

Design and Development of a Web-Based System using Laravel Framework: A Competition Management System

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Abstract: Competition is a common activity that has been held among the community. It is the event that requires gathering of the people who join. Unfortunately, it can be inconvenient when the venue is far from the participant's place. Some of competition activities are also obstructed due the recent pandemic. Another issue is that, in most competitions, participants do not have access for the data and history of the competitions as they are only kept by the administrator. Therefore, a web-based competition management system is proposed to let people organize and participate in competition virtually. In addition, people can create and join many competitions at a time. Through the system, judges can directly evaluate the submissions. The system is developed according to the Agile Scrum Methodology. This system is developed using Laravel and MariaDB database. At the end of project development, testing phase has shown that the system is successfully met all the requirements in terms of the functionality. Each module has been implemented according to the business plan diagram. This system will ease the online management of competition and bring people forward to the digitalization community.

Keywords: Web-based, Competition, Event, Organizer, Participant

1. Introduction

Competition is one of the commonly held activities in the community [1]. It is part of the education system towards a more competitive generation. Constructive competition can motivate people to achieve better at the same time as it makes activities more exciting. Singing, storytelling and rhyming are some of the categories that are usually held for the activity. Most of the time, a competition is held physically at a specific time and location.

In this Covid-19 situation, it is a good approach to held this activity online. To adapt with social distancing, online competition is an alternative to conduct this activity without involving any physical contact [2]. By using this new method, they can remain at their place and still join the competition. By having competition on online platforms, participants from anywhere in Malaysia are now able to join and view a lot of competitions too [3]. In this project, a new web-based competition management system is proposed. The online system will be used mainly by organizers to create and organize their online competition, and also by the participants to register and submit their competition videos.

For organizers, the ability to organize new events or competitions means they can keep up to their venture. While for participants, joining a competition can give a lot of opportunity and exposure to the individual self[4]. However, some of the participants from other cities might face difficulty to join the competition that is held far from their current place. Some might need to be on a long journey and some might not have the transportation. This might have cut the opportunity for those that do not have the convenience but interested to participate in the program. It is also considered to be high cost as there is so much to be prepared. The organizer will need to consider a lot of things such as venue and charges if the event is to be held in conventional mode.

The rest of the paper is organized as follows. Section 1 is the introduction of the Competition Management System that provides an overview of the system in general. This part discusses the problem statements that currently have that the proposed system could solve. This section shows the scope of the project that will be involved in the system and the expected result of the new system. The significance of the project is stated to show how this could ease the process of competition management online. Section 2 discusses the literature review of the physical flow of competition management. It shows how the competition has been handled without an online system. It has the list of the technology used in the system development. Three similar existing systems have been reviewed and compared to the proposed system. Section 3 is the discussion of the methodology used that is Agile Scrum Methodology and system analysis. By this section, it is stated in detail what to be achieved in each sprint. Each sprint come out with new features that have been added or an upgrade from the previous. Section 4 clarifies the analysis that has been done from the previous chapters. The requirements will be interpreted in diagrams to clarify each module in the system during this step. Section 4 discusses the implementation from the previous system planning. It discusses the system that has been built by showing the interfaces in the system according to the modules. For each interface and related function, the code that has been used will be explained. There will be the User Acceptance Test(UAT) that has been prepared for end users and test plan for the system testers. Section is the discussion on what this project has achieved and the overall conclusion.

2. Related Work

Three similar systems have been selected to be discussed. These systems are discussed according to the target user, function and layout. Each system has its own specialty according to what the system focuses on. These systems have different functionality as they have different target users. The similar systems are Sikecilbercerita, Jomrun, and Eventbrite.

2.1 Sikecilbercerita

Sikecilbercerita[5] is a static website to announce and promote a storytelling competition for kindergarten. Unregistered users are able to view the details of the competition, conditions of participation, judgment criteria and winners list of the previous competition. This system is only able to manage one active competition at a time. Participants are not required to register an account to join a competition. They can just join the competition by accessing the Google form link in the homepage. The organizer will receive the submission list from the Google form to be evaluated by the organizer.

2.2 Jomrun

Jomrun[6] is a platform to promote running events and sell merchandise. Users can register an account to purchase e-ticket to the events. The participation requires participants to install Jomrun mobile application. The procedures of this system are download and signup with phone number or email in mobile phone. Then participants need to select an event and purchase the ticket to join the event via online payment. After making the purchase, present the e-ticket at the event for scanning. The organizer of the event will check the e-ticket for the validation. Users can buy e-tickets from the system before going to the event.

2.3 Eventbrite

Eventbrite [7] is an event management and ticketing website. The service allows users to create, browse, and promote events. The service charges a fee from the event organizers in exchange for online ticketing services, unless the event is free. It is a web-based event management application created to simplify ticketing and registration for any type of event. Individuals, organizations, businesses, and virtually anyone else can use the platform. The main function of this web application is to post an event online, customize the event page, sell tickets online, promote events, sell tickets at the door and track ticket sales and registration. Organizer will provide the event details after the participant registration.

2.4 Comparisons of Existing Systems

Table 1 shows three existing systems and the proposed system are compared according to some features. All of the systems have the login function to access their registered account. For creating user profiles, it is not available for Sikecilbercerita and Jomrun systems. Users are not able to add more personal description. Eventbrite and the proposed system allow users to edit profiles such as adding profile picture and descriptions. For products, only Jomrun is available in listing and selling products. The system sells merchandise related to certain events such as t-shirts. Sikecilbercerita and Jomrun do not have the feature to let other organizers register an account and manage their own event in the system while Eventbrite and the proposed system have the feature to let users register an account as an organizer and manage their own event or competition.

All systems require users to login to join the event except for Sikecilbercerita where participants can fill the submission form for a competition without registering any account. All the existing systems do not have the submission evaluation in the system except for the proposed system. That is because Eventbrite and Jomrun are event management systems that do not require evaluation. For the list of winners that will be displayed, Jomrun and Eventbrite do not have this feature compared to Sikecilbercerita and the proposed system. The certification for Sikecilbercerita is by giving e-certificate to the winners and Jomrun is giving the paper printed certificate. Eventbrite does not provide any certificate services in their system while the proposed system also provides e-certificate from the organizers to the winners. The venue for the Sikecilbercerita is online, Jomrun is an offline meet, Eventbrite can be either both and the proposed system is online.

The systems let multiple organizers to have events in the system except for Sikecilbercerita that only have one organizer. Same goes to the number of active events by the organizers where Sikecilbercerita allows the organizer to have one ongoing competition at a time. For the judging, Sikecilbercerita and the proposed system will be done online while Jomrun will be done offline. Eventbrite does not have the judging features.

All the systems allow many entries to join at a time for the participant except for Sikecilbercerita. Same goes to the event or competition created by the organizer that let the organizer create many except Sikecilbercerita. Sikecilbercerita, Jomrun and the proposed system are competition-based management

system while Eventbrite is an event management system that allows any types of events to be created in the system such as seminar or activity.

Table 1: Comparisons of Related Work

Features	Sikecilbercerita	Jomrun	Eventbrite	Proposed system
Login function	√	√	√	√
Create user profile	X	X	√	√
Buy product	X	√	X	X
Create event	X	X	√	√
Join event	No login	Need login	Need login	Need login
Submission evaluation	X	X	X	√
Winner list	√	X	X	√
Certificate	e-certificate	Paper certificate	None	e-certificate
Venue	Online	Offline meet	Online or offline	Online
Number of organizers	One	One to many	One to many	One to many
Active event	One	More than one	More than one	More than one
Judging mode	Online	Offline	None	Online
Number of entries to join at a time	One	One to many	One to many	One to many
Number of events can be created at a time	One	One to many	One to many	One to many
Type of event	Competition only	Competition only	Open to any event	Competition only

3. Project Methodology

3.1 Methodology

The methodology that has been chosen in this project is Agile Scrum methodology model [8] that can be referred in Figure 1. This methodology consists of six phases that are plan, design, develop, test,

deploy, review and launch. It is different from other models where it is an incremental and iterative approach which lets the team upgrade the feature by time.

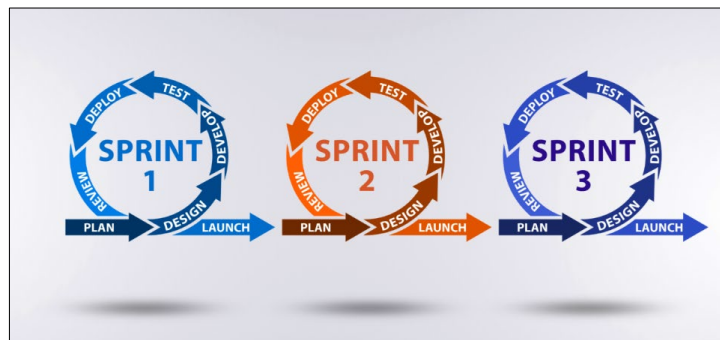


Figure 1: Agile Methodology [8]

Based on the Gantt Chart that has been prepared in Figure 2 until Figure 4(see Appendix A), during the planning phase we discuss what to build or improve for the Competition Management System in the sprint phase. For the design phase, it considers a variety of possible ideas and filter down the options to find the most effective and efficient way to build the solution for each user that is the organizer, participant and judges. For development, it is the phase of building the system using Laravel web development framework. The interfaces and all the functions according to the module will be developed using PHP scripting language. For the interface, this system uses Tailwind CSS. The database used for this project is MariaDB. The testing phase is to test and run the newly developed features for each type of user. The deployment is to officially merge the new feature into the Competition Management System. The last part of the sprint cycle that will review the feature that has been developed with the stakeholder and set goals for the next sprint. Sprints are the time period that is set to complete a set of modules. Table 2 shows the activities in all the first five sprints. From each of the sprints, there are outputs that are produced for the system development.

Table 2: Sprint Activity

SPRINT	PHASE						ACTIVITY	OUTPUT
	Plan	De-sign	De-velop	Test	De-ploy	Re-view		
Sprint #1	√						Project planning	Project proposal
Sprint #2	√	√					Requirement's analysis	Business process diagram and system flow diagram
Sprint #3	√	√					Requirement's analysis	Software Requirements Specification (SRS) document of the Use Case Diagram
Sprint #4		√					System design	Wireframe
Sprint #5		√	√	√	√	√	System design and System development	User account and new organizations

Sprint #6	√	√	√	√	√	√	Create relationship between events and organizations	Able to create event that is belongs to an organization
Table 2: Cont.								
SPRINT	PHASE						ACTIVITY	OUTPUT
	Plan	Design	Develop	Test	Deploy	Review		
Sprint #7		√	√	√	√	√	Manage and invite other users to the organization or event	Admin can invite user according to their role
Sprint #8		√	√	√	√	√	Manage events that can be joined by participants according to date	Participants join the ongoing events
Sprint #9		√	√	√	√	√	Apply roles and permission for all members in organization and event	Each different role can do different task
Sprint #10		√	√	√	√	√	Manage which judge that evaluate the submission and create the flow to calculate marks	Judge in the event able to evaluate submission and submit the final marks
Sprint #11		√	√	√	√	√	Do the calculation and logic to create the list of final result to identify the winners	A new page to show the list of participants sorted by final result
Sprint #12		√	√	√	√	√	Design certificate template using Adobe Illustrator and fill text into the certificate	New generated certificate will be available according to participants' final result
Sprint #13		√	√	√	√	√	Make the certificate to be accessible to the participants	Participants receive email notification for the event result and will be redirected to the system to download certificate
Sprint #14			√	√	√	√	Check and test the overall flow of the system to find what to be improved	Improved flow of the system

4. Analysis and Design

4.1 Use Case Diagram

Figure 1 shows the use case diagram that has three actors that are organizer, participant and judges. It has the use case for register, login, create event, join event, evaluate submission, announce result, prepare certificates, notify participants and receive notification. Users can register an account as a default and use the system as the organizer, participant and judge at the same time.

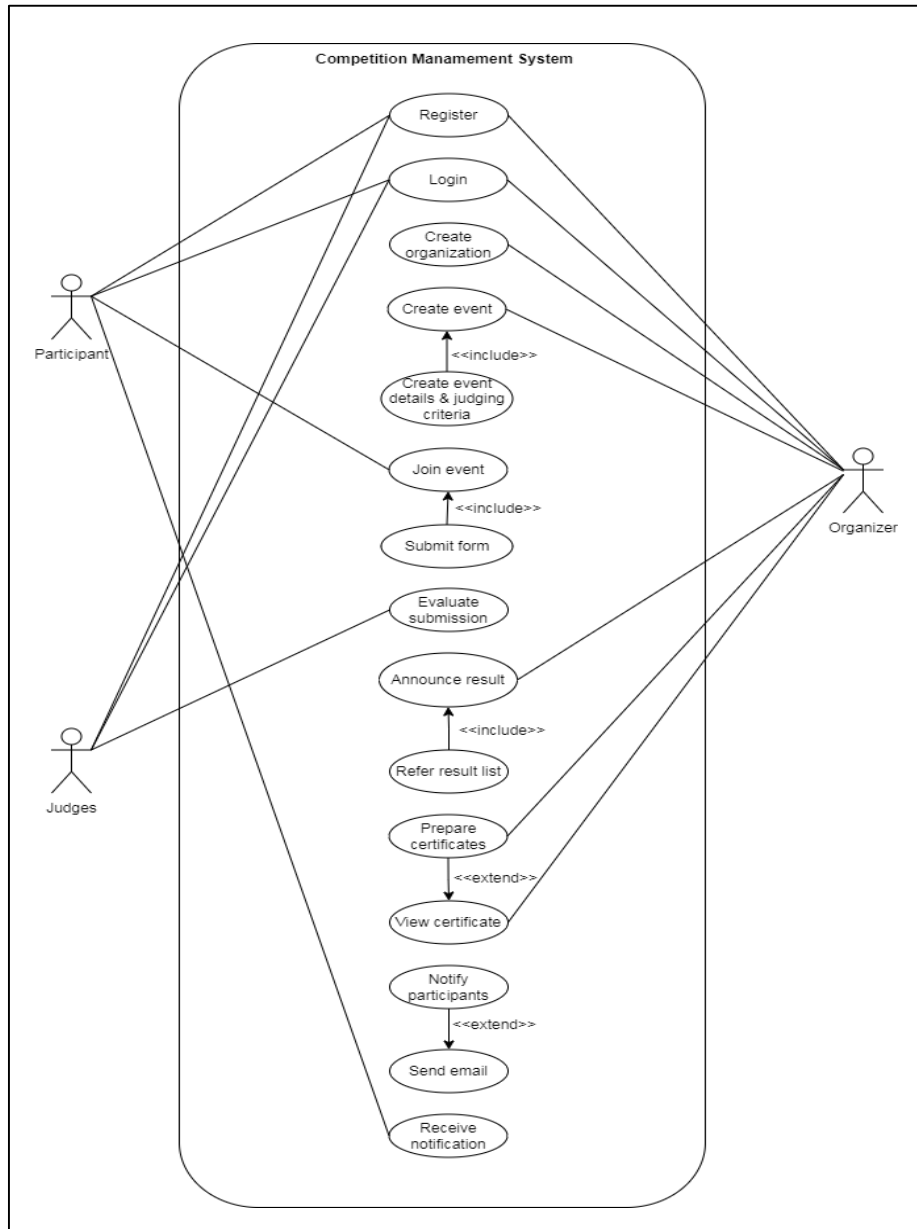


Figure 5: Use Case Diagram

4.2 Sequence Diagram

Figure 2 shows the sequence diagram for the join event. The actor is the participant. It contains the classes of Event, Submission, Result and Database. Figure 3 shows the sequence diagram for evaluate submission. The actors are the judges. It contains the classes of Event, Judging criteria, score and Database.

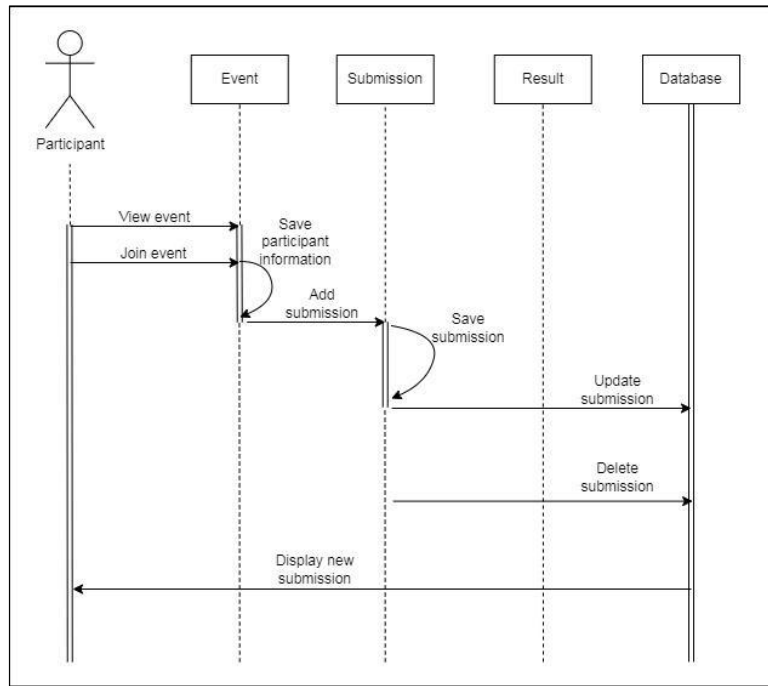


Figure 6: Sequence Diagram for join event

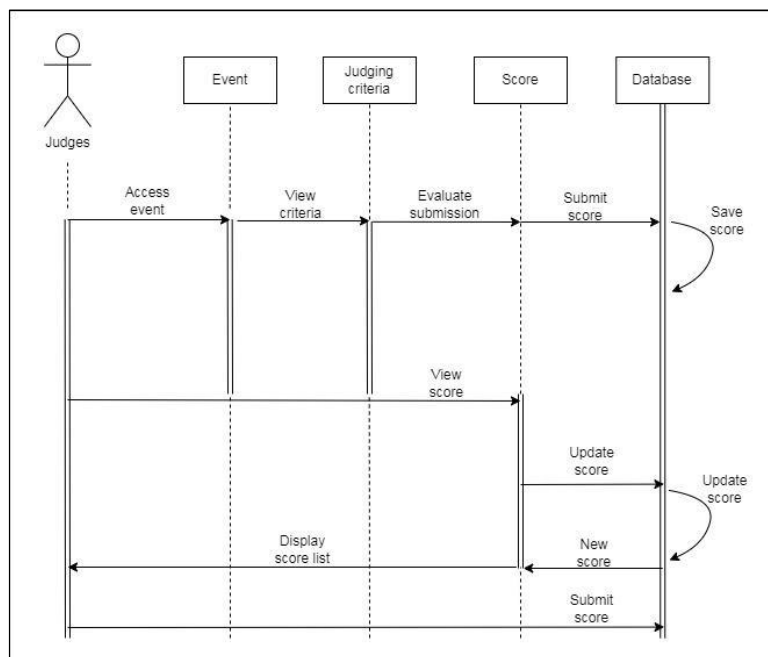


Figure 7: Sequence Diagram for evaluate submission

4.3 Class Diagram

There are nine classes in the class diagram. The classes for this system are user, organization, organizer, event, judges, score, submission, judging criteria and profile. Each of the classes relates to each other. Unfortunately, the diagram will not be available in this report.

4.4 Entity Relationship Diagram

Figure 4 shows the Entity Relationship Diagram that represents the relationship between each entity. The entities consist of users, profiles, joinedevents, submissions, organizations, organizer, events, judges, judging criterias, scores, winners and certificates. Each entities shows the database table in the system.

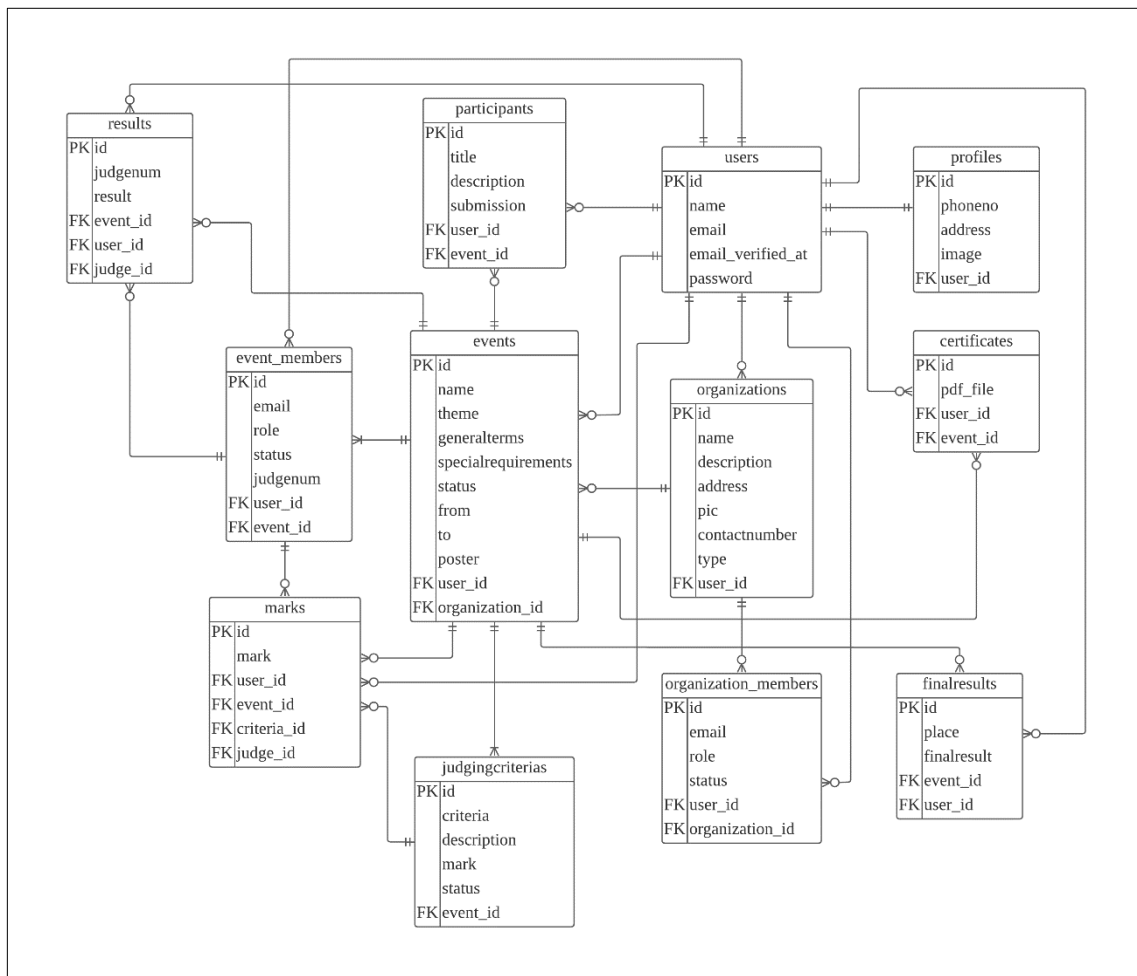


Figure 8: Entity Relationship Diagram

4.5 User Interface Design

In this section, it shows the wireframes for the user interface design. The interface is drawn according to the system analysis that has been done in the previous sections.

Figure 5 shows the create event page when the organizer wants to create a new event. The field consists of the competition name, description, duration and poster of the event.

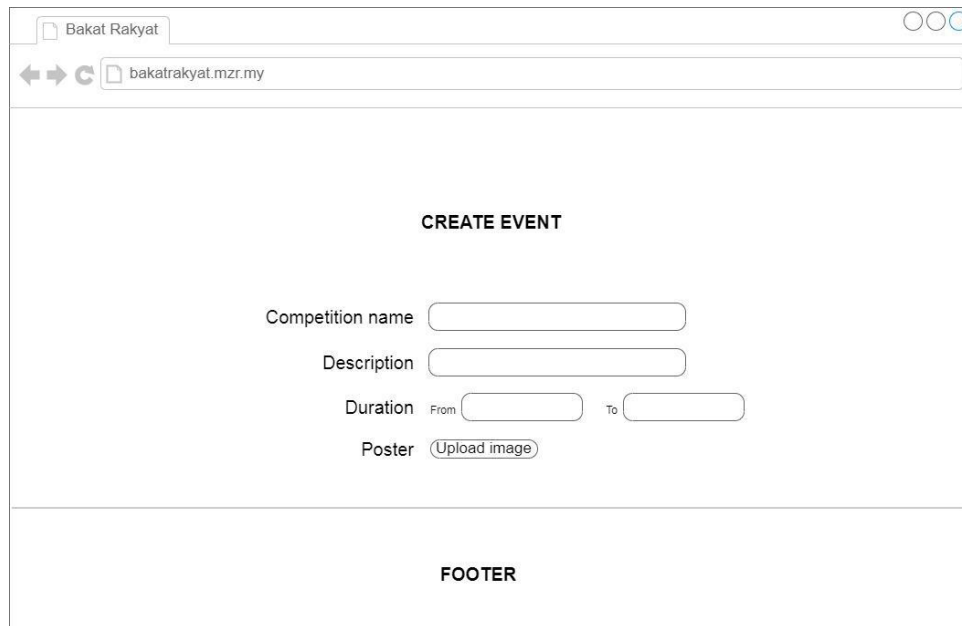


Figure 9: Wireframe for Create Event Page

Figure 6 shows the join or register event page. This page displays the competition name and description on the top. For the register credentials participants are able to review their information such as name, email, phone number and address but it is not editable. They are required to enter the title, description and submission link to join the event. The ‘Join event’ button will confirm the participant’s registration.

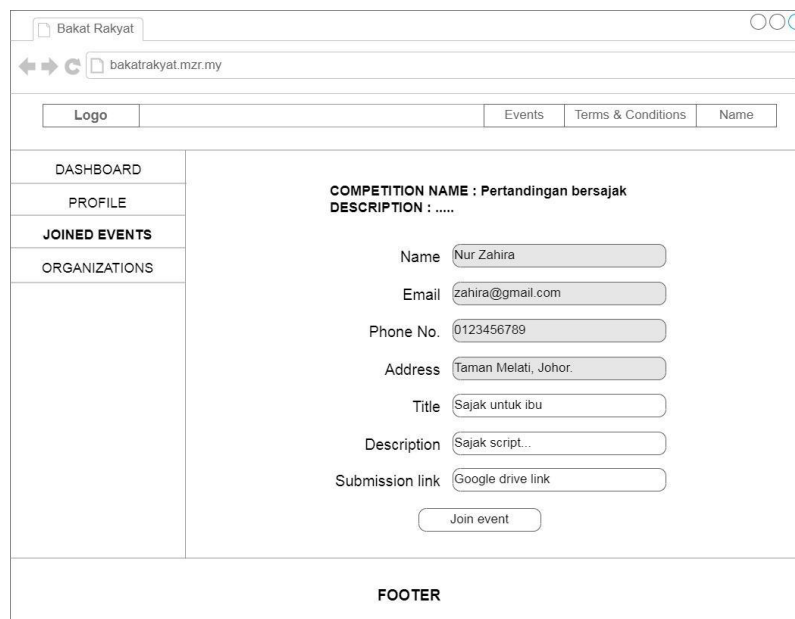


Figure 10: Wireframe for Join Event Page

Figure 7 shows the evaluation page that will be viewed by the judges. At the top of the page, it has the participant’s name and email as judges need to evaluate for each participant one by one. It displays the title and description of the submission by the participant. The next section is the judging criteria that has been added by the organizer. It consists of some components that they need to fill in the scores. After completion, judges are required to click the ‘Confirm’ button at the bottom of the page.

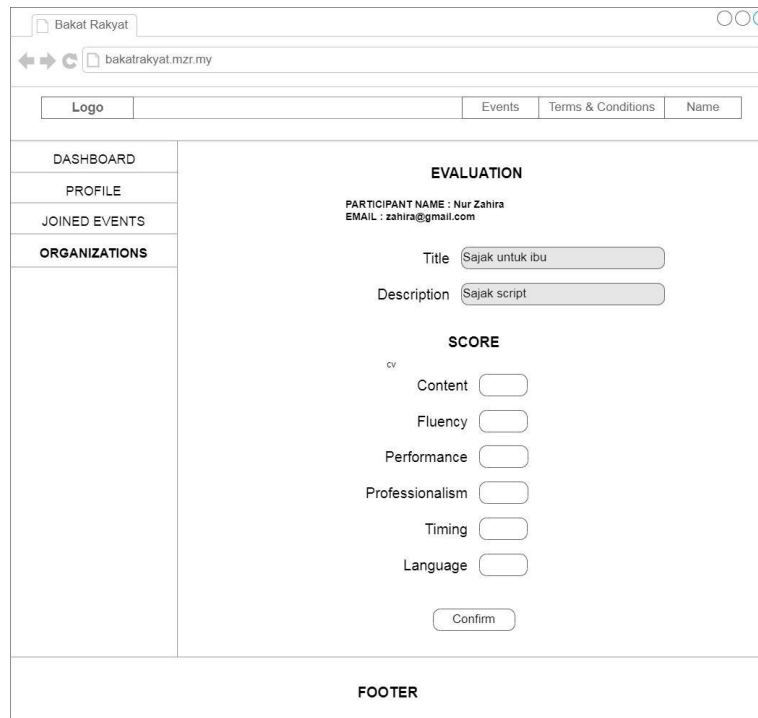


Figure 11: Wireframe for Submission Evaluation Page

5. Implementation and Testing

5.1 System Implementation

5.1.1 Laravel Setup and Database Connection

For Laravel Setup for the project, code editor Visual Studio Code has been installed. Composer has been installed to manage dependencies as Laravel uses Composer. To setup the database, the .env file in the Laravel directory has been configured such as database connection that is *mysql*, database host that is 127.0.0.1, database port that is 3306, database name that is *competition_management_system*, database username and password. Once the connection has been made, Laravel able to migrate database table and settings to the *mysql*.

5.1.2 View Dashboard

Figure 13(refer Appendix B) shows the dashboard user that user will be redirected after login. At the top of the page, there are 3 sections that shows the number of organizations, events and judging that the user has. At the next part, it will display list of available events that is available and can be joined. At the bottom of that, there is the list of completed event that has ended.

Figure 18(refer Appendix C) shows the function to display dashboard page. There are two variables to get the list of events that are publish and completed. The other part is to count the total amount of organizations, events and judging that the authenticated user have.

5.1.3 Create and Manage Event

Figure 14(refer Appendix B) shows the create event page for admin to create new event in the certain organization. The mandatory field are event name, theme, status, date and poster. The status publish is for opening the event to be joined by participants and draft is to save the event as private. The compulsory field are general terms and special requirements.

Figure 19(refer Appendix C) shows the create function that will accept the organization id. The store function will validate the user input before saving to database. The date will be parse to the right format using carbon package.

5.1.4 Invite Administrator/Editor/Judge in Event

Figure 15(refer Appendix B) shows the invitation history page to view all the member invitation activity in the event. The status for the invitation can be pending, accepted, rejected, expired, cancelled and removed.

Figure 20(refer Appendix C) shows the invitationhistory function to display all the members in the organization. It will have the date validation for the unresponded user to check if the invitation is still valid or expired.

5.1.5 Evaluate Submission and Announce Result

Figure 16(refer Appendix B) shows the list result for admin page. It will show the result for each judge. After complete, admin can click the button announce result and the result column will appear at the right side of the table. The announce result button will change to view result.

Figure 21(refer Appendix C) shows the store function store to calculate the final results for the overall event. It will save the \$value key in the finalresults table. Then, the participants will receive the email notification to check their result. They will be notified to download the certificate in the system.

5.1.6 Download Certificate

Figure 17(refer Appendix B) shows the view certificate page that is available for participants to access when the event has ended. The top 3 participants will receive the winner certificate and the rest will receive participation certificate.

Figure 22(refer Appendix C) shows the function view that accept the parameter user id and certificate id. Some information that is needed in the certificate is saved in the variable to be passed in the fill pdf function. The pdf certificate template will be generated according to the user's place either they are winner or not. Then the pdf file will be saved in the storage folder and the path is saved in the database.

5.2 System Testing

5.2.1 Functional Testing

Table 6 shows the functional testing form that will be used by the system testers to test the system functionality. There are 12 categories but only 5 will be shown in this report. System testers will test the category according to the description and see if the system meet the expected results. They will mark the last column as pass or fail.

Table 6: Functional Test

Test Category	Description	Expected results	Result
1	Register account: I. Enter the name, email and password for the registration II. Redirected to the dashboard page	I. New user account	Pass
2	Login: I. Enter the login credentials that are email and password II. Redirected to the dashboard page	I. Able to access the registered account	Pass

Table 6: Cont.

Test Category	Description	Expected results	Result
3	Edit profile: I. Click on the user profile to view II. Click on the 'edit profile' button to update III. Update the phone number and address IV. Add a profile picture V. Click save	I. New profile updated	Pass
4	Create organization: I. Click 'Organizations' tab at the dashboard II. Click 'Create organization' button III. Fill in the mandatory information IV. Click 'Submit' button V. View the list of the user's organizations VI. Click the organization to view the details VII. Click edit button to edit the information	I. The new organization appeared in the list of the user's organizations	Pass
5	Create event: I. In an organization details page, view all the events that is under the organization II. Click 'Create event' button III. Fill in the mandatory information IV. Click 'Submit' button V. View the list of the organization's events VI. Click the event to view the details VII. Click edit button to edit the information	I. The new event appeared in the list of the organization's events	Pass

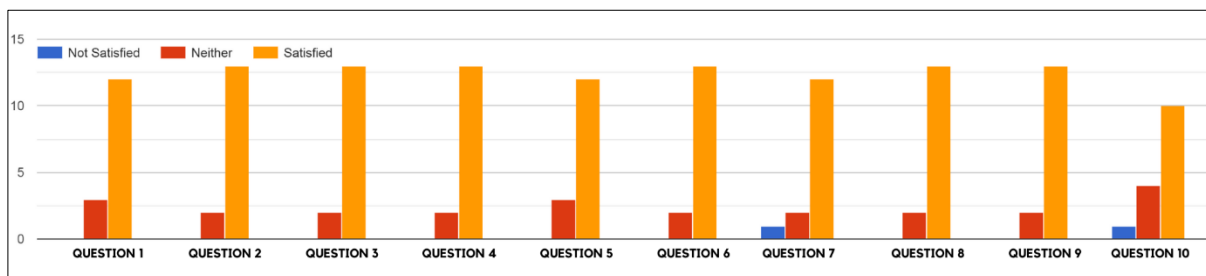
5.2.2 User Acceptance Testing

Table 7 shows the User Acceptance Test (UAT) form that has been used by the end-users to express their satisfaction upon the system. The UAT form consists of 10 questions and rated by either satisfied, neither and not satisfied.

Table 7: User Acceptance Test

o	Acceptance Requirement
1	The system interface is easy to understand
2	The flow of system is easy to navigate
3	The chosen font and color are suitable for the design
4	This system helps to ease to manage online competitions
5	This system is well structured
6	Is the design and layout of the system user friendly?
7	Does it have complete information?
8	Do you have the idea about the flow of the overall system?
9	Is the system layout suitable for this type of system?
10	Does the attached graphic help?

Figure 12 shows the bar charts of the overall result for the user acceptance test. There are fifteen respondents from University Malaysia Pahang students that have tested the system. Majority of the users are satisfied with the system according to each requirement. A small number of users are not quite sure of the choice. Only two out of three acceptance requirements have the vote for not satisfied. The first is about the incomplete information in the system and unhelpful graphics.

**Figure 12: User Testing Result**

6. Discussion and Conclusion

From this research, it is discovered that having an online management system to manage competitions gives positive impacts to the users. The users that are having different needs including participant and organizer can gain a lot of benefit for the time when they use the system. It encourages users to bring out their creativity and connection. In this paper, it has discussed the Competition Management System and its modules. Briefly, it stated the explanation about the system, the literature review that has been done and the system analysis and design.

Acknowledgment

This research was supported by Universiti Tun Hussein Onn Malaysia (UTHM) and MZR Global Sdn Bhd through SEPADAN RE-SIP Grant (Vot M079).

Appendix A

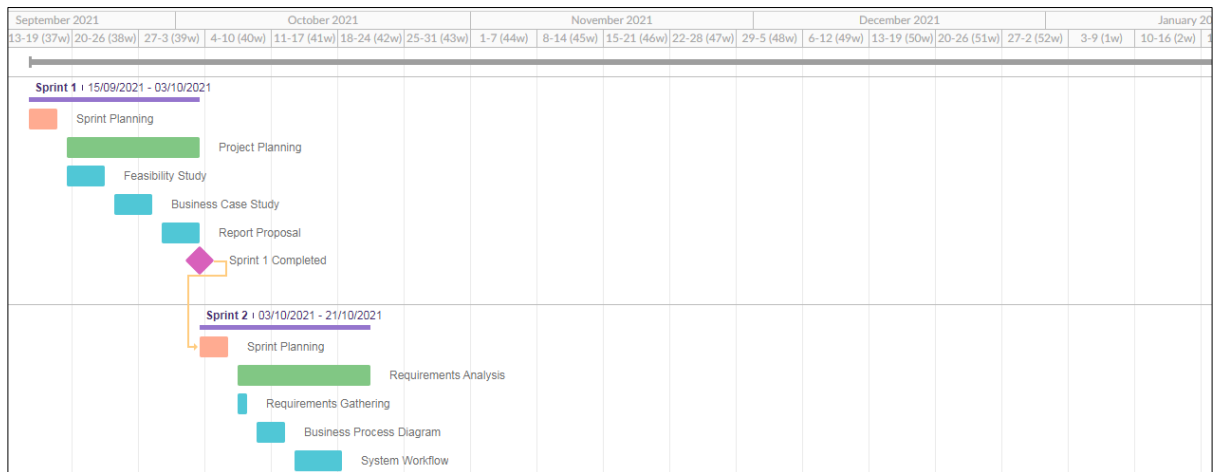


Figure 2: Gantt Chart for Sprint 1 and 2



Figure 3: Gantt Chart for Sprint 3

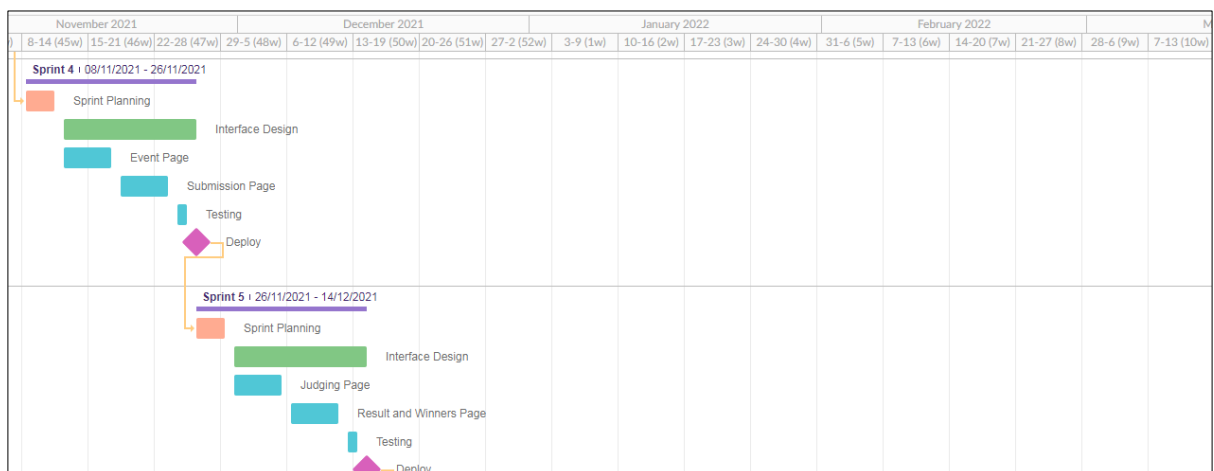


Figure 4: Gantt Chart for Sprint 4 and 5

Appendix B

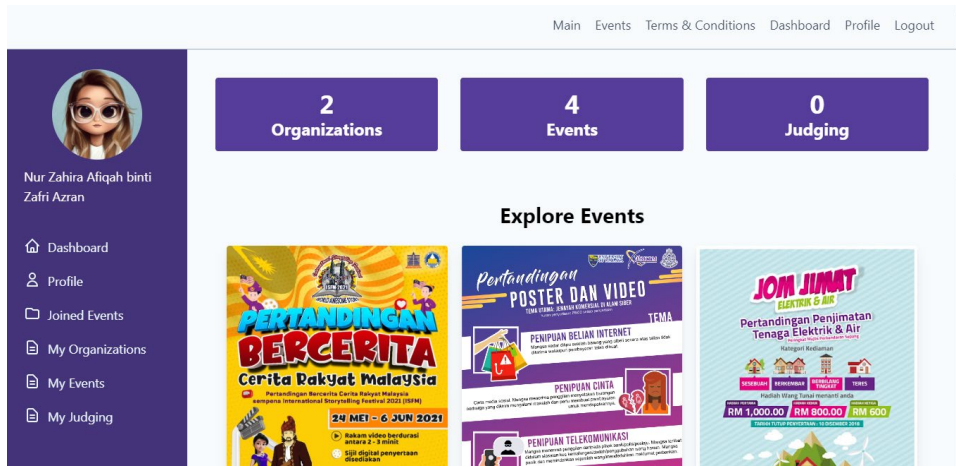


Figure 13: Dashboard Page Interface

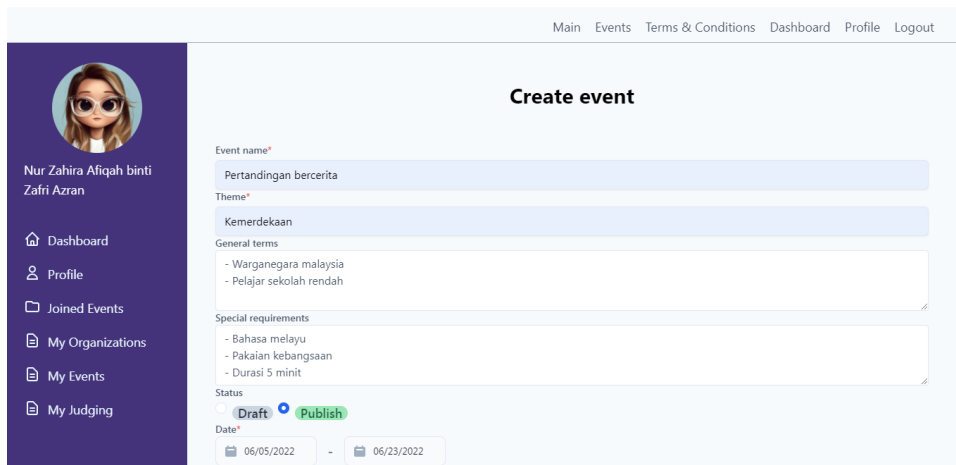


Figure 14: Create Event Page Interface

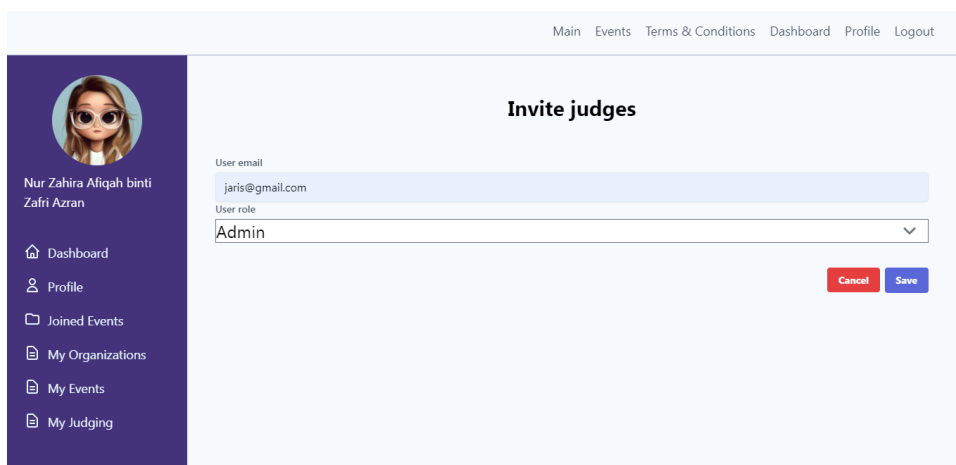
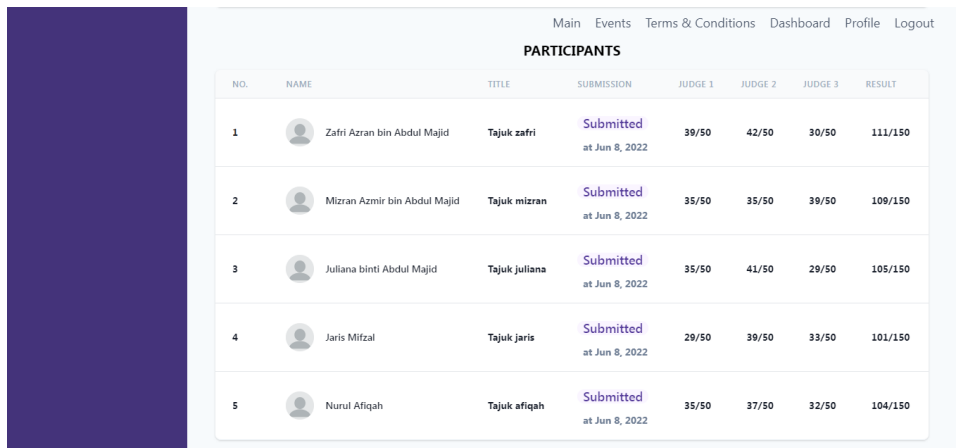


Figure 15: Invite Judge Page Interface



The screenshot shows a web interface with a dark purple sidebar on the left and a main content area. The main area has a navigation bar with links: Main, Events, Terms & Conditions, Dashboard, Profile, Logout. Below the navigation bar is a section titled "PARTICIPANTS" containing a table with the following data:

NO.	NAME	TITLE	SUBMISSION	JUDGE 1	JUDGE 2	JUDGE 3	RESULT
1	Zafri Azran bin Abdul Majid	Tajuk zafri	Submitted at Jun 8, 2022	39/50	42/50	30/50	111/150
2	Mizran Azmir bin Abdul Majid	Tajuk mizran	Submitted at Jun 8, 2022	35/50	35/50	39/50	109/150
3	Juliana binti Abdul Majid	Tajuk juliana	Submitted at Jun 8, 2022	35/50	41/50	29/50	105/150
4	Jaris Mifzal	Tajuk jaris	Submitted at Jun 8, 2022	29/50	39/50	33/50	101/150
5	Nurul Afiqah	Tajuk afiqah	Submitted at Jun 8, 2022	35/50	37/50	32/50	104/150

Figure 16: List Result for Admin Page Interface



Figure 17: View Certificate Page Interface

Appendix C

```

$displayevents = Event::where('status', '=', 'Publish')->get();
$displayevents_completed = Event::where('status', '=', 'Completed')->get();

$organization_owner = Organization::where('user_id', '=', auth()->user()->id)->count();
$organization_member = Organizermember::where('user_id', '=', auth()->user()->id)->count();
$organizations = $organization_owner + $organization_member;

$event1 = Event::where('user_id', '=', auth()->user()->id)->count();
$event2 = Judge::where('user_id', '=', auth()->user()->id)->where('judgesadmin', 'admin')->where('status', '1')->count();
$event3 = Judge::where('user_id', '=', auth()->user()->id)->where('judgesadmin', 'editor')->where('status', '1')->count();
$events = $event1 + $event2 + $event3;

$judging = Judge::where('user_id', '=', auth()->user()->id)->where('status', '=', '1')->where('judgesadmin', 'judges')->get();

$user = User::find(auth()->user()->id);

return view('dashboard2', [
    'displayevents' => $displayevents,
    'displayevents_completed' => $displayevents_completed,
    'events' => $events,
    'organizations' => $organizations,
    'judging' => $judging,
    'user' => $user]);

```

Figure 18: Dashboard Page Code

```

$organization = Organization::find($organization_id);

$event = $organization->events()->create([
    'organization_id' => $organization_id,
    'user_id' => auth()->user()->id,
    'name' => $data['name'],
    'theme' => $data['theme'],
    'generalterms' => $data['generalterms'],
    'specialrequirements' => $data['specialrequirements'],
    'status' => $data['status'],
    'from' => $date_from,
    'to' => $date_to,
    'poster' => $filename,
    'owner_id' => $organization->user->id,
]);

```

Figure 19: Create Event Page Code

```

$jjudge1 = Judge::where('judgenum', '1')->where('event_id', $event_id)->first();
$jjudge2 = Judge::where('judgenum', '2')->where('event_id', $event_id)->first();
$jjudge3 = Judge::where('judgenum', '3')->where('event_id', $event_id)->first();

if($jjudge1 == null){
    $jjudge = Judge::create([
        'user_id' => $userdata->id,
        'event_id' => $request->input('event_id'),
        'judgenum' => 1,
        'email' => $request->input('email'),
        'judgesadmin' => $request->input('judgesadmin'),
        'status' => 0
    ]);
}

```

Figure 20: Invite Judge Page Code

```

foreach ($request->moreFields as $key => $value) {

    if(Mark::where('user_id', $value['user_id'])
        ->where('criteria_id', $value['criteria_id'])
        ->where('event_id', $value['event_id'])
        ->where('judge_id', $value['judge_id'])
        ->exists())
    {
        alert()->error('Failed', 'You already evaluate the submission!');
        return redirect('/event/' . $event_id . '/participant/' . $participant_id);
    }
}

```

Figure 21: List Result for Admin Page Code

```
public function fillPDF($file,$outputfile,$nama,$event,$event_from,$event_to,$sign_organizer,$sign_bakatrakyat)
{
    $fpdi = new FPDF();
    $fpdi->setSourceFile($file);
    $template = $fpdi->importPage(1);
    $size = $fpdi->getTemplateSize($template);
    $fpdi->AddPage($size['orientation'],array($size['width'],$size['height']));
    $fpdi->useTemplate($template);
    $top = 58;
    $right = 18;
    $name = $nama;
    $fpdi->SetFont("helvetica", "",20);
    $fpdi->SetTextColor(25,26,25);
    $fpdi->Text($right,$top,$name);
    $fpdi->Text(18,85,$event);
    $fpdi->Text(18,111,$event_to);
    $fpdi->SetFont("times","I",20);
    $fpdi->Text(19,128,$sign_organizer);
    $fpdi->Text(79,128,$sign_bakatrakyat);

    return $fpdi->Output($outputfile,'F');
}
```

Figure 22: View Certificate Page Code

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