and included in the rental charges.

4.6.3 Non-Functional Requirements

Not applicable in the PMS system.

5. Non-Functional Requirements

5.1 Product Non-Functional Requirements

5.1.1 Usability

- Easy Navigation: Throughout the website, there will be several hyperlinks for any pages that are related to the current page, and/or for the most used pages
- Tour Guide: For new users, there will be a tour of how to use the website so that the users are aware of the features that are available for them to use. This feature can be ignored by pressing “No Thanks” and will show only once.
- Convenient Sign-in: Users have the option to type the sign-in information so that they don’t have to sign in every time they visit the website. This can be done using the check box “Remember me”.
- Tenant Account System: Users will be able to see a summary of their profile, the property they own as well as their payment deadline, payment history, and maintenance log history.

5.1.2 Accessibility

- Color Blind Setting: This setting will change the colors to be in high contrast, making it easy to read for visually impaired individuals
- Voice Commands: Users will be able to use voice commands to easily navigate or use the web application
- Simplistic Mode: Users can choose to use a standard or simplistic mode. In simplistic mode, the icons and text will be larger and the content will be put into a format that is easier to comprehend. However, this mode will give slightly fewer details to make it simple for the user.

5.1.3 Security

- Multi-Factor Authentication: Users will be able to authenticate themselves for signing into their account through multiple methods of authentication such as username & password, **one-time password (OTP)** from phone and from email, biometrics, or facial recognition
- Strong Password Requirement: Users will need to put a password that requires at least eight characters, one capital letter, one lowercase letter, and one symbol. Moreover, they will need to answer a few additional security questions. These questions will be asked when the user needs to reset their password in case they forgot their password.

- Password Generator: Users have the option to have a password generated for them that they can remember instead of making their own password
- CAPTCHA Verification: Users will need to complete a CAPTCHA verification when creating their account to improve security by making sure there are no bots trying to gain access to the system
- Account Recovery: In the case that the user forgets their password or is unable to access their account, they can access the account recovery system. This will require them to provide answers to multiple security questions, and verify their identity via email, phone, or biometric authentication. If the user is still unable to access the system, then the contact information for the account recovery manager will be provided by the stakeholders. This is outside the scope for the PMS.

5.1.4 Maintainability

- Dynamic Store Allocation: The implementation of the PMS will ensure any extensions to the mall will be automatically updated by the system. In other words, the system does not need to be modified to support an increase in properties. This will be achieved by using **Object Oriented Programming (OOP)**.
- Dynamic Scheduling by Leasing Agents: On the Appointment System Page (3.1.5), the leasing agents have access to their appointment schedule to automate the process of scheduling appointments, without having to consult the admin of the PMS.

5.2 Process Non-Functional Requirements

Not applicable in the PMS system.

5.3 External Non-Functional Requirements

Not applicable in the PMS system.

Appendix A: Glossary

Application Programming Interface (API)	A piece of intermediary software that allows communication between other software.
Chromium	It is an open-source web browser project that serves as the basis for many popular web browsers, including Google Chrome, Microsoft Edge, and Opera.
Completely Automated Public Turing test to tell Computers and Humans Apart (CAPTCHA)	It is a popular tool used to verify whether the user is a bot or human for security purposes. This is done by providing a puzzle that is difficult for bots but easy for humans.
Ministry of Economy	A sector of the UAE government that is responsible for the economy or economic policies. They represent the body that governs the rules and regulations regarding the tenant-property transactions.
Multi-Factor Authentication System (MFA)	It is a multi-option system that allows users to verify that the account belongs to them. This can be employed in several ways, but the most common is to have a password system, followed by authentication on the phone where an SMS can be sent.
Object Oriented Programming (OOP)	Represents a programming approach where there is a use of “objects” that serve as objects that have attributes and behavior. “Classes” are often used to serve as a template for these objects. It is a popular approach due to its organization and makes code easier to manage over time.
One-Time Password (OTP)	Represents a system of verification where an SMS is sent to the user’s email or to their phone when logging in to an account for verification. It can be seen as a part of the Multi-Factor Authentication System.
Property Management System (PMS)	A web-based application that is currently being developed for AUSM to allow a more modern and efficient way to automate tenant-property leasing systems.
System Requirement Specifications (SRS)	A document created in a standard IEEE format that serves as a contract between the stakeholders and the software development team regarding the requirements of the system.

Appendix B: References

- Property Management System Problem Description