MINISTRY OF EDUCATION AND TRAINING

FPT UNIVERSITY

Capstone Project Document

The Laboratory Tests Management System

Group 6	
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Ext. Supervisor	N/A
Capstone Project Code	eLTMS

- Ho Chi Minh City, 14 September 2018 -

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A. Introduction

1. Project Information

- Project name: **Building the laboratory tests management system**
- Project Code: **eLTMS**
- Product Type: **Website & Mobile Application**
- Start Date: **September 10th, 2018**
- End Date: **December 14th, 2018**

2. Introduction

Hospital are the essential part of our lives, providing best medical facilities to people suffering from various ailments, which may be due to change in climatic conditions, increased work-load, emotional trauma stress etc. It is necessary for the hospitals to keep track of its day-to-day activities & records of its patients, doctors, nurses, ward boys and other staff personals that keep the hospital running smoothly & successfully.

But keeping track of all the activities and their records on paper is very cumbersome and error prone. It also is very inefficient and a time-consuming process Observing the continuous increase in population and number of people visiting the hospital. Recording and maintaining all these records is highly unreliable, inefficient and error-prone. It is also not economically & technically feasible to maintain these records on paper.

Thus, keeping the working of the manual system as the basis of our project. We have developed "The Laboratory Tests Management System".

The main objective of this project is to analyses the concept and process of laboratory tests in the hospital, from which to build up the website to manage all

patient information of laboratory tests and help doctor, users, and laboratory technician easy to control their job. It also aims at providing low-cost reliable automation of the existing systems. The system also provides excellent security of data at every level of user-system interaction and provides robust & reliable storage and backup facilities.

3. Current Situation

Nowadays, In Vietnam, Except for the large hospitals on the upline have laboratory system, which help doctor conjecture and treat patients in the best way. Other hospital or clinics on the downline do not have this system, If the doctor want to conjecture and treat patients in the best way, they must require patients go to hospital on upline and check their health on the laboratory systems, after that, patient will come back and listen the diagnosis.

But all of hospitals on upline is over-load now. If the patients want to check health, they must take time consuming to change hospital, take time consuming to wait because large numbers overload of patients. Not only time but also money, they must spend money for this moving and laboratory system.

With our laboratory management system, we will help patients and doctor with life easier.

4. Problem Definition

Below are disadvantages of current situation:

- Patients spend too much time, effort to get the health result.
- Doctor do not have the best support tools for offering the best treatment options.
- Hospitals, clinics have difficulty in managing records, reviews.

5. Proposed Solution

Our solution is to build systems capable of placing and managing time (Calendar Manager) to resolve the current situations, we also design the system to be scalable, so we can deploy this system to a multiple insurance services company in future.

eLTMS includes web application and mobile applications with following functions:

5.1. Feature functions

- Web application:

    - Register Appointment: User can register a new account on website. A staff will reply by SMS message for authentication to confirm calendar management
- Mobile application:
    - Register Appointment: User can register a new account on mobile. A staff will reply by SMS message for authentication to confirm calendar management.

5.2. Advantages and disadvantages

- Advantages:
    - Patient is easier in manage time for appointment.
    - Hospitals/Clinics can control facilities, machines and supplies.
    - Hospitals can record the types of illnesses, disease trends, which can be used for deciding how to treat, how to disease prevention.
    - Hospitals/Clinics can maximize the free time of each laboratory.
    - High Automation.
- Disadvantages:
    - Human must still interfere with system in some cases.

6. Functional Requirements

Function requirements of the system are listed as below:

- Base Component:
    - Login.
    - Register.
- User (Patient) component:
    - New account request / Feedback about account request.
    - Book Appointment/ View Booked Appointment/Edit-Cancel Appointment.
    - View test result-View suggestion, note.
    - Edit, Update profile account.
- Receptionist component:
    - View detail appointment.
    - Change status of appointment.
    - View list patient who has testing following day.
- Cashier component:
    - New account creates for user (Patient).
    - View list patient who has testing following day
    - Manage Laboratory (Operate with patient by appropriate/real time)
    - Change status of appointment.
- Nurse component:
    - Change status of appointment.
    - Change status of lab-testing.
- Warehouse-keeper component:
    - Manage items on system.

    - Import and control quantity on the system.
    - Stock control, stock out, stock in
- Doctor component:
    - Check the disease.
    - Suggest Medication (types and quantities)
    - Some good advice for patient.
    - Write note and conclusion
    - Request re-testing
- Laboratory Technician component:
    - Import the test result in the system.
    - Mapping code of specimen.
    - Create New Group of Specimen.
    - Create New Type of Specimen.
- Manager component:
    - Manage Service of Lab Test.
    - Manage Staff account (Add, Edit and Delete).
    - View and Check Result Test.
    - View Feedback.

7. Roles and Responsibility

No	Full Name	Role	Position	Contact
1	Hồ Hoàn Kiếm	Project Manager	Supervisor	Kiemhh@fpt.edu.vn
2	Bạch Minh Đức	Developer	Leader	Ducbmse61791@fpt.edu.vn
3	Châu Minh Ý	Developer	Member	Ycmse61419@fpt.edu.vn
4	Trần Tuấn Dũng	Developer	Member	Dungttse61982@fpt.edu.vn
5	Nguyễn Hữu Lâm	Developer	Member	Lamnhse61234@fpt.edu.vn

Table 1 - Roles and Responsibility

B. Software Project Management Plan

Problem Definition

Name of this Capstone Project

- Official name: **The Laboratory Management System**
- Vietnamese name: **Hệ thống quản lý phòng xét nghiệm**
- Abbreviation: **eLTMS**

Problem Abstract

Hospital is the essential part of our lives providing best medical facilities for people to suffer from various ailments, which may be due to change in climatic conditions, increased work-load, emotional trauma stress etc. It is necessary for the hospitals to keep track of its day-to-day activities & records of its patients, doctors, nurses, ward boys and other staff personals that keep the hospital running smoothly & successfully.

But keeping track of all the activities and their records on paper is very cumbersome and error prone. It also is very inefficient and a time-consuming process Observing the continuous increase in population and number of people visiting the hospital. Recording and maintaining all these records are highly unreliable, inefficient and error-prone. It is also not economically & technically feasible to maintain these records on paper.

Thus, keeping the working of the manual system as the basis of our project. We have developed "The Laboratory Tests Management System".

The main objective of this project is to analyze the concept and process of laboratory tests in the hospital from it building up the website to manage all patient information of laboratory tests and helping doctor, users, and laboratory technician easily to control their job. It also aims to provide low-cost reliable automation of the existing systems. Not only does the system provides excellent security of data at every level of user-system interaction, but also it provides robust & reliable storage and backup facilities.

Project Overview

Current Situation

Nowadays, In Vietnam, Except for the large hospitals on the up-line has laboratory system, which helps doctor conjecture and treat patients in the best way. Other hospitals or clinics on the down line do not have this system, If doctor want to conjecture and treat patients in the best way, they must require patients go to hospital on up-line and check their health on the laboratory systems, after that, patient will come back and listen the diagnosis.

But all of hospitals on up-line is over-load now. If patients want to check their health, they must waste time to change hospital and wait because large numbers

overload of patients. Not only time but also money, they must spend money for this moving and laboratory system.

With our laboratory management system, we will help patients and doctor with life easier.

Below are disadvantages of current situation:

- Patients spend too much time, effort to get the health result
- Doctor do not have the best support tools for offering the best treatment options
- Hospitals, clinics have difficulty in managing records, reviews

The Proposed System

Our solution is to build systems capable of placing and managing time (Calendar Manager) to resolve the current situations, we also design the system to be scalable, so we can deploy this system to a multiple insurance services company in future.

Website and mobile application for user

- **User component (Patient):**
  - Register
  - Login
  - Book an appointment
  - View booked appointment
  - Edit-Cancel appointment
  - View testing result
  - View suggestion, note
  - Edit, Update profile account
  - Feedback about service

Website for administrator

- **Hospital Receptionist component:**
  - View details of appointment
  - View list patient who has appointment by date
  - Change status of appointment
  - View patient' information
- **Department Receptionist component:**
  - Create new appointment for user (Patient)
  - View list appointments by date
  - Change status of appointment

    - View patient' information
- **Nurse component:**
    - View details of appointment
    - Change status of appointment
    - Change status of lab testing
    - View patient's information
- **Laboratory Technician component:**
    - Manage sample group
    - Manage sample
- **Doctor component:**
    - Check for the disease
    - Write note (advice to patient) and conclusion
    - Request re-testing
    - View patient' information
- **Manager component:**
    - Manage service of system
    - Manage staff's account
    - View patient' information
    - View testing result
    - View Feedback

Web Services

- Provide RESTful APIs for web and mobile application
- Handle request, process data and send response to client site

Boundaries of the System

- Allow user to book appointment for testing, view result history of testing, view or edit contact information
- Allow admin to manage patients, appointments, staffs
- The language of this system is Vietnamese
- User's devices (computer, smartphone) must connect to the Internet
- The complete product includes:
    - Website & mobile application for users (patient)
    - Website for administrators
    - Web services

Future plans

Current system is concentrated on core business flow. Therefore, some supporting features are restricted for the development team. These features may be expanded in the future:

- Support more categories
- Develop stronger security to reduce the risk for the system and users
- Develop getting detailed statistics for testing by month, year
- Develop system on mobile for admin

Development Environment

Hardware requirement

- For server

Hardware	Minimum Requirements	Recommended
Internet Connection	Cable, Wi-Fi (6 Mbps)	Cable, Wi-Fi (16 Mbps)
Operating System	Window Server 2012	Window Server 2012
Computer Processor	Intel® Core i3-8100 (3.6Ghz/6MB Smart Cache)	Intel® Core i7-8850H (2.6Ghz/9MB Smart Cache)
Computer Memory	8GB RAM	16GB RAM

Table 2 - Hardware requirement for server

- For web development:

Hardware	Minimum Requirements	Recommended
Internet Connection	Cable, Wi-Fi (4 Mbps)	Cable, Wi-Fi (8 Mbps)
Operating System	Windows 7 or above	Windows 7 or above
Computer Processor	Intel® Core i3-6300 (3.8Ghz/4MB Smart Cache)	Intel® Core i5-6500 (3.6Ghz/6MB Smart Cache)
Computer Memory	4GB RAM	8GB RAM

Table 3 - Hardware requirement for web development

- For mobile development:

Hardware	Minimum Requirements	Recommended

Internet Connection	Wi-Fi (2 Mbps),3G-4G	Wi-Fi (4 Mbps), 3G-4G
Operating System	Android 4.4.2	Android 6.0
Memory	4GB RAM	8GB RAM

Table 4 - Hardware requirement for mobile development

Software requirement

Software	Name / Version
Operating system	Windows 7 or above
Environment	C#.NET, Spring framework, jQuery, Bootstrap
Modeling tool	Offline: StarUML Online: draw.io
IDE	Visual Studio 2017, Android studio
DBMS	SQL Server 2014
Source control	SourceTree, Git
Web browser	Chrome 42 or above

Table 5 - Software requirement

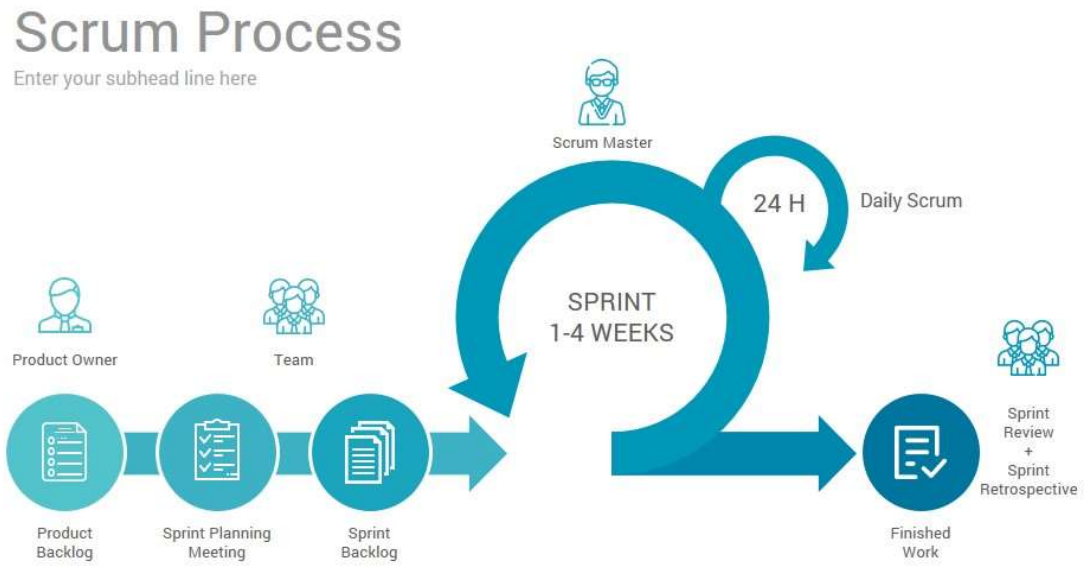
Project organization

Software Process Model

In this project, we choose Scrum which is an agile framework that allows step by step to set up a plan successfully. We choose this model because of the following reasons:

- Time-saving: daily meetings ensure that the process is at correct stage, as established at the beginning of the project
- Easy to use: suitable model for small and medium project
- Fast response to changes: product owner may change requirements or extend / reduce scope and we can adapt better
- Encourage teamwork: roles and tasks are divided and assigned efficiently

Figure 1 - Scrum Model



Roles and responsibilities

No	Full name	Role in Group	Responsibilities
1	**Hồ Hoàn Kiếm**	Supervisor/Project Manager	• Specify user requirements • Control the development process • Support in technique and business logic.
2	**Bạch Minh Đức**	Team leader, scrum master, BA, Developer, Tester	• Clarify requirements • Design database • Design GUI

			• Code • Write document and report • Create test plan • Testing.
3	**Châu Minh Ý**	Scrum member, BA, Developer, Tester	• Clarify requirements • Design database • Design GUI • Code • Write document and report • Create test plan • Testing
4	**Trần Tuấn Dũng**	Scrum member, BA, Developer, Tester	• Clarify requirements • Design database • Design GUI • Code • Write document and report • Create test plan • Testing
5	**Nguyễn Hữu Lâm**	Scrum member, BA, Developer, Tester	• Clarify requirements • Design database • Design GUI • Code • Write document and report • Create test plan • Testing

Table 6 - Roles and Responsibilities Details

Tools and Techniques

Tool / Technique	Name / version
Frontend	HTML,CSS, Javascript, Bootstrap

Mobile	Java
Backend	C#, .NET Framework
DBMS	SQL Server 2014
Source control	SourceTree, Git
Modeling tool	Offline: StarUML Online: draw.io
Web browser	Chrome 42 or above

Table 7 - Tools and Techniques

Project Management Plan

Software development life cycle

Below are all the major tasks that need to be performed sequentially during the development of the system

Phase	Description	Deliverables	Dependencies and Constrains	Risk
Requirements Definition	Collect requirements from customer Identify and clarify requirements for the system in general	Introduce of proposed system Software requirement specification Project task plan Report No.1 Software Project Management Plan	N/A	Missing requirement Unclear scope of project Lack of member share and understand
System and Software Design	Identify hardware and software requirements Decide software architect and clarify software detail design Design database	Report No.2 Software Project Management Plan. Report No. 3 Software Requirement Specification	Depend on Requirements definition	Misunderstood or unclear system's requirement Lack of practical experience leading to unreasonable design

Implementation and Unit Testing	Code the project following the requirement Fix bug of project Testing	Web application Mobile application Report No. 4 Software Design Description	Base on Requirement analysis.	Lack of practical experience Missing the deadlines Get many bug Delay task
Integration and System Testing	Perform integration test and system test	Report No. 5 System Implementation & Test	Implementation and Unit Testing are finished	Lack of testing experience leading to lack of test cases Get many bug to fix
Operation and Maintenance	Deploy the system Create the user's manuals Do routine maintenance activities	Report No.6 Software User's Manual	Integration and System Testing are finished	User's manual may be difficult for user to understand and confuse

Table 8 - Software development life cycle

Phase Detail

Phase 1: Requirements Definition

Task	Description	Author
Report 1	Writing Report 1	Nguyễn Hữu Lâm Bạch Minh Đức
Collect requirements from MEDIC	Go to MEDIC, observe, asking for result papers and information book	Bạch Minh Đức Trần Tuấn Dũn
Identify and clarify requirements for the system in general	Design booking algorithms for almost cases. Explain for the team Discuss together	Bạch Minh Đức Trần Tuấn Dũng Châu Minh Ý Nguyên Hữu Lâm

Table 9 - Phase 1: Requirements Definition

Phase 2: System and Software Design

Task	Description	Author
Identify hardware and software requirements.	Find out the approriate hardware and software for the system	Bạch Minh Đức Trần Tuấn Dũng Châu Minh Ý Nguyên Hữu Lâm
Report 2	Writing Report 2	Châu Minh Ý Nguyên Hữu Lâm
Database/Design	Draw database diagram. Implement it with My SQL Server Insert data Write some queries and test	Bạch Minh Đức Trần Tuấn Dũng Châu Minh Ý Nguyên Hữu Lâm
Diagrams Design	Entity Relationship Class Diagram Use-case Diagram Activity Diagram Sequence Diagram	Bạch Minh Đức Trần Tuấn Dũng Châu Minh Ý Nguyên Hữu Lâm
Report 3	Writing Report 3	Bạch Minh Đức Nguyên Hữu Lâm

Table 10 - Phase 2: System and Software Design

Phase 3: Implementation and Unit Testing

Task	Description	Author
Implements all functions of system	Coding all the components	Bạch Minh Đức Trần Tuấn Dũng Châu Minh Ý Nguyên Hữu Lâm
Create test plan	Planning for testing	Bạch Minh Đức Trần Tuấn Dũng Châu Minh Ý

		Nguyên Hữu Lâm
Perform Unit testing	Write Unit test cases Implement Unit tests	Bạch Minh Đức Trần Tuấn Dũng Châu Minh Ý Nguyên Hữu Lâm
Unit Testing	Write test cases for APIs, Web, Mobile-Run test cases	Bạch Minh Đức Trần Tuấn Dũng Châu Minh Ý Nguyên Hữu Lâm
Report 4	Write Report 4	Châu Minh Ý Nguyên Hữu Lâm

Table 11 - Phase 3: Implementation and Unit Testing

Phase 4: Integration and System Testing

Task	Description	Author
Perform integration test and system test	Write test cases and test the system	Bạch Minh Đức Trần Tuấn Dũng Châu Minh Ý Nguyên Hữu Lâm
Report 5	Write Report 5	Bạch Minh Đức Châu Minh Ý

Table 12 - Phase 4: Integration and System Testing

Phase 5: Operation and Maintenance

Task	Description	Author
Deploy the system	Deploy the system	Bạch Minh Đức Trần Tuấn Dũng Châu Minh Ý Nguyên Hữu Lâm
Create the user's manual	Write user's manual	Bạch Minh Đức Trần Tuấn Dũng

		Châu Minh Ý Nguyên Hữu Lâm
Do routine maintenance activities	Do routine maintenance activities for client system	Bạch Minh Đức Trần Tuấn Dũng Châu Minh Ý Nguyên Hữu Lâm
Report 6	Write Report 6	Châu Minh Ý

Table 13 - Phase 5: Operation and Maintenance

Task sheet

All Task sheet could be found here: https://goo.gl/QJn2AU

All Meeting Minutes

N/A

Naming

- Using camel case for variables and methods
- Using capitalized for classes and interfaces
- Using uppercase words separated by underscores for constants
- Variable, class and interface names should be nouns. Method names should be verbs

Comment

- Using /* */ for block comments
- Using // for line comments

Indentation

- Four spaces should be used as the unit of indentation. The exact construction of the indentation (spaces vs. tabs) is unspecified. Tabs must be set exactly every 8 spaces (not 4)

Declaration

- One declaration per line
- Do not put different types on the same line
- Put declarations only at the beginning of blocks
- Try to initialize local variables where they're declared. The only reason not to initialize a variable where it's declared is if the initial value depends on some computation occurring first

- No space between a method name and the parenthesis "("starting its parameter list
- Open brace "{" appears at the end of the same line as the declaration statement
- Closing brace "}" starts a line by itself indented to match its corresponding opening statement, except when it is a null statement the "}" should appear immediately after the" {"
- Methods are separated by a blank line

C. Software Requirement Specification

1. User Requirement Specification

1.1. Guest Requirement

- Login
- Register
- Make appointment

1.2. Patient Requirement

- Make appointment
- Edit appointment
- Cancel appointment
- View appointment history
- View appointment's test result

1.3. Hospital Receptionist Requirement

- View appointment list
- View appointment detail
- Delete Sample Getting(s) of an appointment
- Mark appointment as "Paid"

1.4. Department Receptionist Requirement

- View Sample Getting List
- Create appointment for offline patient
- Mark Sample Getting as "Paid"

1.5. Nurse Requirement

- View Sample Getting list
- Mark Sample Getting As "Nurse Done"

1.6. Lab Technician Requirement

- Manage Lab Tests, Samples, Sample Groups

1.7. Doctor Requirement

- View Test Results
- Write Conclusion
- Require Re-doing the test

1.8. Warehouse Keeper Requirement

- Manage Supplies
- Manage Import/Export Supplies
- Inventory

2. System Requirement Specification

1.1. External Interface Requirement

User Interface

- Design, layout, colors are suitable for a medical website.

- Primary color are white and light blue.
- Font size is required big enough for elder people can read.
- Only Vietnamese.

Hardware Interface

- Desktops, mobiles, tablets which can connect Wi-Fi steadily.
- Device's screen display in acceptable brightness.

Software Interface

- Using browser: Chrome (v25 or above), Firefox (v46.1) or Microsoft Edge.
- Using Android devices whose version is 4.4.2 or above.

Communication Protocol

- Use the HTTP, HTTPS protocol for communication between web browser and web server, between mobile device and web server.

1.2. System Overview Use Case

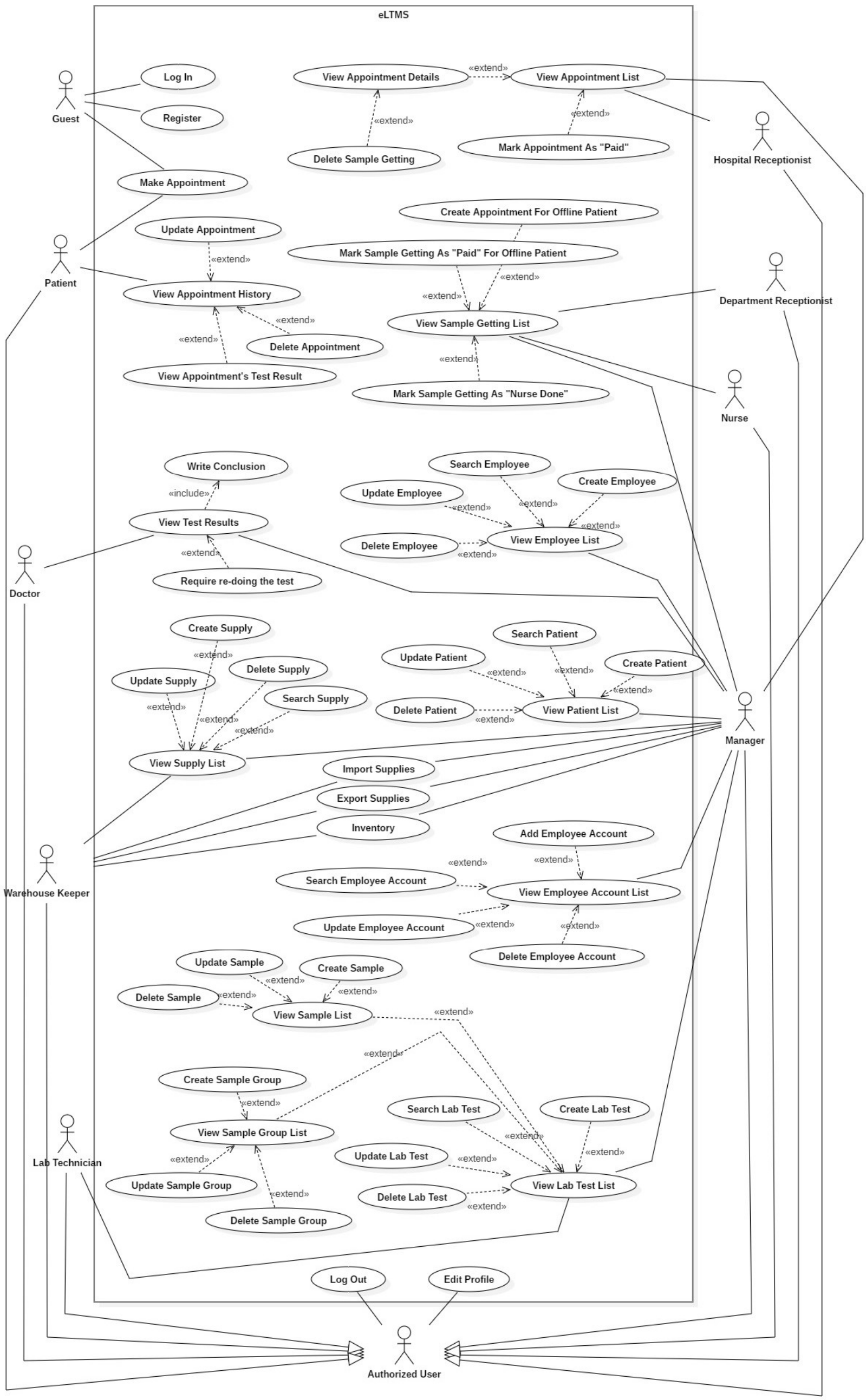


Figure 2 - System Overview Use Case

1.3. List of Use Case

1.3.1. Guest Overview Use Case

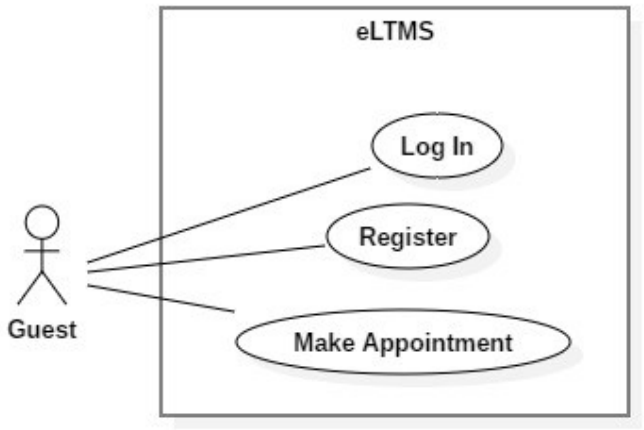


Figure 3 - <Guest>Overview Use Case

1.3.1.1. <Guest> Login

Use Case Diagram

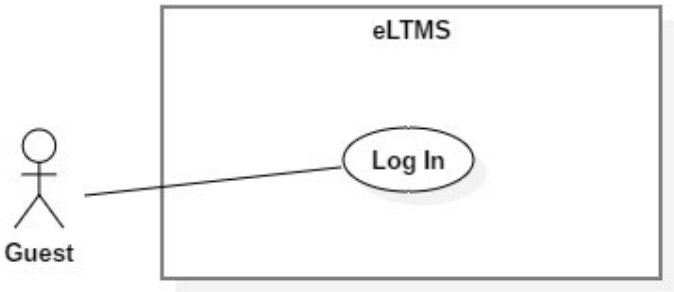


Figure 4 - < Guest > Login

Use Case Specification

USE CASE - UC_01			
Use Case No.	01	**Use Case Version**	1.0
Use Case Name	Login		
Author	DucBM		
Date	1/10/2018	**Priority**	Normal
Actor:			

- **Guest.**

Summary:

- **This use case allows Guest to login to the system.**

Goal:

- **Guests are authorized as their role.**

Triggers:

- **User clicks "Đăng nhập" button.**

Preconditions:

- **User has an account.**

Post Conditions:

- Success**: User logs into the system successfully and gets redirected to a specified page depends on user's role.**
- Fail**: System shows error message.**

Main Success Scenario:

Step	Actor Action	System Response
1	User goes to Login page.	System requires information: • Phone: text input. • Password: password input.
2	User inputs information. User clicks "Đăng Nhập" button.	User will login to the system with roles of this account.

Exceptions:

No	Cause	System Response
1	Phone is invalid length.	Show error message.
2	Password is invalid length.	Show error message.
3	Phone and password does not match with any accounts.	Show error message.

Relationships: **N/A**

Business Rules:

- **Patient can only log in to user-web.**
- **Employee (Hospital Receptionist, Department Receptionist, Nurse, Doctor, Warehouse Keeper and Manager) can only log in to admin-web.**

1.3.1.2. <Guest> Register

Use Case Diagram

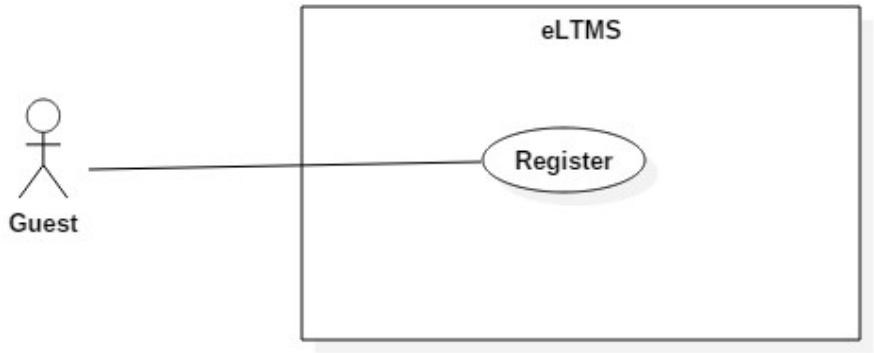


Figure 5 - < Guest > Register

Use Case Specification

USE CASE - UC_02			
Use Case No.	02	**Use Case Version**	1.0
Use Case Name	Register		
Author	DucBM		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Guest.**

Summary:

- **This use case allows Guest to register account.**

Goal:

- **Create a new account for guest.**

Triggers:

- **User clicks "Đăng ký" button.**

Preconditions:

- **N/A**

Post Conditions:

- Success**: System saves account on database and shows success message.**
- Fail**: System shows error message.**

Main Success Scenario:

Step	Actor Action	System Response
1	User goes to "Đăng ký" page.	System requires information: • Phone: text input. • Password: password input. • Confirm password: password input • Full name: text input. • Date of birth: date input. • Email: text input. • Home address: text input. • Company address: text input.
2	User inputs all required field.	User will register the system with roles of this account.

	Then clicks "Đăng ký" button.	[Exception from 1 to 8].

Alternative Scenario: **N/A**

Exceptions:

No	Cause	System Response
1	Phone is invalid.	Show error message.
2	Password is invalid.	Show error message.
3	Confirm password does not match	Show error message.
4	Full name is empty.	Show error message.
5	Date of birth is invalid	Show error message.
6	Email is invalid.	Show error message.
7	Home address is invalid.	Show error message.
8	Company address is invalid.	Show error message.

Relationships: **N/A**

Business Rules:

- **Guest can only register as patient.**
- **Phone is not null and must be verified by code.**
- **Email is not null, correct email format.**
- **Password is not null, in range of 8-255 characters,** includes **at least one** digit **and includes both** lowercase **and** uppercase **letters.**
- **Date of birth is not null and not over the current date.**
- **Full name is not null, in range of 5-50 characters.**

1.3.1.3. <Guest, Patient> Make Appointment

Use Case Diagram

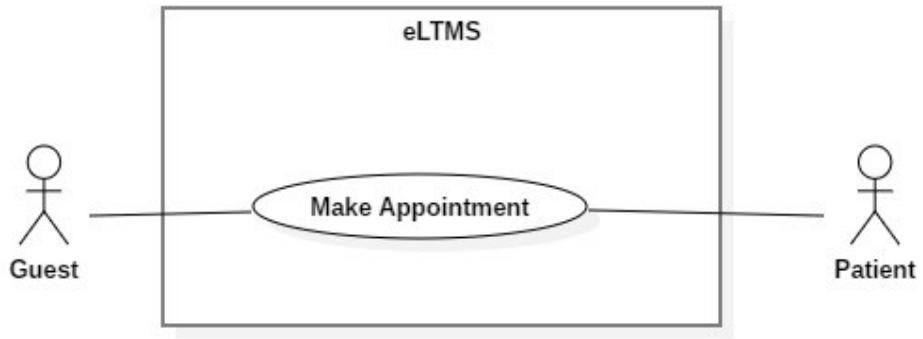


Figure 6 - < Guest, Patient > Make Appointment

Use Case Specification

USE CASE - UC_07			
Use Case No.	07	**Use Case Version**	1.0
Use Case Name	Make Appointment		
Author	DucBM		
Date	1/10/2018	**Priority**	Normal

Actor:

- Patient

Summary:

- Patient makes appointment with personal information, types of LabTest, date and time.

Goal:

- A new appointment of the patient is made.

Triggers:

- User clicks on "Đặt lịch hẹn" menu item on the website or "Đặt lịch" button on mobile app.

Preconditions:

- N/A.

Post Conditions:

- **Success:** Show success message.
- **Fail:** Show error message.

Main Success Scenario:

Step	Actor Action	System Response
1	User clicks on "Đặt lịch hẹn".	System requires information input: • Full name • Phone number
2	User clicks on "Bước 2".	System displays a checkbox list of LabTest types for user to select.
3	User clicks on "Bước 3".	System displays a table that shows the selected LabTests and requires input date and time for each of them.
4	User clicks on "Đặt lịch".	System show message on a popup (success/error).

Exceptions:

No	**Cause**	**System Response**
1	Full name or phone number is empty.	Show error message.

2	No LabTests are selected.	Show error message.
3	A date or time is empty.	Show error message.
4	Two date-times intersects.	Show error message.

Relationships: N/A

Business Rules:

- User cannot book a Sample twice or more on the same day.
- Number of bookings of a Sample-Group, on the same day, at the same slot cannot exceed the number of tables of that Sample-Group.
- User cannot make an appointment with date-time in the past.
- User cannot book 2 date-times which intersects each other.

1.3.2. Patient Overview Use Case

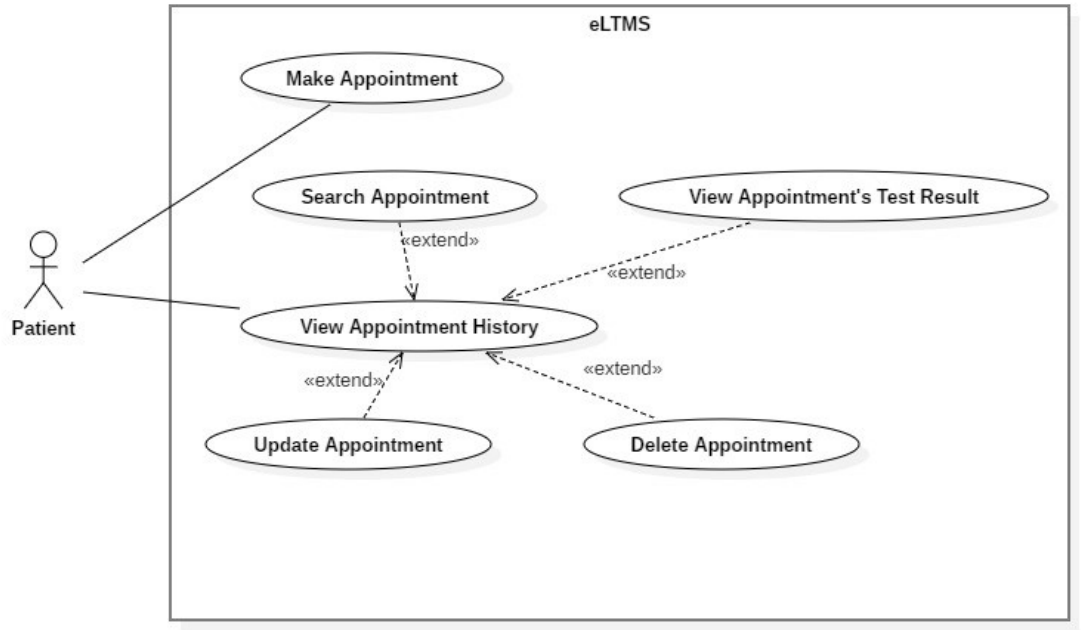


Figure 7 - < Administrator > Overview Use Case

1.3.2.1. <Patient> View Appointment History

Use Case Diagram

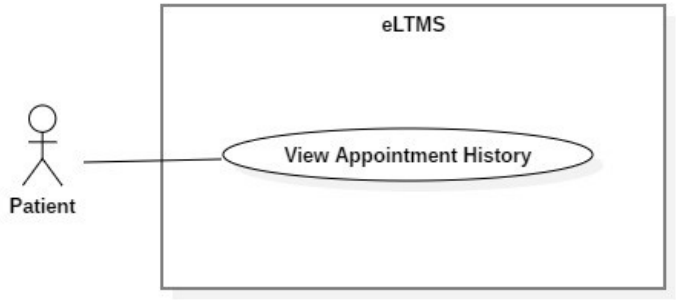


Figure 8 - <Patient> View Appointment History

Use Case Specification

USE CASE - UC_07			
Use Case No.	07	**Use Case Version**	1.0
Use Case Name	View Appointment History		
Author	DucBM		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Patient**

Summary:

- **Patient views his/her appointment history including new appointment, being processed appointment and done appointment.**

Goal:

- **A list of appointments of the patient, with search, filter and pagination controls, is shown.**

Triggers:

- **User clicks on "Danh sách cuộc hẹn" on the Website/Mobile App.**

Preconditions:

- **User is logged in as Patient.**

Post Conditions:

- Has data**: Show a list of appointments of the patient with search, filter and pagination controls.**
- Has no data**: Show "Bạn chưa có cuộc hẹn nào." text.**

Main Success Scenario:

Step	Actor Action	System Response
1	User clicks on "Danh sách cuộc hẹn" on the Website or Mobile App.	System shows a list of appointments of the patient with search, filter and pagination controls.

Alternative Scenario:

Step	Actor Action	System Response

1	User clicks on "Danh sách cuộc hẹn" on the Website or Mobile App.	System shows a text: "Bạn chưa có cuộc hẹn nào."

Exceptions: **N/A**

Relationships: **N/A.**

Business Rules:

- **In this list, each appointment has 3 status:**
  - **"mới tạo": User can edit and delete on Web. User can view detail (selected Samples, LabTests, date, time and price), edit and delete on Mobile App.**
  - **"đang xử lý": User can do nothing**
  - **"hoàn tất": User can view result on Web. User can view detail and view result on Mobile App.**

1.3.2.2. <Patient> Update Appointment

Use Case Diagram

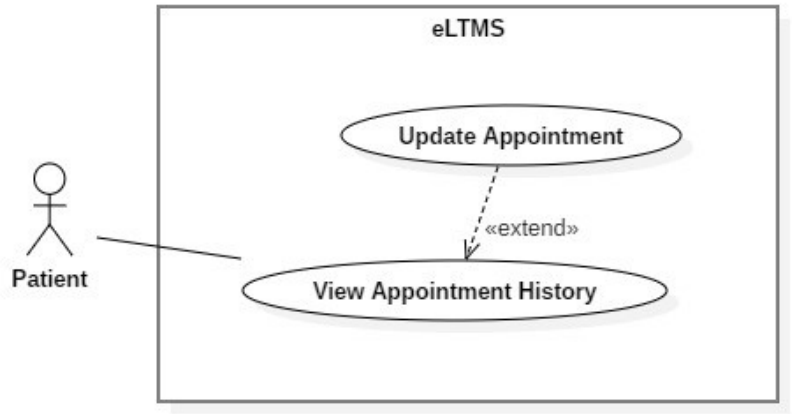


Figure 9 - < Patient >Update Appointment

Use Case Specification

USE CASE - UC_08			
Use Case No.	08	**Use Case Version**	1.0
Use Case Name	Update Appointment		
Author	DucBM		
Date	1/10/2018	**Priority**	Normal
Actor:			

- **Patient**

Summary:

- **Update an appointment's LabTest types, date and time.**

Goal:

- **LabTest types, date and time of an appointment are updated.**

Triggers:

- **User clicks Edit Button in the appointment row.**

Preconditions:

- **User is logged in as Patient.**

Post Conditions:

- Success**: A success message is shown.**
- Fail**: An error message is shown.**

Main Success Scenario:

Step	Actor Action	System Response
1	User clicks on Edit Button in the appointment row.	System redirect to Edit page. Old values of LabTests are set on a checkbox list.
2	User re-selects new LabTests. Then, user clicks "Bước 2"	System show a table of Samples with date and time.
3	User re-selects date and time. Then, user clicks "Cập Nhật"	System processes and return message.

Alternative Scenario: **N/A**

Exceptions: **N/A**

Relationships: **Extended from View Appointment History use case.**

Business Rules:

- **User cannot book a Sample twice or more on the same day.**
- **Number of bookings of a Sample-Group, on the same day, at the same slot cannot exceed the number of tables of that Sample-Group.**
- **User cannot make an appointment with date-time in the past.**
- **User cannot book 2 date-times which intersects each other.**

1.3.2.3. <Patient> View Appointment's Test Result

Use Case Diagram

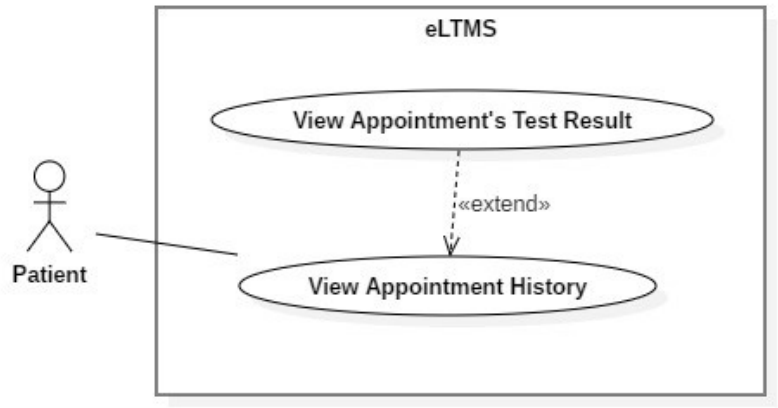


Figure 10 - < Patient > View Appointment's Test Result

Use Case Specification

USE CASE - UC_10			
Use Case No.	10	**Use Case Version**	1.0
Use Case Name	View Appointment's Test Result		
Author	DucBM		
Date	1/10/2018	**Priority**	Normal

Actor:

- Patient

Summary:

- Patient views appointment's test result.

Goal:

- Patient views appointment's test result, a soft version of result paper.

Triggers:

- Patient clicks View Result Button in the appointment row.

Preconditions:

- User is logged in as Patient.

Post Conditions:

- The test result is shown.

Main Success Scenario:

Step	Actor Action	System Response
1	User clicks on View Result Button on the appointment row.	System redirects to View Result page which shows: - Test results indexes: Name, value, status (normal/low/high), result, unit - "Tải tập tin PDF" button.
2	User clicks on "Tải tập tin PDF".	A PDF version is downloaded and opened on browser.

Exceptions: N/A

Relationships: Extended from View Appointment History use-case.

Business Rules:

- In the test result grid: the rows has high or low status must be highlighted (bold, italic and underlined). If high, the result number marked "H" and righ-aligned. If low, the result number marked "L" and left-aligned.

1.3.2.4. <Patient> Delete Appointment

Use Case Diagram

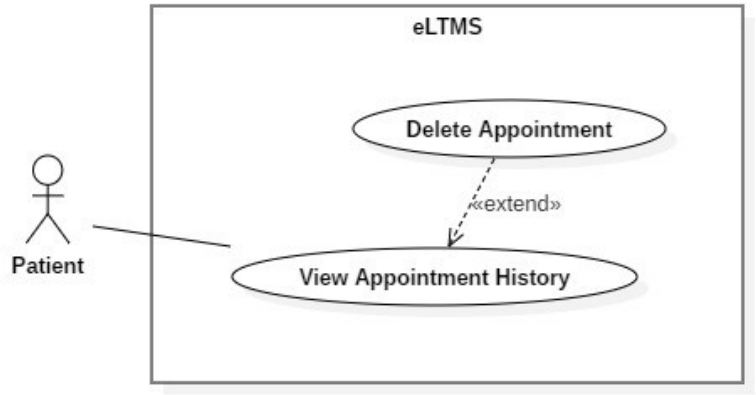


Figure 11 - <Patient> Delete Appointment

Use Case Specification

USE CASE - UC_12			
Use Case No.	12	**Use Case Version**	1.0
Use Case Name	Delete Appointment		
Author	DucBM		
Date	1/10/2018	**Priority**	Normal

Actor:
- Patient

Summary:
- Delete (cancel) an appointment that patient made.

Goal:
- Help patients can flexibly delete the appointments that they cannot come.

Triggers:
- Patient clicks on Delete Button on the appointment row.

Preconditions:
- User is logged in as Patient.

Post Conditions:
- Show success message.

Main Success Scenario:

Step	Actor Action	System Response
1	User clicks on Delete Button on the appointment row.	System show a confirm popup with message: "Bạn có chắc chắn muốn hủy cuộc hẹn này không?"
2	User clicks "Có".	System deletes the appointment and show popup: "Cuộc hẹn đã được hủy thành công."

Alternative Scenario:

Step	Actor Action	System Response
1	User clicks on Delete Button on the appointment row.	System show a confirm popup with message: "Bạn có chắc chắn muốn hủy cuộc hẹn này không?"
2	User clicks "Không".	System closes the popup and come back to the appointment history list.

Exceptions:

No	Cause	System Response
1	The appointment have been deleted before user confirmed "Có". It is deleted from another device (maybe web or mobile).	Show error message.

Relationships: Extended from View Appointment History List.

Business Rules: N/A

1.3.3. Hospital Receptionist Overview Use Case

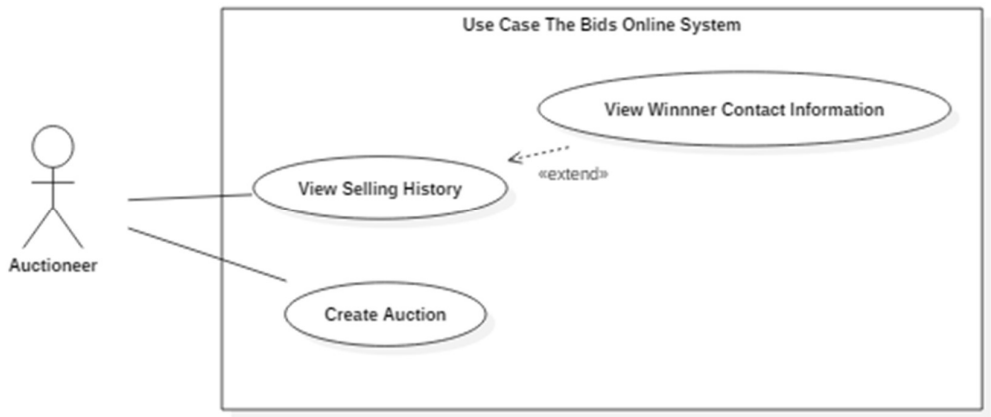


Figure 12 - <Hospital Receptionist> Overview Use Case

1.3.3.1. <Hospital Receptionist, Manager> View Appointment List

Use Case Diagram

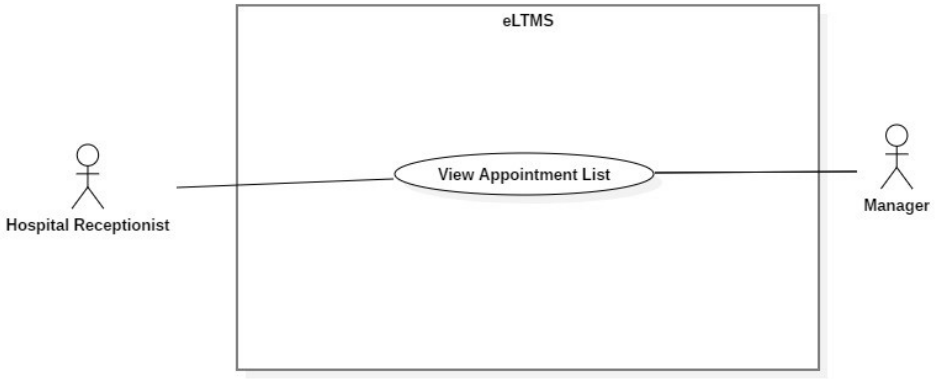


Figure 13 - <Hospital Receptionist> View Appointment List

Use Case Specification

USE CASE - UC_10			
Use Case No.	10	**Use Case Version**	1.0
Use Case Name	View Appointment List		
Author	YCM		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Hospital Receptionist.**
- **Manager**

Summary:

- **Hospital Receptionist views a list of appointments to guide patients coming to the hospital.**

Goal:

- **Hospital Receptionist can view all appointments, search by appointment code and filter by date.**

Triggers:

- **After Hospital Receptionist logged in successfully or clicks on "Quản lý cuộc hẹn" menu item.**

Preconditions:

- **User logged in as Hospital Receptionist.**

Post Conditions:

- **A list of appointments is shown, with search, filter and pagination controls.**

Main Success Scenario:

Step	Actor Action	System Response

1	User clicks on "Quản lý cuộc hẹn" menu item.	A list of appointments is shown, with search, filter and pagination controls.

Alternative Scenario: **N/A**

Exceptions:

No	Cause	System Response
1	Appointment table has no data.	Show message: "Chưa có cuộc hẹn nào"

Relationships: **N/A**

Business Rules:

- **Initially, all IsPaid Switches are set to OFF.**

1.3.3.2. <Hospital Receptionist, Manager> View Appointment Detail

Use Case Diagram

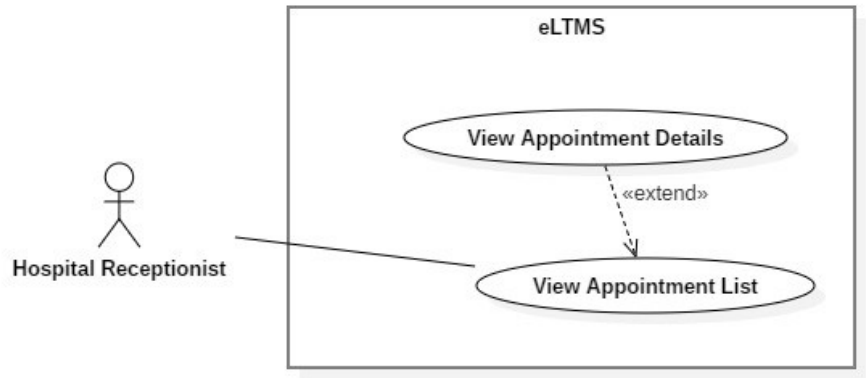


Figure 14 - <Hospital Receptionist, Manager> View Appointment Details

Use Case Specification

USE CASE - UC_11			
Use Case No.	11	**Use Case Version**	1.0
Use Case Name	View Appointment Details		
Author	YCM		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Hospital Receptionist.**
- **Manager**

Summary:

- **This use-case allows Hospital Receptionist to view appointment details.**

Goal:

- **Appointment details, includes patient's information and a list of booked Sample-Getting of the appointment, are shown.**

Triggers:

- **User clicks on "Xem chi tiết" button on the appointment row.**

Preconditions:

- **User logged in as Hospital Receptionist.**
- **User is at View Appointment List page.**

Post Conditions:

- Success**: A pop up with appointment details is shown.**

Main Success Scenario:

Step	Actor Action	System Response
1	User clicks on on "Xem chi tiết" button on the appointment row.	A pop up appears and shows these information: - Patient profile: Full name, phone number, gender, date of birth, email, home address, company address. - A list of booked Sample-Getting.

Alternative Scenario: **N/A**

Exceptions: **N/A**

Relationships: **Extend from View Appointment List use case**

Business Rules: **N/A.**

1.3.3.3. <Hospital Receptionist, Manager> Delete Sample Getting

Use Case Diagram

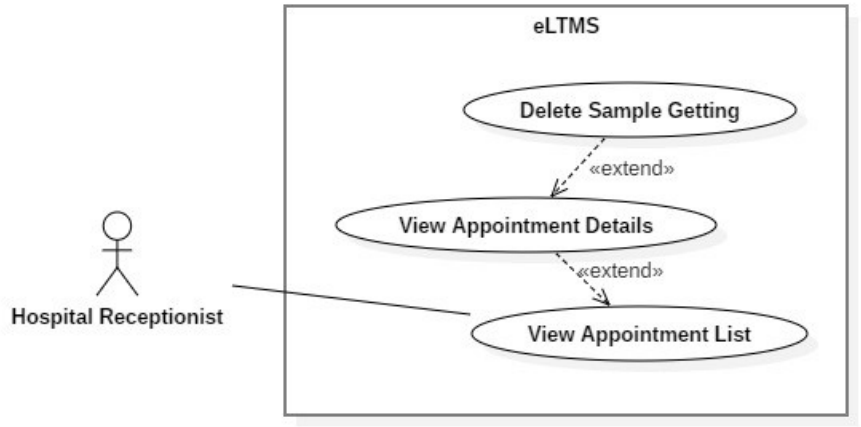


Figure 15 - <Hospital Receptionist, Manager> Delete Sample Getting

Use Case Specification

USE CASE - UC_10			
Use Case No.	10	**Use Case Version**	1.0
Use Case Name	Delete Sample Getting		
Author	YCM		
Date	1/10/2018	**Priority**	Normal

Actor:

- Hospital Receptionist

Summary:

- This use-case allows Hospital Receptionist to delete Sample-Getting for online patient.

Goal:

- Sample-Getting of online patient is deleted.

Triggers:

- Hospital Receptionist clicks on Delete Button on the Sample-Getting row.

Preconditions:

- User logged in as Hospital Receptionist.
- User is at Appointment Detail Popup.

Post Conditions:

- **Success**: Show success message.
- **Fail:** Show error message.

Main Success Scenario:

Step	Actor Action	System Response
1	User clicks on Delete Button on the Sample-Getting row.	System shows a popup: "Bạn có chắc chắn muốn xóa ca lấy mẫu này không?"

2	User clicks “Có”.	System deleted the Sample-Getting and shows pop up: “Ca lấy mẫu đã được xóa.”

Alternative Scenario 1:

Step	Actor Action	System Response
1	User clicks on Delete Button on the Sample-Getting row.	System shows a popup: “Bạn có chắc chắn muốn xóa ca lấy mẫu này không?”
2	User clicks “Không”.	System closes the popup and come back to the Sample-Getting list.

Exceptions: N/A

Relationships: N/A

Business Rules: N/A

1.3.3.4. <Hospital Receptionist, Manager> Mark Appointment As "Paid"

Use Case Diagram

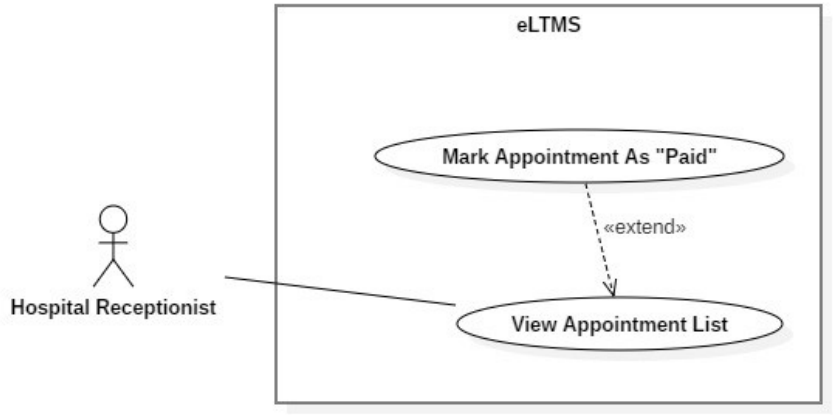


Figure 16 - <Hospital Receptionist, Manager> Mark Appointment As Paid

Use Case Specification

USE CASE - UC_10			
Use Case No.	10	**Use Case Version**	1.0
Use Case Name	Mark Appointment As Paid		
Author	YCM		
Date	1/10/2018	**Priority**	Normal
Actor: - Hospital Receptionist			

Summary:

- This use-case allows Hospital Receptionist to mark the appointment as Paid.

Goal:

- Appointment is marked as Paid.

Triggers:

- User clicks on "Thanh toán" switch on the appointment row.

Preconditions:

- User logged in as Hospital Receptionist.
- User is at Appointment List page.

Post Conditions:

- **Success**: Show success message.
- **Fail:** Show error message.

Main Success Scenario:

Step	Actor Action	System Response
1	User clicks on "Thanh toán" switch on the appointment row.	System show a pop up with a price list of all LabTests, and ask: "Bạn có chắc chắn muốn thanh toán không?"
2	User clicks "Có".	System processes and push notification to Nurses: "Đã thanh toán".

Alternative Scenario 1:

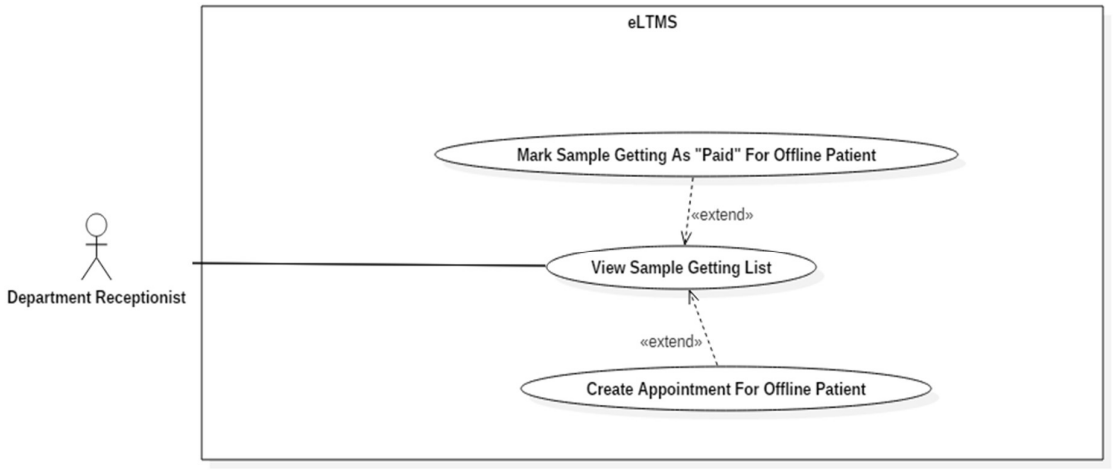
Step	Actor Action	System Response
1	User clicks on "Thanh toán" switch on the appointment row.	System show a pop up with a price list of all LabTests, and ask: "Bạn có chắc chắn muốn thanh toán không?"
2	User clicks "Không".	Come back to Appointment List page.

Exceptions: N/A

Relationships: N/A

Business Rules: N/A

1.3.4. Department Receptionist Overview Use Case



1.3.4.1. <Department Receptionist, Manager, Nurse> View Sample Getting List

Use Case Diagram

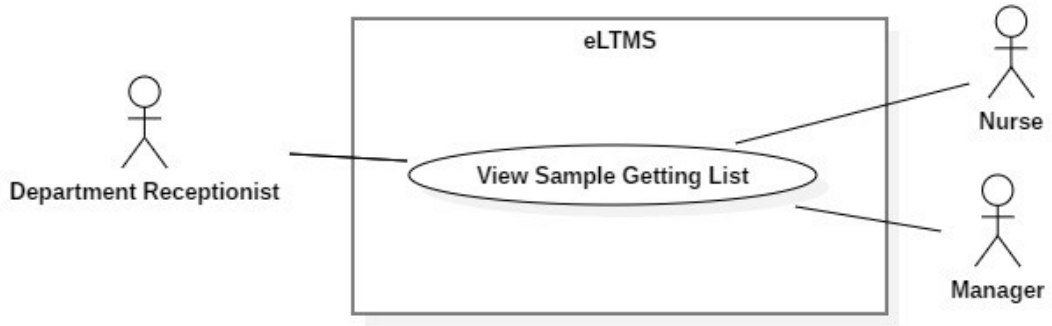


Figure 17 - 2.3.4.1. <Department Receptionist, Manager, Nurse> View Sample Getting List

Use Case Specification

USE CASE - UC_13			
Use Case No.	13	**Use Case Version**	1.0
Use Case Name	View Sample Getting List		
Author	YCM		
Date	1/10/2018	**Priority**	Normal
Actor: - Department Receptionist - Nurse - Manager **Summary**: - View a list of Sample Gettings. **Goal**: - A list of Sample Gettings with suitable controls is shown.			

Triggers:

- User Logged in successfully as Department Receptionist or Manager.

Preconditions:

- User logged in as Department Receptionist or Manager.

Post Conditions:

- Success: A list of Sample Getting is shown, with search, filter and pagination controls.

Main Success Scenario:

Step	Actor Action	System Response
1	Users logged in successfully as Department Receptionist, Nurse or Manager.	System shows list of Sample Getting which includes following information: • Patient's full name • Patient's phone number • Patient's home address • Sample Getting's occurring date • Sample Getting's occurring slot • Action button: Paid

Exceptions:

No	Cause	System Response
1	There are no data.	Show message: "Không có ca lấy mẫu nào."

Relationships: N/A

Business Rules:

- Initially, system displays a list of Sample-getting of the current date.

1.3.4.2. <Department Receptionist, Manager> Mark Sample Getting As "Paid" For Offline Patient

Use Case Diagram

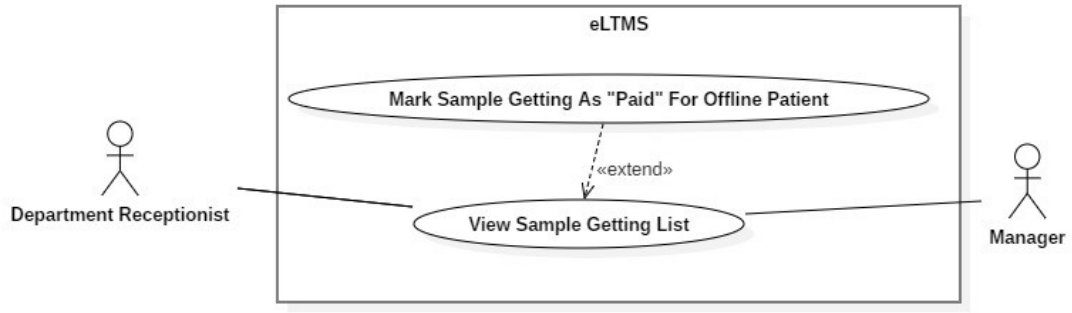


Figure 18 - <Department Receptionist, Manager> Mark Sample Getting As "Paid" For Offline Patient

Use Case Specification

USE CASE - UC_13			
Use Case No.	13	**Use Case Version**	1.0
Use Case Name	Mark Sample Getting As "Paid" For Offline Patient		
Author	YCM		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Department Receptionist**
- **Manager**

Summary:

- **Mark Sample Getting as "Paid" for offline patient.**

Goal:

- **Sample Getting is marked as "Paid" to confirm that the patient has paid for his/her Sample Getting.**

Triggers:

- **Department Receptionist/Manager clicks on Paid Switch.**

Preconditions:

- **User logged in as Department Receptionist or Manager.**
- **User is at View Sample Getting List page.**

Post Conditions:

- Success**: Sample Getting's status is changed into "*Paid*".**

Main Success Scenario:

Step	Actor Action	System Response
1	Click on Paid Switch.	Show a confirm pop up with message "Bạn có chắc chắn muốn thanh toán không?"
2	Click "Có" button.	Change status of the Sample Getting and display message "Đã thanh toán".

Alternative Scenario:

Step	Actor Action	System Response
1	Click on Paid Switch.	Show a confirm pop up with message "Bạn có chắc chắn muốn thanh toán không?"
2	Click "Có" button.	Change status of the Sample Getting and display message "Đã thanh toán" Set Paid switch to ON

Exceptions: **N/A**

Relationships: **Extend from View Sample Getting List**

Business Rules:

- **Initially, all Paid switches are set as OFF.**

1.3.5. Nurse Overview Use Case

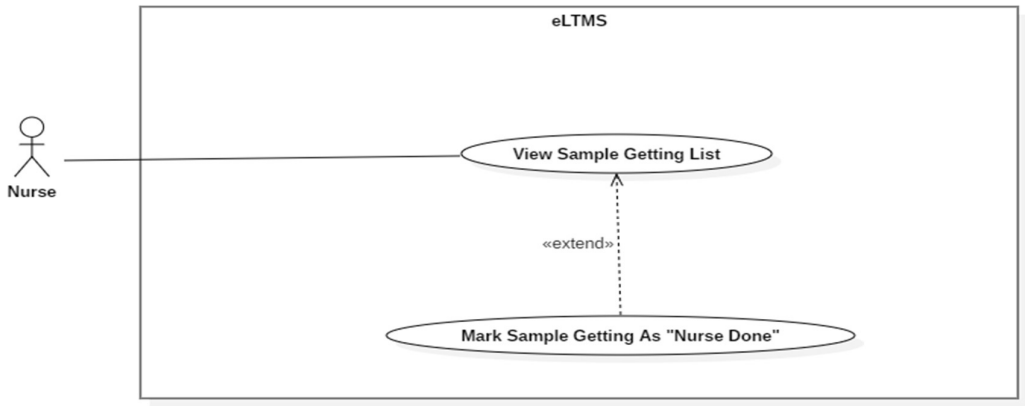


Figure 19 - <Authorized User> Overview Use Case

1.3.5.1. <Nurse, Manager> Mark Sample Getting As "Nurse Done"

Use Case Diagram

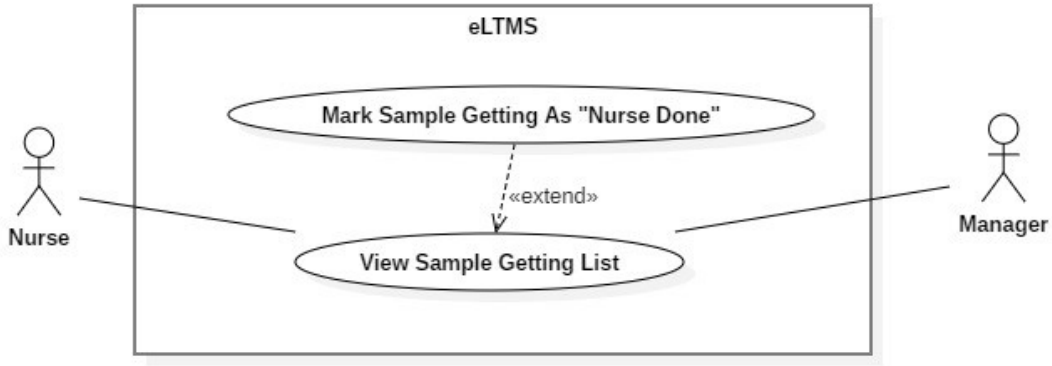


Figure 20 - 2.3.5.1. <Nurse, Manager> Mark Sample Getting As "Nurse Done"

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	Mark Sample Getting As "Nurse Done"		
Author	YCM		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Nurse.**
- **Manager**

Summary:

- **Mark Sample Getting as "Nurse Done"**

Goal:

- **Sample Getting is marked as "Nurse Done".**

Triggers:

- **User clicks on the switch on the "Đã lấy mẫu" column of the Sample Getting's row.**

Preconditions:

- **User logged in as Nurse or Manager.**
- **User is at View Sample Getting List page.**

Post Conditions:

- Success**: Show success message. Sample Getting status is changed into "*Nurse Done*"**

Main Success Scenario:

Step	Actor Action	System Response
1	Click on the switch on the "Đã lấy mẫu" column of the Sample Getting's row.	Show a confirm pop up: "Bạn có chắc chắn đã lấy mẫu?"
2	Click "Có" button.	Show success message.

Alternative Scenario:

Step	Actor Action	System Response
1	Click on the switch on the "Đã lấy mẫu" column of the Sample Getting's row.	Show a confirm pop up: "Bạn có chắc chắn đã lấy mẫu?"
2	Click "Không" button.	Come back to the Sample Getting List.

Exceptions: **N/A**

Relationships: **Extended from View Sample Getting List**

Business Rules:

- **Initially, all switches are set to OFF.**

1.3.6. Warehouse Keeper Overview Use Case

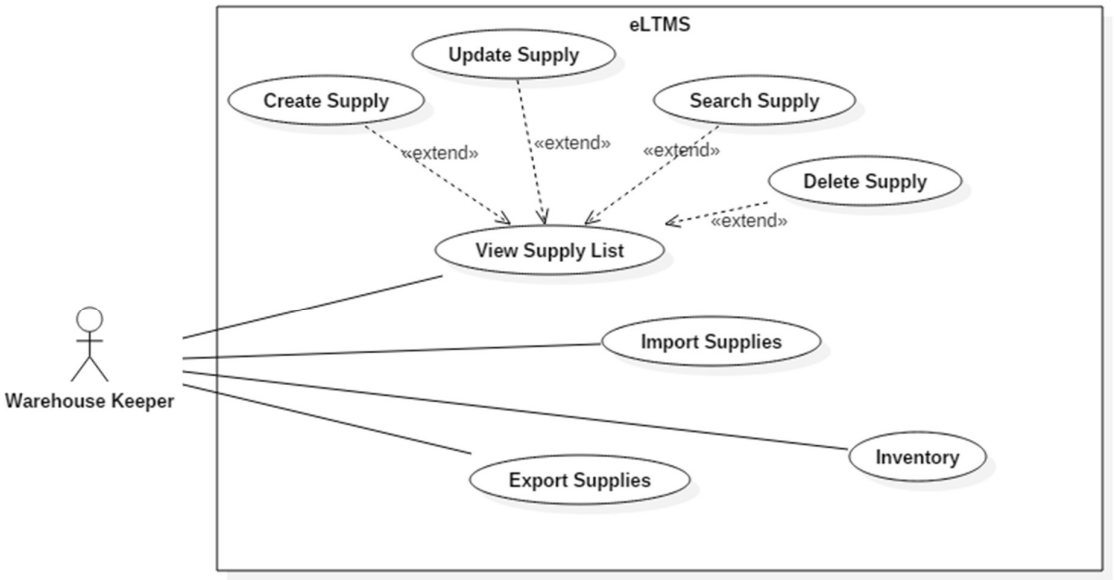


Figure 21 - <Warehouse Keeper> Overview Use Case

1.3.6.1. <Warehouse Keeper, Manager> View Supply List

Use Case Diagram

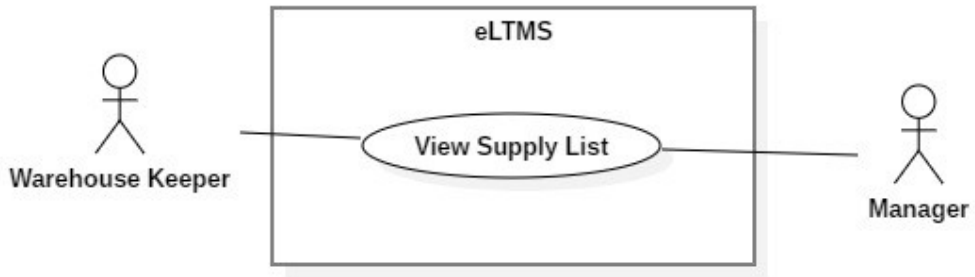


Figure 22 - <Warehouse Keeper, Manager> View Supply List

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	View Supply List		
Author	YCM		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Warehouse Keeper.**
- **Manager**

Summary:

- **Display a list of supplies.**

Goal:

- **A table of supplies' information, with search, filter and pagination controls.**

Triggers:

- **Display as default page of Warehouse Keeper.**
- **Display after user clicks on "Quản lý vật tư" menu item.**

Preconditions:

- **User logged in as Warehouse Keeper or Manager.**

Post Conditions:

- Success**: A list of supplies is displayed.**

Main Success Scenario:

Step	Actor Action	System Response
1	Logged in successfully as Warehouse Keeper.	Display a list of supplies.

Alternative Scenario:

Step	Actor Action	System Response
1	Is at another page and clicks on "Quản lý vật tư" menu item.	Display a list of supplies.

Exceptions:

No	Cause	System Response
1	There are no data of supplies.	Show message: "Chưa có vật tư nào."

Relationships: **N/A**

Business Rules: **N/A.**

1.3.6.2. <Warehouse Keeper, Manager> Search Supply

Use Case Diagram

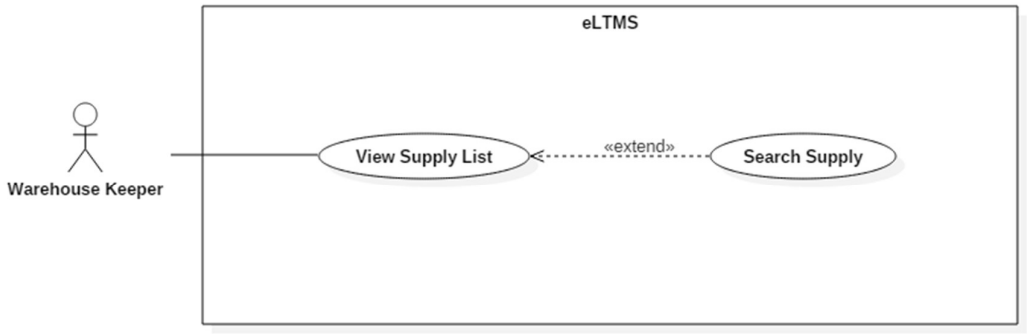


Figure 23 - <Warehouse Keeper, Manager> Search Supply

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	Search Supply		
Author	DungTT		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Warehouse Keeper.**

Summary:

- **Search for supplies.**

Goal:

- **Search for supplies.**

Triggers:

- **User enters a search string into search text field.**

Preconditions:

- **User logged in as Warehouse Keeper or Manager.**

Post Conditions:

- Success**: Show search results.**
- Fail: **Show text "Không tìm thấy kết quả nào".**

Main Success Scenario:

Step	Actor Action	System Response
1	Enter search string into search text field. Type Enter.	Display the search results in the table.

Alternative Scenario:

Step	Actor Action	System Response

1	Enter search string into search text field. Type Enter.	Display text messate: "Không tìm thấy kết quả."

Relationships: **Extended from View Supply List use-case.**

Business Rules:

- **Search results are supplies that contains the search string in Supply Code or Supply Name.**
- **Search case-insensitively.**
- **User can search by unsigned Vietnamese. Ex: User searches "kim tiem", system can return "kim tiêm" results.**

1.3.6.3. <Warehouse Keeper, Manager> Create Supply

Use Case Diagram

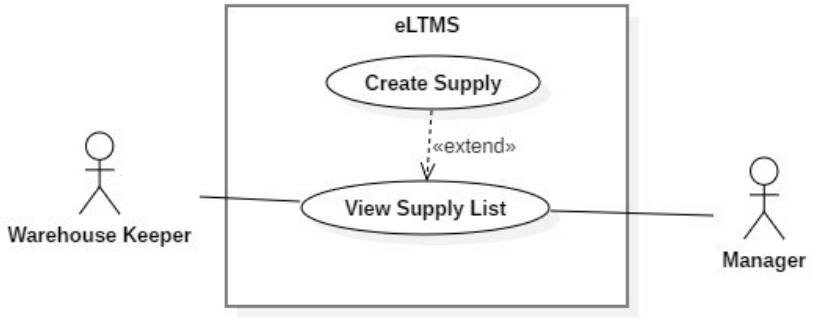


Figure 24 - 2.3.6.2. <Warehouse Keeper, Manager> Create Supply

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	Create Supply		
Author	DungTT		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Warehouse Keeper.**

Summary:

- **Create a new supply.**

Goal:

- **Create a new supply.**

Triggers:

- **User clicks "Thêm mới" Button.**
- **User is at View Supply List page.**

Preconditions:

- **User logged in as Warehouse Keeper or Manager.**

Post Conditions:

- Success**: Show success message.**
- Fail: **Show error message.**

Main Success Scenario:

Step	Actor Action	System Response
1	Click on "Thêm mới" button.	Require information: • Mã vật tư: text input • Tên vật tư: text input • Loại vật tư: dropdown list • Đơn vị: dropdown list • Ghi chú: textarea
2	Input information and click "Lưu" button	Process and show message.

Exceptions:

No	Cause	System Response
1	Mã vật tư is empty.	Show error message
2	Tên vật tư is empty.	Show error message.
3	Loại vật tư is not selected.	Show error message.
4	Đơn vị is not selected.	Show error message.
5	Ghi chú is empty	Show error message.

Relationships: **Extended from View Supply List use-case.**

Business Rules:

- **Mã vật tư is not empty, max length is 50.**
- **Tên vật tư is not empty, max lenth is 50.**
- **Ghi chú is not empty, max length is 50.**

1.3.6.4. <Warehouse Keeper, Manager> Update Supply

Use Case Diagram

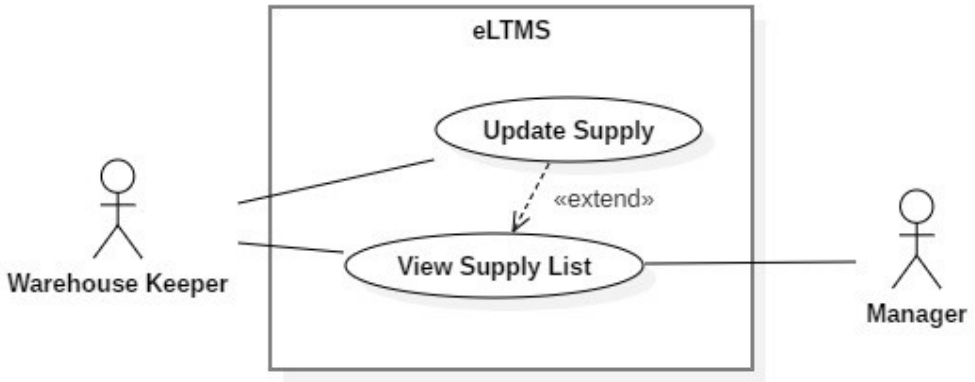


Figure 25 - 2.3.6.3. <Warehouse Keeper, Manager> Update Supply

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	Update Supply		
Author	DungTT		
Date	1/10/2018	**Priority**	Normal

Actor:
- **Warehouse Keeper.**
- **Manager**

Summary:
- **Update a supply's information.**

Goal:
- **Update a supply's information.**

Triggers:
- **User clicks on Edit button on the action column of the supply's row.**

Preconditions:
- **User logged in as Warehouse Keeper or Manager.**

Post Conditions:
- Success**: Show success message.**
- Fail: **Show error message.**

Main Success Scenario:

Step	Actor Action	System Response
1	Click on Edit button on the action column of the supply's row.	Show a popup, containing fields are filled with old information.
2	Enter new formation of the supply and click "Lưu" button.	Show success message.

Exceptions:

No	Cause	System Response
1	Mã vật tư is empty.	Show error message
2	Tên vật tư is empty.	Show error message.
3	Loại vật tư is not selected.	Show error message.
4	Đơn vị is not selected.	Show error message.
5	Ghi chú is empty	Show error message.

Relationships: **Extended from View Supply List**

Business Rules:

- **Mã vật tư cannot be changed in this use-case.**
- **Tên vật tư is not empty, max lenth is 50.**
- **Ghi chú is not empty, max length is 50.**

1.3.6.5. <Warehouse Keeper, Manager> Delete Supply

Use Case Diagram

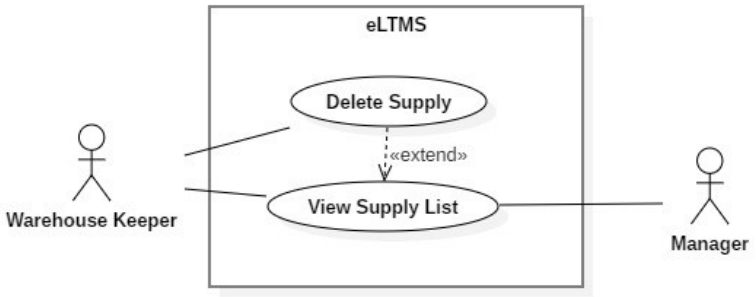


Figure 26 - 2.3.6.4. <Warehouse Keeper, Manager> Delete Supply

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	Delete Supply		
Author	DungTT		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Warehouse Keeper**
- **Manager**

Summary:

- **Delete an existing supply.**

Goal:

- **Delete an existing supply.**

Triggers:

- **User clicks on Delete button on the action column of the supply's row.**

Preconditions:

- **User logged in as Warehouse Keeper or Manager.**

Post Conditions:

- Success**: Show success message.**
- Fail: **Show error message.**

Main Success Scenario:

Step	Actor Action	System Response
1	Click on Delete button on the action column of the supply's row.	Show confirm popup: "Bạn có chắc chắn muốn xóa?"
2	Click "Có".	Show success message.

Alternative Scenario:

Step	Actor Action	System Response
1	Click on Delete button on the action column of the supply's row.	Show confirm popup: "Bạn có chắc chắn muốn xóa?"
2	Click "Không".	Show error message.

Exceptions:

No	Cause	System Response
1	The supply is deleted at the same time by another person.	Show error message.

Relationships: **Extended from View Supply List use-case.**

Business Rules: **N/A.**

1.3.6.6. <Warehouse Keeper, Manager> Import Supply

Use Case Diagram

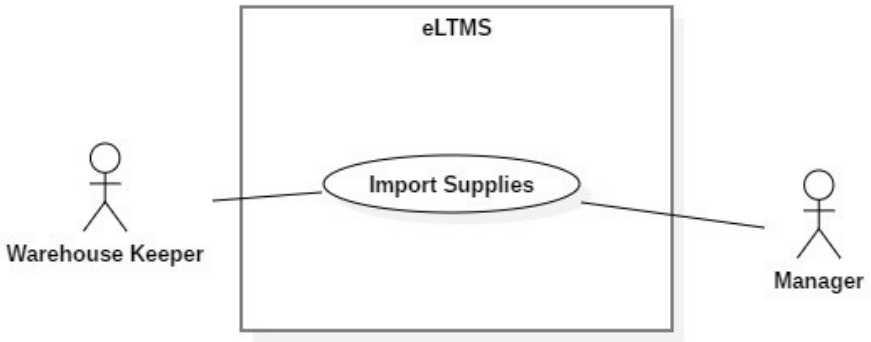


Figure 27 - 2.3.6.5. <Warehouse Keeper, Manager> Import Supply

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	Import Supply		
Author	DungTT		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Warehouse Keeper.**
- **Manager**

Summary:

- **Display a list of supplies.**

Goal:

- **A table of supplies' information, with search, filter and pagination controls.**

Triggers:

- **Display as default page of Warehouse Keeper.**
- **Display after user clicks on "Quản lý vật tư" menu item.**

Preconditions:

- **User logged in as Warehouse Keeper or Manager.**

Post Conditions:

- Success**: A list of supplies is displayed.**

Main Success Scenario:

Step	Actor Action	System Response
1	Logged in successfully as Warehouse Keeper.	Display a list of supplies.

Alternative Scenario:

Step	Actor Action	System Response
1	Is at another page and clicks on "Quản lý vật tư" menu item.	Display a list of supplies.

Exceptions:

No	Cause	System Response
1	There are no data of supplies.	Show message: "Chưa có vật tư nào."

Relationships: **N/A**

Business Rules: **N/A.**

1.3.6.7. <Warehouse Keeper, Manager> Export Supply

Use Case Diagram

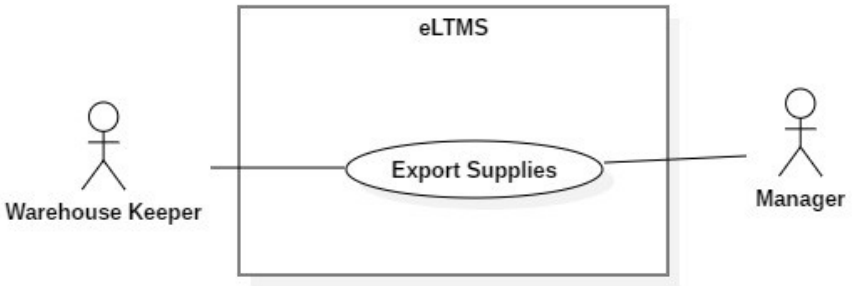


Figure 28 - 2.3.6.6. <Warehouse Keeper, Manager> Export Supply

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	Export Supply		
Author	YCM		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Warehouse Keeper.**
- **Manager**

Summary:

- **Display a list of supplies.**

Goal:

- **A table of supplies' information, with search, filter and pagination controls.**

Triggers:

- **Display as default page of Warehouse Keeper.**
- **Display after user clicks on "Quản lý vật tư" menu item.**

Preconditions:

- **User logged in as Warehouse Keeper or Manager.**

Post Conditions:

- Success**: A list of supplies is displayed.**

Main Success Scenario:

Step	Actor Action	System Response
1	Logged in successfully as Warehouse Keeper.	Display a list of supplies.

Alternative Scenario:

Step	Actor Action	System Response
1	Is at another page and clicks on "Quản lý vật tư" menu item.	Display a list of supplies.

Exceptions:

No	Cause	System Response
1	There are no data of supplies.	Show message: "Chưa có vật tư nào."

Relationships: **N/A**

Business Rules: **N/A.**

1.3.6.8. <Warehouse Keeper, Manager> Inventory

Use Case Diagram

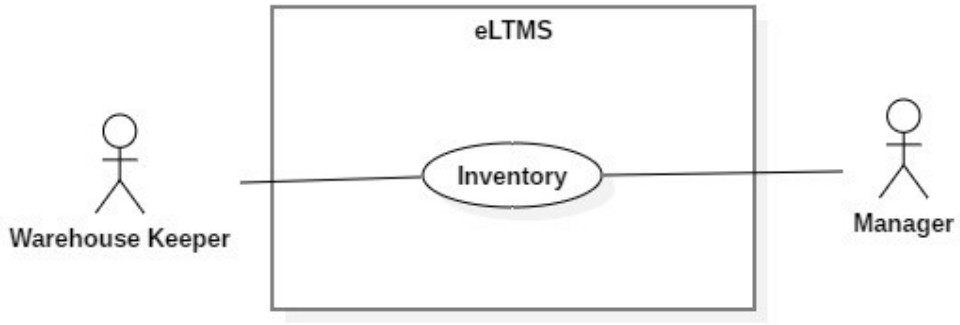


Figure 29 - 2.3.6.7. <Warehouse Keeper, Manager> Inventory

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	Inventory		
Author	YCM		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Warehouse Keeper.**
- **Manager**

Summary:

- **Display a list of supplies.**

Goal:

- **A table of supplies' information, with search, filter and pagination controls.**

Triggers:

- **Display as default page of Warehouse Keeper.**
- **Display after user clicks on "Quản lý vật tư" menu item.**

Preconditions:

- **User logged in as Warehouse Keeper or Manager.**

Post Conditions:

- Success**: A list of supplies is displayed.**

Main Success Scenario:

Step	Actor Action	System Response
1	Logged in successfully as Warehouse Keeper.	Display a list of supplies.

Alternative Scenario:

Step	Actor Action	System Response
1	Is at another page and clicks on "Quản lý vật tư" menu item.	Display a list of supplies.

Exceptions:

No	Cause	System Response
1	There are no data of supplies.	Show message: "Chưa có vật tư nào."

Relationships: **N/A**

Business Rules: **N/A.**

1.3.7. Manager Overview Use Case

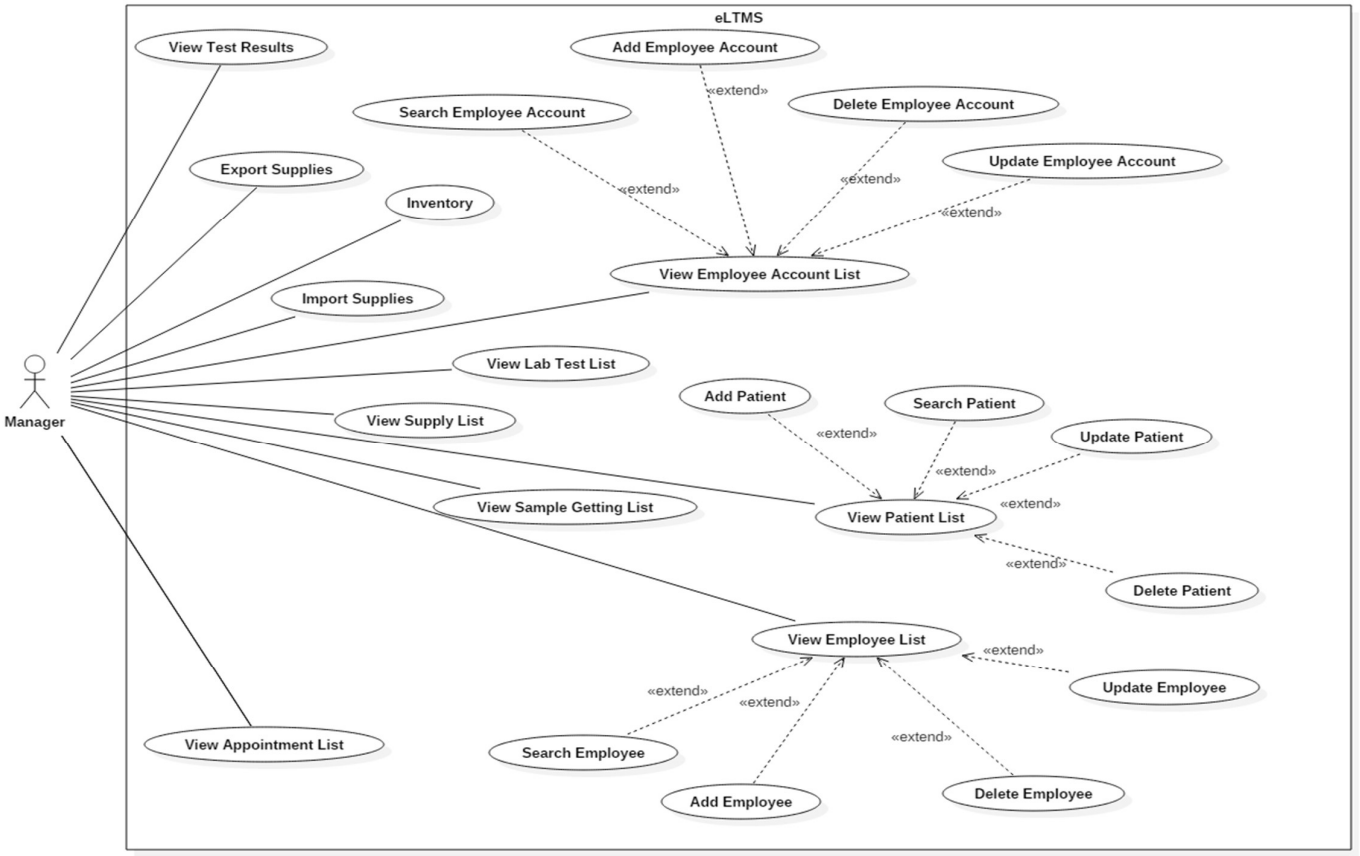


Figure 30 - <Authorized User> Overview Use Case

1.3.7.1. <Manager, Lab Technician> View Sample Group List

Use Case Diagram

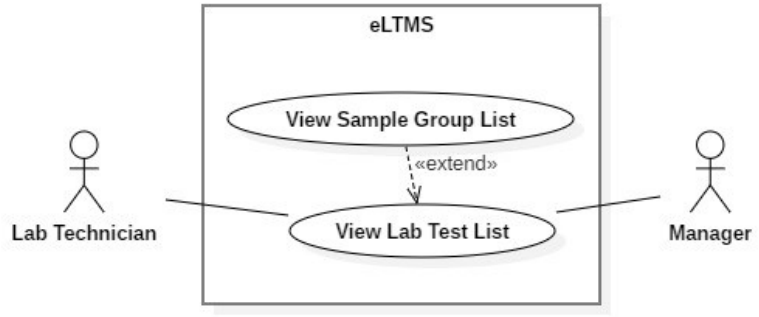


Figure 31 - 2.3.6.1. <Manager, Lab Technician> View Sample Group List

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	View Sample Group List		
Author	DungTT		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Lab Technician.**
- **Manager**

Summary:

- **Display a list of Sample Groups.**

Goal:

- **A table of Sample Groups' information, with search, filter and pagination controls.**

Triggers:

- **Display after user clicks on "Quản lý nhóm xét nghiệm" menu item.**

Preconditions:

- **User logged in as Manager, Lab Technician.**

Post Conditions:

- Success**: A list of Sample Groups is displayed.**

Main Success Scenario:

Step	Actor Action	System Response
1	Logged in successfully as Manager, Lab Technician.	Display a list of Sample Groups.

Alternative Scenario:

Step	Actor Action	System Response
1	Is at another page and clicks on "Quản lý nhóm xét nghiệm" menu item.	Display a list of Sample Groups.

Exceptions:

No	Cause	System Response
1	There are no data of Sample Groups.	Show message: "Chưa có nhóm xét nghiệm nào."

Relationships: **N/A**

Business Rules: **N/A.**

1.3.7.2. <Manager, Lab Technician> Create Sample Group

Use Case Diagram

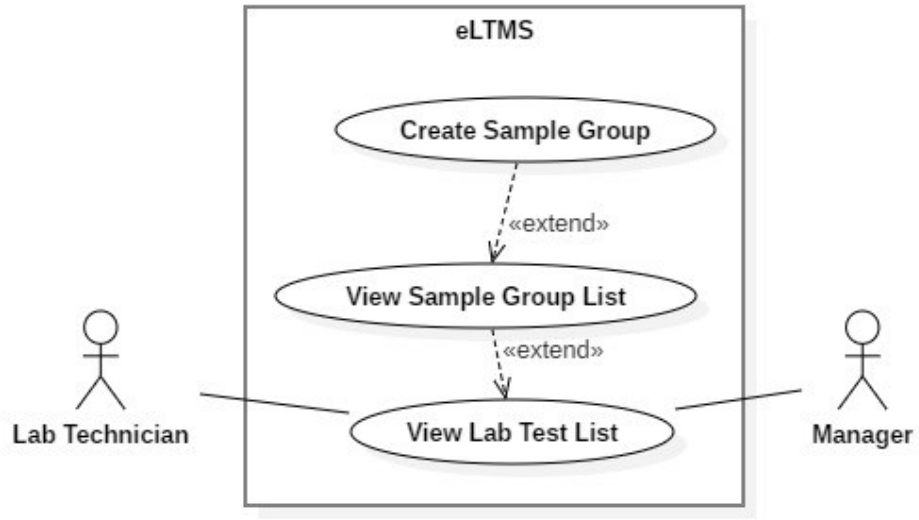


Figure 32 - 2.3.6.2. <Manager, Lab Technician> Create Sample Group

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	Create Sample Group		
Author	DungTT		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Manager, Lab Technician.**

Summary:

- **Create a new Sample Group.**

Goal:

- **Create a new Sample Group.**

Triggers:

- **User clicks "Thêm mới" Button.**
- **User is at View Sample Group List page.**

Preconditions:

- **User logged in as Manager, Lab Technician.**

Post Conditions:

- Success**: Show success message.**
- Fail: **Show error message.**

Main Success Scenario:

Step	Actor Action	System Response
1	Click on "Thêm mới" button.	Require information: • Sample Group Name: text input • Description: text input
2	Input information and click "Lưu" button	Process and show message.

Exceptions:

No	Cause	System Response
1	Sample Group Name is empty.	Show error message
2	Description is empty.	Show error message.

Relationships: **Extended from View Sample Group List use-case.**

Business Rules:

- **Sample Group Name is not empty, max length is 50.**
- **Description is not empty, max length is 500.**

1.3.7.3. <Manager, Lab Technician> Update Sample Group

Use Case Diagram

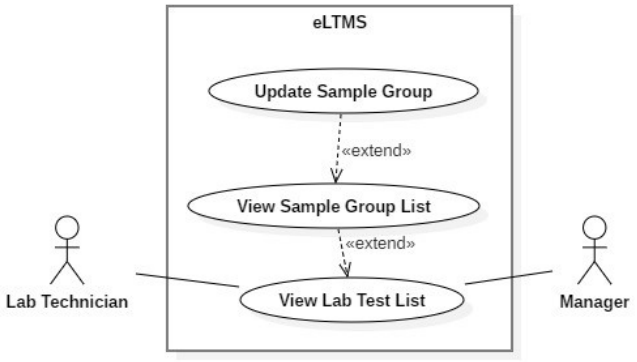


Figure 33 - 2.3.6.3. <Manager, Lab Technician> Update Sample Group

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	Update Sample Group		
Author	DungTT		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Manager, Lab Technician.**

Summary:

- **Update a Sample Group's information.**

Goal:

- **Update a Sample Group's information.**

Triggers:

- **User clicks on Edit button on the action column of the Sample Group's row.**

Preconditions:

- **User logged in as Manager, Lab Technician.**

Post Conditions:

- Success**: Show success message.**
- Fail: **Show error message.**

Main Success Scenario:

Step	Actor Action	System Response
1	Click on Edit button on the action column of the Sample Group's row.	Show a popup, containing fields are filled with old information.
2	Enter new formation of the Sample Group and click "Lưu" button.	Show success message.

Exceptions:

No	Cause	System Response
1	Sample Group Name is empty.	Show error message
2	Description is empty.	Show error message.

Relationships: **Extended from View Sample Group List**

Business Rules:

- **Sample Group Name is not empty, max length is 50.**
- **Description is not empty, max length is 500.**

1.3.7.4. <Manager, Lab Technician> Delete Sample Group

Use Case Diagram

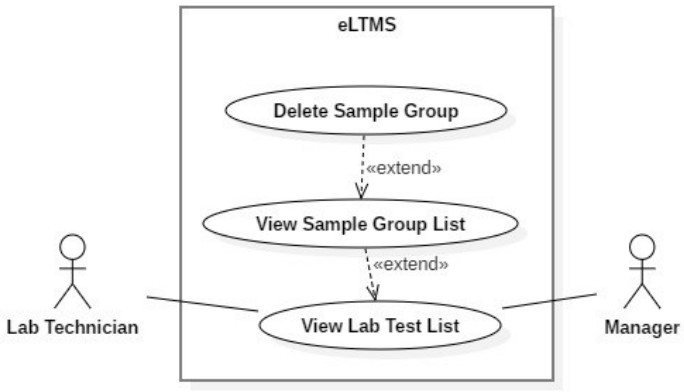


Figure 34 - 2.3.6.4. <Manager, Lab Technician> Delete Sample Group

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	Delete Sample Group		
Author	DungTT		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Manager, Lab Technician**

Summary:

- **Delete an existing Sample Group.**

Goal:

- **Delete an existing Sample Group.**

Triggers:

- **User clicks on Delete button on the action column of the Sample Group's row.**

Preconditions:

- **User logged in as Manager, Lab Technician.**

Post Conditions:

- Success**: Show success message.**
- Fail: **Show error message.**

Main Success Scenario:

Step	Actor Action	System Response
1	Click on Delete button on the action column of the Sample Group's row.	Show confirm popup: "Bạn có chắc chắn muốn xóa?"
2	Click "Có".	Show success message.

Alternative Scenario:

Step	Actor Action	System Response

1	Click on Delete button on the action column of the Sample Group's row.	Show confirm popup: "Bạn có chắc chắn muốn xóa?"
2	Click "Không".	Show error message.

Exceptions:

No	Cause	System Response
1	The Sample Group is deleted at the same time by another person.	Show error message.

Relationships: **Extended from View Sample Group List use-case.**

Business Rules: **N/A.**

1.3.7.5. <Manager, Lab Technician> View Sample List

Use Case Diagram

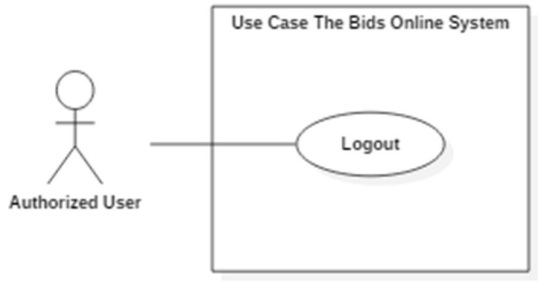


Figure 35 - 2.3.6.1. <Manager, Lab Technician> View Sample List

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	View Sample List		
Author	DungTT		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Manager, Lab Technician.**

Summary:

- **Display a list of Samples.**

Goal:

- **A table of Samples' information, with search, filter and pagination controls.**

Triggers:

- **Display after user clicks on "Quản lý loại xét nghiệm" menu item.**

Preconditions:

- **User logged in as Manager, Lab Technician.**

Post Conditions:

- Success**: A list of Samples is displayed.**

Main Success Scenario:

Step	Actor Action	System Response
1	Logged in successfully as Manager, Lab Technician.	Display a list of Samples.

Alternative Scenario:

Step	Actor Action	System Response
1	Is at another page and clicks on "Quản lý loại xét nghiệm" menu item.	Display a list of Samples.

Exceptions:

No	Cause	System Response
1	There are no data of Samples.	Show message: "Chưa có loại xét nghiệm nào."

Relationships: **N/A**

Business Rules: **N/A.**

1.3.7.6. <Manager, Lab Technician> Create Sample

Use Case Diagram

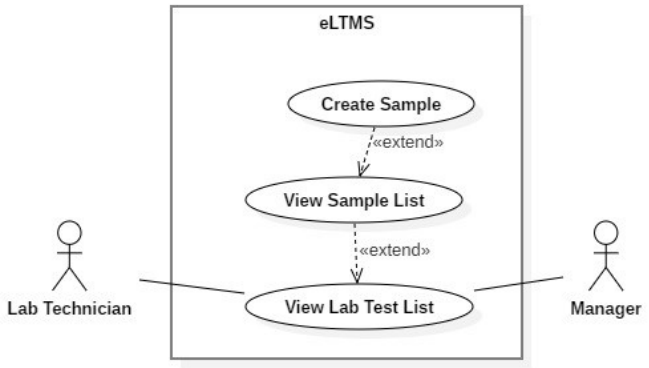


Figure 36 - 2.3.6.2. <Manager, Lab Technician> Create Sample

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	Create Sample		
Author	DungTT		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Manager, Lab Technician.**

Summary:

- **Create a new Sample.**

Goal:

- **Create a new Sample.**

Triggers:

- **User clicks "Thêm mới" Button.**
- **User is at View Sample List page.**

Preconditions:

- **User logged in as Manager, Lab Technician.**

Post Conditions:

- Success**: Show success message.**
- Fail: **Show error message.**

Main Success Scenario:

Step	Actor Action	System Response
1	Click on "Thêm mới" button.	Require information: • Sample Name: text input • Description: text area
2	Input information and click "Lưu" button	Process and show message.

Exceptions:

No	Cause	System Response
1	Sample Name is empty.	Show error message
2	Description is empty.	Show error message.

Relationships: **Extended from View Sample List use-case.**

Business Rules:

- **Sample Name is not empty, max length is 50.**
- **Description is not empty, max length is 500.**

1.3.7.7. <Manager, Lab Technician> Update Sample

Use Case Diagram

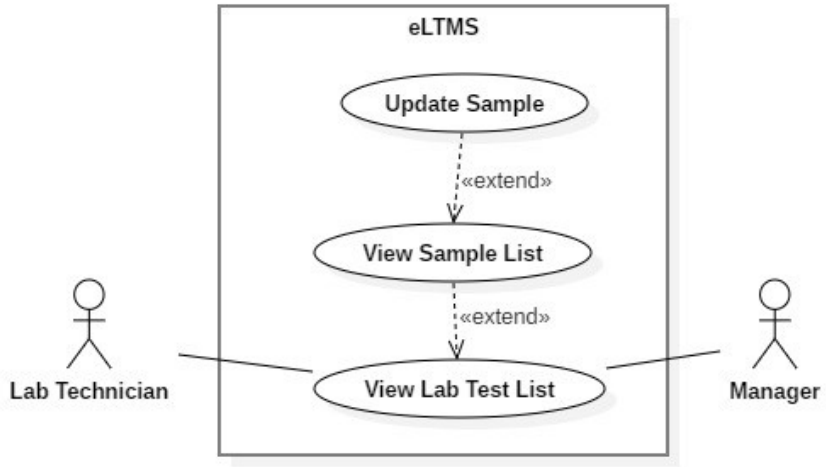


Figure 37 - 2.3.6.3. <Manager, Lab Technician> Update Sample

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	Update Sample		
Author	DungTT		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Manager, Lab Technician.**

Summary:

- **Update a Sample's information.**

Goal:

- **Update a Sample's information.**

Triggers:

- **User clicks on Edit button on the action column of the Sample's row.**

Preconditions:

- **User logged in as Manager, Lab Technician.**

Post Conditions:

- Success**: Show success message.**
- Fail: **Show error message.**

Main Success Scenario:

Step	Actor Action	System Response
1	Click on Edit button on the action column of the Sample's row.	Show a popup, containing fields are filled with old information.
2	Enter new formation of the Sample and click "Lưu" button.	Show success message.

Exceptions:

No	Cause	System Response
1	Sample Name is empty.	Show error message
2	Description is empty.	Show error message.

Relationships: **Extended from View Sample List**

Business Rules:

- **Sample Name is not empty, max length is 50.**
- **Description is not empty, max length is 500.**

1.3.7.8. <Manager, Lab Technician> Delete Sample

Use Case Diagram

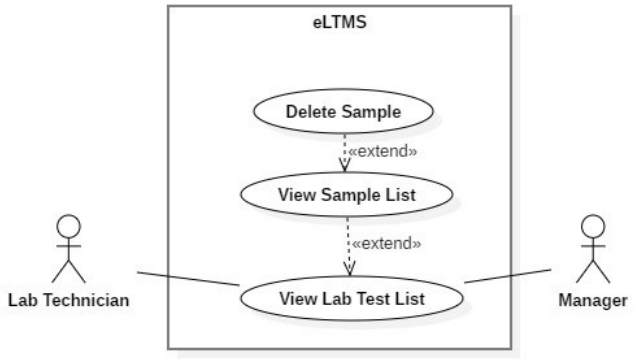


Figure 38 - 2.3.6.4. <Manager, Lab Technician> Delete Sample

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	Delete Sample		
Author	DungTT		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Manager, Lab Technician**

Summary:

- **Delete an existing Sample.**

Goal:

- **Delete an existing Sample.**

Triggers:

- **User clicks on Delete button on the action column of the Sample's row.**

Preconditions:

- **User logged in as Manager, Lab Technician.**

Post Conditions:

- Success**: Show success message.**
- Fail: **Show error message.**

Main Success Scenario:

Step	Actor Action	System Response
1	Click on Delete button on the action column of the Sample's row.	Show confirm popup: "Bạn có chắc chắn muốn xóa?"
2	Click "Có".	Show success message.

Alternative Scenario:

Step	Actor Action	System Response

1	Click on Delete button on the action column of the Sample's row.	Show confirm popup: "Bạn có chắc chắn muốn xóa?"
2	Click "Không".	Show error message.

Exceptions:

No	Cause	System Response
1	The Sample is deleted at the same time by another person.	Show error message.

Relationships: **Extended from View Sample List use-case.**

Business Rules: **N/A.**

1.3.7.9. <Manager, Lab Technician> View LabTest List

Use Case Diagram

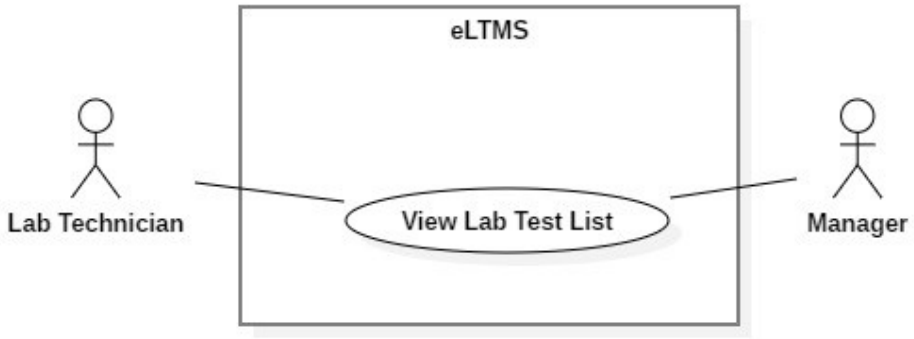


Figure 39 - 2.3.6.1. <Manager, Lab Technician> View LabTest List

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	View LabTest List		
Author	DungTT		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Manager, Lab Technician.**

Summary:

- **Display a list of LabTests.**

Goal:

- **A table of LabTests' information, with search, filter and pagination controls.**

Triggers:

- **Display after user clicks on "Quản lý dịch vụ xét nghiệm" menu item.**

Preconditions:

- **User logged in as Manager, Lab Technician.**

Post Conditions:

- Success**: A list of LabTests is displayed.**

Main Success Scenario:

Step	Actor Action	System Response
1	Logged in successfully as Manager, Lab Technician.	Display a list of LabTests.

Alternative Scenario:

Step	Actor Action	System Response
1	Is at another page and clicks on "Quản lý dịch vụ xét nghiệm" menu item.	Display a list of LabTests.

Exceptions:

No	Cause	System Response
1	There are no data of LabTests.	Show message: "Chưa có dịch vụ xét nghiệm nào nào."

Relationships: **N/A**

Business Rules: **N/A.**

1.3.7.10. <Manager, Lab Technician> Search LabTest

Use Case Diagram

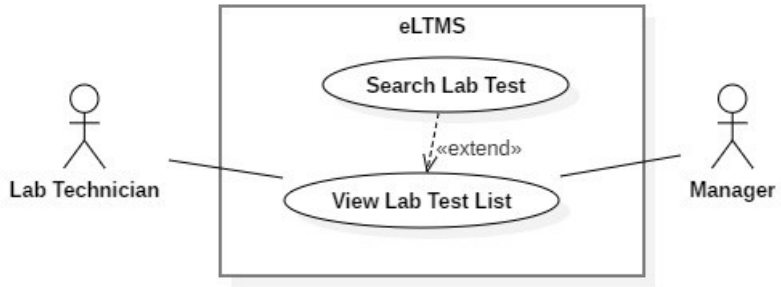


Figure 40 - 2.3.6.2. <Manager, Lab Technician> Search LabTest

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	Search LabTest		
Author	DungTT		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Manager, Lab Technician.**

Summary:

- **Search for LabTests.**

Goal:

- **Search for LabTests.**

Triggers:

- **User enters a search string into search text field.**

Preconditions:

- **User logged in as Manager, Lab Technician.**

Post Conditions:

- Success**: Show search results.**
- Fail: **Show text "Không tìm thấy kết quả nào".**

Main Success Scenario:

Step	Actor Action	System Response
1	Enter search string into search text field. Type Enter.	Display the search results in the table.

Alternative Scenario:

Step	Actor Action	System Response
1	Enter search string into search text field. Type Enter.	Display text messate: "Không tìm thấy kết quả."

Relationships: **Extended from View LabTest List use-case.**

Business Rules:

- **Search results are LabTests that contains the search string in LabTest Code or LabTest Name.**
- **Search case-insensitively.**
- **User can search by unsigned Vietnamese. Ex: User searches "kim tiem", system can return "kim tiêm" results.**

1.3.7.11. <Manager, Lab Technician> Create LabTest

Use Case Diagram

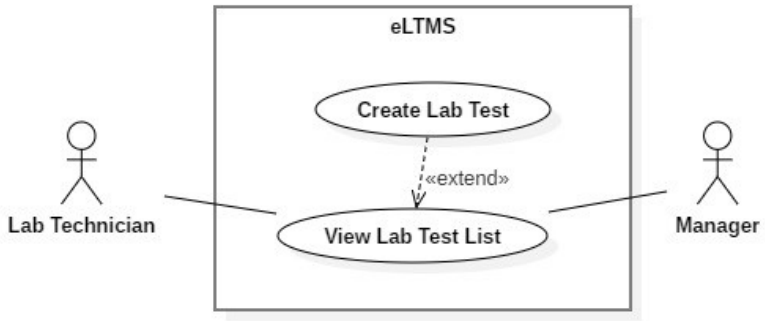


Figure 41 - 2.3.6.2. <Manager, Lab Technician> Create LabTest

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	Create LabTest		
Author	DungTT		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Manager, Lab Technician.**

Summary:

- **Create a new LabTest.**

Goal:

- **Create a new LabTest.**

Triggers:

- **User clicks "Thêm mới" Button.**
- **User is at View LabTest List page.**

Preconditions:

- **User logged in as Manager, Lab Technician.**

Post Conditions:

- Success**: Show success message.**
- Fail: **Show error message.**

Main Success Scenario:

Step	Actor Action	System Response
1	Click on "Thêm mới" button.	Require information: • Lab Test Code: text input • Lab Test Name: text input • Description: text area
2	Input information and click "Lưu" button	Process and show message.

Exceptions:

No	Cause	System Response
1	Lab Test Code is empty.	Show error message
2	Lab Test Name is empty.	Show error message.
3	Description is not selected.	Show error message.

Relationships: **Extended from View LabTest List use-case.**

Business Rules:

- **Lab Test Code is not empty, max length is 50.**
- **Lab Test Name is not empty, max lenth is 50.**
- **Description is not empty, max length is 500.**

1.3.7.12. <Manager, Lab Technician> Update LabTest

Use Case Diagram

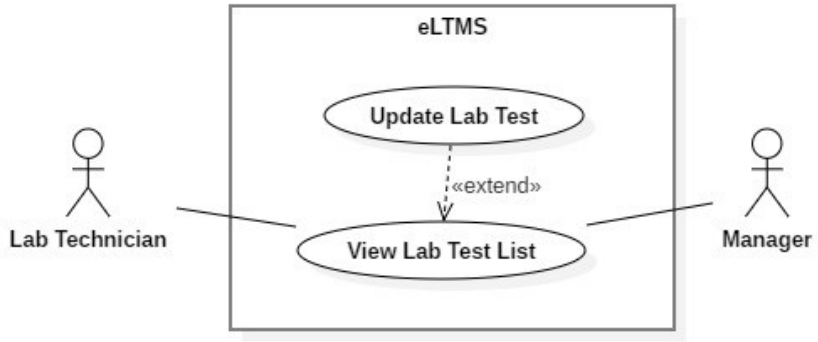


Figure 42 - 2.3.6.3. <Manager, Lab Technician> Update LabTest

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	Update LabTest		
Author	DungTT		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Manager, Lab Technician.**

Summary:

- **Update a LabTest's information.**

Goal:

- **Update a LabTest's information.**

Triggers:

- **User clicks on Edit button on the action column of the LabTest's row.**

Preconditions:

- **User logged in as Manager, Lab Technician.**

Post Conditions:

- Success**: Show success message.**
- Fail: **Show error message.**

Main Success Scenario:

Step	Actor Action	System Response
1	Click on Edit button on the action column of the LabTest's row.	Show a popup, containing fields are filled with old information.
2	Enter new formation of the LabTest and click "Lưu" button.	Show success message.

Exceptions:

No	Cause	System Response
1	Lab Test Code is empty.	Show error message
2	Lab Test Name is empty.	Show error message.
3	Description is not selected.	Show error message.

Relationships: **Extended from View LabTest List**

Business Rules:

- **Lab Test Code is not empty, max length is 50.**
- **Lab Test Name is not empty, max length is 50.**
- **Description is not empty, max length is 500.**

1.3.7.13. <Manager, Lab Technician> Delete LabTest

Use Case Diagram

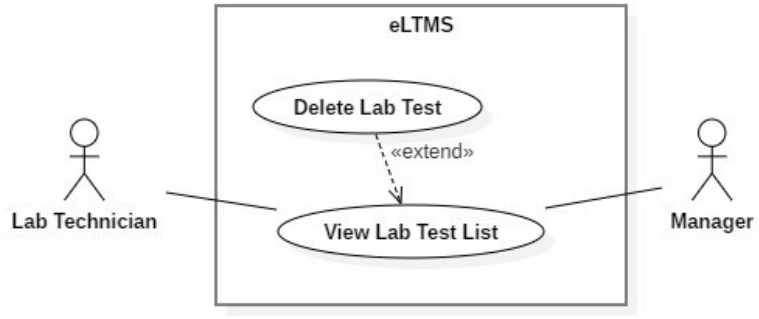


Figure 43 - 2.3.6.4. <Manager, Lab Technician> Delete LabTest

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	Delete LabTest		
Author	DungTT		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Manager, Lab Technician**

Summary:

- **Delete an existing LabTest.**

Goal:

- **Delete an existing LabTest.**

Triggers:

- **User clicks on Delete button on the action column of the LabTest's row.**

Preconditions:

- **User logged in as Manager, Lab Technician.**

Post Conditions:

- Success**: Show success message.**
- Fail: **Show error message.**

Main Success Scenario:

Step	Actor Action	System Response
1	Click on Delete button on the action column of the LabTest's row.	Show confirm popup: "Bạn có chắc chắn muốn xóa?"
2	Click "Có".	Show success message.

Alternative Scenario:

Step	Actor Action	System Response
1	Click on Delete button on the action column of the LabTest's row.	Show confirm popup: "Bạn có chắc chắn muốn xóa?"

2	Click "Không".	Show error message.

Exceptions:

No	Cause	System Response
1	The LabTest is deleted at the same time by another person.	Show error message.

Relationships: **Extended from View LabTest List use-case.**

Business Rules: **N/A.**

1.3.7.14. <Manager> View Employee Account List

Use Case Diagram

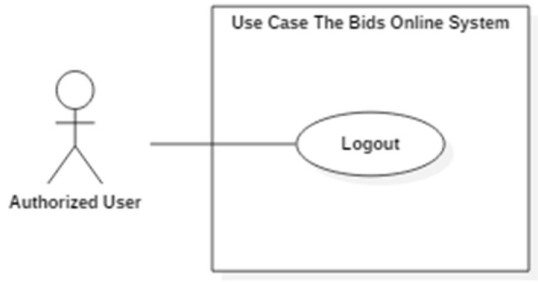


Figure 44 - 2.3.6.1. <Manager> View Employee Account List

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	View Employee Account List		
Author	LamNH		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Manager.**

Summary:

- **Display a list of Employee Accounts.**

Goal:

- **A table of Employee Accounts' information, with search, filter and pagination controls.**

Triggers:

- **Display after user clicks on "Quản lý tài khoản nhân viên" menu item.**

Preconditions:

- **User logged in as Manager.**

Post Conditions:

- Success**: A list of Employee Accounts is displayed.**

Main Success Scenario:

Step	Actor Action	System Response
1	Logged in successfully as Manager.	Display a list of Employee Accounts.

Alternative Scenario:

Step	Actor Action	System Response
1	Is at another page and clicks on "Quản lý tài khoản nhân viên" menu item.	Display a list of Employee Accounts.

Exceptions:

No	Cause	System Response
1	There are no data of Employee Accounts.	Show message: "Chưa có tài khoản nhân viên nào."

Relationships: **N/A**

Business Rules: **N/A.**

1.3.7.15. <Manager> Search Employee Account

Use Case Diagram

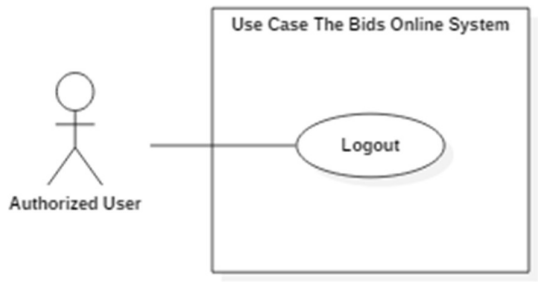


Figure 45 - 2.3.6.2. <Manager> Search Employee Account

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	Search Employee Account		
Author	DungTT		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Manager.**

Summary:

- **Search for Employee Accounts.**

Goal:

- **Search for Employee Accounts.**

Triggers:

- **User enters a search string into search text field.**

Preconditions:

- **User logged in as Manager.**

Post Conditions:

- Success**: Show search results.**
- Fail: **Show text "Không tìm thấy kết quả nào".**

Main Success Scenario:

Step	Actor Action	System Response
1	Enter search string into search text field. Type Enter.	Display the search results in the table.

Alternative Scenario:

Step	Actor Action	System Response
1	Enter search string into search text field. Type Enter.	Display text messate: "Không tìm thấy kết quả."

Relationships: **Extended from View Employee Account List use-case.**

Business Rules:

- **Search results are Employee Accounts that contains the search string in Employee Account Code or Employee Account Name.**
- **Search case-insensitively.**
- **User can search by unsigned Vietnamese. Ex: User searches "kim tiem", system can return "kim tiêm" results.**

1.3.7.16. <Manager> Create Employee Account

Use Case Diagram

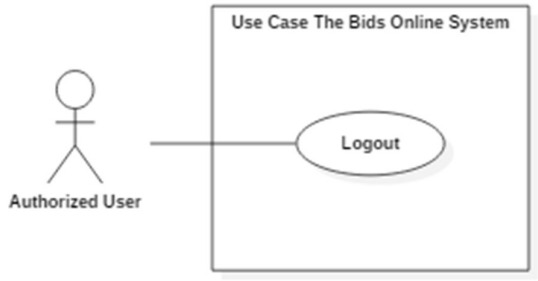


Figure 46 - 2.3.6.2. <Manager> Create Employee Account

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	Create Employee Account		
Author	DungTT		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Manager.**

Summary:

- **Create a new Employee Account.**

Goal:

- **Create a new Employee Account.**

Triggers:

- **User clicks "Thêm mới" Button.**
- **User is at View Employee Account List page.**

Preconditions:

- **User logged in as Manager.**

Post Conditions:

- Success**: Show success message.**
- Fail: **Show error message.**

Main Success Scenario:

Step	Actor Action	System Response
1	Click on "Thêm mới" button.	Require information: • Mã vật tư: text input • Tên vật tư: text input • Loại vật tư: dropdown list • Đơn vị: dropdown list • Ghi chú: textarea

2	Input information and click "Lưu" button	Process and show message.

Relationships: **Extended from View Employee Account List use-case.**

Business Rules: **N/A**

1.3.7.17. <Manager> Update Employee Account

Use Case Diagram

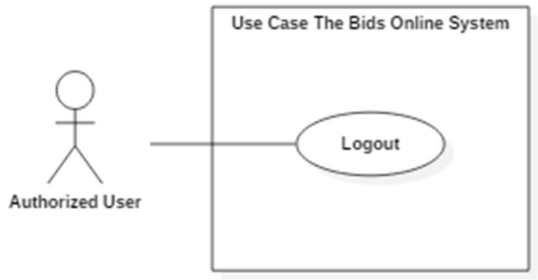


Figure 47 - 2.3.6.3. <Manager> Update Employee Account

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	Update Employee Account		
Author	DungTT		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Manager.**

Summary:

- **Update a Employee Account's information.**

Goal:

- **Update a Employee Account's information.**

Triggers:

- **User clicks on Edit button on the action column of the Employee Account's row.**

Preconditions:

- **User logged in as Manager.**

Post Conditions:

- Success**: Show success message.**
- Fail: **Show error message.**

Main Success Scenario:

Step	Actor Action	System Response
1	Click on Edit button on the action column of the Employee Account's row.	Show a popup, containing fields are filled with old information.
2	Enter new formation of the Employee Account and click "Lưu" button.	Show success message.

Relationships: **Extended from View Employee Account List**

Business Rules: **N/A**

1.3.7.18. <Manager> Delete Employee Account

Use Case Diagram

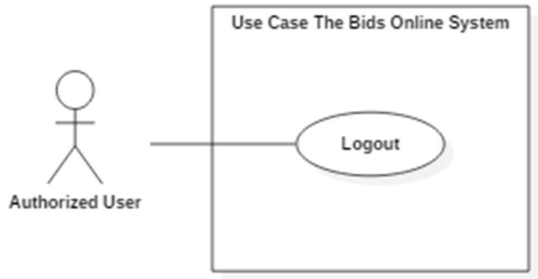


Figure 48 - 2.3.6.4. <Manager> Delete Employee Account

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0

Use Case Name	Delete Employee Account		
Author	DungTT		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Manager**

Summary:

- **Delete an existing Employee Account.**

Goal:

- **Delete an existing Employee Account.**

Triggers:

- **User clicks on Delete button on the action column of the Employee Account's row.**

Preconditions:

- **User logged in as Manager.**

Post Conditions:

- Success**: Show success message.**
- Fail: **Show error message.**

Main Success Scenario:

Step	Actor Action	System Response
1	Click on Delete button on the action column of the Employee Account's row.	Show confirm popup: "Bạn có chắc chắn muốn xóa?"
2	Click "Có".	Show success message.

Alternative Scenario:

Step	Actor Action	System Response
1	Click on Delete button on the action column of the Employee Account's row.	Show confirm popup: "Bạn có chắc chắn muốn xóa?"
2	Click "Không".	Show error message.

Exceptions:

No	Cause	System Response
1	The Employee Account is deleted at the same time by another person.	Show error message.

Relationships: **Extended from View Employee Account List use-case.**

Business Rules: **N/A.**

1.3.7.19. <Manager> View Patient List

Use Case Diagram

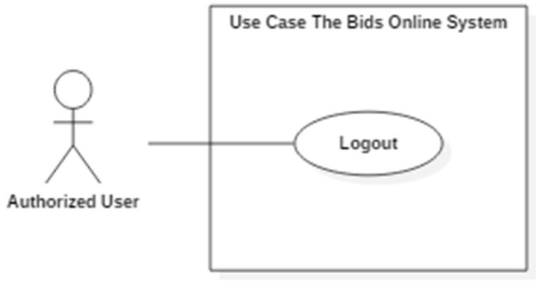


Figure 49 - 2.3.6.1. <Manager> View Patient List

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	View Patient List		
Author	LamNH		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Manager.**

Summary:

- **Display a list of Patients.**

Goal:

- **A table of Patients' information, with search, filter and pagination controls.**

Triggers:

- **Display after user clicks on "Quản lý bệnh nhân" menu item.**

Preconditions:

- **User logged in as Manager.**

Post Conditions:

- Success**: A list of Patients is displayed.**

Main Success Scenario:

Step	Actor Action	System Response
1	Logged in successfully as Manager.	Display a list of Patients.

Alternative Scenario:

Step	Actor Action	System Response
1	Is at another page and clicks on "Quản lý bệnh nhân" menu item.	Display a list of Patients.

Exceptions:

No	Cause	System Response
1	There are no data of Patients.	Show message: "Chưa có nhân viên nào."

Relationships: **N/A**

Business Rules: **N/A.**

1.3.7.20. <Manager> Search Patient

Use Case Diagram

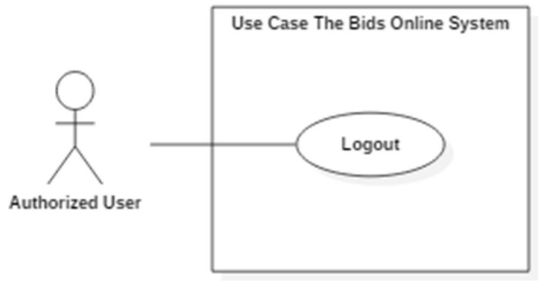


Figure 50 - 2.3.6.2. <Manager> Search Patient

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	Search Patient		
Author	DungTT		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Manager.**

Summary:

- **Search for Patients.**

Goal:

- **Search for Patients.**

Triggers:

- **User enters a search string into search text field.**

Preconditions:

- **User logged in as Manager.**

Post Conditions:

- Success**: Show search results.**
- Fail: **Show text "Không tìm thấy kết quả nào".**

Main Success Scenario:

Step	Actor Action	System Response

1	Enter search string into search text field. Type Enter.	Display the search results in the table.

Alternative Scenario:

Step	Actor Action	System Response
1	Enter search string into search text field. Type Enter.	Display text messate: "Không tìm thấy kết quả."

Relationships: **Extended from View Patient List use-case.**

Business Rules:

- **Search results are Patients that contains the search string in Patient Code or Patient Name.**
- **Search case-insensitively.**
- **User can search by unsigned Vietnamese. Ex: User searches "Nguyen Van", system can return "Nguyễn Văn" results.**

1.3.7.21. <Manager> Create Patient

Use Case Diagram

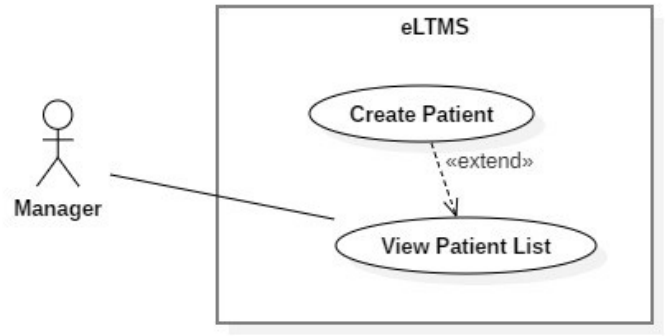


Figure 51 - 2.3.6.2. <Manager> Create Patient

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	Create Patient		
Author	DungTT		
Date	1/10/2018	**Priority**	Normal
Actor: • **Manager.**			

Summary:

- **Create a new Patient.**

Goal:

- **Create a new Patient.**

Triggers:

- **User clicks "Thêm mới" Button.**
- **User is at View Patient List page.**

Preconditions:

- **User logged in as Manager.**

Post Conditions:

- Success**: Show success message.**
- Fail: **Show error message.**

Main Success Scenario:

Step	Actor Action	System Response
1	Click on "Thêm mới" button.	Require information: • Full name: text input • Gender: radio buttons • Phone number: text input • Email: text input • Date of birth: date input • Home Address: text input • Company Address: text input • Identity Card Number: text input
2	Input information and click "Lưu" button	Process and show message.

Exceptions:

No	Cause	System Response
1	Full name is empty.	Show error message
2	Phone number is empty.	Show error message.
3	Date of birth is empty.	Show error message.
4	Identity Card Number is empty.	Show error message.

Relationships: **Extended from View Patient List use-case.**

Business Rules:

- **Full name: is not empty, max length is 200.**
- **Phone number: is not empty, max length is 20.**

- **Email: max length is 255.**
- **Date of birth: is not empty.**
- **Home Address: max length is 200.**
- **Company Address: max length is 200.**
- **Identity Card Number: is not empty, max length is 20.**

1.3.7.22. <Manager> Update Patient

Use Case Diagram

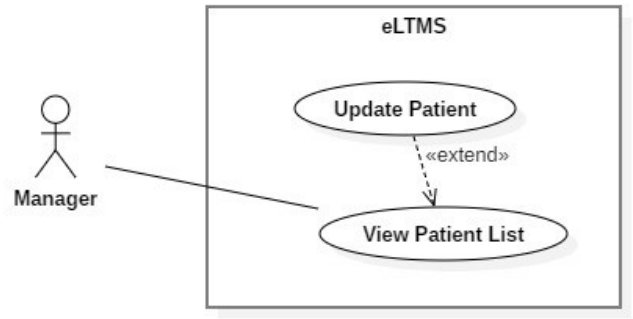


Figure 52 - 2.3.6.3. <Manager> Update Patient

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	Update Patient		
Author	DungTT		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Manager.**

Summary:

- **Update a Patient's information.**

Goal:

- **Update a Patient's information.**

Triggers:

- **User clicks on Edit button on the action column of the Patient's row.**

Preconditions:

- **User logged in as Manager.**

Post Conditions:

- Success**: Show success message.**
- Fail: **Show error message.**

Main Success Scenario:

Step	Actor Action	System Response
1	Click on Edit button on the action column of the Patient's row.	Show a popup, containing fields are filled with old information.
2	Enter new formation of the Patient and click "Lưu" button.	Show success message.

Exceptions:

No	Cause	System Response
1	Full name is empty.	Show error message
2	Phone number is empty.	Show error message.
3	Date of birth is empty.	Show error message.
4	Identity Card Number is empty.	Show error message.
5	Full name is empty.	Show error message

Relationships: **Extended from View Patient List**

Business Rules:

- **Full name: is not empty, max length is 200.**
- **Phone number: is not empty, max length is 20.**
- **Email: max length is 255.**
- **Date of birth: is not empty.**
- **Home Address: max length is 200.**
- **Company Address: max length is 200.**
- **Identity Card Number: is not empty, max length is 20.**

1.3.7.23. <Manager> Delete Patient

Use Case Diagram

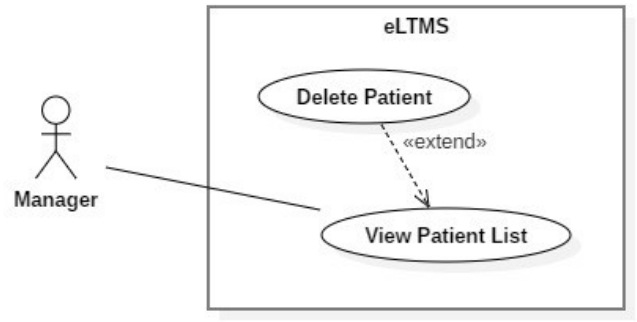


Figure 53 - 2.3.6.4. <Manager> Delete Patient

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	Delete Patient		
Author	DungTT		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Manager**

Summary:

- **Delete an existing Patient.**

Goal:

- **Delete an existing Patient.**

Triggers:

- **User clicks on Delete button on the action column of the Patient's row.**

Preconditions:

- **User logged in as Manager.**

Post Conditions:

- Success**: Show success message.**
- Fail: **Show error message.**

Main Success Scenario:

Step	Actor Action	System Response
1	Click on Delete button on the action column of the Patient's row.	Show confirm popup: "Bạn có chắc chắn muốn xóa?"
2	Click "Có".	Show success message.

Alternative Scenario:

Step	Actor Action	System Response

1	Click on Delete button on the action column of the Patient's row.	Show confirm popup: "Bạn có chắc chắn muốn xóa?"
2	Click "Không".	Show error message.

Exceptions:

No	Cause	System Response
1	The Patient is deleted at the same time by another person.	Show error message.

Relationships: **Extended from View Patient List use-case.**

Business Rules: **N/A.**

1.3.7.24. <Manager> View Employee List

Use Case Diagram

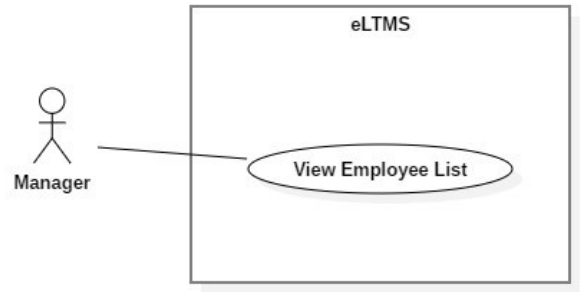


Figure 54 - 2.3.6.1. <Manager> View Employee List

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	View Employee List		
Author	DungTT		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Manager.**

Summary:

- **Display a list of Employees.**

Goal:

- **A table of Employees' information, with search, filter and pagination controls.**

Triggers:

- **Display after user clicks on "Quản lý nhân viên" menu item.**

Preconditions:

- **User logged in as Manager.**

Post Conditions:

- Success**: A list of Employees is displayed.**

Main Success Scenario:

Step	Actor Action	System Response
1	Logged in successfully as Manager.	Display a list of Employees.

Alternative Scenario:

Step	Actor Action	System Response
1	Is at another page and clicks on "Quản lý nhân viên" menu item.	Display a list of Employees.

Exceptions:

No	Cause	System Response
1	There are no data of Employees.	Show message: "Chưa có nhân viên nào."

Relationships: **N/A**

Business Rules: **N/A.**

1.3.7.25. <Manager> Search Employee

Use Case Diagram

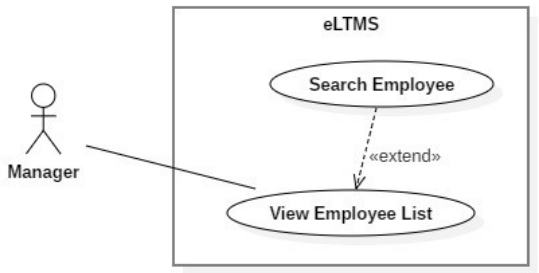


Figure 55 - 2.3.6.2. <Manager> Search Employee

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	Search Employee		
Author	DungTT		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Manager.**

Summary:

- **Search for Employees.**

Goal:

- **Search for Employees.**

Triggers:

- **User enters a search string into search text field.**

Preconditions:

- **User logged in as Manager.**

Post Conditions:

- Success**: Show search results.**
- Fail: **Show text "Không tìm thấy kết quả nào".**

Main Success Scenario:

Step	Actor Action	System Response
1	Enter search string into search text field. Type Enter.	Display the search results in the table.

Alternative Scenario:

Step	Actor Action	System Response
1	Enter search string into search text field. Type Enter.	Display text messate: "Không tìm thấy kết quả."

Relationships: **Extended from View Employee List use-case.**

Business Rules:

- **Search results are Employees that contains the search string in Employee Code or Employee Name.**
- **Search case-insensitively.**
- **User can search by unsigned Vietnamese. Ex: User searches "Nguyen Van", system can return "Nguyễn Văn" results.**

1.3.7.26. <Manager> Create Employee

Use Case Diagram

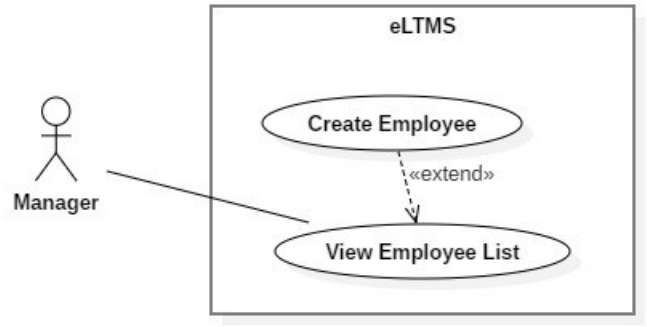


Figure 56 - 2.3.6.2. <Manager> Create Employee

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	Create Employee		
Author	DungTT		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Manager.**

Summary:

- **Create a new Employee.**

Goal:

- **Create a new Employee.**

Triggers:

- **User clicks "Thêm mới" Button.**
- **User is at View Employee List page.**

Preconditions:

- **User logged in as Manager.**

Post Conditions:

- Success**: Show success message.**
- Fail: **Show error message.**

Main Success Scenario:

Step	Actor Action	System Response
1	Click on "Thêm mới" button.	Require information: • Full name: text input • Gender: radio buttons • Phone number: text input • Email: text input • Date of birth: date input • Home Address: text input

2	Input information and click "Lưu" button	Process and show message.

Exceptions:

No	Cause	System Response
1	Full name is empty.	Show error message
2	Date of birth is in the future	Show error message

Relationships: **Extended from View Employee List use-case.**

Business Rules:

- Full name: is not empty, max length is 200
- Phone number: max length is 20
- Email: max length is 255
- Date of birth: is not in the future
- Home Address: max length is 500

1.3.7.27. <Manager> Update Employee

Use Case Diagram

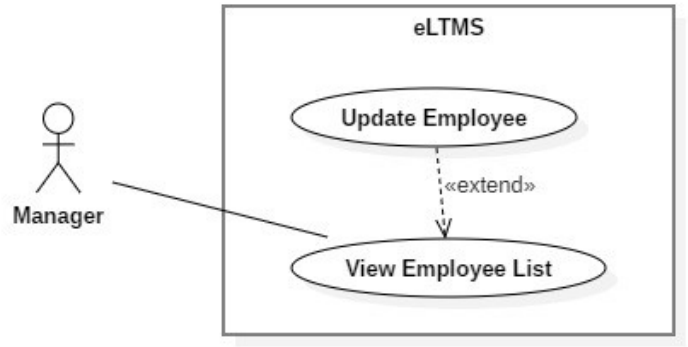


Figure 57 - 2.3.6.3. <Manager> Update Employee

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	Update Employee		
Author	DungTT		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Manager.**

Summary:

- **Update a Employee's information.**

Goal:

- **Update a Employee's information.**

Triggers:

- **User clicks on Edit button on the action column of the Employee's row.**

Preconditions:

- **User logged in as Manager.**

Post Conditions:

- Success**: Show success message.**
- Fail: **Show error message.**

Main Success Scenario:

Step	Actor Action	System Response
1	Click on Edit button on the action column of the Employee's row.	Show a popup, containing fields are filled with old information.
2	Enter new formation of the Employee and click "Lưu" button.	Show success message.

Exceptions:

No	Cause	System Response
1	Full name is empty.	Show error message
2	Date of birth is in the future	Show error message

Relationships: **Extended from View Employee List**

Business Rules:

- Full name: is not empty, max length is 200
- Phone number: max length is 20
- Email: max length is 255
- Date of birth: is not in the future
- Home Address: max length is 500

1.3.7.28. <Manager> Delete Employee

Use Case Diagram

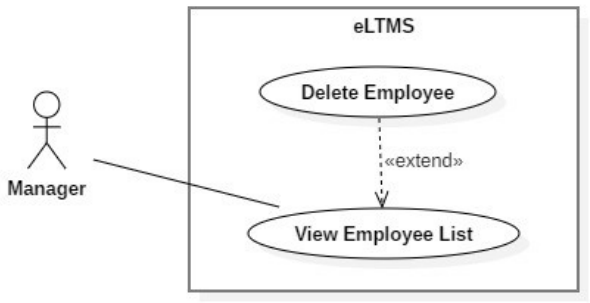


Figure 58 - 2.3.6.4. <Manager> Delete Employee

Use Case Specification

USE CASE - UC_14			
Use Case No.	14	**Use Case Version**	1.0
Use Case Name	Delete Employee		
Author	DungTT		
Date	1/10/2018	**Priority**	Normal

Actor:

- **Manager**

Summary:

- **Delete an existing Employee.**

Goal:

- **Delete an existing Employee.**

Triggers:

- **User clicks on Delete button on the action column of the Employee's row.**

Preconditions:

- **User logged in as Manager.**

Post Conditions:

- Success**: Show success message.**
- Fail: **Show error message.**

Main Success Scenario:

Step	Actor Action	System Response
1	Click on Delete button on the action column of the Employee's row.	Show confirm popup: "Bạn có chắc chắn muốn xóa?"
2	Click "Có".	Show success message.

Alternative Scenario:

Step	Actor Action	System Response

1	Click on Delete button on the action column of the Employee's row.	Show confirm popup: "Bạn có chắc chắn muốn xóa?"
2	Click "Không".	Show error message.

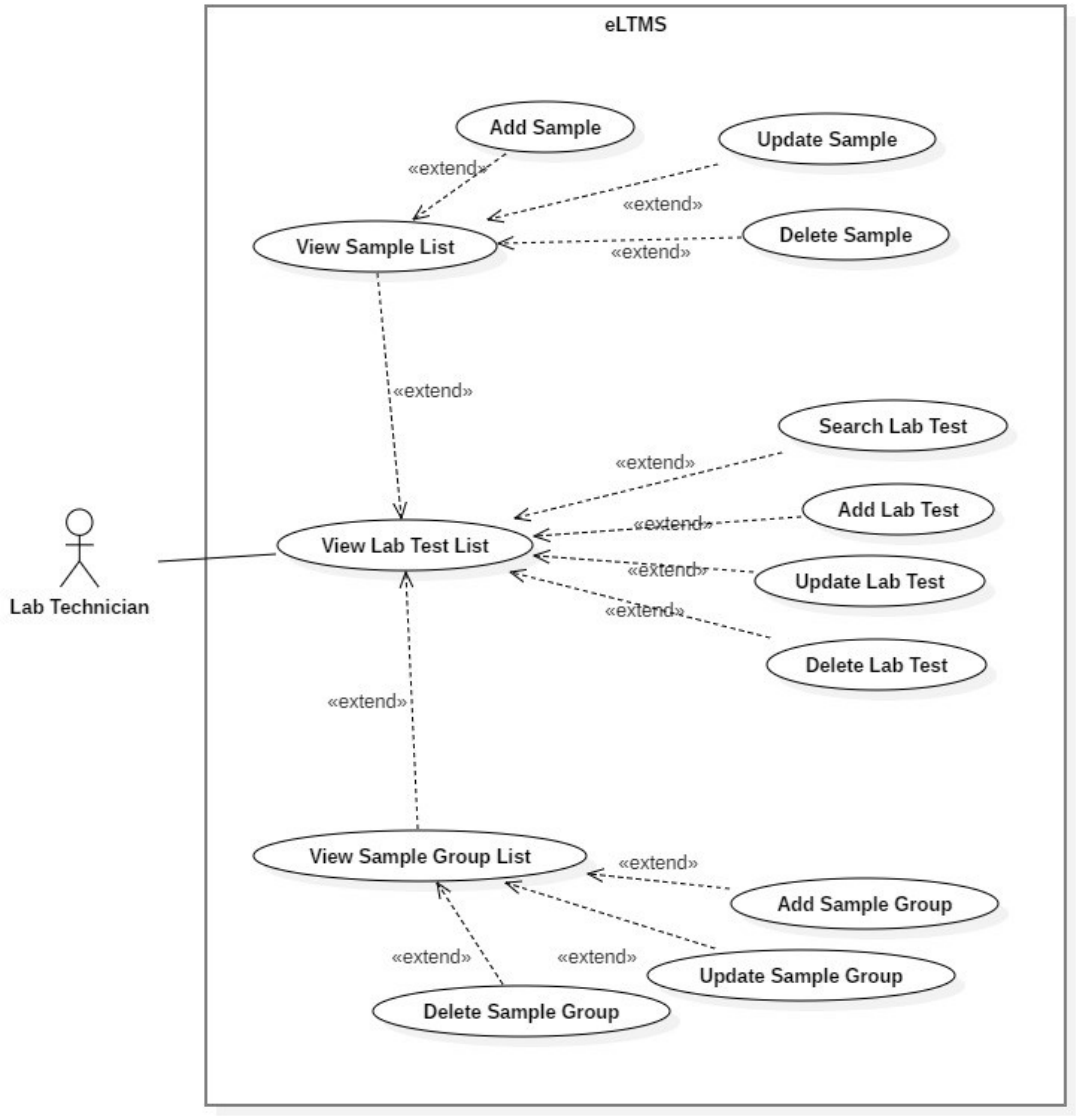
Exceptions:

No	Cause	System Response
1	The Employee is deleted at the same time by another person.	Show error message.

Relationships: **Extended from View Employee List use-case.**

Business Rules: **N/A.**

1.3.8. Lab Technician Overview Use Case



3. Software System Attribute

3.1. Usability

- User website and mobile app: User can make appointment at the first time of using.
- Admin website: 90% employees can work with the system rightly after less than 8 hours of training.

3.2. Reliability

- The rate of failure occurrence shall be 1/1500 (1 occurrence in 1500 days – nearly 3 years).

- The number of sending notification failure is 1 time per 1000 notifications.
- The data should be backed up every day.

3.3. Availability

- System is divided into modules, if a module is down, it will not affect others.
- The system can be adapted for a large number of request (maximum 100 users at the same time).

3.4. Security

- Privacy: Each role of user has a specific permission to interact with system.
- System always checks authorization and authentication before doing anything.
- Only admin can grant permission to other roles.

3.5. Maintainability

- The system is divided into separate modules.
- The source code is easy to maintain and upgrade.

3.6. Portability

- The web application is running on desktop, tablet and mobile.

4. Conceptual Diagram

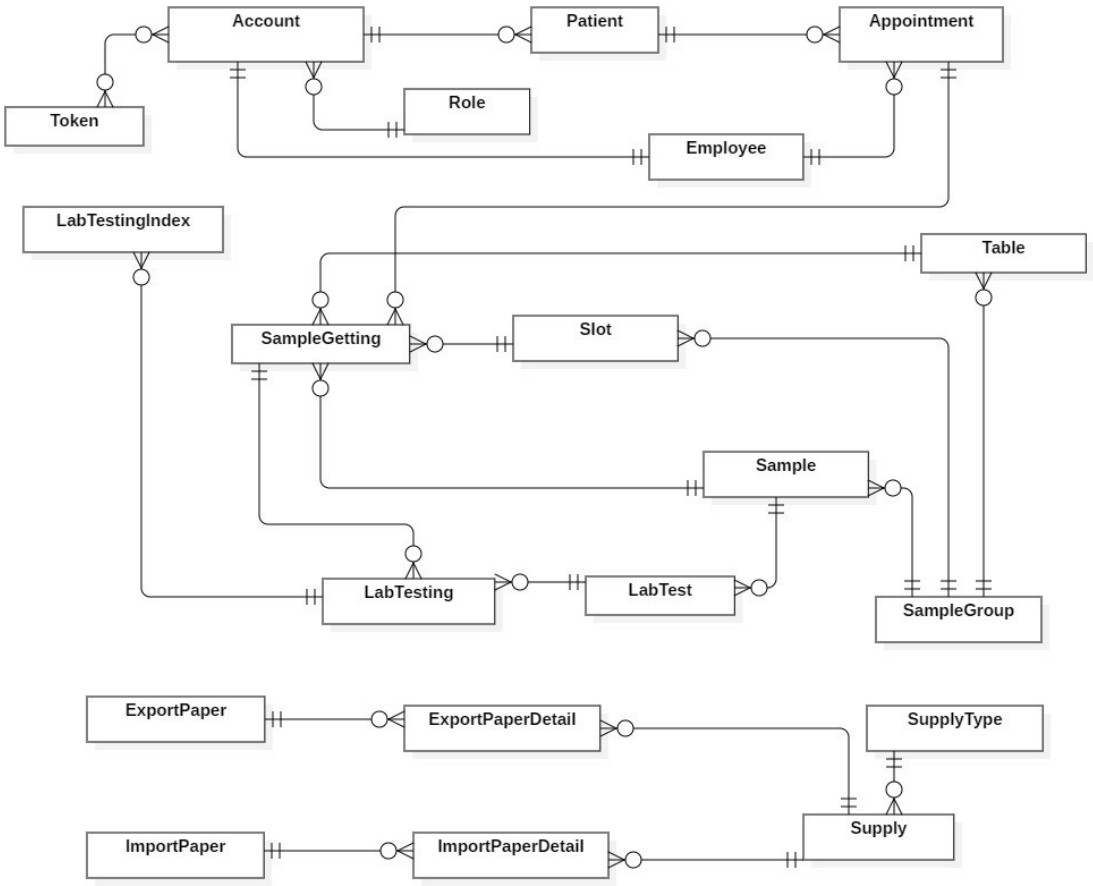


Figure 59 - Conceptual Diagram

Data Dictionary

Entity Data dictionary: describe all content of all entities	
Entity Name	**Description**
Account	Contain account information
Appointment	Contain Appointment information
Employee	Contain staff's information
ExportPaper	Contain Export Paper information
ExportPaperDetail	Contain Export Paper Detail information
ImportPaper	Contain information about Import Paper
ImportPaperDetail	Contain Import Paper Detail information
LabTest	Contain Lab Test information
LabTesting	Contain information about Lab Testing
LabTestingIndex	Contain transaction information of Lab Testing Index
Patient	Contain Patient information
Role	Contain Role information
Sample	Contain Sample information
SampleGetting	Contain Sample Getting information

SampleGroup	Contain Sample Group information
Slot	Contain Slot information
Supply	Contain Supply information
SupplyType	Contain Supply Type information
Table	Contain Table information
Token	Contain Token information

Table 14 - Data dictionary

D. Software Design Description

1. Design Overview

This document describes the technical and user interface design of Building the laboratory tests management system (eLTMS).

Document overview:

Section 2: gives an overall description of the system architecture design.

Section 3: gives component diagrams that describe the connection and integration of the system.

Section 4: gives the details design description which includes class diagram, class explanation, and sequence diagram to detailss the application functions.

Section 5: describes screens design.

Section 6: describes a fully attributed ERD.

Section 7: describes algorithms.

2. System Architectural Design

Our system has been developed under the 3-layer architecture. The 3-layer architecture is different from the 3-tier architecture, because 3 components are separated logically (can be deployed on the same server), not physically (on different servers).

We choose this architecture for our system because of following advantages:

- **Speed of development:** a specific layer can be upgraded with minimal impact on the other layers.
- **Scalability**: By separating out the different layers we can scale each independently depending on the need at any given time.
- **Performance:** This allows you to load balance each layer independently, improving overall performance with minimal resources.

The 3-layer architecture consists of:

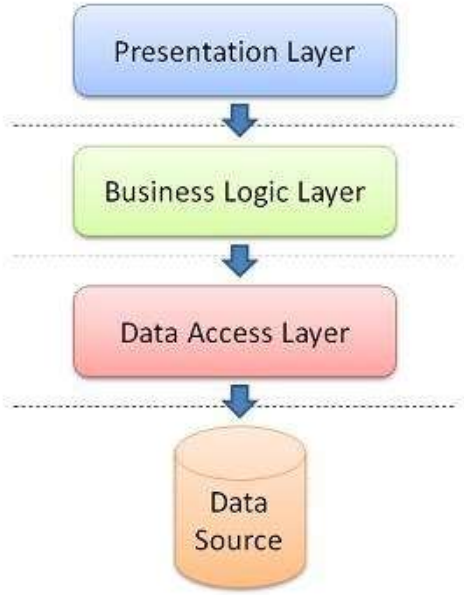


Figure 60 - System Architecture Design

- **Presentation Layer:** consists of the user interface. This user interface is often a graphical one accessible through a web browser or web-based application and which displays content and information useful to an end user.
- **Business Logic Layer:** contains the functional business logic which drives an application's core capabilities.
- **Data Access Layer:** provides simplified access to data source.

3. Details Description

3.1. Class Diagram

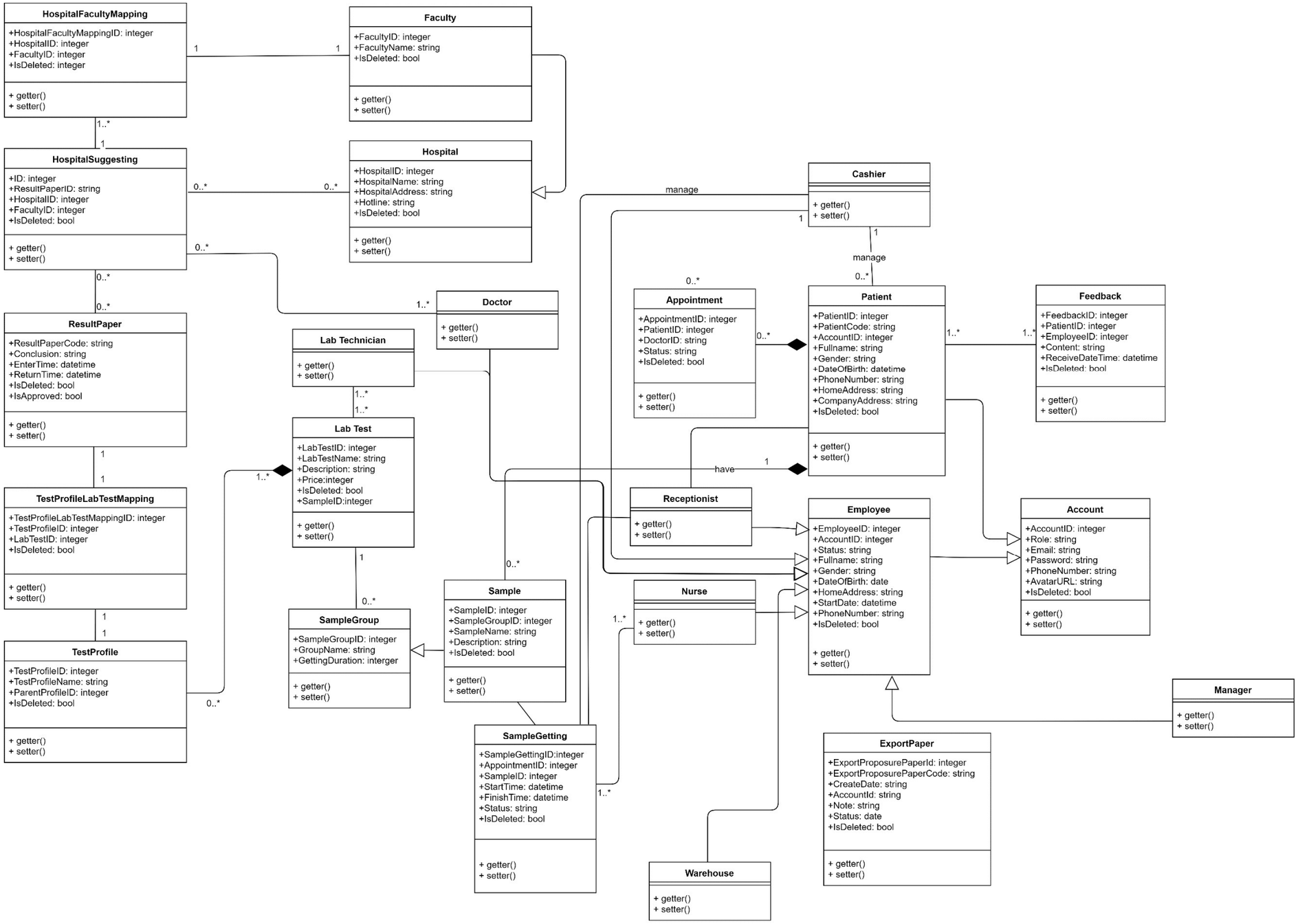


Figure 61 - Class Diagram

CLASS DICTIONARY: DESCRIBE CLASS	
Class Name	**Description**
Patient	Patient
Employee	Employee
Feedback	Feedback
Account	Account
Manager	Manager
Receptionist	Receptionist
Appointment	Appointment
ExportPaperDetail	ExportPaperDetail
ExportPaper	ExportPaper
Supply	Supply
SupplyType	SupplyType
ImportPaperDetail	ImportPaperDetail

Table 15 - Class Dictionary

3.2. Class Diagram Explanation

3.2.1. Account

Attribute

Attribute	Type	Visibility	Description
AccountID	integer	public	Unique identifier of an account
Role	string	public	Account's Role
Email	string	public	Account's Email
Password	string	public	Account's Password
PhoneNumber	string	public	Account's Phone number
AvatarURL	string	public	Account's AvatarURL
IsDeleted	bool	public	Account's IsDeleted

Table 64 Account attribute explanation

Method

Method	Return type	Visibility	Description
getter()	string	public	get attribute value
setter()	void	public	return value of attribute

checkLogin()	Boolean	public	check Account's phone and password
register()	Boolean	public	register new user account

Table 65 Account method explanation

3.2.2. Feedback (removed)

Attribute

Attribute	Type	Visibility	Description
FeedbackID	integer	public	Unique identifier of a feedback
PatientID	integer	public	Feedback's Patient
EmployeeID	integer	public	Feedback's Employee
Content	string	public	Feedback's Content
ReceiveDateTime	datetime	public	Feedback's Date Receive
IsDeleted	bool	public	Feedback's IsDeleted

Table 66 Feedback attribute explanation

Method

Method	Return type	Visibility	Description
getter()	string	public	get attribute value
setter()	void	public	return value of attribute

Table 67 Feedback method explanation

3.2.3. Manager (removed)

Attribute

Attribute	Type	Visibility	Description

Table 68 Manager attribute explanation

Method

Method	Return type	Visibility	Description
getter()	string	public	get attribute value
setter()	void	public	return value of attribute

Table 69 Manager method explanation

3.2.4. ExportPaper

Attribute

Attribute	Type	Visibility	Description
ExportProposurePaperId	integer	public	Unique identifier of an Export Paper
ExportProposurePaperCode	string	public	ExportPaper's Code
CreateDate	datetime	public	ExportPaper's CreateDate
AccountId	integer	public	ExportPaper's Account
Note	string	public	ExportPaper's Note
Status	string	public	ExportPaper's Status
IsDeleted	bool	public	ExportPaper's IsDeleted

Table 70 Export Paper attribute explanation

Method

Method	Return type	Visibility	Description
getter()	string	public	get attribute value
setter()	void	public	return value of attribute

Table 71 Export Paper method explanation

3.2.5. SupplyType

Attribute

Attribute	Type	Visibility	Description
SupplyTypeID	integer	public	Unique identifier of a Supply Type
SupplyTypeName	integer	public	SupplyType's Name
IsDeleted	bool	public	SupplyType's IsDeleted

Table 72 Supply Type attribute explanation

Method

Method	Return type	Visibility	Description
getter()	string	public	get attribute value
setter()	void	public	return value of attribute

Table 73 Supply Type method explanation

3.2.6. Patient (removed)

Attribute

Attribute	Type	Visibility	Description
PatientID	integer	public	Unique identifier of a Patient
PatientCode	string	public	Patient's Code
AccountID	integer	public	Patient's Account
Fullname	string	public	Patient's Name
Gender	string	public	Patient's Gender
DateOfBirth	datetime	public	Patient's BirthDay
PhoneNumber	string	public	Patient's Phone
HomeAddress	string	public	Patient's Home Address
CompanyAddress	string	public	Patient's Company Address
IsDeleted	bool	public	Patient's IsDeleted

Table 74 Patient attribute explanation

Method

Method	Return type	Visibility	Description
getter()	string	public	get attribute value
setter()	void	public	return value of attribute

Table 75 Patient method explanation

3.2.7. Employee (removed)

Attribute

Attribute	Type	Visibility	Description
EmployeeID	integer	public	Unique identifier of an Employee
AccountID	integer	public	Employee's Account
Status	string	public	Employee's Status
Fullname	string	public	Employee's Name
Gender	string	public	Employee's Gender
DateOfBirth	datetime	public	Employee's BirthDay
PhoneNumber	string	public	Employee's Phone
HomeAddress	string	public	Employee's Home Address
StartDay	datetime	public	Employee's Start Day

IsDeleted	bool	public	Employee's IsDeleted

Table 76 Employee attribute explanation

Method

Method	Return type	Visibility	Description
getter()	string	public	get attribute value
setter()	void	public	return value of attribute

Table 77 Employee method explanation

3.2.8. ExportPaperDetail

Attribute

Attribute	Type	Visibility	Description
ExportProposurePaperDetailId	integer	public	Unique identifier of an Export Paper Detail
ExportProposurePaperId	integer	public	ExportPaperDetail's Export Proposer Paper
SuppliesId	integer	public	ExportPaperDetail's Supply
Unit	string	public	ExportPaperDetail's Unit
Quantity	integer	public	ExportPaperDetail's Quantity
Note	string	public	ExportPaperDetail's Note
IsDeleted	bool	public	ExportPaperDetail's IsDeleted

Table 78 Export Paper Detail attribute explanation

Method

Method	Return type	Visibility	Description
getter()	string	public	get attribute value
setter()	void	public	return value of attribute

Table 79 Export Paper Detail method explanation

3.2.9. Supply

Attribute

Attribute	Type	Visibility	Description

SuppliesId	integer	public	Unique identifier of a Supply
SuppliesCode	string	public	Supply's Code
SuppliesName	string	public	Supply's Name
Unit	string	public	Supply's Unit
Quantity	integer	public	Supply's Quantity
Note	string	public	Supply's Note
IsDeleted	bool	public	Supply's IsDeleted

Table 80 Supply attribute explanation

Method

Method	Return type	Visibility	Description
getter()	string	public	get attribute value
setter()	void	public	return value of attribute

Table 81 Supply method explanation

3.2.10. Appointment

Attribute

Attribute	Type	Visibility	Description
AppointmentID	integer	public	Unique identifier of a Appointment
PatientID	integer	public	Appointment's Patient
DoctorID	string	public	Appointment's Doctor
Status	string	public	Appointment's Status
IsDeleted	bool	public	Appointment's IsDeleted

Table 82 Appointment attribute explanation

Method

Method	Return type	Visibility	Description
getter()	string	public	get attribute value
setter()	void	public	return value of attribute

Table 83 Appointment method explanation

3.2.11. Receptionist (removed)

Attribute

Attribute	Type	Visibility	Description

Table 84 Receptionist attribute explanation

Method

Method	Return type	Visibility	Description
getter()	string	public	get attribute value
setter()	void	public	return value of attribute

Table 85 Receptionist method explanation

3.2.12. Nurse (removed)

Attribute

Attribute	Type	Visibility	Description

Table 86 Nurse attribute explanation

Method

Method	Return type	Visibility	Description
getter()	string	public	get attribute value
setter()	void	public	return value of attribute

Table 87 Nurse method explanation

3.2.13. Warehouse Keepper (removed)

Attribute

Attribute	Type	Visibility	Description

Table 88 Warehouse Keepper attribute explanation

Method

Method	Return type	Visibility	Description
getter()	string	public	get attribute value
setter()	void	public	return value of attribute

Table 89 Warehouse Keepper method explanation

3.2.14. ImportPaperDetail

Attribute

Attribute	Type	Visibility	Description
ImportPaperDetailId	integer	public	Unique identifier of an Import Paper Detail
ImportPaperId	integer	public	ImportPaperDetail's Import Paper

SuppliesId	integer	public	ImportPaperDetail's Supply
Unit	string	public	ImportPaperDetail's Unit
Quantity	integer	public	ImportPaperDetail's Quantity
Note	string	public	ImportPaperDetail's Note
IsDeleted	bool	public	ImportPaperDetail's IsDeleted

Table 90 Import Paper Detail attribute explanation

Method

Method	Return type	Visibility	Description
getter()	string	public	get attribute value
setter()	void	public	return value of attribute

Table 91 Import Paper Detail method explanation

3.2.15. Department (removed)

Attribute

Attribute	Type	Visibility	Description
DepartmentID	integer	public	Unique identifier of an Department
DepartmentName	string	public	Department's Name
IsDeleted	bool	public	Department's IsDeleted

Table 92 Department attribute explanation

Method

Method	Return type	Visibility	Description
getter()	string	public	get attribute value
setter()	void	public	return value of attribute

Table 93 Department method explanation

3.2.16. Hospital (removed)

Attribute

Attribute	Type	Visibility	Description
HospitalID	integer	public	Unique identifier of a Hospital
HospitalName	string	public	Hospital's Name
HospitalAddress	bool	public	Hospital's Address

Hotline	string	public	Hospital's Hotline
IsDeleted	bool	public	Hospital's IsDeleted

Table 94 Hospital attribute explanation

Method

Method	Return type	Visibility	Description
getter()	string	public	get attribute value
setter()	void	public	return value of attribute

Table 95 Hospital method explanation

3.2.17. Doctor (removed)

Attribute

Attribute	Type	Visibility	Description

Table 96 Doctor attribute explanation

Method

Method	Return type	Visibility	Description
getter()	string	public	get attribute value
setter()	void	public	return value of attribute

Table 97 Doctor method explanation

3.2.18. Sample

Attribute

Attribute	Type	Visibility	Description
SampleID	integer	public	Unique identifier of a Sample
SampleGroupID	integer	public	Sample's Group
SampleName	string	public	Sample's Name
Description	string	public	Sample's Description
IsDeleted	bool	public	Hospital's IsDeleted

Table 98 Sample attribute explanation

Method

Method	Return type	Visibility	Description
getter()	string	public	get attribute value
setter()	void	public	return value of attribute

Table 99 Sample method explanation

3.2.19. SampleGetting

Attribute

Attribute	Type	Visibility	Description
SampleGettingID	integer	public	Unique identifier of a SampleGetting
SampleGroupID	integer	public	Sample's Group
SampleName	string	public	Sample's Name
Description	string	public	Sample's Description
IsDeleted	bool	public	Hospital's IsDeleted

Table 100 SampleGetting attribute explanation

Method

Method	Return type	Visibility	Description
getter()	string	public	get attribute value
setter()	void	public	return value of attribute

Table 101 SampleGetting method explanation

3.2.20. ImportPaper

Attribute

Attribute	Type	Visibility	Description
ImportPaperId	integer	public	Unique identifier of an Import Paper
ImportPaperCode	string	public	ImportPaper's Code
CreateDate	datetime	public	ImportPaper's CreateDate
AccountId	integer	public	ImportPaper's Account
Note	string	public	ImportPaper's Note
Status	string	public	ImportPaper's Status
IsDeleted	bool	public	ImportPaper's IsDeleted

Table 102 Import Paper attribute explanation

Method

Method	Return type	Visibility	Description
getter()	string	public	get attribute value
setter()	void	public	return value of attribute

Table 103 Import Paper method explanation

3.2.21. Lab Technician (removed)

Attribute

Attribute	Type	Visibility	Description

Table 104 Lab Technician attribute explanation

Method

Method	Return type	Visibility	Description
getter()	string	public	get attribute value
setter()	void	public	return value of attribute

Table 105 Lab Technician method explanation

3.2.22. Lab Test

Attribute

Attribute	Type	Visibility	Description
LabTestID	integer	public	Unique identifier of a Lab Test
LabTestName	string	public	Labtest's Name
Description	string	public	Labtest's Description
Price	integer	public	Labtest's Price
SampleID	integer	public	Labtest's Sample
IsDeleted	bool	public	Labtest's IsDeleted

Table 106 Lab Test attribute explanation

Method

Method	Return type	Visibility	Description
getter()	string	public	get attribute value
setter()	void	public	return value of attribute

Table 107 Lab Test method explanation

3.2.23. SampleGroup

Attribute

Attribute	Type	Visibility	Description
SampleGroupID	integer	public	Unique identifier of a Sample Group
GroupName	string	public	Sample Group's Name
GettingDuration	integer	public	Sample Group's Duration

Table 108 Sample Group attribute explanation

Method

Method	Return type	Visibility	Description
getter()	string	public	get attribute value
setter()	void	public	return value of attribute

Table 109 Sample Group method explanation

3.2.24. Hospital Department Mapping (removed)

Attribute

Attribute	Type	Visibility	Description
HospitalDepartmentMappingID	integer	public	Unique identifier of a Hospital Department Mapping
HospitalID	integer	public	HospitalDepartment's ID
DepartmentID	integer	public	HospitalDepartment's Department
IsDeleted	bool	public	HospitalDepartment's IsDeleted

Table 110 Hospital Department attribute explanation

Method

Method	Return type	Visibility	Description
getter()	string	public	get attribute value
setter()	void	public	return value of attribute

Table 111 Hospital Department method explanation

3.2.25. Hospital Suggesting (removed)

Attribute

Attribute	Type	Visibility	Description
ID	integer	public	Unique identifier of a Hospital Suggest
ResultPaperID	string	public	HospitalSuggest's Result Paper
HospitalID	integer	public	HospitalSuggest's Hospital
DepartmentID	integer		HospitalSuggest's Department
IsDeleted	bool	public	HospitalDepartment's IsDeleted

Table 112 Hospital Suggestion attribute explanation

Method

Method	Return type	Visibility	Description
getter()	string	public	get attribute value
setter()	void	public	return value of attribute

Table 113 Hospital Suggestion method explanation

3.2.26. ResultPa**per (removed)**

Attribute

Attribute	Type	Visibility	Description
ResultPaperCode	integer	public	Unique identifier of a Result Paper
Conclusion	string	public	ResultPaper's Conclusion
EnterTime	integer	public	ResultPaper's EnterTime
ReturnTime	integer	public	ResultPaper's ReturnTime
IsApproved	bool	public	ResultPaper's IsApproved
IsDeleted	bool	public	ResultPaper's IsDeleted

Table 114 Result Paper attribute explanation

Method

Method	Return type	Visibility	Description
getter()	string	public	get attribute value
setter()	void	public	return value of attribute

Table 115 Result Paper method explanation

3.2.27. TestProfileLabTestMapping (removed)

Attribute	Type	Visibility	Description
TestProfileLabTestMappingID	integer	public	Unique identifier of a Test Profile Lab Test
TestProfileID	integer	public	TestProfileLabTestMapping's Test Profile
LabTestID	integer	public	TestProfileLabTestMapping's Lab
IsDeleted	bool	public	TestProfileLabTestMapping's IsDeleted

Table 116 Test Profile Lab Test Mapping attribute explanation

Method

Method	Return type	Visibility	Description
getter()	string	public	get attribute value
setter()	void	public	return value of attribute

Table 117 Test Profile Lab Test Mapping method explanation

3.2.28. TestProfile

Attribute

Attribute	Type	Visibility	Description
TestProfileID	integer	public	Unique identifier of a Test Profile
TestProfileName	string	public	TestProfile's Name
ParentProfileID	integer	public	TestProfile's Profile
IsDeleted	bool	public	TestProfile's IsDeleted

Table 118 Test Profile attribute explanation

Method

Method	Return type	Visibility	Description
getter()	string	public	get attribute value
setter()	void	public	return value of attribute

Table 119 Test Profile method explanation

3.3. Interactive Diagram

3.3.1. Guest

3.3.1.1. <Guest> Make Appointment

Summary: this diagram shows process for making appointment.

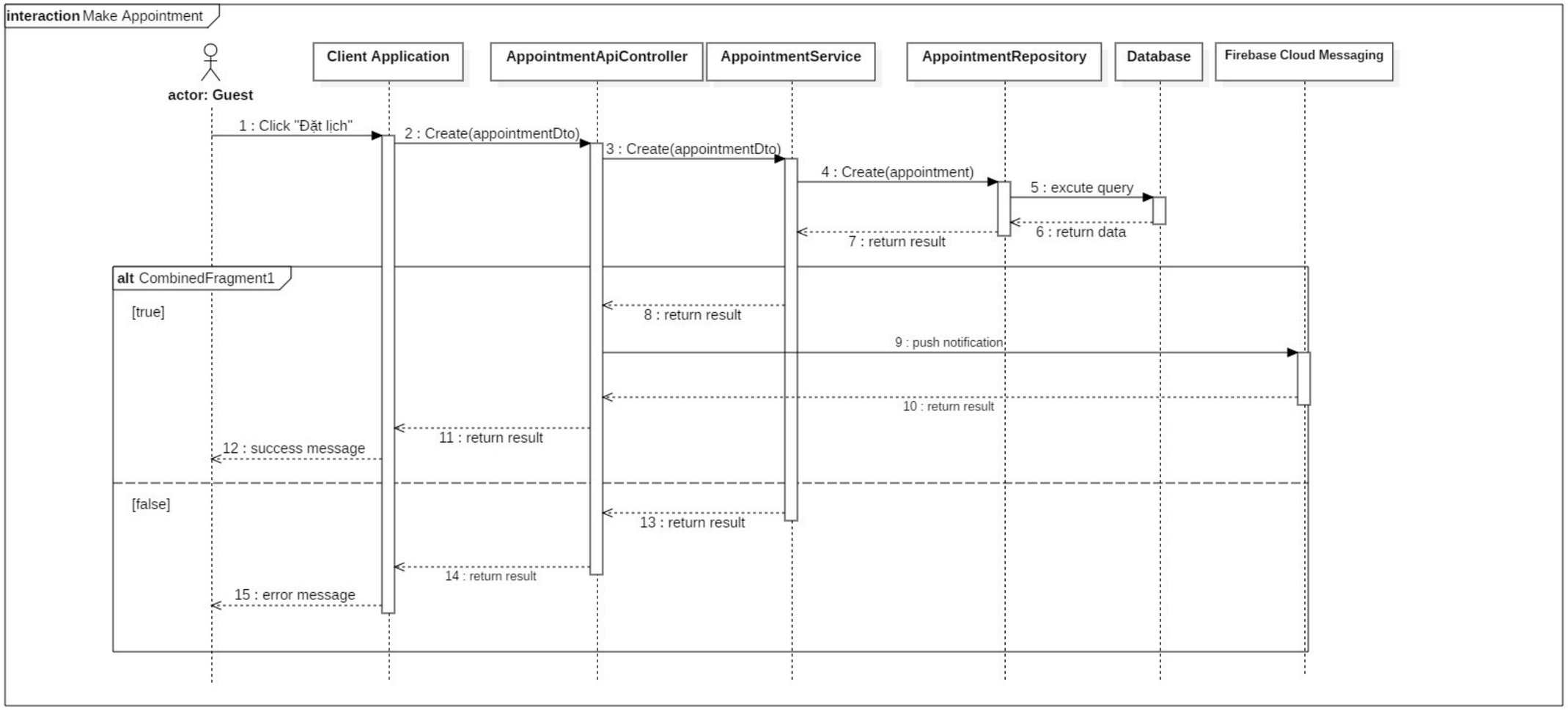
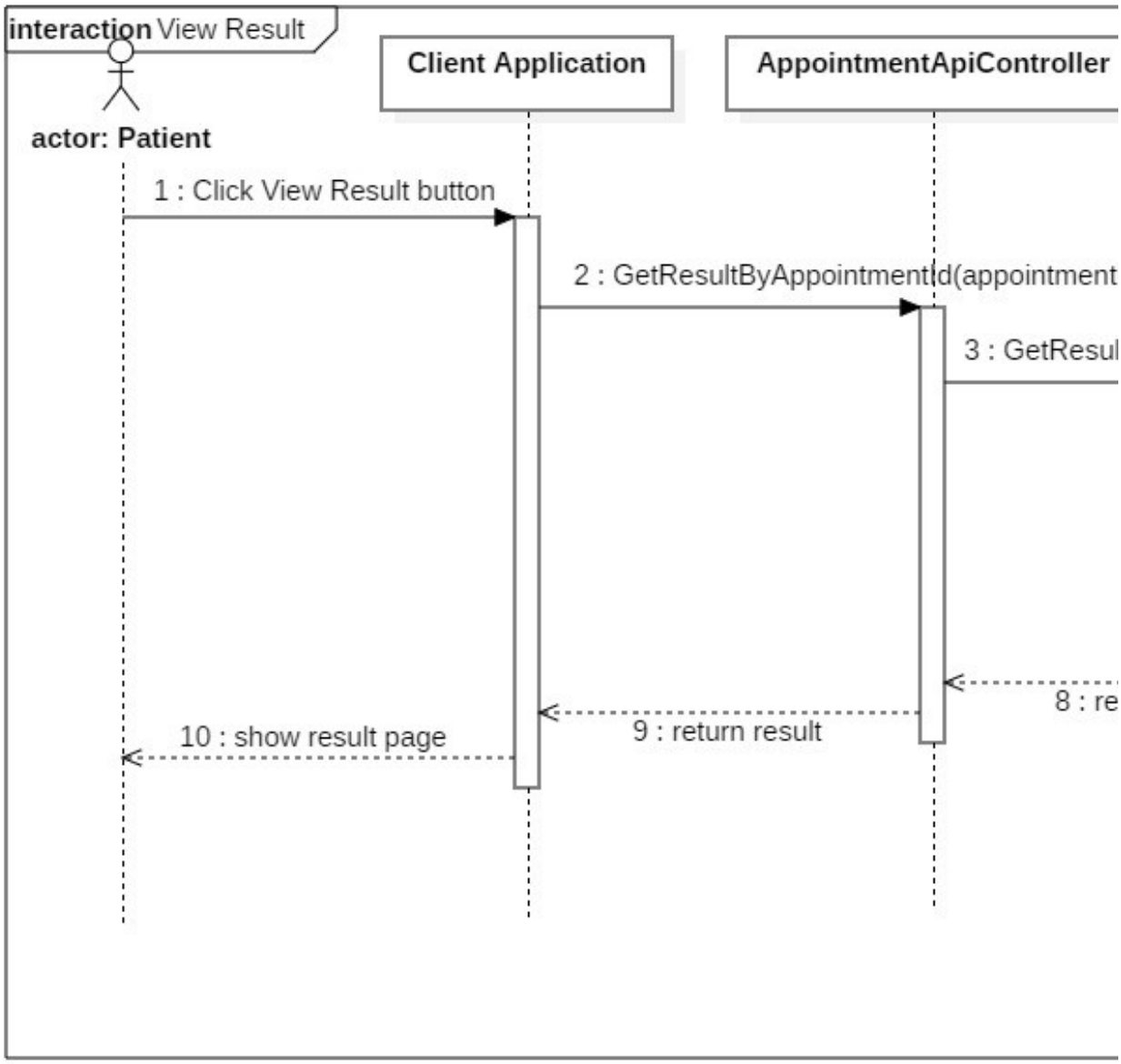


Figure 62 - Sequence Diagram for Make Appointemnt < Guest

3.3.2. Patient

3.3.2.1. <Patient> View Appointment's Test Result

Summary: this diagram shows process for viewing appointment's test result.



3.4. State Machine Diagram

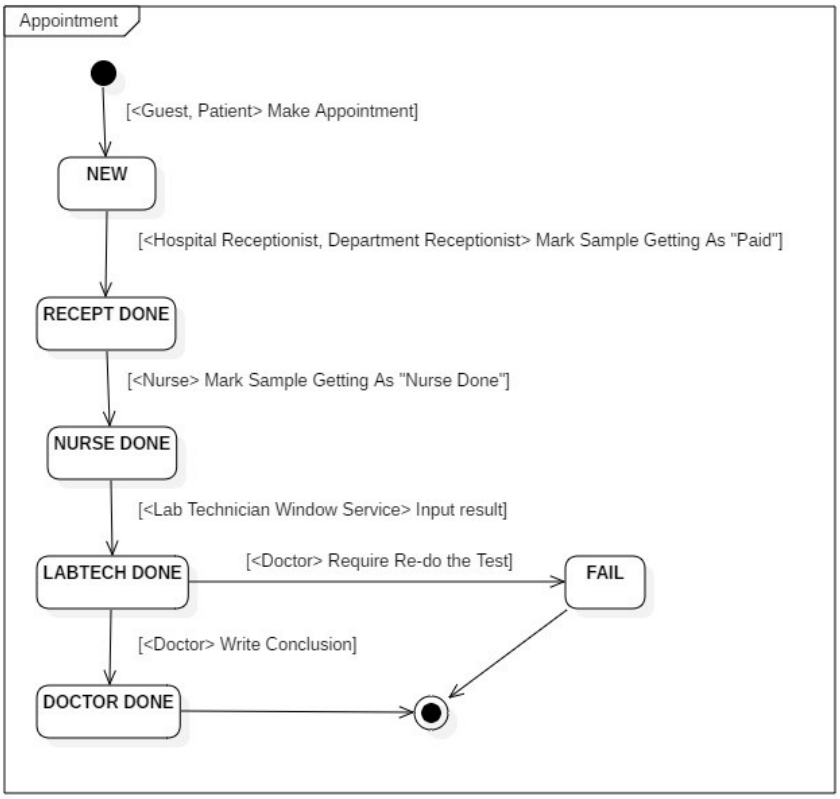


Figure 63 - State Machine Diagram of Appointment

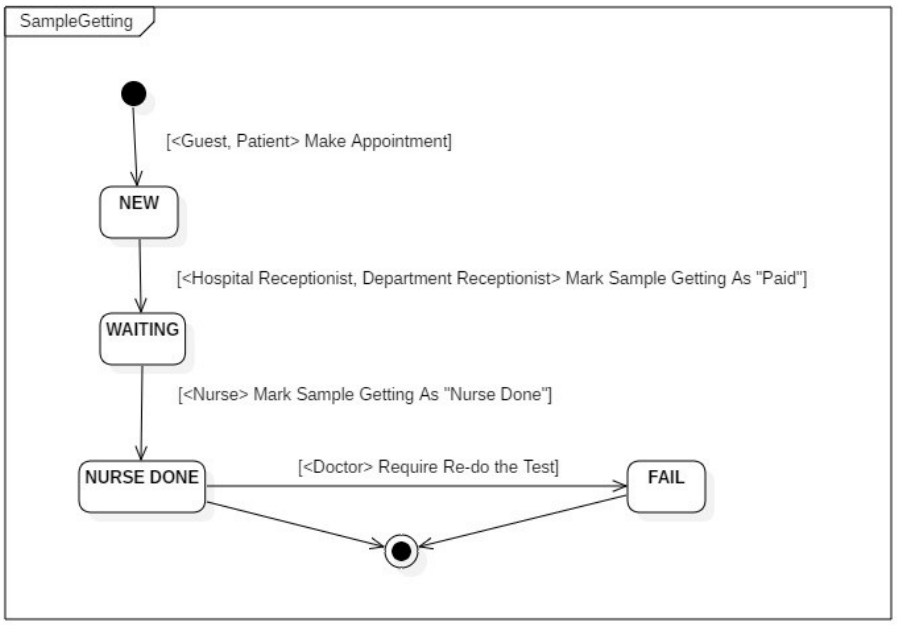


Figure 64 - State Machine Diagram of Sample Gettin

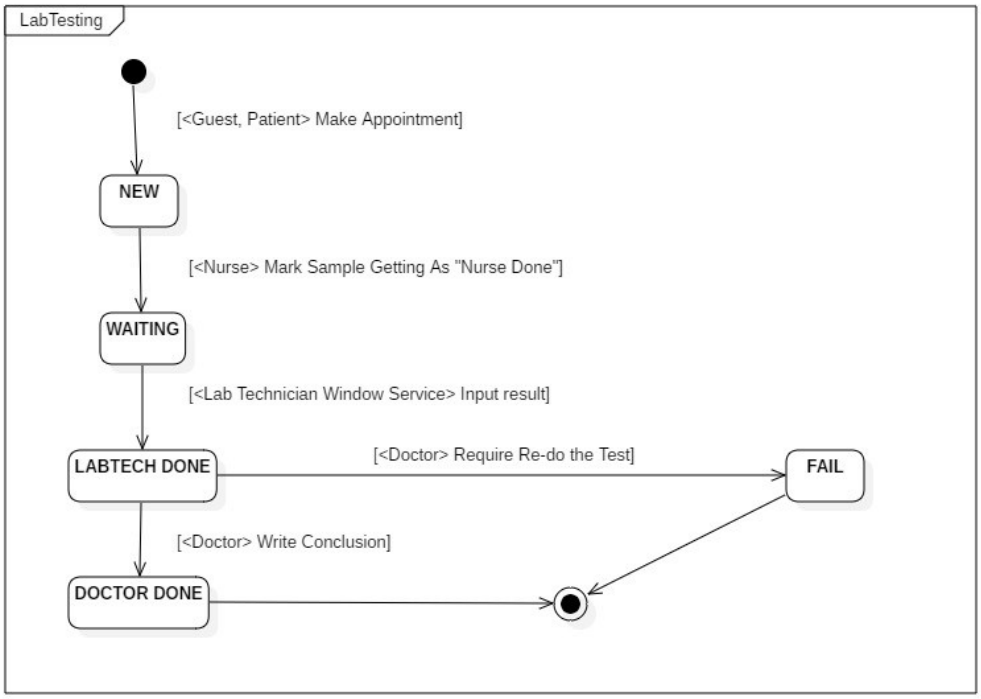


Figure 65 - State Machine Diagram of Lab Testing

4. User Interface Design

4.1. Web admin application user interface

4.1.1. Login Page

Figure 66 - Web Interface <Login>

Field

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type	Length
1	Phone	Phone to login	No	Yes	Textbox	String	
2	Password	Password to login	No	Yes	Textbox	String	
3	Remember me	Auto log in	No	No	Checkbox	Boolean	

Buttons/Hyperlinks:

No	Function	Description	Validation	Outcome
4	Sign In	Login into system	Validate all required fields	Navigate to Admin page

4.1.2. Hospital Receptionist Page

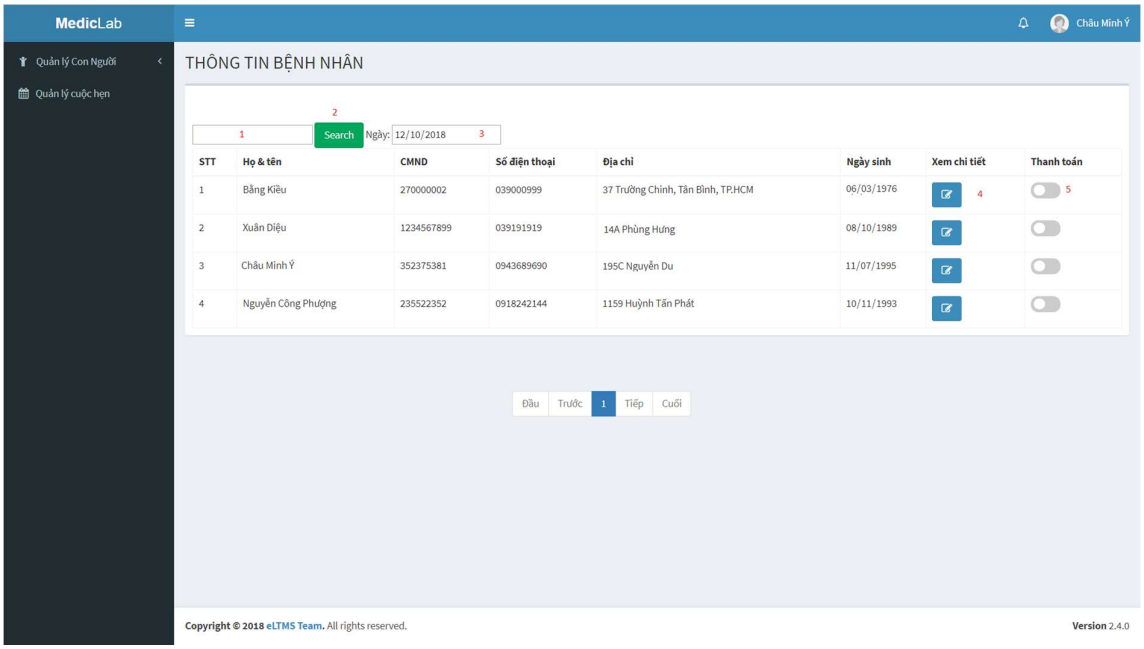


Figure 21 - Admin Web Interface <Hospital Receptionist>

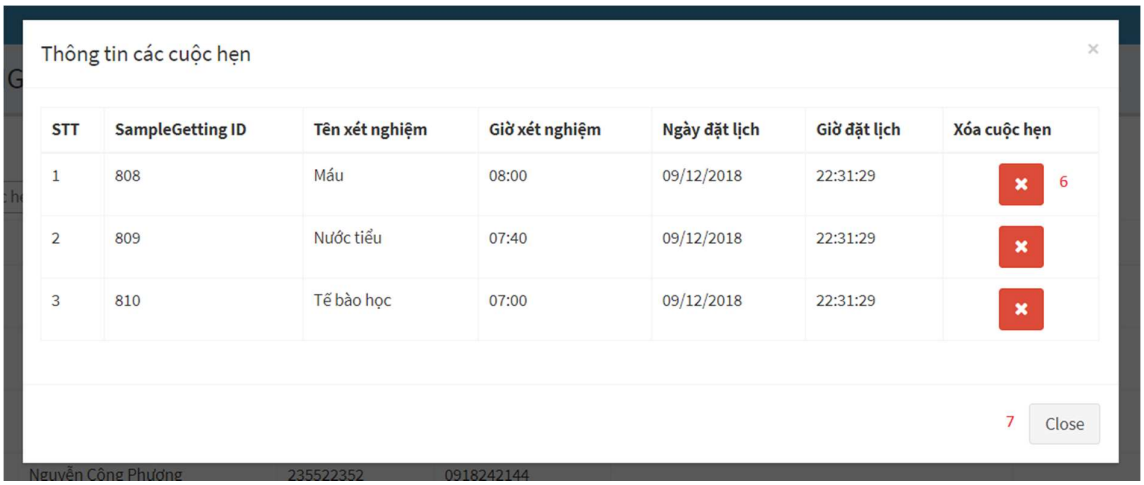


Figure 22 - Admin Web Interface <Hospital Receptionist>

Figure 23 - Admin Web Interface <Hospital Receptionist>

Field

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type	Length
1	Keyword	Fill keyword to search	No	Yes	Text	String	
3	Select Date	Select Date to show Patient	No	Yes	Date	Date	

Buttons/Hyperlinks

No	Function	Description	Validation	Outcome
2	Search	Search after getting keywork	N/A	Show list of patients by keywork
4	Show details appointment	Show list of appointments	N/A	Show list of appointments

5	Change status	Show popup for admin to check hospital fee for patient and pay it	N/A	Show list of price and confirm Y/N to change status
6	Delete sampleGetting	Delete sampleGetting after getting request	N/A	SampleGetting is deleted
7	Close popup	Close popup details appointment	N/A	Popup is closed
8	Cancel paying	Confirm payment	N/A	Status is not changed
9	Accept paying	Confirm payment	N/A	Status is changed

4.1.3. View Department Receptionist Page

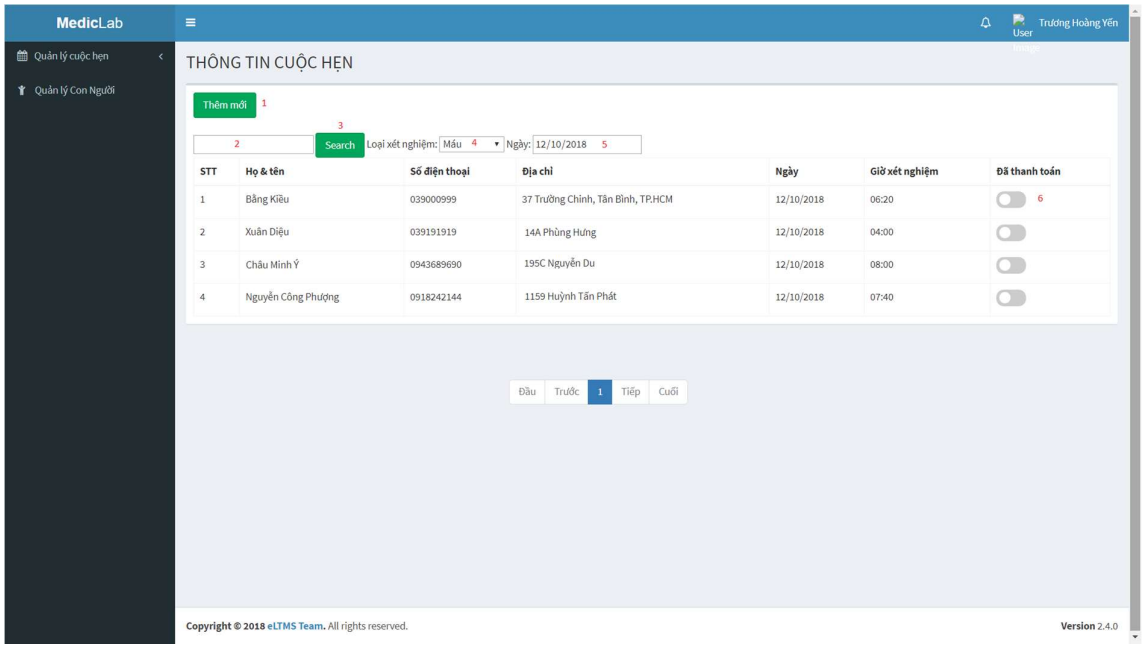


Figure 24 - Admin Web Interface <View Department Receptionist>

Figure 25 - Admin Web Interface <View Department Receptionist>

Figure 26 - Admin Web Interface <View Department Receptionist>

Field

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type	Length
2	Keyword	Fill keyword to search	No	Yes	Text	String	
4	Select sample	Select sample to show appointment	No	Yes	Dropdown list	String	
5	Select Date	Select date to show appointment	No	Yes	Date	Date	
7	Họ và Tên	Patient's information	No	Yes	Textbox	String	
8	CMND	Patient's information	No	Yes	Textbox	String	
9	Ngày sinh	Patient's information	No	Yes	Date	Date	
10	Số điện thoại	Patient's information	No	Yes	Textbox	String	

11	Địa chỉ	Patient's information	No	Yes	Textbox	String	
12	Loại xét nghiệm	Choose labtest	No	Yes	Checkbox	Boolean	

Buttons/Hyperlinks:

No	Function	Description	Validation	Outcome
1	Create appointment	Create appointment for patient	N/A	Show popup appointment's information
3	Search	Search after getting keywork	N/A	Show list of appointments by keywork
6	Change status	Show popup for admin to check hospital fee for patient and pay it	N/A	Show list of price and confirm Y/N to change status
13	Add a new appointment	Add a new appointment	N/A	A new appointment is created
14	Close popup	Close popup details appointment	N/A	Popup is closed
15	Cancel paying	Confirm payment	N/A	Status is not changed
16	Accept paying	Confirm payment	N/A	Status is changed

4.1.4. View Nurse Page

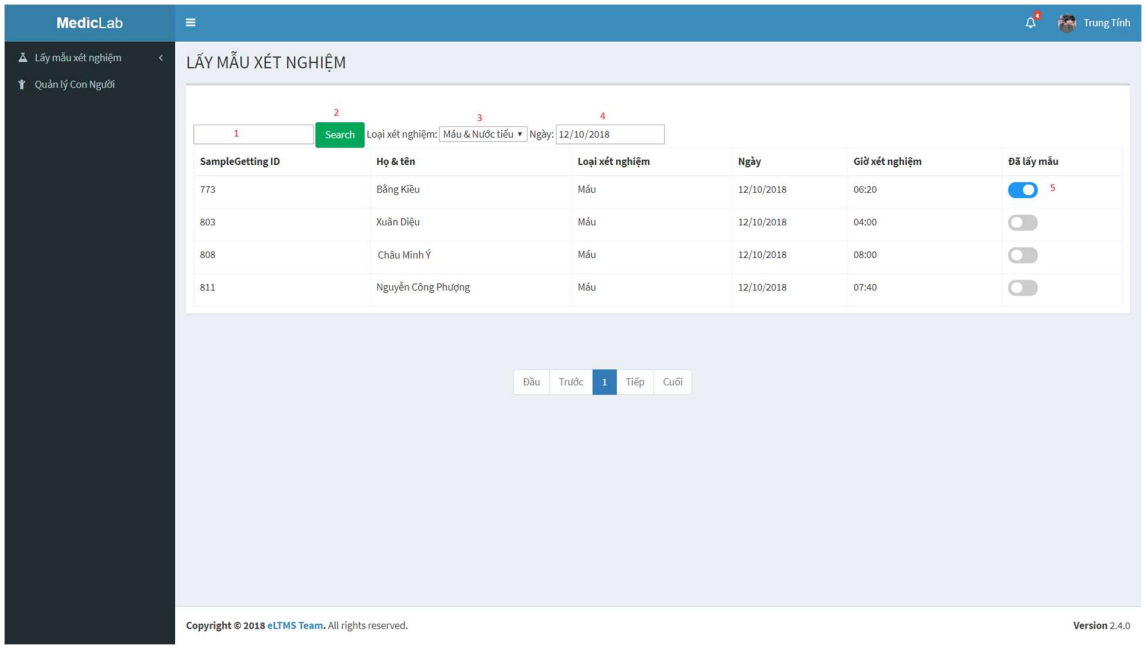


Figure 27 - Admin Web Interface <View Nurse>

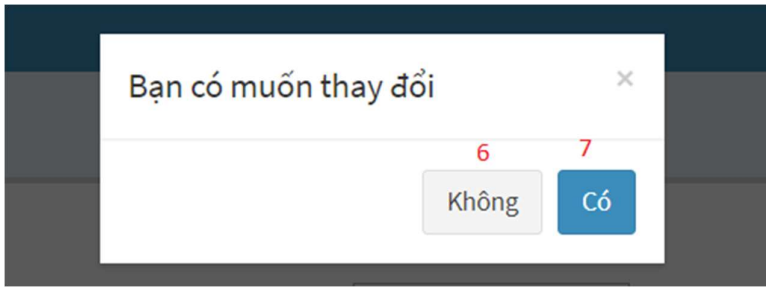


Figure 28 - Admin Web Interface <View Nurse>

Field

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type	Length
1	Keyword	Fill Keyword to seach	No	Yes	Text	String	
3	Select sample	Select sample to show appointment	No	Yes	Dropdown list	String	
4	Select Date	Select date to show appointment	No	Yes	Date	Date	

Buttons/Hyperlinks

No	Function	Description	Validation	Outcome
2	Search	Search after getting keywork	N/A	Show list of appointment by keywork
5	Change status	Show popup for admin to confirm and change status	N/A	Show options to choose Y/N
6	Cancel action	Choose No	N/A	Status is not changed
7	Accept action	Choose Yes	N/A	Status is changed

4.1.5. View Laboratory Technician Page

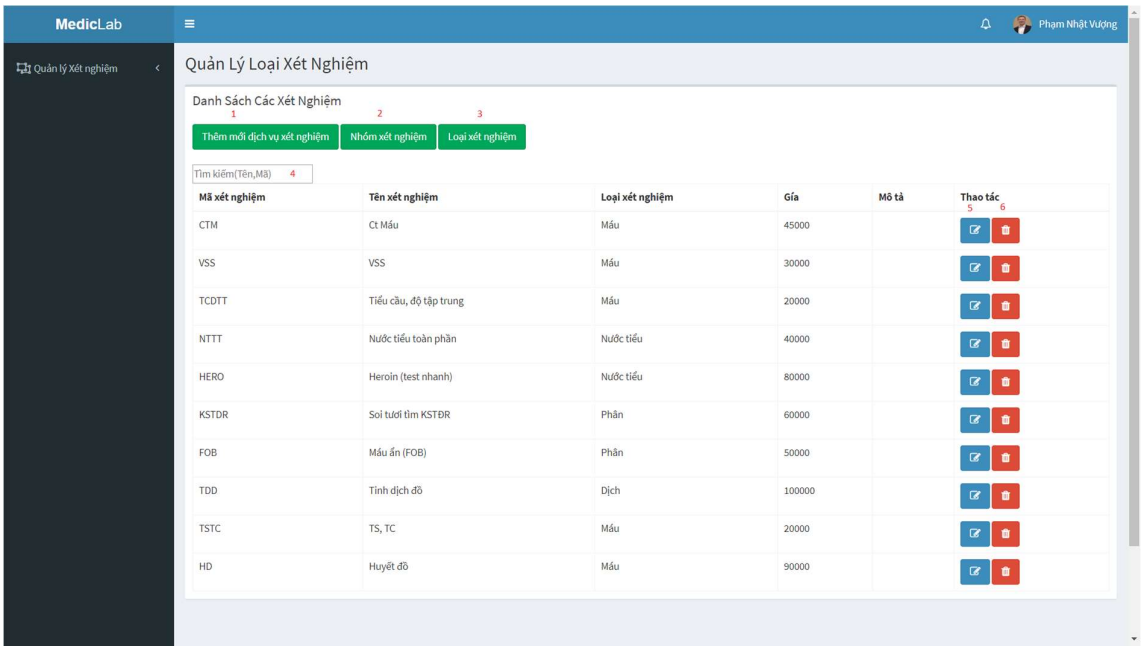


Figure 29 - Admin Web Interface <View Laboratory Technician>

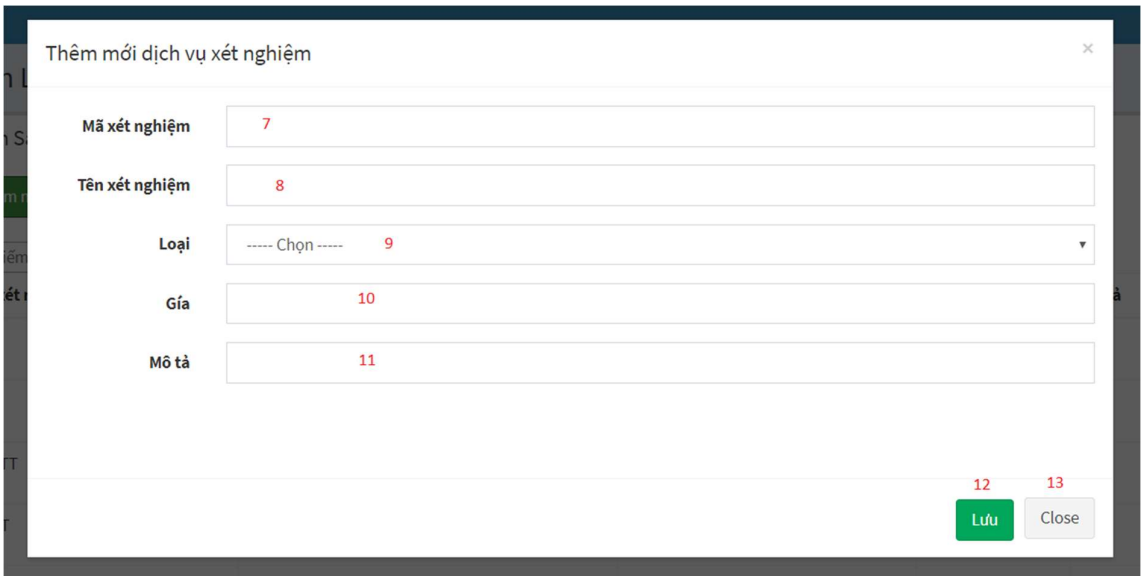


Figure 30 - Admin Web Interface <View Laboratory Technician-Add Labtest>

Figure 31 - Admin Web Interface <View Laboratory Technician-Add Sample group>

Figure 32 - Admin Web Interface <View Laboratory Technician-Add Sample>

Field

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type	Length
4	Keyword	Fill keyword to seach	No	Yes	Text	String	
7	Mã xét nghiệm	Labtest's information	No	Yes	Textbox	String	
8	Tên xét nghiệm	Labtest's information	No	Yes	Textbox	String	
9	Loại	Labtest's information	No	Yes	Dropdown list	String	
10	Giá	Labtest's information	No	Yes	Textbox	String	
11	Mô tả	Labtest's information	No	Yes	Textbox	String	

14	Tên nhóm xét nghiệm	Sample group's information	No	Yes	Textbox	String	
15	Thời gian tiến hành	Sample group's information	No	Yes	Textbox	String	
16	Bắt đầu	Sample group's information	No	Yes	Textbox	String	
17	Kết thúc	Sample group's information	No	Yes	Textbox	String	
20	Tên loại xét nghiệm	Sample's information	No	Yes	Textbox	String	
21	Nhóm xét nghiệm	Sample's information	No	Yes	Dropdown list	String	
22	Mô tả	Sample's information	No	Yes	Textbox	String	

Buttons/Hyperlinks

No	Function	Description	Validation	Outcome
1	Add new labtest	Add new labtest	N/A	Show popup to fill information of labtest
2	Add new sample group	Add new sample group	N/A	Show popup to fill information of sample group
3	Add new sample	Add new sample	N/A	Show popup to fill information of sample
5	Edit labtest	Edit information of labtest	N/A	Edit information of labtest
6	Delete labtest	Delete labtest after getting request	N/A	Labtest is deleted
12	Add a new labtest	Add a new labtest	N/A	A new labtest is created
13	Close popup	Close popup	N/A	Popup is closed
18	Add a new sample group	Add a new sample group	N/A	A new sample group is created
19	Close popup	Close popup	N/A	Popup is closed
23	Add a new sample	Add a new sample	N/A	A new sample is created
24	Close popup	Close popup	N/A	Popup is closed

4.1.6. View Doctor Page

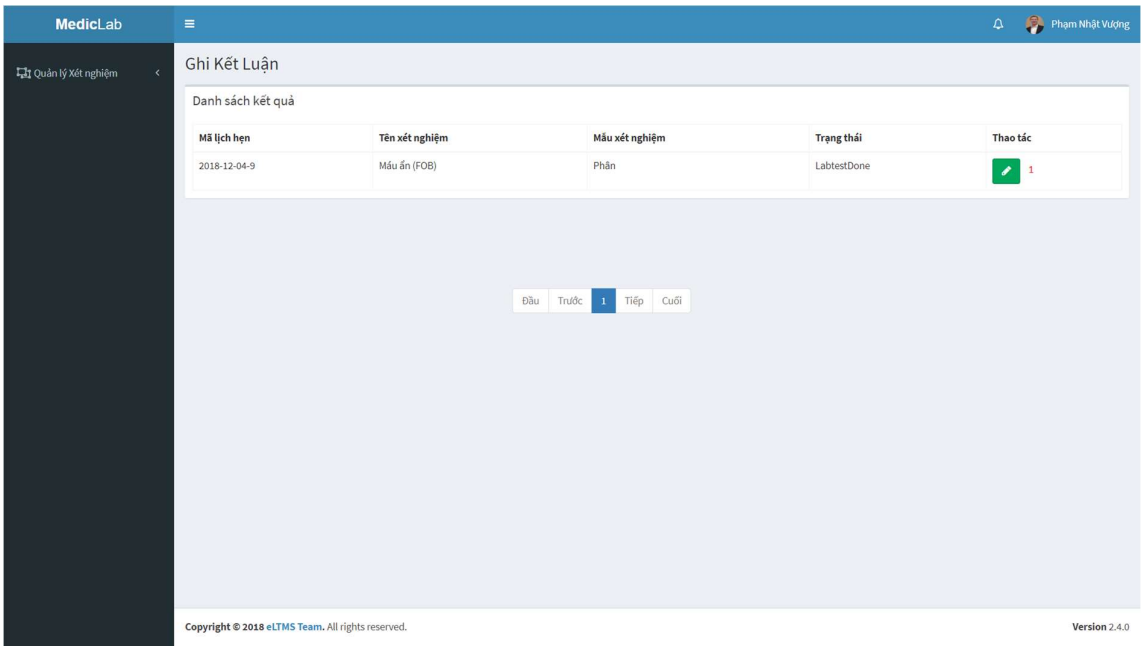


Figure 33 - Admin Web Interface <View Doctor>

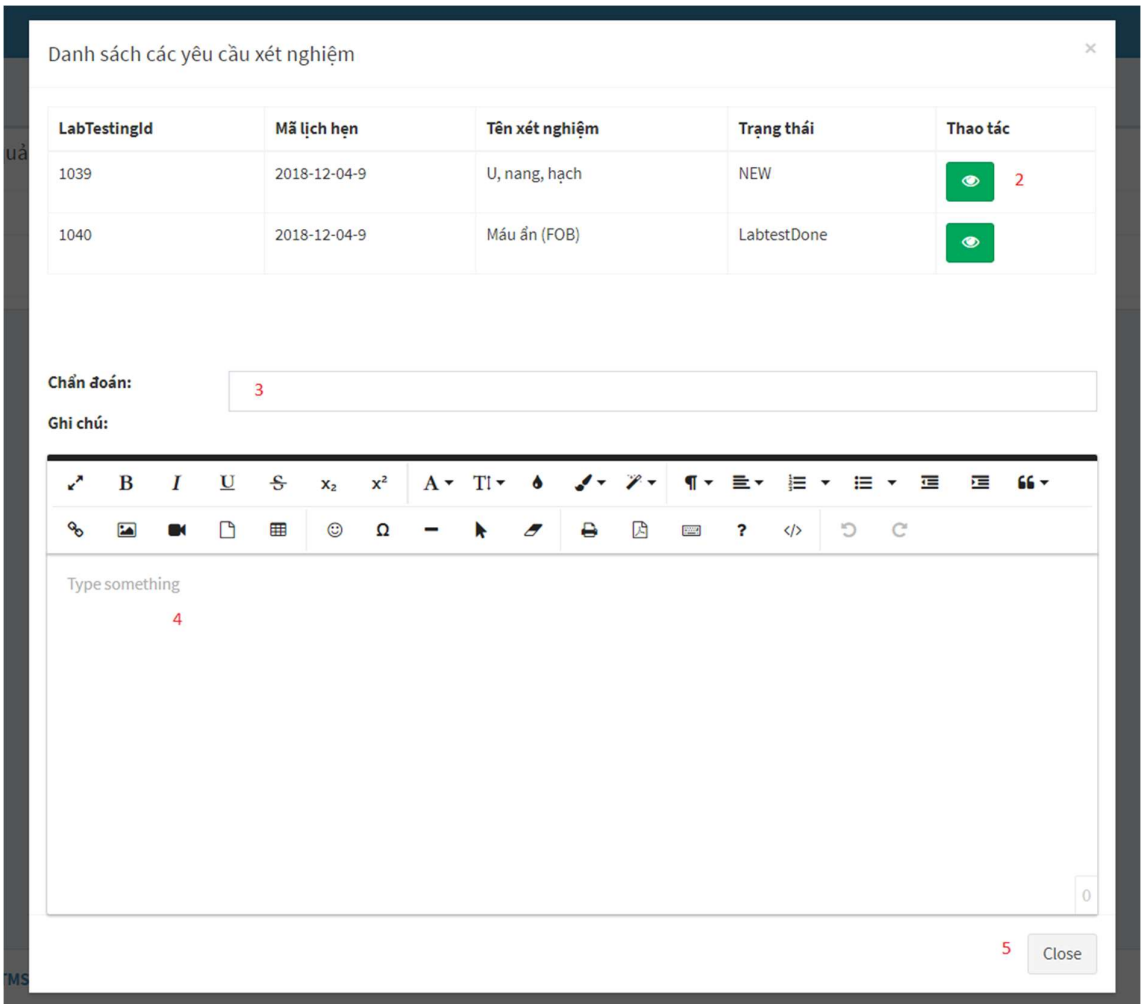


Figure 34 - Admin Web Interface <View Doctor>

Cần làm xét nghiệm lại 6

Labtesting ID	Index Name	Index Value	Trạng Thái	Mức Trung Bình	Đơn Vị
1040	WBC	4.26	N	4 - 10	K/uL
1040	% NEU	20.9	L	37 - 75	%
1040	% LYM	48.7	H	20 - 45	%
1040	% MONO	28.5	H	0 - 12	%
1040	% EOS	0.62	N	0 - 7	%
1040	% BASO	1.3	N	0 - 2.5	%
1040	NEU	0.89	L	2 - 7.5	K/uL
1040	LYM	2.07	N	0.5 - 4.5	K/uL
1040	MONO	1.21	H	0 - 0.9	K/uL
1040	EOS	0.03	N	0 - 0.7	K/uL
1040	BASO	0.06	N	0 - 0.25	K/uL
1040	RBC	5.35	N	3.8 - 5.4	M/uL
1040	HGB	14.3	N	12 - 17	g/dL
1040	HCT	43.3	N	35.5 - 50	%
1040	MCV	80.9	N	80 - 97	fL
1040	MCH	26.8	N	26 - 32	pg
1040	MCHC	33.1	N	31 - 36	g/dL
1040	RDW	12.6	N	10 - 15.7	%
1040	PLT	123	L	140 - 400	K/uL
1040	MPV	9.46	N	6.5 - 11	fL
1040	PDW	21	N	10 - 21	%
1040	PCT	0.12	N	0.1 - 0.7	%

Figure 35 - Admin Web Interface <View Doctor>

Field

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type	Length
3	Chẩn đoán	Conclusion of doctor	No	Yes	Textbox	String	
4	Ghi chú	Note of doctor	No	Yes	Textbox	String	

Buttons/Hyperlinks

No	Function	Description	Validation	Outcome
1	Check for disease	View testing result, write note and conclusion	N/A	Show popup with testing result, space to write note and conclusion

2	View testing result	View testing result	N/A	Show popup with the details of testing result
5	Close popup	Close popup	N/A	Popup is closed
6	Request re-testing	Request re-testing when doctor see something wrong about testing result	N/A	Send request re-testing to patient

4.2. Web application user interface

4.2.1. Login

Figure 36 - Web Interface <Login>

Field

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type	Length
1	Phone	Phone to login	No	Yes	Textbox	String	
2	Password	Password to login	No	Yes	Textbox	String	
3	Remember me	Auto log in	No	No	Checkbox	Boolean	

Buttons/Hyperlinks:

No	Function	Description	Validation	Outcome
4	Sign In	Login into system	Validate all required fields	Navigate to User page

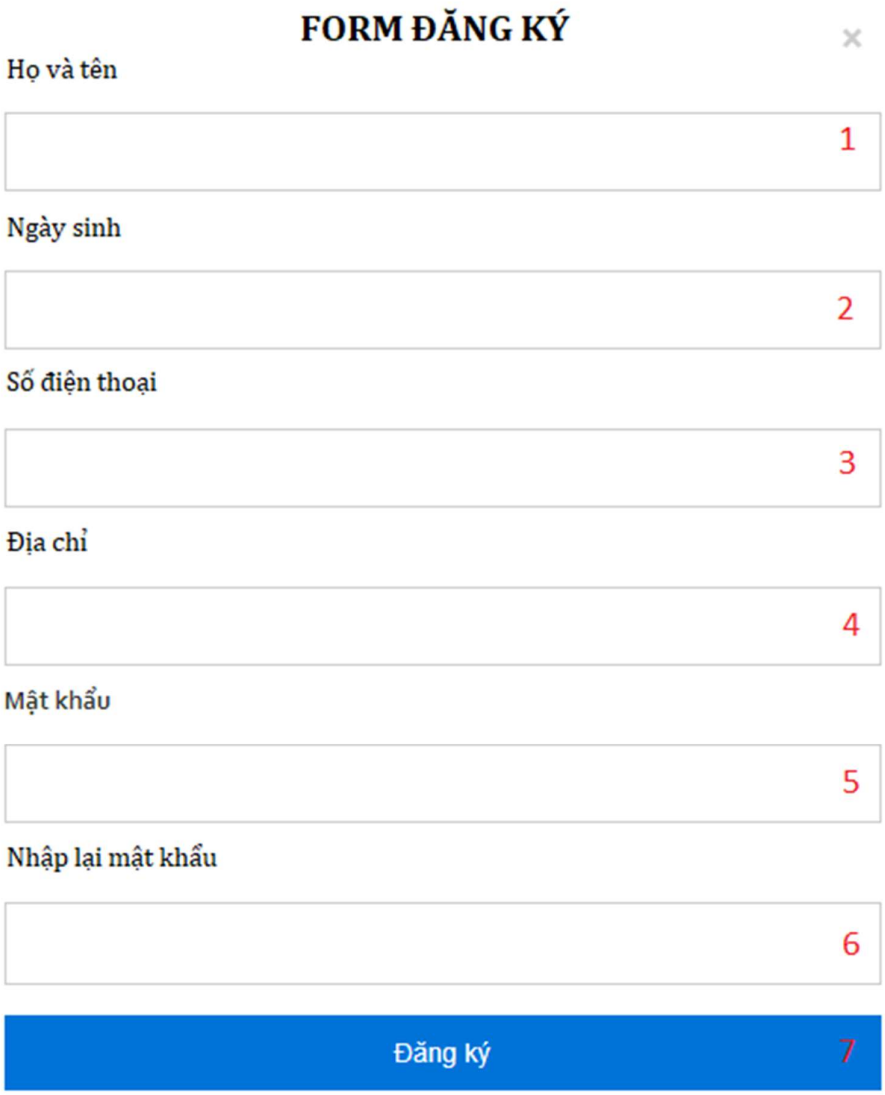


Figure 67 - Web Interface <Register account>

Field

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type	Length
1	Username	Patient's information	No	Yes	Text	String	
2	DateOfBirth	Patient's information	No	Yes	Date	Date	
3	Phone	Patient's information	No	Yes	Text	String	
4	Address	Patient's information	No	Yes	Text	String	

5	Password	Patient's information	No	Yes	Password	String	
6	PasswordConfirm	Patient's information	No	Yes	Password	String	

Buttons/Hyperlinks:

No	Function	Description	Validation	Outcome
7	Register	Click to register	N/A	Navigate to Home page

4.2.2. Nav Bar

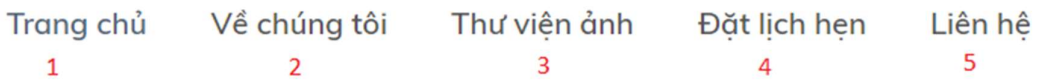


Figure 38 - Web Interface <Menu bar and Categories>

Buttons/Hyperlinks:

No	Function	Description	Validation	Outcome
1	Navigate to Home Page	N/A	N/A	Navigate to Home Page
2	Navigate to Introduction Page	Show list of categories as a drop down list	N/A	Navigate to Introduction Page
3	Navigate to Photo Library Page	N/A	N/A	Navigate to Photo Library Page
4	Navigate to Book Appointment Page	N/A	N/A	Navigate to Book Appointment Page
5	Navigate to Contact us	N/A	N/A	Navigate to Contact us

4.2.3. Home Page

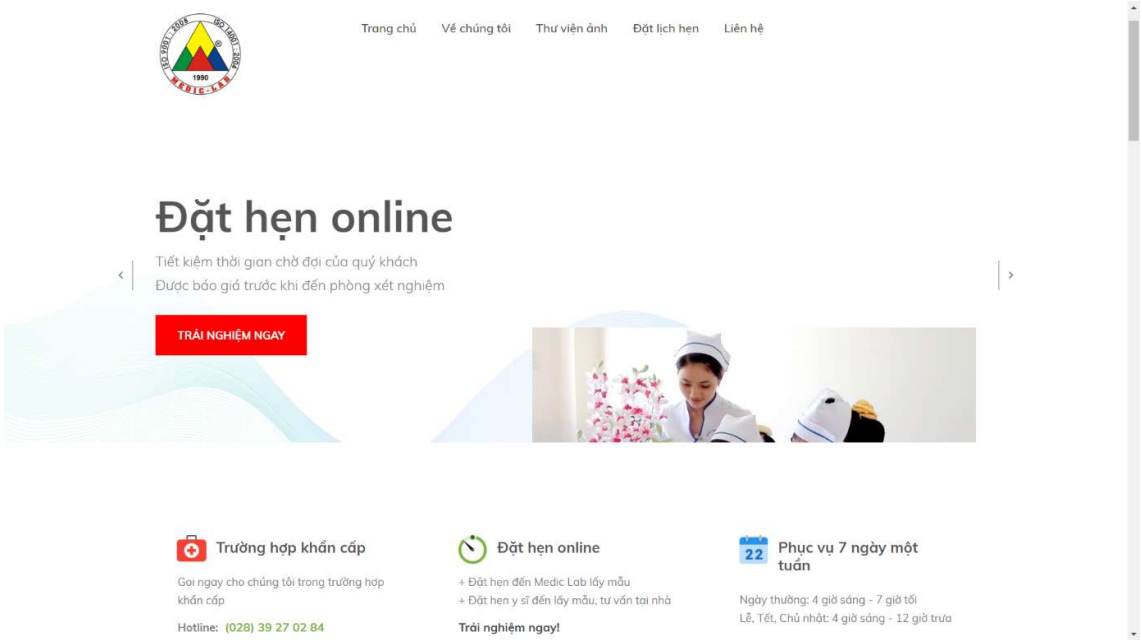


Figure 68 - Web Interface <Home page>

Figure 69 - Web Interface <Home page – Our partner>

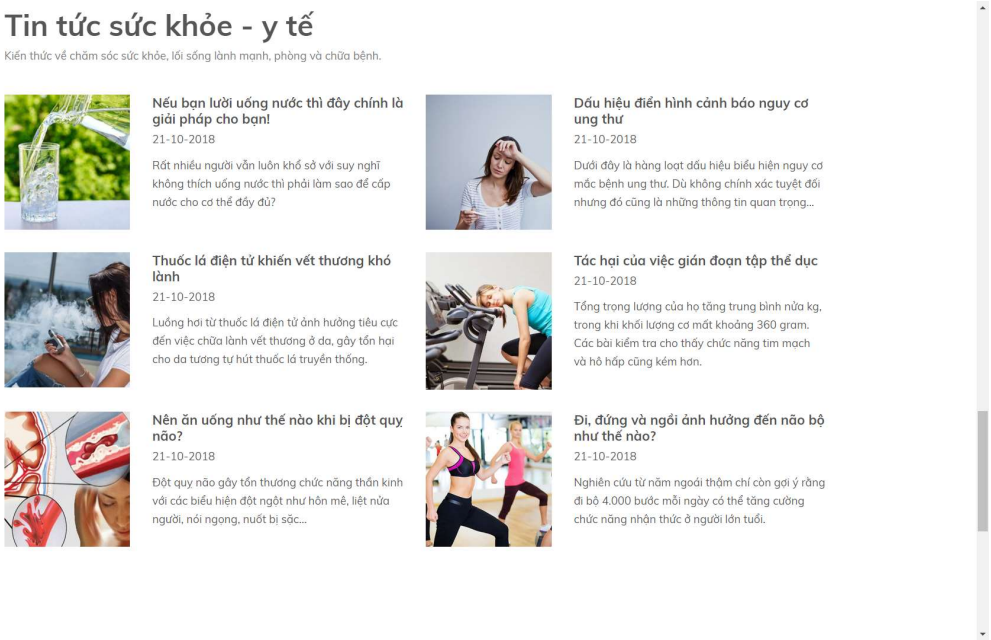


Figure 70 - Web Interface <Home page - News>

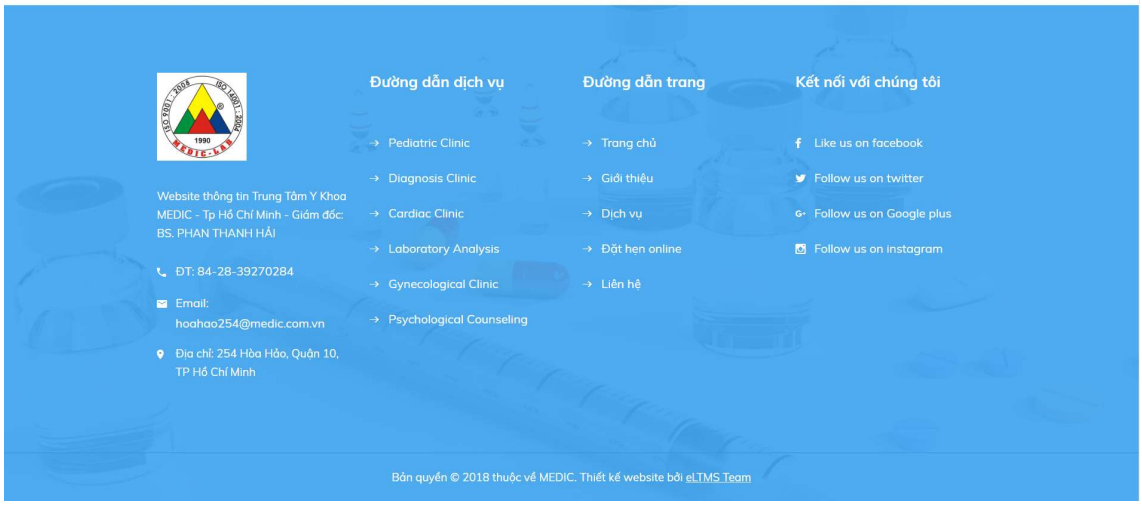


Figure 71 - Web Interface <Home page – Contact us >

4.2.4. Book Appointment

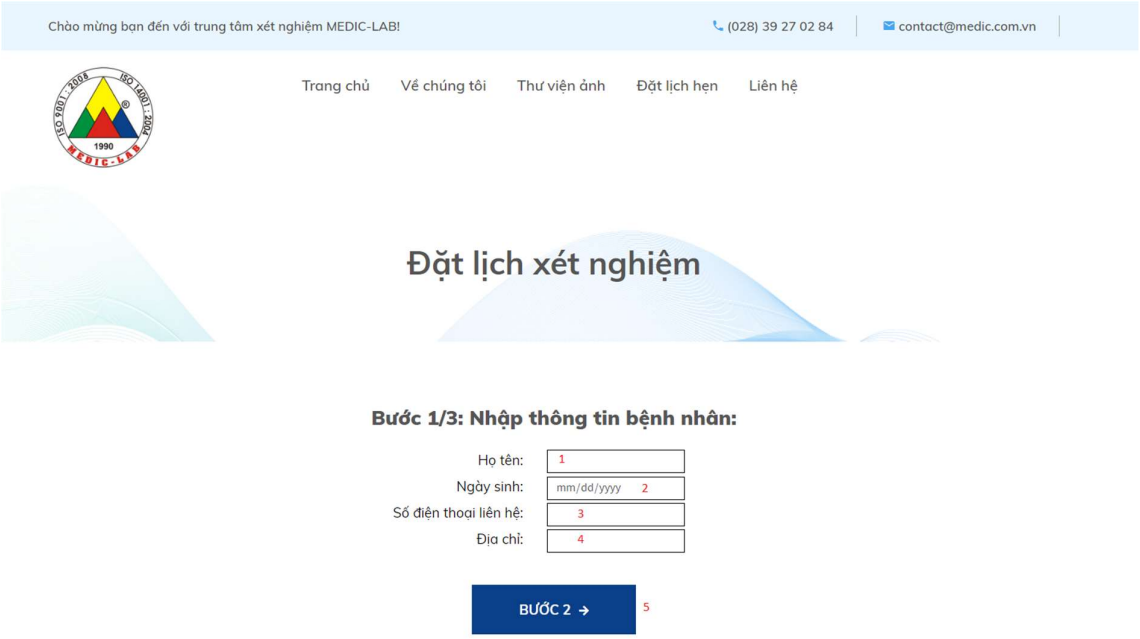


Figure 72 - Web Interface <Book Appointment>

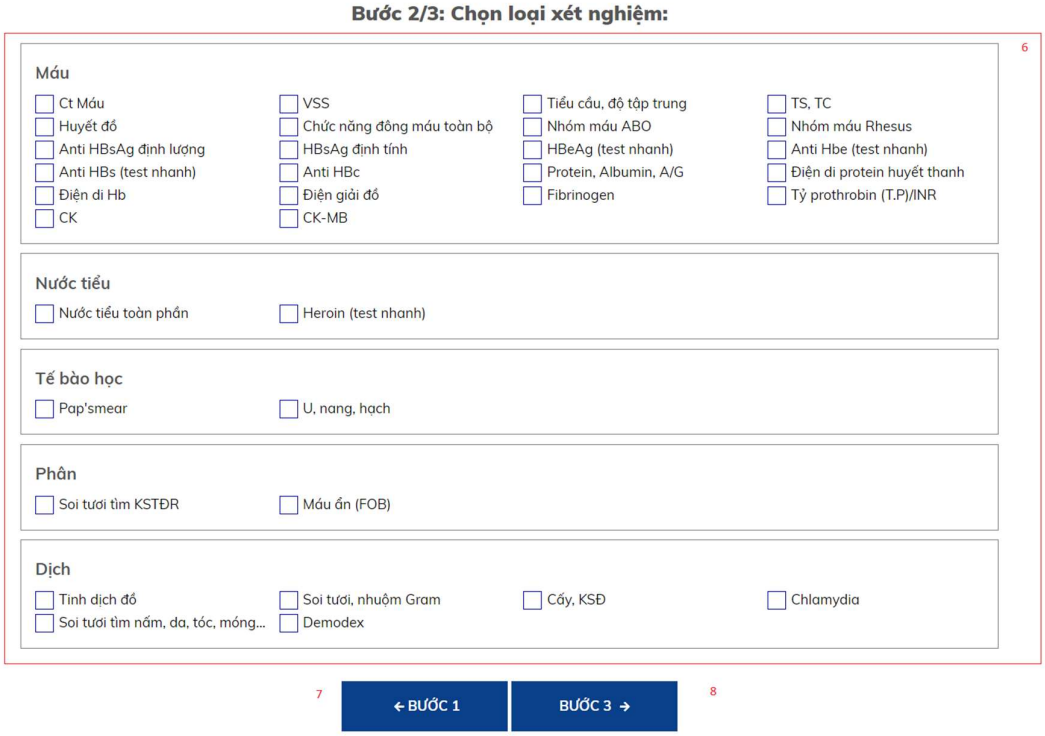


Figure 44 - Web Interface <Book Appointment>

Figure 45 - Web Interface <Book Appointment>

Field

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type	Length
1	Họ và Tên	Patient's information	No	Yes	Textbox	String	
2	Ngày sinh	Patient's information	No	Yes	Date	Date	
3	Số điện thoại	Patient's information	No	Yes	Textbox	String	
4	Địa chỉ	Patient's information	No	Yes	Textbox	String	
6	Loại xét nghiệm	Choose labtest	No	Yes	Checkbox	Boolean	
9	Ngày	Choose approriate time to test	No	Yes	Dropdown list	String	
10	Giờ	Choose approriate time to test	No	Yes	Dropdown list	String	

Buttons/Hyperlinks

No	Function	Description	Validation	Outcome
5	Go to step 2	Click "Bước 2" to go to step 2	Validate all required fields	Go to step 2
7	Go back to step 1	Click "Bước 1" to go back to step 1	N/A	Go back to step 1
8	Go to step 3	Click "Bước 3" to go to step 3	Choose a least one labtest	Go to step 3

11	Go back to step 2	Click "Bước 2" to go back to step 2	N/A	Go back to step 2
12	Submit	Complete booking a new appointment	Validate all required fields	Booking successfully

4.2.5. View list of Booked Appoinments

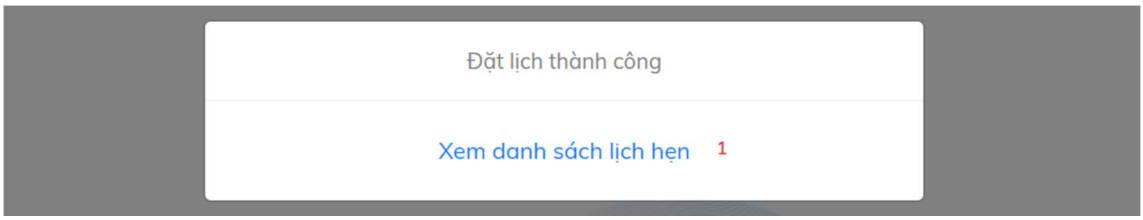


Figure 46 - Web Interface <View list of booked Appointments>

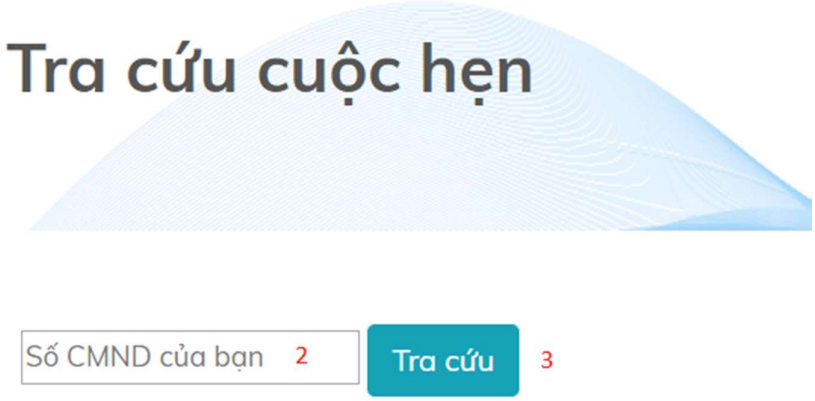


Figure 47 - Web Interface <View list of booked Appointments>

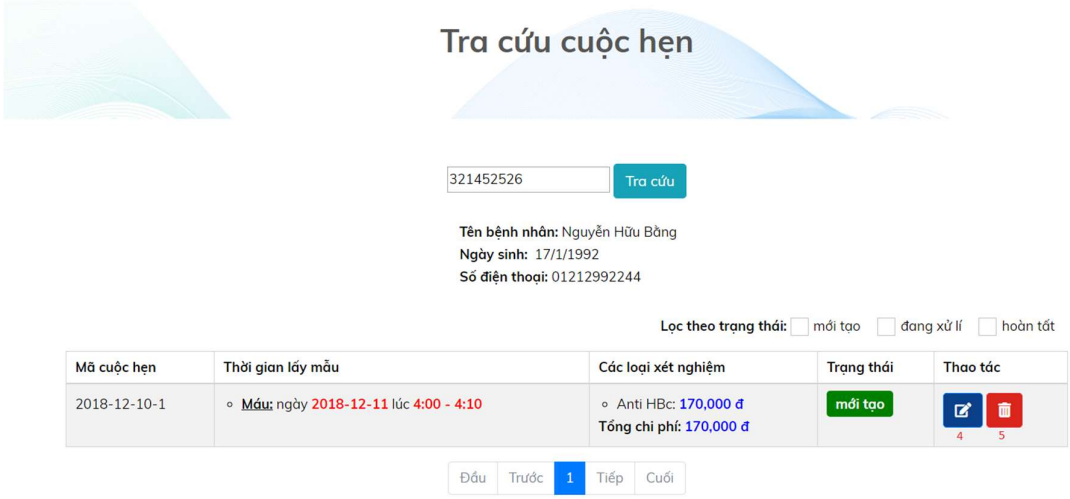


Figure 4873 - Web Interface <View list of booked Appointments>

Field

No	Field Name	Description	Read only	Manda tory	Control Type	Data Type	Length
2	CMND	Input id into textbox area	No	No	Text	String	

Buttons/Hyperlinks

No	Function	Description	Validation	Outcome
1	View Appointment Page	When user clicks on the link, navigate to a page showing textbox to fill id	N/A	Navigate to a page show textbox to fill id of patient
3	Search	Click "Tra cứu" to get result from system	N/A	Go to View Appointment Page
4	Edit appointment	Edit time, sample, labtest for appointment	N/A	Patient's appointment will be updated
5	Delete appointment	Delete appointment	N/A	Appointment is deleted

Figure 74 - Web Interface < Categories bar and sort>

4.2.6. View Testing Result

Figure 49 - Web Interface <View Testing Result>

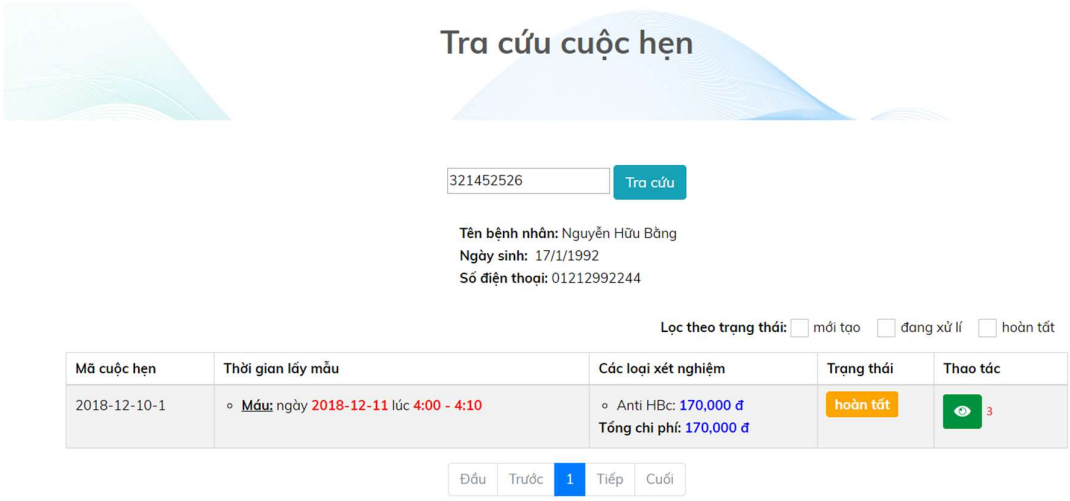
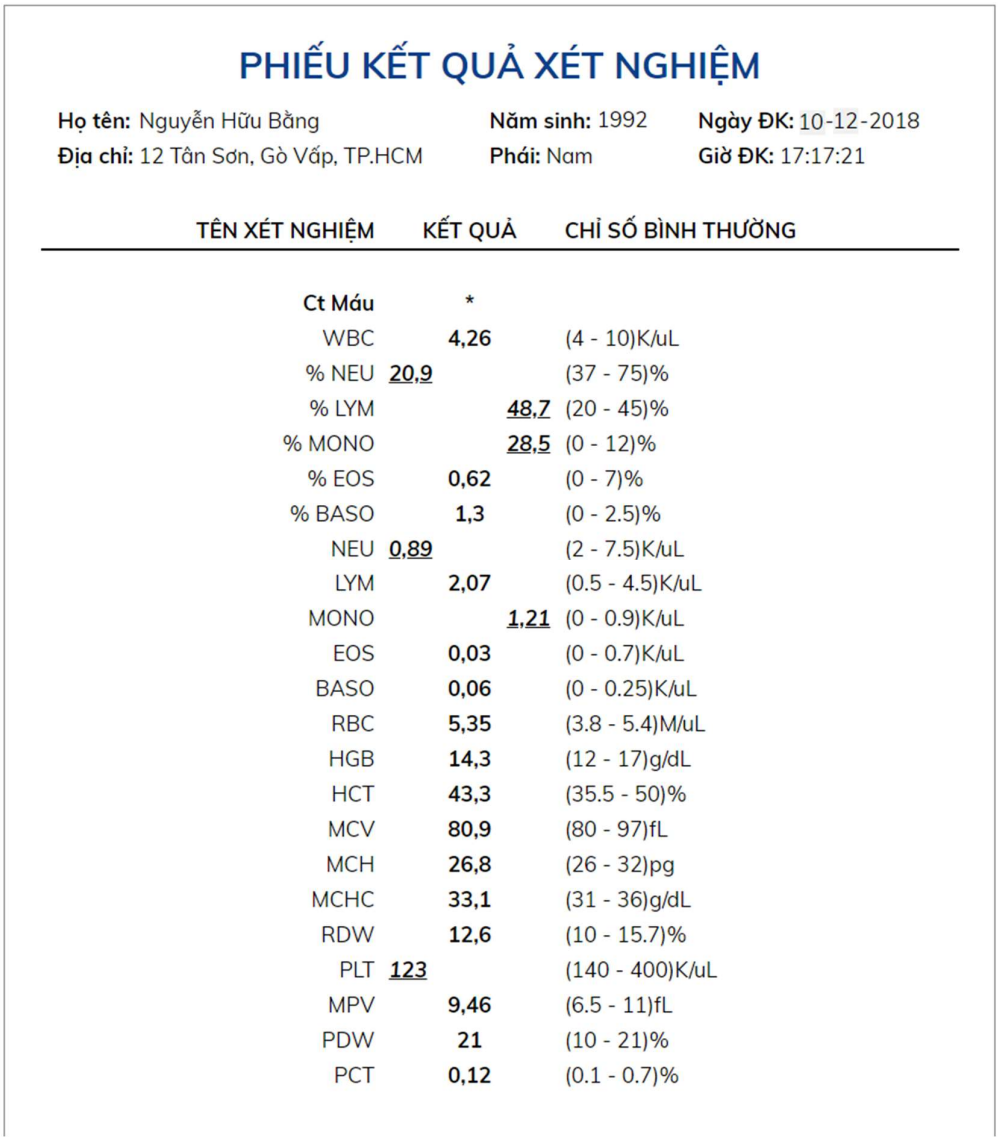


Figure 50 - Web Interface <View Testing Result>

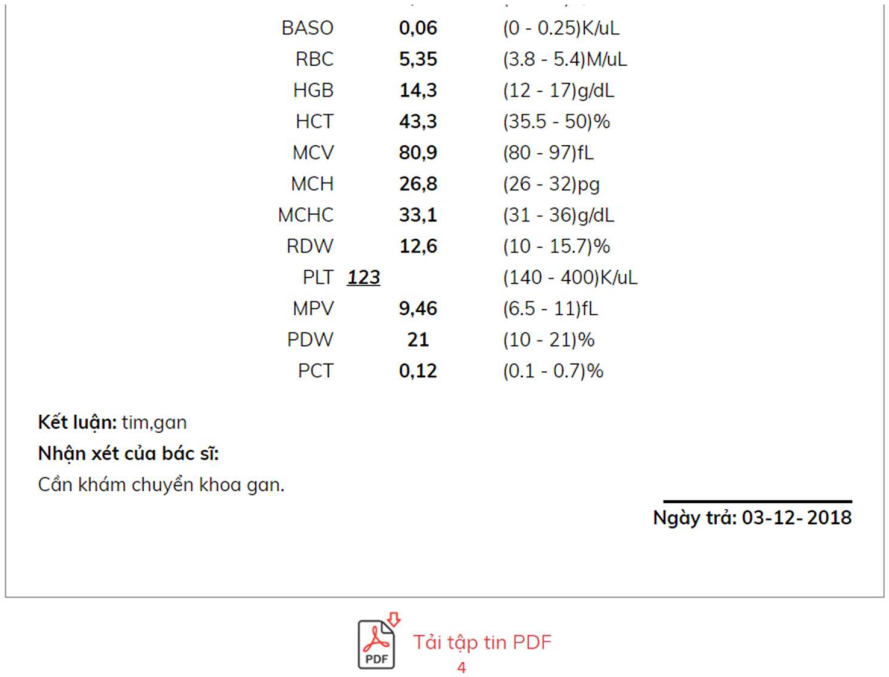


PHIẾU KẾT QUẢ XÉT NGHIỆM

Họ tên: Nguyễn Hữu Bằng **Năm sinh:** 1992 **Ngày ĐK:** 10-12-2018
Địa chỉ: 12 Tân Sơn, Gò Vấp, TP.HCM **Phái:** Nam **Giờ ĐK:** 17:17:21

TÊN XÉT NGHIỆM	KẾT QUẢ	CHỈ SỐ BÌNH THƯỜNG
Ct Máu	*	
WBC	4,26	(4 - 10)K/uL
% NEU	20,9	(37 - 75)%
% LYM	48,7	(20 - 45)%
% MONO	28,5	(0 - 12)%
% EOS	0,62	(0 - 7)%
% BASO	1,3	(0 - 2.5)%
NEU	0,89	(2 - 7.5)K/uL
LYM	2,07	(0.5 - 4.5)K/uL
MONO	1,21	(0 - 0.9)K/uL
EOS	0,03	(0 - 0.7)K/uL
BASO	0,06	(0 - 0.25)K/uL
RBC	5,35	(3.8 - 5.4)M/uL
HGB	14,3	(12 - 17)g/dL
HCT	43,3	(35.5 - 50)%
MCV	80,9	(80 - 97)fL
MCH	26,8	(26 - 32)pg
MCHC	33,1	(31 - 36)g/dL
RDW	12,6	(10 - 15.7)%
PLT	123	(140 - 400)K/uL
MPV	9,46	(6.5 - 11)fL
PDW	21	(10 - 21)%
PCT	0,12	(0.1 - 0.7)%

Figure 51 - Web Interface <View Testing Result>



BASO	0,06	(0 - 0.25)K/uL
RBC	5,35	(3.8 - 5.4)M/uL
HGB	14,3	(12 - 17)g/dL
HCT	43,3	(35.5 - 50)%
MCV	80,9	(80 - 97)fL
MCH	26,8	(26 - 32)pg
MCHC	33,1	(31 - 36)g/dL
RDW	12,6	(10 - 15.7)%
PLT 123		(140 - 400)K/uL
MPV	9,46	(6.5 - 11)fL
PDW	21	(10 - 21)%
PCT	0,12	(0.1 - 0.7)%

Kết luận: tim,gan

Nhận xét của bác sĩ:

Cần khám chuyển khoa gan.

Ngày trả: 03-12-2018

Tải tập tin PDF

4

Figure 52 - Web Interface <View Testing Result>

Field

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type	Length
1	CMND	Input id into textbox area	No	No	Text	String	

Buttons/Hyperlinks

No	Function	Description	Validation	Outcome
2	Search	Click "Tra cứu" to get result from system	N/A	Go to View Appointment Page
3	View testing result	View testing result	N/A	Go to Result Appointment Page
4	Download testing result	User can download testing result file as pdf file	N/A	Testing result file will be downloaded

4.3. Mobile application user interface

4.3.1. Login page

Figure 75 - Mobile Interface <Login>

Field

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type	Length
1	Phone	Phone to login	No	Yes	Textbox	String	
2	Password	Password to login	No	Yes	Textbox	String	

Buttons/Hyperlinks:

No	Function	Description	Validation	Outcome
3	Sign In	Login into system	Validate all required fields	Navigate to Home page
4	Navigate to Register Page	N/A	N/A	Navigate to Register Page

4.3.2. Register Account page

Figure 76 - Mobile Interface <Register account>

Field

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type	Length
1	Username	Username to register	No	Yes	Textbox	String	
2	Phone	Phone to register	No	Yes	Textbox	String	
3	Email	Email to register	No	Yes	Textbox	String	
4	Full name	Fullname to register	No	Yes	Textbox	String	
5	Date of Birth	D.O.B to register	No	Yes	Datepicker	Date	
6	Password	Password to register	No	Yes	Textbox	String	
7	Re-Password	Re-Password to confirm password	No	Yes	Textbox	String	

Buttons/Hyperlinks:

No	Function	Description	Validation	Outcome
8	Register	Register into system	Validate all required fields	Navigate to Phone verify page, then navigate to Login Page
9	Navigate to Login Page	N/A	N/A	Navigate to Login Page

5. Database Design

5.1. Entity relationship diagram (ERD)

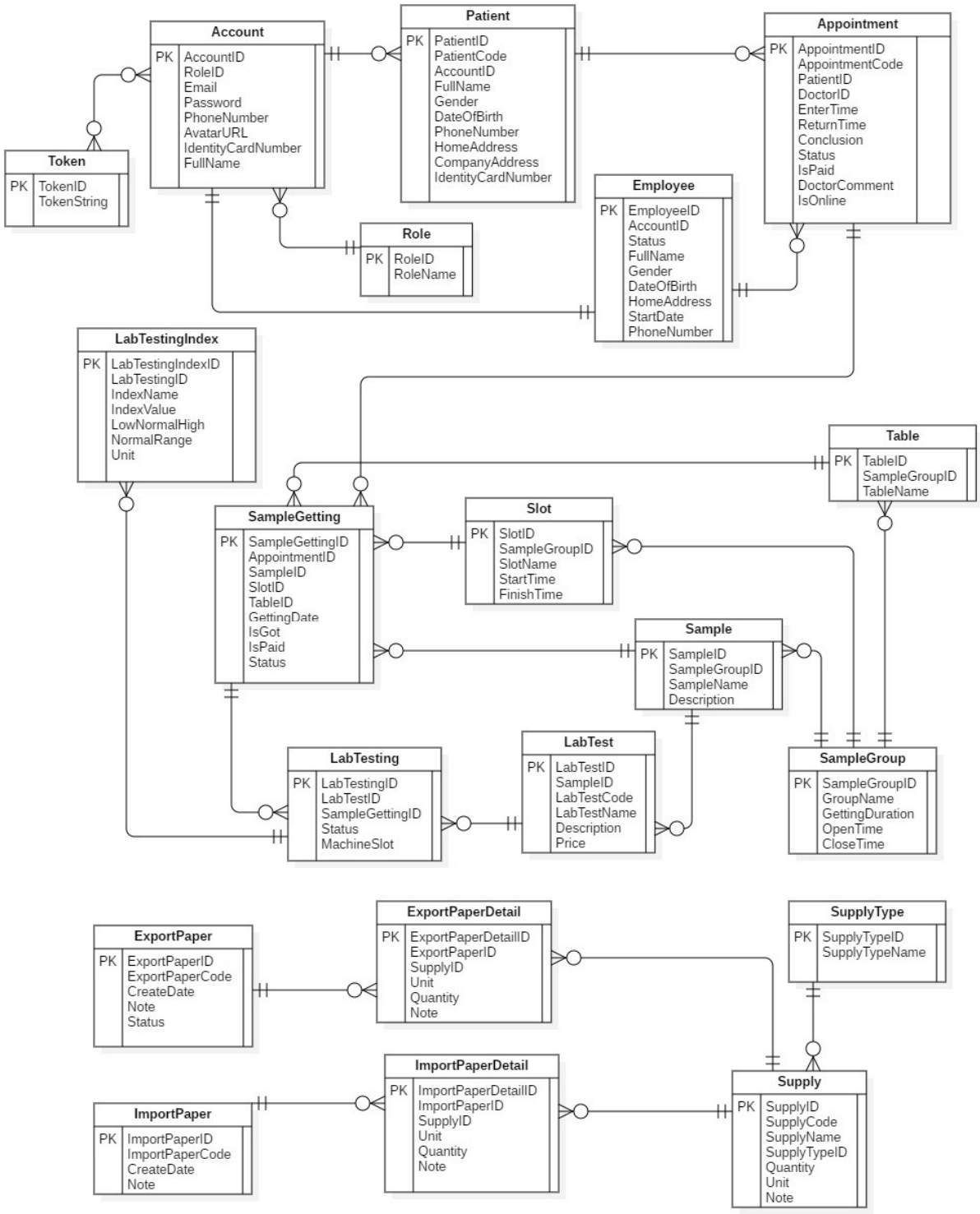


Figure 77 - Entity relationship diagram (ERD)

5.2. Entity dictionary

Entity Data Dictionary: describe content of all entities	
Entity name	**Description**
Account	Contain account information
Appointment	Contain Appointment information
Employee	Contain staff's information
ExportPaper	Contain ExportPaper information
ExportPaperDetail	Contain ExportPaperDetail information
ImportPaper	Contain information about ImportPaper
ImportPaperDetail	Contain ImportPaperDetail information
LabTest	Contain LabTest information
LabTesting	Contain information about LabTesting
LabTestingIndex	Contain transaction information of LabTestingIndex
Patient	Contain Patient information
Role	Contain Role information
Sample	Contain Sample information
SampleGetting	Contain SampleGetting information
SampleGroup	Contain SampleGroup information
Slot	Contain Slot information
Supply	Contain Supply information
SupplyType	Contain SupplyType information
Table	Contain Table information
Token	Contain Token information

Table 16 - Entity dictionary

6. Algorithms

6.1. Slot Suggestion

6.1.1. Definition

Generate the set of samples getting slots which has minimum total time.

6.1.2. Define problem

- When create a new appointment, user often have to spend a lot of effort to choose the suitable slots. Then, there is a need for an automatic solution using algorithms.

- There are N sample-gettings that the patient needs to perform. (blood getting, urine getting, are sample-gettings)
- Each room has a set of slots which have the same durations. Different sample getting rooms can have different slot durations.
- Assume that patients need to do all sample-gettings that they chosed in ONE day, so that the total time is minimum.

6.1.3. Solution

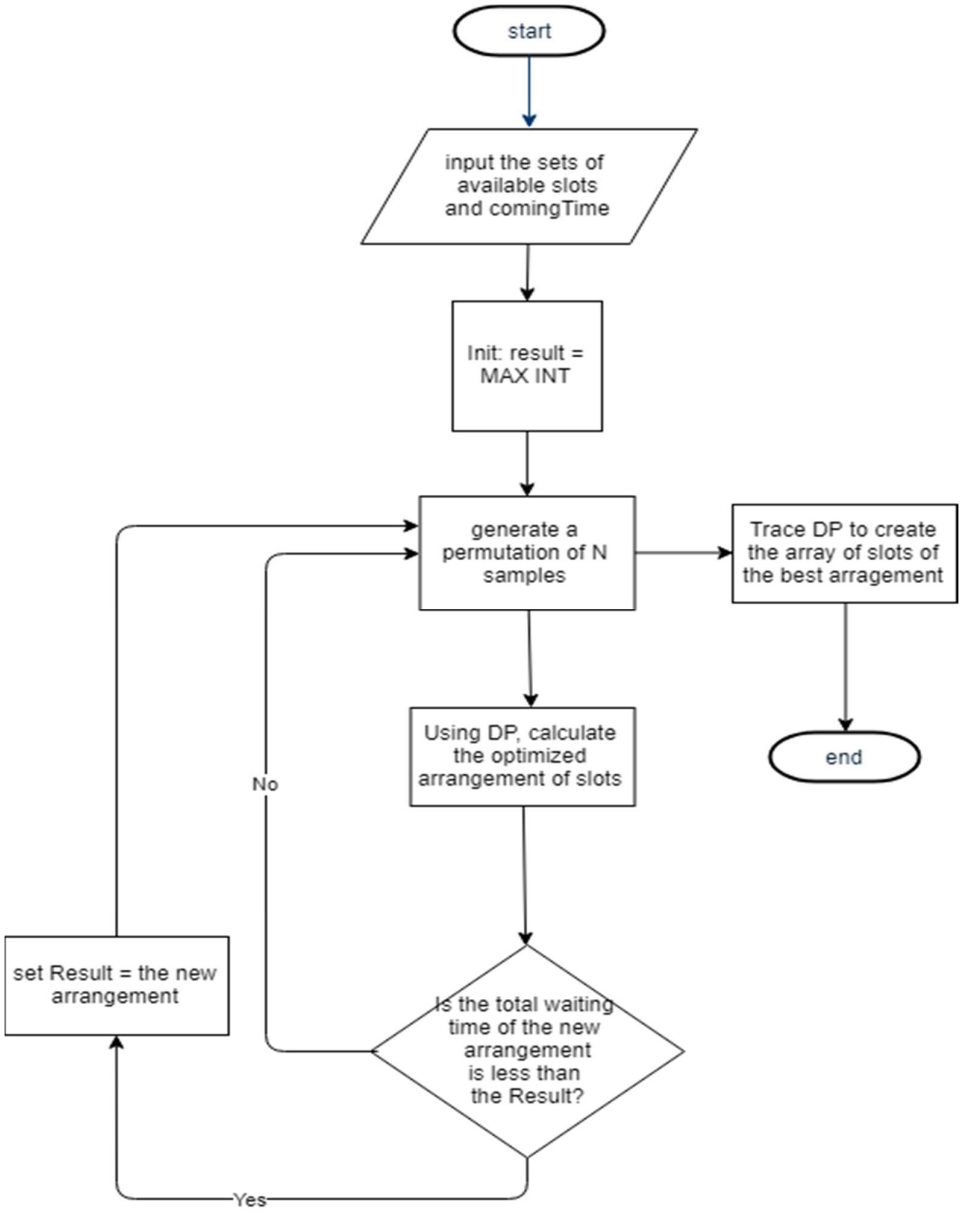
We use permutation recursive permutation and dynamic programming (DP) to solve this problem. We follow 2 steps:

- Step 1: Consider each permutation of N sample getting rooms in order, we use DP to calculate the optimized set of slots in the order of sample-gettings.
- Step 2: DP Formula:
  - Assume that T[i][j].StartTime: the start time of the j-slot in the i-th slot set. (the i-th slot set belongs to the i-th sample getting).
  - Assume that T[i][j].FinishTime: the finish time.
  - Assume that dp[i][j] is the minimum waiting time (between slots of sample gettings) if the last sample-getting is the i-th one and the it's chosed slot is the j-th slot. i is from 0 to N-1, j is from 0 to Length of i-th slot set – 1. Because the sample-gettings' duration is fixed, the order, which has the minimum waiting time, has the minimum total time.
  - dp[i][j] = min {dp[i-1][k] + (T[i-1][k].StartTime – T[i][j].FinishTime) | T[i-1][k].StartTime – T[i][j].FinishTime > 0}.
  - Base: dp[0][j] = T[0][j] – comingTime. (comingTime: the time that the patient arrives at the hospital).
  - The result of problem is min {dp[n-1][j]}.
- Step 3: Trace to get the optimized order of slots.

6.1.4. Complexity

The complexity of this algorithm is **$O(N! * N^3)$.** In which, N is the number of selected Samples of a patient on a day.

6.1.5. Flowchart



E. System Implementation & Test

Details Description

Overview

This section describes the approach and methodologies used by group to plan, organize and manage the testing of eLTMS system. It provides in detail all necessary information about the implementation and testing procedure of the system included test plans, test cases, test result, test environments, pass/fail criteria and risks estimations as well as a checklist to cover all possible cases.

Test approach

- Goal: Test all features in the whole eLTMS system based on the core flow.
- Method: black-box testing
- Technique: check list
  The testing for this project will consists of Integration System test level. Testing the program which was integrated and as a complete system to ensure that the software requirements have been met.
- Integration testing would be performed by all member of team and approved by team leader.
  System testing is focused on assessing the system's reliability. This process is concerned with finding errors that result from unanticipated interactions between components and component interface problems.

Database Relationship Diagram

Physical diagram

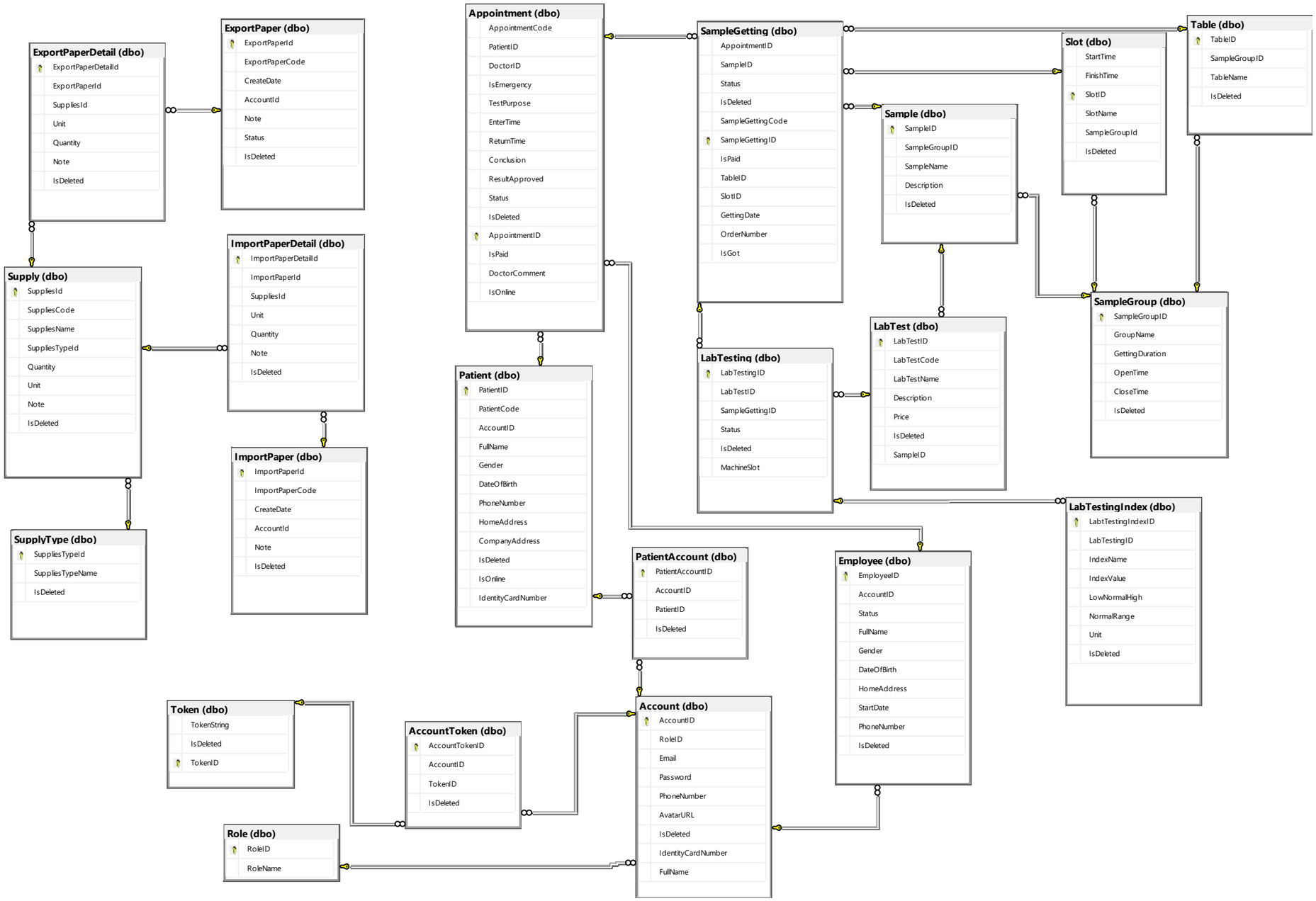


Figure 78 – Physical Database Diagram

System Testing Test Case

User Web Application Test Case

<User> Register Account

ID	Test Case Description	Test case procedure	Expected output	Result	Test Date
RA01	Register	1. Enter "Nguyễn Hoàng Bách" into "Họ và tên" required field. 2. Choose "1/8/1995" into "Ngày sinh" required field. 3. Enter "0943689690" into "phone" required field. 4. Enter "1A Hoàng Diệu" into "Địa chỉ" required field. 5. Enter "123456" into "Mật khẩu" required field.	1. System shows popup "Đăng kí thành công".	Pass	16/11/18

<User/Admin> Login

ID	Test Case Description	Test case procedure	Expected output	Result	Test Date
L01	Test login	1. Enter "0943689690" into "Số điện thoại" required field. 2. Enter "123456" into "Mật khẩu" required field. 3. Click on "Đăng nhập" button.	1. System reloads page and, shows username "Hoàng Bách" and "Đăng xuất" Button on top of the page.	Pass	16/11/18
L02	Test login with a blank text box	1. Input a blank in field "Số điện thoại". 2. Click on "Đăng nhập" button.	1. System shows error message "Vui lòng kiểm tra lại thông tin đăng nhập!".	Pass	16/11/18
L03	Test login with a blank text box	1. Input a blank in field "Mật khẩu". 2. Click on "Đăng nhập" button.	1. System shows error message "Vui lòng nhập mật khẩu!".	Pass	16/11/18

<User> Book Appointment

ID	Test Case Description	Test case procedure	Expected output	Result	Test Date
BA01	Book appointment without login	1. Choose " Đặt lịch hẹn" in menu bar.	1. System navigate to create appointment page.	Pass	16/11/18
BA02	Book appointment with validated input in step 1	1. Enter "Nguyễn Hoàng Bách" into "Họ và tên" required field. 2. Choose "1/8/1995" into "Ngày sinh" required field. 3. Enter "0943689690" into "phone" required field. 4. Enter "1A Hoàng Diệu" into "Địa chỉ" required field.	1. Go to step 2	Pass	16/11/18
BA03	Book appointment with a blank text box in step 1	1. Input a blank in one of the field "Họ và tên","Ngày sinh", "Số điện thoại", "Địa chỉ". 2. Click on "Bước 2" button.	1. System shows error message "Vui lòng điền đầy đủ thông tin"	Pass	16/11/18
BA04	Book appointment with validated input in step 2	1. Check labtest in checkbox area 2. Click on "Bước 3" button	1. Go to step 3	Pass	16/11/18
BA05	Book appointment with a blank text box in step 2	1. Not check any labtest in checkbox area 2. Click on "Bước 3" button	1. System shows error message "Vui lòng chọn loại xét nghiệm".	Pass	16/11/18
BA06	Book appointment with validated input in step 3	1. Select a date and time in the future 2. Click on "Đặt lịch" button.	1. System shows popup "Đặt lịch thành công".	Pass	16/11/18

BA07	Book appointment with a wrong input in step 3	1. Select a date and time in the past 2. Click on "Đặt lịch" button.	1. System shows error message "Vui lòng chọn lại ngày".	Pass	16/11/18

<Patient> View Booked Appointment/Result

ID	Test Case Description	Test case procedure	Expected output	Result	Test Date
VA01	View booked appointment (after login)	1. Choose "Tra cứu cuộc hẹn" in menu bar.	1. System navigate to view appointments page.	Pass	16/11/18
VA02	View booked appointment without login	1. Choose "Tra cứu cuộc hẹn" in menu bar	1. System naviagte to login page and shows "Vui lòng đăng nhập để xem thông tin chi tiết"	Pass	16/11/18

Mobile Application Test Case

<Guest> Login

ID	Test Case Description	Test case procedure	Expected output	Result	Test Date
RA_1	Test "Số điện thoại" guest input.	1. User inputs a blank in field "Số điện thoại". 2. User enters the "Số điện thoại" outside the allowed range from 10 to 12 number. 3. User enters "01692106611" into "Số điện thoại" required field.	1. System shows error message "Vui lòng nhập đầy đủ thông tin!". 2. System shows error message "Số điện thoại không hợp lệ!". 3. System allows user to login.	Pass	10/12/2018

RA_2	Test "Nhập mật khẩu" guest input.	1. User inputs a blank in field "Nhập mật khẩu". 2. User enters "Nhập mật khẩu " more than 200 characters. 3. User enters "12345678" into "Nhập mật khẩu" required field.	1. System shows error message "Vui lòng nhập đầy đủ thông tin!". 2. System shows error message "Mật khẩu không hợp lệ!". 3. System allows user to login.	Pass	10/12/2018
RA_3	Test "Đăng nhập" button	1. User clicks "Đăng nhập" button.	1. System show message if validation failed. 2. System navigate to mainpage if sucessfully.		

<Guest> Register Account

ID	Test Case Description	Test case procedure	Expected output	Result	Test Date
RA_1	Test "Họ và tên" guest input.	1. User inputs a blank in required field "Họ và tên".	1. System shows error message "Vui lòng nhập đầy đủ thông tin".	Pass	10/12/2018
RA_2	Test "Số điện thoại" guest input.	1. User inputs a blank in field "Số điện thoại". 2. User enters "Số điện thoại" already exists. 3. User enters the "Số điện thoại" outside	1. System shows error message "Vui lòng nhập đầy đủ thông tin!". 2. System shows error message "Số điện thoại đã được sử dụng!". 3. System shows error message	Pass	10/12/2018

		the allowed range from 10 to 12 number. 4. User enters "01692106611" into "Số điện thoại" required field.	"Số điện thoại không hợp lệ!". 4. System shows "Đăng ký thành công".		
RA_3	Test "Email" guest input.	1. User inputs a blank in field "Email". 2. User inputs "Email" already exists. 3. User inputs "Email" wrong syntax. 4. User enters "ducbm@gmail.com" into "Email" required field.	1. System shows error message "Vui lòng nhập đầy đủ thông tin!". 2. System shows error message "Email đã được sử dụng!". 3. System shows error message "Email không hợp lệ!". 4. System allows user to register.	Pass	10/12/2018
RA_4	Test "Nhập mật khẩu" guest input.	1. User inputs a blank in field "Nhập mật khẩu". 2. User enters "Nhập mật khẩu " more than 200 characters. 3. User enters "12345678" into "Nhập mật khẩu" required field.	1. System shows error message "Vui lòng nhập đầy đủ thông tin!". 2. System shows error message "Mật khẩu không hợp lệ!". 3. System allows user to register.	Pass	10/12/2018

RA_5	Test "Chứng minh nhân dân" guest choose.	1. User does not choose "Chứng minh nhân dân". 2. User enters "251036695" to textbox "Chứng minh nhân dân".	1. System shows error message "Vui lòng nhập đầy đủ thông tin!". 2. System allows user to register.	Pass	10/12/2018

<Patient> Book Appointment

ID	Test Case Description	Test case procedure	Expected output	Result	Test Date
BA_1	Test "Đặt lịch" screen.	1. User "Đặt lịch" button on main screen. 2. User checks "Loại xét nghiệm" checkbox.	1. System shows "Đặt lịch" screen and "Chọn loại xét nghiệm" section below the title. 2. Checkbox item is checked.	Pass	10/12/2018
BA_2	Test "bước 2" button.	1. User clicks "Bước 2" button on "Chọn loại xét nghiệm" screen. 2. Users selects "Ngày". 3. Users selects time slot.	1. System navigates to "Chọn ngày" screen. 2. System shows datepicker dialog. 3. System shows dropdownlist of time slots.	Pass	10/12/2018
BA_3	Test "Bước 1" button.	1. User clicks "Bước 1" button.	1. System navigates to "Chọn loại xét nghiệm" screen.	Pass	10/12/2018
BA_4	Test "Chọn ngày" screen.	1. User not select "Ngày". 2. User does not select time slots.	1. System shows error message "Vui lòng nhập đầy đủ thông tin!". 2. System shows error message "Vui lòng nhập đầy đủ thông tin!".	Pass	10/12/2018

<Patient> View Appointment

ID	Test Case Description	Test case procedure	Expected output	Result	Test Date
VA_1	Test "Danh sách cuộc hẹn" screen.	1. User clicks "Danh sách cuộc hẹn" button on main screen.	1. System navigates to "Danh sách cuộc hẹn" page. 1.1 System show loading dialog. 1.2 System display "Cuộc hẹn" list on the screen. 1.3 When the list is empty, system shows "Không có dữ liệu" message.	Pass	10/12/2018
VA_2	Test "Xóa" button.	1. User clicks "Xóa" button on the appointment item.	1. System call api to delete appointment and reloads page. 2. System displays "Có lỗi xảy ra" message when an error is occurred during deleting.	Pass	10/12/2018
VA_3	Test "Sửa" button.	1. User clicks "Sửa" button on the appointment item.	1. System navigates to edit appointment screen with the selected appointment.	Pass	10/12/2018
VA_4	Test "Xem chi tiết" button.	1. User clicks "Xem chi tiết" button on the appointment item.	1. System navigates to appointment detail page.	Pass	10/12/2018
VA_5	Test "Xem kết quả khám" button.	1. User clicks "Xem kết quả khám" button on the appointment item.	1. System navigates to "Kết quả khám" page.	Pass	10/12/2018

<Patient> View Appointment Detail

ID	Test Case Description	Test case procedure	Expected output	Result	Test Date
VAD_1	Test "Xem chi tiết cuộc hẹn" screen.	1. User clicks "Xem chi tiết cuộc hẹn" button on appointment item in the appointment history screen.	1. System navigates to "Chi tiết cuộc hẹn" screen. 2. System display appointment detail on the screen.	Pass	10/12/2018

<Patient> Edit Appointment

ID	Test Case Description	Test case procedure	Expected output	Result	Test Date
EA_1	Test "Sửa lịch" screen.	1. User clicks "Sửa lịch" button on appointment item in the appointment history screen. 2. User checks "Loại xét nghiệm" checkbox.	1. System shows "Sửa lịch" screen and auto check the "Loại xét nghiệm" checkbox. 2. Checkbox item is checked.	Pass	10/12/2018
EA_2	Test "bước 2" button.	1. User clicks "Bước 2" button on "Chọn loại xét nghiệm" screen. 2. Users selects "Ngày". 3. Users selects time slot.	1. System navigates to "Chọn ngày" screen. 2. System shows datepicker dialog. 3. System shows dropdownlist of time slots.	Pass	10/12/2018
EA_3	Test "Bước 1" button.	1. User clicks "Bước 1" button.	1. System navigates to "Chọn loại xét nghiệm" screen.	Pass	10/12/2018

EA_4	Test "Chọn ngày" screen.	1. User not select "Ngày". 2. User does not select time slots.	1. System shows error message "Vui lòng nhập đầy đủ thông tin!". 2. System shows error message "Vui lòng nhập đầy đủ thông tin!".	Pass	10/12/2018

<Patient> View Appointment Result

ID	Test Case Description	Test case procedure	Expected output	Result	Test Date
VAR_1	Test "Xem kết quả cuộc hẹn" screen.	1. User clicks "Xem kết quả cuộc hẹn" button on appointment item in the appointment history screen.	1. System navigates to "Kết quả cuộc hẹn" screen. 2. System display appointment result on the screen with: - Name - Birth year - Gender - Address - Date register - List result index.	Pass	10/12/2018

Admin Web Application Test Case

<Admin-Hospital Receptionist> Change status of appointment

ID	Test Case Description	Test case procedure	Expected output	Result	Test Date
CS01	Hospital Receptionist change status (after login)	1. Click on checkbox at "Thanh toán" column	1. System shows "Thực hiện thanh toán" popup to confirm.	Pass	19/11/2018

CS02	Hospital Receptionist change status (after login)	1. Click on "Có" button to perform action	1. System shows notification with content "Đã thanh toán" and "Thay đổi trạng thái thành công"	Pass	19/11/2018

Table 17 - Admin Web Application <Change status of appointment>

<Admin-Department Receptionist> Change status of appointment

ID	Test Case Description	Test case procedure	Expected output	Result	Test Date
CS03	Department Receptionist change status (after login)	1. Click on checkbox at "Thanh toán" column	1. System shows "Thực hiện thanh toán" popup to confirm.	Pass	19/11/2018
CS04	Department Receptionist change status (after login)	1. Click on "Có" button to perform action	1. System shows notification with content "Đã thanh toán" and "Thay đổi trạng thái thành công"	Pass	19/11/2018

Table 18 - Admin Web Application <Change status of appointment>

<Admin-Department Receptionist> Create a new appointment

ID	Test Case Description	Test case procedure	Expected output	Result	Test Date
CA01	Department Receptionist create a new appointment (after login)	1. Click on "Thêm mới" button	1. System shows popup with appointment's information	Pass	19/11/2018
CA02	Department Receptionist create appointment with validated input (after login)	1. Enter "Nguyễn Hoàng Bách" into "Họ và tên" required field. 2. Choose "1/8/1995" into "Ngày sinh" required field. 3. Enter "0943689690" into "phone" required field. 4. Enter "1A Hoàng Diệu" into "Địa chỉ" required field.	1. System shows notification with content "Tạo mới cuộc hẹn thành công"	Pass	19/11/2018

		5. Check labtest in checkbox area 6. Click on "Lưu" button			
CA03	Department Receptionist create appointment with a blank text box (after login)	1. Input a blank in one of the field "Họ và tên","Ngày sinh", "Số điện thoại", "Địa chỉ". 2. Click on "Lưu" button .	1. System shows error message "Vui lòng điền đầy đủ thông tin"	Pass	19/11/2018

Table 19 - Admin Web Application <Create a new appointment>

<Admin-Nurse> Change status of appointment after getting specimen

ID	Test Case Description	Test case procedure	Expected output	Result	Test Date
CS05	Nurse changes status (after login)	1. Click on checkbox at "Đã lấy mẫu" column	1. System shows "Bạn có muốn thay đổi" popup to confirm	Pass	19/11/2018
CS06	Nurse changes status (after login)	1. Click on "Có" button to perform action	1. System shows notification with content "Thay đổi trạng thái thành công"	Pass	19/11/2018

Table 20 - Admin Web Application <Change status of appointment>

<Admin-Lab Technician> Add new labtest

ID	Test Case Description	Test case procedure	Expected output	Result	Test Date
AL01	Lab Technician add a new labtest (after login)	1. Click on "Thêm mới dịch vụ xét nghiệm" button	1. System shows popup with labtest's information form	Pass	19/11/2018
AL02	Lab Technician add a new labtest with validated input (after login)	1. Enter "CTM" into "Mã xét nghiệm" required field. 2. Enter "CT Máu" into "Tên xét nghiệm" required field. 3. Select "Máu" in "Loại" dropdown list required field.	1. System shows notification with content "Thêm mới dịch vụ thành công"	Pass	19/11/2018

		3. Enter "45000" into "Giá" required field. 4. Enter something into "Mô tả" required field. 5. Click on "Lưu" button			
AL03	Lab Technician add a new labtest with a blank text box (after login)	1. Input a blank in one of the field "Mã xét nghiệm", "Tên xét nghiệm", "Giá" and not select "Loại" 2. Click on "Lưu" button .	1. System shows error message "Vui lòng điền đầy đủ thông tin"	Pass	19/11/2018

Table 21 - Admin Web Application <Add new labtest>

<Admin-Lab Technician> Add new sample group

ID	Test Case Description	Test case procedure	Expected output	Result	Test Date
ASG01	Lab Technician add a new sample group (after login)	1. Click on "Nhóm xét nghiệm" button	1. System shows popup with list of sample group	Pass	19/11/2018
ASG02	Lab Technician add a new sample group (after login)	1. Click on "Thêm mới nhóm xét nghiệm" button	1. System shows popup with sample group's information form		
ASG03	Lab Technician add a new sample group with validated input (after login)	1. Enter "Tế bào" into "Tên nhóm xét nghiệm" required field 2. Enter "1200" into "Thời gian tiến hành" required field 3. Enter "25200" into "Bắt đầu" required field 4. Enter "63000" into "Kết thúc" required field 5. Click on "Lưu" button	1. System shows notification with content "Thêm nhóm xét nghiệm thành công"	Pass	19/11/2018

ASG04	Lab Technician add a new sample group with a blank text box (after login)	1. Input a blank in one of the field "Tên nhóm xét nghiệm", "Thời gian tiến hành", "Bắt đầu", "Kết thúc" 2. Click on "Lưu" button .	1. System shows error message "Vui lòng điền đầy đủ thông tin"	Pass	19/11/2018

Table 22 - Admin Web Application <Add new sample group>

<Admin-Lab Technician> Add new sample

ID	Test Case Description	Test case procedure	Expected output	Result	Test Date
AG01	Lab Technician add a new sample (after login)	1. Click on "Loại xét nghiệm" button	1. System shows popup with list of sample	Pass	19/11/2018
AG02	Lab Technician add a new sample (after login)	1. Click on "Thêm mới loại xét nghiệm" button	1. System shows popup with sample group's information form		
AG03	Lab Technician add a new sample with validated input (after login)	1. Enter "Tế bào" into "Tên loại xét nghiệm" required field 2. Select "Tế Bào" in "Nhóm xét nghiệm" dropdown list required field. 3. Enter something into "Mô tả" required field. 4. Click on "Lưu" button	1. System shows notification with content "Thêm loại xét nghiệm thành công"	Pass	19/11/2018
AG04	Lab Technician add a new sample with a blank text box (after login)	1. Input a blank in one of the field "Tên loại xét nghiệm" and not select "Nhóm xét nghiệm" 2. User clicks on "Lưu" button	1. System shows error message "Vui lòng điền đầy đủ thông tin"	Pass	19/11/2018

Table 23 - Admin Web Application <Add new sample>

F. Software User's Manual

User Guide

Admin web application

Login

Figure 79 - Admin web application Guide <Login>

Step	Description
1	Enter phone number
2	Enter password
3	Check "Ghi nhớ tài khoản"checkbox (optional)
4	Click on "Đăng nhập" button to sign in

Table 24 - Admin web application Guide <Login>

View Hospital Receptionist Page

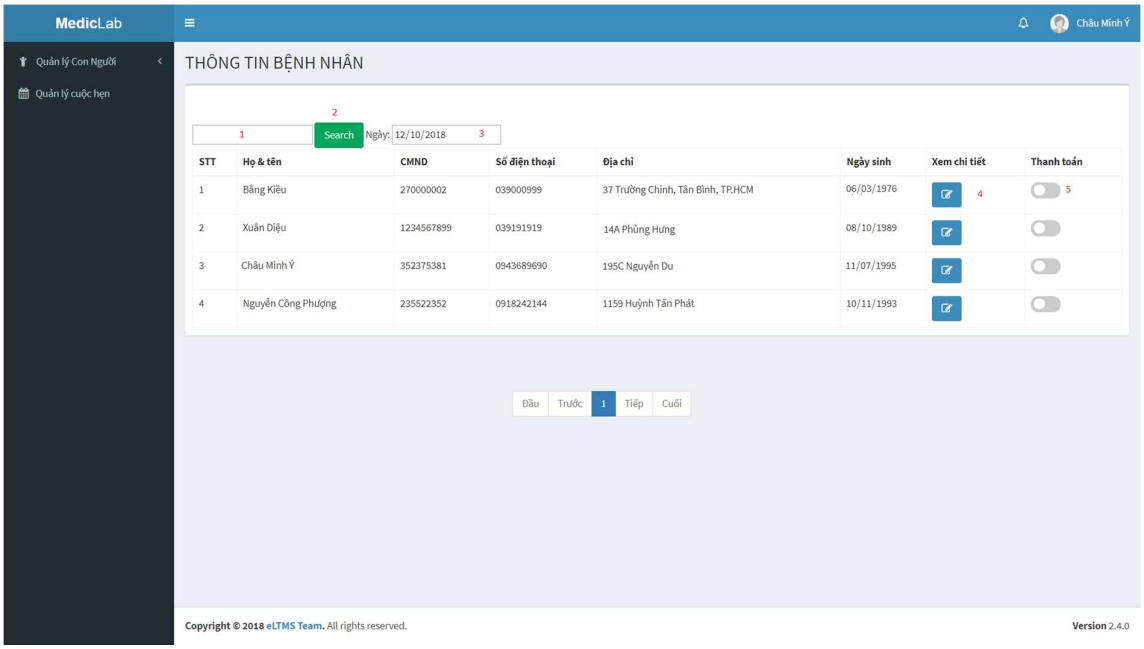


Figure 80 - Admin web application Guide <View Hospital Receptionist>

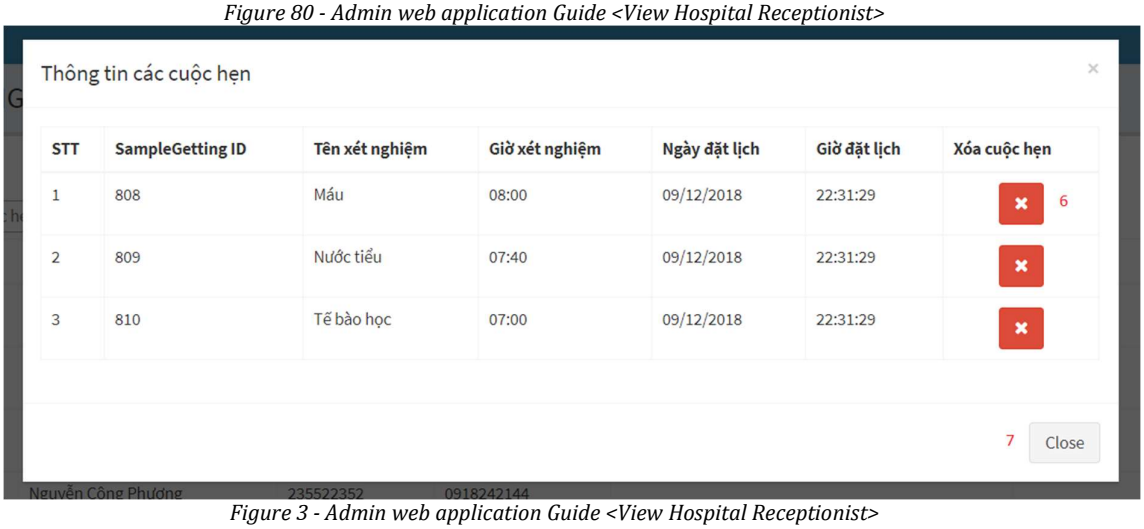


Figure 3 - Admin web application Guide <View Hospital Receptionist>

Figure 4 - Admin web application Guide <View Hospital Receptionist>

Step	Description
1	Type keyword at textbox area to find patient by keyword
2	Click on "Search" button to perform action
3	Click on date area and choose date which you want to show list of patient
4	Click on blue button at "Xem chi tiết" column to view patient's details of appointment
5	Click on switch checkbox at "Thanh toán" column to change status of appointment when patient pay the bill
6	After clicking on blue button in step 5, the popup will show patient's details of appointment. You can click red button to delete a appointment
7	Click "close" button to close popup

8	After clicking on switch checkbox at “Thanh toán” column, the popup will show the bill. You can click “Có” button to pay the bill or “Không” button to cancel

Table 25 - Admin web application Guide <View Hospital Receptionist>

View Department Receptionist Page

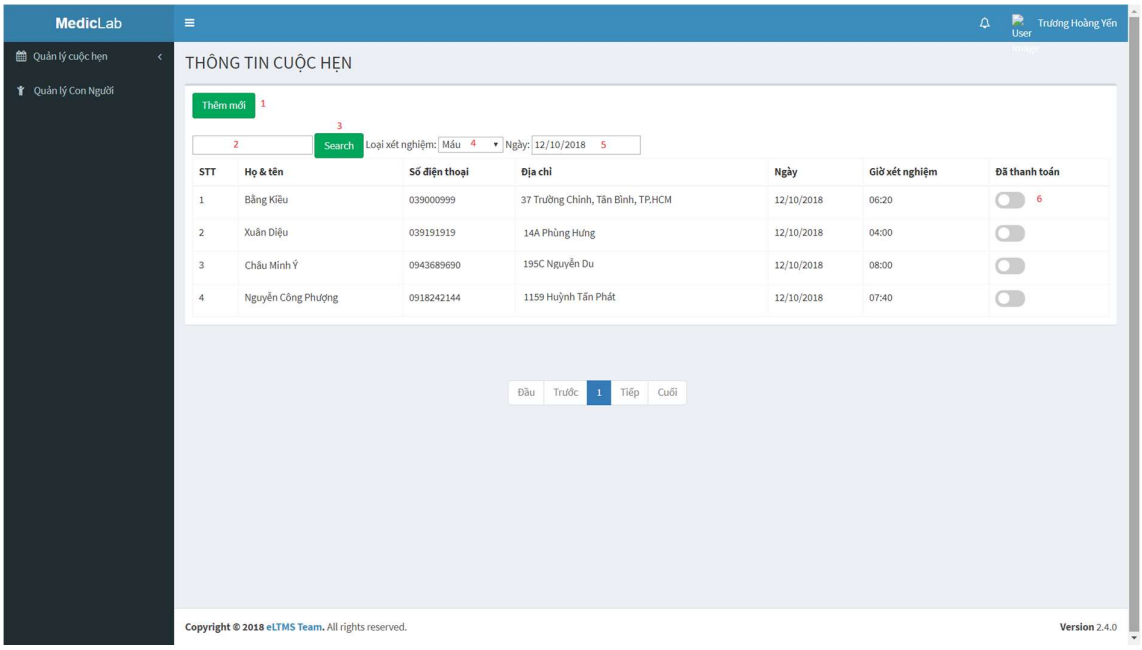


Figure 5 - Admin web application Guide <View Department Receptionist>

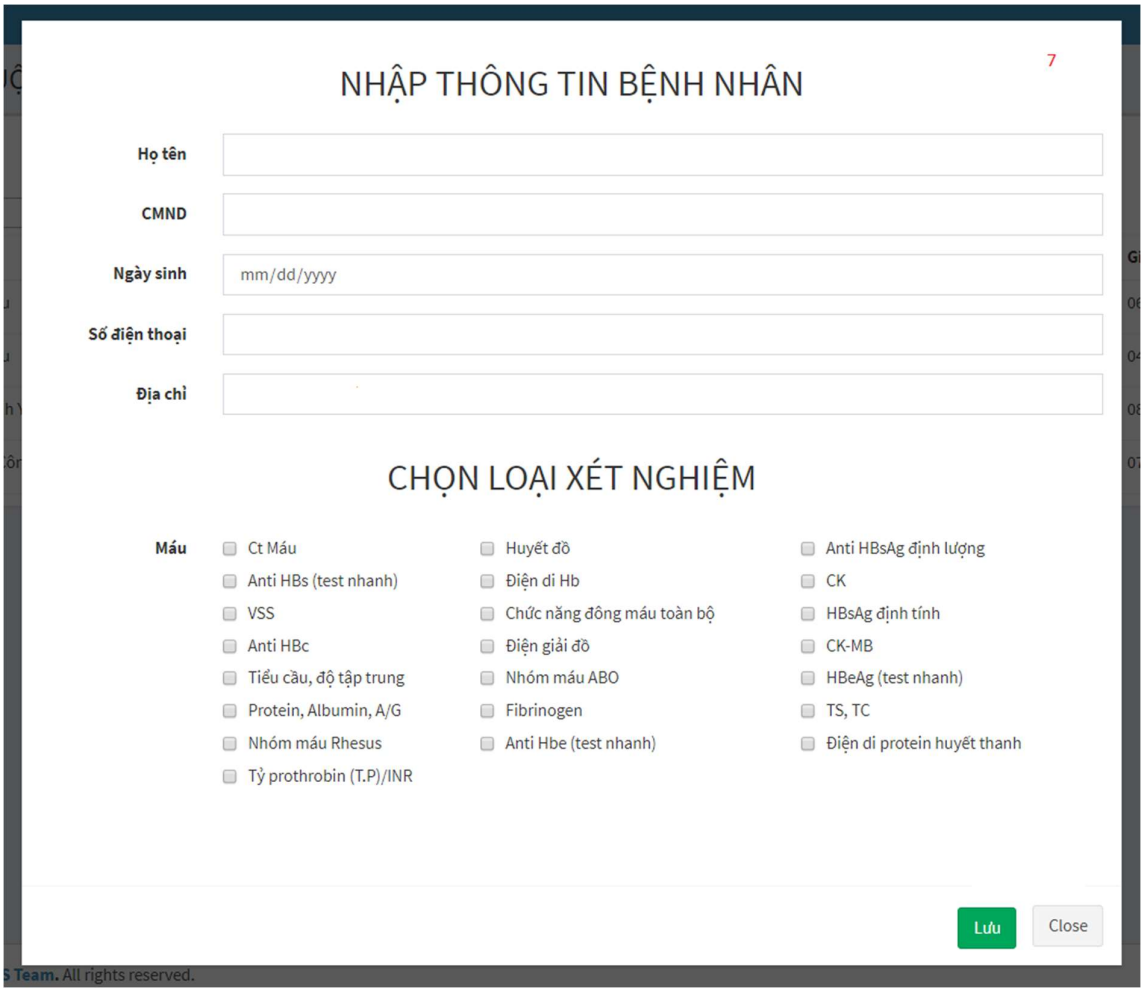


Figure 6 - Admin web application Guide <View Department Receptionist>

Figure 7 - Admin web application Guide <View Department Receptionist>

Step	Description
1	Click on "Thêm mới" button to book a new appointment for patient who has no booking before
2	Type keyword at textbox area to find appointment by keyword
3	Click on "Search" button to perform action
4	Click and choose sample name which is used to filter appointment
5	Click on date area and choose date which you want to show list of appointment
6	Click on switch checkbox at "Thanh toán" column to change status of appointment when patient pay the bill
7	After click on "Thêm mới" button in step 1. You have to fill all of patient's information and choose labtest. Then, click on "Lưu" button to create a new appointment or "Close" to cancel.

8	After clicking on switch checkbox at “Thanh toán” column, the popup will show the bill. You can click “Có” button to pay the bill or “Không” button to cancel

Table 26 - Admin web application Guide <View user management>

View Nurse Page

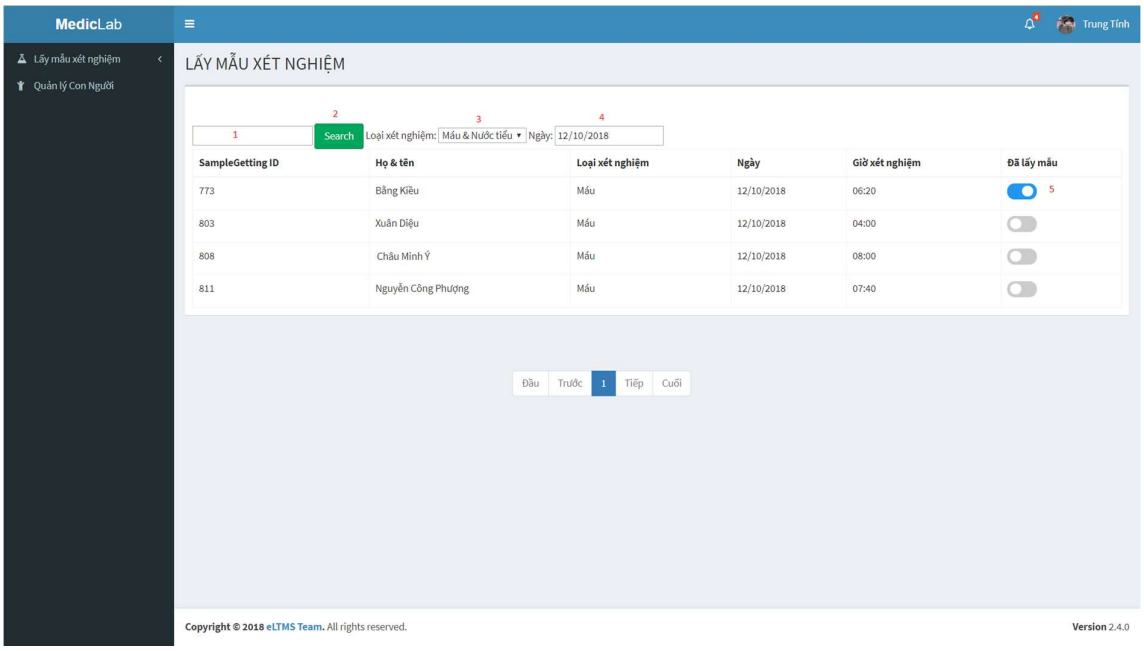


Figure 8 - Admin web application Guide <View Nurse>

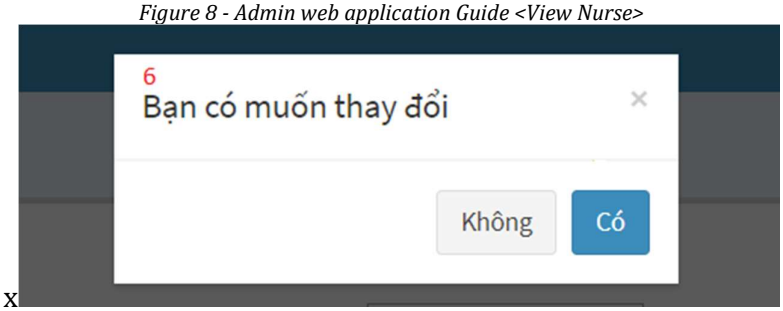
x 

Figure 9 - Admin web application Guide <View Nurse>

Step	Description
1	Type keyword at textbox area to find appointment by keyword
2	Click on “Search” button to perform action
3	Click and choose sample group which is used to filter appointment
4	Click on date area and choose date which you want to show list of appointment
5	Click on switch checkbox at “Đã lấy mẫu” column to change status of appointment when nurse got specimen
6	After clicking on switch checkbox at “Đã lấy mẫu” column, the popup to confirm action. You can click “Có” button to change status of appointment or “Không” button to cancel

Table 27 - Admin web application Guide <View Nurse>

View Laboratory Technician Page

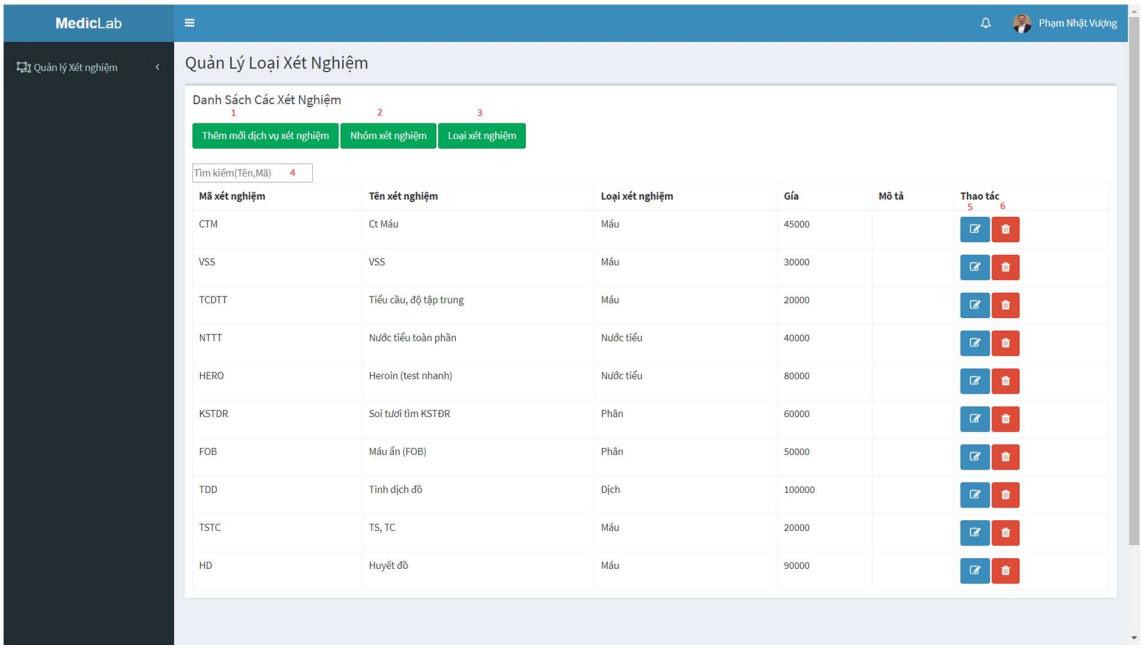


Figure 10 - Admin web application Guide <View Laboratory Technician>

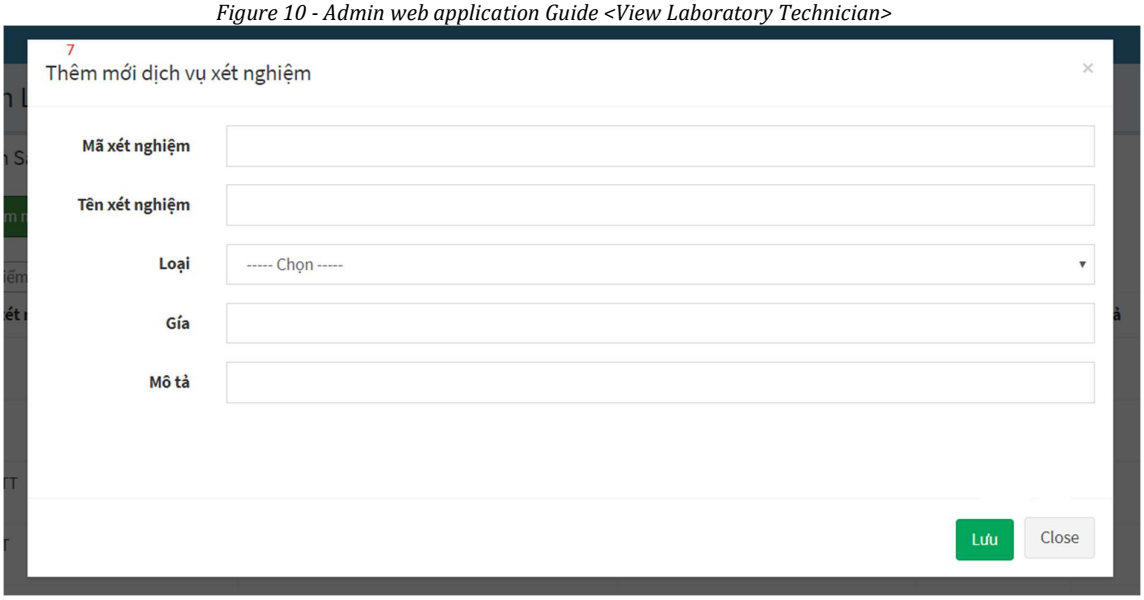


Figure 11 - Admin web application Guide <Laboratory Technician>

Figure 12 - Admin web application Guide <View Laboratory Technician>

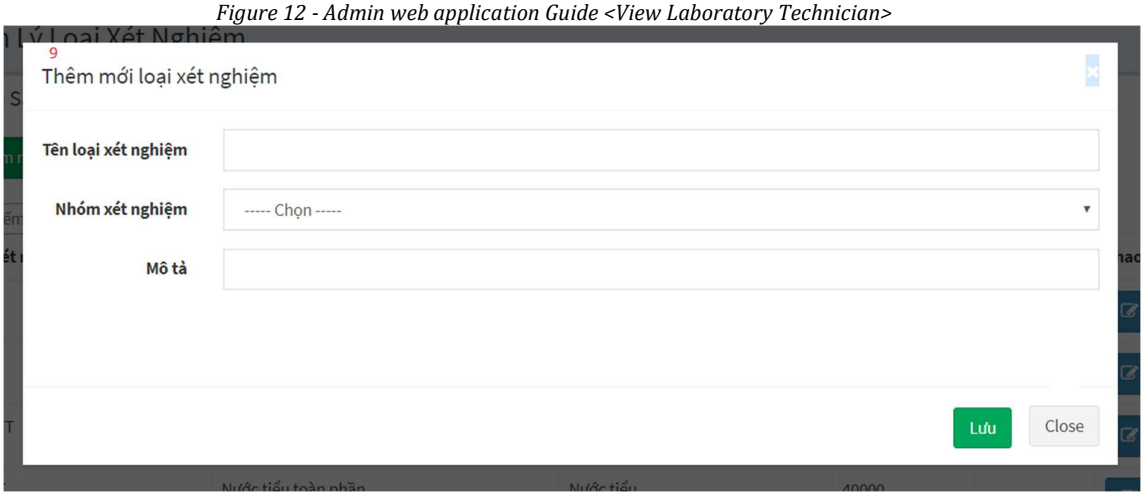


Figure 13 - Admin web application Guide <View Laboratory Technician>

Step	Description
1	Click on "Thêm mới dịch vụ xét nghiệm" button to add new labtest
2	Click on "Nhóm xét nghiệm" button to add new sample group
3	Click on "Loại xét nghiệm" button to add new sample
4	Type keyword at textbox area to find labtest by keyword
5	Click on blue button at "Thao tác" column to edit labtest's information
6	Click on red button at "Thao tác" column to delete a labtest
7	After clicking on "Thêm mới dịch vụ xét nghiệm" button in step 1, you have to fill all of labtest's information. Then, click on "Lưu" button to add a new labtest or "Close" button to cancel

8	After clicking on “Nhóm xét nghiệm” button in step 2, you have to fill all of sample group’s information. Then, click on “Lưu” button to add a new sample group or “Close” button to cancel
9	After clicking on “Loại xét nghiệm” button in step 3, you have to fill all of sample’s information. Then, click on “Lưu” button to add a new sample or “Close” button to cancel

Table 28 - Admin web application Guide <Laboratory Technician>

View Doctor Page

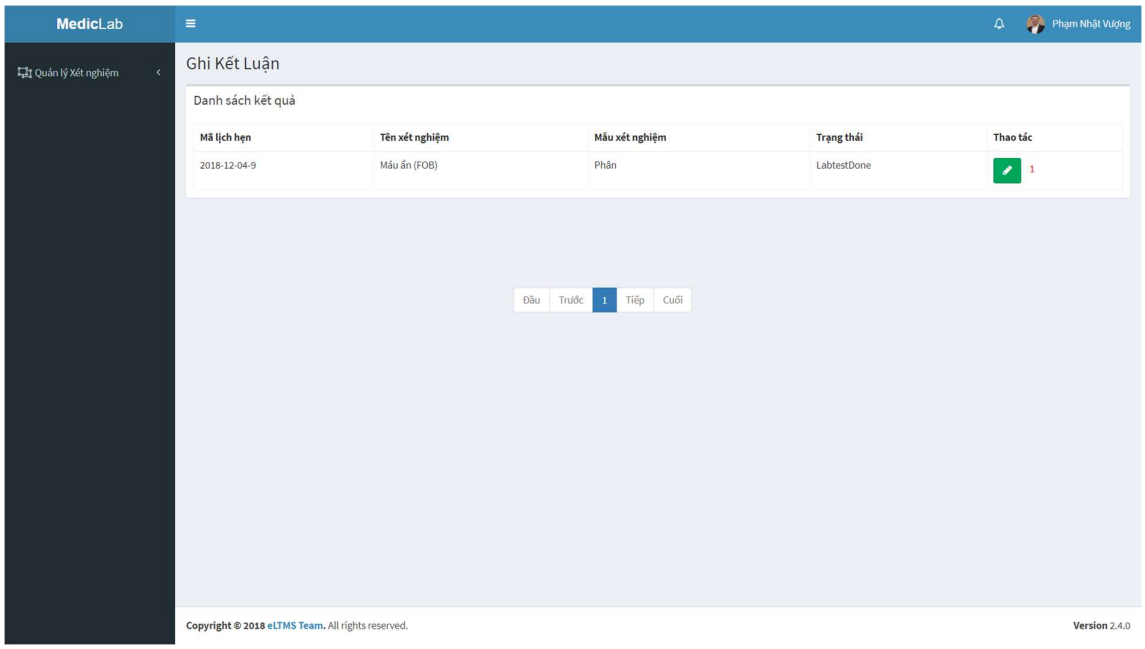


Figure 14 - Admin web application Guide <View Doctor>

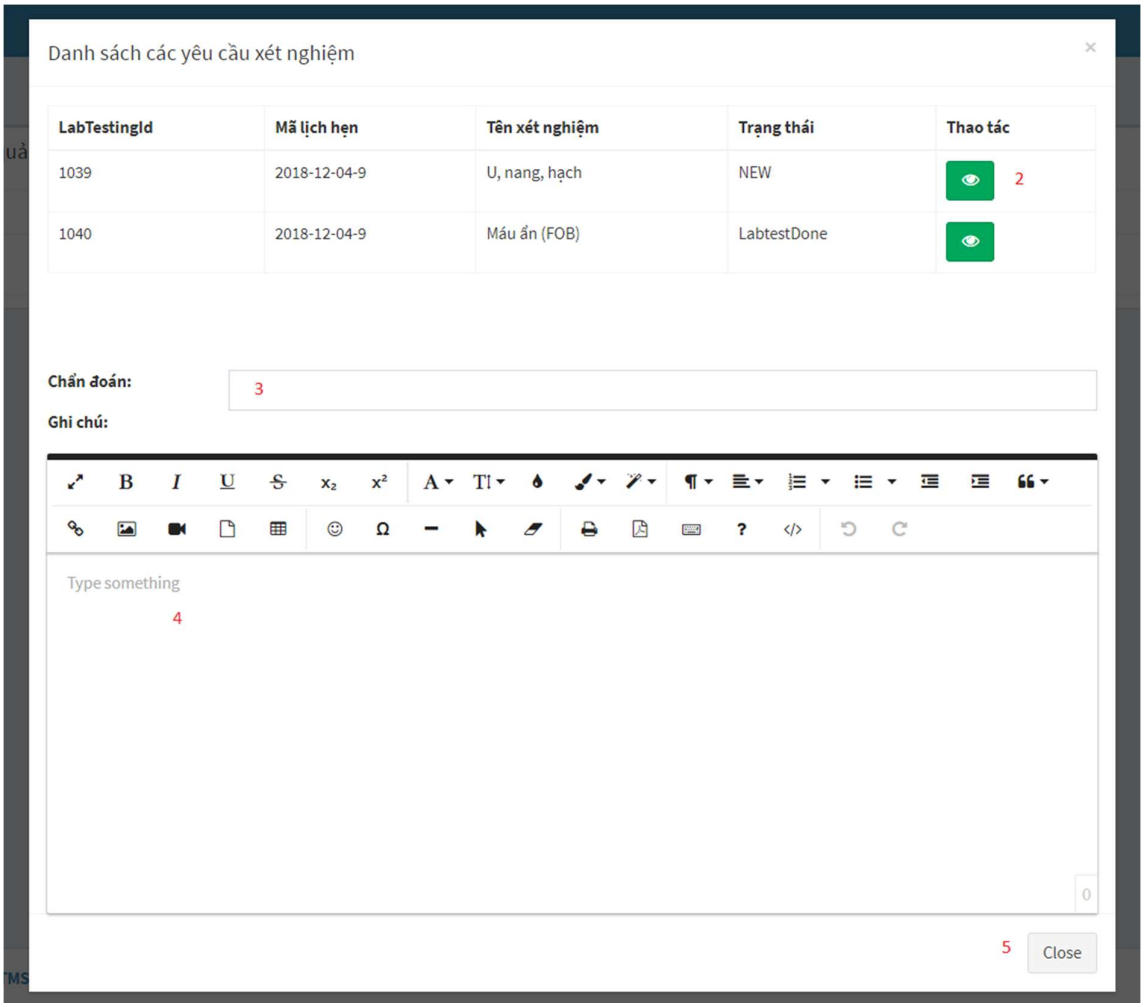


Figure 15 - Admin web application Guide <View Doctor>

Cần làm xét nghiệm lại 6

Labtesting ID	Index Name	Index Value	Trạng Thái	Mức Trung Bình	Đơn Vị
1040	WBC	4.26	N	4 - 10	K/uL
1040	% NEU	20.9	L	37 - 75	%
1040	% LYM	48.7	H	20 - 45	%
1040	% MONO	28.5	H	0 - 12	%
1040	% EOS	0.62	N	0 - 7	%
1040	% BASO	1.3	N	0 - 2.5	%
1040	NEU	0.89	L	2 - 7.5	K/uL
1040	LYM	2.07	N	0.5 - 4.5	K/uL
1040	MONO	1.21	H	0 - 0.9	K/uL
1040	EOS	0.03	N	0 - 0.7	K/uL
1040	BASO	0.06	N	0 - 0.25	K/uL
1040	RBC	5.35	N	3.8 - 5.4	M/uL
1040	HGB	14.3	N	12 - 17	g/dL
1040	HCT	43.3	N	35.5 - 50	%
1040	MCV	80.9	N	80 - 97	fL
1040	MCH	26.8	N	26 - 32	pg
1040	MCHC	33.1	N	31 - 36	g/dL
1040	RDW	12.6	N	10 - 15.7	%
1040	PLT	123	L	140 - 400	K/uL
1040	MPV	9.46	N	6.5 - 11	fL
1040	PDW	21	N	10 - 21	%
1040	PCT	0.12	N	0.1 - 0.7	%

Figure 16 - Admin web application Guide <View Doctor>

Step	Description
1	Click on green button at "Thao tác" column to view testing result, write note and conclusion
2	Click on green button at "Thao tác" column to view details of testing result
3	Type text conclusion at textbox area
4	Write note (Advise for patient) at textbox area
5	Click on "Close" button cancel
6	After clicking on green button at "Thao tác" column to view details of testing result in step 2, you can request re-testing when you see something wrong about testing result

Table 10 - Admin web application Guide <View Doctor>

User web application

Mobile application for all user