CS 6063 (2883): Software Engineering I
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Team Project
Building Management System (BMS)
(Draft)

Building Management System Overview

The Building Management System (BMS) is a project envisioned and requested by the owners of local rental properties throughout the county. It is dedicated to helping the owners of the properties be more competitive by offer their lessees a higher level of services while giving the property owners greater management control and reducing their operational costs. In short, a win-win situation.

The building owners have issued a Request for Proposal (RFP). Your team has been selected to write the Building Management System (BMS). During the first phase of the project your team has identified a basic set of requirements for the project as follows:

Scope Statement for the Building Management System (BMS)

The requirements for the Building Management System (BMS) have been established through conversations and meetings with owners of the office rental properties throughout the county. Each building owner is in need of a system that automates two major responsibilities of office rental management: These responsibilities are office security and office climate control. In both of these areas, the system will need take into account which businesses have rented which rooms in the building for use as office space, and when their control of climate and security in those affected in those areas is in effect.

Office Rental Requirements

A building owner rents office space to business tenants in the form of a zone, which is a group of individual rooms in the building. It is through the rental of zones, instead of individual rooms, that the building owner maximizes his rental profit, and that the business tenants manage their office climate. A

building owner may redefine the zones as they see fit to capture and maintain a share of the office rental Market.

Once a zone is rented by a business, that business may establish climate conditions which will take effect when they move in, which will cease to have any effect after their lease expires. A building owner may decide that certain rooms in the building will not be rented (for whatever reason), Space and choose the control of these areas in a common manner.

Climate Control Requirements

And business tenant controlled climate of the office space it has rented through the use of set points, which defined the desired lighting (on or off) and temperatures of the rented zone. The climate of the rented rooms is control collectively at the zone level (for example all rooms in the zone should be at the same temperature, or have the lights turned on). There are two external systems, the Heating, Ventilating, And Cooling (HVAC) Systems and the Lighting System, which will be commanded at the room level to initiate the maintenance of specific room temperatures and lighting conditions upon activation of a defined set point.

A business is responsible for ensuring that the climate conditions on the flight for zone at all times during its rental period. As a business has written more than one zone in the building, and Dave reuse the set points for any of its own zones.

Employees working in a room that is uncomfortable may request that the building supervisor release the room from zone control, which of course the system to use the thermostat setting in that room to set the temperature instead of the established business set point. Also, if an employee of a business is authorized to do so, they can phone in a remote request to change the conditions of a room they are going to work in, which most likely would be the cores when working on the weekend or off hours, when the business has lowered the temperature to save money on heating bills.

Security Requirements

Different businesses require different levels of security, but the building owner does not want to lose rental because of the lack of the ability to provide, Love for having too much. Therefore, security is controlled by the businesses at the individual room level, not at his own level. Each business may establish a level of clearance necessary to enter a room that has been rented. Correspondingly, it's employee that works for the business is given a level of clearance(none, secret, what top secret) that specifies to which rooms they have access.

The entrance to each room from another room has a locking mechanism which is controlled by a magnetic badge reader. Employees must be able to identify that they are in fact the person designated by the ID badge by entering a five-digit code. If the system recognizes the person and they do have the right clearance to enter the room, the entrance will be unlocked for three seconds, and then automatically lost again. A security guard will be notified if any employee is denied access to a room more than five times within a 15 minute window, which is an indicator of potential security breach. All attempts to access the secure room will be logged.

And business may choose to circumvent all security procedures by manually disabling the locking mechanism on the entrance, which will leave it unlocked at all times.

Requirements Update

After creation of the initial set of requirements several clarifications were documented in requirements update memorandum.

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Memorandum #1
Building layout

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Subject: Building Management System (BMS)

Requirement: Building layout

The market for this new system includes mostly owners of 3 to 4 story office buildings in modern industrial parks. These buildings typically have one main lobby, a shared cafeteria, and maintenance/ storage rooms, none of which are rented to business tenants, but will require some sort of climate control.

A typical layout of an office building:

> 1st floor - entrance, lobby cafeteria, elevators, office rooms (typically 8 and rooms can be adjacent or be accessed though a common hallway)

> 2nd though nth floor - storage space, elevators, hallway, office rooms (typically 8)and rooms can be adjacent or be accessed though a common hallway)

Business tenants will be required to set up their room security levels under the following assumptions:

- Security checks are executed only when an employee desires entry to a room with a higher security level than the room in which the employee currently occupies.

- The doors between rooms can only be locked in one direction (lower to higher clearance level). In the other direction, the door simply pouches open with a release bar.

- Doors between rooms at the same clearance level should have their locks physically disabled by the business tenant.

Because a room can be entered from more than one adjacent room, monitoring or access request results must be done for each individual entrance to that room. A security breach occurs when access is denied 5 times in a 15 minute period for the same employee at the same entrance (to the same room).

Subject:Building Management System (BMS)

Requirement: Climate Set Points

A Business renting one or more zones in the building is responsible for establishing a schedule of climate and lighting set points to control the environment of its workspace. The building owner will not take responsibility for establishing this schedule. The schedule will be in effect for the duration of the lease. When a lease expires, set points will be automatically deleted unless they are currently scheduled for an additional lease that is valid. To allow for a smooth transition into the building for the business tenant, the building will allow businesses to establish their set points in the weeks immediately prior to their lease period.

Each climate or lighting set point is defined by a time of day and a take effect day. The take effect day is not an absolute date, but rather an indication as to the cycle over which this set point will be activated. Valid take effect day values and their meaning are as follows:

One shot   good only the day of entry into the system
Daily   activated every day at the indicated time
Weekday   activated Monday through Friday at the indicated time
Weekend   activated Saturday and Sunday at the indicated time
Monday   activated on Monday's at the indicated time
Tuesday   activated on Tuesday's at the indicated time
Wednesday   activated on Wednesday's at the indicated time
Thursday   activated on Thursday's at the indicated time
Friday   activated on Friday's at the indicated time
Saturday   activated on Saturdays at the indicated time
Sunday   activated on Sunday at the indicated time

A set point is activated according to the over rules, and then remains activated until the next set point is activated, regardless of how many days may pass in between.