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Designing The Complaint Management System With The Mvc Approach

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Abstract: A Complaint Management System Is A System That Centralizes All Complaints Received To Be Handled By The Department In Charge. This System That Serves Similar Like A Helpdesk System In Nature, Will Be Able To Map The Categories And Types Of Complaints With The Departments Involved. This Process Of Centralizing And Distributing Complaints Helps To Make The Workforce More Efficient. Complaints Whether Educational Or Non-Educational Related Such As Student Complaints Over Network Connectivity, Staff Complaints Over Certain Unscheduled Power Interruption, And Issues On The Hostel Maintenance Will Be Handled Effectively By This System. This Research Leads To The Planning Of Complaint Management System Development Using Model-View-Controller (Mvc) Technique And Applying Laravel Framework For System Development. Mvc Is A Pattern Of Software Design And Is Now Widely Used In Web Design Architecture. Laravel Is A Framework Development Aimed At Web Applications Consisting Of Html, Javascript And Css Scripting Languages. The Methodology Used To Develop This Complaint Management System Is Rapid Application Development (Rad). The Development Of This System Can Be A Reference For Any Organizations To Develop A Complaint Management System Or Helpdesk System.

Index Terms: Rad, Web Application Framework, Higher Education Institution, Laravel, Web Application Development.

1. Introduction

Managing Complaint Through Helpdesk In Higher Learning Education Institution In Malaysia Involves Various Processes And Departments. Managing Complaint Effectiveness Will Reflect The Productivity Of Each Department. Higher Learning Institution Must Make Improvements To Maintain Customer Loyalty And Satisfaction. Delaying Managing Complaint Factors Such As Manually Recording Information, Working Habit, Results In The Low-Quality Service Provided By The Department. It Will Reflect The Image Of The Institution. One Of The Problems In Helpdesk Is To Integrate All Complaints By Managing Them Under One Main Department.

Most Of The Higher Learning Institution Currently Managing The Problem Separately Based On The Department. The Aim Of The Helpdesk System Is To Centralize All Complaints Received And Manage By The Main Or One Department. The Helpdesk System Will Be Able To Map The Category And Type Of Complaint With The Department Involve. This Process Will Help To Improve The Quality Of The Service Provided By The Department [1]. By Putting Together, It Will Help To Leverage Resources Available In The Right Manner. Complaint Such As Education Matters And Non-Education Matters Such As Student Complaint, Staff Complaint, Hostel Maintenance Will Effectively Manage By The System Under One Roof.

To Overcome The Complaint And Proper Handling, A System In Needed Where The Complaints Report Is Stored In A System [2]. At Present, Web-Based Application Become A Popular Platform To Develop Application. Web Application Become Efficient And Convenient To The User Because The Accessibility The Web Provided To The User [3].

Several Researchers Have Developing Complaint System Through Various Of Programming Language And Database. Some Of The Well-Known Front-End Languages Are Jsp, Asp.Net, Php And Etc. Author Like [4] Proposed Of Using Php Framework And Postgresql In Managing A Complaint Process Efficiently. In Today Decade, Most Of The Php Framework Applying Model-View-Controller (Mvc) Approach In The System Implementation Regardless Of What Database They Are Using.

The Purpose Of This Study Is To Design A Complaint System Using Mvc Technique And Applying Laravel Framework For System Development.

2. Overview Of Mvc

The Model-View-Controller Or Famously Known As Mvc Is A Software Design Pattern And Is Currently Widely Use In The Web Design Architecture [5]. Due To Its Ability To Clearly Distinguish The Roles Of Data, Display, And Logic, It Has Made Why Mvc Is Widely Adopted By The Practitioners In The Industry [5, 6, 7].

The Mvc Is Based On The Concept That Was Introduced By Trygve Reenskaug In The 1970s At The Xerox Parc For The Smalltalk-80 Application [8]. And Served As The Central Concept Behind The Smalltalk-80 User Interface Development [9]. According To [9], The Use Of Mvc Has Made The Application As An Elegant And Simple, But Quite Unlike The Approach Of Traditional Application Programs During That Time. It Was Also Regarded As A Flexible And Powerful System Then.

In The Mvc Paradigm The User Input, The Modelling Of The External World, And The Visual Feedback To The User Are Explicitly Separated And Handled By Three Types Of Object, Each Specialized For Its Task. According To [9] Each Of The Components That Made Up The Mvc Has The Following Purpose:

1. The Model Manages The Behavior And Data Of The Application Domain, Responds To Requests For Information About Its State (Usually From The View), And Responds To Instructions To Change State (Usually From The Controller).
2. The View Manages The Graphical And/Or Textual Output To The Portion Of The Bitmapped Display That Is Allocated To Its Application.
3. The Controller Interprets The Mouse And Keyboard Inputs From The User, Commanding The Model And/Or The View To Change As Appropriate; And

The Mvc Behavior Is Then Inherited, Added To, And Modified As Necessary To Provide A Flexible And Powerful System Of Smalltalk-80 Then [9]; And It Continues To Become The Basis Of The Modern-Day System Development Framework. This Concept Of Mvc Has Helped Others In Web Application Framework. A More Simplified Characteristics Of The Mvc Is Presented By [10] As Follows:

1. The Model – The Model Is The Part That Interacts With The Database To Handle The Data, Logic And The Rules
2. The View – The View Forms The Part That Interacts With The User By Displaying The Output And Accepting The Input In Various Forms.
3. The Controller – The Controller Sends Commands To The Model To Update The Data As Well As Send Commands To The View To Modify The Data Being Accepted Or Displayed.

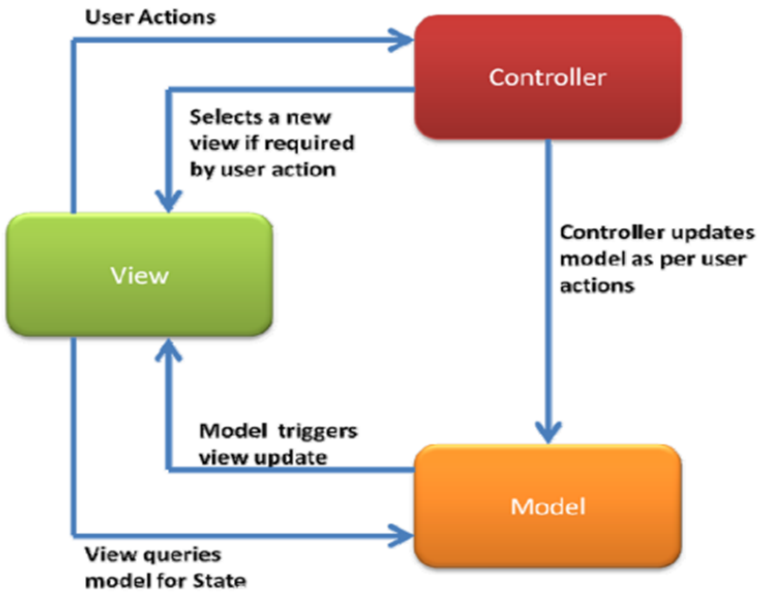

Fig.1. The Mvc Architecture Concept Adapted From [10]

Given The Above Characteristics Of The Mvc, Obviously It Is Highly Suitable For Rapid Web Application Development [8]. Currently, Mvc Has Become A Common Design Pattern That Exists In Many Web Application Frameworks Such As Asp.Net, Cakephp, Laravel, Ruby On Rails, Spring Mvc And Strut [10] Or Zend [11]. It Is Mostly Used As It Could Structure User-Oriented Applications (Meaning Applications That Have A Graphical User Interface – Gui) Easily. In Recent Years We Can See More Articles Showed Case The Use Of Mvc For Web Application Development On Different Framework Such As Laravel, Java, Php, Codeigniter. Among Works Available Are Inventory Management System [12]; Online Shopping System (Mahmood And Ashour [13]; Web Based Learning System [14]; Ticketing Reservation Systems [15]; Institutional Repositories [16]; Online Collaborative Discussion [17]; And Internship Monitoring System [18].

- The Laravel Framework

Laravel Is A Free, Open-Source Php Web Framework, Created By Taylor Otwell And Intended For The Development Of Web Applications Following The Mvc Architectural Pattern. Laravel Is A Framework Development Purposively For Web Application Which Consists Of Html Scripting Language, Javascript And Also Css [19]. The Laravel Framework Is Easy To Understand And Powerful, The Framework Itself Provides Authentication, Routing, Session Manager, Caching, Ioc Container And Tons Of Most Used Component, Also Amazing Database Migration Tools And Integrated Unit Testing Support, All These Tools Give Developers The Ability To Build Complex Applications [20].

Laravel Has Been Designed To Improve The Quality Of The Software By Reducing Initial Development Costs And Repair Costs To Improve The Application By Providing Expressive Syntax That Explains And Installs Core Devices That Will Save Implementation Costs [21].

Among The Advantages Of Laravel Has Are:

1. It Provides Modular Packaging System With A Dedicated Dependency Manager [20].
2. Applications That Required Obscure Backend Is More Suitable To Make With Laravel Whether Large Or Small In Scale [11].
3. It Is Easier To Operate; Through Its Features As A Vagrant Box, Homestead Pre-Packaged [11].
4. It Offers Speed, Security And Seamless Information Relocation [11].
5. It Provides Reverse Routing, Email Integration And Security Management [19].
6. It Is A Robust Framework For Website Developers And Primarily Works In Php [19].

In Addition, According To [22], Laravel Framework Is A Cli Framework, Migration And Artisan Cli That Offers A Set Of Tools And Application Architecture That Combines Many Of The Best Features Of Frameworks Such As Codeigniter, Yii And Asp.Net Mvc.

3. Complaint Management System

The Complaint Management System Comprises Of Many Modules. One Of The Modules Is The Complaint Module That Consists Of Three Main Functions Which Are Manage Customer, Manage Complaint And Generate Report. Manage Customer Allows Customer Registration And Maintenance. Manage Complaint On The Other Hand Responsible To Track The Complaint Record's Activities Starting From The Complaint Is Received Until The Complaint Is Closed. Figure 2 Illustrates The Overview Of The Complaint Process Flow.

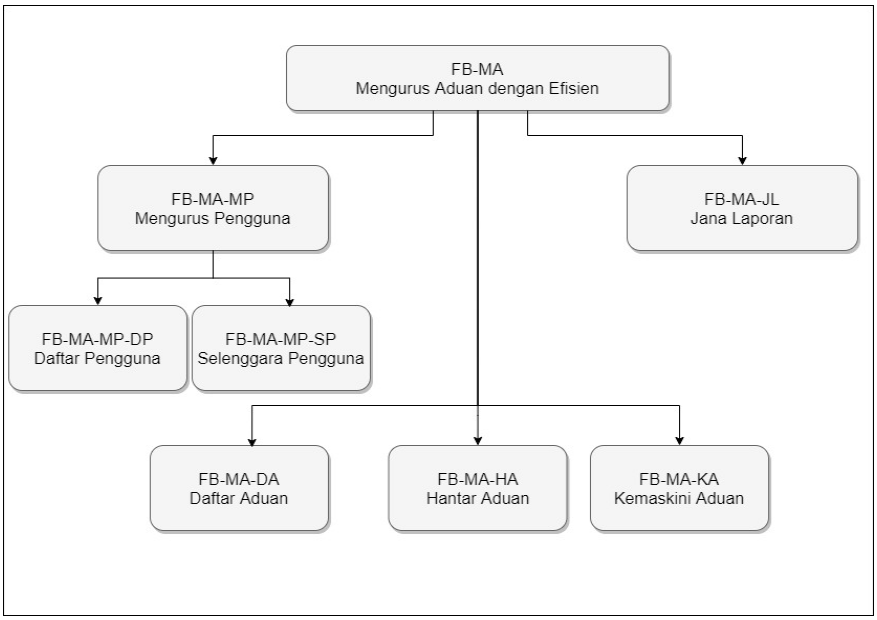

Fig.2. Complaint Process Flow

1. Implementation Of Laravel Framework

Framework Is A Key To A Problem Using The Basic Conceptual Structure Based On Complex Issues That Occur. A Framework Already Contains A Collection Of Architectures Or Concepts That Can Make It At Ease To Solve A Problem. In A Framework, Usually There Are A Variety Of Kinds Of Features For Building A System, Including Standard Coding, Best Practice, Design Patterns And Common Functions. By Employing Various Features That Are Available On The Framework, The Application Development Process Can Be Done Quickly. Framework Usually Uses The Model View Controller Or Mvc Method Which Is A Method Of Separating Data (Model), Interface Design (View) And Function (Controller) [23].

Figure 3 Demonstrated The Route Of Laravel Framework In Cms. The Create Complaint Page - Created With The Laravel Framework Interacted With The Browser, Sends Requests To The Web Server, And Forwards The Request To The Laravel Routing System. The Laravel Router Will Handle And Process The Request And Forward Them To Each Class And Method Corresponding To The Pre-Defined Url Request. In The Controller, Communication With The Model Occurs Whenever The Data Related To The Database Is Required. In Here, The Controller Will Perform A Render View, Which Later Will Be Converted Into Html And Sent Back To The Browser.

The Whole Execution Is Summarized As Below:

1. Users Request A Page To Post A New Complaint. (Create-Form.Blade.Php).

2. Using Route (Web.Php), This Will Try To Search The Dedicated Routing For The Request. Here, This Will Call Route For Submit New Complaint.
3. The Routing Will Invoke Control To Complaintcontroller (Controller).
4. Complaintcontroller Will Interfaces With The Complaint Model Components To Prepares The Necessary Data For The View.
5. Lastly, The Complaint View Is Display To The Browser By Using Create-Form.Blade.Php

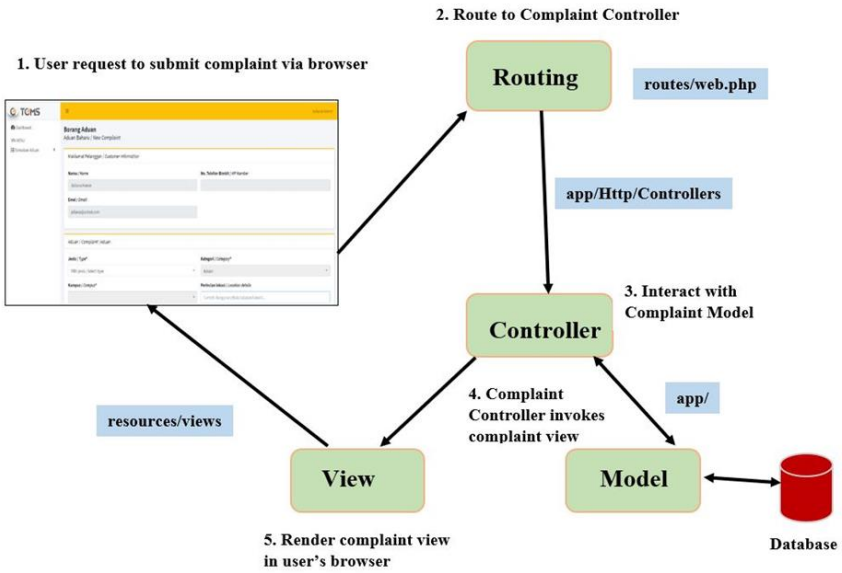

Fig.3. Route Of Laravel Framework In Complaint Management System

- *Routing*: All The Routes Will Be Stored In Routes/Web.Php. The Purpose Of Router In Laravel Is To Accept The Input (Here The Input Is /Spa/Complaints/Create-Form) And Return A Value Either A String, View, Or Controller. A Controller For This Complaintcontroller (It Is A Method Consists In Complaintcontroller Named As Create-Form). Figure 4 Shows Fractions Of The Implementation Code.
- *Controller:* Createform Method Which Resides In Complaintcontroller Object Will Prepare Necessary Data Required For The Complaint Form As Described In Figure 4.
- *Model:* Complaint Model Will Be Responsible In Managing The Data Related To The Complaint Details. This Includes The Data Such As The User Who Issued The Complaint, Category Of Complaint Etc. The Data Required For The Complaint Will Send To The Complaintcontroller Via Createform Method.
- *View:* This View Part Will Be Responsible For The Displaying Of The Page As Request By The User. Here, The Blade Template Is Used For Preparing The View File. Blade Is A Template Engine Provided By Laravel. In Blade, There Are Master Template Master And Template Inheritance. The Purpose Of Template Master Is To Manage The Common Elements So That The Code Is Written Only Once. The Inheritance Template Consists Of The Layout And The Section (Content). In This Case, It Will Invoke Create-Form.Blade File. Figure 5 Illustrate The Design Of The Interface Of Create A Complaint.

```
Route::Get('/Spa/Complaints/Create-Form', [\App\Http\Controllers\Complaintcontroller::Class,
    'Createform']) //Form Create Aduan Jpp
->Name('Spa.Complaints.Create-Form');
```

Fig.4. Create Form Code

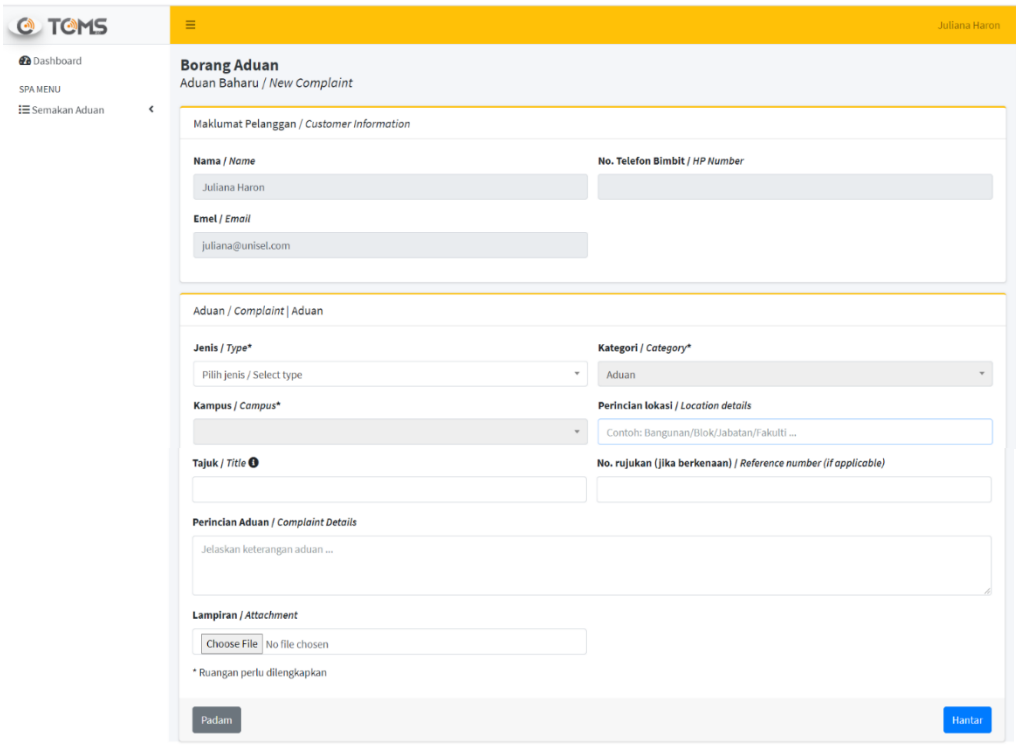

Fig.5. Create Complaint Page

2. Software/Tools Required

To Build The Complaint Management Application, Several Software Or Applications Is Required Including:

- Laragon – Development Environment For Php, Nodejs Etc
- Brower - Google Chrome/Edge Etc
- Laravel 5.7
- Composer (Command Line Interface Tool -Artisan)

3. Methodology

The Complaint Management System Has Been Developed Using Rapid Application Development (Rad) Method Which Has The Benefit Of Fast Developing Besides Producing High Quality Software [24]. This Is Because The Existance Of User Involvement During Implementation Phase. For The Design, The Object Oriented Analysis Design (Ooad) Using Uml Have Been Used To Produced The Necessary System Design. Figure 6 Below Depicts Use Case Diagram For The System.

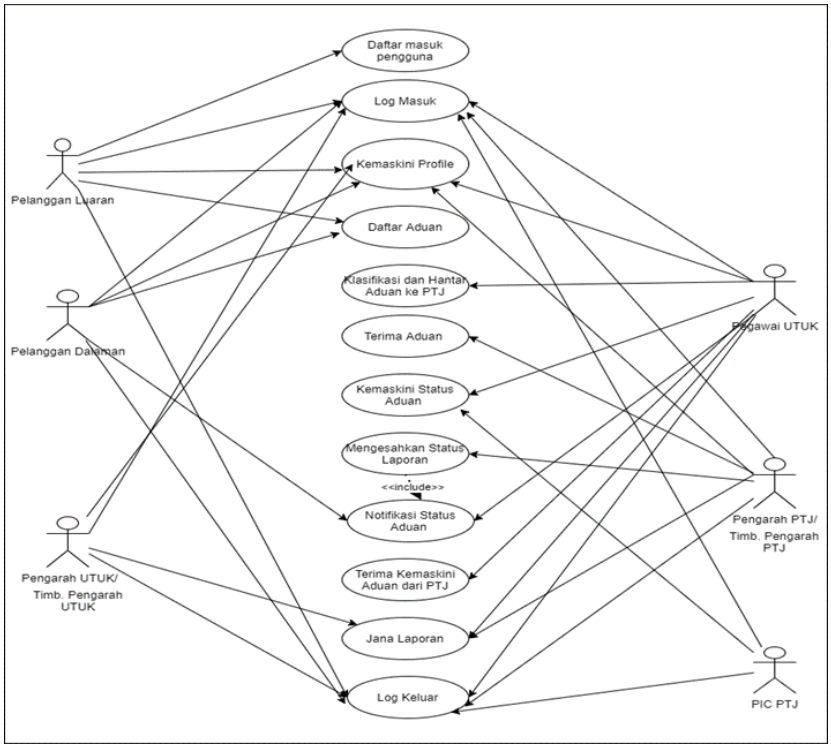

Fig.6. Complaint System Use Case

4. System Design

- The Mvc Architecture

This Section Explains System Design Using Mvc Method On Laravel Framework. The Main Architectural Concept In This System As Discussed Above Consists Of Three Components Such As Model, View And Controller. The Component Created Through Mvc Architecture Are Independent Of Each Other. However, This Feature Helps The Developer To Reuse The Component And Code Easily And Quickly In Any Development Framework. Table I Shows The Mvc Architecture Mapping To The Requirement Based On One Of The Interface Screens Created In Figure 3. It Described How Model, View And Controller Are Mapped To The Requirement Of Creating A Complaint Form.

Based On The Architecture, The Model May Be A Single Object Or Structure Of Objects. In This Case, The Model Is Complaint_Register And It Is Done By Customer. The 'View' Is A Visual Representation Of The Mvc Architecture. It Simply Can Be The Part Of User Interface (Ui) Or User's Screen In Order To Interact With The System. For This Level, It Can Show The Actual Output To The User. However, It Cannot Show Anything By Itself. A View Is Connected To Its Model And Get What Necessary Data For The Presentation By Asking Certain Question Or Message. All These Questions Or Message Are Sent Back To The Model In Such An Easy Terminology That Can Easily Understand The Information Sent By Controller. The 'Controller' Will Interact Between The Screen (View) And Process While The Model Is Associate To The Data Properties. It Also Acts As 'Brain' Of The Entire Mvc Architecture. This Shows What The Process Needed To Be Done In Order To Achieve The Purpose Of The Object Or Model. Therefore, The Controller Needs To Clearly Specify The Input Process And The Output By Providing Appropriate View To Be Presented To Users.

Table 1. Mvc Architecture For Complaint Management System

Mvc Architecture	Requirement Details
View	Ui1 : Complaint_Register

(User Interface (Ui)/Form)	Validation: **Nil**
Controller (Process – To Complete User Action And Manage Business Logic)	This Page Will Enable The Customer To Do The Following: 1. Add New Complaint 2. Attach File As Prove Of Complaint 3. Submit New Complaint 4. Exit From The System
Model (Business Logic & Data Properties) (Note: For Repetitive Identical Model, Do Not Repeat, Just Write The Referral Page Number On The Requirements Details Column)	Complaint Registration Customer Data Properties : 1. Complaint_Register

Figure 7 Shows The User Interface (Ui) Or View Of The User's Screen. Basically, Its Focus On What User Might See And Need To Do In Order To Submit Their Complaint. Based On This Ui, User Need To Fill Up The Form By Entering An Appropriate Data. Therefore, The Data Can Be Store In The Database. It Reflects The Proses Listed In The Controller On The Mvc Architecture. Finally, User Able To Complete Their Action By Clicking The 'Submit' Button.

A Table Is A Collection Data Of Fields Using For Complaint System Where All The Fields Is Needed Is Defined. The Mapping Of Model In This System Could Be Reflected Through The Data Properties Table Or Data Dictionary. A Shown In Table 2 Of Complaint_Register Table, The Combination Of Attributes 'Id_Type' And 'Category_Id'is Being Used To Fetch Data For Each Of The Complaint. No Value Of These Key Is Null And It Is Unique For Every Record. Hence, These Keys Will Be Foreign Key (Fk) Which Connecting To Another Table.

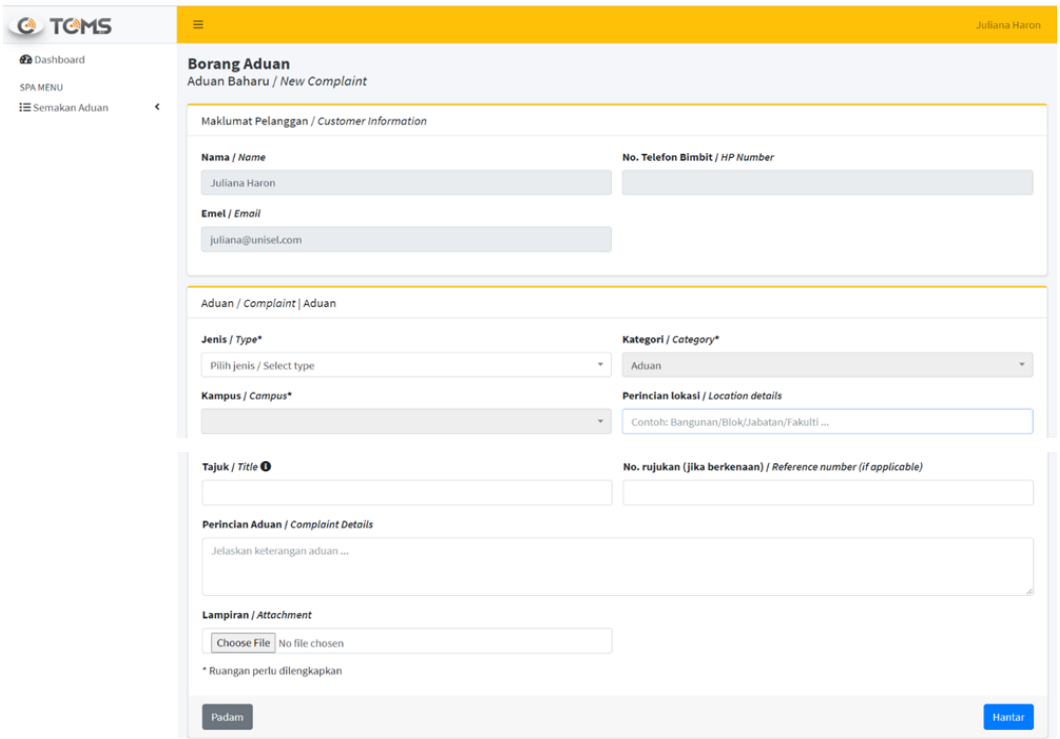

Fig.7. User Interface Complaint Registration

Table 2: Reflections Of Model Through Data Properties: Complaint_Register Table

Field Name/ Attributes	Field Data Type	Field Length	Field Validation
Id_Type	Character	200	Can Be Character And Integer
Category_Id	Character	200	Can Be Character And Integer
Campus	Character	200	Can Be Character And Integer
Details_Location	Character	200	Can Be Character And Integer
Title	Character	200	Can Be Character And Integer
Reference_Num	Character	200	Can Be Character And Integer
Details_Complaint	Character	2000	Can Be Character And Integer
Image	Image		

- Produce Complaint Form

At This Stage, This System Has Created A Complaint Form. Figure 8 Depicts A Fragment Code On How To Create A Complaint Form Using Laravel Framework For Category Field. By Referring To The Complaint_Register Table, It Eases The Developer To Add The Element Of The Form Needed By Customer.

```
public function createForm(Request $request)
  {
    //
    $jenis = \App\Models\Jenis::all();
    $category = Category::find($request->category_id);
    $categories = Category::all();

    return view ('spa.complaints.createform',compact('category','jenis','categories'));
  }
```

Fig.8. Fragment Of Source Code For Category Field

5. Conclusion

The Complaint Management System (Cms) With The Mvc Approach Is Principally The Overview Of The Application Structure With Regards To How The Data Flow Of The Application Works. Mvc Pattern Separates The Business Logic (Models), The Manipulate Coordination (Controllers) And The Presentation Of Statistics (Views) Into Three Distinctive Layers. Mvc Is Applied For Developing User Interfaces Of Cms That Divides The Related Program Logic Into Three Interconnected Elements. This Approach Portrays The Capability Of Reducing Web Application Development Times Drastically And Allows The Developers To Focus More On Application Specific Tasks, Rather

Than Wasting Time Trying To Implement Distinguished Practices And Models. Mvc Also Helps The Developers To Tier The Code For Easier Maintenance.

The Framework Additionally Helps Modular Architect Which Enables Developers To Separate Code Into Unbiased Manageable Modules. During The Development Of The Cms, It Is Much Easier To Change Either The Template Or The Underlying Code Without Touching The Other Just By Keeping The Data-Manipulating Logic Separate From The Bits That Handle The Display. As The Result, The System Performance Is Increased Because Of The Architecture And This Allows For Better Documentation.

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