Title

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Abstract

CONTENTS

I. Introduction

II. Use cases and user stories

To further identify the desired functionality of the University Room Management System, two use cases and three user stories were identified and formulated. One use case and two user stories will be described in more detail in this section.

The identified use cases are *Searching and booking a room* and *Getting navigation instructions to a room*. For the use case *Searching and booking a room* a use case specification was created. The specification is shown in TABLE I. Some aspects of this use case specification will be further elaborated on.

Extension 1a describes searching for a room via room properties. Possible properties for searching and filtering rooms could be: type of the room (lecture room or seminar room), room capacity or the availability of projectors and blackboards.

In extension 5b the maximum allowed number of rooms is noted. This limit can be different depending on the user. Our current specification limits students to be allowed of booking only a single room at a given time. University staff is allowed to book multiple rooms at a time (e.g. a Professor booking multiple rooms for an exam). The specific limits for each group of staff should be selected according to the universities specific needs.

Extension 5c notes the possibility to book a room for future use according to a time schedule. This option shall not be available to students but only to university staff. For example a room can be booked for a specific time frame on a weekly basis. This stands in contrast to the general booking presented in the main success scenario. In that case the room is booked from the time of booking without specifying the length of the booking. The booking has to be terminated manually in the end. Alternatively the booking is also terminated, if the system registers that the room has not been used for a while or a previously scheduled booking is about to start. Please see the BPMN diagram above for this process.

The open issues of the use case note the booking of multiple rooms at once. The process for this will likely be very similar to booking a single room. Showing information for multiple rooms at once and managing the unavailability of a single room ot of the selection need to be further deliberated. Similarly to scheduled booking students should not be allowed to book multiple rooms.

Following three user stories were formulated:

1) As a Student, I want to book a room, so that I have a place to work.
2) As a Guest, I want to have navigational instructions, so that I am able to locate a room.
3) As a Professor, I want to book a room according to a schedule, so that I can give regular lectures in that room.

A good practice is to formulate user stories according to the INVEST principle. This principle describes that a user story should be independent, negotiable, valuable, estimable, small and testable. User stories 1 and 2 were elaborated further and analyzed with regard to the INVEST principle.

The first user story “As a Student, I want to book a room, so that I have a place to work.” is extended by following points:

- A student is only allowed to book at most one room at any given time.
- Students can only book rooms for the current time and are not able to reserve them for later.
- A student is identified by their university id.
- Bookings by students do not have an ending time specified.
- Students are able to terminate their bookings manually.
- Bookings by students are terminated automatically, if a booking by a university employee starts.

The user story fulfills the INVEST principle, as it does not depend on other user stories, leaves room for negotiation and presents a value to the students. A development team should be able to estimate the work required for realization. The story itself is small, as it only focuses on bookings for a single user group. The story can be tested, by students trying to book rooms.

The second user story “As a Guest, I want to have navigational instructions, so that I am able to locate a room.” is extended by following points:

- The user story is also valid for students and university employees.

Name	Searching and booking a room
Scope	University Room Management System
Level	User goal
Primary Actor	Student, Professor or other university staff
Stakeholders / interests	Other members of the university (students, professors, other staff) University / university management
Preconditions	User is in possession of a valid university card and has a user account
Postconditions	Status of the rooms in the room database is updated
Main success scenario	1. User searches a room via a room number 2. System returns a list of rooms fulfilling the search query 3. User selects a room from the list 4. System shows detailed information about the selected room 5. User books the room 6. System updates booking status of the room 7. System shows booking information and confirmation
Extensions	1a. User searches room via room properties 1. User opens page to filter specific properties 2. User selects room requirements and confirms 2a. No room fulfilling the search criteria exists 1. System shows message: “No rooms found” 2. System presents rooms similar to the search query 5a. Room is already booked 1. System shows message: “Room is already booked” 2. System suggests a list of similar rooms 5b. User already booked the allowed maximum amount of rooms 1. System shows message: “You cannot book another room” 2. System shows list of rooms already booked by the user 5c. User books room according to a schedule (for future use) 1. System presents a day and time picker 2. User selects day of week and time 3. System asks for the frequency of the booking 4. User selects how often booking should be repeated 5. System books room for all selected time slots 5a. Room is not available in all time slots 1. System shows message: “Room is not available at <DAY / TIME>” 2. System provides alternative time slots and rooms 3. User selects alternatives
Special requirements	Stable database Simple UI design Fast search
Technology / data variation	Available via a terminal at the university or via a web app
Frequency of occurrence	Very regularly, up to multiple requests per minute at most active times Long pauses without interaction also likely
Open issues	Booking of multiple rooms at once

TABLE I: Use case specification for the use case *Searching and booking a room*

- Navigation is realized trough building schematics, as well as indoor and outdoor maps.
- Other points of interest (e.g. parking spots, water fountains) are out of scope and might be part of standalone user stories.
- Users do not need to be verified for navigation.

This user story is independent of other user stories and still leaves room for negotiation. The value of better navigation at the university campus is provided. The use case is small and the required amount of work can be estimated. Tests might include the navigation between rooms or buildings of the university by external people. Thus, this use case also fulfills the INVEST principle.

III. Using machine learning models as specification instruments

IV. Experiment and Results

V. Discussion

VI. Conclusion

Acknowledgment

APPENDIX