



Figure 1: UML Diagram: Overview of the UHOPE HMS

Appendix

Name	1. Carrying out a laboratory test
Primary Actor	Laboratory technician
Stakeholders	Doctor, Patient
Precondition	The doctor wants the laboratory to carry out a blood test.
Postconditions	<ul style="list-style-type: none"> - The blood test has been carried out successfully. - The results of the blood test have been submitted to the EMR of the patient. - Both the patient and doctor have been notified about the results of the blood test.
Success Scenario	<ol style="list-style-type: none"> 1. The doctor prepares a request for a blood test to be carried out by the laboratory in the HMS. 2. Upon obtaining the EMR of the patient in question, the HMS fills in the patients information. 3. The doctor fills in the remaining information (e.g. type of test, urgency of the test, deadline of the test and possibly additional notes). 4. The doctor submits the request to the HMS system, which transfers the request automatically to the laboratory. 5. The laboratory technician receives the request and prepares the blood test. 6. The laboratory technician carries out the blood test. 7. Upon completion, the laboratory technician enters the results of the blood test into the EMR of the patient and submits the updated EMR to the HMS. 8. The HMS updates the EMR of the patient and all the connected modules take the updated EMR into account. 8. Both the patient and the doctor are notified automatically by the HMS about the results of the blood test and they can examine the results of the blood test. 9. The doctor examines the test. 10. Upon seeing the positive results, he or she notifies the patient.
Alternative Flows	10a. Upon seeing the bad results, he or she calls the patient.
Special Requirements	<ul style="list-style-type: none"> - Loading the patient's EMR should take no longer than 2 seconds. - It should not take longer than 3 seconds for the doctors and technician to log in to the system. - The HMS system needs to be available 24/7, in order to provide allround availability for the doctors, laboratory technicians and patients. - Both the doctor and the laboratory technician should be able to utilize the HMS without any annoyance regarding the usability of the software.

Table A1: Use Case describing the process of carrying out a laboratory test

Name	2. Integration of mobile devices
Primary Actor	Doctor
Stakeholders	Nurses, Patient
Precondition	In an ongoing doctors appointment, the doctor wants to measure both the body temperature and the blood pressure of a patient.
Postconditions	<ul style="list-style-type: none"> - The blood pressure and the body temperature of the patient have been correctly measured. - The measurements have been correctly entered into the EMR of the patient. - The EMR of the patient has been updated.
Success Scenario	<ol style="list-style-type: none"> 1. During an appointment, one of the nurses measures the blood pressure of the patient with a smart blood pressure monitor. 2. The data quickly becomes available on the tablet that the other nurse is using. 3. The other nurse double-checks the measurement and confirms it using the tablet. 4. The measurement is added to the EMR of the patient. 5. The doctor uses the smart thermometer to measure the body temperature of the patient. 6. Unfortunately, the measurement does not become available on the stationary computer. 7. The doctor quickly logs in to the HMS on the stationary computer. 8. The doctor manually enters the body temperature measurement of the patient. 9. The measurement is added to the EMR of the patient. 10. The doctor submits all the measurements to the EMR of the patient. 11. The HMS updates the EMR of the patient automatically and all connected modules take the updated EMR into account.
Alternative Flows	<ol style="list-style-type: none"> 6a. The measurement becomes available on the stationary computer 7a. The measurement is added to the EMR of the patient 8a. The doctor submits all the measurements to the EMR of the patient. 9a. The HMS updates the EMR of the patient automatically and all connected modules take the updated EMR into account.
Special Requirements	<ul style="list-style-type: none"> - Data transfer between mobile measurement devices and devices that have access to the EMR (such as computers and tablets) needs to happen in max. 3 seconds. - The HMS interface should be optimized for different screen sizes. - It should not take longer than 2 seconds for the doctors and nurses to log in to the system. - The HMS system needs to be available 24/7, in order to provide allround availability for the doctors, nurses and patients. - Both the nurses and the doctor should be able to utilize the HMS without any annoyance regarding the usability of the software.

Table A2: Use Case describing the process that incorporates mobile devices

Name	3. Predicting the hospital's performance
Primary Actor	Administrative worker
Stakeholders	Hospital Management
Precondition	The administrative worker wants to predict various performance indicators of the UHOPE hospital for the next year.
Postconditions	<ul style="list-style-type: none"> - The bedding occupancy rate has been predicted for each month of the next year. - The amount of medicine prescribed for each month has been predicted. - Other performance metrics and cost analysis have been predicted for the next year
Success Scenario	<ol style="list-style-type: none"> 1. The administrative coworker starts the Business Intelligence module of the HMS. 2. Based on the data in the central database of the HMS, the system is able to do various forms of analysis. 3. The coworker selects the bedding occupancy rate analysis. 4. Taking previous years and other factors into account (such as ongoing viruses and seasonal illnesses), the system predicts the bedding occupancy rate for each month of the coming year. 5. The coworker saves this information for later reference. 6. The coworker repeats steps 3-5 for the possible other analyses. 7. The coworker utilizes the data generated by the different analyses to present his or her key findings to the hospital management in a meeting. 8. Using the data generated by the different analyses the UHOPE hospital is able to proactively take action.
Special Requirements	<ul style="list-style-type: none"> - It should take the HMS no longer than 10 seconds to perform an analysis based on the input by the user. - The administrative worker should be able to utilize the HMS without any annoyances regarding the usability of the software.

Table A3: Use Case describing the process of predicting the hospital's performance

Name	4. A patient requests additional prescription medicine
Primary Actor	Patient
Stakeholders	Doctor, Pharmacist
Precondition	A patient wants to get additional prescription medicine.
Postconditions	<ul style="list-style-type: none"> - The request for new medicine has been processed correctly. - The patient can now pick up the medicines at the chosen hospital. - The EMR of the patient has been updated with the new information.
Success Scenario	<ol style="list-style-type: none"> 1. The patient logs in to his or her patient portal to submit a request for prescription medicine. 2. After logging in, the patient goes to the page where he or she can request the prescription medicine. 3. The patient selects the correct medicine and the amount of medicine that he or she wants. 4. The patient submits the request. 5. The doctor gets notified automatically by the HMS about the prescription medicine request. 6. The doctor checks if everything in the request is correct and if the patient recently already requested the prescription medicine. 7. After checking all necessary information and adding some additional notes (such as the time of intake and dosage recommendations), the doctor approves the prescription medicine request. 8. The doctor selects one pharmacy out of the database with associated pharmacies. 9. The doctor submits the approved prescription medicine request. 10. The chosen pharmacy gets notified by the HMS about the prescription medicine. 11. A pharmacist prepares the prescription medicine using the information given by the system. 12. The patient is notified that he or she can pick up his or her prescription medicine.
Alternative Flow	<ol style="list-style-type: none"> 7a. After checking all necessary information the doctors denies the request. 8a. The doctor contacts the patient
Special Requirements	<ul style="list-style-type: none"> - The server that the patient portal utilizes has to be available 24/7, in order provide allround availability for the patients. - The doctor, pharmacist and patient should be able to utilize the HMS without any annoyance regarding the usability of the software.

Table A4: Use Case describing the process of requesting additional prescription medicine

Name	5. Patient schedules an appointment with the doctor.
Primary Actor	Patient
Stakeholders	Doctor, Nurses, Receptionist
Precondition	The patient wants to schedule an appointment with a doctor.
Postconditions	<ul style="list-style-type: none"> - The doctors appointment has been planned. - The patient is informed about the appointment. - The doctor is informed about the appointment.
Success Scenario	<ol style="list-style-type: none"> 1. The patient logs into the patient portal and goes to the appointment scheduling module. 2. The patient fills in the required questions for the appointment (e.g. the problems that the patient is having / the reason for the appointment) and submits the scheduling request to the portal. 3. The system automatically provides multiple time slots for the patient to choose from, based on the schedule of doctors and nurses, available rooms and other relevant factors. 4. The patient chooses one of the time slots and submits the appointment after adding some personal notes. 5. The system updates the EMR of the patient and links the appointment to the corresponding doctor and nurses. 6. <i>A few days later: due to illness among the doctors, the appointment has to be rescheduled.</i> 7. The receptionist retrieves all the appointments that have to be rescheduled and he selects the appointment from the patient mentioned above. 8. The receptionist retrieves the EMR of the patient in question and looks for the patients contact information. 9. Based on the presented contact information, the receptionist calls the patient to reschedule the appointment. 10. After rescheduling the appointment with the patient on the phone, the receptionist submits the new date for the appointment in the scheduling module of the HMS. 11. The HMS updates the EMR of the patient automatically and notifies both the doctor and the patient. 12. The doctor checks his revised schedule.
Special Requirements	<ul style="list-style-type: none"> - The server that the patient portal utilizes has to be available 24/7, in order provide allround availability for the patients. - Loading the patients information should not take longer than 3 seconds. - Both the user and the receptionist should be able to utilize the software without any annoyance regarding the usability of the software.

Table A5: Use Case describing the process of the patient scheduling an appointment

Name	6. Patient edits their contact information after moving
Primary Actor	Patient
Stakeholders	No other direct stakeholders
Precondition	The patient wants to alter their contact information after moving to a new house.
Postconditions	<ul style="list-style-type: none"> - The contact information of the patient is changed correctly. - The EMR of the patient has been updated.
Success Scenario	<ol style="list-style-type: none"> 1. The patient logs into the patient portal on his or her smartphone. 2. Firstly, the patient checks the status of an ongoing blood test and sees that the test is still 'in progress'. 2. The patient goes to their contact information. 3. The patient changes their contact information to match with their current living address. 4. The patient also changes their phone number and email address. 5. The patient confirms and submits the changes. 6. The EMR of the patient is now updated and all the connected modules take the updated EMR into account.
Special Requirements	<ul style="list-style-type: none"> - The server that the patient portal utilizes has to be available 24/7, in order to provide allround availability for the patients. - The patient should be able to utilize the software without any annoyance regarding the usability of the software. - The patient portal should be optimized for different screen sizes.

Table A6: Use Case describing the patient editing their contact information