

# FirstDraft\_FYP

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# **BEST – R SYSTEM**



## **Project Report**

**submitted in partial fulfilment of the requirements for the award  
of the degree Bachelor of Engineering  
in  
Information Technology**

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**CERTIFICATE**

This is to certify that the B.E. project titled “**BEST – R System**”, which is being submitted by **Ms. Tshering Yangchen (0216538)**, **Mr. Ratu Tshering (0215527)**, **Mr. Yesi Lhundup (0217536)** in partial fulfilment of the requirement for the award of the degree of Bachelor of Engineering in Information Technology is a record of students’ work carried out at College of Science and Technology, Phuentsholing under my supervision and guidance. This project was the collaborative project between the College and Royal Bhutan Police, Phuentsholing towards addressing some of issues related in Bhutan.

Mr. Tsheten Dorji  
**Project Guide**

## **ACKNOWLEDGEMENT**

We would like to express our sincere gratitude to our project guide Mr. Tsheten Dorji for providing us unwavering supports and guidance throughout the project without which our project wouldn't have been successful.

We owe deep gratitude to major Sonam Tobgay Royal Bhutan Police, Phuentsholing for providing us all necessary documents needed for the development of this project. It was indeed our greatest privilege to get an opportunity to work on such a collaborative project between the College and RBP. In addition, we are immensely thankful to all the panel members for providing us constructive feedback and suggestions that acted as meaningful input for the completion of the project.

<sup>1</sup> Lastly, we would like to thank the College of Science and Technology for providing us with a platform to implement our theoretical knowledge practically in the project. We also our friends Dechen Wangmo and Tashi Lhamo for going through our UI design and providing us valuable feedback.

## **ABSTRACT**

Every year number of entertainment places are rising. Though there exist rules and regulations related to bar and entertainment places, the lack of man power, and strict monitoring by law enforcer has become main source of social problems like morbidity, youth crime, domestic violence, motor vehicle accidents and family disharmony. Since there is no proper record keeping system to keep track of violators, there is a high chance that enforcement agent may become weak due to lots of interference from hierarchy, friends, relatives, families and result in preferential treatment. Therefore, it has become crucial to come up with a system such that it becomes convenient for the law enforcer to implement the rule of law easily, uniformly and transparently.

<sup>25</sup> The main aim of this project is to develop “BESTR” web application. The core system shall be manned by department of trade. In this system, admin has to add others users of the system (Infringement providers and license holders), license holders can view license status using registered license number, and Infringement providers can issue BIN/EIN to violators (Bar and entertainment license holders). Further, the system shall have a colour coded record according to number of violations, and one’s license will be automatically revoked after third violations. The system has also incorporated search and reports generation functionalities. This system will help in providing opportunities to the law-abiding citizens rather than violators.

## **TERMINOLOGY**

**Prototype:** It is a pre-production sample, model, or release of product

**Laravel:** It is a free, open-source PHP web platform built on Symfony that is designed to build web applications using the model–view–controller (**MVC**) architecture pattern.<sup>14</sup>

**Bootstrap:** It is the Html, CSS and JavaScript framework that help to develop responsive websites, mobile website in frontend design.

**Web application:** It is a program that runs on a web server and it is accessed through a web browser without having to installed on our device.

**Discotheques:** It is a nightclub where dancing takes place in live or recorded music concerts with sophisticated sound systems and lighting effects.

**Drayang:** Drayang is an entertainment centre that operates the same as Karaoke Bars where women perform different traditional as well as modern music on the stage.

**Karaoke:** It is a form of bar and club entertainment in which customers sing famous songs into a microphone over pre-recorded tracks based on screen lyrics.

### LIST OF ABBREVIATIONS

SI. No	Terms	Descriptions
1	<b>BEST-R</b>	Bar and Entertainment Scheduled Timing Regulation system
2	<b>BIN</b>	Bar Infringement Notice
3	<b>EIN</b>	Entertainment Infringement Notice
4	<b>XAMPP</b>	Cross-platform, Apache, MariaDB (MySQL), PHP and Perl
5	<b>PHP</b>	Hypertext Pre-processor
6	<b>MVC</b>	Model View Controller
7	<b>HTML</b>	Hypertext Mark-up Language
8	<b>CSS</b>	Cascading Style Sheets
9	<b>ERD</b>	Entity Relationship Diagram
10.	<b>PK</b>	Primary Key
11	<b>FK</b>	Foreign Key
12	<b>CID</b>	Citizen Identity Card
13	<b>RBP</b>	Royal Bhutan Police
14	<b>UML</b>	Unified Modeling Language

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## CHAPTER 1 INTRODUCTION

### 1.1 Background

The harmful side effect of alcohol is worldwide phenomenon. According to National Survey on Drug Use and Health (NSDUH), about 55.6% of people above the age group of 18 were reported to drink alcohol at the same stage of their life worldwide. About 3 million deaths every year are caused by alcohol-related cases according to WHO (2018). A large portion of alcohol consumption was homemade or illegally produced. These types of beverages have a high risk of harm because of unknown and potentially dangerous contaminants and impurities. Due to such an increase in problem, a place like Green Bay police has introduced a point system whereby concerning the degree of criminal activities associate with each bar points are given. If the designated bar accumulates more than 12 points then municipal courts could automatically suspend the license of the bar.

As per the data available from national policy and strategic framework to reduce the harmful use of alcohol 2015-2020, there are a total of 5407 outlets including retail, wholesale, bars and 104 entertainment places (22 discotheques, 43 Drayng's and 39 Karaoke's) in our country Bhutan (MoH & RGoB, 2020). Compared to other dzongkhag Thimphu is a highly populated region and has higher numbers of outlets and entertainment centres. It is said that Thimphu alone has 9 Discotheques, 13 Drayng, 627 bars, and 26 karaoke's (Bhutanese, 2016).

In our society, consumption and offering of alcohol is considered as part of our culture and tradition but it is becoming a source of social problems like domestic violence, vehicle accidents, youth crime, family disharmony and morbidity (Kuensel, 2020). Because of cultural reasons, it is very difficult to ban alcohol completely. Therefore, our focus must be on strict implementation of existing rules and regulation of bar and entertainment centres. If there is a system in place to monitor the compliance of laws then it will be convenient for the law enforcer to implement the rules easily, uniformly and transparently. Therefore, there is a need for a system that helps in keeping and managing records easily with less human interference as far as possible.

## **1.2 Motivation**

Though consuming and offering of alcohol has been culturally and traditionally rooted in Bhutanese society yet it has become a core element of social problems like morbidity, youth crime, domestic violence, motor vehicle accidents and family disharmony. Government has come up with various strategies to curb down harmful use of Alcohol (e.g., increasing price of alcohol) and they found out that it is not effective solution for the existing problems. On top of that due to lack of strict monitoring by law enforcer, People are taking advantages of this loophole and committing activities that are against rule of law. Among many rules, not closing bars and entertainments on time, serving alcohol to underage, monks and students and operating without bars and entertainments license are most common rules that are frequently violated. Currently it is very troublesome job of law enforcer to penalize a violator as they have to put extra effort and there are chances that some may get preferential treatment saying law enforcer is his/her relatives or friends.

Looking at the statistics, it is high time to come up with a system so that with the introduction of BIN & EIN, it would ease the job of law enforcer and will become politically & professionally correct. There are no chances of data manipulation once it was entered into the system. As of now, only Royal Bhutan Police were involved in monitoring bar and entertainment places. With this system in place, instead of keeping the enforcement power in the hands of few law enforcement agencies, it will decentralize the power to issue the BIN/EIN to RBP, LG Leaders, schools principal and heads of educational Institutes. Our system shall have colour coding based upon number of times of violation so that licence holders are encouraged to retain the value of the licence because more the violation more the vulnerable to revocation of licence. We were encouraged by the above-mentioned problems to develop web application that helps to monitor bar and entertainment places through strict implementation of rule of law

## **1.3 Aim**

To develop a web application which would be used for monitoring the schedule and timing of bar and entertainment centres in Bhutan.

#### **1.4 Objectives**

- To manage the information of all registered bar and entertainment license holders, rules and regulations and records of violation of rules and regulations against each license holders.
- To implement a license registration module to register both existing and new license holders.
- To manage bar and entertainment infringement notice.
- To implement colour coding of the license based upon number of violations they have committed.
- To provide a function of revoking the license automatically after third violation.
- To implement a search functionality to find license holders and infringement providers easily.
- To incorporate report generation functionality.

#### **1.5 Scope**

Our web-based application will have the following features:

##### **License Registration Module:**

Instead of license holders registering themselves into the system, Admin of the web application will add all the existing as well as new Bar and Entertainment license holders. License holders can use their license number to view their license status.

##### **User management Module:**

To manage the users of the web application. Here users include Infringement providers and license holders (Bars and entertainments). Admin will assign an email address and password to BIN/EIN infringement providers. Using the correct credentials provided by admin, they will be able to login to the web application and issue BIN/EIN to the violators.

##### **Infringement management module:**

It notifies the license holders regarding the number of times they have violated rules and regulations and, whenever the violators are being issued with BIN and EIN the colour of license will automatically change (Green for the first timer, Yellow for the second timers and Red for

the third timers). The license is automatically revoked after third times offence. When infringement providers issued BIN/EIN, accordingly license holders and Admin will receive notifications.

#### **Report Generation Module:**

Allows law enforcement personnel and concerned authority to generate required report. Through this report they will get overview of offences committed by the bar and entertainment license holders for particular months/years.

#### **Search Module:**

In our web application, we have implemented search functionalities in order to make searching much faster rather than manually scrolling up and down the pages which consumes lots of time. Admin can search registered license holders either by license number or by license holder name. Similarly, he/she can search infringement providers by their name or by CID number.

#### **1.6 About This Report**

- *Chapter 2* covers the project requirements including hardware, software, functional and non-functional requirements.
- *Chapter 3* describes methodology and literature reviews.
- *Chapter 4* includes various diagrams like UML, database and prototype design of our web application
- *Chapter 5* contains testing method we used for testing functionalities of our web application.
- *Chapter 6* contains final result (web app) we obtained after following the above-mentioned steps.

## **CHAPTER 2 PROJECT REQUIREMENTS**

### **2.1 Requirement Specification**

#### **2.1.1 Functional Requirement**

- Admin will register existing as well as new bar and entertainment license holders, generate reports and search license holders, inbox and infringement providers through license number, name and CID respectively.
- Police and head of educational institute must be able to login into the system using correct credentials provided by the admin.
- After successful login, they will be redirected to infringement page where they can issue BIN and EIN to the violators.
- License holders will be able to view license status by using their license number. Status here includes colour coding of their license, offences they have committed.
- System shall automatically cancel the license of violators after violating rules and regulations consecutively for three times.
- Users must be able to logout whenever required.

### **2.1.2 Non-Functional Requirement**

#### **User Friendly**

The system must be easy to use and without facing any difficulties users must be able to perform the required function. In short, we can say that system must be simple, well-organized, intuitive and reliable.

#### **Security**

The system must be safe to use without any security issues. For examples; users must be given privilege to change the initially assigned password by admin after first successful login. The password must be encrypted to prevent hackers from stealing the information of users.

#### **Maintenance**

In some cases, the cost of maintaining the system is much higher than actually developing the system. The system must be developed in such a way that new features can be added easily.

## Scalability

There are cases where system cannot function properly when there are many users. The system should be able to handle any numbers of users and must be able to avail the various services based upon their interest without any hindrance.

## 2.2 System Requirement

### 2.2.1 Software Requirement

The software used for the development of the proposed application are;

- **Laravel**

There are lots of PHP framework used for web application development. One of the most popular PHP frameworks is Laravel. It is free and open source and it is used to develop both simple and complex web applications. Laravel follows Model View Controller architectural design pattern (“PHP Laravel Tutorial”,2021).

Model is a class that store and manages data of the application. View is a class that provide user interface. It uses HTML, CSS and PHP languages. Everything that is visible on the browser is the view. A controller is the class that act as a middle man between Model and View classes. It fetches the data from the model and forward the data to the view class.

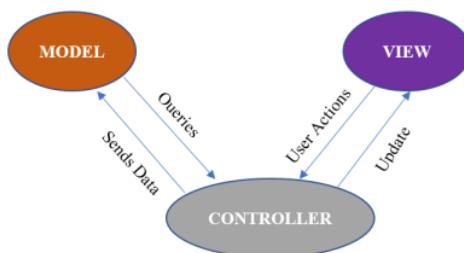


Figure 1 MVC Paradigm

- **XAMPP version**

### 7.3.11

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It stands for cross-platform(X), apache (A), MariaDB (MySQL), PHP and Perl. XAMPP is a popular cross-platform web server that allows programmers to develop and test their code on a local web server (XAMPP tutorial, n.d.).

- ❖ **Cross-platform:** It can support different platforms such as packages of Linus, Windows, and Mac OS
- ❖ **Apache:** It is a HTTP cross-platform web server and used for worldwide delivering web content like images, request file and document
- ❖ **Maria DB:** Widely used relational database management system developed by MySQL. It gives services like data storage, manipulation, retrieval, and deletion.
- ❖ **PHP:** It stands for Hypertext Processor. Backend scripting language for the developing the web applications which create dynamic web pages
- ❖ **Perl:** Perl is combination of two high level dynamic programming language, perl5 and Perl 6

- **Composer**

It stands for cross-platform(X), apache (A), MariaDB (MySQL), PHP and Perl. XAMPP is a popular cross-platform web server that allows programmers to develop and test their code on a local web server (XAMPP tutorial, n.d.).

### 2.2.2 Hardware Requirement

Following are the hardware used to develop proposed application

- Laptop, RAM 8GB, 64-bit windows OS, i5 and above core processor

We have used Laravel framework for the building BEST-R system due to the following advantages;

1. We can easily install Laravel by issuing the Composer create-project command in your terminal as follows;

```
# Composer create-project --prefer-dist laravel/bestr "6.*"  
# php artisan serve
```

After serving the project we get the default Laravel page. We have started implementation by customizing default Laravel first page.

- 23
2. Laravel reuses the components from other framework in developing web application Therefore saving lots of time of the developers.
  3. Laravel provide easiest way of implementation of authentication. We can run few artisan commands to get the default authentication in Laravel.

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```
# Composer require Laravel/ui "^1.0" --dev  
# php artisan ui vue --auth
```

4. Laravel was developed with keeping testing in mind (automation testing is less time consuming)
5. Fixing of error was made easy due to clear separation between business logic and presentation.
6. There are extensive documentation and it is easy to understand. No matter what Laravel version we use, there are documentation from start till end including all the required concepts and it is really helpful especially for an absolute beginner.
7. Laravel has built in class called Mail, which helps to sends emails.

# CHAPTER 3 METHODOLOGY

## 3.1 General Methodology

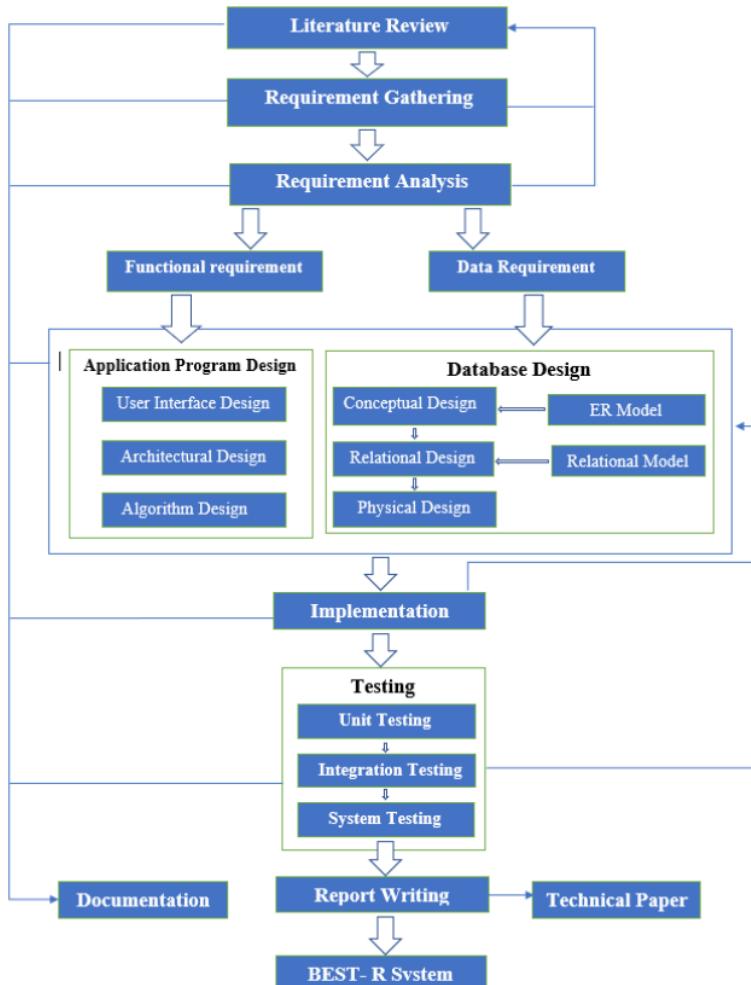


Figure 2 General Methodology

### Literature Review

In this phase we reviewed various published papers related to our web application. To further understand various existing laws regarding bar and entertainment centres we have reviewed various law books of the country.

## **Documentation**

Documentation starts from literature phase and it continues till the testing phase of our web application. In this phase, we kept records of all the literature reviews we have done. This makes report writing much easier and faster at later stage.

## **Requirement Gathering**

Before we really start with implementation, we must clearly know our requirements to develop particular system. In this phase we mainly concentrated on collecting data required for the development of an application. We have gathered requirements through brainstorming and meeting (Client, project guide and team members).

## **Requirement Analysis**

Here we have reviewed the collected data and checked whether the data necessary for the development were all gathered and there is no missing of the important requirements. The gathered requirements are analysed, verified and validated. After requirement analysis we got functional and data requirement.

## **Design**

Based on system requirement specification we have designed our web application. We have divided design into two parts; Application Program Design and Database Design. Application Program Design includes UI, Architectural and Algorithm Design whereas Database Design includes conceptual, Relational and Physical Design.

## **Implementation**

After completion of design phase, we got the overall picture of our web application (BESTR System). In this phase we focused on implementing it in one of the programming languages. We have used Laravel framework to develop our system and has incorporated all the features defined in the scope.

## **Testing**

Once system was developed, it is not guaranteed that it will work well without any errors. we have to test the system using some testing technique. Here we will evaluate the functionalities of our web application and if there are any bugs or it is not performing as expected we have to

make changes accordingly. Testing will help to produce quality product and ensures everything is working as per the requirement.

### **Report Writing**

At last, we focused on writing detailed report (technical paper) of the web application. During documentation, we did extensive reviewing of papers and all without following the report format. Now this phase is continuation of documentation phase where we focused on adding new points aligning with report format.

### **BEST\_R System**

Finally, after completion of the all above mentioned phases, BEST\_R System comes into existence. This system will be fully functional where admin will be able to add users of an application, infringement providers can issue BIN/EIN to violators and License Holders will be able to view their license status.

### **3.2 Developmental Methodology**

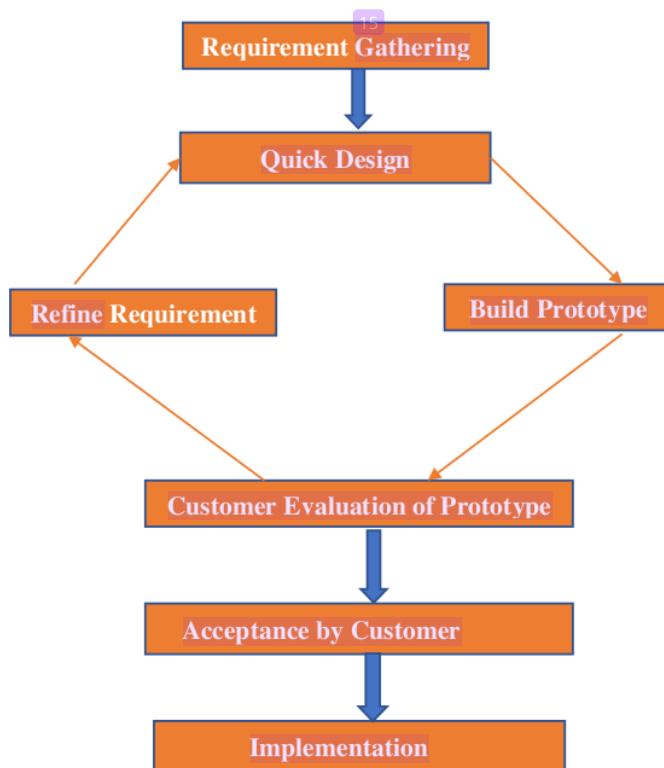


Figure 3 Evolutionary Prototyping Model

To develop BESTR system we followed prototype development model.

- **Requirement Gathering**

In this phase we have gathered the requirements by interviewing clients, brainstorming and conducting the meeting with project guide and team members.

- **Quick Design**

A simple design was created to get an overview of the system. However, this is not the complete design.

- **Build Prototype**

Based upon the information gathered from quick design a real prototype was designed.

It's a scaled-down version of the necessary structure.

- **Customer Evaluation**

The proposed system was presented to the client. Comments and suggestions were collected from them.

- **Refining prototype**

We have modified the prototype based on customer feedback. Above four mentioned steps were executed repeatedly until and unless our client were satisfied with our prototype.

- **Implementation**

Here we have designed the real system following the final prototype of the system.

### 3.3 Literature Review

Every year numbers of bars and entertainment centres are increasing and management and monitoring will be troublesome for concerned authority. Thimphu alone has 9 Discotheques, 13 Drayang, 627 bars and 26 karaoke's. Chief of police Brigadier Kipchu Namgyal said that it is the fundamental duty of every citizen of the country to cooperate in reducing the crime rate before it is too late.

Treatment of alcohol related health problems is too expensive. It is said that to treat one alcoholic patient the government is spending around Nu 1,22,000 which is a huge expenditure. Although alcohol is the root cause of social problems like vehicle accidents, death and family

disharmony, it will be very difficult to completely ban alcohol as it is considered as part of our culture and tradition.

“We have policies and legislations, rules and regulations, but when it comes to implementation,<sup>24</sup> I think we are not very effective,” said Damber K. Nirola, a doctor at the Thimphu Hospital<sup>27</sup> (Ongmo & Parikh, 2019). As per the 2018 Annual Health Bulletin, Alcohol liver disease is the leading cause of deaths in Bhutan.

It is far better if the system monitors the compliance of rules and regulation rather than humans. Efficient use of licensing gives concerned authorities a better control over their activities and it can be used to regulate their activities. In Green Bay, Wisconsin, police, and attorneys have created a “point” system where municipal courts were able to automatically suspend a license after violating rules several times (Bieler & Roman, 2013, p.15)

Increase in the number of alcohols related social and economic problems made everyone concerned. With the hope to reduce the consumption of alcohol, the government is trying all possible strategies. They have once increased the prices of beer. It discouraged people to drink beer but, on the other hand, it encouraged them to drink local liquor (special courier, black mountain etc.) more (Tobgay, 2011).

Different countries will have their own way of dealing with alcohol related problems depending on cultural background. Ban on sale of tobacco and ban on sale of alcohol is different based upon religious background. Ban on sale of tobacco on religious grounds was enforced in the region but the same cannot be applied for alcohol. Firstly, consumption is deeply rooted in Bhutanese culture, and secondly, it is not necessary to establish an environment where no one drinks. In such nations, restriction in alcohol consumption is favoured over complete ban (Dorji, 2012).

# CHAPTER 4 DESIGN

## 26 4.1. UML Diagrams

UML stands for Unified Modeling Language. It helps users to understand any systems faster and better. It broadly consists of two categories namely Behavioral and structural diagrams. Behavioral diagram shows what should happen in a system (dynamic aspect of system) whereas structural diagrams represent various objects in a system.

### 4.1.1 Use Case Diagram

It is one of the most common types of behavioural diagrams. It represents various functionalities the systems will have. It consists of use cases, actors and their relationship. Our web application consists of four actors. They are Admin, Police, head of educational Institute and license holders. Main use cases of Admin consist of adding infringement providers and license holders. Infringement Providers can login into the system using correct credentials provided by Admin and their main use case is to issue BIN/EIN to violators. License Holders using their license number they can view their license status.

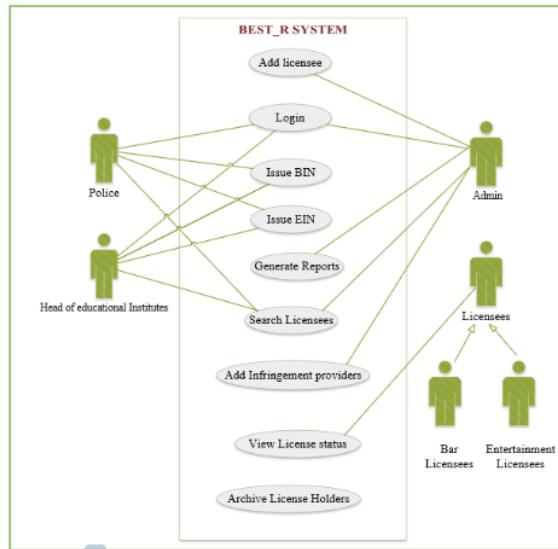


Figure 4 Use Case Diagram

#### 4.1.2 Class Diagram

It is one of the types of structural diagrams. It consists of three section; upper, middle and bottom where upper section contains name of class, middle section contains attributes of class and bottom section contain operations of class. For our web application we have defined 9 different classes connected to each other either through association, aggregation, composition or multiplicity logical connections.

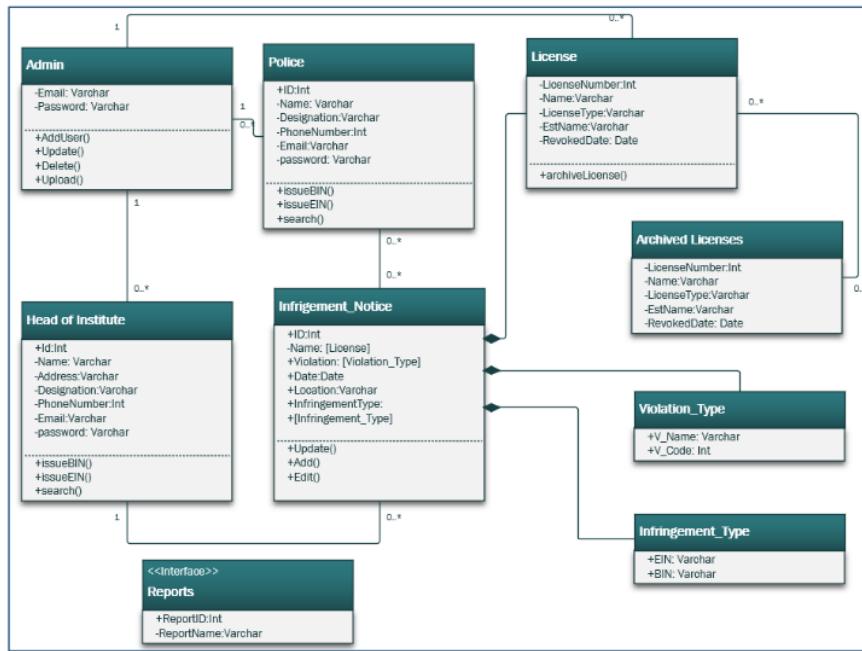


Figure 5 Class Diagram

## 4.2 Database Design

The main goal of database design is to provide logical and physical representation of our proposed application. Logical model focuses on application specifications independent of physical considerations whereas physical design emphasizes on converting logical design onto physical media using database management systems (DBMS).

### 4.2.1 Conceptual Design- ER Model

Conceptual model of database was designed using Entity Relationship model  
Conceptual design is a stage in the design process in which the broad outlines of a product's purpose and shape are defined.

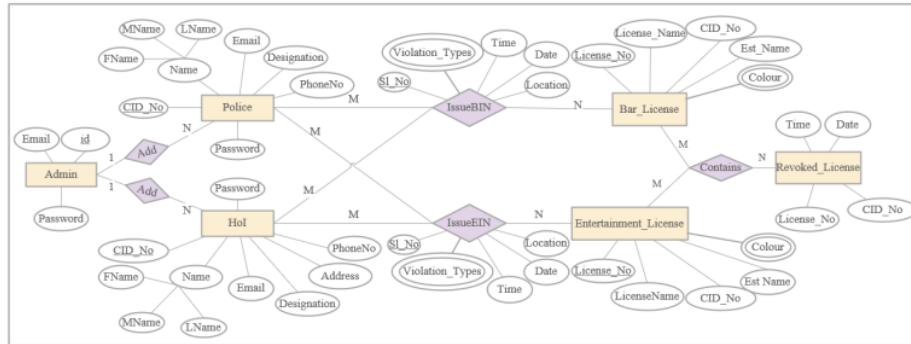


Figure 6 ER Model

### 4.2.2 Relational Design - Relational Model

Relational model depicts how data in Relational Databases is stored. Relational model is used to model data in the form of tables. It can be implemented using any Relational Database Management Systems languages like MySQL, SQL or Oracle.

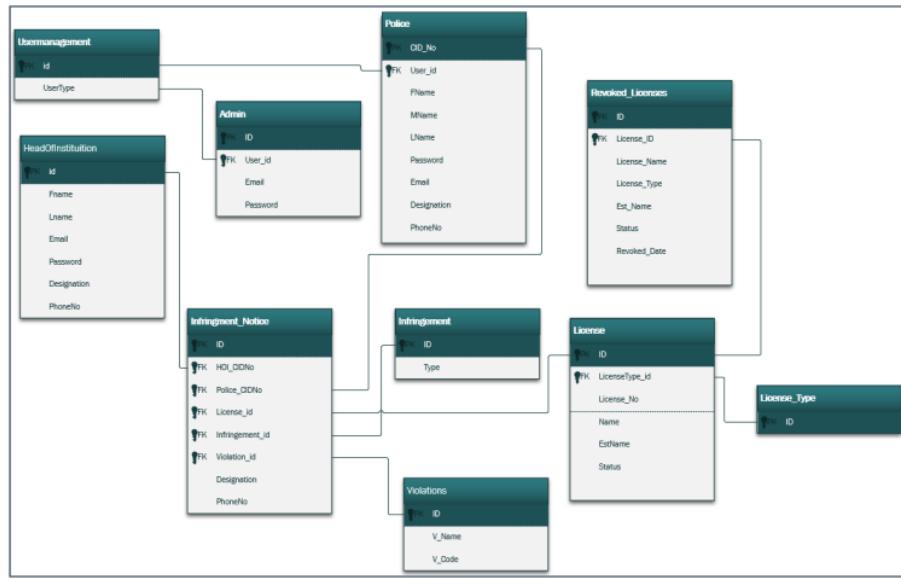


Figure 7 Relational Model

#### 4.2.3 Physical Design

It is final phase of database design. Here designer try to convert the logical database design including entities, attributes, relationships and constraints into physical database design that can be implemented using any database management system.

<i>Table Name</i>	<i>Attribute Name</i>	<i>Data Type</i>
<i>Infringement Providers</i>	CID_No	INT (11) PK
	Issuername	VARCHAR (25) Not Null
	Designation	VARCHAR (25) Not Null
	Email	VARCHAR (30) Unique
	Phone_No	INT (20)
	ID	INT (11)
	Password	VARCHAR (255) Not Null
<i>License</i>	License_No	INT (10) PK Unique
	License_Name	VARCHAR (20) Not Null
	CID_No	INT (20)
	Revoked_Date	DATE ()
	Location	VARCHAR (30) Not Null
	Phone	VARCHAR (191) Not Null
	License_type	VARCHAR (191) Not Null
<i>Violation Types</i>	V_Code	INT (5) AUTO_INCREMENT
	V_Name	STRING (40)
	SL_No	INT (5) FK
	Remarks	TEXT ()
<i>Colour</i>	C_Code	INT (5) AUTO_INCREMENT
	C_Name	STRING (10)
	License_No	INT (10) FK
<i>Issue BIN</i>	SI_No	INT (5) AUTO_INCREMENT
	Time	TIME ()
	Date	DATE ()
	Location	VARCHAR (25) Not Null
	License_No	INT (10) FK
<i>Issue EIN</i>	CID_No	INT (20) FK
	SI_No	INT (5) AUTO_INCREMENT
	Time	TIME ()
	Date	DATE ()
	Location	VARCHAR (25) Not Null
<i>Admin</i>	License_No	INT (10) FK
	CID_No	INT (20) FK
	id	INT (11) PK AUTO_INCREMENT
	Name	VARCHAR (191)
	Email	VARCHAR (255) Unique
	Password	VARCHAR (20) Not Null

Figure 8 Physical Design

#### 4.3 Prototype Design

To better understand and get look and feel of our web application, we have designed prototype. This is not the final outcome of the project and it will help developers at later stage. It will act as guideline throughout the implementation phase.

### 4.3.1 User Interface Prototype Design

This is the first page of our web application.

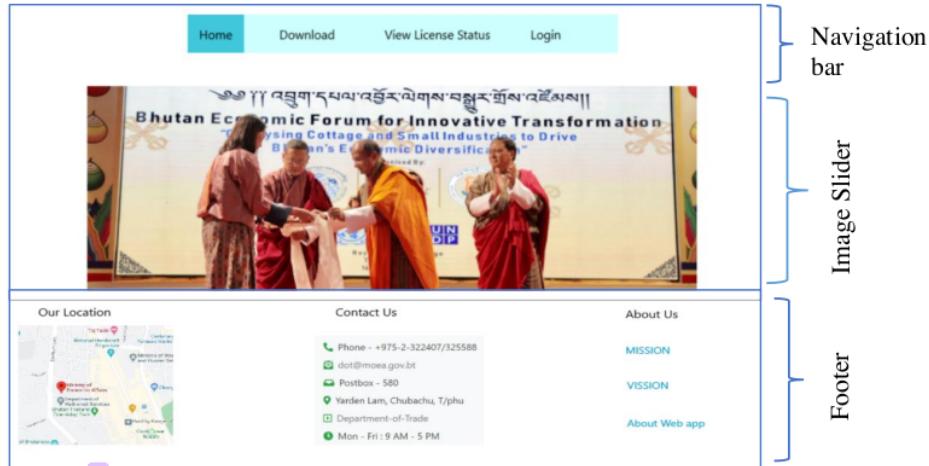


Figure 9 Home Page

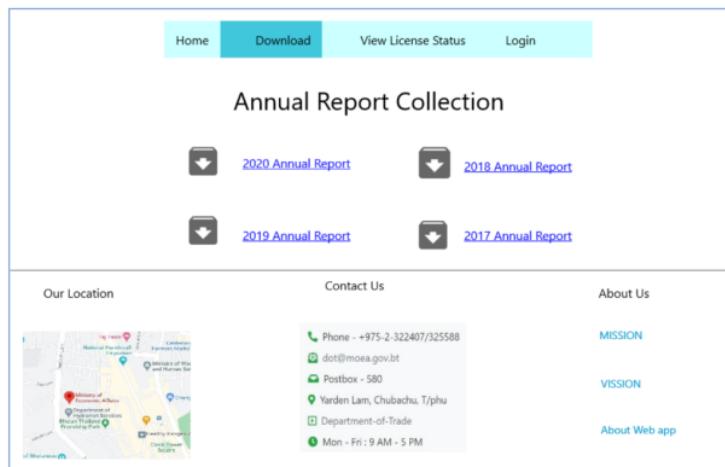


Figure 10 Download Page

View License Status	
License Number:	<input type="text" value="License Number"/>
<input type="button" value="View"/>	

Figure 11 Licensee Login page

Figure 12 License Status Form

### Figure 13 Offences Page

## Figure 15 Rules Page

**BEST-R SYSTEM**

Providers Login

Email Address

Password

login

Figure 14 Provider login page

Figure 17 BIN page

Figure 16 Infringement Page

#### 4.3.2 Backend Interface

Figure 18 Admin Dashboard

Figure 19 Admin Login

Figure 20 View License Holder page

Figure 21 Add Holders

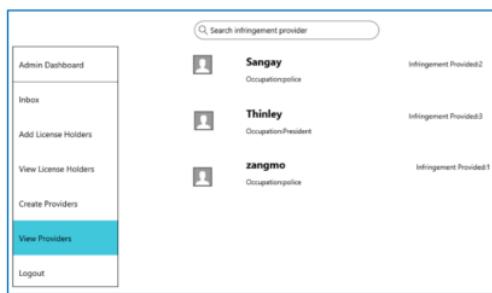


Figure 22 View Providers Page

The screenshot shows a form for creating a new provider. At the top right is a "Create BIN/EIN Providers" button. On the left is a sidebar with the same links as Figure 22: Admin Dashboard, Inbox, Add License Holders, View License Holders, Create Providers (highlighted in blue), and View Providers. At the bottom are Logout and Create User buttons. The main area has a "Upload Picture" placeholder and several input fields:

Field	Description
CID Number :	Text input field
Name :	Text input field
Password :	Text input field
Confirm Password :	Text input field
Phone Number :	Text input field
Designation :	Text input field

At the bottom right are "Reset" and "Create User" buttons.

Figure 23 Create Providers Page

## CHAPTER 5 TEST CASES

Now in this technological world, just having web app or mobile app is not enough. We have to develop applications which are informative, secure and user friendly. To ensure the quality and user friendliness of our web application, we have thoroughly checked web application. Web application at best must not contain any errors and inconveniences and in case if there are errors it must be easy to fix without much effort. Sometime scenario may arise where cost of maintenance is much higher than actual development cost of software/web application. We can test web application from any points. Following listed are some common web application testing techniques;

- Functionality Testing
- Usability Testing

### **Functionality Testing**

It ensures that applications correspond to its specifications and focuses mostly on outputs generated based upon the given inputs. This test is passed if the expected result and actual results matched with each other.

### **Usability Testing**

It is to verify how easy novice users can navigate through an application without spending much time.

### Testcase no:1

Project: BESTR

Module: Functionality Testing

Functional Specification: Add and View License Holders; User Management, inbox, download, Issue BIN/EIN, View licence Status and Account

Test Objectives: All the page should be linked

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<b>Test Case Name</b>	<b>Test Case Scenario</b>	<b>Test Steps</b>	<b>Expected Result</b>	<b>Actual Result</b>	<b>Pass/Fail</b>
Functionality of Add Licence Holder	Check the Add licence holder pages and its input field	Click on add license holders' link to register Licence Holder	Licence Holder Registration form will be shown	Registration form shown	Pass
		Click on add license holders' link to register Licence Holder with Error link	Error in Displaying pages	Registration form not shown	Pass
Functionality of View License Holders page	Check View License holders page	Click on view license holders link to view the Licence Holder	Redirect to View License holders page	Redirected Successfully	Pass
		Click on view license holders link with an error	Error in redirecting to view license holders page	Page Not found	Pass
Functionality of User Management page	Check the add users' page	Click on add user link to add the users	Redirect to add users page	Add users form shown	Pass
	Validate the input field with correct information	Registered user display below adds user button	Registered user displayed	As expected	Pass
Functionality of Inbox	Check the details of BIN and EIN	Click on inbox link to show BIN and EIN Inbox	Displayed BIN and EIN inbox	Shown as Expected	Pass
		Click on view details link to show BIN and EIN details	Displayed BIN and EIN Details	Shown as Expected	Pass
		Click on Inbox link with error	Error in display	Error shown	Pass

Functionality of Download	To download the Annual report	Click on download nav bar to download reports	Uploaded reports shown here	As expected	Pass
		Click on download nav bar to download reports with an error	Error in displaying the report	Reports not shown	Pass
Functionality of Account	Check the Infringement provider sign in page	Click on sign in link	Sign in page displayed	As expected	Pass
		Click on sign in link with error	Error in displaying sign in page	Intended page not shown	Pass
Functionality of BIN/EIN	Check the BIN/EIN form page	Click on BIN/EIN link to check the BIN/EIN form	Redirect to BIN/EIN form	Expected	Pass
		Click on BIN/EIN link to check the BIN/EIN form with error	Error in displaying form	BIN/EIN form not displayed	Pass
Functionality of View Licence status	Check the view licence link to show status form	Click on link to get the licence status	Show the Licence status form	Expected	Pass
		Click on link to get the licence status with error link	Error link/pages	Form not displayed	Pass

*Table 1 Functionality Testing*

Testcase no:2
Project: BESTR
Module: Usability Testing
Functional Specification: Add and View License Holders; User Management, inbox, download, Issue BIN/EIN, View licence Status and Account
Test Objectives: All pages are visible and responsive

Test Case Name	Test Case Scenario	Test Steps	Expected Result	Actual Result	Pass/Fail
Usability of User Management	Check Registration of providers with valid data	<ol style="list-style-type: none"> <li>Provide name</li> <li>Provide Designation</li> <li>Provide Phone Number</li> <li>Provide Email</li> <li>Provide password</li> <li>Re-enter same password</li> <li>Click Register Button</li> </ol>	Providers registered successfully	As Expected	Pass
	Check Registration of providers with invalid data	<ol style="list-style-type: none"> <li>keep any field empty For example; provide phone number greater or less than 8 digits, or provide confirm password input different from password</li> <li>Click Register Button</li> </ol>	Error in Field	Failed to register Providers	Pass
Usability of Infringement Providers Login	Check Infringement providers login with valid data	<ol style="list-style-type: none"> <li>Enter Email address</li> <li>Enter password</li> <li>Click Login Button</li> </ol>	Providers will be able to login	Login successfully	Pass
	Check Infringement providers login with invalid data	<ol style="list-style-type: none"> <li>Enter invalid email address or password</li> <li>Click Login Button</li> </ol>	Invalid credentials	As Expected	Pass

Usability of Register License holders	Check registration of license holders with valid data	1. Enter license number 2. Enter name 3. Enter CID number 4. Enter Phone Number 5. Enter current Location of business 6. Enter License Type 7. Click Register Button	License Holders will be registered successfully	As Expected	Pass
	Check registration of license holders with invalid data	1. Keep any field empty or provide invalid data 2. Click Register Button	License Holders will not be registered	As Expected	Pass
Usability of view License Holders status	Check Licensee login with valid data	1. Enter registered license number 2. Click on View Button	Display Licence status	As Expected	Pass
	Check Licensee login with valid data	1. Provide invalid license number 2. Click on View Button	Cannot view their license status	As Expected	Pass
Usability of Issue EIN/BIN By the infringement provider	Check the BIN/EIN Button in Home pages	1. Click on EIN/BIN button 2. Fill the details of Licensee Check the Check box 3. Submit the evidence Click on Issue BIN/EIN button	Notification: BIN/EIN issued Successfully	Expected	Pass
		1. Click on EIN/BIN button 2. Fill the details of Licensee (Missing some fill) 3. Check the Check box	Notification: Error message	Not as expected	Pass

		4. Submit the evidence Click on Issue BIN/EIN button			
--	--	--	--	--	--

*Table 2 Usability Testing*

## CHAPTER 6 RESULT

This section contains the actual outcomes of our final year project on BESTR System. Here we have included every pages of web application and provided various steps users have to perform in order to complete their required tasks.

### 6.1 Users

#### Home Page



Figure 24 Home page

Home page of BESTR System consist of navigation bars to navigate to other pages of an application, image slider and footer. In footer it contains location of ministry of economic Affairs office, contact details and mission and vision of the department of trade. Users can view mission and vision by clicking on the given buttons.

## Sign in Page

The screenshot shows a login form with a decorative circular logo at the top. The logo contains traditional symbols and text. Below the logo, the words "LOGIN FORM" are centered. The form consists of two input fields: "Enter Email Address" with a user icon and "Enter Password" with a lock icon. To the left of the password field is a green "login" button. Next to the "login" button is a "Remember Me" checkbox. To the right of the password field is a blue "Forgot Password?" link.

Figure 25 Infringement Provider's sign in page

This is the sign in page where infringement providers can login into the system. If they want to issue BIN/EIN to the violators they have to first sign in into the system. We have implemented sign in in two different ways. They can either click on “Account” or “Issue BIN/EIN”. By doing so, they will be redirected to sign in page. They can login into the system using the correct credentials provided by admin. After successfully sign in they will be redirected to page where they will be able to issue Bar and Infringement Notice to the violators.

## Issue BIN Page

The screenshot shows a web-based form titled "BAR INFRINGEMENT NOTICE (BIN)". The form has a light green header and a pink rectangular input area. At the top, there are four input fields: "License Number" (with placeholder "License Number"), "License Holder Name" (with placeholder "Name"), "CID No" (with placeholder "CID Number"), and "Violation Date" (with placeholder "mm/dd/yyyy" and a calendar icon). Below these fields is a section titled "Nature of Offence/Violations" containing a list of eight options, each preceded by an empty checkbox. The options are: 1) Dry Day Violation, 2) Selling of alcohol and alcoholic beverages before 1PM, 3) Selling of alcohol and alcoholic beverages after 10PM, 4) Selling of alcohol and alcoholic beverages to underage/monks/students, 5) Fronting/Leasing of License, 6) Selling of alcohol and alcoholic beverages to underage/monks/students, 7) Illegal sale of alcohol and alcoholic beverages, and 8) Not separate bar from other business including grocery shop except in hotel and restaurant.

Figure 26 BIN Form

If any infringement providers found out that particular bar or entertainment license holders committed any violations as reflected on the form, they can issue BIN/EIN accordingly. They have to enter correct license number of the violators and accordingly its name and CID number associated with that license number will be auto filled. They have to choose the nature of offence that particular license holders have committed. They can attach 4 to 5 photos as an evidence. After successful completion of issuing BIN/EIN they will see the message stating BIN/EIN issued successfully.

## Download

People without having to login into our web application they can download reports. This report was generated by Admin and uploaded so that anybody who wish to see the status of violation related to bar and entertainment places they can do so.

## **View License Status**

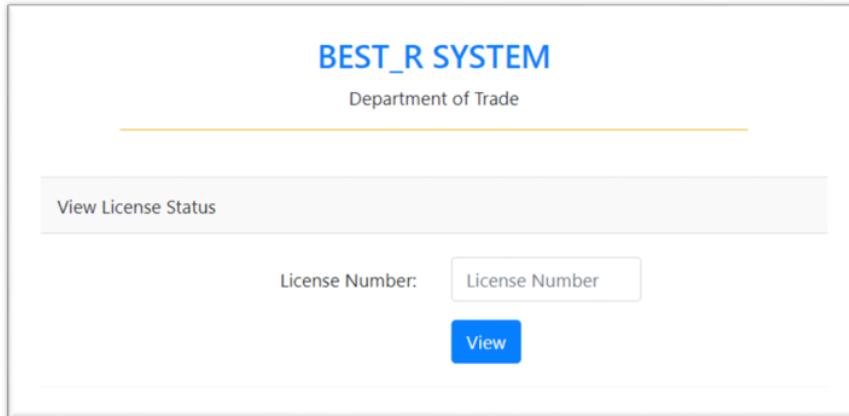


Figure 27 View License Status

If license holders wish to see the status like number of times, they have violated rules and regulations, they can view it by using their license number. Until and unless users know the license number, they can see the status of any license holders.

## **Logout**

Infringement providers after completing their intended tasks they can logout of the system. After logout they will be redirected to home page of the web application.

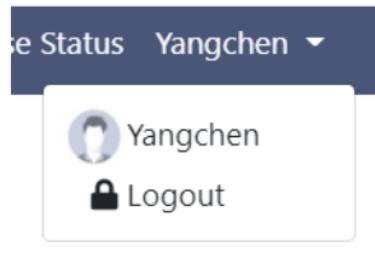
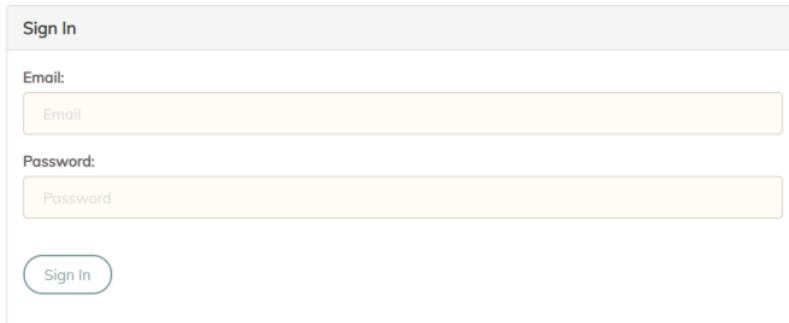


Figure 28 Logout

## 6.2 Admin Dashboard

### Login Page

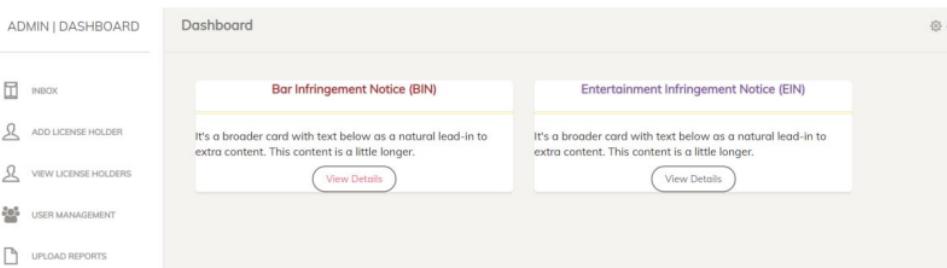


The image shows a simple sign-in form titled "Sign In". It contains two input fields: "Email:" and "Password:", both with placeholder text "Email" and "Password" respectively. Below the fields is a blue "Sign In" button.

Figure 29 Admin Login Page

This is the sign in page for Admin of the system. Using the correct credentials, they can login into the system and perform the desired tasks.

### Dashboard



The dashboard interface includes a sidebar with links: ADMIN | DASHBOARD, INBOX, ADD LICENSE HOLDER, VIEW LICENSE HOLDERS, USER MANAGEMENT, and UPLOAD REPORTS. The main area is titled "Dashboard" and features two cards: "Bar Infringement Notice (BIN)" and "Entertainment Infringement Notice (EIN)". Each card has a brief description and a "View Details" button.

Figure 30 Admin Dashboard

### Inbox

Here Admin will see Bar and Entertainment Infringement Notice details. To view details of BIN and EIN he can click on view Detail's button. It contains information such as how many times particular license holders were issued with infringement notice, violation date with evidences uploaded by infringement providers. Admin without having to scroll up and down, he/she can search intended license holder using the license number

The screenshot shows the 'BIN Details' page. At the top left is the 'ADMIN | DASHBOARD' header. Below it is a sidebar with icons and labels: INBOX, ADD LICENSE HOLDER, VIEW LICENSE HOLDERS, USER MANAGEMENT, and UPLOAD REPORTS. The main content area is titled 'BIN Details' and contains a search bar labeled 'Search by License Number' with a magnifying glass icon. Below the search bar is a table with the following columns: ID, License No, Name, CID No, Violation Date, and Evidence. A single row is displayed with the following data: ID 1, License No 12345678, Name Yangchen, CID No 12001002051, Violation Date 2021-05-11, and Evidence showing a small image of red roses.

Figure 31 View Details Page

### Add License Holders

The screenshot shows the 'Add License Holder' form. At the top left is the 'ADMIN | DASHBOARD' header. Below it is a sidebar with icons and labels: INBOX, ADD LICENSE HOLDER, VIEW LICENSE HOLDERS, USER MANAGEMENT, and UPLOAD REPORTS. The main content area is titled 'Add License Holder'. It contains several input fields: 'License Number' (with placeholder 'License Number'), 'License Holder Name' (with placeholder 'Name'), 'CID No.' (with placeholder 'CID No.'), 'Phone No.' (with placeholder 'Phone No.'), 'Location' (with placeholder 'Current location of your business'), and a dropdown menu 'Select License Type' set to 'Bar License'. At the bottom is a green 'Register' button.

Figure 32 Add new license holders

Admin of the system is responsible for adding all existing as well as new license holders of bars and entertainments in our country. He/she have to add license number, license holder's name, current location where bars/entertainment is running, license type, CID and phone number.

## View License Holders

The screenshot shows a user interface for managing license holders. On the left, there's a sidebar with links: 'ADMIN | DASHBOARD', 'INBOX', 'ADD LICENSE HOLDER', 'VIEW LICENSE HOLDERS' (which is the active page), 'UPLOAD REPORTS', and 'USER MANAGEMENT'. The main area is titled 'View License Holders' and contains a search bar with placeholder text 'Search by License number or name' and a magnifying glass icon. Below the search bar is a table with the following data:

ID	License No	Name	CID No	Phone No	Location	License Type	EDIT	DELETE
1	12345678	Yangchen	12001002051	17580483	Zhemgang	Entertainment License	<button>EDIT</button>	<button>DELETE</button>
2	0122335	Ratu	12001002066	12345678	Paro	Entertainment License	<button>EDIT</button>	<button>DELETE</button>

Figure 33 View registered license holders

This page displays all the license holders added by Admin. Here we have incorporated search, edit and delete functionalities. Our system will have thousands of license holders and searching particular license holders will be hectic job for Admin. We have implemented search functionalities in order to make searching faster and easier. Admin can search license holders either using license number or license holder name. If Admin want to edit and update some fields, he/she can do so by clicking on “EDIT” button and also, he/she can delete license holders

## User Management

Basically, user management includes adding and managing bar and entertainment infringement providers. Admin adds BIN/EIN issuers. He/she will assign default email address and password to the infringement providers. Using this assigned email and password infringement providers can login into the system.

Provider Name:

CID Number:

Phone Number :

Email Address:

User Type :

Password

**Register**

Figure 34 Add Providers Page

### View registered Infringement Providers

ID	Name	CID	Phone No	Email	Created At	User Type	EDIT	DELETE
3	Yangchen	12001002051	17580483	0216538.cst@rub.edu.bt	2021-05-05 09:27:48	Police	<b>EDIT</b>	<b>DELETE</b>

Figure 35 View List of infringement providers

Infringement providers added by Admin and all the details of infringement providers will be shown here. He/she can search infringement providers using name. On top of that he/she can edit the details and delete if particular infringement providers are not required in the system.

**Upload Reports**

## CONCLUSION

In our country there were no system that keeps proper records of violations related bars and entertainments. Law enforcers had been dealing with violators in primitive ways which is time consuming. On top of that there were lack of man power in monitoring bars and entertainment.

Bar and entertainment scheduled timing regulation system was developed mainly for department of trade to keep proper records of license holders, bar infringement notice, entertainment infringement notice, generate reports and to keep track of colour coding of the license. With this system power of issuing BIN/EIN was decentralized to local government leaders, school's principal, RBP and heads of educational institute. This system will help the law enforcer and department of trade in implementing rule of law uniformly and in transparent manner.

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