MINISTRY OF EDUCATION AND TRAINING

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**FPT UNIVERSITY**

Capstone Project Document

**Call-Center on Mobile for Clinics**

|  |  |
| --- | --- |
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| **Ext. Supervisor** | N/A |
| **Capstone Project code** |  |

-Ho Chi Minh City, ***18/05/2018*-**

# Table of Contents

Contents

[MINISTRY OF EDUCATION AND TRAINING 1](#_Toc514858049)

[Table of Contents 2](#_Toc514858050)

[List of Tables 4](#_Toc514858051)

[List of Figures 4](#_Toc514858052)

[Definitions, Acronyms, and Abbreviations 4](#_Toc514858053)

[A. Introduction 5](#_Toc514858054)

[1. Project Information 5](#_Toc514858055)

[2. Introduction 5](#_Toc514858056)

[3. Current Situation 5](#_Toc514858057)

[4. Problem Definition 5](#_Toc514858058)

[5. Proposed Solution 6](#_Toc514858059)

[5.1 Feature functions 6](#_Toc514858060)

[5.2 Values and Challenges 6](#_Toc514858061)

[6. Functional Requirements 6](#_Toc514858062)

[7. Role and Responsibility 6](#_Toc514858063)

[B. Software Project Management Plan 7](#_Toc514858064)

[1. Problem Definition 7](#_Toc514858065)

[1.1 Name of this Capstone Project 7](#_Toc514858066)

[1.2 Problem Abstract 7](#_Toc514858067)

[1.3 Project Overview 7](#_Toc514858068)

[1.3.1 Current Situation 7](#_Toc514858069)

[1.3.2 The Proposed System 8](#_Toc514858070)

[The system will have four sub-systems: 8](#_Toc514858071)

[1.3.2.1 API application 8](#_Toc514858072)

[1.3.2.2 Mobile application 8](#_Toc514858073)

[1.3.2.3 Hotline server 8](#_Toc514858074)

[1.3.2.4 Web application 8](#_Toc514858075)

[1.3.3 Boundaries of the System 8](#_Toc514858076)

[1.3.4 Future Plans 8](#_Toc514858077)

[1.3.5 Development Environment 9](#_Toc514858078)

[1.3.5.1 Hardware requirements 9](#_Toc514858079)

[1.3.5.2 Software requirements 9](#_Toc514858080)

[2. Project organization 9](#_Toc514858081)

[2.1 Software Process Model 9](#_Toc514858082)

[2.2 Roles and responsibilities 10](#_Toc514858083)

[2.3 Tools and Techniques 12](#_Toc514858084)

[3. Project Management Plan 12](#_Toc514858085)

[3.1 Product Backlog 12](#_Toc514858086)

[3.2 Sprint Backlog 13](#_Toc514858087)

[3.2.1 Sprint 1 (18.05.2018 – 25.05.2018): Project initiation 13](#_Toc514858088)

[3.2.1.1: Goal 13](#_Toc514858089)

[1.1 Project Information 13](#_Toc514858090)

[1.2 Introduction 13](#_Toc514858091)

[1.3 Current Situation 13](#_Toc514858092)

[1.4 Problem Definition 13](#_Toc514858093)

[1.5 Proposed Solution 13](#_Toc514858094)

[1.6 Role and Responsibility 13](#_Toc514858095)

[1.7 Functional Requirements 13](#_Toc514858096)

[2.1 Create Product Backlog 13](#_Toc514858097)

[3.1 Problem Definition 13](#_Toc514858098)

[3.2 Project Organization 13](#_Toc514858099)

[3.3 Project management plan 13](#_Toc514858100)

[3.4 Coding Convention 13](#_Toc514858101)

[3.2.1.2: Development 13](#_Toc514858102)

[3.3 All Meeting Minutes 13](#_Toc514858103)

[4. Coding Convention 13](#_Toc514858104)

[C. Report No. 3 Software Requirement Specification 14](#_Toc514858105)

[1. User Requirement Specification 14](#_Toc514858106)

# List of Tables

# List of Figures

Definitions, Acronyms, and Abbreviations

|  |  |
| --- | --- |
| **Name** | **Definition** |
| PO | Product owner |

A. Introduction

## 1. Project Information

* Project name: **Call-Center on Mobile for Clinic**
* Project Code: **CallClinic**
* Product Type: **Mobile Application**
* Start Date: **May 18th, 2018**
* End Date: **August 31th, 2018**

## 2. Introduction

In this document, we introduce an automatically Call-Center system for clinics. At the present, the clinic usually uses traditional ways to received the call, that is hiring switchboard operator. But, that solution has a few problems such as missed call or receive wrong information. So, the use of switchboard operator to received call do not high efficiency.

Another way to solve this problem for the clinic is Call-Center, the clinic will rent Call-Center to received the call from patients. In this method, Call-Center will provide more professional service for the clinic, but the cost is quite expensive and it is hard to exchange appointment information for the clinic.

That is the reason why we decided to build an automatically Call-Center system to save time and cost for the clinic. When there is a call from the patient, the system will pick up the call automatically, receive information and schedule appointment for the patient. And then, the system will send SMS for the patient when the appointment is due. The clinic just accesses the system to view all schedule appointment.

## 3. Current Situation

Currently, Clinic using two ways for make appointment:

* **Switchboard operator**

- When patients want to book an appointment in the afternoon, they must call the clinic that morning. An employee at the clinic will record this information, based on that information, the employee will give the patient a specific time. The patient will go to the clinic at the time given and have the examination. All this process must be done manually, this is time consuming and sometime, some information is missing or mistaken because employees usually do many things at the same time.

* **Call Center**

- Call center acts as a middleman between clinic and patients. At first, the clinic contacts to a call center and sign up for a service there. When patients want to make an appointment, they call to call center's number, the staff at the call center will receive information from patients and transfer back to the clinic.

## 4. Problem Definition

**Clinic using Call-Center:**

**Advantages**:

* Provide professional service to take care patient
* Clinic and Call-Center has difficulties on the way transfer data.

**Disadvantages**:

* Expensive cost that’s why small clinics do not have funds to hire Call-Center

**Switchboard operator:**

**Advantages**:

* Reduce costs and suitable for small clinics

**Disadvantages**:

* Clinics need a staff for wait a call from patient.
* Staff has difficulties to get information from patient for the appointment.
* Clinics are managing patient information, schedule appointment manually, that way makes them time-consuming and inconvenient.

## 5. Proposed Solution

### 5.1 Feature functions

Our solution is build an automatically Call-Center system for clinics to provide appointment booking service.

When there is a call from the patient, the system will pick up the call automatically, receive information and schedules the appointment for patient. Appointments will automatically schedule base on doctor's hours and patient's free time. The end result is that the doctor will only need follow those schedule, and the patient will receive the correct date and time without the need to pick up or wait for the appointment. Clinics free times will be optimized and no more overload.

### 5.2 Values and Challenges

**Values:**

* Save the time and the money for clinic.
* Provide better information management system for the clinic.

**Challenges:**

* Make clinic’s phone (the device that we put in the clinic) auto pick up an incoming call.
* Get patient voice and analyze that.
* Push reply (by voice) back to patient.
* Receive and analyze SMS from patient.

## 6. Functional Requirements

Functional requirements of the system are listed as below:

* **Patient component**
  + Be notification
* **Doctor component**
* View list appointment
* Register profile
* **Service component**
* Auto receive customer’s call hotline
* Generate list appointment
* Notification for and doctor
* Receive SMS from patient
* Send SMS to patient

## 7. Role and Responsibility

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No** | **Full Name** | **Role** | **Position** | **Contact** |
| 1 | Kiều Trọng Khánh | Project Manager | Supervisor | khanhkt@fpt.edu.vn |
| 2 | Nguyễn Thế Phương | Developer | Leader | Phuongntse62087@fpt.edu.vn |
| 3 | Phan Thành thuận | Developer | Member | Thuanptse62063@fpt.edu.vn |
| 4 | Nguyễn Cao Duy | Developer | Member | duyncse61032@fpt.edu.vn |
| 5 | Nguyễn Lương Tuấn Kiệt | Developer | Member | kietnltse61696@fpt.edu.vn |

Table 1 Roles and Responsibilities

B. Software Project Management Plan

## 1. Problem Definition

### 1.1 Name of this Capstone Project

* **Official name:**  Call-Center on Mobile for Clinic
* **Vietnamese name:** Hệ thống nhân cuôc gọi tại phòng mạch tư nhân
* **Abbreviation:** CallClinic

### 1.2 Problem Abstract

This project is our exertion to help the clinic reduce costs, the patients save time and simplify the user experience. However, when we start to identify problems and find the way to resolve them, we found many difficult things. We decide to use smartphone as a switchboard to receive and answer call. We try on both Android and IOS but as we know that, take the privilege of system phone is really hard things. We try to root Android system and jailbreak IOS to take that privilege but it still not worked correctly. And event after many hours research we find the way to done the first step is auto pickup phone call (only working on Samsung’s device). We instantly face with another problem, we can not send voice answer when we are receiving the call. So, we fail on that way.

After that, we research about third-party framework provides programmable voice (like Twilio, Nexmo), but the cost of doing research and demonstration voice-answering is quite expensive.

Moreover, we research more about VoIP technical (WebRTC) for the call over internet protocol and about a third-party framework to receive SMS from the patient. Finally, we find out solutions to remind patients when their appointment is due.

### 1.3 Project Overview

1.3.1 Current Situation

Below are the problems encountered in this project:

* Difficulty to get permission the privilege of system phone call for both IOS and Android.
* Limit in human resources and time: Team has only 4 members and time for all project is about 13 weeks for writing the document, implementing the products and testing
* New technique: Some team members are new to the techniques used in the project. The team needs an amount of time to get familiar with those techniques.
* The cost for research and demonstration with third-party framework programmable voice is quite expensive.
* Lack of knowledge about manage the clinics.
* Lack of the amount of the necessary datas: doctors, nurses, patients, …

1.3.2 The Proposed System

The system will have four sub-systems:

* An API application for handling data and response data for the mobile application.
* Mobile application for the doctor to view schedule appointment.
* Web application for clinic manage doctor, schedule appointment.
* Hotline server handle incoming SMS and patient call.

1.3.2.1 API application

* The server system takes responsibility to respond all the requests and also manages and processes data
* Provide APIs for Mobile Application

1.3.2.2 Mobile application

* Sign in
* View list schedule appointment.

1.3.2.3 Hotline server

* Send SMS for mobile phone
* Receive incoming SMS for make appointment
* Receive incoming Call from patient

1.3.2.4 Web application

* Base component
  + - Sign in
    - Sign out
* Clinic component
  + - View list schedule appointment
    - Manipulate patient

1.3.3 Boundaries of the System

* Allow patient make an appointment
* Allow doctor view list schedule appointment
* Pick up the call automatically and schedule appointment
* Notification for doctor
* Send SMS for patients
  + 1. Future Plans

The current system is focused on solve core problem, that is cost saving and time for the clinic. So, some support features are limited. These features will be expanded in the future.

* Survey for service quality of clinic
* Automatically send voice-answer when an incoming call

1.3.5 Development Environment

1.3.5.1 Hardware requirements

**For server**

|  |  |  |
| --- | --- | --- |
| **Hardware** | **Minimum Requirements** | **Recommended** |
| Internet Connection | Cable, Wi-Fi (7 Mbps) | Cable, Wi-Fi (20 Mbps) |
| Computer Processor | Intel® Core ® i7 2.4GHz | Intel® Core ® i7 2.4GHz |
| Computer Memory | 8GB RAM | 12GB or more |

Table 2:

Table 2: Hardware Requirement for Server

**For smartphone**

|  |  |  |
| --- | --- | --- |
| **Hardware** | **Minimum Requirements** | **Recommended** |
| Internet Connection | Wi-Fi (7 Mbps) | Wi-Fi (14 Mbps) |
| Operating System | Android 5 | Android 7 |
| Memory | 2Gb | 3Gb or more |

Table 3: Hardware Requirement for Client

1.3.5.2 Software requirements

|  |  |  |
| --- | --- | --- |
| **Software** | **Name / Version** | **Description** |
| Environment | Java EE 7  Java android | Specification for developing web application  Specification for developing mobile application |
| Modeling tool | Star UML | Used to design diagram |
| IDE | Visual Studio Code 1.23.1  Android Studio 3.1.2 | Programming tools |
| DBMS | MySQL 5.6.30 | Used to create & manage the database for system |
| Source control | SourceTree 2.7.3 | Used for source control |
| Web browser | Chrome 42 or later | Testing browser |
| Mobile OS | Android 7 or later | Testing mobile application |

Table 4: Software requirements

## 2. Project organization

### 2.1 Software Process Model

This project is developed using Scrum model – part of an agile framework for Software development project. Our team choose Scrum model because of the following reasons:

* Our team only has 4 members, and tasks are assigned vertically, do all steps from design, coding, testing and implementation. Scrum is the most suitable model for small and medium project.
* In the project there are many new technologies that need to be learned. With the Scrum model, the team can learn and develop in parallel to meet deadline.
* Product owner can change requirement or extend scope. The team will adapt to change better.



Figure 1 Scrum framework

Reference: <https://www.scrum.org/resources/what-is-scrum>

### 2.2 Roles and responsibilities

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Full name** | **Role in group** | **Responsibilities** |
| 1 | Kiều Trọng Khánh | Project Owner | ·         Specify scope and user requirement  ·         Give out technique and business analysis support  ·          Control the development process |
| 2 | Nguyễn Thế Phương | Scrum master | ·         Create Sprint Backlog and Product  Backlog  ·         Make sure the Scrum teams understand and follow the process.  ·         Help the team master scrum artifacts such as: Sprint Backlog, Product Backlog, ...  ·         Writing report  ·         Always be present to answer questions and give advice when product owner or scrum member needs. |
| 3 | Nguyễn Thế Phương  Phan Thành Thuận  Nguyễn Cao Duy  Nguyễn Lương Tuấn Kiệt | Scrum team members | ·         Clarifying requirements  ·         Prepare documents  ·         Designing database  ·         GUI Design  ·         Coding  ·         Testing |

Table 5: Roles and Responsibilities Details

### 2.3 Tools and Techniques

|  |  |
| --- | --- |
| **Tool/Technique** | **Name and version** |
| Back-end | Node JS |
| IDE | Android Studio 3.1.2, VSCode |
| Database | MySQL |
| Modelling Tool | Star UML |

Table 6: Tools

Table 6: Technique

## 3. Project Management Plan

### 3.1 Product Backlog

|  |  |  |  |
| --- | --- | --- | --- |
| **Story ID** | **Story** | **Task ID** | **Task** |
| 1 | Product Owner (PO) wants to have introduction document | 1.1 | Project Information |
|  |  | 1.2 | Introduction |
|  |  | 1.3 | Current Situation |
|  |  | 1.4 | Problem Definition |
|  |  | 1.5 | Proposed Solution |
|  |  | 1.6 | Role and Responsibility |
|  |  | 1.7 | Functional Requirements |
| 2 | Scrum master wants to have Product Backlog | 2.1 | Create Product Backlog |
| 3 | PO wants to have project management plan | 3.1 | Problem Definition |
|  |  | 3.2 | Project Organization |
|  |  | 3.3 | Project management plan |
|  |  | 3.4 | Coding Convention |

Table 8: Sprint Backlog

### 3.2 Sprint Backlog

3.2.1 Sprint 1 (18.05.2018 – 25.05.2018): Project initiation

3.2.1.1: Goal

- Sprint 1 must complete the following tasks:

1.1 Project Information

1.2 Introduction

1.3 Current Situation

1.4 Problem Definition

1.5 Proposed Solution

1.6 Role and Responsibility

1.7 Functional Requirements

2.1 Create Product Backlog

3.1 Problem Definition

3.2 Project Organization

3.3 Project management plan

3.4 Coding Convention

3.2.1.2: Development

|  |  |  |  |
| --- | --- | --- | --- |
| **Task ID** | **Task** | **Responsible** | **Review** |
| 1.1 | Project Information | PhuongNT | DuyNC |
| 1.2 | Introduction | DuyNC | ThuanPT, KietNLT |
| 1.3 | Current Situation | KietNLT | ThuanPT |
| 1.4 | Problem Definition | DuyNC | KietNLT |
| 1.5 | Proposed Solution | KietNLT | PhuongNT, KietNLT |
| 1.6 | Role and Responsibility | DuyNC | ThuanPT |
| 1.7 | Functional Requirements | ThuanPT | PhuongNT |
| 2.1 | Create Product Backlog | PhuongNT | DuyNC, ThuanPT |
| 3.1 | Problem Definition | PhuongNT | KietNLT |
| 3.2 | Project Organization | ThuanPT | KietNLT |
| 3.3 | Project management plan | PhuongNT | DuyNC, ThuanPT |
| 3.4 | Coding Convention | ThuanPT | PhuongNT |

### 3.3 All Meeting Minutes

All meeting minutes are saved at:

## 4. Coding Convention

- **NodeJs**

* **Naming convention:**

- Variables, properties and function names should use **lowerCamelCase**. They should also be descriptive. Single character variables and uncommon abbreviations should generally be avoided.

- Constants should be declared as regular variables or static class properties, using all uppercase letters.

* **Functions.**

- Feel free to give your closures a name. It shows that you care about them, and will produce better stack traces, heap and cpu profiles.

- Use closures, but don't nest them. Otherwise your code will become a mess.

- One method per line should be used if you want to chain methods. You should also indent these methods so it's easier to tell they are part of the same chain.

* **Comment:**

- Use slashes for both single line and multi line comments. Try to write comments that explain higher level mechanisms or clarify difficult segments of your code. Don't use comments to restate trivial things.

- **Android**

* **Naming convention:**

- Class names are written in [**UpperCamelCase**](http://en.wikipedia.org/wiki/CamelCase). Ex: SignInActivity.

- Resources file names are written in **lowercase\_underscore**.

- Layout files should match the name of the Android components that they are intended for but moving the top level component name to the beginning.

- Resource files in the values folder should be **plural**

* **Functions.**

- Don’t ignore exception and don’t catch generic exception.

* **Comment:**

- Use TODO comments for code that is temporary, a short-term solution, or good-enough but not perfect. TODOs should include the string TODO in all caps.

* **Others:**

- Fully quality imports

Using Android coding convention  from: <https://source.android.com/setup/contribute/code-style#dont-use-finalizers>

Using NodeJs coding convention from: https://github.com/felixge/node-style-guide

# C. Report No. 3 Software Requirement Specification

## 1. User Requirement Specification