

Technical Report - Product specification

# MediSync

Course: IES - Introdução à Engenharia de Software

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Project abstract: MediSync is a multi-layered service that helps with hospital management by integrating various functionalities that help with room/patient management and provide real-time patient information to help nurses deliver optimal care.

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## 1 Introduction

The goal for the project was to propose, justify and implement a multi-service application that featured live data being fed into our system. Besides the actual code development, it also serves as a way to master collaborative work practices in agile project architecture.

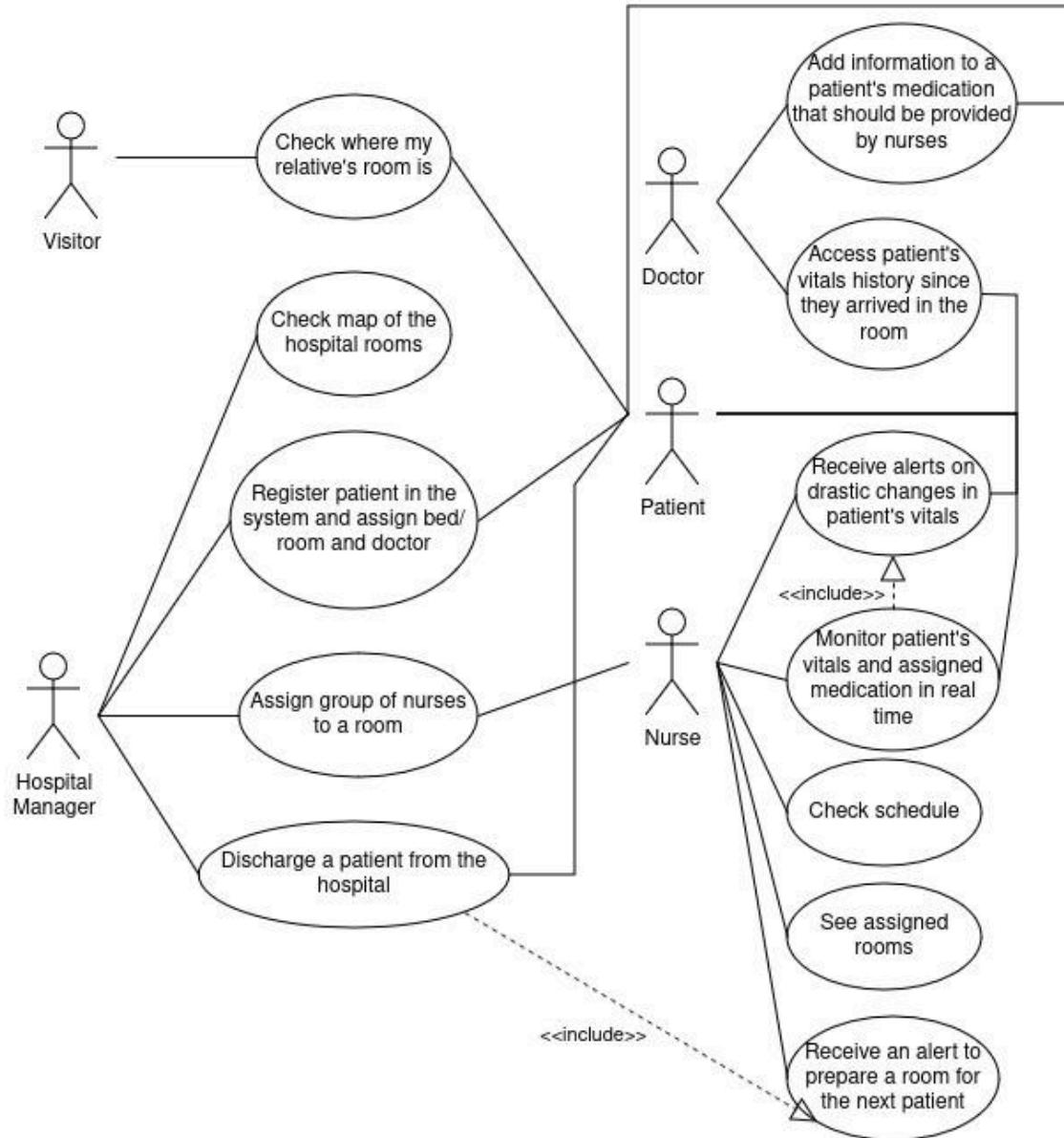
## 2 Product concept

### Vision statement

MediSync is a web / app software that aims to aid hospital staff in organizing personnel and patient allocation in hospitalization bedrooms, in order to increase efficiency and organization, as well as aid said personnel in keeping tabs on the patient's condition while he / she is hospitalized and is undergoing treatment.

While laying out the expectations of our system, we had initially compromised with also maintaining coordination on surgeries and regular appointments, but we determined that covering so many aspects of hospital management would prove detrimental, and instead decided to focus on a single aspect of hospital management that could work perfectly, being able to expand to other fields in the future should that be the direction of the system.

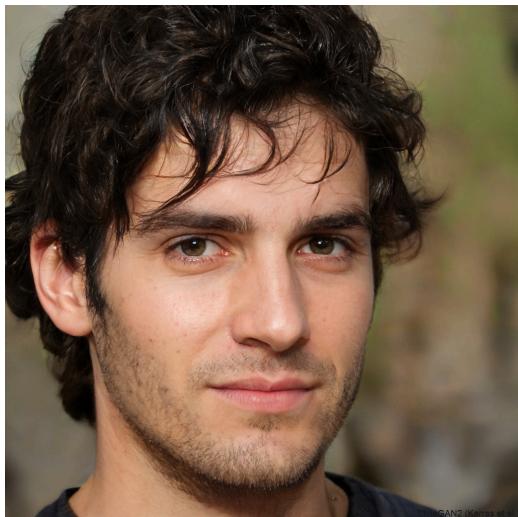
Our system serves as an aid to the regular hospital systems, which are commonly known to be clunky and oftentimes inefficient, as many of us already experienced. Thus, our system is not particularly different from a subsystem you could find at a regular hospital, but it competes with that system as it is specifically gauged to maintaining coordination within the hospital's resources, initially on a smaller scale.



Gathering the requirements turned out to be a difficult process - as we laid out the expectations for what we wanted our system to do, we also needed to maintain the scope of our system relatively low (as mentioned above). We used a principle of “using a sniper instead of a shotgun”, so to say, we focused on wanting to make our main aim of the system as good as possible, rather than having many different mediocre features. Once we had those expectations laid out, we aimed at having 12 User Stories balanced between different personas (except with the visitor), and after that, we suggested many different stories and filtered those who we believed were the best at achieving the “Sniper” effect.

## Personas and Scenarios

### Personas



**Peter** is a 29 year old **nurse** at Wood Hospital and he has been working at the hospital for 5 years now. He provides care to multiple patients by monitoring their vital signs, giving injections, among other tasks. He is young so he has an ease with technology and the hospital machines which helps him with his job but he is frustrated by the current state of the Wood Hospital which is very outdated with old machines with no connectivity which makes his job harder and more demanding. He thinks that the patients deserve the best and optimal care possible while also being able to do other important tasks in the hospital

**Motivation:** Peter would like to have a way to check his timetable to be more efficient in his workplace and also be able to receive alerts from unusual vitals from one of his patients.

**Nadia** is a 43 year old that has been practicing **medicine** for almost two decades. She has a large number of patients, all very diverse with different conditions. She is analytical and likes to check the medical history of patients to see how they are reacting to the treatment. She also has a lot to do so she likes to be quick and communicate as fast as possible with staff



**Motivation:** Nadia is driven to find solutions that allow her to quickly access comprehensive patient information, make informed decisions, and communicate rapidly with staff to ensure timely treatments.



**David** has been a member of Wood Hospital since it opened, 25 years ago. He kept advancing in his career until he got to his current position of **hospital manager**. He controls all the patient rooms in the hospital, as well as the staff (nurses and doctors). Since he has to deal with a lot of people it makes it hard to communicate all the decisions and changes made to everyone in an efficient time. David's job is very demanding since the number of rooms is limited and he has to take into account multiple factors, for example, the fact that

some patients can't be in the same room as others, because of contagious diseases.

**Motivation:** David wants to find a way to check room availability in room time, be able to assign patients and staff to each room in an efficient way, optimizing hospital resources.

**Maria** recently found out that her grandmother got sick and was put in a hospital with pneumonia and wants to visit her at Wood Hospital. She doesn't live in the town where the hospital is located, so she has never been there. She also doesn't have a great sense of direction and worries a lot about getting lost.

**Motivation:** Maria is motivated by the desire to quickly and easily find her grandmother's hospital room, so she can spend as much time as possible with her while minimizing the stress and confusion of navigating an unfamiliar hospital.



## Scenarios

### Scenario 1

Peter starts his shift at Wood Hospital, working with outdated machines that require him to manually check and record patient vitals. While giving medications to a patient, he misses an unusual heart rate in another patient due to the lack of real-time alerts. A month later, MediSync is introduced, a system that notifies him immediately of any unusual vitals from his patients while also recording their data in real-time. Besides that in the same platform he can also check his schedule which allows him to do this work efficiently.

### Scenario 2

Nadia starts her day by providing an appointment to an hospitalized patient. She quickly gets all the information about the patient in MediSync and realizes that the health of the patient is not improving, deciding to increase the dosage of medication. She updates the respective dosage in the MediSync service that will make sure the nurses are aware of the changes.

### Scenario 3

David opens his computer with the MediSync service and quickly realizes that a lot of patients are going to be coming in and need a room to stay in. He checks which rooms are available and easily separates patients with similar contagious conditions that can be given and the same room and which can't. He quickly gives each patient and a room and then quickly assigns a nurse and a doctor to each patient so they are well taken care of.

### Scenario 4

Maria has just arrived at the hospital to visit her grandmother and quickly gets overwhelmed with the amount of rooms and people. She opens the MediSync service and selects an option to “Check Room” she inserts a phone number, which is in the list of visitors and quickly gets a code as a text message. She inserts the code and a map of the hospital with the room of her grandmother is shown giving her clear directions

## Product requirements (User stories)

- **Hospital Room and Bed Management**
  - As David, a hospital manager, I want to be able to check a map of the rooms and the respective beds, to check bed/room availability and which rooms have patients with contagious diseases so that I can optimize patient placement and hospital management
  - As David, a hospital manager, I want to be able to register a patient in the system and assign a bed/room and a doctor to the patient so that the hospital can be more organized
  - As David, a hospital manager, I want to be able to easily discharge a patient from the hospital so that I can optimize bed/room usage and help patients quickly
  - As Peter, a nurse, I want to receive an alert when a patient is discharged, so that I know which rooms/beds need to be prepared.
- **Staff Assignment and Scheduling**
  - As David, a hospital manager, I want to assign a group of nurses to a specific room and a specific time frame by selecting the room, the time frame and selecting their names from a list of available nurses so that I can ensure adequate staffing and that each room has staff assigned to it.
  - As Peter, a nurse, I want to check my assignments schedule for the day So that I can know where I'll be needed next.
  - As Peter, a nurse, I want to see what rooms I am assigned to so that I can be prepared and present in the correct locations to provide care for patients
- **Patient Health Monitoring and Alerts**
  - As Peter, a nurse, I want to be able to monitor the vital signs and assigned medication of the patients in the rooms I'm assigned too in real-time so that I can ensure their health status is stable and respond promptly to any changes
  - As Peter, a nurse, I want to be able to receive an alert if something unusual like a drastic change in heartbeat happens to my patient, so that I can help them as fast as possible.
  - As Nadia, a doctor, I want to be able to access a patient's vital signs history since they arrived at their room so that I can have a bigger picture of how their health progressed since they arrived
  - As Nadia, a doctor, I want to be able to add information to each patient about necessary medication that needs to be provided by the nurses at a specific time so that they can make sure that the treatment is made while the patients are in their rooms.
- **Visitor Management**
  - As Maria, a visitor, I want to be able to check where my relative's room is by receiving a secret code from the application sent by the reception so that when I enter the hospital to visit them, I know where to go.

### 3 Architecture notebook

#### Key requirements and constraints

<Identify issues that will drive the choices for the architecture such as: Will the system be driven by complex deployment concerns, adapting to legacy systems, or performance issues? Does it need to be robust for long-term maintenance?

Identify critical issues that must be addressed by the architecture, such as: Are there hardware dependencies that should be isolated from the rest of the system? Does the system need to function efficiently under unusual conditions? Are there integrations with external systems? Is the system to be offered in different user-interfacing platforms (web, mobile devices, big screens,...)?

E.g.: (the references cited in [XX ] would be hypothetical links to previous specification documents/deliverables )

There are some key requirements and system constraints that have a significant bearing on the architecture. They are:

- The existing legacy Course Catalog System at Wylie College must be accessed to retrieve all course information for the current semester. The C-Registration System must support the data formats and DBMS of the legacy Course Catalog System [E2].
- The existing legacy Billing System at Wylie College must be interfaced with to support billing of students. This interface is defined in the Course Billing Interface Specification [E1].
- All student, professor, and Registrar functionality must be available from both local campus PCs and remote PCs with internet dial up connections.
- The C-Registration System must ensure complete protection of data from unauthorized access. All remote accesses are subject to user identification and password control.
- The C-Registration System will be implemented as a client-server system. The client portion resides on PCs and the server portion must operate on the Wylie College UNIX Server. [E2]
- All performance and loading requirements, as stipulated in the Vision Document [E2] and the Supplementary Specification [15], must be taken into consideration as the architecture is being developed.>

#### Architectural view

- Discuss architecture planned for the software solution.
- include a diagram

## Module interactions

- explain how the identified modules will interact. Use sequence diagrams to clarify the interactions along time, when needed
- discuss more advanced app design issues: integration with Internet-based external services, data synchronization strategy, distributed workflows, push notifications mechanism, distribution of updates to distributed devices, etc.>

## 4 Information perspective

<which concepts will be managed in this domain? How are they related?>

<use a logical model (UML classes) to explain the concepts of the domain and their attributes>

## 5 References and resources

<document the key components (e.g.: libraries, web services) or key references (e.g.: blog post) used that were really helpful and certainly would help other students pursuing a similar work>