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AUTOMATION OF THE PROCESS OF SETTLEMENT IN DORMITORIES USING THE UNIFIED MODELING LANGUAGE UML

Samchuk L., Povstiana Y. Automation of the process of settlement in dormitories using the unified modeling language UML. This paper considers the computerization of the lodging check-in prepare, especially room reservation. The research's fundamental objective is to create an successful framework that permits robotization and optimizing the forms of settling understudies in a inn, decreasing time and asset costs, and expanding the comfort and fulfillment of clients. The work analyzes the existing frameworks and strategies of booking rooms and uncovers their inadequacies and focal points. Based on this investigation, a modern computerized framework was created, counting a helpful interface for clients and the residence organization, usefulness for booking and saving rooms, bookkeeping for complimentary places, and integration with the understudy database. For creating the framework UML graphs were utilized, counting case charts, action graphs, and grouping graphs, which made a difference to arrange the structure and behavior of the framework in detail. The most comes about of the investigate are the creation of a framework model and testing of its effectiveness in genuine conditions. The test comes about appeared a significant reduction within the time required to prepare settlement applications, a diminishment within the number of blunders, and an advancement within the in general organization of the method. The work is of viable significance for the organizations of instructive teach looking for to progress the effectiveness of quarters administration, as well as for computer program engineers who specialize in making computerization frameworks for instructive teach.

Keywords: UML diagrams, automation, administrators, users, modeling, ordering a room.

Самчук Л.М., Повстяна Ю.С. Автоматизація процесу поселення в гуртожитки з використанням єдиної мови моделювання UML. У даній роботі розглядається автоматизація процесу поселення в гуртожиток, зокрема бронювання номерів. Основною метою дослідження є розробка ефективної системи, яка дозволяє автоматизувати та оптимізувати процеси поселення студентів у гуртожиток, зменшити витрати часу та ресурсів, підвищити зручність та задоволеність користувачів. У роботі проаналізовано існуючі системи та методи бронювання номерів, виявлено їх недоліки та переваги. На основі цього аналізу розроблено нову автоматизовану систему, що включає зручний інтерфейс для користувачів та адміністрації гуртожитку, функціонал бронювання та резервування кімнат, облік вільних місць, інтеграцію зі студентською базою. Для розробки системи використовувалися діаграми UML, включаючи діаграми випадків, діаграми діяльності та діаграми послідовності, які допомогли детально спланувати структуру та поведінку системи. Основними результатами досліджень є створення прототипу системи та перевірка її ефективності в реальних умовах. Результати тестування показали значне скорочення часу обробки заявок на розрахунки, зменшення кількості помилок та покращення загальної організації процесу. Робота має практичне значення для адміністрацій навчальних закладів, які прагнуть підвищити ефективність управління гуртожитками, а також для розробників програмного забезпечення, які спеціалізуються на створенні систем автоматизації навчальних закладів.

Ключові слова: UML діаграми, автоматизація, адміністрування, користувач, моделювання, поселення в гуртожиток.

Introduction. The current hostel check-in process is often complex and inefficient, requiring significant effort from both administrators and students. The lack of an automated system to manage the accommodation check-in process increases the risk of error and the time taken. In order to develop an effective automated system, it is necessary to create a detailed model of the hostel check-in process. UML diagrams are a powerful tool for modelling and visualising systems and can be used to represent the check-in process.

The UML recommends a standard arrangement of diagrams and a documentation for demonstrating object-oriented frameworks and presents the main semantics of what these diagrams and symbols mean. Therefore, this study presents Web Based Hostel Reservation System with UML, an extension of UML covering the main parts of the reservation system at the different perspectives and diagrams of UML. In this study illustrated web-based hostel reservation system using UML to have meaningful and standardized behavioural specifications of reservation system would make it feasible to determine the properties and enable more thorough and less costly.

The main system components such as hostels, rooms, administrators and users should be defined and represented in UML diagrams. It is important to determine how the main components of the system interact with each other during the boarding process. A class diagram can be used to show the structure of a system and the relationships between its components. A sequence diagram can be used to show the interaction

between components during the room booking process. A state diagram can be used to show the different states a room can be in (e.g. free, booked, occupied). Once the UML diagrams have been created, they should be analysed and used to develop an automated student accommodation billing system.

Literature review. In the paper [1] this paper proposes the advancement of an computerized residence administration framework. The codes for the mechanized framework were created utilizing Visual Essential, and Microsoft Get to was utilized to create the most database. The created framework dispenses with the deficiencies of conventional residence administration strategies; it is more helpful, graphical client interface-oriented, solid, effective, and ensured by get to control instruments. Research [2] showed that the online marketplace platform was targeted at a large number of hostel searchers, using an architectural proposal to model an authentic hostel market, a software architecture developed on the Information Systems platform, using technologies: geolocation, Google Maps API, artificial intelligence, and speech recognition API.

The paper [3] portrays a extend that addresses the issues of lodging administration and maintains a strategic distance from the issues that emerge when it is done physically. It is anticipated that this venture will diminish the burden on individuals and incredibly encourage the method of distributing inns for understudies and hostel directors with the assistance of this program. In this way, the number of lodgings for the settlement of understudies beneath thought in this college will be advance expanded.

In the work [4] the proposed framework, which is able of collecting point by point data almost the understudy residence in a convenient way, can precisely and viably the residence settlement insights, the residence power circumstance, the understudies wellbeing status within the residence and the remote staff entering and clearing out the information, make the understudies residence work administration staff can get it the understudy quarters in detail in genuine time and alter the understudy quarters administration procedures agreeing to the information to successfully fathom the issue of topsy-turvy data for the majority understudies to supply a great benefit stage. As displayed within the work [5] the Hostel Management system may be a web application that's made for overseeing diverse exercises within the lodging. This extend is expected to limit human work and make inn allotment much less demanding for understudies and lodging chairmen with the assistance of the net application to the lodging, normally select the understudy from the holding up list and mess charging, out pass era, complaint enrollment, and so forward. In the article [6] it is proposed to use an electronic governance system to solve the identified problems. The proposed system allows the student to register on the Internet and provides him/her with an ID card. The proposed system collects information about students in an electronic archive, which can simplify the import of their information in the future.

The authors [7] have developed an automation system for dormitory settlement using fuzzy logic (Mamdani algorithm) to optimize room allocation while considering residents' psychological compatibility. A comprehensive analysis of existing solutions was conducted, identifying their shortcomings, and a prototype was implemented in the FUZZY LOGIC environment to enhance transparency and settlement management efficiency.

The creators [8] contend that in most understudy residences in creating nations, numerous individuals live in single-function quarters. The division of the residence is as well settled, coming about within the quarters frequently missing utilitarian spaces. This brings a parcel of burden to the understudy instructing and administration staff. By separating the residence into a few diverse categories concurring to their usefulness through the shrewdly plan of entryway locks, the framework can accomplish more proficient and adaptable asset allotment, which not as it were makes a difference the school administration, but moreover benefits the understudies.

Researches Methodology. The utilize of UML charts within the field of software engineering is getting to be increasingly common. They are utilized to characterize and record frameworks, making a difference to distinguish the necessities and scope of systems and applications. The most objective of these ponders is to efficiently survey the writing on the utilize of UML graphs in computer program designing investigate [9-10]. Bound together Modeling Dialect is utilized to indicate, visualize, alter, develop, and record the artifacts of an object-oriented software-intensive framework beneath advancement. Amid this distinctive charts are drawn agreeing to require & the sorts of prerequisites. The require of this ponder is to discover out the significance of diverse graphs (use-case, grouping, and movement) amid computer program improvement [11].

The framework plan is the stage where designers attempt to address the framework prerequisites distinguished within the examination stage of the advancement arrange. It begins by understanding how the system works to realize the specified framework usefulness. Usually done by utilizing Bound together

Modeling Dialect (UML) diagrams which visualize the components of the framework engineering. Since there are so numerous UML graphs with distinctive purposes, as it were a couple of and the basics are utilized for this paper. These considers affirm the significance of utilizing UML graphs to computerize the residence check-in handle. They appear how UML can be utilized to imagine and make strides real-world forms.

In today's world, robotization is getting to be increasingly common in different circles of life. One of these ranges is the administration of lodgings. This prepare includes a few complex errands, such as room assignment, administration of inhabitation demands, and room inhabitation control. UML graphs can be utilized to robotize this prepare. Utilize case graphs are behavioral charts that visualize the interaction between on-screen characters and the framework. On-screen characters, which can be clients or other frameworks, are substances that control the usefulness of the framework. Utilize cases chart gives a rearranged see of what the framework does by recognizing framework functionalities and how they associated with inner and outside performing artists. Within the lodging administration framework, there are five on-screen characters, understudy, admin, database, head of the quarters, and location which have diverse parts that the framework reacts to appropriately. A utilize case chart can be upheld by a case portrayal for more understanding. This depiction can give more detailed data which isn't included within the graph due to effortlessness and coherence requests. Table 1 includes a description of the diagram of the website for booking a room in a hostel.

Table 1 – Description of the diagram of the website for booking a room in a hostel

Student	Reserves a room, fills in personal data, views available rooms
Admin	Fills in data about the rooms and monitors the functionality of the site
Database	The place to save personal data of each student
Head of the dormitory	An employee of the dormitory who provides data to the administrator and confirms the reservation to students
Site	Displays all information about places in the dormitory

A graphical interpretation of Table 1 is given in Figure 1

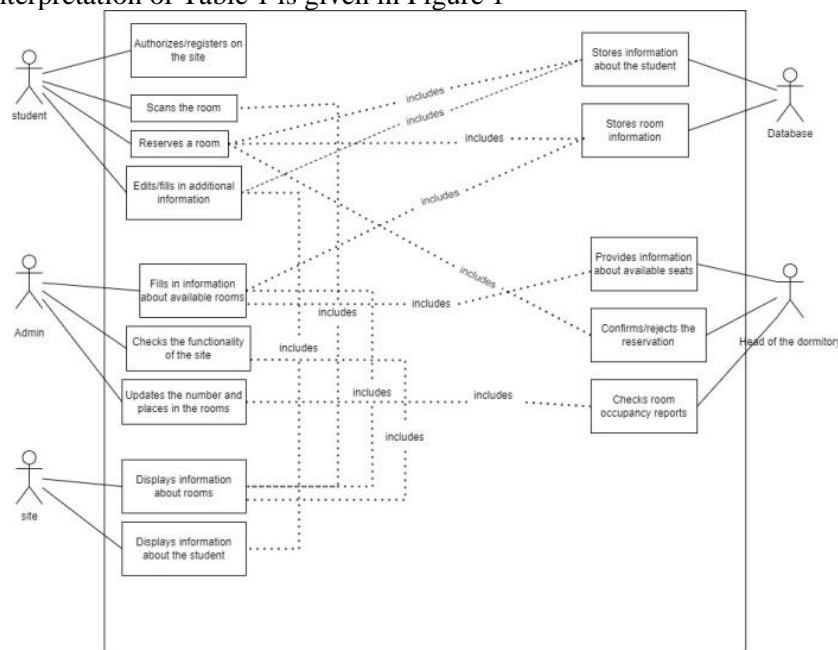


Fig. 1 – Diagram of precedents for displaying the operation of the site for booking a room

The proposed structure is key to guaranteeing students' comfort when looking for data approximately lodging openings. An imperative condition is that the asset keeps up an alluring appearance and usefulness. A use-case chart captures these component connections. Arrangement charts appear the interaction of components of a framework in a arrangement of time. In this chart, time is demonstrated on the vertical hub, whereas framework objects are adjusted on the flat pivot. It moreover visualizes the arrange of execution of messages and choices within the engineering of the framework to be outlined. Table 2. includes a detailed description of the components of a sequence diagram for displaying processes.

Table 2 – Description of the components of a sequence diagram for displaying processes

Authorizing / registering	The student registers if he enters the site for the first time or authorizes if he has already visited it.
Stores student data	The data entered by the student is stored in the database.
Transmits information about the student.	Information is stored in the database, which is then provided to the dormitory for entering data into its database.
Provides information about the room	The head of the dormitory provides information to the administrator about free rooms, places, risers, etc.
Fills in information about the room	The administrator fills in the provided information in the database
Stores room information	The database stores and updates the information entered by the administrator.
Displays information for the user	All information from the database about the rooms is displayed on the website.
Fills in additional information	The student fills in additional information (place of residence, whether there is a benefit, etc.)
Stores data in the database	Additional information about the student is also stored in the database.
Reserves a room	The student, having chosen a room to his liking, books it
Waiting for room confirmation / rejection	After booking, the student is waiting for a notification about the approval or rejection of the reservation of the room – accommodation.
Confirms / rejects room reservation	After the student has booked a room, the dormitory confirms or rejects the settlement.
Updates the settlement about the room	When deciding on a room reservation, the administrator updates the information that the room or place is already occupied. Nothing changes when the reservation is rejected.
Displays updated room information	After updating the information by the administrator, the site displays the new information.

The components of a grouping chart for speaking to forms are visualized in Figure 2.

An movement graph may be a behavioral graph that appears the energetic angles of a framework. It portrays the stream of the framework from an starting system-triggering act of a client to decision-making steps and framework yields.

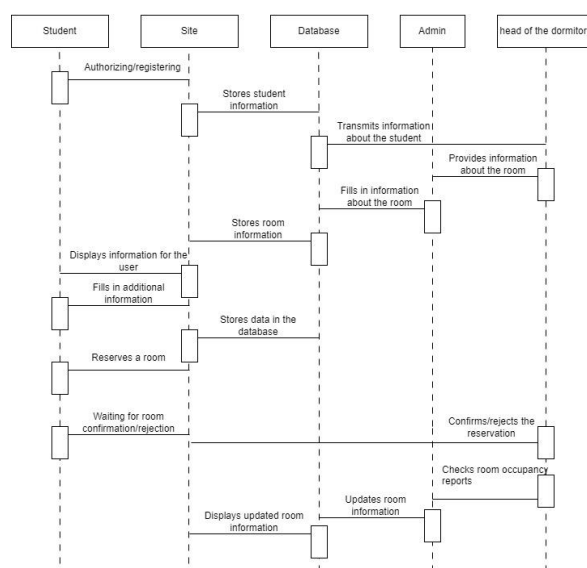


Fig. 2 – Sequence diagram

The graph underneath visualizes the workflow to illustrate the room reservation prepare. Table 3 incorporates a nitty gritty depiction of the room reservation handle.

Table 3 – Detailed description of the room reservation process

Login to the site	The student enters our site
Are you registered?	If the student is on the site for the first time, then he needs to register, if not, then he must log in
You are on the site	After registration/authorization, you get to the room reservation site, after which the choice is made
Go to the profile tab	A page with additional information about the student
Did you fill in additional information?	If yes, then it is possible to edit the information, if not, then you need to enter it
Book a room	This is a button on the room reservation page, after which you choose the room you like
Filling the "filter" of the room	You need to filter the room, i.e. male or female, and also select the faculty
View available rooms	We are looking at all the rooms that are available for our faculty
Booking a room you like	Actually, booking a room
Waiting for an answer about settlement	The student is waiting for an answer about settlement or rejection

Based on Table 3, an algorithm was developed (Fig. 3).

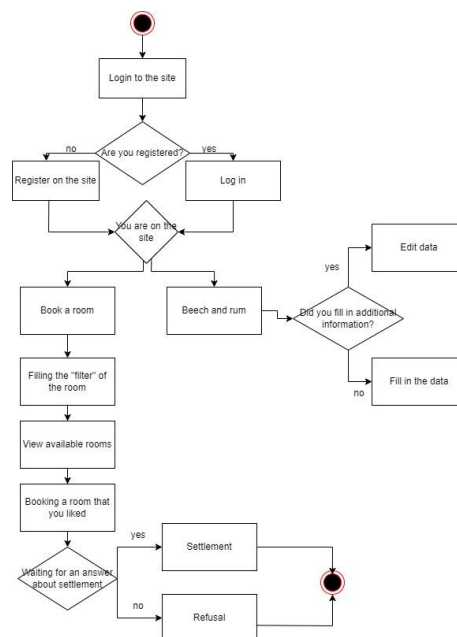


Fig. 3 – Activity diagram to demonstrate the room reservation process

Results. This ponder brought about in creating a framework for disseminating participants to residence rooms, considering their individual characteristics, scholarly execution, inclinations, and way of life. The proposed framework points to extend the consolation of living and make an environment conducive to students' advancement.

The reason of this try is to consider individual characteristics, academic performance, inclinations, and lifestyle in planning a framework for distributing understudies to residence rooms. By bookkeeping for the conclusions of understudies who have as of now experienced the adjustment period in residences, this approach points to progress consolation levels, social adjustment, and students' scholarly execution. Also, it will enable the modeling of a UML chart to imagine the framework design components for designers, encouraging the creation of a room reservation framework for understudy quarters. The think about is based on subjective and quantitative examination of the collected information. Members were educated almost

the reason of the study and told that the inquire about points to accumulate their suppositions on their encounter of adjusting to residence living so that the results and recommendations might be considered within the advancement processservices (Table 4).

Table 4 – Target audience survey results

Questions	Options for responses	Numerosity
Which year of study you are?	1st year of study	20
	2nd year of study	16
	3rd year of study	14
Do you prefer to live with roommates from the same faculty as yours?	I want to live only with roommates from the same faculty as mine	26
	I prefer to live with roommates from the same faculty as mine. However, if that's not possible, I am open to living with roommates from a different faculty	18
	I don't mind whether my roommates are from the same faculty as mine	6
Do you prefer living with roommates who will maintain cleanliness in your room?	I often clean my room and hope that my roommates do the same	31
	I clean my room from time to time and hope that my roommates do the same	19
	I don't mind how often my room is cleaned. I just hope that basic cleanliness is maintained in my room	–
Interaction with my roommates	I have an extroverted personality, and I would prefer my roommates to communicate with me in a lively manner	14
	I have an introverted personality, and I would prefer my roommates to communicate with me quietly	10
	I don't care if my roommates talk to me loudly or quietly	26
How satisfied are you with your roommates?	well	34
	good	12
	satisfactorily	4
Is it important to consider the academic performance of roommates when allocating rooms for first-year students?	important	37
	not important	13
Are factors such as smoking, hobbies, interests, preferences, sports, etc., important in influencing the relationships between roommates?	yes	23
	no	23
	indifferently	4

The learning members were understudies of Lutsk National Technical University (LNTU) dwelling in residences. A add up to of 50 understudies were chosen for the inquire about. The test was shaped with thought of the differences of resources and the individual characteristics of the understudies. Information collection was conducted employing a Google Shapes survey. The essential center was on parameters such as the specifics of intelligent between roommates, strategies for upgrading versatility, and components impacting their connections (smoking, cleanliness, melodic inclinations, sports interface, etc.). All questions were defined essentially and concisely to guarantee they were effectively caught on by all respondents. The collected information was handled utilizing factual strategies. The taking after key discoveries were distinguished: The larger part of understudies favor roommates who share their values with respect to cleanliness, communication, and scholarly execution; Components affecting connections between roommates are critical for half of the respondents; The advancement of an assignment framework ought to consider workforce, scholastic execution, individual characteristics, and communication

inclinations. This approach will offer assistance make a supportive environment for understudies within the residence.

Conclusions. The study demonstrated that the use of UML diagrams for automating the student dormitory settlement process significantly improves management efficiency and minimizes administrative costs. The implementation of this system will automate room reservations, reducing the processing time for settlement applications by nearly half compared to the traditional method. The introduction of an automated room allocation mechanism based on personal characteristics and academic performance helps create a more comfortable living environment. The use of UML diagrams in the development process ensured clear system modeling, enhancing the quality of its implementation and further maintenance. The obtained results confirm the feasibility of using automated systems for student dormitory management. Future research may focus on expanding the system's functionality and integrating it with other university management platforms.

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