**MINISTRY OF EDUCATION AND TRAINING**

**FPT UNIVERSITY**

Capstone Project Document

**Insurance Card**

|  |  |
| --- | --- |
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| **Ext. Supervisor** | N/A |
| **Capstone Project Code** | MIC |

- Ho Chi Minh City, 12 May 2015 -

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Definitions, Acronyms, and Abbreviations

|  |  |
| --- | --- |
| Name | Definition |
| MIC | Motor Insurance Card |
| NFC | Near field communication |
|  |  |

Table : Definitions, Acronyms, and Abbreviations

# Introduction

## Project Information

* Project name: **Insurance Card**
* Project Code: **MIC**
* Product Type: **Website & Android Application**
* Start Date: **May 11th, 2015**
* End Date: **September 5­th,2015**

## Introduction

In this document we introduce a solution for motorbike insurance company. Current insurance company systems have some problems like delayed in renew contracts for customer or inconvenient in checking insurance card validation process. Based on our researches and analysis, we proposed a solution for insurance company in Vietnam and other developed countries.

We build a system which help the insurance companies to solve current problems. In the process of analysis we believe the NFC cards is capable to resolve the problem by using NFC card to save information about insurance contract. NFC cards are convenient to manage the contract information and checking, validating process. Beside of that we also provide an information system to manage NFC cards so that insurance companies will manage the contracts easier.

This document also describes our working process in 4 months includes our perspective in the system, component designs and detailed core workflows. We hope the system and our solution will help resolve the problems from insurance companies in Vietnam and other developed countries.

## Current Situation

When participating in traffic, vehicle owners is required to have compulsory insurance. Therefore, vehicle owners buy insurance from insurance companies or its agents. They pay insurance premium by cash or in online website and receive an insurance certificate with a term of one year, the term can be shorter in some specific situation. When their insurance out of date, they must buy a new insurance, old certificate will be useless. Traffic police will read insurance certificate to check traffic participants.

## Problem Definition

Below are disadvantages of current situation:

* **Forget insurance’s expired date**: Vehicle owners usually keeps their insurance certificate in wallet or somewhere on their vehicle. However, except in cases of necessity, people are not often check their insurance so they could forget its expired date. An expired insurance is not good while it be revealed by traffic officers and could get worse in case of traffic accident.
* **Hard for traffic officers to check and verify insurance**: Traffic officers must read insurance certificate to check and verify vehicle owner’s information. It can be difficult and hinder their work in some cases as at dark or handwriting illegible on insurance certificate.
* **Insurance certificate made of paper:** It could be torn, wet, smudged and especially is counterfeited.
* **Difficult to track and manage number of traffic violations and collisions:** In current scenario, insurance companies almost impossible knows vehicle owner’s history to adjust their insurance policy.

## Proposed Solution

The proposed solution is to build an insurance NFC card system, include a web application and 2 mobile applications with following functions:

### Feature functions

* Web application:
  + Register insurance: user can register a new insurance card with on website using online payment. A staff will contact the user to create contract and send an insurance NFC card to him/her. If users already have a NFC card, they can use the website to renew current contract.
  + Check card information: user can login into the website and check for their card’s information.
  + Request compensation: user can fill data into the sample fields and send compensation request to the company.
  + Make/manage contracts: staff can make and manage contracts.
  + Resolve compensation: staff can receive and resolve compensation requests.
  + Notify contract state: system will send an email to notify the insured one when their insurance is expired.
  + Notify compensation state: system will send an email to info the insured one when their compensation were accepted or rejected.
* Insurance card printer (mobile app):
  + Simulating NFC card printer: staff can print NFC card.
* Insurance card checker (mobile app):
  + Check card: traffic police and Police Department can check specified motor insurance card expired or not.
  + Update the punishment of violator: traffic police and Police Department can update the punishment of violator to the card information.

### Advantages and disadvantages

* Advantages:
  + The interaction between the insured one and the insurance company: the insured one and the company now are easier to communicate through the website when each person has an account.
  + Reduce risk of insurance card made of paper: the NFC insurance card will not be torn, wet or smudged. And it is difficult to be counterfeit than insurance card made of paper.
  + Support police to check valid insurance card easier.
* Disadvantages:
  + At the present time, not consistent with the law of Vietnam about insurance card issues.
  + Checking the valid of card can take a long time when the internet is slow.

## Functional Requirements

Function requirements of the system are listed as below:

* **User component:**
  + New contract request
  + Check card information.
  + Renew contract.
  + Request compensation.
  + Lost card request
  + Cancel contract
* **Staff component**
  + Create new contracts
  + Manage contracts.
  + Resolve compensation requests.
  + Resolve lost card request
* **System component** 
  + Manage contract states
* **Payment system**
  + Process payments
* **Notify component**
  + Notify contract expiration.
  + Notify compensation states (approved / rejected).
* **Checker mobile application**
  + Check card validation.
  + Update punishment information.
  + Retrieve card information.
* **Printer mobile application**
  + Get contract information from server.
  + Print NFC insurance card.

## Roles and Responsibility

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No | Full Name | Role | Position | Contact |
| 1 | Kiều Trọng Khánh | Project Manager | Supervisor | khanhkt@fpt.edu.vn |
| 2 | Đinh Quang Trung | Developer | Leader | trungdqse60994@fpt.edu.vn |
| 3 | Nguyễn Hữu Phúc | Developer | Member | phucnhse60749@fpt.edu.vn |
| 4 | Phùng Quang Minh Trí | Developer | Member | tripqmse60746@fpt.edu.vn |
| 5 | Nguyễn Chí Kha | Developer | Member | khanc60351@fpt.edu.vn |

Table Roles and Responsibility

# Software Project Management Plan

## Problem Definition

### Name of this Capstone Project

* **Official name**: Insurance Card
* **Vietnamese name**: Thẻ bảo hiểm
* **Abbreviation**: MIC

### Problem Abstract

As current in Viet Nam customer use Motor Insurance Certificate Paper when they get problems with their motor. Using the Motor Insurance Certificate Paper is inconvenient, for example it can be wet or to insert or update the information in to insurance certificate paper is complicate. So we use the NFC card we call it is insurance card to handle it. The NFC card is supplied by insurance company when the customer buy insurance. The card contain the information of customer, if the customer join with many insurance service they just use only one card.

We provide a software to check the validation of card, the deadline of card and some insurance services that customer joined. We also provide some other advantage that can help save time and costs in some process of company. For example, the software can automatic extend the insurance service, update the information about accidents of motor. In addition we also provide a system software to manage the information of customer via some insurance card we bought, this software will deploy at insurance company.

### Project Overview

#### Current Situation

Below is the problems encountered in this project:

* Security: currently, there is few possible problems encountered with NFC tags as NFC tags can be counterfeited, attacked during data transmission caused data loss, data corruption.
* Server crash: all the needed data is stored in the server. So if server crash, all the devices can’t get card information.
* Absence of team members: team members can get sick or unexpected problems.
* At the present time, not consistent with the law of Vietnam about insurance card issues.

#### The Proposed System

According to the technology researches, we found out that the NFC technology is very capable of resolve the current situations in insurance companies. We can use a feature of NFC tag to resolve the security problem from NFC card. The basic idea is to use a NFC tag (or NFC “card”) which contains a unique card ID as an insurance card instead of paper card currently.

We also build a high available webserver to maintain the main system to work 24/7 to make sure that if mobile applications need access to the information there will be always available.

We assign responsibility in vertical to make sure if any member in this problem cannot continue to work in our team there will be the least harmful to the project processes.

To resolve problem from Vietnam laws of insurance for motorbike, we support the insurance companies to propose new law sections about using technology devices to work with insurance certificate paper to make our system work legally in current situation.

Our system includes three main subsystems: an online website for company’s staffs, a mobile application for police officers and a mobile application to simulate the card printer.

##### Website

Website is a common communication portal for insurance company’s staffs and users (customers). Website provide following features:

* For users (customers):
  + Users can register new insurance card with online payment.
  + Users can look up information about their insurance card: compensation history, punishment history, expired date…
  + Users can renew current insurance contract with online payment.
  + Users can request compensations to insurance company when an accident occurs.
  + Users will be notified by emails when insurance card is nearly expired or a compensation request is approved/rejected.
* For staffs:
  + Staffs can create new contract for customer.
  + Staffs can manage contracts, see all insurance cards published and see statistics
  + Staffs can update compensation requests, resolve a compensation request when the case is done.

Beside above, website system also provides an API interface for two mobile applications to retrieve, update data from mobile applications.

##### Checker Mobile Application

This mobile application is used by traffic officer. This application do followings:

* Check if an insurance card (NFC card) is valid or not.
* Send punishment if the customer has law violations. Punishment information will be updated in server.

##### Printer Mobile Application

This is a simulating application to simulate the work of Card Printer. In reality the company who deploy this system need to have a NFC Card Printer to write information about the insurance company and customer information into an NFC card. However our system currently only support this as a simulating application. This application is used by company’s staffs and do followings:

* Retrieves insurance contract information and write data to a physical NFC card.

#### Boundaries of the System

This section suppose that the government law in local area supports the method of using NFC cards as insurance cards, and accept NFC insurance cards are legal.

* Every company who has Information System infrastructure can deploy this system.
* Companies who deployed this system has to equip enough devices for the system to run, includes:
  + Computer system with internet connection.
  + Smartphone devices with built-in NFC technology.
* The language of this system is Vietnamese
* The complete product includes:
  + Website application for staffs and users
  + Printer mobile application for staffs.
  + Checker mobile application for traffic police officers

#### Development Environment

##### Hardware requirement

* For continuous integrating server:

|  |  |  |
| --- | --- | --- |
| Hardware | Minimum Requirements | Recommended |
| Internet Connection | 512Kbps | 8 Mbps |
| Operating System | Ubuntu Server 12 LTS | Ubuntu Server 14.04.2 LTS |
| Computer Processor | Intel® Pentium II | Intel® Core(TM) i5 CPU , M 460 @ 2.53GHz |
| Computer Memory | 128MB of RAM | 3GB of RAM or more |

Table Hardware requirement for continuous integrating server

* For web development:

|  |  |  |
| --- | --- | --- |
| Hardware | Minimum Requirements | Recommended |
| Internet Connection | 512Kbps | 8 Mbps |
| Operating System | Windows Vista, 7, 8 | Windows 7, 8 |
| Computer Processor | 1 GHz | Intel® Core(TM) i5 CPU , M 460 @ 2.53GHz |
| Computer Memory | 1GB of RAM | 3GB of RAM or more |

Table Hardware requirement for web development

* For mobile development:

|  |  |  |
| --- | --- | --- |
| Hardware | Minimum Requirements | Recommended |
| Internet Connection | 512Kbps | Wi-Fi Connection 12MB |
| Operating System | Android 4.0 | Android 4.0 |
| Hardware | NFC supported | NFC supported |
| Memory | 128MB of RAM | 1GB of RAM or more |

Table Hardware requirement for mobile development

##### Software requirement

|  |  |
| --- | --- |
| Software | Name / Version |
| Operating system | Windows 7 or above |
| Environment | Java EE 6 |
| Modeling tool | Microsoft Visio 2013 |
| IDE | Netbeans 7.2.1, Intellij IDEA 14.1 |
| DBMS | MySQL 5.6 |
| Source control | TortoiseSVN 1.8.11 |
| Web browser | Chrome 42 or above |

Table Software requirement

## Project organization

### Software Process Model

This project is developed under waterfall model, we applies waterfall model with customizes to capable with current situation in our team. We choose this model because the following reasons:

* This project is 4 months long due to the FPT University Capstone Project timeline, which can be consider a short project.
* Based on researches and clarify Vietnam laws of insurance for motorbike and current system in insurance companies, the requirements of this project are stable, clear, fixed and well understood by all team members.
* This project use NFC technology, which we have strong background knowledge and well practice skills. We also have experience in designing, building web and mobile application system.



Figure Waterfall model

Reference: SOFTWARE ENGINEERING 9th Edition, by Ian Sommerville.

We customize the waterfall model from the reference to make the process more capable with current situation of our team.

### Roles and responsibilities

|  |  |  |  |
| --- | --- | --- | --- |
| No | Full name | Role in Group | Responsibilities |
| 1 | Kiều Trọng Khánh | Supervisor / Project Manager | - Clarify user requirement.  - Technical support and business analysis.  - Tracking development process.  - Review document and product. |
| 2 | Đinh Quang Trung | Team leader, BA, Developer, Tester | - Tracking process.  - Planning project, distribute tasks.  - Requirement analysis.  - Database design.  - Documentation.  - GUI Design.  - Coding.  - Testing.  - Deploy product. |
| 3 | Nguyễn Hữu Phúc | BA, Developer, Tester | - Requirement analysis.  - Database design.  - Documentation.  - GUI Design.  - Coding.  - Testing. |
| 4 | Phùng Quang Minh Trí | BA, Developer, Tester | - Requirement analysis.  - Database design.  - Documentation.  - GUI Design.  - Coding.  - Testing. |
| 5 | Nguyễn Chí Kha | BA, Developer, Tester | - Requirement analysis.  - Database design.  - Documentation.  - GUI Design.  - Coding.  - Testing. |

Table Roles and responsibilities

### Tools and Techniques

|  |  |
| --- | --- |
| Tool / Technique | Name / version |
| Frontend | HTML, CSS, JavaScript, jQuery, Bootstrap |
| Backend | JavaEE, Servlet, JSP, Hibernate |
| Web server | Apache Tomcat 7 |
| Development tool | Netbeans 7.2.1, Intellij IDEA 14 |
| DBMS | MySQL 5.6 |
| Source control | TortoiseSVN 1.8.11 |
| Modeling tool | Microsoft Visio 2013 |
| Document tool | Microsoft Word 2013 |

Table 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 | Resource needed | Dependencies and Constrains | Risk |
| Requirements Definition | Identify and clarify system requirements. | Report No.1 Introduction. | 20 man-days | N/A | - Missing requirement.  - Project’s scope can be unclear.  - 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 and  Report No. 4 Software Design Description. | 50 man-days | Depend on Requirements Definition. | - Misunderstood or unclear system’s requirement.  - Lack of practical experience leading to unreasonable design. |
| Implementation and Unit Testing | - Implements all functions of system.  - Create test plan.  - Perform Unit testing. | Software package. | 120 man-days | - Base on Software Requirement Specification and Software Design Description.  - Coding try to follow coding convention. | - Member does not performs unit test.  - Lack of practical experience. |
| Integration and System Testing | - Perform integration test and system test. | Report No. 5 System Implementation & Test | 35 man-days | Implementation and Unit Testing are finished. | - Lack of testing experience leading to lack of test cases.  - Not enough time for performing test. |
| Operation and Maintenance | - Deploy the system  - Create the user’s manuals.  - Do routine maintenance activities. | Report No.6 Software User’s Manual | 15 man-days | Integration and System Testing are finished. | User’s manual may be difficult for user to understand and confuse. |

### Phase Detail

#### Phase 1: Requirements Definition

|  |  |  |
| --- | --- | --- |
| Task | Description | Author |
| Identify and clarify system requirements. | Research current systems to collect requirements.  Define main and needed functions the system must include. | Đinh Quang Trung  Nguyễn Hữu Phúc  Phùng Quang Minh Trí  Nguyễn Chí Kha |

#### Phase 2: System and Software Design

|  |  |  |
| --- | --- | --- |
| Task | Description | Author |
| Identify hardware and software requirements. | Find out the suitable hardware and software for the system, as well as its minimum and recommended requirements. | Đinh Quang Trung  Nguyễn Hữu Phúc  Phùng Quang Minh Trí  Nguyễn Chí Kha |
| Decide software architect and clarify software detail design. | - Define the major software components and interfaces.  - Draw core flow diagram, use case diagram, prototype …  - Group meeting to review and modify. | Đinh Quang Trung  Nguyễn Hữu Phúc  Phùng Quang Minh Trí  Nguyễn Chí Kha |
| Design database. | - Design database for the system. | Đinh Quang Trung  Nguyễn Hữu Phúc  Phùng Quang Minh Trí  Nguyễn Chí Kha |

#### Phase 3: Implementation and Unit Testing

|  |  |  |
| --- | --- | --- |
| Task | Description | Author |
| Implements all functions of system. | Coding all the components. | Đinh Quang Trung  Nguyễn Hữu Phúc  Phùng Quang Minh Trí  Nguyễn Chí Kha |
| Create test plan. | Planning for testing. | Đinh Quang Trung  Nguyễn Hữu Phúc  Phùng Quang Minh Trí  Nguyễn Chí Kha |
| Perform Unit testing. | - Write Unit test cases.  - Implement Unit tests. | Đinh Quang Trung  Nguyễn Hữu Phúc  Phùng Quang Minh Trí  Nguyễn Chí Kha |

#### Phase 4: Integration and System Testing

|  |  |  |
| --- | --- | --- |
| Task | Description | Author |
| Perform integration test and system test. | - Test groups of modules and test whole the system. | Đinh Quang Trung  Nguyễn Hữu Phúc  Phùng Quang Minh Trí  Nguyễn Chí Kha |

#### Phase 5: Operation and Maintenance

|  |  |  |
| --- | --- | --- |
| Task | Description | Author |
| Deploy the system | Deploy the system in client environment. | Đinh Quang Trung  Nguyễn Hữu Phúc  Phùng Quang Minh Trí  Nguyễn Chí Kha |
| Create the user’s manuals. | Create a guideline to instruct users using system. | Đinh Quang Trung  Nguyễn Hữu Phúc  Phùng Quang Minh Trí  Nguyễn Chí Kha |
| Do routine maintenance activities. | Do routine maintenance activities for client system. | Đinh Quang Trung  Nguyễn Hữu Phúc  Phùng Quang Minh Trí  Nguyễn Chí Kha |

### Task sheet

Refer to “Task sheet” folder.

### All Meeting Minutes

Refer to “Meeting minutes” folder.

## Coding Convention

This project follows “Code Conventions for the Java TM Programming Language, by Sun Microsystems, rev April 20, 1999”.

<http://www.oracle.com/technetwork/java/codeconventions-150003.pdf>

We use followings naming convention from the reference to capable with current situation in our team:

* Naming:
  + Class names must be in Pascal case.
  + Variable names must be in Camel case.
  + Each Java class belongs to a single file.
* Intentions:
  + Use 4 spaces intentions.
  + Avoid lines with more than 80 characters
* Declaration:
  + One declaration per line is recommended since it encourages commenting.
  + In absolutely no case should variables and functions be declared on the same line.
  + Do not put different types on the same line.

# Software Requirement Specification

## User Requirement Specification

### Customer requirement

### Staff requirement

### Police requirement

## System Requirement Specification

### External Interface Requirement

### System Overview Use Case

#### Web Application

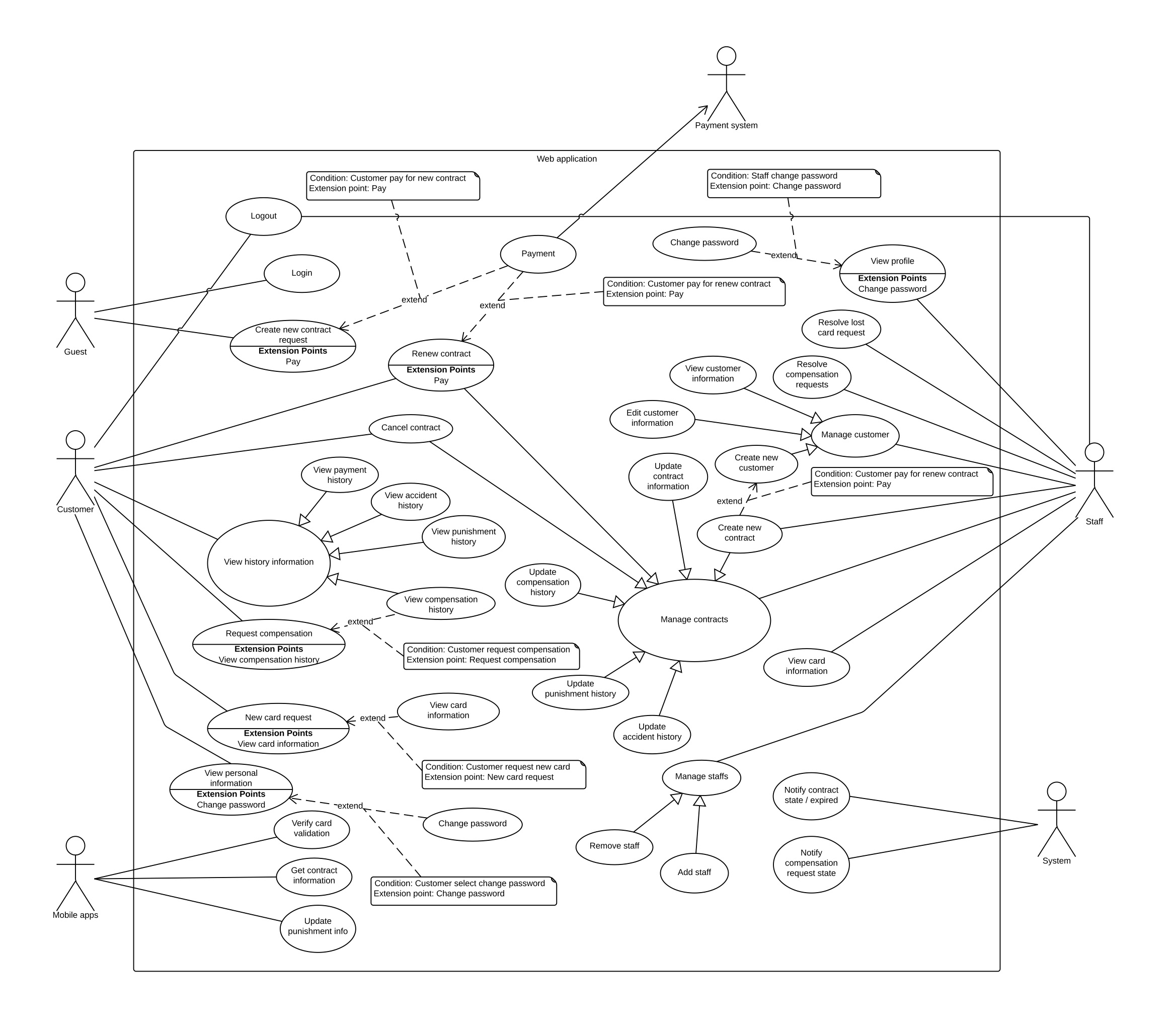


Figure 2 Web Application Overview Use Case

#### Checker Mobile Application

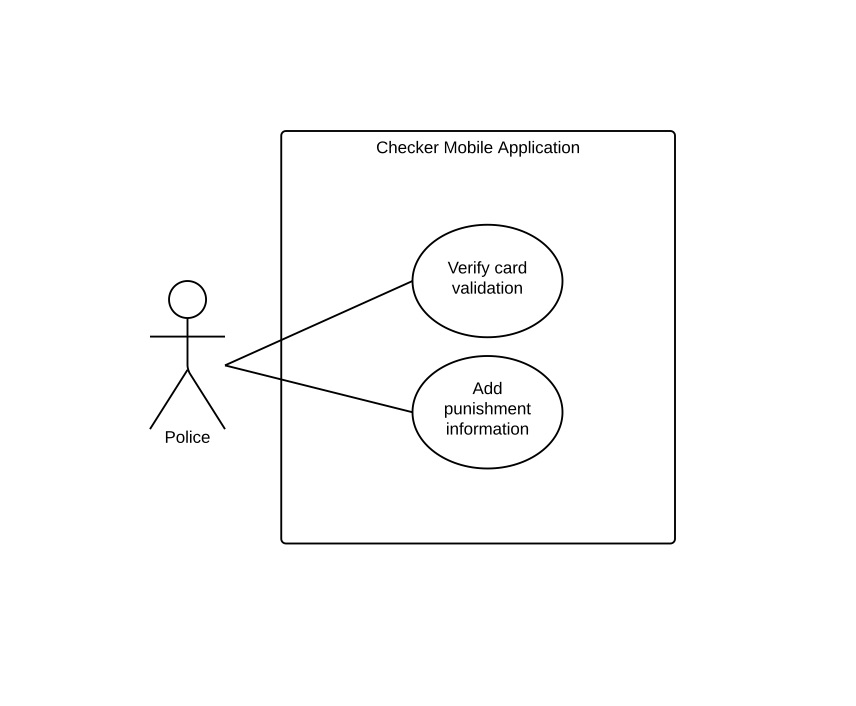


Figure Checker Mobile Application

#### Printer Mobile Application

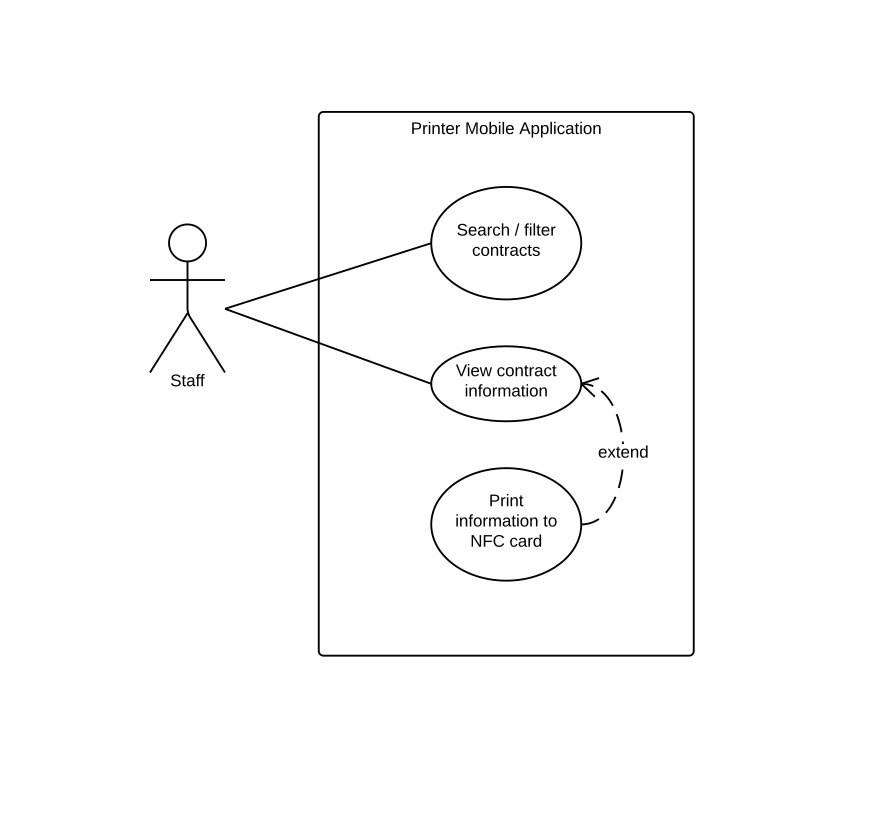


Figure Printer Mobile Application

### List of Use Case

#### Web Application

##### <Guest> Overview Use Case

###### <Guest> Login

<Guest> Create new contract request

##### <Customer> Overview Use Case

###### <Customer> Logout

###### <Customer> Renew contract

###### <Customer> Cancel contract

###### <Customer> View payment history

###### <Customer> View accident history

###### <Customer> View punishment history

###### <Customer> Request compensation

###### <Customer> View compensation history

###### <Customer> New card request

###### <Customer> View card information

###### <Customer> View personal information

###### <Customer> Change password

##### <Staff> Overview Use Case

###### <Staff> View profile

###### <Staff> Change password

###### <Staff> Resolve lost card request

###### <Staff> Resolve compensation

###### <Staff> View customer information

###### <Staff> Edit customer information

###### <Staff> Create new customer

###### <Staff> Create contract

###### <Staff> Renew contract

###### <Staff> Cancel contract

###### <Staff> Update contract information

###### <Staff> Update compensation history

###### <Staff> Update punishment history

###### <Staff> Update accident history

###### <Staff> View cards information

###### <Staff> Remove staff

###### <Staff> Add staff

##### <Mobile apps> Overview Use Case

###### Verify card validation

###### Get contract information

###### Update punishment info

##### <System> Overview Use Case

###### Notify contract state / expired

###### Notify compensation request state

#### Checker Mobile Application

##### <Police> Overview Use Case

###### Verify card information

###### Add punishment information

#### Printer Mobile Application

##### <Staff> Overview Use Case

###### Search / filter contract

###### View contract information

###### Print information to NFC card

## Software System Attribute

### Usability

### Reliability

### Availability

### Security

### Maintainability

### Portability

### Performance

## Conceptual Diagram